PALMDALE

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NOTICE OF INTENT TO ADOPT A MITIGATED NEGATIVE DECLARATION

Pursuant to Title 14 of the California Code of Regulations, Sections 15072 and 15073, as amended to date, this is to advise that the City of Palmdale, which is the lead agency overseeing this project, has completed a Mitigated Negative Declaration for the proposed project described below.

Project No.: General Plan Amendment 18-002, Zone Change 18-002 and Site Plan Review 18-005

Project Location: Approximately 5 acres located at the southeast corner of 42nd Street East and Avenue S in the R-1-7,000 zone (APNs 3052-001-071 and -072), City of Palmdale, County of Los Angeles.

Project Description: The proposed project involves the construction of 80 row townhomes. The proposed project includes a General Plan Amendment and Zone Change to allow construction of higher density residential facilities on-site.

Public Review Period: The Mitigated Negative Declaration is available for public review and comment pursuant to California Code of Regulations, Title 14, Sections 15072 and 15073 (California Environmental Quality Act). All comments must be submitted in writing to the address below. Please refer to this project by the project numbers listed above. If you have no comment, no reply is necessary. The City of Palmdale does not limit public comments to only the circulation period. Comments can be submitted for consideration up until final action is taken by a vote of the approving authority. The review period has not been shortened pursuant to Section 15105 of the California Environmental Quality Act Guidelines. The comment period during which the City will receive comments on the Mitigated Negative Declaration is:

Starting Date: May 4, 2020 **Ending Date: May 23, 2020**

Public Hearing: The City of Palmdale Planning Commission is scheduled to make a decision regarding this project and the associated Mitigated Negative Declaration on June 11, 2020, in the City Council Chambers at 38300 Sierra Highway, Palmdale, California, 93550 at 7:00 p.m.

Responses and Comments: Please send your written comments to:

Senior Planner Megan Taggart
City of Palmdale, Economic and Community Development Department
38250 Sierra Highway
Palmdale, California 93550
Phone (661) 267-5213, FAX (661) 267-5233
Email: mtaggart@cityofpalmdale.org

Document Availability: The environmental document is available on the City website at www.cityofpalmdale.org.

Carlene Saxton
Acting Planning Manager

4/28/2020
Date

CITY OF PALMDALE

General Plan Amendment 18-002, Zone Change 18-002 and Site Plan Review 18-005

INITIAL STUDY /
MITIGATED NEGATIVE DECLARATION

Prepared for:

City of Palmdale
38250 Sierra Highway
Palmdale, CA 93550

Prepared by:

Christopher Aune

April 2020

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Appendix B: Biological Resource Assessment
Appendix C: Geotechnical Investigation Report
Appendix D: Hydrology Study
Appendix E: Sewer Area Study
Appendix F: Acoustical Analysis

1. INTRODUCTION

A. Purpose and Background of the Initial Study

Pursuant to Section 15063 of the *California Environmental Quality Act (CEQA) Guidelines* (Title 14, California Code of Regulations, Section 15000 et seq.), this Initial Study (IS) is a preliminary environmental analysis that was prepared by Christopher Aune and is used by the lead agency (City of Palmdale) as a basis for determining whether an Environmental Impact Report (EIR), a Negative Declaration (ND), or a Mitigated Negative Declaration (MND) is required for the project. The *State* CEQA Guidelines require that an Initial Study contain a project description of environmental setting, identification of environmental effects by checklist or other similar form, explanation of environmental effects, discussion of mitigation for significant environmental effects, evaluation of the project's consistency with existing, applicable land use controls, and the name of persons who prepared the study. Based on the analysis contained in this Initial Study, it has been determined that the proposed project would not result in any significant impacts that cannot be mitigated to less than significant levels. Therefore, preparation of a Mitigated Negative Declaration is appropriate for the project.

B. Lead Agency
City of Palmdale
Economic and Community Development Department
Planning Division
38250 Sierra Highway
Palmdale, CA 93550

C. Technical Studies

- *Acoustical Analysis 5-Acre Multi-Family Residential Development City of Palmdale* by Christopher Jean & Associates, Inc. (February 19, 2018)
- *42nd Street East and East Avenue S Air Quality Study and Greenhouse Gas Study* by Rincon Consultants, Inc. (March 2018)
- *Biological Resource Assessment of APNs 3052-001-071 and 072 Palmdale, California* by Mark Hagan (February 8, 2018)
- *Geotechnical Investigation Report for Proposed Multi-Unit Residential Complex Palmdale, Los Angeles County California APN 3052-001-071 & 072* by Bruin Geotechnical Services, Inc. (March 22, 2018)
- *Hydrology Study, 42nd Street East & Avenue S Palmdale, California* by Duke Engineering (November 12, 2019)

- *Phase 1 Cultural Resource Investigation For a 5-Acre Property Southeast of the Intersection of 42nd Street East and Avenue S Palmdale, Los Angeles County, California* by RT Factfinder Cultural Resources (February 2018)
- *Sewer Area Study, 42nd Street East and Avenue S, Palmdale, California* by Duke Engineering (November 12, 2019)

2. PROJECT DESCRIPTION

A. Project Location

Approximately 5 acres located at the southeast corner of 42nd Street East and Avenue S in the R-1-7,000 (Single-family Residential, minimum lot size of 7,000 square feet) zone (APN's: 3052-001-071 and -072).

B. Project Setting

The site is relatively flat and is significantly devoid of vegetation due to previous disturbance. The project site is surrounded by vacant land on the north, east, and west. Existing single-family homes are located south of the project site, south of Sorrell Avenue (see Figure 1). Land uses surrounding the proposed project site include SFR-3 (Single Family Residential, 3.1 to 6 dwelling units per acre) to the east, west and south. To the north, across Avenue S, land uses are SFR-3 (Single Family Residential, 3.1 to 6 dwelling units per acre) and NC (Neighborhood Commercial). Zoning surrounding the proposed project site is R-1-7,000 (Single-family Residential, minimum 7,000 square foot lot size) to the east, west and south. To the north, across Avenue S, zoning is R-1-7,000 (Single-family Residential, minimum 7,000 square foot lot size) and C-1 (Light Commercial).

C. Project Components

The project would involve the construction of 80 townhouses on approximately 5 acres.

The applicant has requested to amend the General Plan land use designation of the project site from SFR-3 (Single Family Residential, 3.1 to 6 dwelling units per acre) to MFR (Multi-family Residential, 10.1 to 16 dwelling units per acre; see Figures 2 and 4), and to change the zoning of the project site from R-1-7,000 (Single Family Residential, minimum lot size 7,000 square feet) to R-3 (Multiple Residential; see Figures 3 and 5). These changes would allow the proposed use with a Site Plan Review (SPR) request.

D. Regulatory Requirements, Permits, and Approvals

To implement the proposed project, the following agreements, permits and approvals are anticipated:

- General Plan Amendment
- Zone Change
- Site Plan Review
- Building Permits
- Grading Permit
- Air Quality Permits
- SWPPP General Permit
- Encroachment Permit

Figure 1
Aerial Map

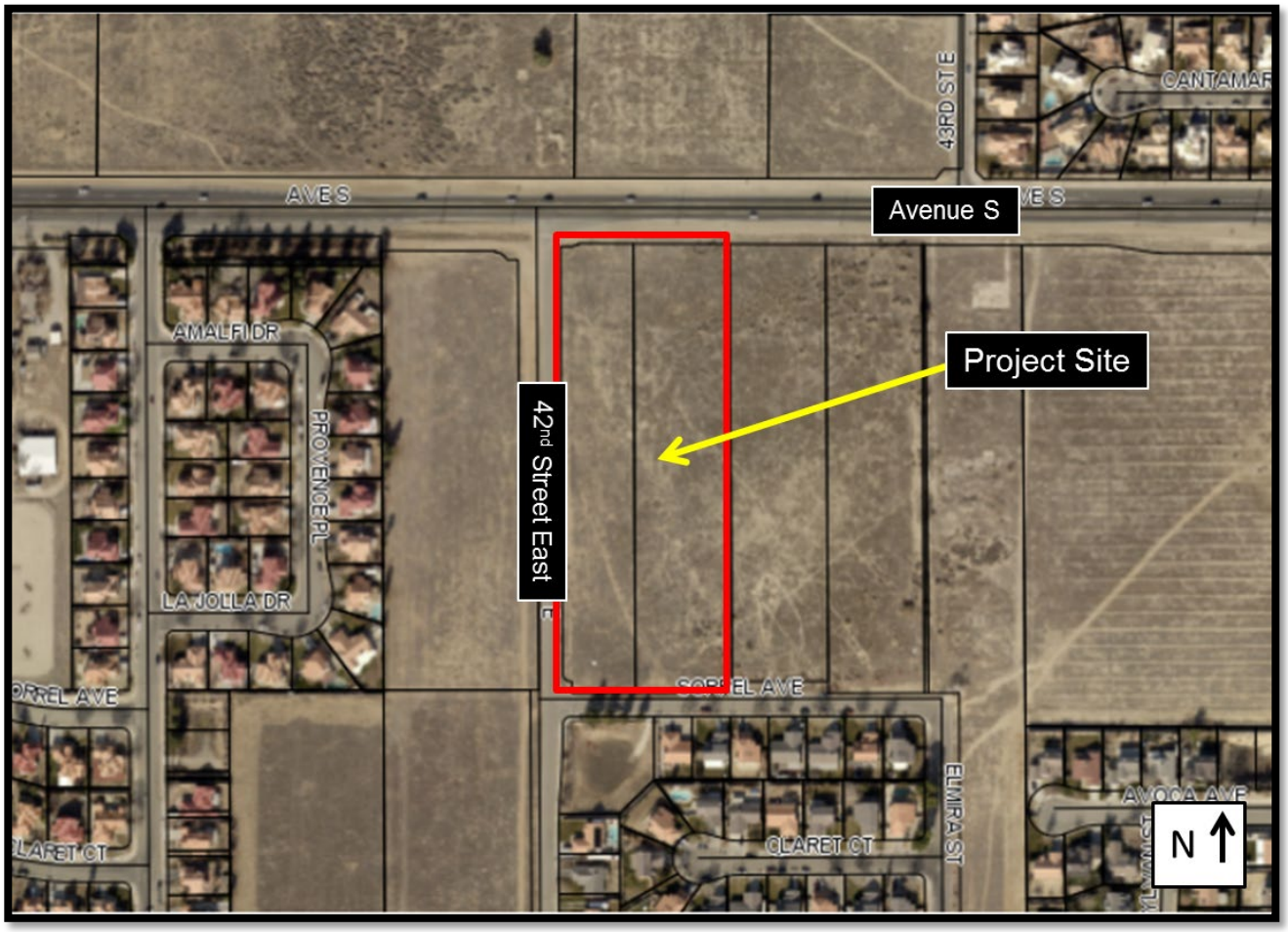


Figure 2
Existing Land Use Designation

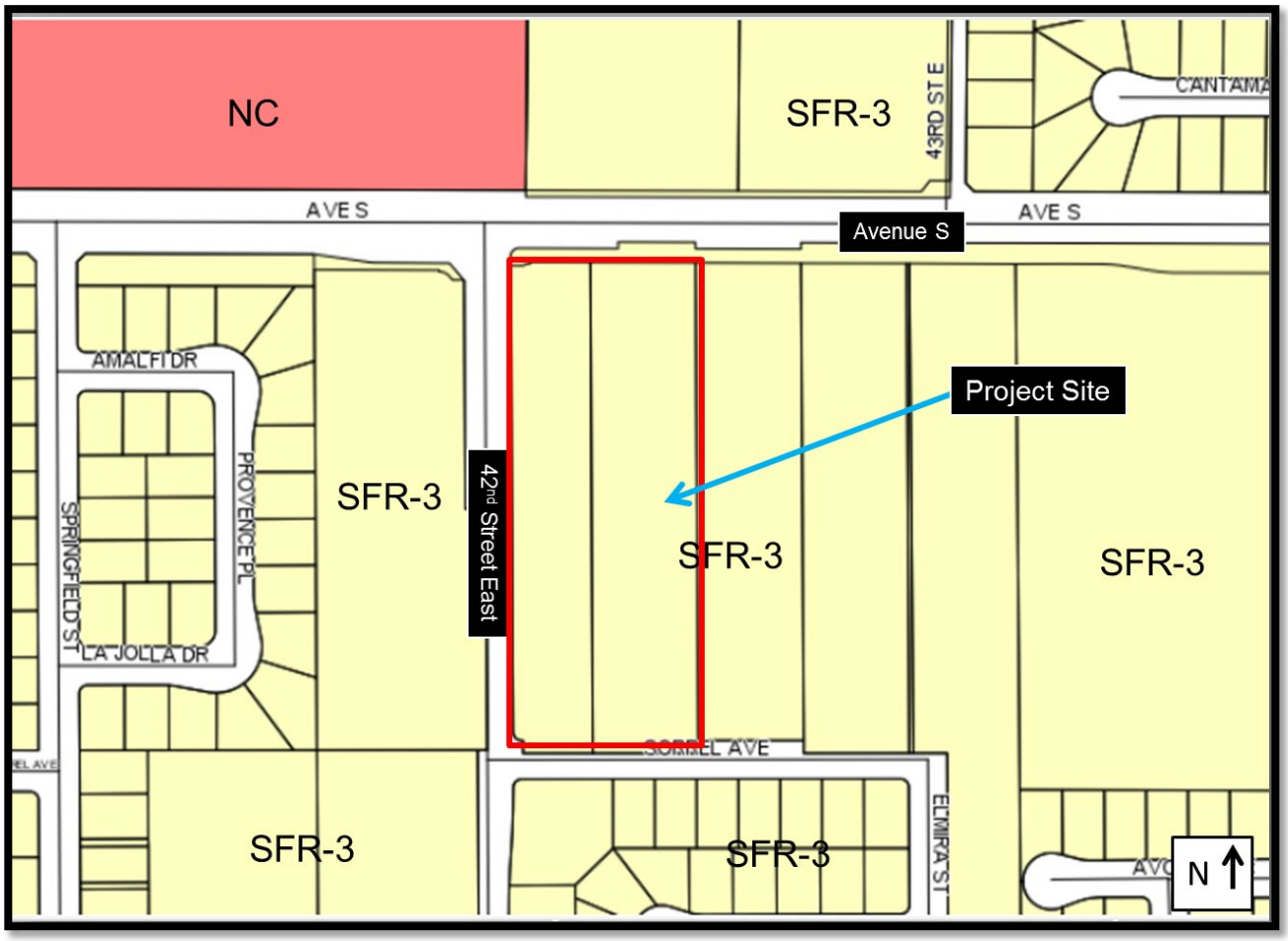


Figure 3
Existing Zoning

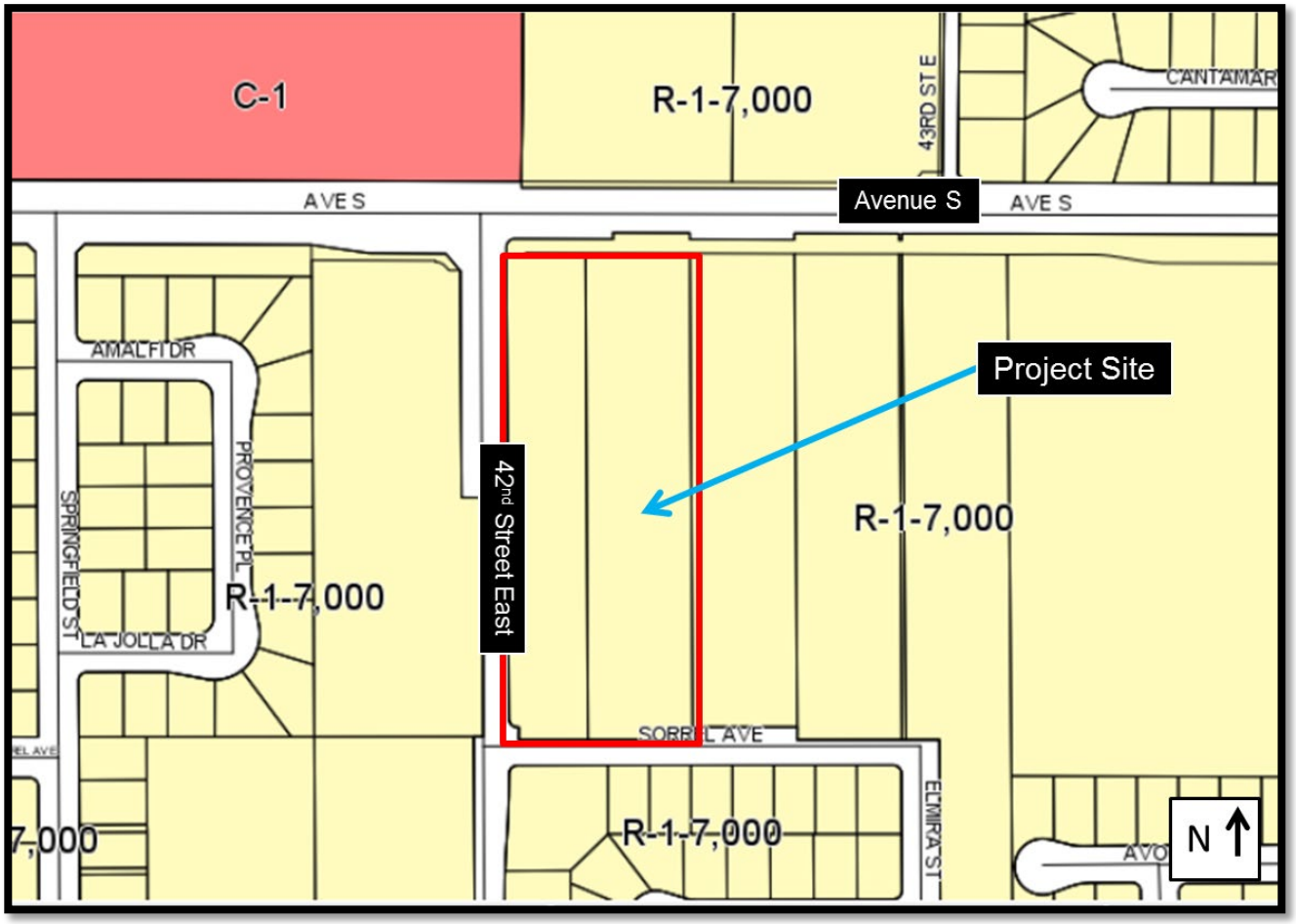


Figure 4
Proposed Land Use Designation

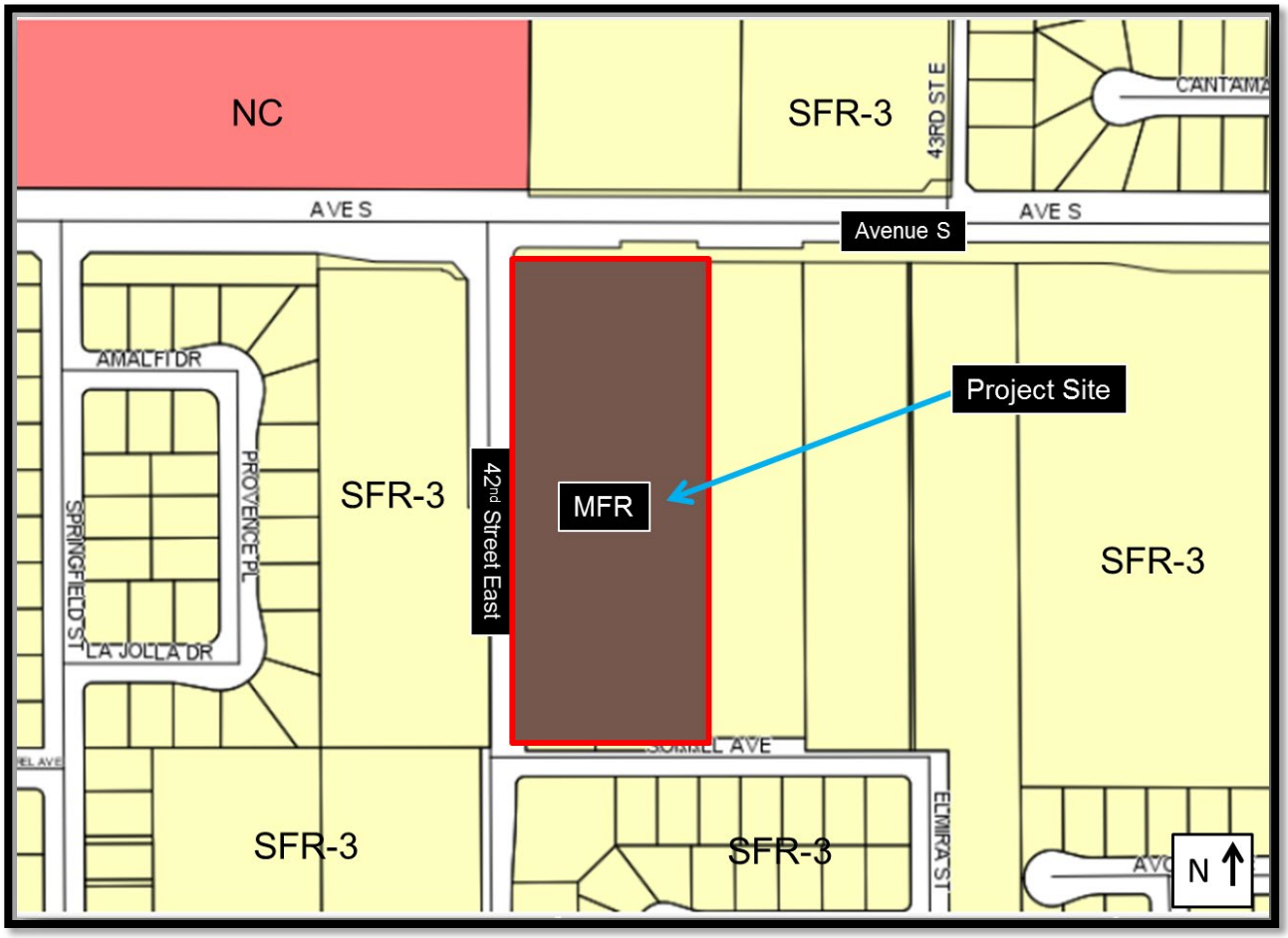


Figure 5
Proposed Zone

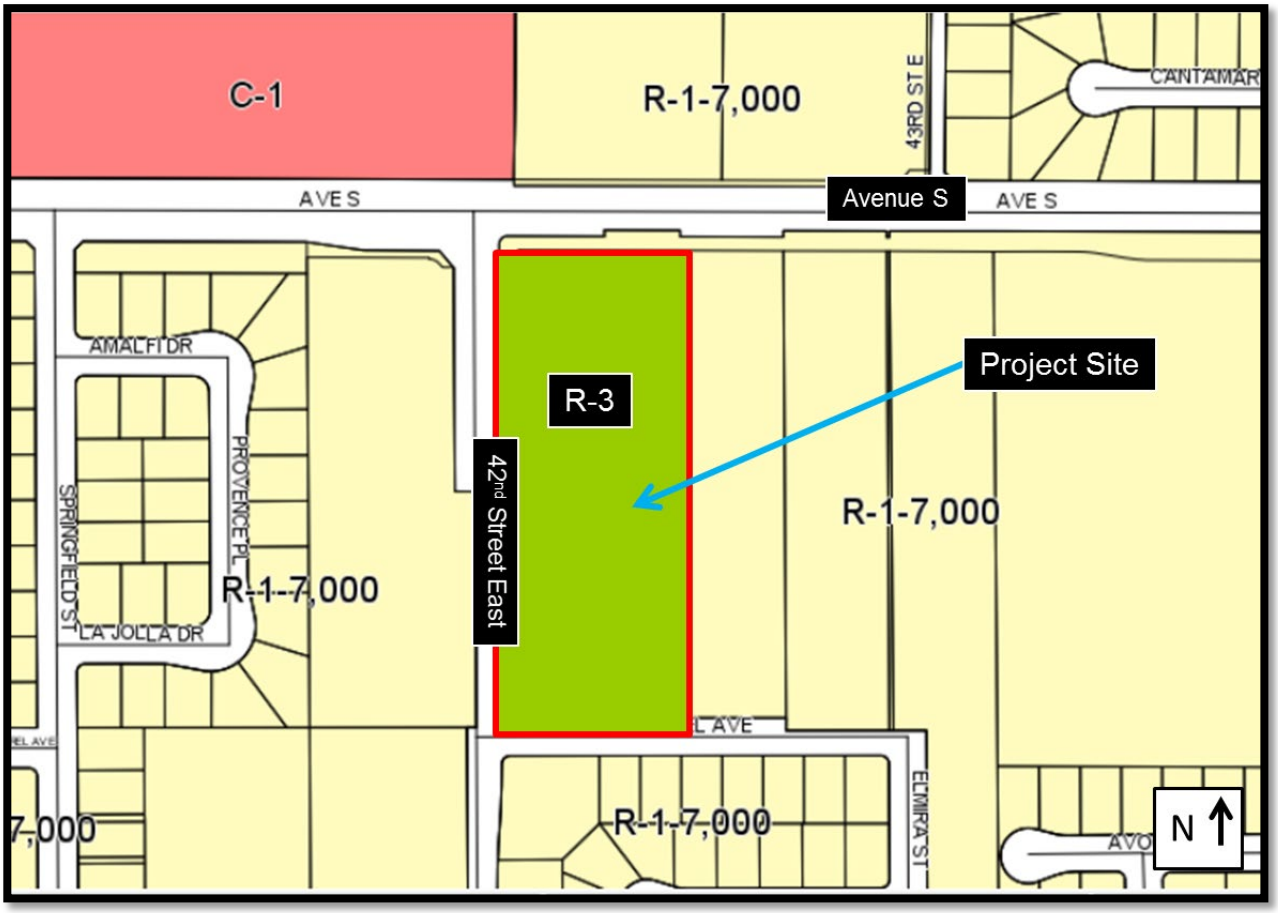
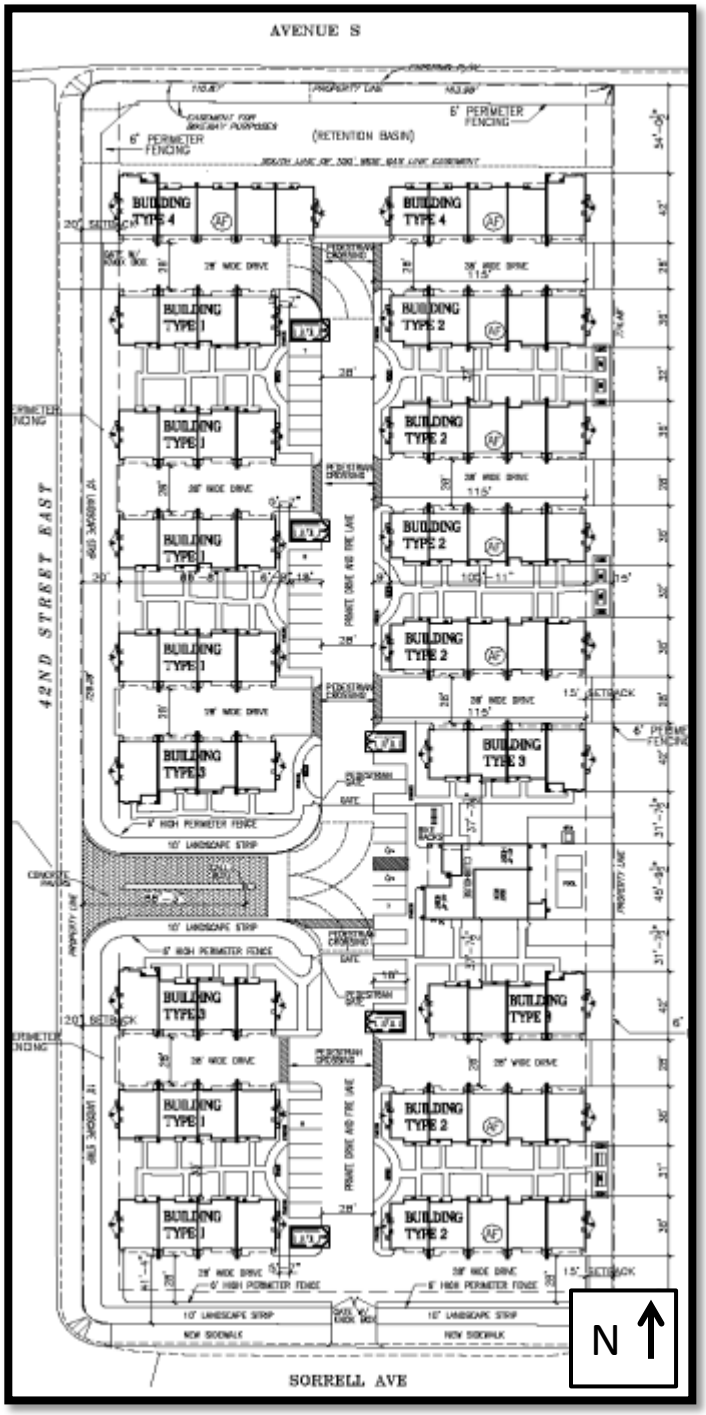


Figure 6
Conceptual Site Plan



3. ENVIRONMENTAL CHECKLIST

A. Background

1. Project Title:

General Plan Amendment 18-002, Zone Change 18-002 and Site Plan Review 18-005

2. Lead Agency Name and Address:

City of Palmdale
Economic and Community Development Department
Planning Division
38250 Sierra Highway
Palmdale, CA 93550

3. Contact Person and Phone Number:

Senior Planner Megan Taggart
City of Palmdale
Economic and Community Development Department
Planning Division
38250 Sierra Highway
Palmdale, CA 93550
(661) 267-5213

4. Project Location:

The Project Site consists of approximately 5 acres located at the southeast corner of Avenue S and 42nd Street East (APN's 3052-001-071 and -072).

5. Project Applicant's Name and Address:

Phillip Terry
1666 McCadden Place
Hollywood, CA 90028

6. Existing Land Use / Zoning / General Plan:

	SURROUNDING LAND USE	ZONING	GENERAL PLAN
SITE	Vacant	R-1-7,000 (single-family residential, minimum 7,000 square foot lot size)	SFR-3 (single-family residential, 3.1-6 dwelling units per acre)
NORTH	Vacant land, across Avenue S	R-1-7,000 (single-family residential, minimum 7,000 square foot lot size) / C-1 (Light Commercial)	SFR-3 (single-family residential, 3.1-6 dwelling units per acre) / NC (Neighborhood Commercial)
SOUTH	Single-family Residences, across Sorrel Avenue	R-1-7,000 (single-family residential, minimum 7,000 square foot lot size)	SFR-3 (single-family residential, 3.1-6 dwelling units per acre)
EAST	Vacant land	R-1-7,000 (single-family residential, minimum 7,000 square foot lot size)	SFR-3 (single-family residential, 3.1-6 dwelling units per acre)
WEST	Vacant land, across 42nd Street East	R-1-7,000 (single-family residential, minimum 7,000 square foot lot size)	SFR-3 (single-family residential, 3.1-6 dwelling units per acre)

7. Description of Project:

The proposed project is located on a vacant parcel at the southeast corner of Avenue S and 42nd Street East in the City of Palmdale. The proposed project involves the construction of a row townhouse community consisting of 80 units. The proposed project includes a General Plan Amendment and Zone Change to allow construction of higher density residential uses on-site.

B. Environmental Factors Potentially Affected

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a “Potentially Significant Impact”, as indicated by the checklist on the following pages. Potentially significant impacts that are mitigated to “Less Than Significant” are not shown here.

☐	Aesthetics	☐	Agriculture and Forestry Resources	☐	Air Quality
☒	Biological Resources	☒	Cultural Resources	☐	Energy
☐	Geology / Soils	☐	Greenhouse Gas Emissions	☐	Hazards and Hazardous Materials
☐	Hydrology / Water Quality	☐	Land Use / Planning	☐	Mineral Resources
☒	Noise	☐	Population / Housing	☐	Public Services
☐	Recreation	☐	Transportation	☐	Tribal Cultural Resources
☐	Utilities / Service Systems	☐	Wildfire	☐	Mandatory Findings of Significance

C. Determination

On the basis of this initial evaluation: (Select one)

☐ I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

☒ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because the mitigation measures described on an attached sheet have been added to the project. A MITIGATED NEGATIVE DECLARATION will be prepared.

☐ I find that the proposed project MAY have a significant effect on the environment, and ENVIRONMENTAL IMPACT REPORT is required.

☐ I find that the proposed project MAY have a significant effect(s) on the environment, but at least one effect: 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards; and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets, if the effect is a "potentially significant impact" or "potentially significant unless mitigated". An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the proposed project could have a significant effect on the environment, there WILL NOT be a significant effect in this case because all potentially significant effects (a) have been analyzed adequately in an earlier EIR pursuant to applicable standards and (b) have been avoided or mitigated pursuant to that earlier EIR, including revisions or mitigation measures that are imposed upon the proposed project.

4/28/2020
Date

Carlene Saxton
Acting Planning Manager

D. Evaluation of Environmental Impacts

Each of the responses in the following environmental checklist considers the whole action involved, including project-level, cumulative, on-site, off-site, indirect, construction, and operational impacts. A brief explanation is provided for all answers and supported by the information sources cited.

1. A “No Impact” answer is adequately supported if the referenced information sources show that the impact simply does not apply to projects like the one involved (e.g., the project falls outside a fault rupture zone).

2. A “Less Than Significant Impact” applies when the proposed project would not result in a substantial and adverse change in the environment. This impact level does not require mitigation measures.

3. A “Less Than Significant Impact With Mitigation Incorporated” applies when the proposed project would not result in a substantial and adverse change in the environment after additional mitigation measures are applied.

4. “Potentially Significant Impact” is appropriate if there is substantial evidence that an effect is significant. If there are one or more “Potentially Significant” entries when the determination is made, an EIR is required.

4. ENVIRONMENTAL ANALYSIS

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
I *AESTHETICS*. Would the Project:				
a) Have a substantial adverse effect on a scenic vista?	☐	☐	☐	☒
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☐	☒
c) In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?	☐	☐	☒	☐
d) Create a new source of substantial light or glare that would adversely affect day or nighttime views in the area?	☐	☐	☒	☐

Project Impacts and Mitigation Measures

a) **No Impact.** The City of Palmdale has identified scenic vistas, areas, and view corridors in the General Plan Community Design Element and Environmental Resources Element. The General Plan identifies the following Scenic Routes: Barrel Springs Road, Tierra Subida Avenue, Sierra Highway south of Avenue S, Elizabeth Lake Road, Pearblossom Highway, Bouquet Canyon Road, Godde Hill Road, and the Antelope Valley Freeway south of Rayburn Road. The proposed project location has not been identified as a scenic vista, view corridor and is not adjacent to a scenic highway as identified by the City of Palmdale General Plan. Views of the open mountains surrounding the Antelope Valley are available from the Project Site and roadways. However, with implementation of the proposed project, these views would not change and would continue to be available from the roadways and Project Site. Therefore, no impacts would occur.

Mitigation Measures: No mitigation measures are necessary.

b) **No Impact.** Currently, no officially designated or eligible state scenic highways are near the Proposed Project Site. The nearest designated or eligible state scenic

highway is Highway 2, approximately 15 miles southwest of the Proposed Project Site (Caltrans 2011). In addition, the Project Site does not contain any rock outcroppings, trees or buildings (historic or otherwise). Therefore, no impacts would occur.

Mitigation Measures: No mitigation measures are necessary.

c) **Less than Significant Impact.** The General Plan land use designation of the Proposed Project Site is SFR-3 (single-family residential, 3.1-6 dwelling units per acre) and the site is zoned R-1-7,000 (single-family residential, minimum 7,000 square foot lot size). Land uses surrounding the proposed project site include SFR-3 (Single Family Residential, 3.1 to 6 dwelling units per acre) to the east, west and south. To the north, across Avenue S, land uses are SFR-3 (Single Family Residential, 3.1 to 6 dwelling units per acre) and NC (Neighborhood Commercial). Zoning surrounding the proposed project site is R-1-7,000 (Single-family Residential, minimum 7,000 square foot lot size) to the east, west and south. To the north, across Avenue S, zoning is R-1-7,000 (Single-family Residential, minimum 7,000 square foot lot size) and C-1 (Light Commercial). The proposed project will include a General Plan Amendment, Zone Change and Site Plan Review for the construction of 80 townhomes.

The construction of the proposed project would replace the vacant and disturbed site and would utilize building materials that would complement the aesthetics of the existing residences in the surrounding area. Additionally, the proposed project would comply with Palmdale Municipal Code (PMC) Sections 17.86.010 and 17.87.050.H.2, which will require landscaping associated with the proposed project to maximize the aesthetic quality on site.

While the proposed project would result in visual impacts during construction such as the presence of equipment, vehicles, construction fencing, signage, and lighting, these impacts would be short term in nature and limited to the construction phase only. Once fully built, the proposed project would result in a permanent impact to the visual character of the proposed project area with the presence of townhomes with a maximum height of 38 feet. In addition, the proposed project would include construction Best Management Practices (BMPs) including but not limited to proper storage of equipment, project site maintenance and clean up, dust control measures, and limiting hours of construction within the hours mandated by PMC Section 8.28.030 (i.e. 6:30 am to 8 pm Monday through Saturday) in order to minimize any impacts regarding the visual character of the area.

Permanent impacts would include the presence of a new development on a currently vacant site. The proposed project is located within an area containing residential uses

and vacant, undeveloped land. The proposed use of the site would be consistent with the General Plan with the approval of the proposed General Plan Amendment and the building height will be compatible with heights allowed within the surrounding area. Therefore, implementation of the proposed project would result in a less than significant impact associated with visual character and scenic quality.

Mitigation Measures: No mitigation measures are necessary.

d) **Less than Significant Impact**. The proposed project will include temporary and permanent lighting. During construction, the proposed project will include temporary construction lighting for areas requiring additional lighting such as confined spaces, and any digging. The proposed project will limit construction hours as specified within PMC Section 8.28.030 to between the hours of 6:30 AM to 8:00 PM, Monday through Saturday. Other additional lighting sources would come from vehicles and other large operating equipment. Once operational, permanent lighting sources will be from outdoor lighting necessary to ensure safety and vehicle lights.

Lighting associated with the proposed project will be required to comply with PMC Section 17.86.030, which requires illumination levels consistent with the character and use of surrounding development; excessive illumination will not be allowed. Additionally, exterior lighting would be required to be located and designed to minimize glare beyond the proposed project site; glare onto adjacent properties will be minimized by using downcast, cut-off type fixtures, as necessary, that are shielded and would direct the light toward specific areas requiring illumination. For areas that are located nearby residences, the lowest allowable lighting levels will be used. Therefore, implementation of the proposed project would result in a less than significant impact associated with light or glare.

Mitigation Measures: No mitigation measures are necessary.

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
II. *AGRICULTURE AND FORESTRY RESOURCES.* In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997), prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland. Would the Project:				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to nonagricultural use?	☐	☐	☐	☒
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☒
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	☐	☐	☐	☒
d) Result in the loss of forestland or conversion of forestland to non-forest use?	☐	☐	☐	☒
e) Involve other changes in the existing environment, which due to their location or nature, could result in conversion of Farmland to nonagricultural use or conversion of forestland to non-forest use?	☐	☐	☐	☒

Project Impacts and Mitigation Measures

a) **No impact**. The California Department of Conservation, Division of Land Resource Protection, Farmland Mapping and Monitoring Program (FMMP), tracks and categorizes land with respect to agricultural resources. Land is designated as one of the following and each has a specific definition: Prime Farmland, Farmland of Statewide Importance, Unique Farmland, Farmland of Local Importance, Grazing Land, Urban and Built-Up Land, and Other Land.

According to the Los Angeles County Farmland Map, which was last updated in 2016, the project site is designated as “Other Land”. This designation is defined as “land not included in any other mapping category, common examples include low density rural developments, brush, timber, wetland, and riparian areas not suitable for livestock grazing, confined livestock, poultry, or aquaculture facilities, strip mines, borrow pits, and water bodies smaller than 40 acres. Vacant and nonagricultural

land surrounded on all sides by urban development and greater than 40 acres is mapped as other land. The proposed project would not convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to a non-agricultural use. Therefore, no impact would occur.

Mitigation Measures: No mitigation measures are necessary.

b-e) **No Impact.** Although the project includes a Zone Change, the project site is currently within the single-family residential zone (minimum lot sizes of 7,000 square feet), which does not allow agricultural related uses. The proposed zone would also not allow agricultural related uses. No agricultural uses are present on the subject property or within the vicinity. The proposed project would not impact any agricultural uses. Additionally, neither the project site nor property in the vicinity of the project site is under a Williamson Act contract. Therefore, no impact would occur.

In addition, there are no forests or timberlands located within the City of Palmdale. Therefore, the proposed project would not result in the rezoning of forest or timberland and would not cause the loss of forest land or the conversion of forest land to non-forest land. Therefore, no impact would occur.

Mitigation Measures: No mitigation measures are necessary.

		Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
III.	AIR QUALITY. Where available, the significance criteria established by the applicable air quality management district or air pollution control district may be relied upon to make the following determinations. Would the Project:				
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 non-attainment under an applicable federal or state ambient air quality standard?	☐	☐	☒	☐
c)	Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☒	☐
d)	Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	☐	☐	☒	☐

Project Impacts and Mitigation Measures

a) **Less than Significant Impact**. An Air Quality Study and Greenhouse Gas Study

were completed for the Project Site by Rincon Consultants, Inc., dated March 2018 (Appendix A). Implementation of the proposed project would result in the construction of 18, three-story buildings, for a total of 80 units.

The City of Palmdale is located within the Antelope Valley Air Quality Management District (AVAQMD). National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS) have been established for the following criteria pollutants: carbon monoxide (CO), ozone (O_3), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), inhalable particulate matter (PM_{10}), fine particulate matter ($PM_{2.5}$), and lead. The CAAQS also set standards for sulfates, hydrogen sulfide, and visibility.

Sources of Emissions

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

Construction Impacts

Table 1 summarizes maximum daily emissions of pollutants associated with buildout of the proposed project. Maximum daily estimates account for compliance with AVAQMD requirements, but do not include any additional mitigation. Emissions of CO, PM_{10}, $PM_{2.5}$, NO_X, and ROG would not exceed AVAQMD regional thresholds, assuming adherence to the conditions listed above required by AVAQMD Rule 403 and Rule 1113.

Operational Air Pollutant Emissions

Table 2 summarizes estimated emissions associated with operation of the proposed project. The majority of project-related operational emissions would be due to vehicle trips to and from the site. Emissions would not exceed AVAQMD thresholds for any criteria pollutant.

Table 1: Construction Emissions

Construction Year	Maximum Emissions (tons per year)					
	ROG	NO_X	SO_X	CO	PM_{10}	$PM_{2.5}$
2021 Construction	0.5	3.0	< 0.1	2.5	0.3	0.2
2022 Construction	0.1	0.4	< 0.1	0.4	< 0.1	< 0.1
Maximum tons per year	0.5	3.0	< 0.1	**2.5**	0.3	0.2
AVQMD Thresholds	25	25	25	100	15	12
Threshold Exceeded?	**No**	**No**	**No**	**No**	**No**	**No**

Notes: All calculations were made using CalEEMod. See Appendix A for calculations. Site Preparation, Grading, Paving, Building Construction, and Architectural Coating totals include worker trips, soil export hauling trips, construction vehicle emissions and fugitive dust. Emission data is pulled from "mitigated" results that include compliance with regulations and project design features that will be included in the project.

1 Grading phases incorporate anticipated emissions reductions, which are required by AVAQMD Rule 403 to reduce fugitive dust. The architectural coating phases incorporate anticipated emissions reductions, which are required by Rule 1113.

Table 2: Estimated Operational Emissions

Emission Source	Estimated Emissions (tons/year)					
	ROG	NO_X	SO_X	CO	PM_{10}	$PM_{2.5}$
Area	0.3	< 0.1	< 0.1	0.4	< 0.1	< 0.1
Energy	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Mobile	0.1	0.5	< 0.1	1.2	0.3	0.1
Project Total	0.4	0.5	< 0.1	1.7	0.3	0.1
AVQMD Thresholds	25	25	25	100	15	12
Threshold Exceeded?	**No**	**No**	**No**	**No**	**No**	**No**

See Appendix A for CalEEMod computer model output. Note: Numbers may not add due to rounding.

Based on the Air Quality Study, the proposed project is not anticipated to conflict or obstruct with implementation of an applicable air quality plan. As shown in Table 1 above, the estimated annual and daily emissions of construction and total operational emissions are below the applicable thresholds. While the proposed project would involve the use of equipment during construction, the results from the Air Quality Study indicated that emissions will be below the AVAQMD Significant Emissions Thresholds (Appendix A). As required by Section 8.04 of the PMC, the proposed project would implement fugitive dust control measures. These measures include, but are not limited to, suspending grading operations, application of water and/or chemical stabilizers, temporary coverings, installation of silt fencing, or the establishment of vegetative ground cover (PMC 2019). In addition, the Conditions of Approval for the project will require compliance with AVAQMD Rule 403, which will require minimization of site disturbance as feasible, treatment of graded and excavated materials, ensuring that all soil is stabilized, avoiding grading activities

during wind advisory days, and sweeping streets. Compliance with these measures and applicable regulations of the California Air Resources Board (CARB) and AVAQMD would minimize potential air quality impacts. Impacts would be less than significant.

Mitigation Measures: No mitigation measures are necessary.

b) **Less than Significant Impact.** The activities required to construct the proposed project will generate emissions associated with construction vehicles and equipment, grading, paving of roadways, etc. Project-related emissions were calculated using the CalEEMoD. The calculations shown in Table 1 demonstrate emissions from construction and operation of criteria pollutants for each construction year. These emissions are not anticipated to exceed the construction emission thresholds established by the AVAQMD. Additionally, all work would comply with the AVAQMD's rules and regulations, particularly those pertaining to construction equipment and dust control (such as Rule 403).

The proposed project, in conjunction with other development as allowed by the General Plan, would result in a cumulative increase in pollutants. However, since the emissions associated with the construction and operation of the proposed project does not exceed any established thresholds; the contribution would not be cumulatively considerable. Therefore, impacts would be less than significant.

Mitigation Measures: No mitigation measures are necessary.

c) **Less than Significant Impact**. According to the AVAQMD, CEQA, and Federal Conformity Guidelines, residences, schools, daycare centers, playgrounds and medical facilities are considered sensitive receptor land uses. The following project types proposed for sites within the specified distance to an existing or planned (zoned) sensitive receptor land use must be evaluated:

- Any industrial project within 1,000 feet
- A distribution center (40 or more trucks per day) within 1,000 feet
- A major transportation project (50,000 or more vehicles per day) within 1,000 feet
- A dry cleaner using perchloroethylene within 500 feet
- A gasoline dispensing facility within 300 feet

According to the Air Quality Study, the proposed project is not considered one of the project types that the AVAQMD CEQA Guidelines require to be evaluated for potentially exposing sensitive receptors to substantial pollutant concentrations. As

such, toxic air contaminates emissions were not calculated, and the proposed project was not evaluated for potential health risks to sensitive receptors (Appendix A). The proposed project would serve as a residential development and would not include activities that would generate substantial pollutant concentrations. Impacts would be less than significant.

Mitigation Measures: No mitigation measures are necessary.

d) **Less than Significant Impact.** Construction-related sources of odors will come from construction equipment ranging from exhaust fumes to grease and oils. Impacts from construction-generated odors can be dependent upon the source, frequency of the generation of the odor, intensity, wind direction, and receptor sensitivity. The impacts from odors would be temporary and will occur only during construction. The short-term odors that would be generated by the equipment would dissipate. Additionally, the Proposed Project would comply with AVAQMD Rule 403 to control fugitive dust emissions.

During proposed project operations, outside of normal maintenance equipment, no anticipated uses of materials would result in substantial emissions of odors and dust. Therefore, impacts would be less than significant.

Mitigation Measures: No mitigation measures are necessary.

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
IV. BIOLOGICAL RESOURCES. Would the Project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	☐	☒	☐	☐
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies or regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	☐	☐	☐	☒
c) Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☐	☒

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nesting sites?	☐	☐	☒	☐
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☐	☒
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☒	☐

Project Impacts and Mitigation Measures

a) **Less than Significant Impact with Mitigation Incorporated**. A Biological Resource Assessment was completed for the Project Site by Mark Hagan, Wildlife Biologist, dated February 8, 2018 (Appendix B). The survey indicates that the Project Site was characteristic of a highly disturbed field. No desert tortoises (*Gopherus agassizii*) or their sign were observed. No burrowing owls (*Athene cunicularia*) or their sign were observed. California ground squirrel (*Citellus beecheyi*) burrows were observed within the study site. California ground squirrel burrows provide future potential cover sites for burrowing owls. The vegetation within the study site does not provide potential nesting sites for migratory birds. The proposed project area is located within the geographic range of the Mohave ground squirrel (*Spermophilus mohavensis*). However, the study area did not appear suitable to support Mohave ground squirrels and, therefore, Mohave ground squirrels are not expected to be present.

Although the project site does not currently contain any active burrowing owl burrows, construction disturbances during the nesting season (February to July) has the potential to impact nesting burrowing owls. As such, the following mitigation measures are required to reduce potential impacts to below a significant level.

Mitigation Measures:

BIO-1: A pre-construction presence/absence survey for burrowing owl shall be conducted within 30 days prior to any on-site ground disturbing activity. The survey shall be conducted pursuant to the recommendations and guidelines established by the California Department of Fish and Wildlife (CDFW). In the event these species

are not identified within the project limits, no further mitigation is required. If, during the pre-construction survey, the burrowing owl is found to occupy the site, Mitigation Measure **BIO-2** shall be required.

BIO-2: If burrowing owls are identified during the survey period, the City shall require the project applicant to take the following actions to offset impacts prior to ground disturbance:

Active nests within the areas scheduled for disturbance or degradation shall be avoided from February 1 through September 15, and a minimum 250-foot buffer shall be provided until fledging has occurred. Following fledging, owls may be passively relocated by a qualified biologist. If impacts on occupied burrows in the non-nesting period are unavoidable, on-site passive relocation techniques may be used if approved by the CDFW to encourage owls to move to alternate burrows outside of the impact areas.

If relocation of the owls is approved for the site by the CDFW, the City shall require the developer to hire a qualified biologist to prepare a plan for relocating the owls to a suitable site. The relocation plan shall include all of the following:

- The location of the nest and owls proposed for relocation;
- The location of the proposed relocation site;
- The number of owls involved and the time of year when the relocation is proposed to take place;
- The name and credentials of the biologist who will be retained to supervise the relocation;
- The proposed method of capture and transport for the owls to the new site;
- A description of site preparation at the relocation site (e.g., enhancement of existing burrows, creation of artificial burrows, one-time or long-term vegetation control); and,
- A description of efforts and funding support proposed to monitor the relocation.

b) **No Impact**. The proposed project does not contain any wetlands, desert washes, or riparian habitats. There were no blue line streams documented on the USGS Quadrangle for the proposed project area. No ephemeral washes were observed. There were no identified sensitive natural communities within the proposed project area. The vegetation within the site does not provides potential nesting sites for migratory birds and there were no sensitive plant species that were observed within the proposed project area. Therefore, impacts would be less than significant.

Mitigation Measures: No mitigation measures are necessary.

c) **No Impact**. As previously discussed in Section IV response (b), the proposed project area does not contain any wetlands. No impact would occur.

Mitigation Measures: No mitigation measures are necessary.

d) **Less Than Significant Impact**. Many species of birds and their active nests are protected under the Migratory Bird Treaty Act (MBTA). According to the Biological Resources Assessment (Appendix B), the vegetation within the study area does not provide potential nesting sites for birds as the site is devoid of vegetation suitable for nesting. Therefore, impacts would be less than significant.

Mitigation Measures: No mitigation measures are necessary.

e) **No Impact**. The City of Palmdale has a Native Desert Vegetation Preservation Ordinance (PMC Section 14.04) that regulates the removal of Joshua trees and California junipers; however, the Project Site does not contain Joshua trees or California junipers. As such, no impact would occur.

Mitigation Measures: No mitigation measures are necessary.

f) **Less Than Significant Impact**. The proposed project is within the boundaries of the West Mojave Plan (habitat conservation plan) (Bureau of Land Management 2005). However, while the proposed project is located within the geographic range of special species of concern, state listed, and federal listed species, none are expected to occur within the proposed project area due to the high level of disturbance and lack of thriving habitats. The proposed project site is highly disturbed and is not located within a Significant Ecological Area or Regional Habitat Linkages for Los Angeles County (Department of Regional Planning 2014), and would not interfere with the Desert Renewable Energy Conservation Plan. Impacts would be less than significant.

Mitigation Measures: No mitigation measures are necessary.

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
V. CULTURAL RESOURCES. Would the Project:				
a) Cause a substantial adverse change in the significance of a historical resource pursuant to Public Resources Code Section 21084.1 and CEQA Guidelines Section 15064.5?	☐	☐	☒	☐

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
b) Cause a substantial adverse change in the significance of an archaeological resource as defined in Public Resources Code Section 21083.2 and 281084.1 and CEQA Guidelines Section 15064.5?	☐	☒	☐	☐
c) Disturb any Native American tribal cultural resources or human remains, including those interred outside of dedicated cemeteries?	☐	☒	☐	☐

Project Impacts and Mitigation Measures

a) **Less than Significant Impact**. A cultural resources survey was conducted for the project site by RT Factfinders Cultural Resources and documented in a report entitled "Phase 1 Cultural Resource Investigation For a 5-Acre Property Southeast of the Intersection of 42nd Street East and Avenue S Palmdale, Los Angeles County, California", dated February, 2018. The assessment of the project site included both a records search and a physical survey. Based on the assessment, a less than significant impact would occur.

Mitigation Measures: No mitigation measures are necessary.

b) **Less than Significant Impact with Mitigation Incorporated**. No known archaeological resources exist on the site and based on the assessment, there is very low likelihood of impacting archeological resources.

Nonetheless, during excavation and grading activities associated with construction of the project, a remote possibility exists that historical or cultural resources may be discovered. If that should occur, the project applicant will be required to comply with existing regulations, including California Public Resources Code Section 21083.2 that specifies the protocol if archaeological resources are discovered during excavation, grading, or construction activities. If standard procedures are followed in the event cultural/historical resources are uncovered at the project site, the project's impact would be less than significant. In the event that cultural resources are encountered during the course of construction activities, all work must cease until a qualified archaeologist determines the proper disposition of the resource. With implementation of the mitigation measure listed below, impacts would be less than significant.

Mitigation Measures:

CUL-1: If a cultural resource is discovered during project implementation, ground disturbing activities shall be suspended 60 feet around the resource(s) and an Environmentally Sensitive Area (ESA) physical demarcation/barrier constructed. An archaeologist with at least three years of regional experience in archaeology shall be immediately contacted to perform an initial assessment regarding the nature and significance of the resource. In case of pre-contact cultural resources, the protocol outlined in **TCR-1** shall be followed. Should the resource be recommended significant and/or meet the definition of a Tribal Cultural Resource (TCR), the process outlined in **TCR-1** will continue to be followed, and an archaeological monitor shall be present for all remaining ground-disturbing activities that occur within the proposed project area (which includes, but is not limited to, tree/shrub removal and planting, clearing/grubbing, grading, excavation, trenching, compaction, fence/gate removal and installation, drainage and irrigation removal and installation, hardscape installation [benches, signage, boulders, walls, seat walls, fountains, etc.], and archaeological work). A sufficient number of archaeological monitors shall be present each workday to ensure that simultaneously occurring ground disturbing activities receive thorough levels of monitoring coverage. At the conclusion of monitoring for the project, a draft monitoring report shall be submitted to the Lead Agency, SMBMI and the Fernandeño Tataviam Band of Mission Indians for review, and the final monitoring report shall be submitted to all parties for their records.

c) **Less than Significant Impact with Mitigation Incorporated**. Refer to responses V(a) and V(b), above. While there are currently no identified Native American cultural resources and there is a low likelihood to encounter previously unknown and unrecorded human remains, in the unlikely event that human remains, or other buried materials are encountered, Mitigation Measure **TCR-2** will apply in order to reduce impacts to a less than significant level.

Mitigation Measure: See Section XVIII.

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
VI. ENERGY. Would the Project:				
a) Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?	☐	☐	☒	☐
b) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	☐	☐	☒	☐

Project Impacts and Mitigation Measures

a) **Less than Significant Impact**. The proposed project would result in increased use of energy (such as natural gas and electricity) during the construction phase. Energy usage would come from fuels to power construction vehicles and equipment and electricity with the use of equipment, lighting during construction, dust control, and during the production of materials such as asphalt, steel, concrete, pipes, and other materials. Energy use during construction would be temporary and cease once the proposed project has been completed.

Once in operation, the proposed project would result in increased use of energy for the operation and maintenance of the proposed project. The construction and design of the proposed project would be required to comply with the 2019 California Energy Code Title 24 Part 6 for energy efficiency standards for residential buildings. The proposed project will be built in accordance with the Palmdale Green Building Code (PMC Chapter 8.04.200). In addition, the City of Palmdale adopted an Energy Action Plan in 2011 providing recommendations and measures to improve energy efficiency for existing and new development (City of Palmdale 2011). Utilizing the recommendations within the Energy Action Plan, along with compliance with the Green Building Code would ensure that impacts would be less than significant.

Mitigation Measures: No mitigation measures are necessary.

b) **Less than Significant Impact**. As noted in Section VI(a) above, the construction and operation of the proposed project would be required to comply with Title 24 of the California Code of Regulations. Compliance with this regulation would reduce any impact associated with an obstruction of a plan for renewable energy or energy efficiency. The impact would be less than significant.

Mitigation Measures: No mitigation measures are necessary.

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
VII. GEOLOGY AND SOILS				
a) Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:	☐	☐	☒	☐
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Map issued by the State Geologist for the area or based upon on other substantial evidence of a known fault?	☐	☐	☒	☐
ii) Strong seismic ground shaking?	☐	☐	☒	☐
iii) Seismic-related ground failure, including liquefaction?	☐	☐	☒	☐
iv) Landslides?	☐	☐	☒	☐
b) Result in substantial soil erosion or the loss of topsoil?	☐	☐	☒	☐
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	☐	☐	☒	☐
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?	☐	☐	☒	☐
e) Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of waste water?	☐	☐	☐	☒
f) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☒	☐	☐

Project Impacts and Mitigation Measures

a) **i) and ii) Less than Significant Impact**. A Geotechnical Investigation Report was completed for the project site by Bruin Geotechnical Services, Inc., dated March 22, 2018 (Appendix C).

Surface Fault Rupture

The Project Site does not lie within a currently delineated State of California, Alquist-Priolo Earthquake Fault Zone. Well-delineated fault lines cross through this region as shown on California Geological Survey (CGS) maps. Therefore, active fault rupture is unlikely to occur at the Project Site. While fault rupture would most likely occur along previously established fault traces, future fault rupture could occur at other locations.

Historical Seismicity

The Palmdale area is in the seismically active southern California with at least eight prominent major earthquakes historically affecting the area. These include the 1812 Wrightwood, 1857 Fort Tejon, 1872 Owens Valley, 1952 Arvin-Tehachapi, 1971 San Fernando, 1992 Landers, 1994 Northridge, and 1999 Hector Mine earthquakes. Strong ground motions were experienced with magnitudes ranging from approximately 6.5 to 7.9. Approximately 35 magnitude 5.5 or greater historic earthquakes have occurred within 60 miles of the proposed project.

Design and construction of the new facilities would comply with all seismic-safety development requirements, including the Title 24 standards of the current California Building Code. Therefore, implementation of the proposed project would result in a less than significant impact associated with strong seismic ground shaking.

iii) Less Than Significant Impact.

Soil Liquefaction and Lateral Spreading

Liquefaction is the loss of soil strength from sudden shock (usually earthquake shaking), causing the soil to become a fluid mass. Liquefaction describes a phenomenon in which saturated soil loses shear strength and deforms as a result of increased pore water pressure induced by strong ground shaking during an earthquake. Dissipation of the excess pore pressures will produce volume changes within the liquefied soil layer, which can cause settlement. Shear strength reduction combined with inertial forces from the ground motion may also result in lateral migration (lateral spreading). Factors known to influence liquefaction include soil type, structure, grain size, relative density, confining pressure, depth to groundwater, and the intensity and duration of ground shaking. Soils most susceptible to liquefaction are saturated, loose sandy soils and low plasticity clay and silt. In general, for the effects of liquefaction to be manifested, groundwater levels must be within 50 feet of the ground surface and the soils within the saturated zone must also

be susceptible to liquefaction. The project does not lie in a zone designated by California Geologic Survey for the Ritter Ridge Quadrangle. Exploration did not reveal a shallow groundwater table or a perched water table. Research of nearby water well data and historic groundwater levels indicate both current and historic groundwater tables are greater than 50 feet below the ground surface. Since groundwater tables are greater than 50 feet below the existing ground surface (bgs), the estimated the potential for liquefaction at the site is low.

Lateral spreading (lateral migration) is caused when a loose and saturated soil layer is liquefied by a nearby earthquake of sufficient magnitude and a sloping ground, free face conditions, or sufficient building/embankment stresses exist near the site. Currently, these factors are not present at this site. The field and laboratory testing indicate that the soils within 50 feet of the surface are not subject to liquefaction. Therefore, lateral spreading at this site has a low potential.

Because the proposed project site is not subject to liquefaction and contains low potential for lateral spreading, potential impacts associated with liquefaction or ground-failure are less than significant.

iv) Less than Significant Impact. The site is relatively flat and proposed new slopes are anticipated to be less than 5 feet high. The site is not within any of the Earthquake Induced Landslide Hazard Zones designated by the Seismic Hazard Zone Map for the Ritter Ridge Quadrangle. Therefore, potential hazards from slope instability, landslides, or debris flows are considered very low and impacts would be less than significant.

Mitigation Measures: No mitigation measures are necessary.

b) **Less than Significant Impact**. Construction of the proposed project would require the preparation of a Storm Water Pollution Prevention Plan (SWPPP); the SWPPP identifies best management practices (BMPs) to reduce soil erosion and runoff from the construction site during construction. The proposed project will also comply with the recommendations provided in Appendix C during grading, foundation, and slope construction. Compliance with the BMPs identified in the SWPPP and implementation of the recommendations would reduce any impacts associated with erosion. Therefore, this impact is less than significant.

Mitigation Measures: No mitigation measures are necessary.

c) **Less than Significant Impact**. As noted in Section VII (a)(iv), the proposed project site is relatively flat and would not increase on- or off-site landslide potential. As

discussed in Section VII (a)(iii), impacts associated with seismically induced liquefaction, landslides and lateral spreading are low, impacts would be less than significant.

Mitigation Measures: No mitigation measures are necessary.

d) **Less than Significant Impact**. As expansive soils absorb water they swell, and as they lose water they shrink. Expansive soils may become unstable during ground shaking and are one of the most prevalent causes of earthquake damage to buildings. The proposed project site is located in an area considered to have very low expansion potential as defined by ASTM D 4829 and the 2019 California Building Code. With the incorporation of the recommendations provided within Appendix C relating to expansive soil, any potential impacts would be reduced to less than significant.

Mitigation Measures: No mitigation measures are necessary.

e) **No Impact**. The proposed project would not involve activities that would require the installation of septic tanks or alternative wastewater disposals systems. The proposed project will connect to existing sewer systems that discharge to Los Angeles County Sanitation District #20 and the Palmdale Water Reclamation Plant. No impact would occur.

Mitigation Measures: No mitigation measures are necessary.

f) **Less than Significant Impact with Mitigation Incorporated**. According to the General Plan, a Paleontologic Sensitivity Study was prepared for the Palmdale area in 1990 identifying high, unknown, and low potential areas of paleontological resources based on the assessment of identified paleontological resources in the rock units. Paleontological resources, or fossils, represent the remains, imprints, or traces of once-living organisms preserved in rocks and sediments. These include mineralized, partly mineralized, or un-mineralized bone and teeth, soft tissues, shell, wood, leaf impressions, footprints, burrows, and microscopic remains. According to the Paleontological Sensitivity Map in the General Plan, the proposed project is located in an area of undetermined potential of paleontological resources (City of Palmdale 1993). The undetermined potential does not preclude the possibility of undiscovered resources to be present within the proposed project. Deeper excavations could encounter unique and significant resources. Implementation of the mitigation measure below would reduce impacts to unique paleontological resources to less than significant.

Mitigation Measures:

GEO-1: In the event that paleontological resources are encountered, all work shall stop at the discovery site. At that time, a qualified paleontological monitor shall be consulted to evaluate the find. Construction activities shall be temporarily redirected to another location on-site (minimum of 100 feet from the location of the find) so that the monitor can recover any specimens encountered during excavation. All fossils/specimens collected during this work shall be deposited in a City approved museum repository for curation and storage.

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
VIII. GREENHOUSE GAS EMISSIONS. Would the Project:				
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☒	☐
b) Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☒	☐

Project Impacts and Mitigation Measures

a) **Less than Significant Impact**. Refer to response III(b), above. The proposed project involves the construction and occupancy of 80 townhomes. An Air Quality Study and Greenhouse Gas Study was completed for the Project Site by Rincon Consultants, Inc., dated March 2018 (Appendix A). The proposed project would generate air emissions during construction activities, some of which may be greenhouse gases.

Construction Emissions
As shown in Table 3, construction activity for the project would generate a maximum of approximately 451 tons of CO_2e.

Combined Construction, Stationary, and Mobile Source Emissions
Table 4 combines the 2022 construction emissions (Table 3) with the annual operational (stationary and mobile source) emissions associated with the project to provide a conservative estimate of the emissions that would be generated during 2022, when the project is both constructed and operational. The maximum combined annual emissions would total approximately 746 tons of CO_2e. These emissions do not exceed the AVAQMD threshold of 100,000 tons of CO_2e per year.

Table 3. Estimated Construction Emissions of Greenhouse Gases

Construction Year	Annual Emissions (tons of CO_2e)
2021	451.1
2022	74.3
Threshold[1]	100,000
Exceeds Threshold?	No

1. AVAQMD 2016
See Appendix A for CalEEMod results.
GHG emissions are reported in metric tons in CalEEMod; 1 metric ton (MT) = 1.10231 US ton (Ton)

Table 4. Combined Annual Emissions Tons of CO_2e/year

Emission Source	Project Emissions
2022 Construction Emissions	74.3
Operational	
Area	26.7
Energy	159.9
Solid Waste	13.8
Water	30.1
Mobile	
CO_2, and CH_4	421.0
N_2O	20.1
Total	745.9
AVAQMD Threshold	100,000
Exceeds Threshold?	No

1. AVAQMD 2016
GHG emissions are reported in metric tons in CalEEMod; 1 metric ton (MT) = 1.10231 US ton (Ton)
Source: Calculations were made in CalEEMod, see Appendix A for full model output. Values have been rounded

The construction and operational greenhouse gas emissions are well below the AVAQMD-recommended significance threshold of 100,000 tons of CO_2e per year and therefore would not prevent the State from reaching its greenhouse gas reduction targets. Therefore, impacts would be less than significant.

Mitigation Measures: No mitigation measures are necessary.

b) **Less than Significant Impact**. Refer to response VII(a), above. The project would not result in GHG emissions above the thresholds established by the AVAQMD to identify projects that require additional mitigation measures to achieve statewide GHG targets contained in Assembly Bill (AB) 32.

The Palmdale General Plan contains policies which require projects to promote attainment of state and federal air quality standards and all projects must comply with the City's Green Building Ordinance and Palmdale Energy Action Plan. The project is consistent with the General Plan, as amended through the proposed General Plan Amendment, and would be required to implement City, regional, and State policies adopted for the purpose of reducing GHGs. Therefore, impacts with respect to conflicts with an agency's plans, policies and regulations would be less than significant

Mitigation Measures: No mitigation measures are necessary.

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
IX. HAZARDS AND HAZARDOUS MATERIALS. Would the Project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, emission or disposal of hazardous materials?	☐	☐	☒	☐
b) Create a significant hazard to the public or the environment through reasonable foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☒	☐
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☒
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	☒
e) For a project located within an airport land use plan area or, where such a plan has not been adopted, within 2 miles of a public airport or a public use airport, result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☒
f) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☒	☐
g) Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?	☐	☐	☐	☒

Project Impacts and Mitigation Measures

a) **Less than Significant Impact**. The proposed project will utilize potentially hazardous materials during the construction phase such as the storage, use, and disposal of fuels, oils, lubricants, cements, petroleum-based products, and other construction-related materials. The handling of these chemicals has the potential to accidentally release hazardous materials to the environment. The handling and disposal of potentially hazardous materials will be done in compliance with the products' Safety Data Sheets and applicable federal, State, and local regulations and would be managed by a licensed provider. The use of these materials will be limited during the construction phase. Storage, handling, and disposal of these

materials would be required to comply with regulations set forth by State and federal agencies regarding hazardous materials, such as the Hazardous Materials Transportation Act, Resource Conservation and Recovery Act, the California Hazardous Material Management Act, and the California Code of Regulations, Title 22. Adherence to these regulations would reduce impacts related to routine transport, use, or disposal of hazardous materials to a level less than significant.

During proposed project operation, use of hazardous materials by the proposed project would be limited to minor amounts used for maintenance, building repair, household cleaning, and landscaping. In the unlikely event that the proposed project would generate hazardous materials, it is not anticipated that they would be acutely hazardous and would be transported, used, and disposed of consistent with applicable regulations. This impact is less than significant.

Mitigation Measures: No mitigation measures are necessary.

b) **Less Than Significant Impact**. As described in Section IX (a) above, adherence to regulations set forth by State and federal agencies regarding storage, handling, and disposal of hazardous materials would reduce the potential for impacts associated with accident conditions during construction to a less than significant level. The proposed project would not routinely use substantial amounts of hazardous materials that would result in a significant risk of release into the environment. Furthermore, new structures associated with the proposed project would be constructed consistent with all applicable safety regulations and would not introduce accident conditions that could result in the release of hazardous materials into the environment. Impacts would be less than significant.

Mitigation Measures: No mitigation measures are necessary.

c) **No Impact**. The nearest school to the proposed project site is Cimarron Elementary School, which is located approximately 0.26 miles to the southeast of the proposed project site. The school is located at 36940 45th Street East, Palmdale, California. Given that the school is more than 0.25 miles away from the proposed project site, implementation of the proposed project would not result in hazardous emissions within 0.25 mile of a school. No impact would occur.

Mitigation Measures: No mitigation measures are necessary.

d) **No Impact**. A review of federal and state standard and supplemental databases indicated that the proposed project site is not located within any identified hazardous material site pursuant to Government Code Section 65962.5. No hazardous

materials sites are located within one-quarter mile of the project site (SWRCB 2019, DTSC 2019). The proposed project would not create a significant hazard to the public or environment. No impacts would occur.

Mitigation Measures: No mitigation measures are necessary.

e) **No Impact**. The nearest airport to the proposed project site is Palmdale Regional Airport and Air Force Plant 42, located approximately 3.5 miles northwest from the proposed project site. The airports are separate facilities but utilize the same runway space. The proposed project site is not located within a Clear Zone or Accident Potential Zone (City of Palmdale 1993). No impact would occur.

Mitigation Measures: No mitigation measures are necessary.

f) **Less than Significant Impact**. The project site is located on the southeast corner of Avenue S and 42nd Street East. Avenue S is identified as an evacuation route according to the City's General Plan (Exhibit S-1, City of Palmdale 1993). Although the proposed project would generate additional traffic, the project will be conditioned to provide the necessary improvements to accommodate the anticipated volume of traffic to be generated by the project. As a result, the traffic generated by the proposed project is not expected to block the roadways, and the proposed project would not impair or physically block any identified evacuation routes and would not interfere with any adopted emergency response plan. Impacts would be less than significant.

Mitigation Measures: No mitigation measures are necessary.

g) **No Impact**. The proposed project site is not located in an area identified as a Very High Fire Hazard Severity Zone (CAL FIRE 2012). No impact would occur.

Mitigation Measures: No mitigation measures are necessary.

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
X. HYDROLOGY AND WATER QUALITY. Would the Project:				
a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?	☐	☐	☒	☐
b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?	☐	☐	☒	☐
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course or a stream or river or through the addition of impervious surfaces, in a manner that would:	☐	☐	☒	☐
i) Result in substantial erosion or siltation on- or off-site;	☐	☐	☒	☐
ii) substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite;	☐	☐	☒	☐
iii) create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or	☐	☐	☒	☐
iv) impede or redirect flood flows?	☐	☐	☒	☐
d) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?	☐	☐	☐	☒
e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	☐	☐	☒	☐

A Hydrology Study was prepared for the proposed project by Duke Engineering on November 12, 2019 (Appendix D).

Project Impacts and Mitigation Measures

a) **Less than Significant Impact**. The construction activities will include site grading, excavation, and other groundwork activities that could expose soils to construction materials and constituents and potential erosion due to wind and stormwater runoff which would impact water quality. The construction of on-site improvements would result in an increase in impervious surfaces that could increase runoff and potentially

degrade water quality.

Implementation of the proposed project's SWPPP plan would reduce potential impacts in degradation of water quality. The proposed project would be designed and constructed in accordance with the stormwater pollution control requirements of the Lahontan Region of the California Regional Water Quality Control Board (RWQCB) and comply with applicable National Pollution Discharge Elimination System (NPDES) requirements.

The Palmdale Water District provides water services to certain areas of the City of Palmdale, including the proposed project area. The proposed project would implement strategies to minimize water usage, including but not limited to, installation of water-efficient appliances and fixtures and drought-tolerant landscaping. Impacts would be less than significant.

Mitigation Measures: No mitigation measures are necessary.

b) **Less than Significant Impact**. The proposed project will not substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level. The proposed project site is located within the jurisdiction of the Palmdale Water District. Construction and development of the project will require water service from Palmdale Water District, which has not indicated that water supplies are unavailable for the project. Furthermore, measures associated with minimizing water usage will be applied to the project, including water efficient landscape requirements and compliance with Title 24 Building Code requirements for efficient appliances and fixtures. This is consistent with current City Ordinances, including the Water Efficient Landscape Ordinance (PMC Section 14.05). While implementation of the project would increase impervious surfaces at the site the project site will drain towards the northern portion of the site, where a proposed retention/detention basin will collect storm water runoff from the surface and storm drain flows. With project features and compliance with current City Ordinances, impacts are less than significant and no mitigation is required.

Mitigation Measures: No mitigation measures are necessary.

c) **Less than Significant Impact**. The proposed project will not substantially alter the existing drainage pattern of the site or area, including the alteration of the course of a stream or river, in a manner that would result in substantial erosion or siltation on- or off-site. The proposed project is located within the Pearland watershed, as identified within the City of Palmdale Master Plan of Drainage and the Master Plan of

Drainage Update. Specifically, the Master Plan of Drainage Update analyzes pre-development and ultimate development conditions for six watersheds, including Pearland. Based on the analysis, the Master Plan of Drainage Update recommends retention basins, regional drains, channels, and master plan facilities to serve ultimate development. Furthermore, the PMC requires development projects to mitigate the impacts of the development on the City's drainage facilities through the construction of drainage facilities in accordance with the City of Palmdale Master Plan of Drainage or payment of drainage fees that will be used to construct future drainage facilities.

The proposed project site does not contain any streams, rivers, or ephemeral drainage features. Runoff on-site moves in a sheet flow fashion toward the north. Development of the project site would result in an increase in the amount of impervious surface in the form of residential buildings and roadways. Conditions resulting from this change could degrade existing water quality due to increased runoff volumes and velocity; reduce infiltration; increased flow frequency, duration, and peak; and result in faster time to reach peak flow. However, the proposed project will be required to accommodate the existing storm flows in the project vicinity and reduce the post development storm flows to 85% of the existing condition. Furthermore, implementation of the proposed project would include the implementation of BMPs that would remove pollutants from runoff coming from the Project Site. With implementation of BMPs, as outlined in the project SWPPP and WQMP, and requirements specified by standard engineering practices, the Project would have a less than significant impact. No mitigation is required.

Mitigation Measures: No mitigation measures are necessary.

d) **No Impact.** The project site is designated as Zone X-Shaded per the Flood Insurance Rate Map (FIRM) No. 06037C0700F, which is outside the 100-year flood zone. As a result, development of the proposed project would not place housing or structures within an area at risk of flooding. Therefore, no flooding impacts would occur as a result of the proposed project. As a result, development of the proposed project would not place housing or structures within an area at risk of flooding. Therefore, no flooding impacts would occur as a result of the proposed project.

Mitigation Measures: No mitigation measures are necessary.

e) **Less Than Significant Impact.** Refer to response X(a-c) above. The proposed project site is within the Palmdale Water District Service A Division 3. A 2015 Urban Water Management Plan was prepared for the Palmdale Water District. The proposed project does not include activities that could obstruct future water projects.

Therefore, impacts would be less than significant.

Mitigation Measures: No mitigation measures are necessary.

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XI. LAND USE AND PLANNING. Would the Project:				
a) Physically divide an established community?	☐	☐	☐	☒
b) Cause significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☒	☐

Project Impacts and Mitigation Measures

a) **No Impact**. The proposed project consists of the construction and occupancy of 80 townhomes. The proposed project would not block a public street, trail or other access route or result in a physical barrier that would divide the community. Therefore, no impacts would occur.

Mitigation Measures: No mitigation measures are necessary.

b) **Less than Significant Impact**. The proposed project site is zoned R-1-7,000 (single-family residential, minimum 7,000 square foot lot size). The proposed project includes applications for a Zone Change and General Plan Amendment to increase the residential densities. The proposed project would not result in a significant environmental impact due to conflict with any land use plan because the proposed project is located within an urbanized area consisting of existing residential uses. Although the proposed project would not be consistent with the existing General Plan land use designation, the proposed project would meet General Plan Land Use Objective L3.1 to "provide for the distribution of residential densities and housing types to meet the varied lifestyles and needs of existing and future City residents." In addition, the proposed project would meet Housing Element Policy H1.1.1 to, "Encourage a variety of housing types such as single-family attached (townhouse), multifamily units, planned unit developments, mixed use housing and other housing types that make housing more affordable." The proposed project would meet Housing Element Policy H8.1.3 to "Encourage mixed use housing in designated areas along transportation corridors and other commercial strips." In addition, the City is trying to encourage development where infrastructure is already in place. Therefore, the proposed General Plan and Zone Change would be consistent with

the City's General Plan and PMC. Therefore, impacts would be less than significant.

Mitigation Measures: No mitigation measures are necessary.

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XII. MINERAL RESOURCES. Would the Project:				
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	☒
b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	☒

Project Impacts and Mitigation Measures

a-b) **No Impact**. The project site does not contain any mining or recovery operations for mineral resources and no such activities have occurred on the Project Site in the past. According to the Palmdale General Plan, the project site is not within an area containing significant mineral resources. The site is not designated in the City's General Plan or PMC for any extractive use. Such a use would be incompatible with existing adjacent land uses. Therefore, no impacts to mineral resources would occur.

Mitigation Measures: No mitigation measures are necessary.

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XIII. NOISE. Would the Project:				
a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☒	☐	☐
b) Generation of excessive ground borne vibration or ground borne noise levels?	☐	☒	☐	☐

An Acoustical Analysis was prepared for the Proposed Project by Christopher Jean & Associates, Inc. dated February 19, 2018 (Appendix F).

Project Impacts and Mitigation Measures

a) **Less than Significant Impact with Mitigation Incorporated**. Pearblossom Highway is located approximately 0.89 miles south of the project site. According to the General Plan Exhibit N-5, (Future Transportation Noise Contours), the project site is located outside the 60 dB Community Noise Equivalent Level (CNEL) contour. The City of Palmdale requires all residential projects to conform to the following applicable noise criteria: Exterior, 65 dBA CNEL; Interior, 45 dbA CNEL; and Unit-to-Unit, STC 50/IIC 50.

The expected future roadway noise impact was projected using the Federal Highway Administration's Highway Noise Prediction Model (FHWA RD-77-108) together with several roadway and site parameters that determine the projected impact of vehicular traffic noise. Based on traffic input data listed in the noise study, the calculations yielded design noise levels of 75 dBA CNEL 100 feet from the centerline of Avenue S and 72 dBA CNEL at 50 feet from the centerline of 42nd Street East. These exceed the maximum 65 dB noise level required by the General Plan Noise Element for residential development.

The closest railroad passes to the south of the project site at a distance of approximately 3,000 feet. Therefore, the project site is not subject to excessive noise from railroads.

To ensure operational noise impacts do not adversely impact on-site noise sensitive uses, Mitigation Measures **NOI 1-5** are prescribed for the project.

The increase in noise levels created by construction activities would be temporary and restricted by PMC Section 8.28.030, which limits construction disturbance to persons sleeping or residing within 500 feet of the construction area between the hours of 6:30 a.m. and 8:00 p.m. Monday through Saturday. For all construction related activities, noise attenuation techniques must be employed as needed to ensure that noise remains as low as possible during construction, as described in Mitigation Measure **NOI-6**.

With implementation of the prescribed mitigation measures, potentially significant impacts would be reduced to a less than significant level.

Mitigation Measures:

NOI-1: The proposed project shall install sound barriers for all private patios and balconies facing Avenue S and 42nd Street East. Construction shall include erecting permanent barriers consisting of clear vinyl, plexiglass or some other similar material

a minimum of nine feet around each first floor patio adjacent to Avenue S, eight feet around each second floor balcony adjacent to Avenue S, five feet around each first floor patio adjacent to 42nd Street East and five feet around each second floor balcony adjacent to 42nd Street East.

Each barrier shall consist of a solid face from top-to-bottom. Cutouts and/or openings shall be prohibited, except for openings required for proper drainage.

NOI-2: The buildings shall be constructed, as a minimum, with the following:

1) Siding or stucco exterior walls, on 5/8-inch drywall, on 2-inch x 4-inch stud walls with R- 13 fiberglass insulation;
2) Double pane windows;
3) Double pane sliding glass doors; and,
4) Concrete tile roof over 1/2-inch plywood with fiberglass insulation, 5/8-inch drywall, and vented.

This shall be adequate for all units with the following exceptions:

1) Add STC (sound transmission class) 32 glazing to all rooms facing 42nd Street East;
2) Add STC 36 glazing, exterior wall upgrades and baffled attic vents to all rooms facing Avenue S.

NOI-3: At least one of the following widely used common floor/ceiling assemblies, all of which rate at least STC 50 shall be incorporated into the building plans:

1) 8-inch concrete slab (in compliance with State standards);
2) 1 1/2-inch lightweight concrete, sub-floor, R-11 insulation, resilient channel, drywall ceiling (in compliance with State standards); or
3) 1 3/8-inch Gyp-Crete, sub-floor, 2-inch by 10-inch joists, R-11 insulation, resilient channel, 1/2-inch drywall ceiling (in compliance with State standards).

NOI-4: At least one of the following shall be incorporated into the building plans:

1) Two layers of 1/2-inch direct nailed drywall, 2-inch by 6-inch plate, 2-inch by 4-inch staggered studs, fiberglass insulation, two layers of 1/2- inch direct nailed drywall (in compliance with State standards);
2) Two layers of 5/8-inch direct nailed drywall, 2-inch by 6-inch plate, 2-inch by 4-inch staggered studs, R-11 insulation, two layers of 5/8- inch direct nailed drywall (in compliance with State standards);
3) 5/8-inch direct nailed drywall, 2-inch by 4-inch plate with 2-inch by 4-inch studs, R-11 insulation, 1-inch airspace at plate, 2-inch by 4- inch plate with

2-inch by 4-inch studs, 5/8-inch: direct nailed drywall (in compliance with State standards);

4) Same as #3 but with two layers of R-11 insulation (in compliance with State standards);
5) Two layers 5/8-inch drywall direct nailed, 2-inch by 4-inch plate with 2-inch by 4-inch studs, 1-inch clear air space at plate, 2 -inch by 4-inch plate with 2-inch by 4-inch studs, R-11 insulation, two layers 5/8-inch drywall (in compliance with State standards);
6) Same as #5 with two layers of R-11 insulation (in compliance with State standards).

NOI-5: Prior to issuance of building permits, a final report from a licensed acoustical engineer shall be submitted, verifying that interior and exterior area noise levels are within acceptable levels. In the event the noise is not mitigated to acceptable levels, additional mitigation measures shall be recommended by the noise specialist and implemented subject to the review and approval of the Director of Economic and Community Development.

NOI-6: For all construction-related activities, noise attenuation techniques shall be employed as needed to ensure that noise remains as low as possible during construction. The following noise attenuation techniques shall be incorporated into contract specifications to reduce the impact of construction noise:

- Ensure that construction equipment is equipped with properly operating and maintained mufflers consistent with manufacturers' standards.
- Place noise-generating construction equipment and locate construction staging areas away from sensitive receptors, where feasible.
- Schedule high noise-producing activities between the hours of 7:00 a.m. and 5:00 p.m. to minimize disruption to sensitive receptors.
- Implement noise attenuation measures to the extent feasible, which may include, but are not limited to, temporary noise barriers or noise blankets around stationary construction noise sources.
- Use electric air compressors and similar power tools rather than diesel equipment, where feasible.
- All stationary construction equipment (e.g. air compressor, generators, impact wrenches, etc.) shall be operated as far away from residential uses as possible and shall be shielded with temporary sound barriers, sound aprons or sound skins.
- Construction-related equipment, including heavy-duty equipment, motor vehicles, and portable equipment, shall be turned off when not in use for more than 30 minutes.
- During all construction activities, the job superintendent shall limit all

construction-related activities to between the hours 6:30 a.m. and 8:00 p.m. Monday through Saturday (excluding holidays).

- Clearly post construction hours, allowable workdays, and the phone number of the job superintendent at all construction entrances to allow the surrounding property owners/occupants to contact the job superintendent. If the City or the job superintendent receives a complaint, the superintendent shall investigate, take appropriate corrective actions and report the actions to the complainant.

b) **Less than Significant Impact with Mitigation Incorporated**.

Construction

Vibration impacts from construction activities associated with the proposed project would be a function of the vibration generated by construction equipment, equipment location, sensitivity of nearby land uses, and the timing and duration of the construction activities. Nearest sensitive receptors consist of single-family residences located south of Sorrell Avenue, just south of the site. Exposure to vibration can range from no perceptible effects at low levels, to rumbling sounds and detectable vibration at moderate levels, to slight damage at very high levels. Ground borne vibration levels decrease with distance. While the proposed project would generate vibration impacts during construction, construction would occur in conformance with PMC Section 8.28.030, which allows construction Monday through Saturday (excluding holidays) from 6:30 AM to 8:00 PM, which would limit the potential adverse effects of the proposed project. Implementation of Mitigation Measure **NOI-6** for construction-related activities would reduce impacts to less than significant. In addition, the construction hours would occur during the daytime when the proposed project area is more active and has increased ambient noise. Impacts would be less than significant with mitigation incorporated.

Operation

Once in operation, the proposed project would consist of daily residential activities. These activities are not anticipated to generate ground borne vibration that would be felt by the nearby residences. Impacts would be less than significant.

Mitigation Measures: Refer to **NOI-6**, above.

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XIV. POPULATION AND HOUSING. Would the Project:				
a) Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☒	☐
b) Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

Project Impacts and Mitigation Measures

a) **Less than Significant Impact**. The proposed project would add 80 homes, as opposed to an estimate of 31 homes, given the existing zoning of R-1-7000. The 80 homes could potentially add 290 residents, based on a 3.62 persons per household ratio (DOF 2017). Despite the potential increase in housing and population, the level of growth associated with the project was anticipated in SCAG's long-term population forecasts and would not exceed regional population projections. Specifically, the increase of 80 units associated with the proposed project would represent an increase of approximately 0.5 percent of the approximate increase of 16,200 units projected for Palmdale through year 2040. This increase in housing units and population would not have a significant effect on any local or regional growth projections.

In addition, the project will increase density on a site currently dedicated to single-family housing. Increasing the density will help ensure that that the City of Palmdale meets its housing allocation needs as mandated by the Regional Housing Needs Assessment (RHNA). Furthermore, the site is located in a partially developed area largely surrounded by existing and proposed residential homes. The proposed project is adjacent to a major arterial street that can already or will be conditioned to have the capacity to accommodate added traffic volume. Therefore, the proposed project would not accelerate development in an undeveloped area, nor would build-out result in an adverse physical change in the environment or introduce unplanned infrastructure not previously evaluated by the City's General Plan. Impacts would be less than significant.

Mitigation Measures: No mitigation measures are necessary.

b) **No Impact**. The project site is currently vacant. No housing or people would be

displaced necessitating the construction of replacement housing elsewhere. Therefore, no impact would occur.

Mitigation Measures: No mitigation measures are necessary.

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XV. PUBLIC SERVICES. Would the Project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the following public services:				
a) Fire protection?	☐	☐	☒	☐
b) Police protection?	☐	☐	☒	☐
c) Schools?	☐	☐	☒	☐
d) Parks?	☐	☐	☒	☐
e) Other public facilities?	☐	☐	☒	☐

Project Impacts and Mitigation Measures

a) **Less than Significant Impact**. The Los Angeles County Fire Department provides comprehensive emergency services for the City, including fire, rescue, and emergency medical (paramedic) services, as well as fire prevention functions. Los Angeles County Fire Station No. 131, located at 2629 East Avenue S, approximately 1.5 miles west of the project site, would serve as the first responder in the event of an emergency. Given that the proposed project would generate up to an estimated 290 new residents to the City (DOF 2017), the proposed project could potentially increase the demand for Fire Department services. This increase of people would be within regional growth projections for the City and thus, would not substantially affect the provision of fire protection given the location of the proposed project in an urbanized area and close proximity to existing fire stations. Furthermore, compliance with more current applicable fire code and building code provisions determines a project's impact on fire services. The proposed project would be required to meet all current code provisions to the satisfaction of the City and Fire Department. As a result, the proposed project would be adequately served by existing public services and would not necessitate the provision of new or physically altered governmental facilities and is therefore not anticipated to result in substantial adverse impacts. The overall need for fire protection services is not expected to substantially increase. Impacts would be less than significant.

Mitigation Measures: No mitigation measures are necessary.

b) **Less than Significant Impact**. The Los Angeles Sheriff's Department provides police protection services to the project site from its station at 750 East Avenue Q, approximately 4 miles to the northwest of the project site. The proposed project would generate up to an estimated 290 residents to the City (DOF 2017). This increase of people would be within regional growth projections for the City and thus, would not substantially affect provision of police protection given the location of the proposed project in an urbanized area and its proximity to existing police protection services and patrol routes. As such, the proposed project would not result in a need for new or physically altered governmental facilities. The overall need for police protection services would not increase substantially as a result of the proposed project.

Mitigation Measures: No mitigation measures are necessary.

c) **Less than Significant Impact**. The project area is currently served by Palmdale School District and Antelope Valley Union High School District and the following nearby schools: Cimarron Elementary, Shadow Hills Middle School, and William J. Knight High School. The proposed project is anticipated to generate an increase in students; however, the project applicant would be required to pay the applicable school facility fees to the school districts based on a current fee schedule for new residential construction prior to the issuance of building permits to provide funds to ensure adequate school facilities are available. Pursuant to Government Code 65996, payment of school fees constitutes the exclusive means of both "considering" and "mitigating" impacts on school facilities. As such, compliance with this statutory requirement would result in less than significant impacts.

Mitigation Measures: No mitigation measures are necessary.

d) **Less than Significant Impact**. The proposed project would create housing for up to 290 residents within the City (DOF 2017). The site provides on-site amenities for future residents; however, it is reasonable that the residents would utilize recreation and park facilities in the surrounding area. Any additional demand would be met through payment of the City's park fees to provide funding for park and recreation facilities. Thus, recreation facility impacts would be less than significant.

Mitigation Measures: No mitigation measures are necessary.

e) **Less than Significant Impact.** The proposed project would not create any significant increase in demand for library services. In accordance with the requirements of the City's Municipal Code, the project applicant would be required

to pay the City's public facilities fee to finance the City's public facilities, including libraries. Payment of the impact fee would result in a less than significant impact to library facilities.

Mitigation Measures: No mitigation measures are necessary.

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XVI. RECREATION				
a) Would the project increase the use of existing neighborhood or regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☒	☐
b) Would the project increase the use of existing neighborhood or regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☒

Project Impacts and Mitigation Measures

a) **Less than Significant Impact**. The proposed project is a residential project that would add additional residents to the City. The addition of new residents could increase the use of existing recreational facilities. The project is not, however, identified as a location of immediate parks needs in the General Plan. Due to the distance between the proposed project and the nearest park, Joshua Hills Park, impacts would be less than significant. In addition, the proposed project would be required to pay development impact fees for parks and other public facilities for the upkeep of existing facilities or for the construction of new public facilities. The payment of development impact fees will ensure that park and public facilities will be adequate to serve new growth. Impacts will be less than significant.

Mitigation Measures: No mitigation measures are necessary.

b) **No Impact.** The proposed project does not include the development of recreational facilities for public use or require expansion of existing recreational facilities. As stated in previous Section XVI(a), the proposed project will be required to pay development impact fees for parks and other public facilities to ensure that parks and public facilities will be adequate to service new growth to the area. No impact would occur.

Mitigation Measures: No mitigation measures are necessary.

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XVII. TRANSPORTATION. **Would the Project:**				
a) Conflict with a program plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?	☐	☐	☒	☐
b) Would the project conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision(b)?	☐	☐	☒	☐
c) Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g. farm equipment)?	☐	☐	☒	☐
d) Result in inadequate emergency access?	☐	☐	☒	☐

Project Impacts and Mitigation Measures

a) **Less than Significant Impact**. The proposed project will not conflict with the applicable Circulation Element, a congestion management program, or ordinance and/or policy that establishes measures of effectiveness for the performance of the project (or the regional circulation systems applicable to the proposed project). This includes, but is not limited to, level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways. Will approval of the proposed General Plan Amendment and Zone Change, the proposed project will be consistent with the City's General Plan and zoning classification and, as such, it will also be consistent with the City's aggregate traffic demand modeling provided through the General Plan EIR.

A Traffic Impact Analysis (TIA) is not required as the proposed 80 units falls below the City's established Thresholds of Significance for traffic impacts. The proposed project will not create a substantial amount of traffic that will impede the design speed and/or travel demands of the City's circulation system. The proposed street circulation pattern will be consistent with the City's design standards. Furthermore, the proposed project is served by the Antelope Valley Transit Agency (AVTA), which provides transit services to the upper and lower Antelope Valley area. Pursuant to review of the AVTA Transit System Map, which is cited as a source material herein, there are existing transit routes that intersect and/or are adjacent to the proposed project. More specifically, there is a line that runs easterly and westerly along Avenue S (which is

adjacent to the northern boundary of the proposed project).

In conclusion, and based upon the project's compliance with the City's General Plan, which includes the Circulation Element and applicable congestion management plan, as well as a review of the AVTA Transit System, the proposed project will not conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation systems. This takes into account all modes of transportation including mass transit (e.g., a review of the AVTA transit system map) and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit.

In addition, the proposed project would not include activities that would remove access to bicycle lanes and pedestrian paths and would not conflict with a congestion management or circulation plan. Impacts would be less than significant.

Mitigation Measures: No mitigation measures are necessary.

b) **Less than Significant Impact**. CEQA Guidelines Section 15064.3 provides consideration whether a project's vehicle miles traveled may result in a significant impact. Projects that are located within one half mile of transit, or nearby existing transit stops would be considered less than significant. The proposed project is located at the southeast corner of Avenue S and 42nd Street East. The Antelope Valley Transit Authority provides a bus stop which is located approximately 300 feet east of the project site at the intersection of Springfield Street and Avenue S (AVTA 2019). Therefore, impacts would be less than significant.

c) **Less than Significant Impact**. The proposed project would not result in hazards due to a geometric design feature or incompatible uses, as the project does not include any substantial changes to the existing roadway network. New structures associated with the proposed project would be constructed consistent with relevant building and fire codes, including access requirements into and out of the project site. Implementation of the proposed project would result in a less than significant impact.

Mitigation Measures: No mitigation measures are necessary.

d) **Less than Significant Impact**. The proposed project site is bordered by one arterial street and one local street. A traffic control plan will be implemented during construction to minimize disruptions due to lane closures and to maintain access for emergency response and evacuation. New structures associated with the proposed

project would be constructed consistent with relevant building and fire codes, including access requirements into and out of the project site. As described in Section XVII(a) above, the proposed project would not reduce traffic LOS below acceptable levels, and consequently, would not block or interfere with emergency and evacuation routes. Therefore, the proposed project would not result in inadequate emergency access, and impacts would be less than significant.

Mitigation Measures: No mitigation measures are necessary.

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XVIII. TRIBAL CULTURAL RESOURCES. Would the Project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:				
a) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code Section 5020.1(k), or	☐	☒	☐	☐
b) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) to Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	☐	☒	☐	☐

Project Impacts and Mitigation Measures

a-b) **Less than Significant Impact with Mitigation Incorporated**. As described above in Section V(a), no historical resources exist within or adjacent to the project site and thus the proposed project will not cause a substantial adverse change to any known historical resources.

On April 23, 2020, the City submitted Assembly Bill 52 (AB 52) notification letters to four Native American tribal governments or designated tribal representatives. These tribes were the San Gabriel Band of Mission Indians, Gabrieleño Band of Mission Indians – Kizh Nation, San Manuel Band of Mission Indians, and the Fernandeño Tataviam Band of Mission Indians. Of the four tribes or tribal representatives, the City received responses from two tribes: San Manuel Band of Mission Indians and

the Fernandeño Tataviam Band of Mission Indians. Both tribes offered their comments on the proposed mitigation measures.

As such, in order to ensure that no unknown tribal resources are adversely affected due to construction of the project, Mitigation Measures **TCR-1** and **TCR-2** are included to require monitoring by a qualified archeologist and coordination with the tribes, as necessary. With the incorporation of the mitigation measure, any impacts would be reduced to less than significant.

Mitigation Measures:

TCR-1: If a pre-contact cultural resource is discovered during project implementation, ground disturbing activities shall be suspended 60 feet around the resource(s) and an Environmentally Sensitive Area (ESA) physical demarcation/barrier constructed. A research design shall be developed by the archaeologist that shall include a plan to evaluate the resource for significance under CEQA criteria. Representatives from the SMBMI Cultural Resources Department, the Fernandeño Tataviam Band of Mission Indians, the archaeologist/applicant, and the Lead Agency shall confer regarding the research design, as well as any testing efforts needed to delineate the resource boundary. Following the completion of evaluation efforts, all parties shall confer regarding the archaeological significance of the resource, its potential as a Tribal Cultural Resource (TCR), and avoidance (or other appropriate treatment) of the discovered resource.

Should any significant resource and/or TCR not be a candidate for avoidance or preservation in place, and the removal of the resource(s) is necessary to mitigate impacts, the research design shall include a comprehensive discussion of sampling strategies, resource processing, analysis, and reporting protocols/obligations. Removal of any cultural resource(s) shall be conducted with the presence of a Tribal monitor representing the Tribes, unless otherwise decided by SMBMI or the Fernandeño Tataviam Band of Mission Indians (collectively, Tribes). All plans for analysis shall be reviewed and approved by the applicant and the Tribes prior to implementation, and all removed material shall be temporarily curated on-site. It is the preference of the Tribes that removed cultural material be reburied as close to the original find location as possible. However, should reburial within/near the original find location during project implementation not be feasible, then a reburial location for future reburial shall be decided upon by the Tribes, the landowner, and the Lead Agency, and all finds shall be reburied within this location.

Additionally, in this case, reburial shall not occur until all ground-disturbing activities associated with the project have been completed, all monitoring has ceased, all

cataloguing and basic recordation of cultural resources have been completed, and a final monitoring report has been issued to the Lead Agency, CHRIS, SMBMI and the Fernandeño Tataviam Band of Mission Indians. All reburials are subject to a reburial agreement that shall be developed between the landowner and the Tribes outlining the determined reburial process/location, and shall include measures and provisions to protect the reburial area from any future impacts (vis a vis project plans, conservation/preservation easements, etc.).

Should it occur that avoidance, preservation in place, and on-site reburial are not an option for treatment, the landowner shall relinquish all ownership and rights to this material and confer with the Tribes to identify an American Association of Museums (AAM)-accredited facility within the County that can accession the materials into their permanent collections and provide for the proper care of these objects in accordance with the 1993 CA Curation Guidelines. A curation agreement with an appropriate qualified repository shall be developed between the landowner and museum that legally and physically transfers the collections and associated records to the facility. This agreement shall stipulate the payment of fees necessary for permanent curation of the collections and associated records and the obligation of the Project developer/applicant to pay for those fees.

All draft records/reports containing the significance and treatment findings and data recovery results shall be prepared by the archaeologist and submitted to the Lead Agency and the Tribes for their review and comment. After approval from all parties, the final reports and site/isolate records are to be submitted to the local CHRIS Information Center, the Lead Agency, SMBMI and the Fernandeño Tataviam Band of Mission Indians.

TCR-2: In the event that any human remains are discovered within the project area, ground disturbing activities shall be suspended 100 feet around the resource(s) and an ESA physical demarcation/barrier constructed. The on-site lead/foreman shall then immediately notify SMBMI, the Fernandeño Band of Mission Indians, the applicant/developer, and the Lead Agency. The Lead Agency and the applicant/developer shall then immediately contact the County Coroner regarding the discovery. If the Coroner recognizes the human remains to be those of a Native American, or has reason to believe that they are those of a Native American, the Coroner shall ensure that notification is provided to the NAHC within 24 hours of the determination, as required by California Health and Safety Code § 7050.5 (c). The NAHC-identified Most Likely Descendant (MLD), shall be allowed, under California Public Resources Code § 5097.98 (a), to (1) inspect the site of the discovery and (2) make determinations as to how the human remains and funerary objects shall be treated and disposed of with appropriate dignity. The MLD, Lead Agency, and

landowner agree to discuss in good faith what constitutes "appropriate dignity" as that term is used in the applicable statutes. The MLD shall complete its inspection and make recommendations within 48 hours of the site visit, as required by California Public Resources Code § 5097.98.

Reburial of human remains and/or funerary objects (those artifacts associated with any human remains or funerary rites) shall be accomplished in compliance with the California Public Resources Code § 5097.98 (a) and (b). The MLD in consultation with the landowner, shall make the final discretionary determination regarding the appropriate disposition and treatment of human remains and funerary objects. All parties are aware that the MLD may wish to rebury the human remains and associated funerary objects on or near the site of their discovery, in an area that shall not be subject to future subsurface disturbances.

The applicant/developer/landowner shall accommodate on-site reburial in a location mutually agreed upon by the Parties. It is understood by all Parties that unless otherwise required by law, the site of any reburial of Native American human remains or cultural artifacts shall not be disclosed and shall not be governed by public disclosure requirements of the California Public Records Act. The Coroner, parties, and Lead Agency, will be asked to withhold public disclosure information related to such reburial, pursuant to the specific exemption set forth in California Government Code § 6254 (r).

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XIX. UTILITIES AND SERVICE SYSTEMS. Would the Project:				
a) Require or result in relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?	☐	☐	☒	☐
b) Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?	☐	☐	☒	☐
c) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☒	☐

d) Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?	☐	☐	☒	☐
e) Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?	☐	☐	☒	☐

Project Impacts and Mitigation Measures

a) **Less than Significant Impact**. The proposed project will require installation of new utility services such as electric, gas, water, telecommunications, and drainage since the existing project site is currently vacant. The proposed project is not located above a hazardous materials site or a groundwater resource. The proposed project will receive adequate services for wastewater treatment and would not require the construction of new or expanded facilities. Impacts would be less than significant.

Mitigation Measures: No mitigation measures are necessary.

b) **Less than Significant Impact**. The City is served by the Los Angeles County Sanitation District, Palmdale Water district, and a number of local mutual water companies. The proposed project will be serviced by Palmdale Water District. According to the Palmdale's Urban Water District's 2016 Water Distribution Master Plan, the District has adequate water supplies to meet projected demands in all types of water years from normal to multiple-dry years, and therefore has adequate supplies to provide services to the proposed project. The proposed project would also use low flow fixtures that would reduce water consumption and decrease wastewater discharges. Impacts would, therefore, be less than significant.

Mitigation Measures: No mitigation measures are necessary.

c) **Less than Significant Impact.** According to the letter received from the County Sanitation Districts of Los Angeles County, dated March 25, 2020, the proposed project would discharge to a local sewer line not maintained by the County Sanitation Districts of Los Angeles County (Districts), for conveyance to the Districts' 35th Street East Trunk Sewer, located along 35th Street east at Avenue R-8. The Districts' 21-inch diameter truck sewer has a capacity of 9.7 million gallons per day (mgd) to 10.1 mgd and conveyed a peak flow of 1.8 mgd when last measured in 2017. Project wastewater would be treated at the Palmdale Water Reclamation Plant (LWRP), which has a capacity of 12 million gallons of wastewater per day and is currently processing an average flow of 9.6 mgd. The proposed 80 dwelling unit project is anticipated to generate approximately 15,600 gallons per day of wastewater, which would be 0.13% of the capacity of the water reclamation plant.

The proposed project site is located within the boundaries of County Sanitation Districts of Los Angeles County (Districts). Copies of the proposed project plans were provided to the Districts for review and comment. The City of Palmdale General Plan policies require that any water infrastructure necessary to serve the site be financed and constructed by the project. The proposed project will be required to construct the necessary on-site infrastructure and sewer connections to the existing system and pay any applicable fees as required by the City of Palmdale. Therefore, given the existing capacity of the wastewater treatment plant and compliance with PMC requirements, there will be a less than significant impact. No mitigation is required.

Mitigation Measures: No mitigation measures are necessary.

d) **Less than Significant Impact**. The AB 32 Scoping Plan written in 2008 provided the process of identifying ways to achieve GHG reductions from the Waste Management sector such as controlling landfill methane emissions as one of the early action measures. The 2008 Scoping Plan also included mandatory recycling, reuse and remanufacturing of recovered materials, composting, and other alternatives to using landfills.

The Antelope Valley region's waste and recycling collection services are provided by the Waste Management Inc. Antelope Valley Public Landfill receives the waste generated by the City. The remaining capacity of Antelope Valley Landfill is estimated at 12.9 million tons and the landfill has a remaining life of 20 years as of 2016 according to the Los Angeles Integrated Waste Management Plan (County of Los Angeles 2016). The proposed project's construction and operational wastes would be diverted to recycling facilities or made available for reuse when appropriate to reduce waste. The proposed project will comply with AB 32 and the City's General Plan Policy ER5.5.2 to require citizens and businesses to recycle to the extent possible and comply with the Solid Waste Management Plan (SWMP) (City of Palmdale 1993). Impacts would be less than significant.

Mitigation Measures: No mitigation measures are necessary.

e) **Less than Significant Impact**. The proposed project will comply with AB 32 and the City's General Plan goals and policies for reduction of waste and implementing recycling standards so that facilities and programs could accommodate solid waste disposal. Impacts would be less than significant.

Mitigation Measures: No mitigation measures are necessary.

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XX. **WILDFIRE.** If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:				
a) Substantially impair an adopted emergency response plan or emergency evacuation plan?	☐	☐	☒	☐
b) Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	☐	☐	☐	☒
c) Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk that may result in temporary or ongoing impacts to the environment?	☐	☐	☐	☒
d) Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?	☐	☐	☐	☒

Project Impacts and Mitigation Measures

a) **Less than Significant Impact**. The proposed project site is not located within a Very High Fire Hazard Severity Zone (CAL FIRE 2012). Avenue S is identified as an evacuation route according to the City General Plan Exhibit S-1 (City of Palmdale 1993). However, implementation of the proposed project would not result in substantial impacts to this roadway because the proposed project does not include any road closures or maintenance activities that will significantly impair an emergency response plan or emergency evacuation plan. Additionally, the proposed project would comply with Los Angeles County Fire Department requirements regarding emergency vehicle access to the proposed project site. Therefore, implementation of the proposed project would not result in an impact associated with an emergency evacuation plan within or near a state responsibility area or land classified as Very High Fire Hazard Severity Zone. Therefore, the impacts would be less than significant.

Mitigation Measures: No mitigation measures are necessary.

b) **No Impact**. The proposed project site is not located in an area identified as a Very High Fire Hazard Severity Zone (CAL FIRE 2012). Additionally, the proposed project

site is on a site that is relatively flat and devoid of significant amounts of vegetation that could increase fire risk. No impact would occur.

Mitigation Measures: No mitigation measures are necessary.

c) **No Impact**. The proposed project site is not located in an area identified as a Very High Fire Hazard Severity Zone (CAL FIRE 2012). Additionally, the proposed project is on a site that is devoid of significant amounts of vegetation that could increase fire risk and does not require the installation of any infrastructure to reduce the risk associated with wildfires. No impact would occur.

Mitigation Measures: No mitigation measures are necessary.

d) **No Impact**. The proposed project site is not located in an area identified as a Very High Fire Hazard Severity Zone (CAL FIRE 2012). Additionally, the proposed project site is relatively flat and is not susceptible to post fire drainage and/or slope issues. The proposed project has been previously graded and is devoid of significant amounts of vegetation. No impact would occur.

Mitigation Measures: No mitigation measures are necessary.

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
XXI. MANDATORY FINDINGS OF SIGNIFICANCE				
a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☒	☐	☐
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	☐	☐	☒	☐
c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☒	☐	☐

The following are Mandatory Findings of Significance in accordance with Section 15065 of the CEQA Guidelines.

a) **Less than Significant Impact with Mitigation Incorporated**. The proposed project consists of highly disturbed field and does not contain any wetlands, desert washes, or riparian habitats; and the general area continues to become degraded and fragmented and lacks suitable habitats.

As discussed in Section III, burrowing owls are considered a species of special concern by the CDFW. While none were identified to be within the proposed project area, the burrows of the California ground squirrel were observed and can provide potential cover sites for burrowing owls and, as a result, may result in the potential presence of burrowing owls. Implementation of **BIO-1** and **BIO-2** will reduce impacts to burrowing owls to less than significant.

The proposed project will not have a substantial adverse effect on state or federally listed wildlife due to the disturbed conditions of the property. Any potential impacts to burrowing owls would be mitigated through a burrowing owl survey prior to ground-disturbing activities to ensure that no owls would be within the proposed project site. In addition, according to the Biological Resources Assessment, the vegetation within the study does not provide potential nesting sites for birds.

The proposed project site does not contain any recorded archaeological resources, historical resources, and no identified Native American cultural resources. The project site is located on a previously graded vacant site, and there is very low likelihood of impacting archeological resources. However, during excavation and grading activities associated with construction of the proposed project, a remote possibility exists that cultural resources may be discovered. If that should occur, the project applicant would be required to comply with existing regulations, including California Public Resources Code Section 21083.2 that specifies the protocol if archaeological resources are discovered during excavation, grading, or construction activities. Therefore, implementation of Mitigation Measure **CUL-1** will ensure appropriate levels of effort in the identification of all Native American cultural resources. If any buried cultural materials are encountered during earth-moving operations associated with the Project, all work in that area will be halted or diverted until a qualified archaeologist or paleontologist can evaluate the nature and significance of the finds.

With the implementation of mitigation measures and compliance with the PMC the proposed project will have a less than significant impact.

b) **Less than Significant Impact.** There are no projects to be located near the proposed

project area that could occur within the same timeframe according to the City of Palmdale 2018 Ten-Year Capital Improvement Plan (City of Palmdale 2018). In addition, the proposed project will coordinate with the City to ensure that potential impacts would not be cumulatively considerable such as compliance and coordination to ensure traffic control plans for multiple projects are consistent with each other. Impacts would be less than significant.

c) **Less than Significant Impact with Mitigation Incorporated**. The Proposed Project could have the potential to impact humans during construction of the residential facilities with regard to potential exposure to emissions, hazardous materials, noise, and traffic. However, with the implementation of project BMPs, substantial adverse impacts would be minimized during construction and operation of the proposed project. The implementation of mitigation measures **NOI-1** through **NOI-6** would reduce impacts to a less than significant level.

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Appendix A

42nd Street East and East Avenue S

Air Quality and Greenhouse Gas Study

prepared for

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Appendix A CalEEMod Air Quality and Greenhouse Gas Modeling Results

1. Project Description

1.1 Introduction

This study analyzes the potential air quality and greenhouse gas (GHG) emissions impacts of the proposed 42nd Street East and East Avenue S Residential Project (project) in Palmdale, California. Rincon Consultants, Inc. prepared this study under contract to Creativity Investments, LLC for use by the City of Palmdale, in support of the environmental documentation being prepared pursuant to the California Environmental Quality Act (CEQA). The purpose of this study is to analyze the project's air quality and GHG impacts related to both temporary construction activity and long-term operation of the project.

1.2 Project Description

The project site encompasses approximately 5.11 acres, on the southwest corner of 42nd Street East and East Avenue S (Assessor Parcel Numbers, (APN): 3052-001-071 and 3052-001-072). The project would include construction of 18, two-story buildings, for a total of 80 units. Vehicular parking would consist of 47 open parking spaces, 160 garage parking spaces, for a total of 207 total vehicular parking spaces. As mentioned, the project site is located on the southeast corner of 42nd Street East and East Avenue S and is bordered by 42nd Street East and a vacant lot to the west, East Avenue S and a vacant lot to the north, a vacant lot to the east, and Sorrell Avenue and a residential development to the south. California State Route 138 (SR 138), which transitions to 47th Street East, is located approximately 0.4 miles east of the project site and Pearblossom Highway is located approximately 0.9 miles south of the project site. As shown on the applicant provided site plans, the proposed project would develop a site that is currently vacant and there would be no wood burning fire places included in the project.

2. Air Quality

2.1 Background

Local Climate and Meteorology

The project site is located in the City of Palmdale, which is situated in the Antelope Valley portion of the Mojave Desert Air Basin (MDAB). Antelope Valley and the MDAB are disconnected from the Southern California coastal and Central California valley regions by the Tehachapi Mountains to the northwest and by the San Gabriel Mountains to the south. Air quality management in the Antelope Valley is under jurisdiction of the Antelope Valley Air Quality Management District (AVAQMD). The AVAQMD jurisdiction spans the western portion of the MDAB and encompasses the incorporated cities of Lancaster and Palmdale, Air Force Plant 42, and the southern portion of Edwards Air Force Base (AVAQMD 2016). The MDAB is located in a mountain range that is divided by long, broad valleys, some of which have dry lakes. The mountains in the lower region generally reach heights of up to 1,000 to 4,000 feet above the valley floor. Prevailing winds in the MDAB come from the west and southwest and are due to a combination of the proximity of MDAB to coastal and central regions as well as the location of the Sierra Nevada Mountains to the north which prevent air from passing through.

During summer, the MDAB is normally influenced by the Pacific Subtropical High cell off of the coast that prevents cloud formation and encourages daytime solar heating. Cold air masses moving south from Canada and Alaska do not generally influence the MDAB because the frontal systems are weak and diffuse before they reach the desert. Therefore, desert moisture comes in the form of warm, moist, unstable air masses from the south and the MDAB averages three to seven inches of rain annually. As such, it is classified as a dry-hot desert climate, with portions classified as a dry-very hot desert, which means that at least three months have maximum average temperatures over 100.4 degrees Fahrenheit (AVAQMD 2016).

Air Quality Regulation

The federal and state governments have established ambient air quality standards for the protection of public health. The United States Environmental Protection Agency (U.S. EPA) is the federal agency designated to administer air quality regulation, while the California Air Resources Board (ARB) is the State equivalent in the California Environmental Protection Agency (CalEPA). County-level Air Pollution Control Districts (APCDs) provide local management of air quality. The ARB has established air quality standards and is responsible for the control of mobile emission sources, while the local APCDs are responsible for enforcing standards and regulating stationary sources. The ARB has established 14 air basins statewide.

The U.S. EPA has set primary national ambient air quality standards (NAAQS) for ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter less than 10 microns in diameter(PM_{10}), particulate matter less than 2.5 microns ($PM_{2.5}$), and lead (Pb). Primary standards are those levels of air quality deemed necessary, with an adequate margin of safety, to protect public health. In addition, the State of California has established health-based ambient air quality standards for these and other pollutants, some of which are more stringent than the federal standards. Table 1 lists the current federal and State standards for regulated pollutants.

Table 1 Federal and State Ambient Air Quality Standards

Pollutant	Averaging Time	Federal Primary Standards	California Standard
Ozone	1-Hour	–	0.09 ppm
	8-Hour	0.070 ppm	0.070 ppm
Carbon Monoxide	8-Hour	9.0 ppm	9.0 ppm
	1-Hour	35.0 ppm	20.0 ppm
Nitrogen Dioxide	Annual	0.053 ppm	0.030 ppm
	1-Hour	0.100 ppm	0.18 ppm
Sulfur Dioxide	Annual	–	–
	24-Hour	–	0.04 ppm
	1-Hour	0.075 ppm	0.25 ppm
PM_{10}	Annual	–	20 μg/m^3
	24-Hour	150 μg/m^3	50 μg/m^3
PM_{25}	Annual	12 μg/m^3	12 μg/m^3
	24-Hour	35 μg/m^3	–
Lead	30-Day Average	–	1.5 μg/m^3
	3-Month Average	0.15 μg/m^3	–

ppm = parts per million
μg/m^3 = micrograms per cubic meter
Source: Ambient Air Quality Standards (ARB 2016)

The MDAB within the AVAQMD has been designated as nonattainment for the federal and State 8-hour O_3 standards, and the State PM_{10} standard. This area is unclassified or in attainment for the federal and State standards for CO; the federal standard for PM_{10}; and the federal and State standards for $PM_{2.5}$. The MDAB within the AVAQMD is in attainment for all other federal and State standards.

Ozone

Ozone is produced by a photochemical reaction[1] (triggered by sunlight) between nitrogen oxides (NO_X) and reactive organic gases (ROG). NO_X is formed during the combustion of fuels, while reactive organic gases are formed during combustion and evaporation of organic solvents. Because O_3 requires sunlight to form, it mostly occurs in substantial concentrations between the months of April and October. Ozone is a pungent, colorless, toxic gas with direct health effects on humans including respiratory and eye irritation and

[1] Organic compound precursors of ozone are routinely described by a number of variations of three terms: hydrocarbons (HC), organic gases (OG), and organic compounds (OC). These terms are often modified by adjectives such as total, reactive, or volatile, and result in a rather confusing array of acronyms: HC, THC (total hydrocarbons), RHC (reactive hydrocarbons), TOG (total organic gases), ROG (reactive organic gases), TOC (total organic compounds), ROC (reactive organic compounds), and VOC (volatile organic compounds). While most of these differ in some significant way from a chemical perspective, from an air quality perspective two groups are important: non-photochemically reactive in the lower atmosphere, or photochemically reactive in the lower atmosphere (HC, RHC, ROG, ROC, and VOC).

possible changes in lung functions. Groups most sensitive to O_3 include children, the elderly, people with respiratory disorders, and people who exercise strenuously outdoors.

Carbon Monoxide

CO is a local pollutant that is found in high concentrations only near fuel combustion equipment and other sources of CO. The primary source of CO, a colorless, odorless, poisonous gas, is automobile traffic. Elevated concentrations, therefore, are usually only found near areas of high traffic volumes. CO's health effects are related to its affinity for hemoglobin in the blood. At high concentrations, CO reduces the amount of oxygen in the blood, causing heart difficulty in people with chronic diseases, reduced lung capacity, and impaired mental abilities.

Nitrogen Dioxide

NO_2 is a by-product of fuel combustion, with the primary source being motor vehicles and industrial boilers and furnaces. The principal form of nitrogen oxide produced by combustion is nitric oxide (NO), but NO reacts rapidly to form NO_2, creating the mixture of NO and NO_2 commonly called NO_X. Nitrogen dioxide is an acute irritant. A relationship between NO_2 and chronic pulmonary fibrosis may exist, and an increase in bronchitis in young children at concentrations below 0.3 parts per million (ppm) may occur. NO_2 absorbs blue light and causes a reddish brown cast to the atmosphere and reduced visibility. It can also contribute to the formation of ozone/smog and acid rain.

Suspended Particulates

Atmospheric particulate matter is comprised of finely divided solids and liquids such as dust, soot, aerosols, fumes, and mists. The particulates that are of particular concern are PM_{10} (which measures no more than 10 microns in diameter) and $PM_{2.5}$, (a fine particulate measuring no more than 2.5 microns in diameter). The characteristics, sources, and potential health effects associated with the small particulates (PM_{10} and $PM_{2.5}$) and $PM_{2.5}$ can be different. Major man-made sources of PM_{10} are agricultural operations, industrial processes, combustion of fossil fuels, construction, demolition operations, and entrainment of road dust into the atmosphere. Natural sources include windblown dust, wildfire smoke, and sea spray salt. The finer, $PM_{2.5}$ particulates are generally associated with combustion processes as well as being formed in the atmosphere as a secondary pollutant through chemical reactions. $PM_{2.5}$ is more likely to penetrate deeply into the lungs and poses a serious health threat to all groups, but particularly to the elderly, children, and those with respiratory problems. More than half of the small and fine particulate matter that is inhaled into the lungs remains there, which can cause permanent lung damage. These materials can damage health by interfering with the body's mechanisms for clearing the respiratory tract or by acting as carriers of an absorbed toxic substance.

Current Air Quality

The AVAQMD operates one air quality monitoring station (Lancaster-43301 Division Street monitoring station) in the MDAB. The purpose of the monitoring station is to measure ambient concentrations of pollutants and determine whether ambient air quality meets the California and federal standards. The monitoring station is located at 43301 Division Street, approximately 8.9 miles northwest of the project site. Table 2 indicates the number of days that each of the standards has been exceeded at the Lancaster-43301 Division Street monitoring station. The data collected at the station indicates that the State and federal 8-hour ozone standards have been exceeded each year from 2014 to 2016; State ozone worst hour standards were exceeded each year from 2014 to 2016,

while federal ozone worst hour standards were exceeded in 2015; and $PM_{2.5}$ standards were exceeded in 2014 and 2016. No other State or federal standards were exceeded at this monitoring station.

Table 2 Ambient Air Quality at the Monitoring Station

Pollutant	2014	2015	2016
8 Hour Ozone (ppm), 8-Hr Maximum	0.087	0.103	0.090
Number of Days of State exceedances (>0.070)	35	80	60
Number of days of Federal exceedances (>0.070)	35	80	60
Ozone (ppm), Worst Hour	0.101	0.132	0.108
Number of days of State exceedances (>0.09 ppm)	3	26	3
Number of days of Federal exceedances (>0.112 ppm)	0	1	0
Nitrogen Dioxide (ppb) - Worst Hour	0.0519	0.0418	0.0488
Number of days of State exceedances (>0.18 ppm)	0	0	0
Number of days of Federal exceedances (0.10 ppm)	0	0	0
Particulate Matter 10 microns, $\mu g/m^3$, Worst 24 Hours	131.5	123.8	145.0
Number of days above Federal standard (>150 $\mu g/m^3$)	0	0	0
Particulate Matter <2.5 microns, $\mu g/m^3$, Worst 24 Hours	42.0	10.4	64.8
Number of days above Federal standard (>35 $\mu g/m^3$)	1	0	2

Source: ARB 2017a
Lancaster-43301 Division Street monitoring station

Air Quality Management Plan

The AVAQMD has adopted an attainment plan (*AVAQMD Federal 8-Hour Ozone Attainment Plan [2008 AQMP]*) for ozone pursuant to the Federal Clean Air Act, which serves as the District's Air Quality Management Plan (AVAQMD 2008). The *2008 AQMP* provided an update to the A*VAQMD 2004 Ozone Attainment Plan* and established a goal of being in attainment for the 8-hour NAAQS for ozone by 2021. As such, the *2008 AQMP* includes planning assumptions regarding population, vehicle activity, and industrial activity and addresses all existing and forecast ozone precursor-producing activities within the Antelope Valley through 2020.

Sensitive Receptors

Ambient air quality standards have been established to represent the levels of air quality considered sufficient, with a margin of safety, to protect public health and welfare. They are designed to protect that segment of the public most susceptible to respiratory distress, such as children under 14; the elderly over 65; persons engaged in strenuous work or exercise; and people with cardiovascular and chronic respiratory diseases. The majority of sensitive receptor locations are therefore, schools, hospitals, and residences. The sensitive receptors closest to the project site are the single family residences located directly to the south of the project site across Sorrell Avenue. Additionally, there are residences located to the north of the project site, across East Avenue S and to the west of the project across 42nd Street East which are additional sensitive receptors.

Local Regulations

The Palmdale General Plan Land Use Element contains the following policy specific to air quality (Palmdale 1993):

> **Policy L2.1.8:** Support creation and adoption of a separate air quality management plan for the Southeast Desert Air Basin portion of the South Coast Air Quality Management District.[2]

There are no additional policies contained in the plan that are directly applicable to the project.

2.2 Impact Analysis

Methodology and Significance Thresholds

This air quality analysis conforms to the methodologies recommended in the *AVAQMD's California Environmental Quality Act (CEQA) and Federal Conformity Guidelines* (AVAQMD 2016). The handbook includes thresholds for emissions associated with both construction and operation that are applicable to the proposed project. Project construction would generate diesel emissions and dust. Construction equipment that would generate criteria air pollutants includes excavators, graders, cranes, dump trucks, and loaders. Some of this equipment would be used during grading activities as well as during building construction. It is assumed that all construction equipment used would be diesel-powered, based on an anticipated statewide fleet mix per the California Emissions Estimator Model (CalEEMod) defaults (California Air Pollution Control Officers Association [CAPCOA] 2017). The project's construction emissions were calculated using the CalEEMod software version 2016.3.2 using model defaults for the types and number of pieces of equipment that would be used onsite during each of the construction phases. It is assumed that grading would be balanced onsite. Additionally, the default CalEEMod phase lengths were used for each phase of construction excluding the architectural coating phase, which was extended to last approximately half of the building construction phase to reflect a more accurate construction schedule, as individual buildings would be painted as they are completed.

Operational emissions were also estimated using CalEEMod. Operational emissions include mobile source emissions, energy emissions, and area source emissions. Mobile source emissions are generated by the increase in motor vehicle trips to and from the project associated with operation of onsite development. Emissions attributed to energy use include natural gas consumption for space and water heating. Area source emissions are generated by landscape maintenance equipment, consumer products, and architectural coating.

Regional Thresholds

To determine whether a project would have a significant impact to air quality, Appendix G of the CEQA Guidelines questions whether a project would:

1) Conflict with or obstruct implementation of the applicable air quality plan
2) Violate any air quality standard or contribute substantially to an existing or projected air quality violation

[2] This goal was achieved.

3) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors)
4) Expose sensitive receptors to substantial pollutant concentrations
5) Create objectionable odors affecting a substantial number of people

The AVAQMD recommends the following quantitative regional significance thresholds for temporary construction activities and long-term project operation within the western portion of the MDAB (AVAQMD 2016):

Annual Thresholds (tons)	Daily Thresholds (lbs)
100 tons per year of CO	548 pounds per day of CO
25 tons per year of NO_X	137 pounds per day of NO_X
25 tons per year of ROG	137 pounds per day of ROG
25 tons per year of SO_X	137 pounds per day of SO_X
15 tons per year of PM_{10}	82 pounds per day of PM_{10}
12 tons per year of $PM_{2.5}$	65 pounds per day of $PM_{2.5}$

Emissions thresholds are provided as a daily value and an annual value so that multi-phased projects (such as a project with a construction phase and a separate operational phase) with phases shorter than one year can be compared to the daily value. Because construction would extend over a 13 month period based on CalEEMod defaults, the annual thresholds would apply to construction of the project. Additionally, because the project's operation would also occur over multiple years, the annual threshold would apply to operational emissions as well.

Regulatory Requirements

Project development would comply with all applicable regulatory standards. In particular, project development would comply with 2016 CALGreen Code, in addition to AVAQMD Rules 403, *Fugitive Dust*, and 1113, *Architectural Coatings*, as well as all other applicable AVAQMD rules. Rules 403 and 1113 were added as "mitigation" in CalEEMod, as discussed below.

The grading phase involves the greatest amount of heavy equipment and the greatest generation of fugitive dust. For the purposes of construction emissions modeling, it was assumed that the project would comply with AVAQMD Rule 403, which identifies measures to reduce fugitive dust and is required to be implemented at all construction sites located in the MDAB. Therefore, the following conditions, which would be required to reduce fugitive dust in compliance with AVAQMD Rule 403, were included in CalEEMod for the site preparation and grading phases of construction.

1. **Minimization of Disturbance.** Construction contractors should minimize the area disturbed by clearing, grading, earth moving, or excavation operations to prevent excessive amounts of dust.
2. **Soil Treatment.** Construction contractors should treat all graded and excavated material, exposed soil areas, and active portions of the construction site, including unpaved onsite roadways to minimize fugitive dust. Treatment shall include, but not necessarily be limited to, periodic watering, application of environmentally safe soil stabilization materials, and/or roll compaction as appropriate. Watering shall be done

as often as necessary, and at least twice daily, preferably in the late morning and after work is done for the day.

3. **Soil Stabilization.** Construction contractors should monitor all graded and/or excavated inactive areas of the construction site at least weekly for dust stabilization. Soil stabilization methods, such as water and roll compaction, and environmentally safe dust control materials, shall be applied to portions of the construction site that are inactive for over four days. If no further grading or excavation operations are planned for the area, the area shall be seeded and watered until landscape growth is evident, or periodically treated with environmentally safe dust suppressants, to prevent excessive fugitive dust.
4. **No Grading During High Winds.** Construction contractors should stop all clearing, grading, earth moving, and excavation operations during periods of high winds (20 miles per hour or greater, as measured continuously over a one-hour period).
5. **Street Sweeping.** Construction contractors should sweep all onsite driveways and adjacent streets and roads at least once per day, preferably at the end of the day, if visible soil material is carried over to adjacent streets and roads.

The architectural coating phase involves the greatest release of ROG. The emissions modeling for the project also includes the use of low-VOC paint (50 grams per liter (g/L) for flat coatings) as required by AVAQMD Rule 1113.

Construction Impacts

Table 3summarizes maximum daily emissions of pollutants associated with buildout of the proposed project. Maximum daily estimates account for compliance with AVAQMD requirements, but do not include any additional mitigation. Emissions of CO, PM_{10}, $PM_{2.5}$, NO_X, and ROG would not exceed AVAQMD regional thresholds, assuming adherence to the conditions listed above required by AVAQMD Rule 403 and Rule 1113.

Table 3 Estimated Construction Emissions

Construction Year	Maximum Emissions[1] (tons/year)					
	ROG	NO_x	SO_X	CO	PM_{10}	$PM_{2.5}$
2019	0.5	3.0	<0.1	2.5	0.3	0.2
2020	0.1	0.4	<0.1	0.4	<0.1	<0.1
Maximum tons per year	0.5	3.0	<0.1	2.5	0.3	0.2
AVAQMD Thresholds	25	25	25	100	15	12
Threshold Exceeded?	No	No	No	No	No	No

Notes: All calculations were made using CalEEMod. See Appendix A for calculations. Site Preparation, Grading, Paving, Building Construction, and Architectural Coating totals include worker trips, soil export hauling trips, construction vehicle emissions and fugitive dust. Emission data is pulled from "mitigated" results that include compliance with regulations and project design features that will be included in the project.

[1] Grading phases incorporate anticipated emissions reductions, which are required by AVAQMD Rule 403 to reduce fugitive dust. The architectural coating phases incorporate anticipated emissions reductions, which are required by Rule 1113.

Long-Term Regional Impacts

Air Quality Management Plan Consistency

In the AVAQMD, a project would be consistent with the Air Quality Management Plan (AQMP) 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 forecast in the applicable plans (AVAQMD 2016). Per the *AVAQMD CEQA and Federal Conformity Guidelines,* conformity with growth forecasts can be established by demonstrating that a project is consistent with the land use plan that was used to generate growth forecasts. 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 the affected area (relative to the applicable land use plan) (AVAQMD 2016). However, if the project generated emissions are less than the significance thresholds, the project would also be consistent with the AQMP (De Salvio 2018). The *2008 AQMP*, the most recent AQMP adopted by the AVAQMD, incorporates local city general plans.

The proposed project involves the construction of a residential development, which could cause a direct increase in the City's housing and population. According to data provided by the California Department of Finance (DOF), the estimated population of the City of Palmdale is 158,605 and the average persons per household is 3.62 (DOF 2017). Because the project would involve the construction of 80 dwelling units, it could potentially add 290 residents (80 units x 3.62 persons per dwelling unit = 290). SCAG forecasts that the population of the City of Palmdale will increase by 47,300 new residents between 2012 and 2040, for a total of 201,500 residents in 2040 (SCAG 2016a). The addition of 196 new residents to the City would equal 0.4 percent of the City's total projected population growth through 2040. The level of population growth associated with the project was anticipated in SCAG's long-term population forecasts and would not exceed official regional population projections.

Likewise, based on SCAG estimates, there were approximately 43,100 dwelling units in Palmdale in 2012, with a projected increase of approximately 16,200 units through 2040, for a total of 59,300 units (SCAG 2016a). The increase of 80 units associated with the proposed project would represent an increase of approximately 0.3 percent. Because this housing increase would be within SCAG's projected 2040 growth for the City of Palmdale, housing growth generated by the project would be consistent with the AQMP.

Although the project is consistent with current SCAG projections, the proposed project would exceed population projections contained in the AQMP (which is based on population projects from 2002), but it would comply with all applicable AVAQMD rules, not interfere with implementation of measures, and not exceed construction or operational thresholds established by AVAQMD. As it would not exceed construction or operational thresholds for O_3 and PM_{10}, that the Basin is in nonattainment for, it would not conflict with or obstruct implementation of the attainment plan. Furthermore, the SCAG data is the most recent and provides a more accurate estimate of population and housing projections.

Operational Air Pollutant Emissions

Table 4 summarizes estimated emissions associated with operation of the proposed project. The majority of project-related operational emissions would be due to vehicle trips to and from the site. Emissions would not exceed AVAQMD thresholds for any criteria pollutant.

Table 4 Estimated Operational Emissions

Emissions Source	Estimated Emissions (tons/year)					
	ROG	NO_x	SO_x	CO	PM_{10}	$PM_{2.5}$
Area	0.3	<0.1	<0.1	0.4	<0.1	<0.1
Energy	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Mobile	0.1	0.5	<0.1	1.2	0.3	0.1
Project Total	0.4	0.5	<0.1	1.7	0.3	0.1
AVAQMD Thresholds	25	25	25	100	15	12
Threshold Exceeded?	No	No	No	No	No	No

See Appendix A for CalEEMod computer model output. Note: Numbers may not add due to rounding.

Local Carbon Monoxide Concentration

Areas with high vehicle density, such as congested intersections, have the potential to create high concentrations of CO, known as CO hotspots. A project's localized air quality impact is considered significant if CO emissions create a hotspot where either the California one-hour standard of 20 ppm or the federal and State eight-hour standard of 9.0 ppm is exceeded. This typically occurs at severely congested intersections (level of service [LOS] E or worse). As shown in Table 4, CO emissions that would be generated from buildout of the project would not exceed AVAQMD thresholds. Further, CO levels at the closest air quality monitoring station, the Lancaster-43301 Division Street station, have consistently been substantially below the State and federal standards (ARB 2017a). Additionally, the AVAQMD is in attainment for the State and federal standards for CO. Because background CO concentrations are low and the project would not generate CO emissions above thresholds, the project would not result in the creation of CO hotspots or expose sensitive receptors to substantial pollutant concentrations.

Odors

The *AVAQMD California Environmental Quality Act (CEQA) and Federal Conformity Guidelines* do not discuss potential impacts associated with odors. However, the AVAQMD used to be under the jurisdiction of the South Coast Air Quality Management District (SCAQMD) and the *1993 SCAQMD CEQA Air Quality Handbook* identifies land uses associated with odor complaints. These land uses include: agriculture (farming and livestock), wastewater treatment plants, food processing plants, chemical plants, composting facilities, refineries, landfills, dairies, and fiberglass molding facilities. Residential uses are not identified as land uses associated with odor complaints in the 1993 SCAQMD CEQA Air Quality Handbook. Therefore, the proposed project would not generate objectionable odors affecting a substantial number of people.

Toxic Air Contaminants (TACs)

The ARB's *Quality and Land Use Handbook: A Community Health Perspective* (2005) recommends against siting sensitive receptors within 500 feet of a freeway, urban roads with 100,000 vehicles/day, or rural roads with 50,000 vehicles/day, or near other major sources of toxic air contaminants (TACs), such as rail yards, distribution centers, ports, or refineries. The primary concern with respect to freeway adjacency is the long-term effect of diesel exhaust particulates, a TAC, on sensitive receptors. The primary source of diesel

exhaust particulates is heavy-duty trucks on freeways and high-volume arterial roadways. The project site is located approximately 0.4 miles from SR 138, and there are no rail yards, distribution centers, ports, refineries, or other major sources of TACs in the vicinity. Furthermore, the portion of SR 138 that is closest to the project site has approximately 18,100 annual average daily trips (AADT) (Caltrans 2016). Although the project would be a sensitive receptor, the project site is not located near TAC sources that would result in substantial health risks to future residents.

3. Greenhouse Gases

3.1 Background

This section analyzes GHG emissions associated with the project and potential impacts related to climate change.

Climate Change and Greenhouse Gases

Climate change is the observed increase in the average temperature of Earth's atmosphere and oceans along with other substantial changes in climate (such as wind patterns, precipitation, and storms) over an extended period of time. The term "climate change" is often used interchangeably with the term "global warming," but "climate change" is preferred to "global warming" because it helps convey that there are other changes in addition to rising temperatures. The baseline against which these changes are measured originates in historical records identifying temperature changes that have occurred in the past, such as during previous ice ages. The global climate is continuously changing, as evidenced by repeated episodes of substantial warming and cooling documented in the geologic record. The rate of change has typically been incremental, with warming or cooling trends occurring over the course of thousands of years. The past 10,000 years have been marked by a period of incremental warming, as glaciers have steadily retreated across the globe. However, scientists have observed acceleration in the rate of warming during the past 150 years. Per the United Nations Intergovernmental Panel on Climate Change (IPCC 2014), the understanding of anthropogenic warming and cooling influences on climate has led to a high confidence (95 percent or greater chance) that the global average net effect of human activities has been the dominant cause of warming since the mid-20th century (IPCC 2014).

Gases that absorb and re-emit infrared radiation in the atmosphere are called greenhouse gases (GHG). The gases that are widely seen as the principal contributors to human-induced climate change include carbon dioxide (CO_2), methane (CH_4), nitrous oxides (N_2O), fluorinated gases such as hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). Water vapor is excluded from the list of GHG because it is short-lived in the atmosphere and its atmospheric concentrations are largely determined by natural processes, such as oceanic evaporation.

Both natural processes and human activities emit GHGs. $CO_2$and CH_4 are emitted in the greatest quantities from human activities. Emissions of CO_2 are largely by-products of fossil fuel combustion, whereas CH_4 results from off-gassing associated with agricultural practices and landfills. Observations of CO_2 concentrations, globally-averaged temperature, and sea level rise are generally well within the range of the extent of the earlier IPCC projections. The recently observed increases in CH_4 and N_2O concentrations are smaller than those assumed in the scenarios in the previous assessments. Each IPCC assessment has used new projections of future climate change that have become more detailed as the models have become more advanced.

Man-made GHGs, many of which have greater heat-absorption potential than CO_2, include fluorinated gases and SF_6 (CalEPA 2006). Different types of GHGs have varying global warming potentials (GWP). The GWP of a GHG is the potential of a gas or aerosol to trap heat in the atmosphere over a specified timescale (generally, 100 years). Because GHG absorb different amounts of heat, a common reference gas (CO_2) is used to relate the amount of heat absorbed to the amount of the gas emissions, referred to as "carbon

dioxide equivalent" (CO_2e), and is the amount of a GHG emitted multiplied by its GWP. CO_2 has a 100-year GWP of one. By contrast, CH_4 has a GWP of 25, meaning its global warming effect is 25 times greater than CO_2 on a molecule per molecule basis (IPCC 2007).

The accumulation of GHGs in the atmosphere regulates the earth's temperature. Without the natural heat trapping effect of GHGs, Earth's surface would be about 34° C cooler (CalEPA 2006). However, it is believed that emissions from human activities, particularly the consumption of fossil fuels for electricity production and transportation, have elevated the concentration of these gases in the atmosphere beyond the level of naturally occurring concentrations.

Greenhouse Gas Emissions Inventory

Worldwide anthropogenic emissions of GHG were approximately 46,000 million metric tons (MMT or gigatonne) of CO_2e in 2010 (IPCC 2014). CO_2 emissions from fossil fuel combustion and industrial processes contributed about 65 percent of total emissions in 2010. Of anthropogenic GHGs, CO_2 was the most abundant accounting for 76 percent of total 2010 emissions. CH_4 emissions accounted for 16 percent of the 2010 total, while N_2O and fluorinated gases account for 6 and 2 percent respectively (IPCC 2014).

Total U.S. GHG emissions were 6,586.7 million metric tons (MMT or gigatonne) CO_2e in 2015 (U.S. EPA 2017). Total U.S. emissions have increased by 3.5 percent since 1990; emissions decreased by 2.3 percent from 2014 to 2015 (U.S. EPA 2017). The decrease from 2014 to 2015 was a result of multiple factors, including: (1) substitution from coal to natural gas consumption in the electric power sector; (2) warmer winter conditions in 2015 resulting in a decreased demand for heating fuel in the residential and commercial sectors; and (3) a slight decrease in electricity demand (U.S. EPA 2017). Since 1990, U.S. emissions have increased at an average annual rate of 0.2 percent. In 2015, the industrial and transportation end-use sectors accounted for 29 percent and 27 percent of CO_2 emissions (with electricity-related emissions distributed), respectively. Meanwhile, the residential and commercial end-use sectors accounted for 16 percent and 17 percent of CO_2 emissions, respectively (U.S. EPA 2017).

Based upon the ARB *California Greenhouse Gas Inventory for 2000-2015*, California produced 440.4 MMT CO_2e in 2015 (ARB 2017b). The major source of GHG emissions in California is transportation, contributing 39 percent of the State's total GHG emissions. Industrial sources are the second largest source of the state's GHG emissions (ARB 2017b). California emissions are due in part to its large size and large population compared to other states. However, a factor that reduces California's per capita fuel use and GHG emissions, as compared to other states, is its relatively mild climate. The ARB has projected statewide unregulated GHG emissions for the year 2020 will be 509.4 MMT CO_2e (ARB 2017c). These projections represent the emissions that would be expected to occur in the absence of any GHG reduction actions.

Potential Effects of Climate Change

Globally, climate change has the potential to affect numerous environmental resources through potential impacts related to future air, land, and water temperatures and precipitation patterns. Scientific modeling predicts that continued GHG emissions at or above current rates would induce more extreme climate changes during the 21st century than were observed during the 20th century. Long-term trends have found that each of the past three decades has been warmer than all the previous decades in the instrumental record, and the decade from 2000 through 2010 has been the warmest. The global combined land and ocean temperature data show an increase of about 0.89°C (0.69°C–1.08°C) over the period 1901–2012 and about 0.72°C (0.49°C–0.89°C) over the period

1951–2012 when described by a linear trend. Several independently analyzed data records of global and regional Land-Surface Air Temperature (LSAT) obtained from station observations are in agreement that LSAT, as well as sea surface temperatures, has increased. In addition to these findings, there are identifiable signs that global warming is currently taking place, including substantial ice loss in the Arctic over the past two decades (IPCC 2014).

According to the CalEPA's 2010 Climate Action Team Biennial Report, potential impacts of climate change in California may include decreased snow pack, sea level rise, and increase in extreme heat days per year, high ground-level O_3 days, large forest fires, and drought (CalEPA 2010). Below is a summary of some of the potential impacts that could be experienced in California as a result of climate change.

Air Quality

Higher temperatures, which are conducive to air pollution formation, could worsen air quality in many areas of California. Climate change may increase the concentration of ground-level O_3, but the magnitude of the effect, and therefore its indirect effects, are uncertain. If higher temperatures are accompanied by drier conditions, the potential for large wildfires could increase, which, in turn, would further worsen air quality. However, if higher temperatures are accompanied by wetter, rather than drier conditions, the rains would tend to temporarily clear the air of particulate pollution and reduce the incidence of large wildfires, thereby ameliorating the pollution associated with wildfires. Additionally, severe heat accompanied by drier conditions and poor air quality could increase the number of heat-related deaths, illnesses, and asthma attacks throughout the state (CEC 2009).

Water Supply

Analysis of paleoclimatic data (such as tree-ring reconstructions of stream flow and precipitation) indicates a history of naturally and widely varying hydrologic conditions in California and the west, including a pattern of recurring and extended droughts. Uncertainty remains with respect to the overall impact of climate change on future water supplies in California. However, the average early spring snowpack in the Sierra Nevada decreased by about 10 percent during the last century, a loss of 1.5 million acre-feet of snowpack storage. During the same period, sea level rose eight inches along California's coast. California's temperature has risen 1°F, mostly at night and during the winter, with higher elevations experiencing the highest increase. Many Southern California cities have experienced their lowest recorded annual precipitation twice within the past decade. In a span of only two years, Los Angeles experienced both its driest and wettest years on record (DWR 2008; CCCC 2009).

This uncertainty complicates the analysis of future water demand, especially where the relationship between climate change and its potential effect on water demand is not well understood. The Sierra snowpack provides the majority of California's water supply by accumulating snow during the state's wet winters and releasing it slowly during the state's dry springs and summers. Based upon historical data and modeling DWR projects that the Sierra snowpack will experience a 25 to 40 percent reduction from its historic average by 2050. Climate change is also anticipated to bring warmer storms that result in less snowfall at lower elevations, reducing the total snowpack (DWR 2008).

Hydrology and Sea Level Rise

As discussed above, climate change could potentially affect: the amount of snowfall, rainfall, and snow pack; the intensity and frequency of storms; flood hydrographs (flash floods, rain or snow events, coincidental high tide and high runoff events); sea level rise

and coastal flooding; coastal erosion; and the potential for salt water intrusion. According to The Impacts of Sea-Level Rise on the California Coast, prepared by the CCCC (CCCC 2009), climate change has the potential to induce substantial sea level rise in the coming century. The rising sea level increases the likelihood and risk of flooding. The rate of increase of global mean sea levels over the 2001-2010 decade, as observed by satellites, ocean buoys and land gauges, was approximately 3.2 mm per year, which is double the observed 20th century trend of 1.6 mm per year (WMO 2013). As a result, sea levels averaged over the last decade were about 8 inches higher than those of 1880 (WMO 2013). Sea levels are rising faster now than in the previous two millennia, and the rise is expected to accelerate, even with robust GHG emission control measures. The most recent IPCC report (2013) predicts a mean sea-level rise of 11-38 inches by 2100. This prediction is more than 50 percent higher than earlier projections of 7-23 inches, when comparing the same emissions scenarios and time periods. A rise in sea levels could result in coastal flooding and erosion and could jeopardize California's water supply due to salt water intrusion. In addition, increased CO_2 emissions can cause oceans to acidify due to the carbonic acid it forms. Increased storm intensity and frequency could affect the ability of flood-control facilities, including levees, to handle storm events.

Agriculture

California has a $30 billion annual agricultural industry that produces half of the country's fruits and vegetables. Higher CO_2 levels can stimulate plant production and increase plant water-use efficiency. However, if temperatures rise and drier conditions prevail, water demand could increase; crop-yield could be threatened by a less reliable water supply; and greater air pollution could render plants more susceptible to pest and disease outbreaks. In addition, temperature increases could change the time of year certain crops, such as wine grapes, bloom or ripen, and thereby affect their quality (CCCC 2006).

Ecosystems and Wildlife

Climate change and the potential resulting changes in weather patterns could have ecological effects on the local and global levels. Increasing concentrations of GHGs are likely to accelerate the rate and severity of climate change impacts. Scientists project that the average global surface temperature could rise by 1.0-4.5°F (0.6-2.5°C) in the next 50 years, and 2.2-10°F (1.4-5.8°C) during the next century, with substantial regional variation. Soil moisture is likely to decline in many regions, and intense rainstorms are likely to become more frequent. Rising temperatures could have four major impacts on plants and animals: (1) timing of ecological events; (2) geographic range; (3) species' composition within communities; and (4) ecosystem processes, such as carbon cycling and storage (Parmesan 2006).

Regulatory Setting

The following regulations address both climate change and GHG emissions.

California Regulations

The ARB is responsible for the coordination and oversight of State and local air pollution control programs in California. California has numerous regulations aimed at reducing the State's GHG emissions. These initiatives are summarized below.

Assembly Bill (AB) 1493 (2002), California's Advanced Clean Cars program (referred to as "Pavley"), requires the ARB to develop and adopt regulations to achieve "the maximum feasible and cost-effective reduction of GHG emissions from motor vehicles." On June 30, 2009, the U.S. EPA granted the waiver of Clean Air Act preemption to California for its

greenhouse gas emission standards for motor vehicles beginning with the 2009 model year. Pavley I took effect for model years starting in 2009 to 2016 and Pavley II, which is now referred to as "LEV (Low Emission Vehicle) III GHG" will cover 2017 to 2025. Fleet average emission standards would reach 22 percent reduction from 2009 levels by 2012 and 30 percent by 2016. The Advanced Clean Cars program coordinates the goals of the Low Emissions Vehicles (LEV), Zero Emissions Vehicles (ZEV), and Clean Fuels Outlet programs and would provide major reductions in GHG emissions. By 2025, when the rules will be fully implemented, new automobiles will emit 34 percent fewer GHGs and 75 percent fewer smog-forming emissions from their model year 2016 levels (ARB 2011).

In 2005, the governor issued Executive Order (EO) S-3-05, establishing statewide GHG emissions reduction targets. EO S-3-05 provides that by 2010, emissions shall be reduced to 2000 levels; by 2020, emissions shall be reduced to 1990 levels; and by 2050, emissions shall be reduced to 80 percent below 1990 levels (CalEPA 2006). In response to EO S-3-05, CalEPA created the Climate Action Team (CAT), which in March 2006 published the Climate Action Team Report (the "2006 CAT Report") (CalEPA 2006). The 2006 CAT Report identified a recommended list of strategies that the state could pursue to reduce GHG emissions. These are strategies that could be implemented by various state agencies to ensure that the emission reduction targets in EO S-3-05 are met and can be met with existing authority of the state agencies. The strategies include the reduction of passenger and light duty truck emissions, the reduction of idling times for diesel trucks, an overhaul of shipping technology/infrastructure, increased use of alternative fuels, increased recycling, and landfill methane capture, etc. In April 2015, the governor issued EO B-30-15, calling for a new target of 40 percent below 1990 levels by 2030.

California's major initiative for reducing GHG emissions is outlined in Assembly Bill (AB) 32, the "California Global Warming Solutions Act of 2006," signed into law in 2006. AB 32 codifies the statewide goal of reducing GHG emissions to 1990 levels by 2020 (essentially a 15 percent reduction below 2005 emission levels; the same requirement as under S-3-05), and requires the ARB to prepare a Scoping Plan that outlines the main State strategies for reducing GHGs to meet the 2020 deadline. In addition, AB 32 requires the ARB to adopt regulations to require reporting and verification of statewide GHG emissions.

After completing a comprehensive review and update process, the ARB approved a 1990 statewide GHG level and 2020 limit of 427 MMT of CO_2e. The Scoping Plan was approved by the ARB on December 11, 2008, and included measures to address GHG emission reduction strategies related to energy efficiency, water use, and recycling and solid waste, among other measures. Many of the GHG reduction measures included in the Scoping Plan (e.g., Low Carbon Fuel Standard, Advanced Clean Car standards, and Cap-and-Trade) have been adopted since approval of the Scoping Plan. Implementation activities are ongoing and the ARB recently updated the Scoping Plan.

In May 2014, the ARB approved the first update to the AB 32 Scoping Plan. The 2013 Scoping Plan update defines the ARB's climate change priorities for the next five years and sets the groundwork to reach post-2020 goals set forth in EO S-3-05. The update highlights California's progress toward meeting the "near-term" 2020 GHG emission reduction goals defined in the original Scoping Plan. It also evaluates how to align the State's longer-term GHG reduction strategies with other State policy priorities, such as for water, waste, natural resources, clean energy and transportation, and land use (ARB 2017b).

Senate Bill (SB) 97, signed in August 2007, acknowledges that climate change is an environmental issue that requires analysis in CEQA documents. In March 2010, the California Resources Agency (Resources Agency) adopted amendments to the State CEQA Guidelines for the feasible mitigation of GHG emissions or the effects of GHG emissions.

The adopted guidelines give lead agencies the discretion to set quantitative or qualitative thresholds for the assessment and mitigation of GHGs and climate change impacts.

ARB Resolution 07-54 establishes 25,000 MT of GHG emissions as the threshold for identifying the largest stationary emission sources in California for purposes of requiring the annual reporting of emissions. This threshold is just over 0.005 percent of California's total inventory of GHG emissions for 2004.

Senate Bill (SB) 375, signed in August 2008, enhances the state's ability to reach AB 32 goals by directing ARB to develop regional GHG emission reduction targets to be achieved from passenger vehicles for 2020 and 2035. In addition, SB 375 directs each of the state's 18 major Metropolitan Planning Organizations (MPO) to prepare a "sustainable communities strategy" (SCS) that contains a growth strategy to meet these emission targets for inclusion in the RTP. On September 23, 2010, ARB adopted final regional targets for reducing GHG emissions from 2005 levels by 2020 and 2035.

The SCAG was assigned targets of an 8 percent reduction in GHGs from transportation sources by 2020 and a 13 percent reduction in GHGs from transportation sources by 2035. In the SCAG region, SB 375 also provides the option for the coordinated development of subregional plans by the subregional councils of governments and the county transportation commissions to meet SB 375 requirements.

In April 2011, the governor signed SB 2X, requiring California to generate 33 percent of its electricity from renewable energy by 2020.

On September 8, 2016, the governor signed Senate Bill 32 (SB 32) into law, extending AB 32 by requiring the State to further reduce GHGs to 40 percent below 1990 levels by 2030 (the other provisions of AB 32 remain unchanged). On December 14, 2017, the ARB adopted the 2017 Scoping Plan, which provides a framework for achieving the 2030 target. The 2017 Scoping Plan relies on the continuation and expansion of existing policies and regulations, such as the Cap-and-Trade Program, as well as implementation of recently adopted programs and policies, such as SB 350 and SB 1383 (see below). The 2017 Scoping Plan also puts an increased emphasis on innovation, adoption of existing technology, and strategic investment to support its strategies. As with the 2013 Scoping Plan Update, the 2017 Scoping Plan does not provide project-level thresholds for land use development. Instead, it recommends that local governments adopt policies and locally-appropriate quantitative thresholds consistent with a statewide per capita goal of six metric tons (MT) of CO_2e by 2030 and two MT of CO_2e by 2050 (ARB 2017c). As stated in the 2017 Scoping Plan, these goals may be appropriate for plan-level analyses (city, county, subregional, or regional level), but not for specific individual projects because they include all emissions sectors in the State.

Adopted on October 7, 2015, SB 350 supports the reduction of GHG emissions from the electricity sector through a number of measures, including requiring electricity providers to achieve a 50 percent renewables portfolio standard by 2030, a cumulative doubling of statewide energy efficiency savings in electricity and natural gas by retail customers by 2030.

Adopted in September 2016, SB 1383 requires the ARB to approve and begin implementing a comprehensive strategy to reduce emissions of short-lived climate pollutants. The bill requires the strategy to achieve the following reduction targets by 2030:

- Methane – 40% below 2013 levels
- Hydrofluorocarbons – 40% below 2013 levels
- Anthropogenic black carbon – 50% below 2013 levels

The bill also requires CalRecycle, in consultation with the State board, to adopt regulations that achieve specified targets for reducing organic waste in landfills.

For more information on the Senate and Assembly Bills, Executive Orders, and reports discussed above, and to view reports and research referenced above, please refer to the following websites: www.climatechange.ca.gov and www.arb.ca.gov/cc/cc.htm.

California Environmental Quality Act

Pursuant to the requirements of SB 97, the Resources Agency has adopted amendments to the State CEQA Guidelines for the feasible mitigation of GHG emissions or the effects of GHG emissions. The adopted CEQA Guidelines provide general regulatory guidance on the analysis and mitigation of GHG emissions in CEQA documents, while giving lead agencies the discretion to set quantitative or qualitative thresholds for the assessment and mitigation of GHGs and climate change impacts. To date, a variety of air districts have adopted quantitative significance thresholds for GHGs.

Regional Regulations

As discussed above, SB 375 requires MPOs to prepare an RTP/SCS that will achieve regional emission reductions through sustainable transportation and growth strategies. On September 23, 2010, the ARB adopted final regional targets for reducing GHG emissions from 2005 levels by 2020 and 2035. SCAG[3] was assigned targets of an 8 percent reduction in GHGs from transportation sources by 2020 and a 13 percent reduction in GHGs from transportation sources by 2035. Most recently, SCAG adopted the 2016-2040 RTP/SCS on April 7, 2016. It includes a number of strategies and objectives to encourage transit-oriented and infill development and use of alternative transportation to minimize vehicle use.

Local Regulations

The City of Palmdale adopted an Energy Action Plan (EAP) in August 2011 (City of Palmdale 2011). The EAP was developed to achieve energy independence, efficiency, and conservation; and establish land uses that reduce transportation time and costs, encourage job creation, and identify strategies to increase investment in the local economy. The primary purpose of the EAP was to identify how the City would use energy efficiency and independence strategies to achieve its GHG emission reduction target of 15 percent by 2020, consistent with the State's overall target to reduce GHG emissions statewide to 1990 levels by 2020. The EAP includes goals and measures focused on energy, water, transportation, land use, and solid waste to reduce GHG emissions and enhance the local economy, while reducing reliance on inefficient energy imports. The EAP establishes an emission reduction goal[4] and appears to be a qualified GHG reduction plan per the requirements of CEQA 15183.5. Specifically, the plan:

- Quantifies GHG emissions, both existing and projected over a specified period of time
- Establishes a level, based on substantial evidence, below which the contribution of GHG emissions from activities covered by the plan would not be cumulatively considerable

3 The Counties under SCAG's jurisdiction include: Imperial County, Los Angeles County, Orange County, Riverside County, and Ventura County, as well as all unincorporated areas in these counties.

4 Although the EAP establishes an emission reduction strategy, it is not consistent with the requirements of SB 32.

- Identifies and analyzes the GHG emissions resulting from specific actions or categories of actions anticipated within the City
- Specifies measures, including performance standards, that substantial evidence demonstrates, if implemented on a project-by-project basis, would collectively achieve the specified emissions levels
- Establishes a mechanism to monitor the plan's progress towards achieving the level and to require amendment if the plan is not achieving specified standards
- Was adopted in a public process following environmental review

3.2 Impact Analysis

Significance Thresholds

Based on Appendix G of the State CEQA Guidelines, impacts related to GHG emissions from the project would be significant if the project would:

- Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment
- Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of GHGs

The vast majority of individual projects do not generate sufficient GHG emissions to directly influence climate change. However, physical changes caused by a project can contribute incrementally to cumulative effects that are significant, even if individual changes resulting from a project are limited. The issue of climate change typically involves an analysis of whether a project's contribution towards an impact would be cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, other current projects, and probable future projects (CEQA Guidelines, Section 15064[h][1]).

For future projects, the significance of GHG emissions may be evaluated based on locally adopted quantitative thresholds or by establishing a project's consistency with a regional GHG reduction plan (such as a Climate Action Plan). Although the City of Palmdale has a qualified GHG reduction plan, the entirety of the project design features are not currently known and consistency with the specific EAP measures were not able to be determined at this time. However, the AVAQMD has adopted a GHG emissions threshold of 100,000 tons per year or 548,000 pounds per day for projects that are shorter than one year (AVAQMD 2016). Per the CEQA Guidelines, Lead Agencies have discretion to formulate their own significance thresholds. Therefore, the project-generated emissions were compared to the applicable AVAQMD adopted GHG threshold. Because project construction would take approximately 13 months, based on CalEEMod defaults, the emissions from each year of construction, as well as operation, are compared to 100,000 ton per year GHG threshold.

Study Methodology

This analysis is based on the methodologies recommended by the CAPCOA (2008) *CEQA and Climate Change* white paper and focuses on CO_2, CH_4, and N_2O because these make up 98.9 percent of all GHG emissions by volume and are the GHG emissions that the project would emit in the largest quantities (IPCC 2007). Fluorinated gases, such as HFCs, PFCs, and SF_6, were also considered for the analysis, but because the project involves residential development, the quantity of fluorinated gases would not be significant since fluorinated gases are primarily associated with industrial processes. Emissions of all GHGs are converted into their equivalent GWP in MT of CO_2e. Small amounts of other GHGs

(such as chlorofluorocarbons [CFCs]) would also be emitted; however, these other GHGs would not substantially add to the total GHG emissions. Calculations are based on the methodologies discussed in the CAPCOA *CEQA and Climate Change* white paper (CAPCOA 2008) and included the use of the California Climate Action Registry (CCAR) *General Reporting Protocol* (CCAR 2009). GHG emissions associated with the project were calculated using CalEEMod version 2016.3.2 (Appendix A). As outlined in *California Regulations*, SB 32 nor the 2017 Scoping Plan provides project-level thresholds for land use development; therefore, the applicable GHG threshold of 100,000 ton per year, as outlined in the *AVAQMD CEQA and Federal Conformity Guidelines*, was used to determine the potential GHG-related impacts of the project (AVAQMD 2016).

Construction Emissions

Although construction activity is addressed in this analysis, CAPCOA does not discuss whether any of the suggested threshold approaches adequately address impacts from temporary construction activity. Construction of the project would generate temporary GHG emissions primarily due to the operation of construction equipment and truck trips. Site preparation and grading typically generate the greatest amount of emissions due to the use of grading equipment and soil hauling. CalEEMod provides an estimate of emissions associated with the construction period, based on parameters such as the duration of construction activity, area of disturbance, and anticipated equipment to be utilized during construction. As mentioned, in Section 2.2, *Impact Analysis*, CalEEMod defaults for the types and number of pieces of equipment that would be used onsite during each of the construction phases were used. Additionally, the default CalEEMod phase lengths were used for each phase of construction excluding the architectural coating phase, which was extended to last approximately half of the building construction phase to reflect a more accurate construction schedule, as individual buildings would be painted as they are completed. Complete results from CalEEMod and assumptions can be viewed in Appendix A.

Operational Emissions

CalEEMod was also used to calculate operational emissions from the project, which include CO_2, N_2O, and CH_4. Energy-related emissions are from electricity and natural gas use. The emissions factors for natural gas combustion are based on EPA's AP-42, (Compilation of Air Pollutant Emissions Factors) and CCAR. Electricity emissions are calculated by multiplying the energy use by the carbon intensity of the utility district per kilowatt hour (CAPCOA 2017).

Emissions associated with area sources, including consumer products, landscape maintenance, and architectural coating were calculated in CalEEMod and utilize standard emission rates from the ARB, U.S. EPA, and district supplied emission factor values (CAPCOA 2017).

Emissions from waste generation were also calculated in CalEEMod and are based on the IPCC's methods for quantifying GHG emissions from solid waste using the degradable organic content of waste (CAPCOA 2017). Waste disposal rates by land use and overall composition of municipal solid waste in California was primarily based on data provided by the California Department of Resources Recycling and Recovery (CalRecycle).

Emissions from water and wastewater use calculated in CalEEMod were based on the default electricity intensity from the CEC's 2006 Refining Estimates of Water-Related Energy Use in California using the average values for Southern California.

For mobile sources, CO_2 and CH_4 emissions from vehicle trips to and from the project site were quantified using CalEEMod. Because CalEEMod does not calculate N_2O emissions from

mobile sources, N_2O emissions were quantified using the CCAR *General Reporting Protocol* (2009) direct emissions factors for mobile combustion (see Appendix A for calculations). The estimate of total daily trips associated with the project was based on CalEEMod defaults. Emission rates for N_2O emissions were based on the vehicle fleet mix output generated by CalEEMod and the emission factors found in the CCAR *General Reporting Protocol*.

Project Impacts

The following summarizes project emissions and compares calculated emissions to the recommended GHG emissions threshold of 100,000 tons of CO_2e per year.

Construction Emissions

As shown in Table 5, construction activity for the project would generate a maximum of approximately 451 tons of CO_2e.

Table 5 Estimated Construction Emissions of Greenhouse Gases

Construction Year	Annual Emissions (tons of CO_2e)
2019	451.1
2020	74.3
Maximum tons per year	451.1
Threshold[1]	100,000
Exceeds Threshold?	No

1. AVAQMD 2016

See Appendix A for CalEEMod results.

GHG emissions are reported in metric tons in CalEEMod; 1 metric ton (MT) = 1.10231 US ton (Ton)

Combined Construction, Stationary, and Mobile Source Emissions

Table 6 combines the 2020 construction emissions (Table 5) with the annual operational (stationary and mobile source) emissions associated with the project to provide a conservative estimate of the emissions that would be generated during 2020, when the project is both constructed and operational. The maximum combined annual emissions would total approximately 746 tons of CO_2e. These emissions do not exceed the AVAQMD threshold of 100,000 tons of CO_2e per year.

Table 6 Combined Annual Emissions Tons of CO_2e/year

Emission Source	Project Emissions
2020 Construction Emissions	74.3
Operational	
Area	26.7
Energy	159.9
Solid Waste	13.8
Water	30.1
Mobile	
CO_2 and CH_4	421.0
N_2O	20.1
Total	**745.9**
AVAQMD Threshold[1]	100,000
Exceeds Threshold?	No

1. AVAQMD 2016

GHG emissions are reported in metric tons in CalEEMod; 1 metric ton (MT) = 1.10231 US ton (Ton)

Source: Calculations were made in CalEEMod, see Appendix A for full model output. Values have been rounded

Consistency with GHG Reduction Plans and Policies

As discussed under *Regulatory Setting*, a few plans and policies have been adopted to reduce GHG emissions in the Southern California region and the City of Palmdale. Specifically, the project would be consistent with the SCAG RTP/SCS goals and policies. In addition to the RTP/SCS, the City of Palmdale has adopted an EAP. The goals of the EAP include reducing energy demand through energy conservation and efficiency; reducing water consumption for energy conservation; promoting renewable energy generation and use; reducing transportation emissions through alternative vehicles, trip reductions and consolidation, and efficient flow; implementing smart land use to reduce vehicular trips; reducing waste; and supporting the “buy-local” movement. The project design features have not yet been identified, therefore, the project’s consistency with the EAP cannot be sufficiently determined at this time. However, as required, the design and implementation of the proposed project would align with the goals of the CALGreen Building Standards, which include measures such as inclusion of water efficient plumbing fittings and fixtures, to reduce emissions. Further, the proposed project would comply with AVAQMD Rule 1113 that limits ROGs from building architectural coatings to 50 grams/liter (g/L). The proposed project would be constructed on a vacant site in close proximity to commercial uses (e.g. 0.4 miles to the intersection of East Avenue S and 47th Street East, where a variety of commercial uses are located, which include grocery stores, restaurants, gas stations, car repair stores, electronic/video game stores, beauty parlors, etc.) that would generate a maximum of approximately 746 tons of CO_2e per year. The construction and

operational GHG emissions are well below the AVAQMD-recommended significance threshold of 100,000 tons of CO_2e per year.

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Appendix A

CalEEMod Air Quality and Greenhouse Gas Modeling Results

Appendix B

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

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

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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.

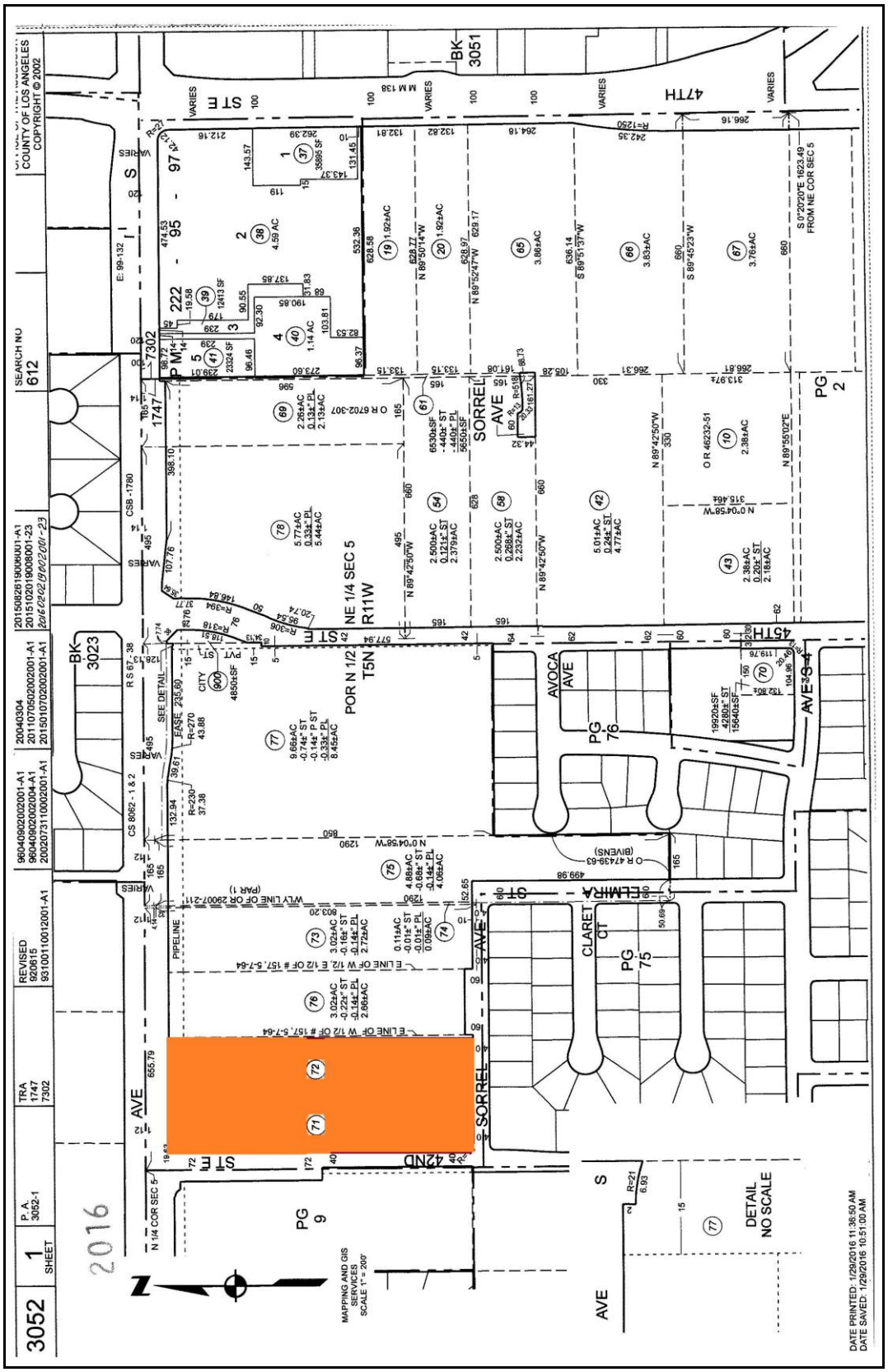

Figure 1. Location of proposed project site as depicted on APN map.

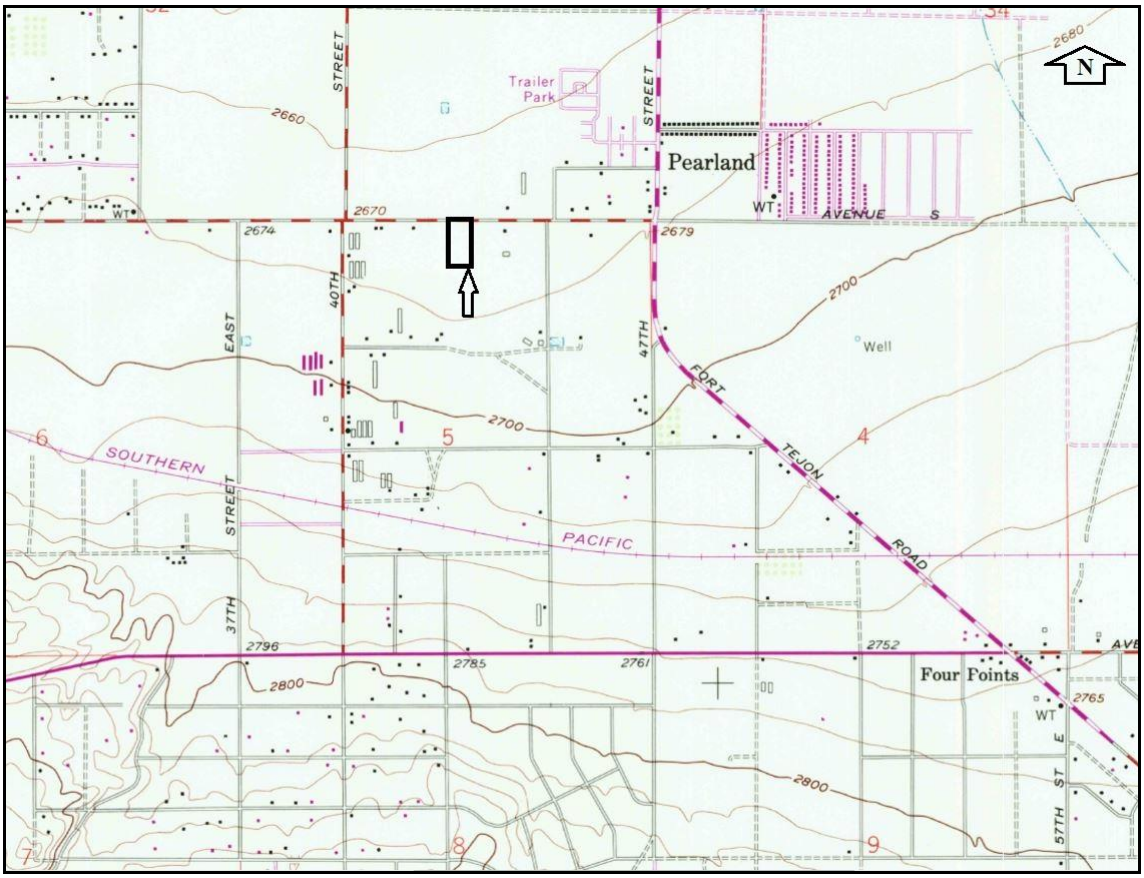

Figure 2. Approximate location of study area as depicted on excerpt from U.S.G.S. Quadrangle, Palmdale, Calif., 7.5' 1974.

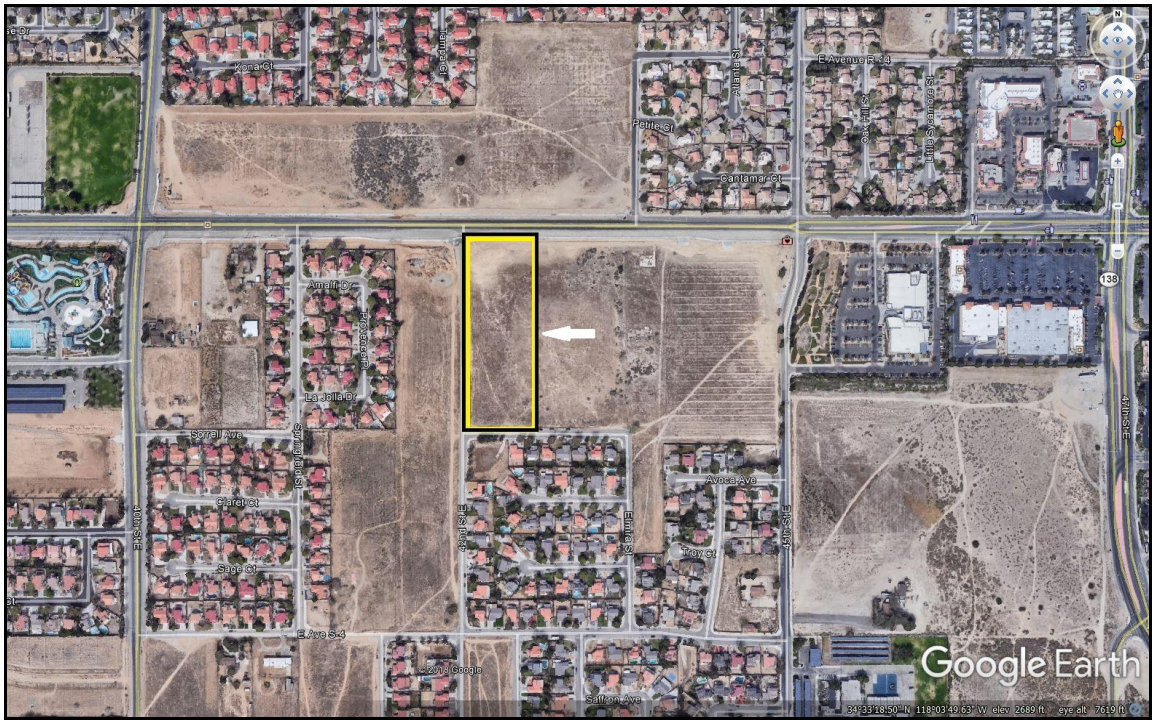

Figure 3. Approximate location of study area as depicted on excerpt from Google Earth accessed 6 February 2018, showing surrounding land use.

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 C

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.

REGISTERED PROFESSIONAL ENGINEER
RYAN DANIEL DUKE
9/2018
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CIVIL ENGINEER
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GEOTECHNICAL INVESTIGATION REPORT

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APPENDIXES

Appendix A	**Boring Logs and Classification Key**
Appendix B	**Laboratory Test Data**
Appendix C	**USGS Seismic Design Summary Report**
Appendix D	**General Earthwork and Grading Guidelines**

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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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.

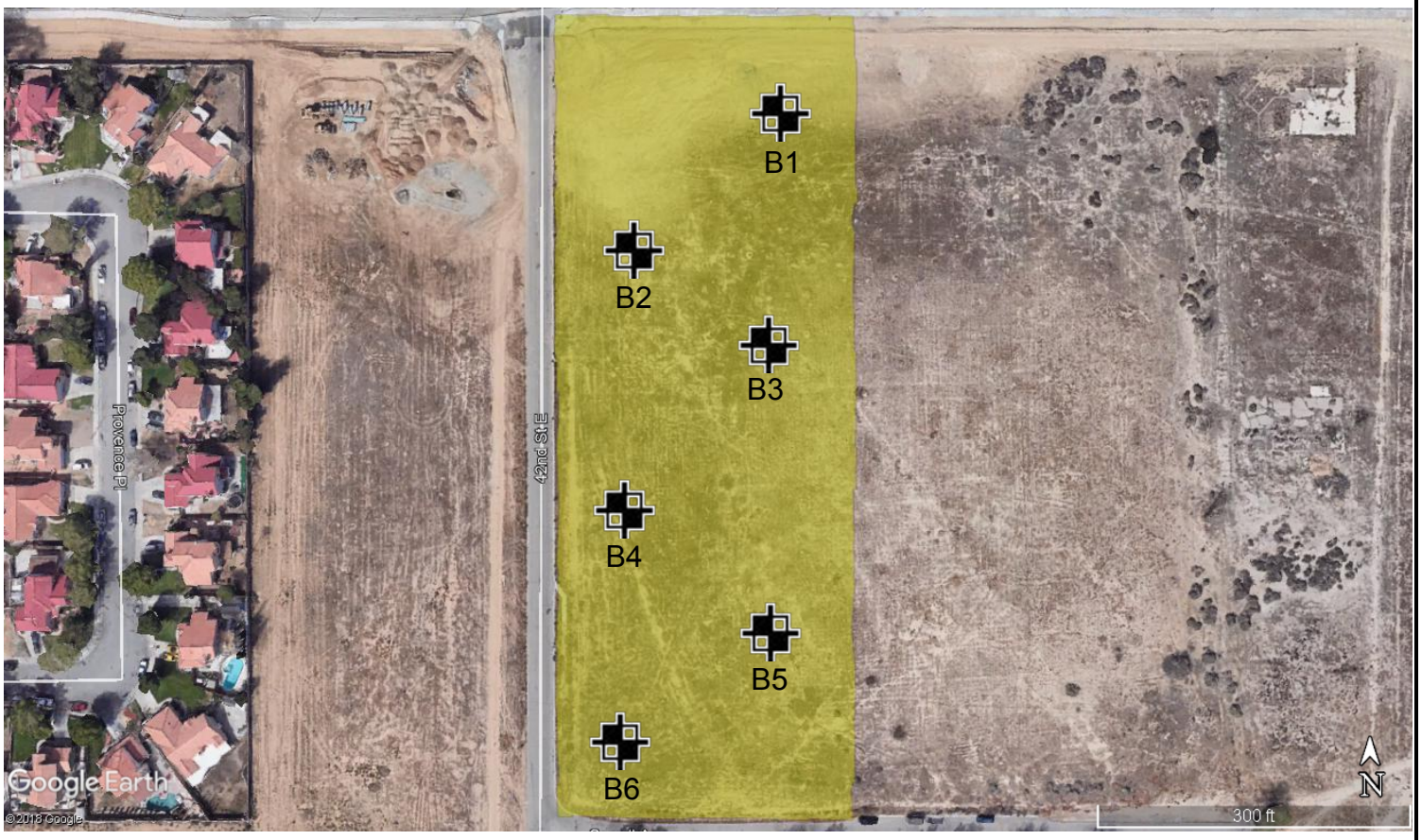
4.2 Laboratory Testing

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/(ft^2-hr-inHg)] and comply with the ASTM E1745 Class A requirements. Install vapor barrier according to ASTM E1643, including proper perimeter seal. Basis of design: Stego Wrap Vapor Barrier 15 mil and Stego Crete Claw Tape (perimeter seal tape). Approved Alternatives: Vaporguard by Reef Industries, Sundance 15 mil Vapor Barrier by Sundance Inc.

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

Bruin Geotechnical Services
44732 Yucca Avenue
Lancaster, CA 93534
(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

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
	■	SM		Yellowish brown silty fine to coarse sand w/ occ. #4 gravel medium dense, dry	8-10	113.2	1.2
5'							
	■	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

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

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
5'	■	SM		Yellowish brown silty fine to coarse sand w/ occ. #4-3/5" gravel medium dense, slightly moist	14-14	110.0	3.1
	■	SM		Yellowish brown silty fine to coarse sand w/ occ. #4 gravel medium dense, moist	17-17	113.9	5.2
10'	■	SM		Yellowish brown silty fine to coarse sand w/ occ. 3/8" gravel & DG medium dense, slightly moist	14-16	107.2	3.9
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

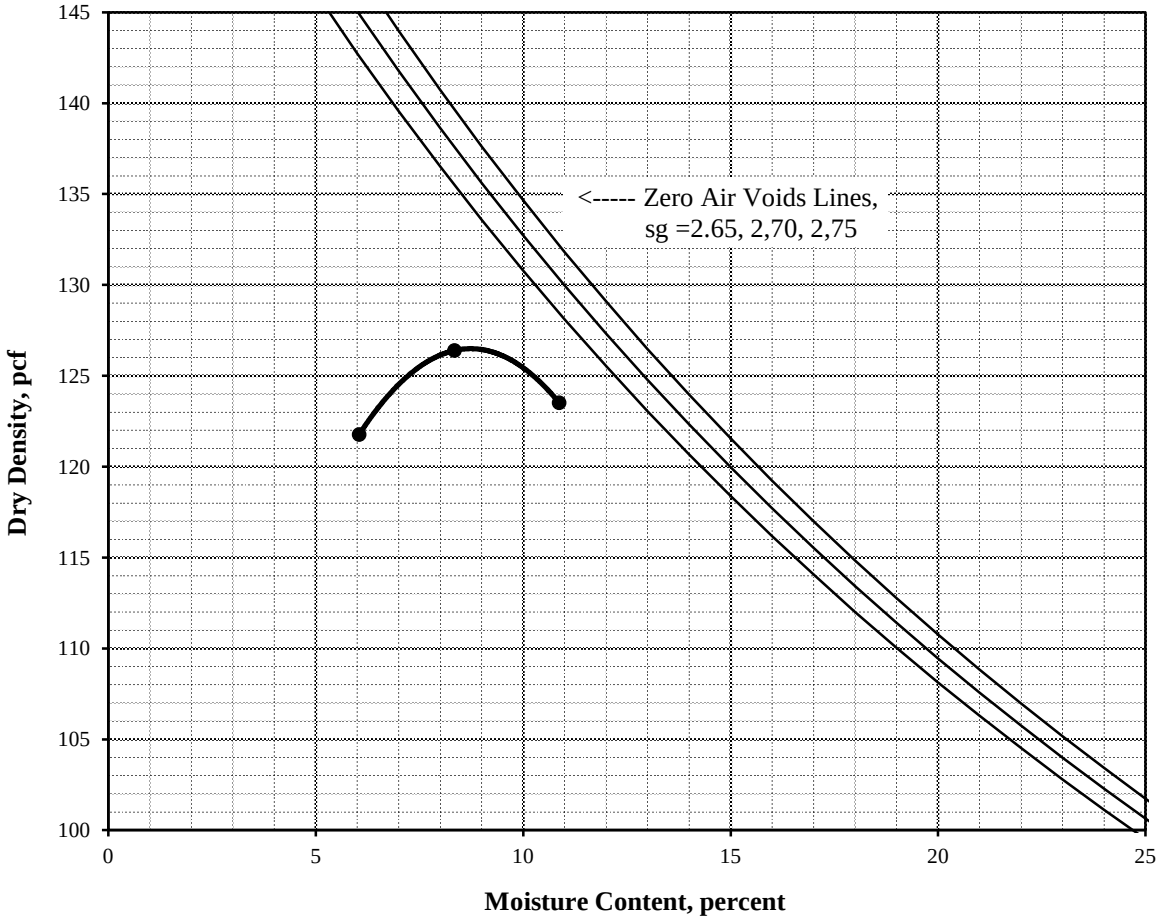
Bruin Geotechncial Services Inc.
44732 Yucca Avenue
Lancaster, CA 93534
661-273-9078

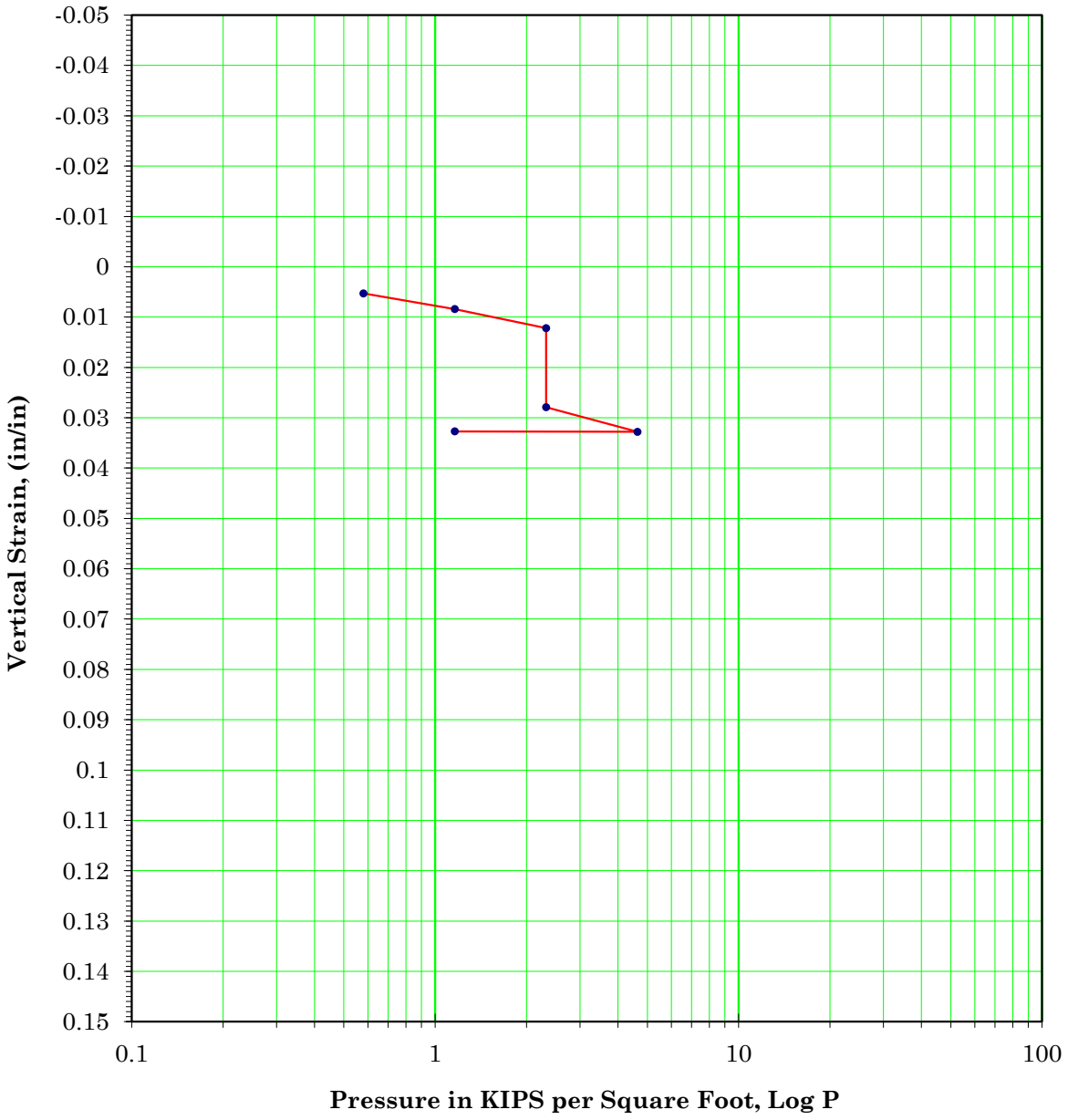
Maximum Density/Optimum Moisture Proctor ASTM D698/D1557

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	

Maximum Density: **126.5 pcf**
Optimum Moisture: **8.5%**

Sieve Size	% Retained
3/4"	
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

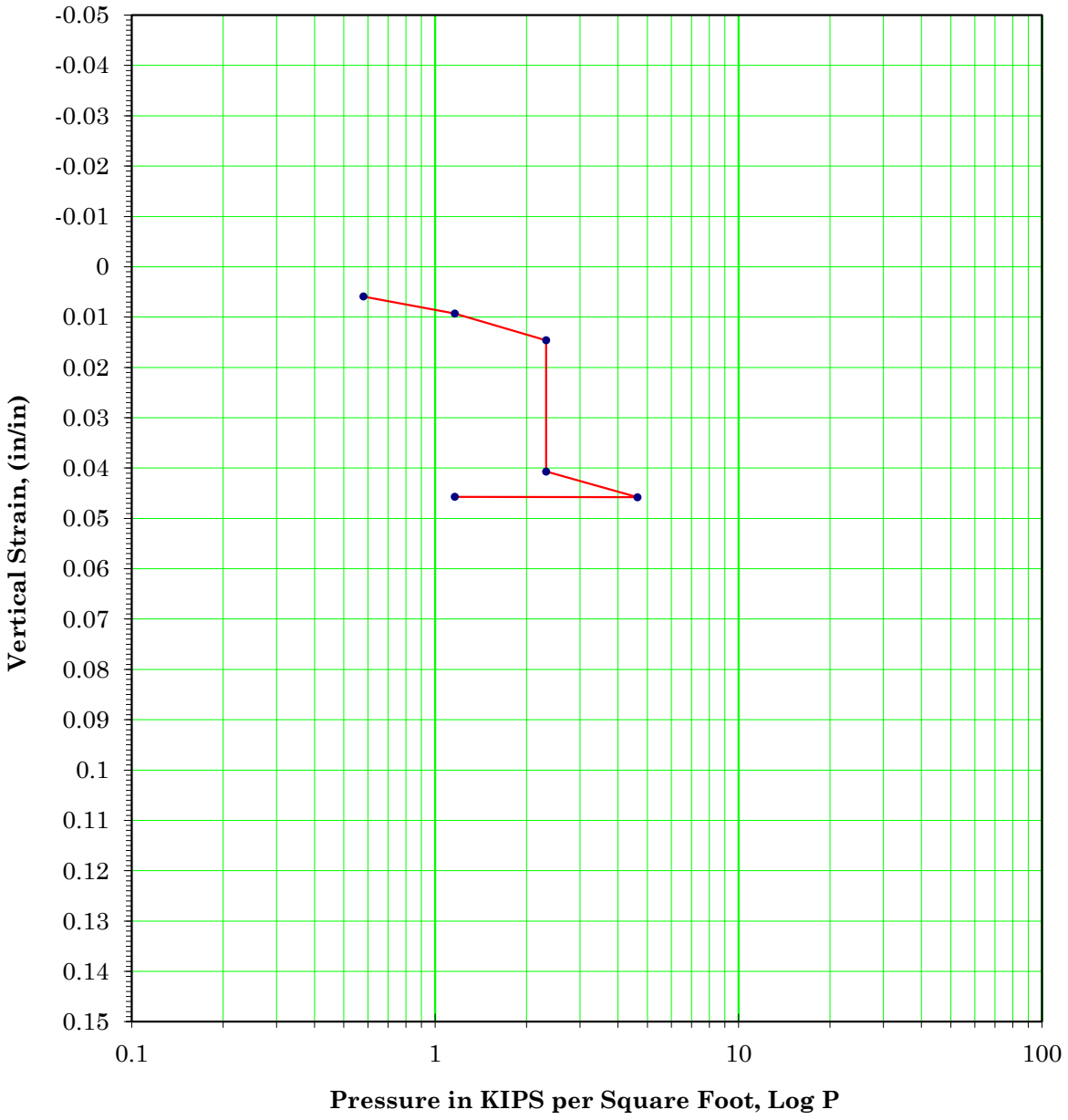
Consolidation Test

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

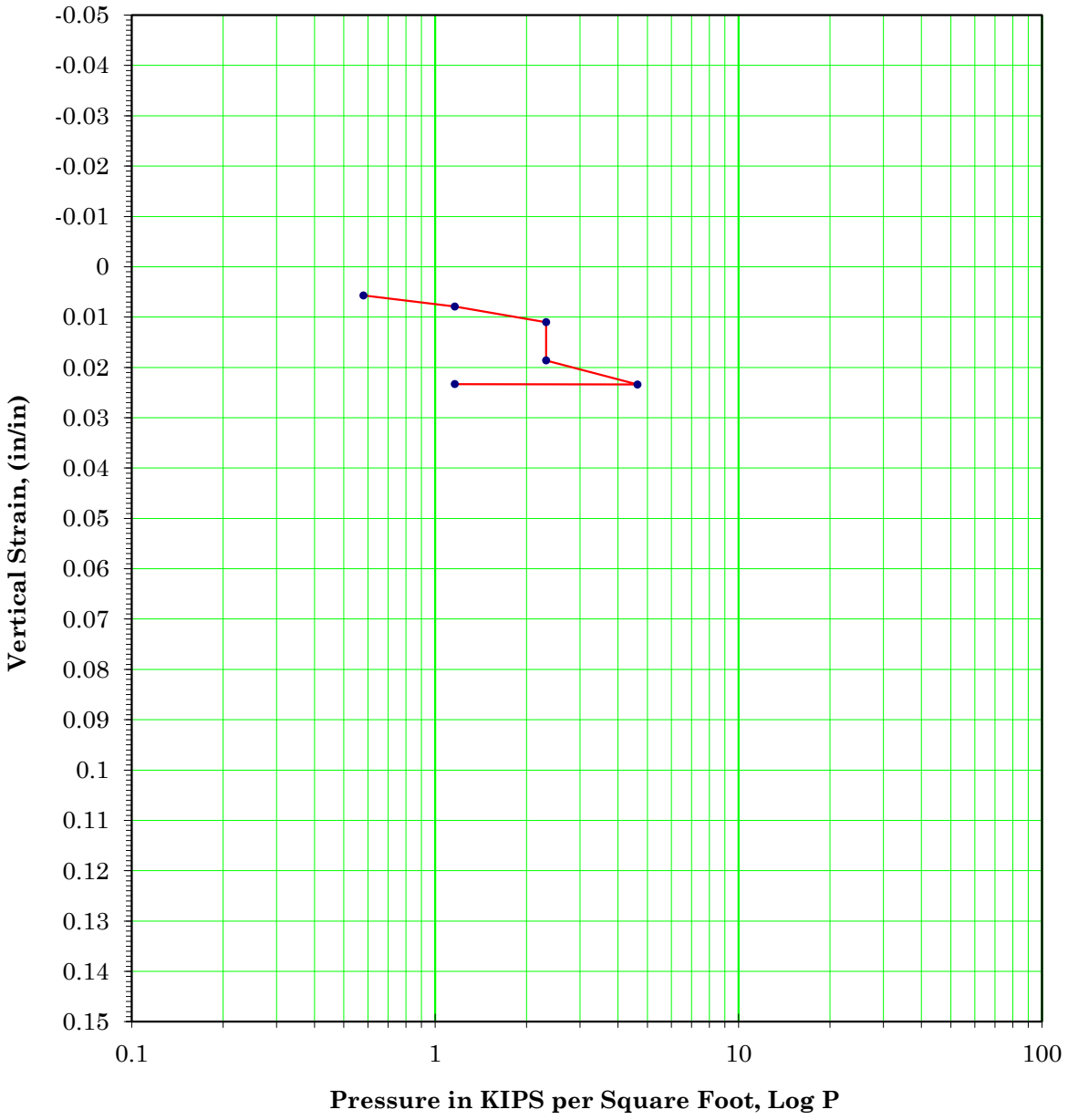
Consolidation Test

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

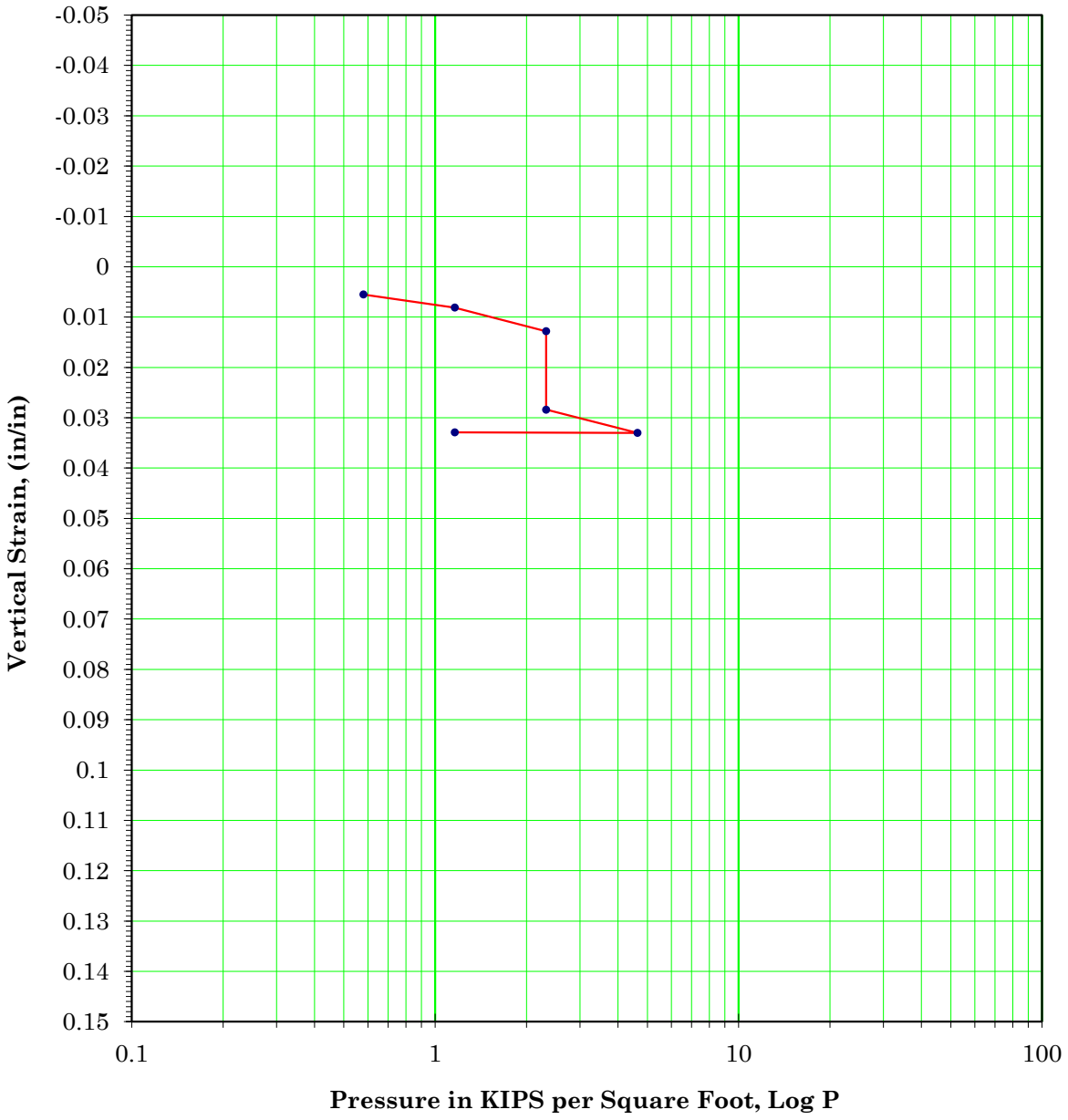
Consolidation Test

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

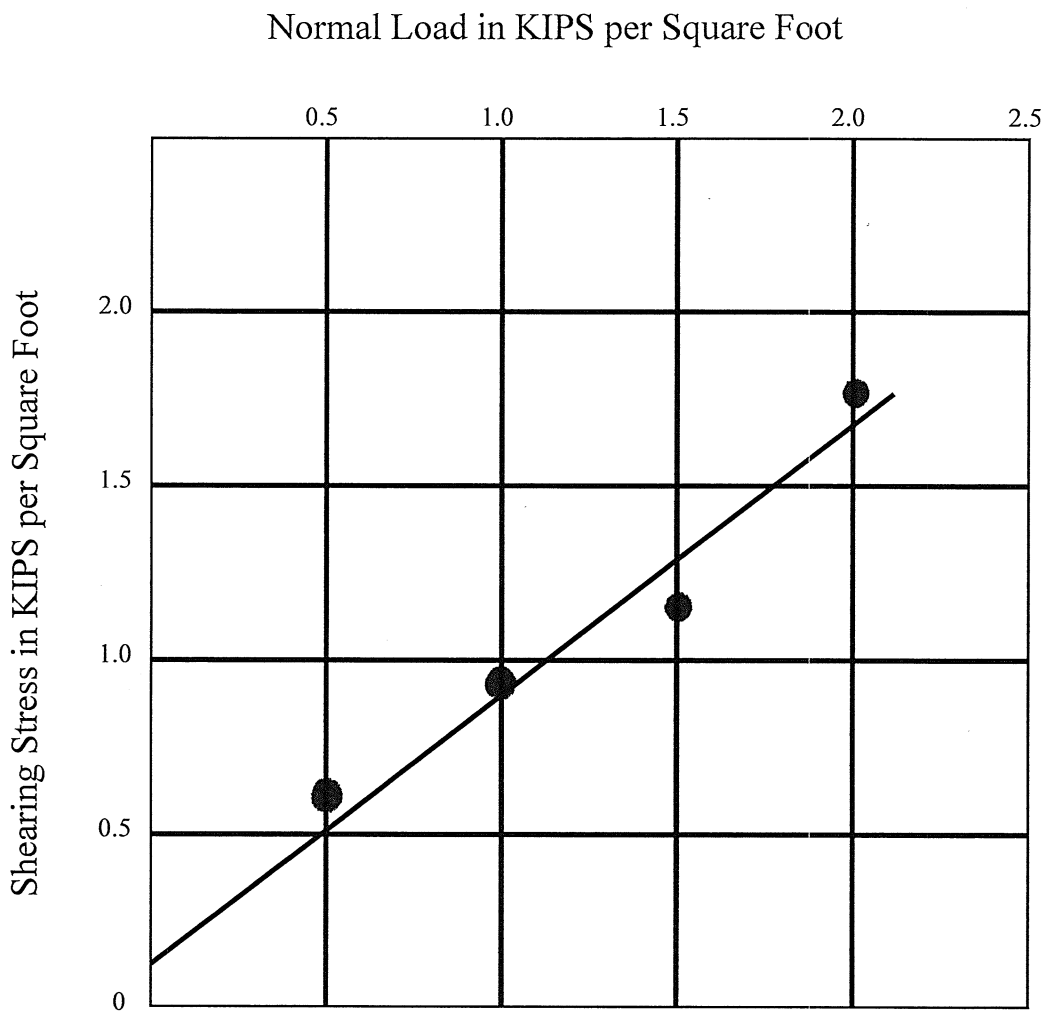
Creativity Investments, LLC

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

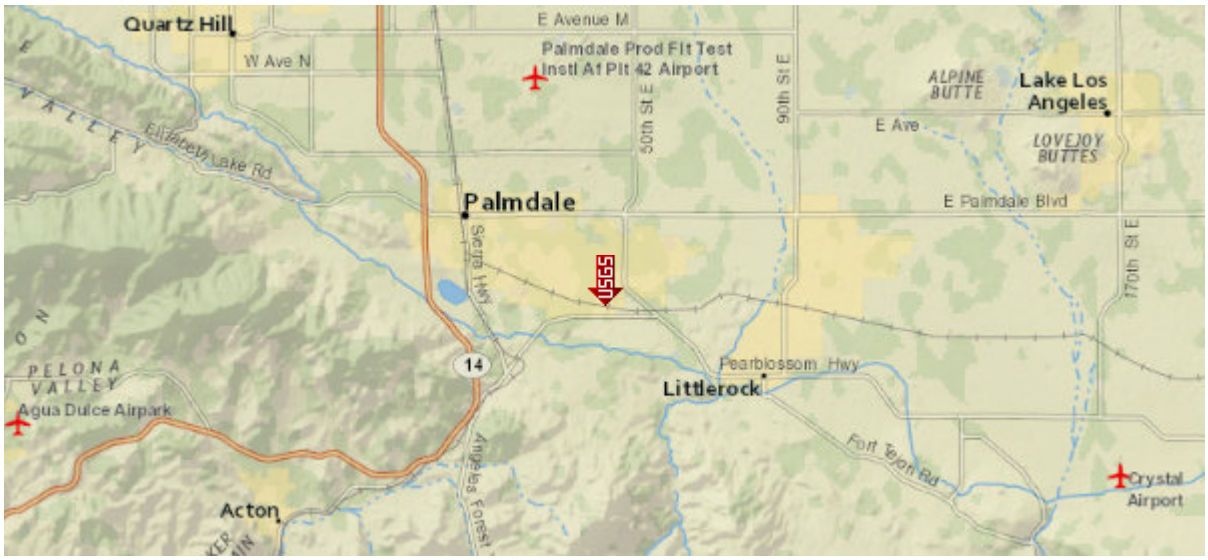
APPENDIX C

USGS Seismic Design Summary Report

USGS Design Maps Summary Report

User–Specified Input

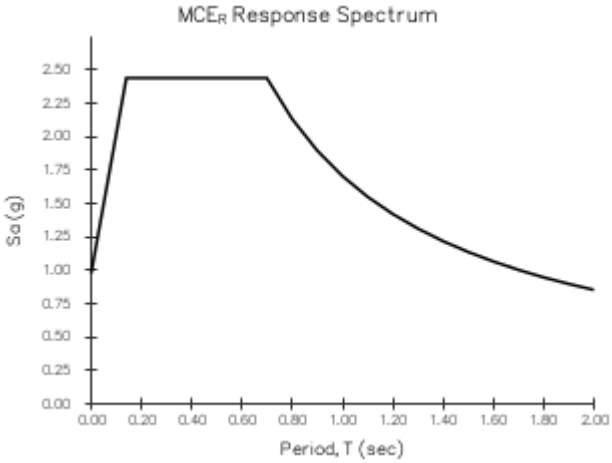
Report Title	18-18 Creativity Investments Mon March 19, 2018 15:16:12 UTC
Building Code Reference Document	2012/2015 International Building Code (which utilizes USGS hazard data available in 2008)
Site Coordinates	34.55587°N, 118.05406°W
Site Soil Classification	Site Class D – "Stiff Soil"
Risk Category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

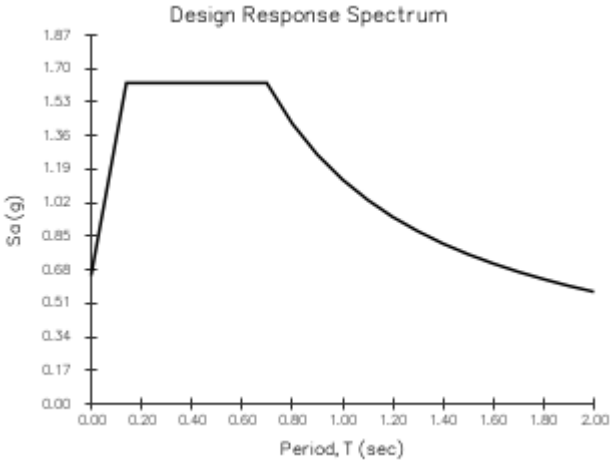


USGS–Provided Output

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	$\bar{v}_s$	$\bar{N}$ or $\bar{N}_{ch}$	$\bar{s}_u$
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 $\bar{s}_u$ < 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				
	$S_S \leq 0.25$	$S_S = 0.50$	$S_S = 0.75$	$S_S = 1.00$	$S_S \geq 1.25$
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				
	$S_1 \leq 0.10$	$S_1 = 0.20$	$S_1 = 0.30$	$S_1 = 0.40$	$S_1 \geq 0.50$
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): $S_{DS} = \frac{2}{3} S_{MS} = \frac{2}{3} \times 2.440 = 1.627$ g

---

Equation (16-40): $S_{D1} = \frac{2}{3} S_{M1} = \frac{2}{3} \times 1.705 = 1.137$ 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 D

HYDROLOGY STUDY

APN 3052-001-071 & 072
42nd Street East & Avenue S
Palmdale, California

Prepared For:

Creativity Investments, LLC
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Palmdale, CA 93551

Prepared By:

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Phone 661-992-8199

Date: November 12, 2019

REGISTERED PROFESSIONAL ENGINEER
RYAN DUKE
C079729
Exp. 9-30-20
CIVIL
STATE OF CALIFORNIA

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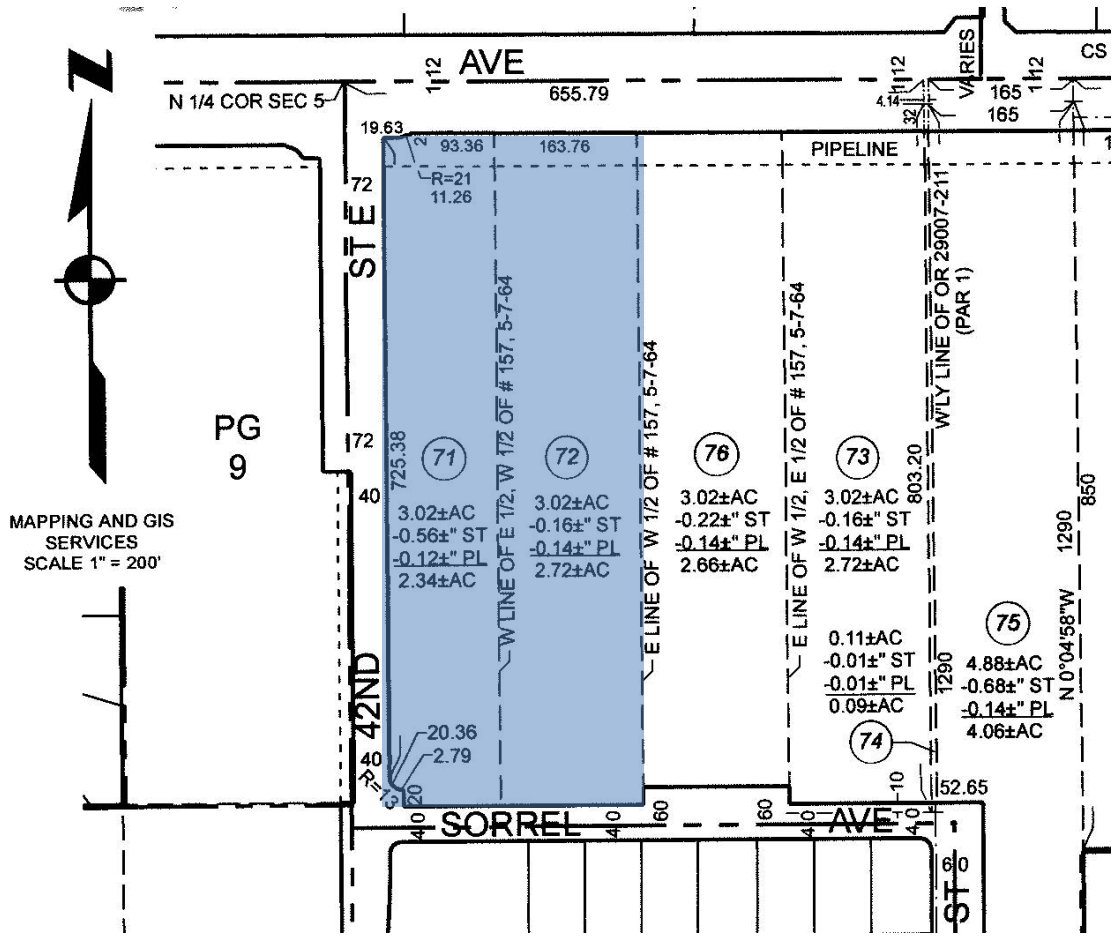
Introduction:

The purpose of this report is to address the drainage conditions within and tributary to the subject property located at 42nd Street East and Avenue S in the City of Palmdale. This report will quantify the storm water run-off from both the pre-developed and post-developed conditions to adequately size storm water mitigation measures.

Project Location

The project site is located at the southeast corner of the intersection at 42nd Street East and Avenue S. The subject property is approximately 6 acres and is currently undeveloped native desert with a residential community along the southerly boundary. The North, East, and West property lines are adjacent to undeveloped native desert. The subject property of undeveloped native desert is the primary focus of this analysis.



Existing Conditions:

The existing condition of the project site is a native desert (undeveloped parcel) with improvements on three sides. The improvements consist of partially paved roads for Avenue S (North), 42nd Street West (West) and Sorrel Avenue (South) of the project site. To the East of the project site is currently undeveloped native desert. On-site the existing terrain drains from South to North with an average slope of 0.50%. The site has not been previously graded and has no concentrated flow paths within the site. The current storm drainage, sheet flows through the project site.

Offsite, a graded swale along the Easterly half of 42nd Street East collects storm water runoff from the subject parcel and periodically outlets into the public curb and gutter via parkway drains or cross gutters.

Proposed Conditions:

The proposed conditions consist of fully improving Avenue S, and Sorrel Avenue, with half street improvements along 42nd Street East. Currently there is no tributary area South of the project site, as an existing storm water basin located just South of the project site has been constructed to mitigate storm water, and the emergency overflow outlets along Southerly half of Sorrel Avenue which then drains to the East.

The proposed on-site conditions consist of building 80 residential units (18 Multi-Family Structures) with an onsite Community Building. The site will have parking located adjacent to the buildings and driveways into the proposed garages. A center paved drive aisle is designed along the center of the development from South to North. Along the Northerly edge of the subject property is a proposed shallow detention basin to mitigate the storm water run-off. On-site ribbon gutters, catch basin and storm drain pipe will collect and convey the storm water run-off into the proposed onsite basin.

Rainfall Data:

This site has the following rainfall data:

Storm Frequency = 50, 25, 10 Year
Isohyet Line = 2.8 (See Figure 4)
Soil Number = 120 (See Figure 4)

Storm Runoff:

The LA County MODRAT model is used to determine the storm runoff values. The individual sub areas are shown on the hydrology map (Section 1). The Tc calculation formula is shown below.

On-Site Areas:

Tc = 0.31 * (Cd*It) ^ -0.519 * (L) ^ 0.483 * (S) ^ -0.135
(Cd * It) = Rainfall excess in inches per hour
Cd = (0.9 * IMP) + (1-IMP) * Cu ; (Runoff Coefficient adjusted for development)
It = I1440 * (It / I1440) ; (Rain fall intensity at t-minutes in inches per hour)
L = Longest Flow Path
S = Slope

The results from the WMS program using the MODRAT computer model calculations are shown in the Calculations Section.

Conveyance:

The current drainage pattern of the proposed site is from south to north, with sheet flow across the project towards the paved drive aisles where ribbon gutters will collect the storm water until the run-off reaches the detention basin.

There is no off-site tributary drainage upstream from the property, and therefore no offsite analysis is needed.

The proposed improvements will complement the existing drainage pattern and will flow along the gutter system of the subject property and terminate along the northern property line in the onsite detention basin. The proposed improvements begin with ribbon gutters along the proposed drive aisle that drain into the proposed catch basin which will be located along the northern portion of the proposed gutter. These catch basins will flow via underground storm drain, to the proposed retention basin located at the northeast end of the site.

The Post Developed Storm Water Run-off accumulates a flow rate of 4.07 CFS (See Section 3). The Manning's Storm Drain Sizing calculator will determine the adequate size pipe to collect and convey this developed storm water into the proposed detention basin facility.

Storm Drain Sizing:

18" Storm Drain Pipe - Mannings Calculation

Q = (1.49/n)A(R^2/3)(S^1/2)

Q =	6.74	CFS	>> Actual Flow Rate 'OK'	
Depth of Flow =	1.125	ft	P =	5.47
Mannings 'n'	0.013			
R (Hydraulic Radius)	0.323	ft		
Slope	0.005	ft/ft		
Radius	0.750	ft		
Area (Circle)	1.766	sq ft		

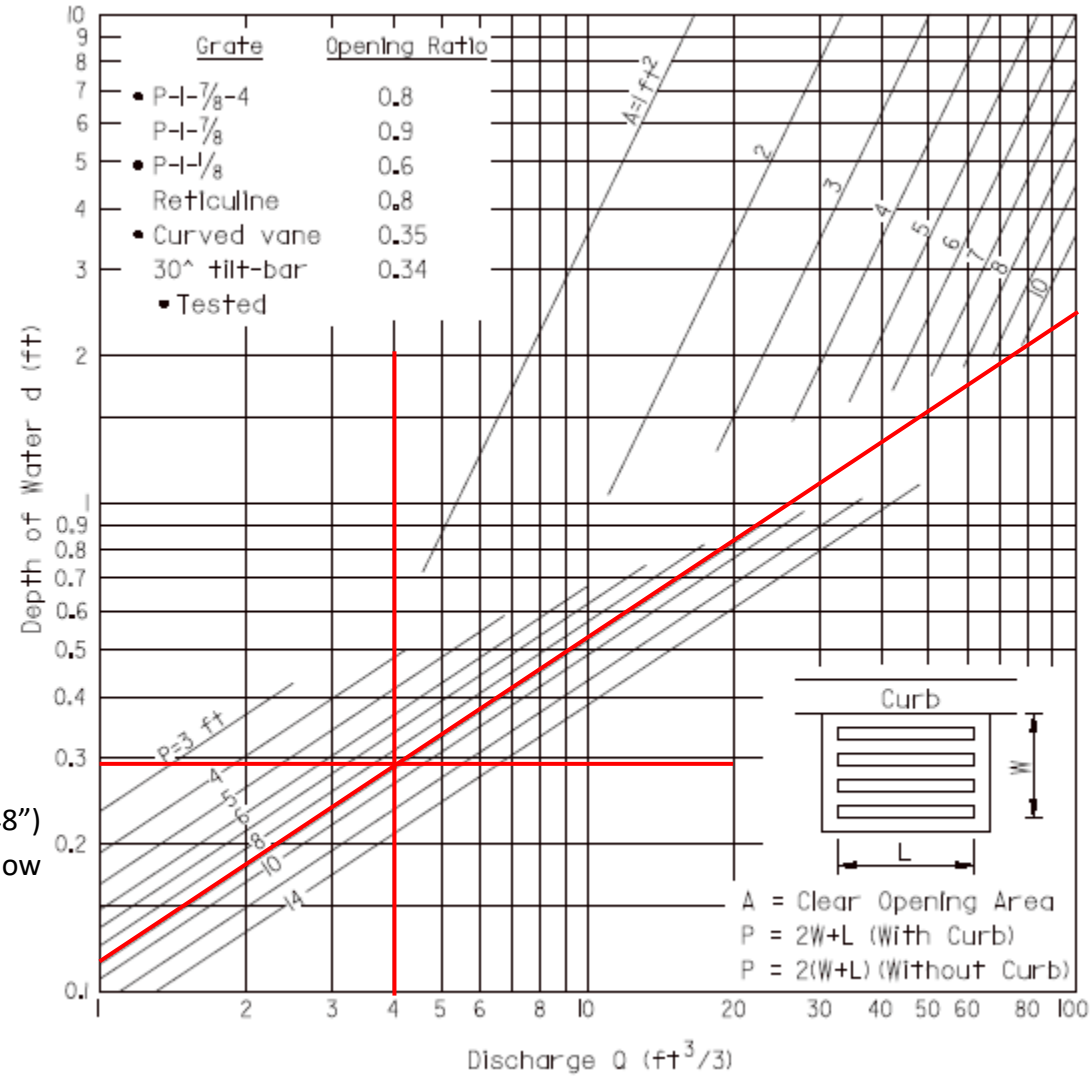
SECTION 1:
CAPACITY CALCULATIONS

Catch Basin A: <u>Minimum Size 24”x24”</u> (Located at the center of the of the drive aisle)

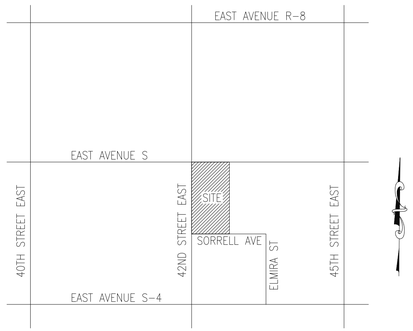
A grated inlet catch basin will be installed in a sump condition to collect the on-site runoff and route the flow into the proposed storm drain line and ultimately into the detention basin. The tributary area to this catch basin collects **<u>4.07 CFS</u>** during a 25 Year Storm Event. The grated inlet capacity is shown below, with a 3.48” depth of flow.

Capacity Calculation:

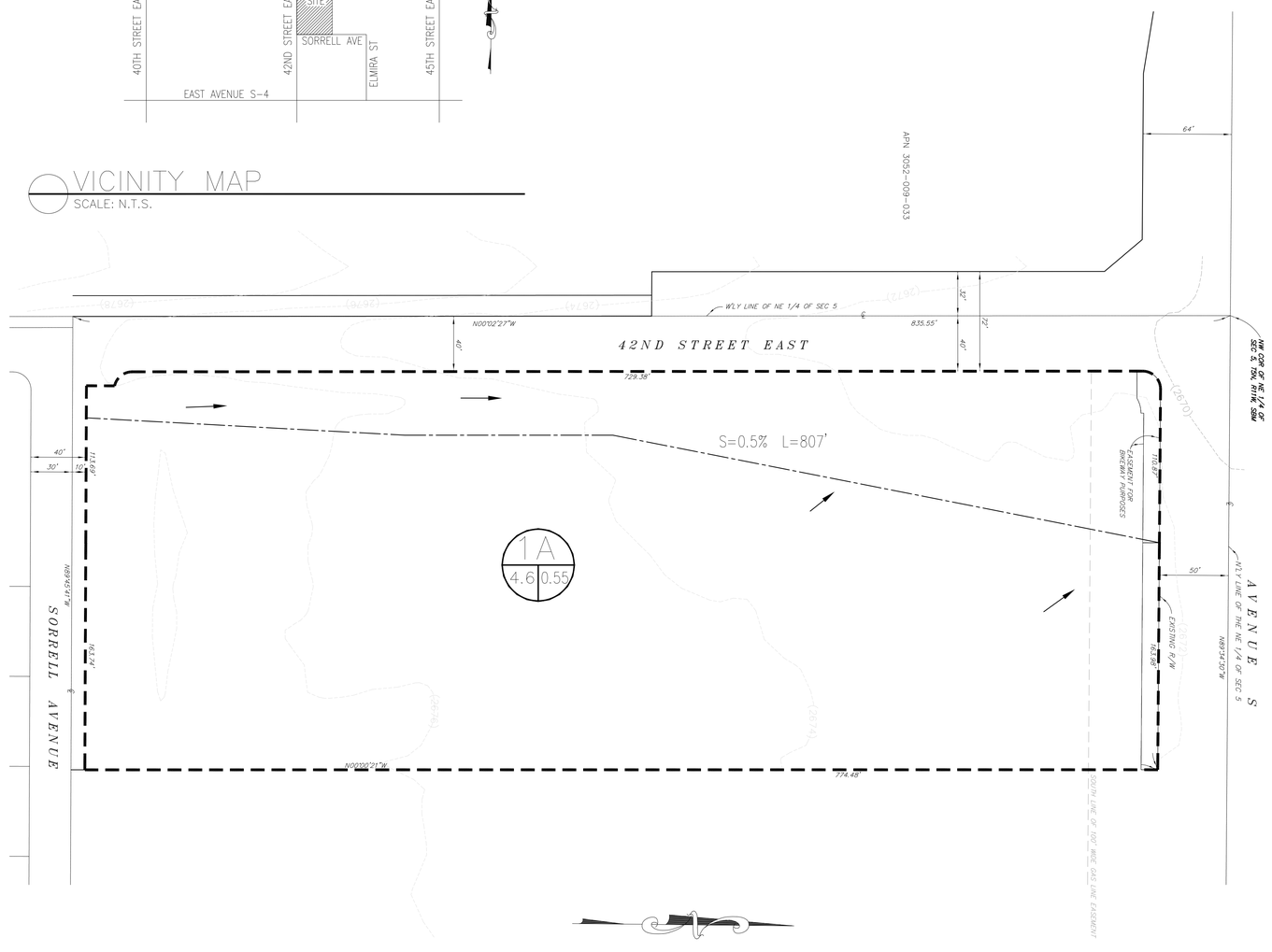
.29’ (3.48”)
Depth of Flow



SECTION 2:
ON-SITE PRE-DEVELOPED AREA & CALCULATIONS



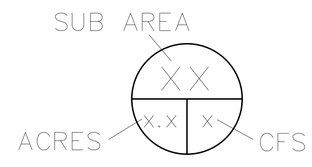
VICINITY MAP
SCALE: N.T.S.



OVERALL SITE

HYDROLOGY ANALYSIS			
SUB-AREA	AREA	CFS	AC-FT
1A	4.6	0.55	0.17
TOTAL	4.6	0.55	0.17

TOTAL VOL. 0.17 AC-FT



PROJECT DEVELOPER

CREATIVITY INVESTMENTS LLC.

CIVIL ENGINEERS

Duke Engineering
CIVIL & STRUCTURAL
LANCASTER - CALIFORNIA

Sheet Title

PRE DEVELOPED HYDROLOGY MAP

Drawn By: AO

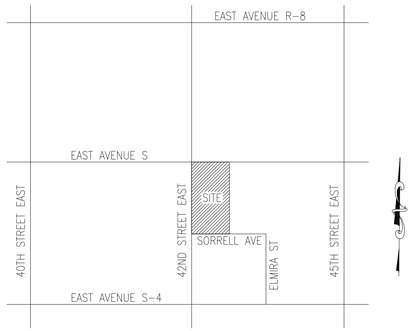
Checked By: DUKE

Project No. 18032

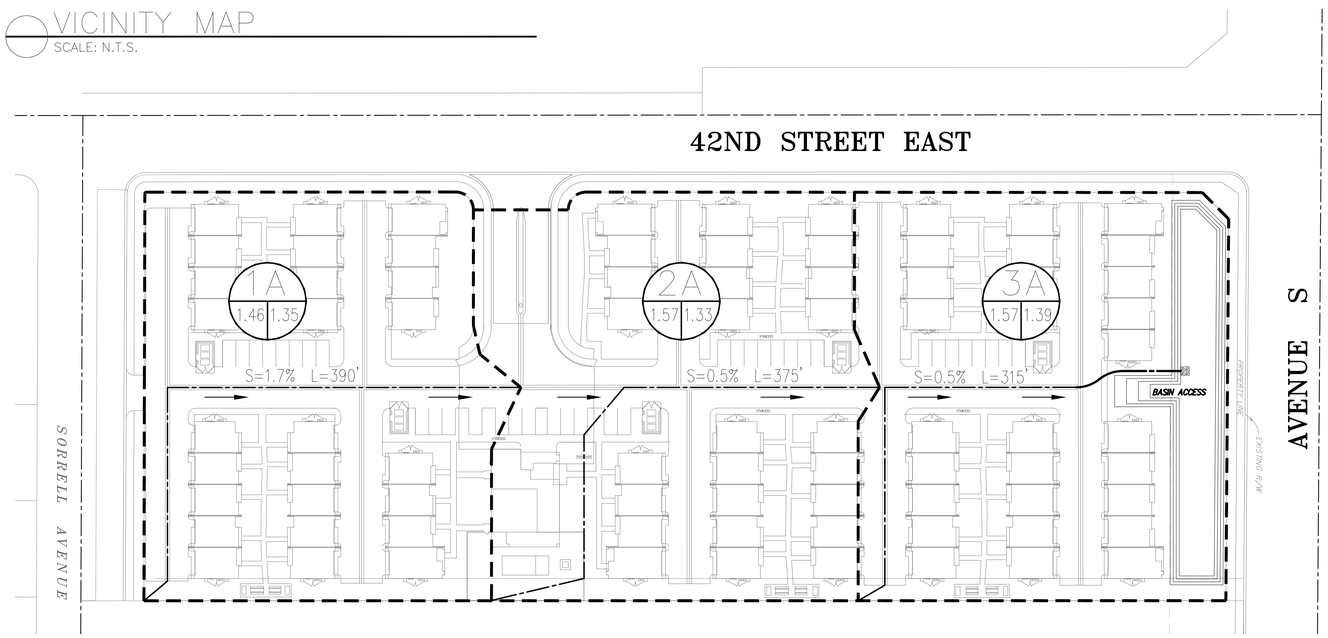
Sheet

PRE-DEV

SECTION 3:
ON-SITE POST-DEVELOPED AREAS & CALCULATIONS



VICINITY MAP
SCALE: N.T.S.



OVERALL SITE

HYDROLOGY ANALYSIS POST			
SUB-AREA	AREA	CFS	AC-FT
1A	1.46	1.35	0.25
2A	1.57	1.33	0.27
3A	1.57	1.39	0.27
TOTAL	4.60	4.07	0.79
L.S.& R/W	0.51		

BASIN SIZE

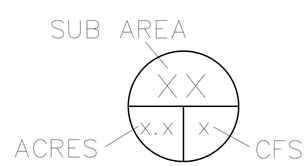
STORM RUN OFF		
	85% PRE	POST
RUNOFF	.14 AC. FT	.79 AC. FT
DELTA	0.65 AC. FT.	

TOTAL VOL. 0.65 ACRE FEET

CU. FT. OF WATER TO RETAIN ON SITE – 28,310 CU. FT.

BASIN VOLUME

BASIN DESIGN VOLUME		
DEPTH	VOLUME	AREA
1' DEEP	0.19 AC-FT	8,137 SF
2' DEEP	0.22 AC-FT	9,459 SF
3' DEEP	0.25 AC-FT	10,860 SF
TOTAL	0.66 AC-FT	28,456 SF



PROJECT DEVELOPER

CREATIVITY INVESTMENTS LLC.

CIVIL ENGINEERS

Duke Engineering
CIVIL & STRUCTURAL
LANCASTER - CALIFORNIA

Sheet Title

POST DEVELOPED HYDROLOGY MAP

Drawn By: AO

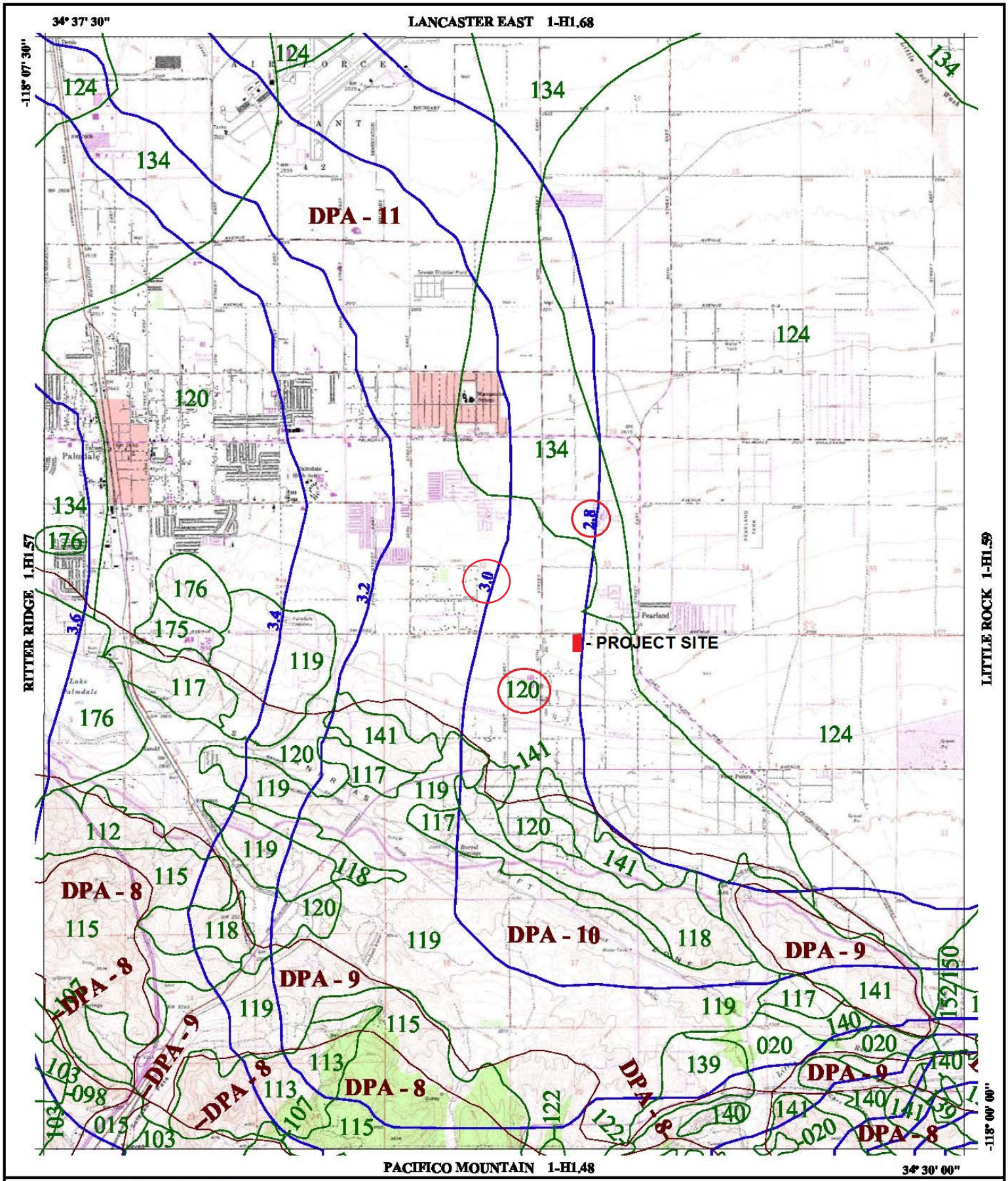
Checked By: DUKE

Project No. 18032

Sheet

POST-DEV

SECTION 4:
ISOHYET MAP



016 SOIL CLASSIFICATION AREA

7.2 INCHES OF RAINFALL

DPA - 6 DEBRIS POTENTIAL AREA

N S E W

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

SEWER AREA STUDY

42nd Street East and Avenue S
Palmdale, CA 93552

Owner:

Creativity Investments LLC.

Prepared By:

Duke Engineering
44732 Yucca Avenue
Lancaster, CA 93534
Phone: 661-952-7918

REGISTERED PROFESSIONAL ENGINEER
RYAN DUKE
C079729
Exp. 9-30-20
CIVIL
STATE OF CALIFORNIA

ENGINEER'S CERTIFICATION:

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

Date: November 12, 2019

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Introduction

The purpose of this study is to determine the increase in effluent produced by the proposed project and project its impact on the existing sanitary sewer infrastructure.

Approach:

The approach that will be used in determining this increase in effluent will be by both 'Estimated Average Daily Sewage Flows by Occupancies' and 'Zoning Coefficients'. The greater of the two values will be used in determining the projects increase in effluent.

Purpose:

The purpose of this analysis will be to determine if the increase in effluent will exceed the allowable maximum flow depth of the existing sanitary sewer system. The study will also size the proposed sewer main lines to adequately serve the project site and any tributary areas.

Project Location:

The project site is located at the South-East corner of 42nd Street East and Avenue S. The Subject Property is approximately 5.11 Acres and is currently undeveloped native desert with partial Street Improvements along the Northerly, Westerly, and Southerly boundary line, and vacant land to the East of the Subject Property.

Project Use:

The proposed Project will be a Multi-Family housing development that will construct 80 Units and adjacent Community Amenity buildings. The project will construct an on-site sanitary sewer system that will collect effluent from each structure and convey the effluent to an on-site 8" main that will flow from South to North, towards Avenue S. The site will connect via sewer tie-in to the existing manhole located in the 15" VCP main line located along Avenue S. The manhole location is East of the intersection of 42nd Street East and Avenue S within the alignment of Avenue S.

Analysis

Onsite Sewer Area Study

The proposed project of 80 residential units within 18 multi-family structures will develop the following effluent:

Analysis A: *'Estimated Average Daily Sewage Flows for Various Occupancies'*

Unit Types:

Plan No.	Type	Count	Avg Dly Flow	ADF_{Total}	
Plan 1	1 Bedroom Units	8	200	1,600	
Plan 2	2 Bedroom Units	44	250	11,000	
Plan 3	2 Bedroom Units	22	250	5,500	
Plan 4	3 Bedroom Units	6	300	1,800	
			Sum ADF_{Total}	19,900	gallons/day

Gal/Day = 0.134Cubic Feet / Day = 0.134CF/24Hours = 0.134CF/1440Min = 0.134CF/86,400Sec

1 Gallon/Day = 0.00000155 CFS

ADF_{Total} = 19,900 G/Day x 0.00000155 = **0.031 CFS x 2.5 Peaking = 0.078 CFS** **[GOVERNS]**

Analysis B: *'Zoning Coefficients'*

Proposed Zoning: **R-3**

Flow Rate: **0.012 CFS/Acre**

Total Acres: **5.11 Acres (Net Usable)**

Total Flow Rate: **0.06 CFS**

On-Site Results:

The governing effluent flow rate based on Analysis A and B is: 0.078 CFS.

Based on this analysis, the on-site sewer system shall be sized to handle an effluent flow rate of 0.078 cfs without exceeding a flow depth of 50%. After the point of connection an off-site analysis will be conducted within this study to determine if the existing system has exceeded the allowable capacity.

On-Site Sewer Analysis:

The Manning's calculation below will size the on-site sewer main at 50% flow depth based on the results of the effluent analysis:

8" Sewer Pipe - Mannings Calculation

Q = (1.49/n)A(R^2/3)(S^1/2)

Q =	0.83	CFS	>> Actual Flow Rate 'OK'	
Depth of Flow =	0.330	ft	P =	2.09
Mannings 'n'	0.013			
R (Hydraulic Radius)	0.163	ft		
Slope	0.005	ft/ft		
Radius	0.330	ft		
Area (Circle)	0.342	sq ft		

Figure 1

Off-Site Sewer Main Map

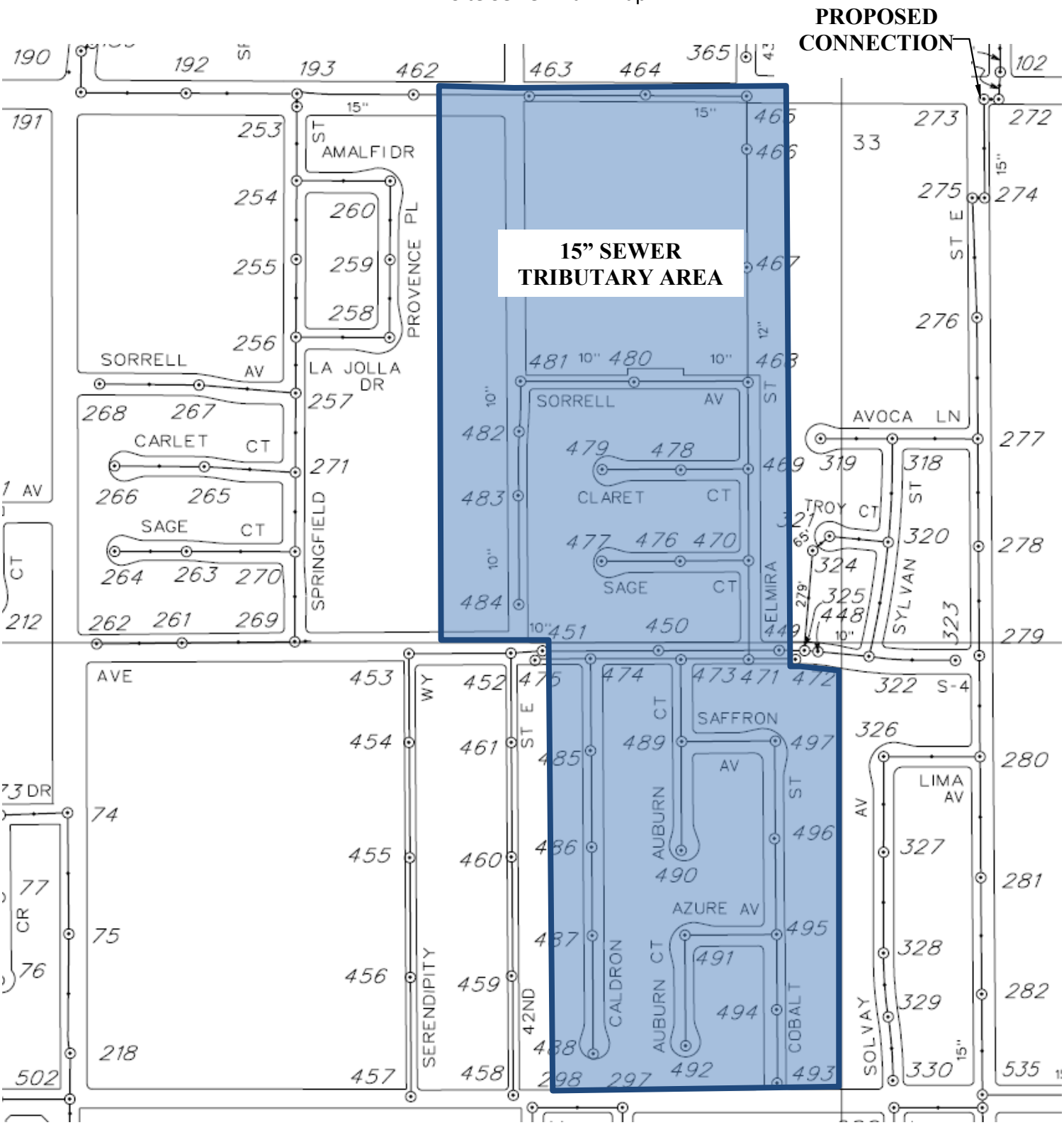

Figure 2

Off-Site Sewer Tributary Area

Off-Site Sewer Analysis:

The offsite tributary area shown accounts for 65.60 Acres of Single Family Homes plus the proposed Multi-Family Project Site. There are 144 existing homes with a potential 80 future homes (224 Total). The tributary area encompasses the area from Avenue S to Avenue S-8, and from 42nd Street East to Cobalt/Elmira Streets. The analysis for this area will be conducted with the two methods 'Estimated Average Daily Sewage Flows' and 'Zoning Coefficients'.

Analysis A: *'Estimated Average Daily Sewage Flows for Various Occupancies'*

Unit Types:

Plan No.	Type	Count	Avg Dly Flow	ADF_{Total}	
Plan 1	Mutlifamily Project	1	-	19,900	
Plan 2	3 Bedroom Units	224	300	67,200	
			Sum ADF_{Total}	87,100	gallons/day

Gal/Day = 0.134Cubic Feet / Day = 0.134CF/24Hours = 0.134CF/1440Min = 0.134CF/86,400Sec

1 Gallon/Day = 0.00000155 CFS

ADF_{Total} = 87,100 G/Day x 0.00000155 = **0.135 CFS x 2.5 Peaking = 0.34 CFS**

Analysis B: *'Zoning Coefficients'*

Proposed Zoning: **R-3**

Flow Rate: **0.012 CFS/Acre**

Total Acres: **65.60 Acres**

Total Flow Rate: **0.787 CFS** **[GOVERNS]**

Off-Site Results:

The governing effluent flow rate based on Analysis A and B is: 0.787 CFS.

Based on this analysis, the off-site sewer system shall be sized to handle an effluent flow rate of 0.787 cfs without exceeding a flow depth of 50%. This analysis will be conducted at the proposed point of connection to determine if the maximum allowable flow rate is exceeded for the existing sanitary sewer system.

Off-Site Sewer Analysis:

The Manning's calculation below will size the off-site sewer main at 50% flow depth based on the results of the effluent analysis:

15" Sewer Pipe - Mannings Calculation

Q = (1.49/n)A(R^2/3)(S^1/2)

Q =	4.58	CFS	>> Actual Flow Rate 'OK'	
Depth of Flow =	0.625	ft	P =	3.925
Mannings 'n'	0.013			
R (Hydraulic Radius)	0.313	ft		
Slope	0.005	ft/ft		
Radius	0.625	ft		
Area (Circle)	1.227	sq ft		

Conclusion:

Based on the analysis conducted within this study the proposed 8” on-site sewer main is capable of servicing the proposed development and has enough capacity for additional usage if required. Additionally, the off-site existing 15” sewer main located within Avenue S is sufficiently sized to handle our additional flow rate generated from the Project Site.

In my opinion, the proposed on-site sewer main and existing off-site sewer main is therefore sufficient and will meet the development needs and provide additional capacity if required.

Sincerely,

Ryan Duke P.E.
RCE 79729

Principle Engineer

Appendix F

CHRISTOPHER JEAN & ASSOCIATES, INC.
ACOUSTICAL CONSULTING SERVICES

February 19, 2018

ACOUSTICAL ANALYSIS

5-ACRE MULTI-FAMILY

RESIDENTIAL DEVELOMENT

CITY OF PALMDALE

Prepared by:

Christopher Jean, INCE

Prepared for:

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

P. O. BOX 2325 • FULLERTON, CALIFORNIA • 92837
PHONE: 714-805-0115

CHRISTOPHER JEAN & ASSOCIATES, INC.
ACOUSTICAL CONSULTING SERVICES

SUMMARY

This analysis has been completed to determine the exterior and interior noise exposure and the necessary mitigation measures for the proposed 5-Acre Multi-Family Residential Development project located at Avenue S and 42nd Street East in the City of Palmdale. A list of requirements and recommendations is given in the following summary. Details are discussed in the body of the report.

A. EXTERIOR NOISE CONTROL

Sound barriers at least nine feet (9') high are required at first floor patios facing Avenue S and at least eight feet (8') high at second floor decks facing Avenue S. Sound barriers at least five feet (5') high are required at all first floor patios and second floor decks facing 42nd Street East.

The above wall heights were determined using a standing receiver height. If the City will allow the assumption of a seated receiver, then each required wall height would be two feet lower.

If the City will not allow first floor wall heights in excess of six feet, the specified wall heights can be achieved by erecting a wall six feet high atop an earthen berm tall enough to produce a total height equal to the specified barrier height.

B. NOISE CONTROL BARRIER CONSTRUCTION MATERIALS

The required noise control barriers may be constructed using any of the following materials:

(1) Masonry block

(2) Stucco on wood frame

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(3) 3/4" plywood

(4) 1/4" tempered glass or 1/2" Lexan

(5) Earthen berm

(6) Any combination of the above materials or any material with a surface weight of at least 3.5 pounds per square foot.

Each completed noise control barrier must present a solid face from top-to-bottom and end-to-end. Cutouts are not permitted except for drain holes.

C. INTERIOR NOISE CONTROL

The buildings shall be constructed, as a minimum, in accordance with the outline of Table 4 found in the body of the report. This will be adequate for all units with the following exceptions:

(1) Add STC 32 glazing to all rooms facing 42nd Street East,

(2) Add STC 36 glazing, exterior wall upgrades and baffled attic vents to all rooms facing Avenue S.

Please see Appendix 6 for an explanation of attic vent baffles.

D. VENTILATION

This analysis assumed that all windows and doors are kept closed. If the allowable interior noise levels are met by requiring that windows and doors be kept closed, then the design of the structure must also specify a ventilation or air conditioning system to provide a habitable interior environment. The ventilation system must not compromise the dwelling or guest room noise reduction.

E. UNIT-TO-UNIT NOISE CONTROL

Common floor/ceiling assemblies between units are subject to Title 24 Sound Transmission Class (STC) and Impact Insulation Class (IIC) requirements. The plan set provided for this analysis did not include common floor/ceiling assembly details. It is highly recommended that one of the following widely used common floor/ceiling assemblies, all of which rate at least STC 50, be incorporated into the building plans:

(1) 8" concrete slab (Riverbank Acoustical Labs, TL 76-77, 1977, 16f, for Pre-stressed Concrete Institute, STC 58 – IIC 71 with carpet, IIC 34 for bare floor)

(2) 1 1/2" lightweight concrete, plywood sub-floor, 3 1/2" thick fiberglass insulation, resilient channels, drywall ceiling (Geiger and Hamme CCA-14MT, CCA-15MT, 1972, 16f, for Cellular Concrete Association, STC 60 – IIC 73 with carpet, IIC 47 with vinyl tile)

(3) 1 3/8" Gyp-Crete, plywood sub-floor, 2" by 10" wood joists, 3 1/2" thick fiberglass insulation, resilient channels, 1/2" drywall ceiling (Riverbank Acoustical Labs TL 81-16, for Gyp-Crete Corporation, 1981, STC 60 – Riverbank Acoustical Labs IN 81-14, for Gyp-Crete Corporation, 1981, IIC 51 with sheet vinyl)

As can be seen by the above list, some of the recommended assemblies cannot meet the IIC 50 minimum requirement without carpet. Uncarpeted areas above other living units will require some form of proprietary isolation product included in the assembly to achieve the required rating. Such products include Enkasonic, Acousti-Mat, Regupol and others. Such products are designed to be installed atop the bare sub-floor and topped with either lightweight concrete/Gyp-Crete pour or additional layers of plywood. Each product has its own specific installation requirements. These products can produce both design and field IIC compliance with sheet vinyl or wood flooring. While various lab tests have shown these same products to produce design IIC compliance when used with ceramic tile, field testing experience has proven that actual ceramic tile installations are marginal. The use of ceramic tile or marble is not recommended, regardless of the installation method.

The plan set provided for this analysis did not include common wall assembly details. It is highly recommended that one of the following widely used common wall assemblies, all of which rate at least STC 50, be incorporated into the building plans:

(1) Two layers of 1/2" direct nailed drywall, 2" by 6" plate, 2" by 4" staggered studs, 3 1/2" thick fiberglass insulation, two layers 1/2" direct nailed drywall (Owens/Corning Fiberglas, OCF W-55-69, 1969, 16f, for Owens/Corning Fiberglas, STC 54)

(2) Two layers of 5/8" direct nailed drywall, 2" by 6" plate, 2" by 4" staggered studs, 3 1/2' thick fiberglass insulation, two layers 5/8" direct nailed drywall (National Gypsum Company NGC 2376, 1970, 16f, STC 53)

(3) 5/8" direct nailed drywall, 2" by 4" plate with 2" by 4" studs, 3 1/2" thick fiberglass insulation, 1" clear air space at plate, 2" by 4" plate with 2" by 4" studs, 5/8" direct nailed drywall (Owens/Corning Fiberglas OCF 448, 1967, 16f, STC 56)

(4) Same as #3 but with two layers of 3 1/2" thick fiberglass insulation (Riverbank Acoustical Labs TL 75-83, 1975, 16f, for U. S. Department of Agriculture, STC 57)

(5) Two layers 5/8" direct nailed drywall, 2" by 4" plate with 2" by 4" studs, 3 1/2" thick fiberglass insulation, 1" clear air space at plate, 2" by 4" plate with 2" by 4" studs, two layers 5/8" direct nailed drywall (National Gypsum Company, NGC 3056, 1970, 16f, for Gypsum Association, STC 58)

(6) Same as #5 but with two layers of 3 1/2" thick fiberglass insulation (Riverbank Acoustical Labs TL 75-82, 1975, 16f, for U. S. Department of Agriculture, STC 63)

All wall assemblies between any common space and a living unit must be an STC 50 minimum rated assembly. All plumbing, mechanical and electrical installations shall be installed per the instructions and details contained in Appendix 7. Add all appropriate details to the project plans.

F. PROJECT DISCLOSURE

The acoustical code requirements represent minimal acceptable standards. Compliance with the Building Department acoustical criteria does not require, guarantee or even imply that local sound sources will be mitigated to inaudibility. Compliance with an exterior noise limit of 65 dBA CNEL means that exterior noise will remain clearly audible within the mitigated exterior space. Compliance with an interior noise limit of 45 dBA CNEL means that exterior noise sources will remain audible on the interior of a building.

Due to quality control and other field related problems, the code minimum laboratory ratings of STC/IIC 50 for common assemblies does not guarantee that all common assemblies will pass a field test. In fact, there is a 50 percent chance that half of all common assemblies rated at the STC/IIC minimum could fail field tests. An STC 50 rated assembly will produce around 45 dBA of voice reduction in the field. This means that normal conversation in adjoining units will be audible a certain percentage of the time.

Do not misrepresent the degree of exterior to interior or unit-to-unit acoustical isolation as anything more than meeting code during any phase of this project. Never, ever, use any form of the term "Soundproof" to describe any portion of this project.

CHRISTOPHER JEAN & ASSOCIATES, INC.
ACOUSTICAL CONSULTING SERVICES

1.0 INTRODUCTION

This report presents the results of a noise impact and design study of the proposed 5-Acre Multi-Family Residential Development project located at Avenue S and 42nd Street East in the City of Palmdale. This report includes a discussion of the expected exterior community noise environment and the recommendations for control of noise in the exterior and interior living spaces as well as between living units.

A vicinity map showing the general location of the project site is presented in Exhibit 1 – Site Location Map. An aerial photograph of the existing project site and its surroundings is shown on Exhibit 2. The project site plan is shown on Exhibit 3. The project consists of multi-family housing.

2.0 APPLICABLE NOISE CRITERIA

The City of Palmdale requires all residential projects to conform to the requirements of Table 1.

TABLE 1

APPLICABLE NOISE CRITERIA (1)

Exterior	65 dBA CNEL
Interior	45 dBA CNEL
Unit-to-Unit	STC 50/IIC 50

(1) Please see Noise Rating Methods (Appendix 1) for an explanation of the commonly applicable acoustical terminology.

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3.0 DESIGN NOISE LEVELS

3.1 ROADWAYS

The expected future roadway noise impact was projected using the Federal Highway Administration's Highway Noise Prediction Model (FHWA RD-77-108) together with several roadway and site parameters that determine the projected impact of vehicular traffic noise. These include the roadway cross-section (e.g. number of lanes), the roadway active width, the average daily traffic (ADT), the vehicle travel speed, the percentage of auto and truck traffic, the roadway grade, the angle of view, the site conditions ("hard" or "soft" site), and the percentage of average daily traffic that flows each hour throughout a 24 hour period.

The build-out capacity traffic volumes were taken from the Circulation Element of the City of Palmdale General Plan. The percentage of truck traffic was taken from a standard arterial mix. The same source was used to project the distribution by time of day. The input data is listed in Table 2.

TABLE 2

TRAFFIC INPUT DATA

	% DAY	% EVENING	% NIGHT	% VOLUME
Autos	75.51	12.57	9.34	100.0
Medium Trucks	1.56	0.09	0.19	100.0
Heavy Trucks	0.64	0.02	0.08	100.0

Volume = 54,000 ADT on Avenue S, 36,000 ADT on 42nd Street East

Speed = 55 MPH on Avenue S, 35 MPH on 42nd Street East

The calculations are contained in Appendix 2. The calculations yield design noise levels of 75 dBA CNEL at 100 feet from the centerline of Avenue S and 72 dBA CNEL at 50 feet from the centerline of 42nd Street East.

3.2 RAILROAD

A line of the Union Pacific railroad passes to the south of the project site at a distance of approximately 3,000 feet. This distance combined with significant existing building and terrain shielding means that railroad noise will not impact the site.

3.3 AIRCRAFT

There are no concentrated aircraft operations in the vicinity of the project site. Aircraft noise, though frequently audible, will not impact the project site as defined by the City standards.

4.0 MITIGATION MEASURES

4.1 EXTERIOR

The mitigation of exterior noise would require sound barriers around the private exterior use spaces closest to the major roadways. For purposes of analysis, the barrier height calculations assume that the barrier is located at the top of any slope between the roadway and building pads or patio elevations, and is only intended to reduce exterior noise to 65 dBA CNEL. The assumptions for the barrier height calculations are listed in Table 3 on the following page.

TABLE 3

BARRIER ANALYSIS GENERAL ASSUMPTIONS
FOR RECEIVER AND SOURCE GEOMETRY

RECEIVER ASSUMPTIONS

HORIZONTAL GEOMETRY	VERTICAL GEOMETRY
Distance behind top-of-roadways barrier: 5' to 10'	Height above pad for ground level receivers: 5'
Distance behind individual patio and balcony barriers: 1' to 3'	Height above pad for second level receivers: 14'

SOURCE ASSUMPTIONS

HORIZONTAL GEOMETRY *	VERTICAL GEOMETRY	
For roadways with grades no greater than 2%, all vehicles were located at the single lane equivalent acoustic center of the full roadway. For roadways with over 2% grade, vehicle count was divided in half and located at the single lane equivalent acoustic center for each side of the roadway.	Automobiles:	0' above center of road grade
	Medium Trucks:	2.3' above center of road grade
	Heavy Trucks:	8' above center of road grade

* = Single Lane Equivalent (SLE) location.

The barrier calculations are contained in Appendix 3. These calculations show that sound barriers at least nine feet (9') high are required at first floor patios facing Avenue S and at least eight feet (8') high at second floor decks facing Avenue S. Sound barriers at least five feet (5') high are required at all first floor patios and second floor decks facing 42nd Street East.

The barrier heights required to comply with the City's 65 dBA CNEL residential exterior noise limit exceed the typically six foot (6') height of the perimeter walls of existing residential developments in the immediate vicinity. The existing walls cannot provide compliance with the City's 65 dBA CNEL standard even with the existing traffic volumes. The City may have waived exterior compliance for these developments due to a City desire to not allow walls greater than 6 feet high.

One way around this dilemma is to erect walls six feet high atop landscaped berms tall enough to create a total height equal to that required for compliance with the exterior noise limit. In this case, first floor patio walls six feet (6') high atop earthen berms three feet (3') high would achieve the total barrier height of nine feet (9') required

for patios facing Avenue S. First floor patio walls six feet (6') high atop earthen berms one feet (1') high would achieve the total barrier height of seven feet (7') required along 42nd Street East.

If the City will approve the assumption of a seated receiver instead of the standing receiver assumed for this analysis, then each barrier height could be reduced by two feet.

The required noise control barriers may be constructed using any of the following materials:

(1) Masonry block

(2) Stucco on wood frame

(3) 3/4" plywood

(4) 1/4" tempered glass or 1/2" Lexan

(5) Earthen berm

(6) Any combination of the above materials or any material with a surface weight of at least 3.5 pounds per square foot.

Each completed noise control barrier must present a solid face from top-to-bottom. Cutouts and/or openings are not permitted except for drain holes.

4.2 INTERIOR

The City's exposure criteria for new residential construction require that the interior noise environment, attributable to outside noise sources, be limited to 45 dBA CNEL. Analysis and recommendations for control of outdoor-to-indoor noise intrusion are presented in this section.

The exterior-to-interior noise reduction expected for the planned construction was based on a detailed analysis of sample rooms and units planned for the development. Calculations of the expected typical noise reduction performance were performed for sample rooms. The analysis was based on the typical spectra expected for the primary sources of community noise impact, the typical octave-band transmission loss for each element in the planned building shell, the relative square footage of each element of the planned building shell, the expected typical interior surface treatment, and the acoustical absorption coefficient for each interior surface treatment. Corrections for the "A" Weighted room absorption factors are also included.

Each component of the building shell (e.g. exterior wall, windows, doors, etc.) provides a different amount of transmission loss for each "A" Weighted octave- band of

community noise. With the knowledge of the building shell components and their individual octave band transmission loss values for the noise sources, calculations of the composite building shell transmission loss can be made for each room.

The characteristics of the basic building shell are listed in Table 4.

TABLE 4

BASIC BUILDING SHELL CHARACTERISTICS

PANEL	CONSTRUCTION
Exterior Wall	Siding or stucco, 2" X 4" studs, R-13 fiberglass insulation, 5/8" drywall
Windows	Double pane
Sliding Glass Door	Double pane
Roof	Shingle over 1/2" plywood, fiberglass insulation, 5/8" drywall, vented
Floor	Carpeted except kitchen and baths

Table 4 construction minimums will normally provide around 20 dBA of interior noise reduction. This would be adequate for all units exposed to exterior noise levels as high as 65 dBA CNEL. This will include all unit on the interior of the project. Units facing Avenue S will be exposed to exterior noise levels as high as 75 dBA CNEL and will require as much as 30 dBA of interior noise reduction. Units facing 42nd Street East will be exposed to exterior noise levels as high as 72 dBA CNEL and will require as much as 27 dBA of interior noise reduction.

Since Table 4 construction will yield only around 20 dBA, sample room calculations were carried out to determine how much additional mitigation is needed along the major roadways. These calculations are contained in Appendix 4 and the results are listed in Table 5 on the following page.

TABLE 5

ROOM NOISE REDUCTION VALUES

ROOM	NOISE REDUCTION VS. GLAZING STC							
	24	26	28	30	32	34	36	38
Multi-Family Bedroom	19	21	23	25	26	27	28	29
Multi-Family Living Rm	20	22	24	25	27	28	29	30

The results of Table 5 show that Table 4 construction alone cannot achieve the 30 dBA of interior noise reduction in all rooms. Thus, additional calculations were performed assuming upgraded exterior walls and baffled attic vents. Exterior wall upgrades shall consist of two layers of interior drywall mounted on RC-1 resilient channels. These calculations are contained in Appendix 5 and the results are listed in Table 6.

TABLE 6

ROOM NOISE REDUCTION VALUES
WITH EXTERIOR WALL UPGRADES
AND BAFFLED ATTIC VENTS

ROOM	NOISE REDUCTION VS. GLAZING STC							
	24	26	28	30	32	34	36	38
Multi-Family Bedroom	20	22	24	26	28	29	31	33
Multi-Family Living Rm	20	22	24	26	28	30	32	34

The results of Tables 5 and 6 show that Table 4 construction should be adequate for all units with the following exceptions:

(1) Add STC 32 glazing to all rooms facing 42nd Street East,

(2) Add STC 36 glazing, exterior wall upgrades and baffled attic vents to all rooms facing Avenue S.

Please see Appendix 6 for an explanation of attic vent baffles.

4.3 VENTILATION

If interior allowable noise levels are met by requiring that windows be unopenable or remain closed, then the design of the structure must also specify a ventilation or air conditioning system to provide a habitable interior environment. The ventilation system must not compromise the dwelling unit or guest room noise reduction.

4.4 UNIT-TO-UNIT NOISE CONTROL

Common floor/ceiling assemblies between units are subject to Title 24 Sound Transmission Class(STC) and Impact Insulation Class (IIC) requirements. The plan set provided for this analysis did not include common floor/ceiling assembly details. It is highly recommended that one of the following widely used common floor/ceiling assemblies, all of which rate at least STC 50, be incorporated into the building plans:

(1) 8" concrete slab (Riverbank Acoustical Labs, TL 76-77, 1977, 16f, Pre-stressed Concrete Institute, STC 58 -- IIC 71 with carpet, IIC 34 for bare floor)

(2) 1 1/2" lightweight concrete, sub-floor, R-11 insulation, resilient channel, drywall ceiling (Geiger and Hamme CCA-14MT, CCA-15MT, 1972, 16f, Cellular Concrete Associates, STC 60 --IIC 73 with carpet, IIC 47 with vinyl tile)

(3) 1 3/8" Gyp-Crete, sub-floor, 2" by 10" joists, R-11 insulation, resilient channel, 1/2" drywall ceiling (Riverbank Acoustical Labs TL 81-16, Gyp-Crete Corp., 1981, STC 60 -- Riverbank Acoustical Labs IN 81-14, Gyp-Crete Corp., 1981, IIC 51 with sheet vinyl)

As can be seen by the above list, some of the recommended assemblies cannot meet the IIC 50 minimum requirement without carpet. Uncarpeted areas above other living units will require some form of proprietary isolation product under the floor to achieve the required rating. Such products include Enkasonic, Acousti-Mat, USG SRM-25, and others. Such products are designed to be installed atop the bare sub-floor and topped with either a LWC/Gyp-Crete pour or additional layers of plywood. Each product has its own specific installation requirements. These products can produce both design and field IIC compliance with sheet vinyl or wood flooring. While various lab tests have shown these same products to produce design IIC compliance when used with ceramic tile, field testing experience has proven that actual ceramic tile installations are marginal. The use of ceramic tile or marble flooring is not recommended, regardless of the installation method.

The plan set provided for this analysis did not include common wall assembly details. It is highly recommended that one of the following widely used common wall assemblies, all of which rate at least STC 50, be incorporated into the building plans:

(1) Two layers 1/2" direct nailed drywall, 2" by 6" plate, 2" by 4" staggered studs, fiberglass insulation, two layers 1/2" direct nailed drywall (Owens/Corning Fiberglas, OCF W-55-69, 1969, 16f, Owens/Corning Fiberglas, STC 54)

(2) Two layers 5/8" direct nailed drywall, 2" by 6" plate, 2" by 4" staggered studs, R-11 insulation, two layers 5/8" direct nailed drywall (National Gypsum Co. NGC 2376, 1970, 16f, STC 53)

(3) 5/8" direct nailed drywall, 2" by 4" plate with 2" by 4" studs, R-11 insulation, 1" airspace at plate, 2" by 4" plate with 2" by 4" studs, 5/8" direct nailed drywall (Owens/Corning Fiberglas OCF 448, 1967, 16f, STC 56)

(4) Same as #3 with two layers of R-11 insulation (Riverbank Acoustical Labs TL75-83, 1975, 16f, U.S. Department of Agriculture, STC 57)

(5) Two layers 5/8" drywall direct nailed, 2" by 4" plate with 2" x 4" studs, 1" air space, 2" by 4" plate with 2" by 4" studs, R-11 insulation, two layers 5/8" drywall (National Gypsum Co. NGC 3056, 1970, 16f, Gypsum Association, STC 58)

(6) Same as #5 with two layers of R-11 insulation (Riverbank Acoustical Labs TL 75-82, 1975, 16f, U.S. Department of Agriculture, STC 63)

All wall assemblies between any common space and a living unit must be an STC 50 minimum rated assembly. All Plumbing and electrical installations shall be installed per the instructions contained in Appendix 7. Put all details onto Plans.

5.5 PROJECT DISCLOSURE

The acoustical code requirements are minimal acceptable standards. Compliance with Building Department acoustical criteria does not require, guarantee or even imply that local sound sources will be mitigated to inaudibility. Compliance with an exterior noise limit of 65 dBA CNEL means that exterior noise will remain clearly audible within the mitigated exterior space. Compliance with an interior noise limit of 45 dBA CNEL means that exterior noise sources will remain audible on the interior of a structure.

Due to quality control and other field related problems, the code minimum laboratory rating of STC/IIC 50 for common assemblies does not guarantee that all common assemblies will pass a field test. In fact, there is a 50% chance that half of all laboratory rated STC/IIC 50 common assemblies could fail field tests. An STC 50 rated assembly will produce around 45 dBA of voice reduction in the field. This means that normal conversation in adjoining units will be audible a certain percentage of the time.

Do not misrepresent the degree of exterior to interior or unit to unit acoustical isolation as anything more than meeting code during any phase of this project. Never, ever, use any form of the term "Soundproof" to describe any portion of this project.

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APPENDIX 1

NOISE RATING METHODOLOGY

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NOISE RATING METHODOLOGY

The A-weighted decibel (dBA) or "A" scale on a sound level meter is typically used for environmental noise measurements because the weighting characteristics of the "A" scale approximate the subjective response of the human ear to a broad frequency band noise source by discriminating against the very low and very high frequencies of the audible sound spectrum.

Since community noise is seldom constant, varying from moment to moment and throughout the day, the "A" weighted noise level needs to be further described to provide meaningful data. The Environmental Protection Agency, the Federal Department of Transportation, several foreign countries and many private consultants are now using three time-exceeded percentile figures to describe noise, which are:

(1) L_{90} is the noise level that is exceeded 90 percent of any sample measurement period (such as 24 hours) and is often used to describe the background or ambient noise level.

(2) L_{50} is the noise level that is exceeded 50 percent of any sample measurement period. It is generally considered to represent the median noise level.

(3) L_{10} is the noise level that is exceeded 10 percent of any sample measurement period. It is a good descriptor of fluctuating noise sources such as vehicular traffic. It indicates the near-maximum noise levels that occur for groups of single noise events. Being related to the subjective annoyance to community noise, the L_{10} is a good design tool in the planning of acoustical barriers.

More recent noise assessment methods are based on the equivalent energy concept where Leq(x) represents the average energy content of a fluctuating noise source over a sample measurement period. The subscript (x) represents the period over which the energy is computed and/or measured. Current practice references the time quantity to either one (1) hour, eight (8) hours, or twenty-four (24) hours. When referenced to one (1) hour, Leq is also called the HNL (Hourly Noise Level).

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Since Leq is the summation of the functional products of noise level and duration, many different combinations of noise levels, duration times and time histories can produce similar Leq values. Thus a value of Leq(24) equals 50 means only that the average noise level is 50 dB. During that 24-hour period, there can be times when the noise level is higher than 50 dB and times when it is lower than 50 dB.

If the period of the measurement is only a single event, the energy content is not averaged. The energy expression for a single event is simply the sum of the functional product of the noise level and duration time of the event. This term is called the Le or SENEL (Single Event Noise Exposure Level). The summation of Le values averaged over one hour is Leq(1), over eight hours is Leq(8), over 24 hours is Leq(24), etc.

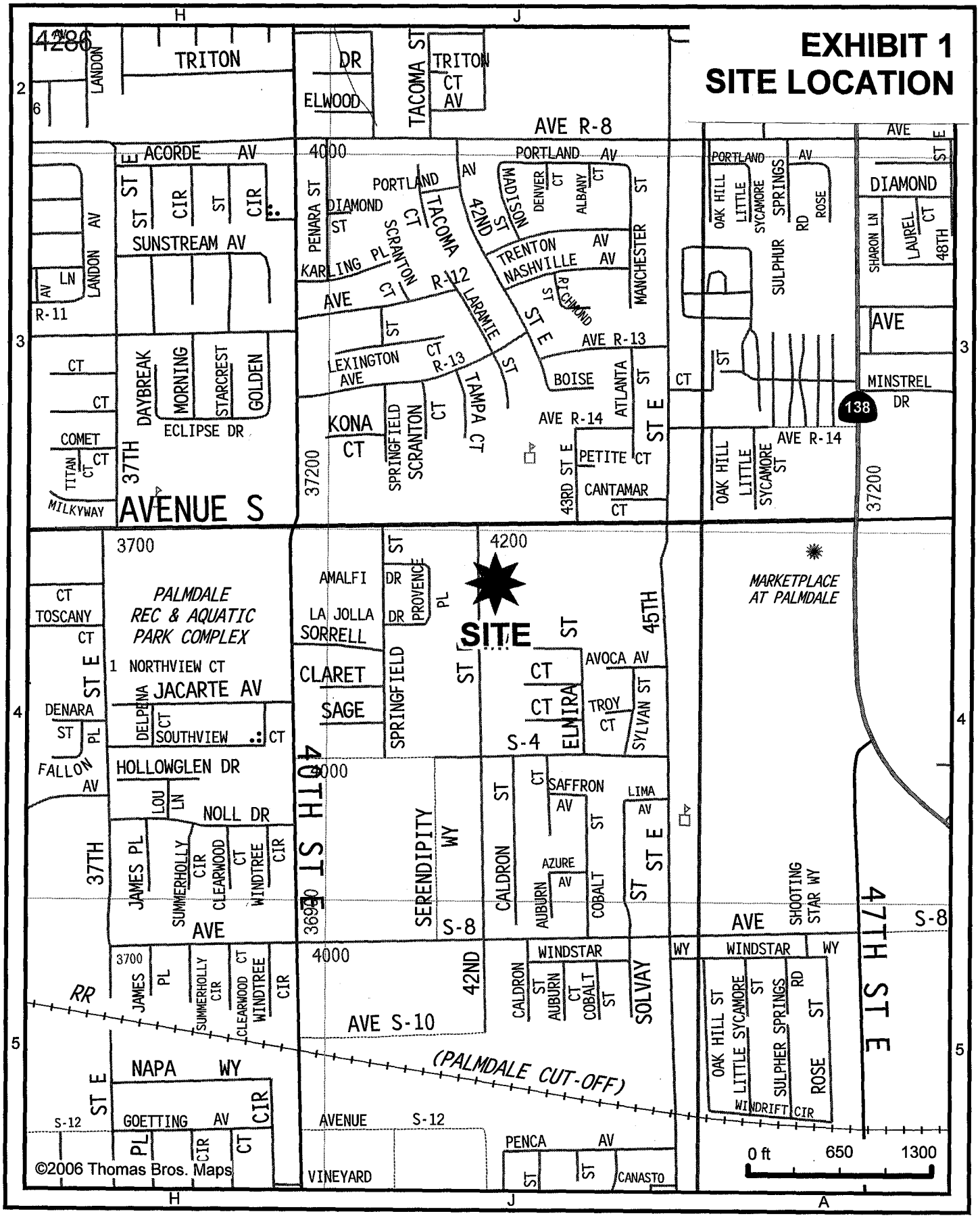
Leq is further refined into Ldn (Level Day-Night) and CNEL (Community Noise Equivalent Level), where noise that occurs during certain hours of the day are weighted (or penalized) in an attempt to compensate for the general perception that such noise is more annoying during these time periods (typically evening and nighttime hours).

(1) Ldn is the sound level in dBA that corresponds to the average energy content of the noise being measured over a 24-hour period but includes a ten (10) dBA weighting penalty for noise that occurs during the nighttime hours between 10:00 PM and 7:00 AM. The Ldn is a noise rating method recommended by the Environmental Protection Agency because it takes into account those subjectively more annoying noise events that occur during normal sleeping hours.

(2) CNEL is the sound level in dBA that corresponds to the average energy content of the noise being measured over a 24-hour period but includes a five (5) dBA penalty for noise that occurs during the evening hours between 7:00 PM and 10:00 PM, and a ten (10) dBA penalty for noise that occurs during the nighttime hours between 10:00 PM and 7:00 AM. For typical highway vehicular traffic situations, computer analysis has shown that the Ldn and CNEL values correlate within 0.5 dBA.

The percentile figures L_{10}, L_{50} and L_{90} can be directly scaled from a graphical recording of the measured noise sample over a particular time period. These figures can also be measured directly using modern automatic noise measuring equipment. Measurement of the parameters Le, Leq, Ldn and CNEL requires even more sophisticated and correspondingly expensive noise measuring equipment. As a result, engineers have devised ways of estimating Leq (and hence, Ldn) using standard instrumentation and methods.

EXHIBIT 1
SITE LOCATION



SITE: 4286 - J4

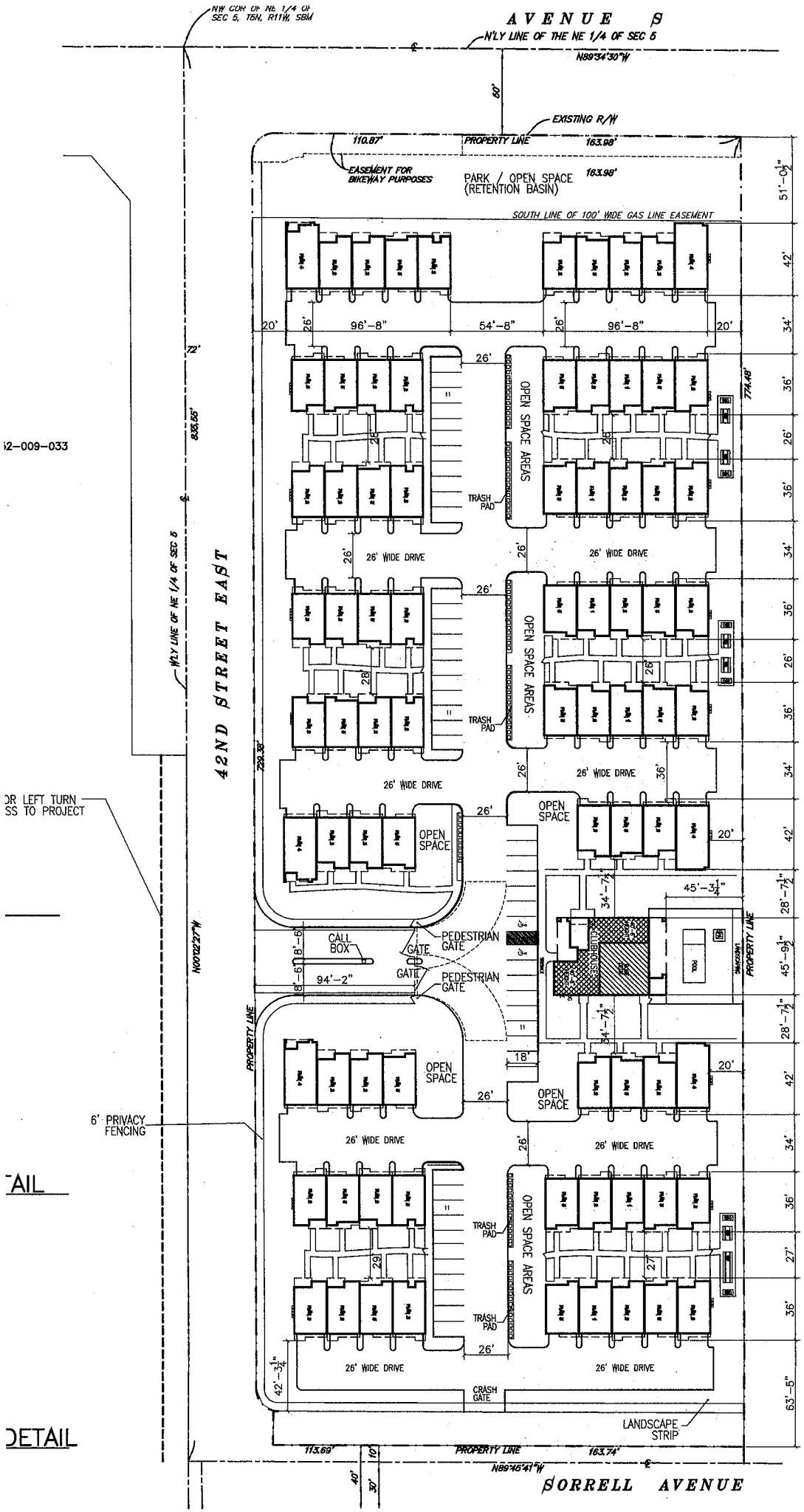
EXHIBIT 2
AERIAL PHOTO

Google Maps MULTI-FAMILY TRIPLEX PROJECT

Imagery ©2018 DigitalGlobe, U.S. Geological Survey, USDA Farm Service Agency, Map data ©2018 Google

100 ft

EXHIBIT 3
SITE PLAN



PLAN 4 3 BDRM UNIT: 1

TOTAL
CLUBHOUSE:

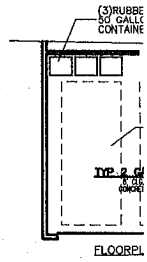
PARKING REQUIRMENTS:

1 BDRM UNIT: 1.25 PER (6 units)
2 BDRM UNIT: 1.75 PER (68 units)
3 BDRM UNIT: 2.00 PER (6 units)
GUEST PARKING: 1 PER 5 UNITS

PARKING REQUIRED:
(OR 2.25 PER UNIT CALCULATION)

TOTAL PARKING PROVIDED:
44 OPEN PARKING SPACES
INCLUDES 2 HANDICAP ACCESSIBLE S
AND (80 2 CAR GARAGES (160 PAR

NET USABLE S.F. OF SITE
OPEN SPACE REQUIRED:
OPEN SPACE PROVIDED:



GARAGE EXI
SCALE: N.T.S.

GARBAGE CANS NOTE:

GARBAGE CANS TO BI
GARAGES AND MOVED
PADS FOR PICK UP

NOTE:

EXTERIOR ELEVATIONS
3 COLORS AND 3 MA
BUILDING.

NOTE:

CRASH GATES ARE PF
MITIGATE THE NEED F
EMERGENCY VEHICLE

:2-009-033

OR LEFT TURN
SS TO PROJECT

AIL

DETAIL

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APPENDIX 2

FUTURE ROADWAY NOISE CALCULATIONS

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FHWA RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT NAME	:AVENUE S RESIDENTIAL
SITE LOCATION	:PALMDALE
DESCRIPTION	:42ND STREET EAST
SITE TYPE	:HARD

INPUT DATA	AUTO	MEDIUM TRUCK	HEAVY TRUCK
SPEED	35	35	55
% DAY	75.51	1.56	.64
% EVENING	12.57	0.09	0.02
% NIGHT	9.34	.19	.08
% VOLUME	100	100	100
VOLUME	36000		

----AVERAGE HOURLY NOISE LEVELS AT 50 FEET----

	DAY	EVENING	NIGHT	24 HOUR	CNEL
AUTO	68.17	66.41	60.35	66.27	69.53
MEDIUM TRK.	62.01	55.64	54.11	59.71	62.78
HEAVY TRK.	66.68	57.65	58.90	64.30	67.37
TOTAL	71.08	67.26	63.26	68.96	72.13

NOISE LEVEL AT SPECIFIED DISTANCES

DISTANCE	CNEL
50	72.13
75	70.37
100	69.12
125	68.15
150	67.36
175	66.69
200	66.11
225	65.60
250	65.14
275	64.73
300	64.35
325	64.00
350	63.68
375	63.38
400	63.10
450	62.59
500	62.13
550	61.72
600	61.34
650	60.99
700	60.67
750	60.37
800	60.09

FHWA RD-77-108 HIGHWAY NOISE PREDICTION MODEL

PROJECT NAME :AVENUE S RESIDENTIAL
SITE LOCATION :PALMDALE
DESCRIPTION :AVENUE S
SITE TYPE :HARD

INPUT DATA	AUTO	MEDIUM TRUCK	HEAVY TRUCK
SPEED	55	55	55
% DAY	75.51	1.56	.64
% EVENING	12.57	0.09	0.02
% NIGHT	9.34	.19	.08
% VOLUME	100	100	100
VOLUME	54000		

----AVERAGE HOURLY NOISE LEVELS AT 50 FEET----

	DAY	EVENING	NIGHT	24 HOUR	CNEL
AUTO	75.45	73.68	67.62	73.55	76.81
MEDIUM TRK.	68.46	62.09	60.57	66.17	69.24
HEAVY TRK.	68.44	59.41	60.66	66.06	69.13
TOTAL	76.91	74.12	69.08	74.89	78.10

NOISE LEVEL AT SPECIFIED DISTANCES

DISTANCE	CNEL
50	78.10
75	76.34
100	75.09
125	74.12
150	73.33
175	72.66
200	72.08
225	71.57
250	71.11
275	70.70
300	70.32
325	69.97
350	69.65
375	69.35
400	69.07
450	68.56
500	68.10
550	67.69
600	67.31
650	66.96
700	66.64
750	66.34
800	66.06

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APPENDIX 3

SOUND BARRIER HEIGHT CALCULATIONS

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BARRIER NOISE REDUCTION ANALYSIS,WALL HEIGHT VARIABLE

REFERENCE VEHICLE LEVELS AT 50 FEET

AUTO.....= 76.81
M.TRUCK.....= 69.24
H.TRUCK.....= 69.13

PROJECT.....5 ACRE RESIDENTIAL
DESCRIPTION..PATIOS FACING AVENUE S
SOURCE ELEVATION..... 0
RECEIVER ELEVATION..... 0
BARRIER ELEVATION..... 0
RECEIVER HEIGHT..... 5
DISTANCE TO SOURCE..... 90
DISTANCE TO RECEIVER... 10
AUTO NOISE LEVEL..... 73.7997
M.TRK NOISE LEVEL..... 66.2297
H.TRK NOISE LEVEL..... 66.1197
SOURCE NOISE LEVEL..... 75.09

ANGULAR CORRECTION(DB) - 0

WALL HEIGHT	ANL	MTNL	HTNL	TNL	TIL
0.00	73.80	66.23	66.12	75.09	0.00
FN	0.0000	0.0000	0.0000		
1.00	73.80	66.23	66.12	75.09	0.00
FN	0.0000	0.0000	0.0000		
2.00	73.80	66.23	66.12	75.09	0.00
FN	0.0000	0.0000	0.0000		
3.00	73.80	66.23	66.12	75.09	0.00
FN	0.0000	0.0000	0.0000		
4.00	73.80	66.23	66.12	75.09	0.00
FN	0.0000	0.0000	0.0000		
5.00	68.65	61.17	66.12	71.05	4.04
FN	0.0132	0.0049	0.0000		
6.00	67.63	60.21	60.81	69.06	6.03
FN	0.1227	0.0934	0.0269		
7.00	66.51	59.20	59.78	67.97	7.12
FN	0.3416	0.2913	0.1582		
8.00	65.05	57.77	58.56	66.54	8.54
FN	0.6656	0.5943	0.3947		
9.00	63.62	56.32	57.12	65.11	9.98
FN	1.0883	0.9962	0.7301		
10.00	62.34	55.02	55.74	63.82	11.27
FN	1.6020	1.4890	1.1565		

BARRIER NOISE REDUCTION ANALYSIS,WALL HEIGHT VARIABLE

REFERENCE VEHICLE LEVELS AT 50 FEET

AUTO.....= 76.81
M.TRUCK.....= 69.24
H.TRUCK.....= 39.13

PROJECT.....5 ACRE RESIDENTIAL
DESCRIPTION..SECOND FLOOR DECKS FACING AVENUE S
SOURCE ELEVATION..... 0
RECEIVER ELEVATION..... 10
BARRIER ELEVATION..... 10
RECEIVER HEIGHT..... 5
DISTANCE TO SOURCE..... 90
DISTANCE TO RECEIVER... 5
AUTO NOISE LEVEL..... 74.02246
M.TRK NOISE LEVEL..... 66.45246
H.TRK NOISE LEVEL..... 36.34247
SOURCE NOISE LEVEL..... 74.72

ANGULAR CORRECTION(DB) - 0

WALL HEIGHT	ANL	MTNL	HTNL	TNL	TIL
0.00	74.02	66.45	36.34	74.72	0.00
FN	0.0000	0.0000	0.0000		
1.00	74.02	66.45	36.34	74.72	0.00
FN	0.0000	0.0000	0.0000		
2.00	74.02	66.45	36.34	74.72	0.00
FN	0.0000	0.0000	0.0000		
3.00	74.02	66.45	36.34	74.72	0.00
FN	0.0000	0.0000	0.0000		
4.00	74.02	66.45	36.34	74.72	0.00
FN	0.0000	0.0000	0.0000		
5.00	68.31	60.90	31.18	69.04	5.68
FN	0.0635	0.0485	0.0142		
6.00	66.79	59.40	29.81	67.52	7.21
FN	0.3309	0.2957	0.1960		
7.00	64.78	57.41	27.96	65.51	9.21
FN	0.7962	0.7407	0.5760		
8.00	62.95	55.56	26.05	63.67	11.05
FN	1.4316	1.3560	1.1265		

BARRIER NOISE REDUCTION ANALYSIS,WALL HEIGHT VARIABLE

REFERENCE VEHICLE LEVELS AT 50 FEET

AUTO.....= 69.53
M.TRUCK.....= 62.78
H.TRUCK.....= 37.37

PROJECT.....5 ACRE RESIDENTIAL
DESCRIPTION..PATIOS FACING 42ND EAST
SOURCE ELEVATION..... 0
RECEIVER ELEVATION..... 0
BARRIER ELEVATION..... 0
RECEIVER HEIGHT..... 5
DISTANCE TO SOURCE..... 55
DISTANCE TO RECEIVER... 10
AUTO NOISE LEVEL..... 68.39056
M.TRK NOISE LEVEL..... 61.64057
H.TRK NOISE LEVEL..... 36.23057
SOURCE NOISE LEVEL..... 69.23

ANGULAR CORRECTION(DB) - 0

WALL HEIGHT	ANL	MTNL	HTNL	TNL	TIL
0.00	68.39	61.64	36.23	69.23	0.00
FN	0.0000	0.0000	0.0000		
1.00	68.39	61.64	36.23	69.23	0.00
FN	0.0000	0.0000	0.0000		
2.00	68.39	61.64	36.23	69.23	0.00
FN	0.0000	0.0000	0.0000		
3.00	68.39	61.64	36.23	69.23	0.00
FN	0.0000	0.0000	0.0000		
4.00	68.39	61.64	36.23	69.23	0.00
FN	0.0000	0.0000	0.0000		
5.00	63.01	56.49	36.23	63.89	5.33
FN	0.0332	0.0125	0.0000		
6.00	61.94	55.46	31.03	62.83	6.40
FN	0.1806	0.1256	0.0169		
7.00	60.60	54.28	29.99	61.51	7.71
FN	0.4441	0.3551	0.1376		
8.00	59.06	52.77	28.79	59.98	9.24
FN	0.8195	0.6966	0.3705		
9.00	57.63	51.30	27.31	58.55	10.68
FN	1.3003	1.1438	0.7094		
10.00	56.38	50.00	25.88	57.28	11.94
FN	1.8786	1.6887	1.1465		

BARRIER NOISE REDUCTION ANALYSIS,WALL HEIGHT VARIABLE

REFERENCE VEHICLE LEVELS AT 50 FEET

AUTO.....= 69.53
M.TRUCK.....= 62.78
H.TRUCK.....= 67.37

PROJECT.....5 ACRE RESIDENTIAL
DESCRIPTION..SECOND FLOOR DECKS FACING 42ND ST EAST
SOURCE ELEVATION..... 0
RECEIVER ELEVATION..... 10
BARRIER ELEVATION..... 10
RECEIVER HEIGHT..... 5
DISTANCE TO SOURCE..... 55
DISTANCE TO RECEIVER... 5
AUTO NOISE LEVEL..... 68.73819
M.TRK NOISE LEVEL..... 61.98819
H.TRK NOISE LEVEL..... 66.57819
SOURCE NOISE LEVEL..... 71.34

ANGULAR CORRECTION(DB) - 0

WALL HEIGHT	ANL	MTNL	HTNL	TNL	TIL
0.00	68.74	61.99	66.58	71.34	0.00
FN	0.0000	0.0000	0.0000		
1.00	68.74	61.99	66.58	71.34	0.00
FN	0.0000	0.0000	0.0000		
2.00	68.74	61.99	66.58	71.34	0.00
FN	0.0000	0.0000	0.0000		
3.00	68.74	61.99	66.58	71.34	0.00
FN	0.0000	0.0000	0.0000		
4.00	63.67	56.98	66.58	68.68	2.66
FN	0.0058	0.0007	0.0000		
5.00	62.39	55.82	61.16	65.34	5.99
FN	0.1599	0.1231	0.0366		
6.00	60.56	54.12	59.66	63.65	7.68
FN	0.5283	0.4602	0.2705		
7.00	58.52	52.07	57.66	61.63	9.71
FN	1.0999	1.0011	0.7091		
8.00	56.79	50.29	55.76	59.83	11.51
FN	1.8472	1.7179	1.3249		

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APPENDIX 4

INTERIOR NOISE REDUCTION CALCULATIONS

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WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME MULTI-FAMILY BEDROOM + STC = 24

FLOOR AREA 152

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	40		41	0.00410
EXT.WALL 2	43		104	0.00521
EXT.WALL 3	50		0	0.00000
INT.WALL			272	
WINDOW 1	22	.05	40	0.25238
WINDOW 2	25	.05	16	0.05060
WINDOW 3	32	.05	0	0.00000
SGD	22	.05	0	0.00000
DOORS	0	.04	0	0.00000
ROOF	40	.04	152	0.01520
FLOOR		.6	152	
ET*S				0.32749
-10LOG(ET*S)				4.8
10LOGA				20.5
NOISE REDUCTION				19.4

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME MULTI-FAMILY BEDROOM + STC = 26

FLOOR AREA 152

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	40		41	0.00410
EXT.WALL 2	43		104	0.00521
EXT.WALL 3	50		0	0.00000
INT.WALL			272	
WINDOW 1	24	.05	40	0.15924
WINDOW 2	27	.05	16	0.03192
WINDOW 3	34	.05	0	0.00000
SGD	24	.05	0	0.00000
DOORS	0	.04	0	0.00000
ROOF	40	.04	152	0.01520
FLOOR		.6	152	
ET*S				0.21568
-10LOG(ET*S)				6.7
10LOGA				20.5
NOISE REDUCTION				21.2

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME MULTI-FAMILY BEDROOM + STC = 28

FLOOR AREA 152

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	40		41	0.00410
EXT.WALL 2	43		104	0.00521
EXT.WALL 3	50		0	0.00000
INT.WALL			272	
WINDOW 1	26	.05	40	0.10048
WINDOW 2	29	.05	16	0.02014
WINDOW 3	36	.05	0	0.00000
SGD	26	.05	0	0.00000
DOORS	0	.04	0	0.00000
ROOF	40	.04	152	0.01520
FLOOR		.6	152	
ET*S				0.14513
-10LOG(ET*S)				8.4
10LOGA				20.5
NOISE REDUCTION				22.9

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME MULTI-FAMILY BEDROOM + STC = 30

FLOOR AREA 152

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	40		41	0.00410
EXT.WALL 2	43		104	0.00521
EXT.WALL 3	50		0	0.00000
INT.WALL			272	
WINDOW 1	28	.05	40	0.06340
WINDOW 2	31	.05	16	0.01271
WINDOW 3	38	.05	0	0.00000
SGD	28	.05	0	0.00000
DOORS	0	.04	0	0.00000
ROOF	40	.04	152	0.01520
FLOOR		.6	152	
ET*S				0.10062
-10LOG(ET*S)				10.0
10LOGA				20.5
NOISE REDUCTION				24.5

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME MULTI-FAMILY BEDROOM + STC = 32

FLOOR AREA 152

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	40		41	0.00410
EXT.WALL 2	43		104	0.00521
EXT.WALL 3	50		0	0.00000
INT.WALL			272	
WINDOW 1	30	.05	40	0.04000
WINDOW 2	33	.05	16	0.00802
WINDOW 3	40	.05	0	0.00000
SGD	30	.05	0	0.00000
DOORS	0	.04	0	0.00000
ROOF	40	.04	152	0.01520
FLOOR		.6	152	
ET*S				0.07253
-10LOG(ET*S)				11.4
10LOGA				20.5
NOISE REDUCTION				25.9

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME MULTI-FAMILY BEDROOM + STC = 34

FLOOR AREA 152

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	40		41	0.00410
EXT.WALL 2	43		104	0.00521
EXT.WALL 3	50		0	0.00000
INT.WALL			272	
WINDOW 1	32	.05	40	0.02524
WINDOW 2	35	.05	16	0.00506
WINDOW 3	42	.05	0	0.00000
SGD	32	.05	0	0.00000
DOORS	0	.04	0	0.00000
ROOF	40	.04	152	0.01520
FLOOR		.6	152	
ET*S				0.05481
-10LOG(ET*S)				12.6
10LOGA				20.5
NOISE REDUCTION				27.1

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME MULTI-FAMILY BEDROOM + STC = 36

FLOOR AREA 152

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	40		41	0.00410
EXT.WALL 2	43		104	0.00521
EXT.WALL 3	50		0	0.00000
INT.WALL			272	
WINDOW 1	34	.05	40	0.01592
WINDOW 2	37	.05	16	0.00319
WINDOW 3	44	.05	0	0.00000
SGD	34	.05	0	0.00000
DOORS	0	.04	0	0.00000
ROOF	40	.04	152	0.01520
FLOOR		.6	152	
ET*S				0.04363
-10LOG(ET*S)				13.6
10LOGA				20.5
NOISE REDUCTION				28.1

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME MULTI-FAMILY BEDROOM + STC = 38

FLOOR AREA 152

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	40		41	0.00410
EXT.WALL 2	43		104	0.00521
EXT.WALL 3	50		0	0.00000
INT.WALL			272	
WINDOW 1	36	.05	40	0.01005
WINDOW 2	39	.05	16	0.00201
WINDOW 3	46	.05	0	0.00000
SGD	36	.05	0	0.00000
DOORS	0	.04	0	0.00000
ROOF	40	.04	152	0.01520
FLOOR		.6	152	
ET*S				0.03657
-10LOG(ET*S)				14.4
10LOGA				20.5
NOISE REDUCTION				28.9

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME MULTI-FAMILY LIVING ROOM + STC = 24

FLOOR AREA 144

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	40		71	0.00710
EXT.WALL 2	43		0	0.00000
EXT.WALL 3	50		0	0.00000
INT.WALL			324	
WINDOW 1	22	.05	40	0.25238
WINDOW 2	25	.05	0	0.00000
WINDOW 3	32	.05	0	0.00000
SGD	22	.05	0	0.00000
DOORS	0	.04	0	0.00000
ROOF	40	.04	144	0.01440
FLOOR		.6	144	
ET*S				0.27388
-10LOG(ET*S)				5.6
10LOGA				20.5
NOISE REDUCTION				20.1

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME MULTI-FAMILY LIVING ROOM + STC = 26

FLOOR AREA 144

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	40		71	0.00710
EXT.WALL 2	43		0	0.00000
EXT.WALL 3	50		0	0.00000
INT.WALL			324	
WINDOW 1	24	.05	40	0.15924
WINDOW 2	27	.05	0	0.00000
WINDOW 3	34	.05	0	0.00000
SGD	24	.05	0	0.00000
DOORS	0	.04	0	0.00000
ROOF	40	.04	144	0.01440
FLOOR		.6	144	
ET*S				0.18074
-10LOG(ET*S)				7.4
10LOGA				20.5
NOISE REDUCTION				21.9

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME MULTI-FAMILY LIVING ROOM + STC = 28

FLOOR AREA 144

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	40		71	0.00710
EXT.WALL 2	43		0	0.00000
EXT.WALL 3	50		0	0.00000
INT.WALL			324	
WINDOW 1	26	.05	40	0.10048
WINDOW 2	29	.05	0	0.00000
WINDOW 3	36	.05	0	0.00000
SGD	26	.05	0	0.00000
DOORS	0	.04	0	0.00000
ROOF	40	.04	144	0.01440
FLOOR		.6	144	
ET*S				0.12198
-10LOG(ET*S)				9.1
10LOGA				20.5
NOISE REDUCTION				23.6

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME MULTI-FAMILY LIVING ROOM + STC = 30

FLOOR AREA 144

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	40		71	0.00710
EXT.WALL 2	43		0	0.00000
EXT.WALL 3	50		0	0.00000
INT.WALL			324	
WINDOW 1	28	.05	40	0.06340
WINDOW 2	31	.05	0	0.00000
WINDOW 3	38	.05	0	0.00000
SGD	28	.05	0	0.00000
DOORS	0	.04	0	0.00000
ROOF	40	.04	144	0.01440
FLOOR		.6	144	
ET*S				0.08490
-10LOG(ET*S)				10.7
10LOGA				20.5
NOISE REDUCTION				25.2

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME MULTI-FAMILY LIVING ROOM + STC = 32

FLOOR AREA 144

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	40		71	0.00710
EXT.WALL 2	43		0	0.00000
EXT.WALL 3	50		0	0.00000
INT.WALL			324	
WINDOW 1	30	.05	40	0.04000
WINDOW 2	33	.05	0	0.00000
WINDOW 3	40	.05	0	0.00000
SGD	30	.05	0	0.00000
DOORS	0	.04	0	0.00000
ROOF	40	.04	144	0.01440
FLOOR		.6	144	
ET*S				0.06150
-10LOG(ET*S)				12.1
10LOGA				20.5
NOISE REDUCTION				26.6

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME MULTI-FAMILY LIVING ROOM + STC = 34

FLOOR AREA 144

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	40		71	0.00710
EXT.WALL 2	43		0	0.00000
EXT.WALL 3	50		0	0.00000
INT.WALL			324	
WINDOW 1	32	.05	40	0.02524
WINDOW 2	35	.05	0	0.00000
WINDOW 3	42	.05	0	0.00000
SGD	32	.05	0	0.00000
DOORS	0	.04	0	0.00000
ROOF	40	.04	144	0.01440
FLOOR		.6	144	
ET*S				0.04674
-10LOG(ET*S)				13.3
10LOGA				20.5
NOISE REDUCTION				27.8

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME MULTI-FAMILY LIVING ROOM + STC = 36

FLOOR AREA 144

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	40		71	0.00710
EXT.WALL 2	43		0	0.00000
EXT.WALL 3	50		0	0.00000
INT.WALL			324	
WINDOW 1	34	.05	40	0.01592
WINDOW 2	37	.05	0	0.00000
WINDOW 3	44	.05	0	0.00000
SGD	34	.05	0	0.00000
DOORS	0	.04	0	0.00000
ROOF	40	.04	144	0.01440
FLOOR		.6	144	
ET*S				0.03742
-10LOG(ET*S)				14.3
10LOGA				20.5
NOISE REDUCTION				28.7

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME MULTI-FAMILY LIVING ROOM + STC = 38

FLOOR AREA 144

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	40		71	0.00710
EXT.WALL 2	43		0	0.00000
EXT.WALL 3	50		0	0.00000
INT.WALL			324	
WINDOW 1	36	.05	40	0.01005
WINDOW 2	39	.05	0	0.00000
WINDOW 3	46	.05	0	0.00000
SGD	36	.05	0	0.00000
DOORS	0	.04	0	0.00000
ROOF	40	.04	144	0.01440
FLOOR		.6	144	
ET*S				0.03155
-10LOG(ET*S)				15.0
10LOGA				20.5
NOISE REDUCTION				29.5

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APPENDIX 5

INTERIOR NOISE REDUCTION CALCULATIONS

WITH EXTERIOR WALL UPGRADES AND BAFFLED ROOF

P. O. BOX 2325 • FULLERTON, CALIFORNIA • 92837
PHONE: 714-805-0115

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME MULTI-FAM BEDROOM W/ UPGRADE WALLS/ROOF + STC = 24

FLOOR AREA 152

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	50		41	0.00041
EXT.WALL 2	53		104	0.00052
EXT.WALL 3	60		0	0.00000
INT.WALL			272	
WINDOW 1	22	.05	40	0.25238
WINDOW 2	25	.05	16	0.05060
WINDOW 3	32	.05	0	0.00000
SGD	22	.05	0	0.00000
DOORS	0	.04	0	0.00000
ROOF	50	.04	152	0.00152
FLOOR		.6	152	
ET*S				0.30543
-10LOG(ET*S)				5.2
10LOGA				20.5
NOISE REDUCTION				19.7

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME MULTI-FAM BEDROOM W/ UPGRADE WALLS/ROOF + STC = 26

FLOOR AREA 152

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	50		41	0.00041
EXT.WALL 2	53		104	0.00052
EXT.WALL 3	60		0	0.00000
INT.WALL			272	
WINDOW 1	24	.05	40	0.15924
WINDOW 2	27	.05	16	0.03192
WINDOW 3	34	.05	0	0.00000
SGD	24	.05	0	0.00000
DOORS	0	.04	0	0.00000
ROOF	50	.04	152	0.00152
FLOOR		.6	152	
ET*S				0.19362
-10LOG(ET*S)				7.1
10LOGA				20.5
NOISE REDUCTION				21.7

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME MULTI-FAM BEDROOM W/ UPGRADE WALLS/ROOF + STC = 28

FLOOR AREA 152

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	50		41	0.00041
EXT.WALL 2	53		104	0.00052
EXT.WALL 3	60		0	0.00000
INT.WALL			272	
WINDOW 1	26	.05	40	0.10048
WINDOW 2	29	.05	16	0.02014
WINDOW 3	36	.05	0	0.00000
SGD	26	.05	0	0.00000
DOORS	0	.04	0	0.00000
ROOF	50	.04	152	0.00152
FLOOR		.6	152	
ET*S				0.12307
-10LOG(ET*S)				9.1
10LOGA				20.5
NOISE REDUCTION				23.6

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME MULTI-FAM BEDROOM W/ UPGRADE WALLS/ROOF + STC = 30

FLOOR AREA 152

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	50		41	0.00041
EXT.WALL 2	53		104	0.00052
EXT.WALL 3	60		0	0.00000
INT.WALL			272	
WINDOW 1	28	.05	40	0.06340
WINDOW 2	31	.05	16	0.01271
WINDOW 3	38	.05	0	0.00000
SGD	28	.05	0	0.00000
DOORS	0	.04	0	0.00000
ROOF	50	.04	152	0.00152
FLOOR		.6	152	
ET*S				0.07856
-10LOG(ET*S)				11.0
10LOGA				20.5
NOISE REDUCTION				25.6

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME MULTI-FAM BEDROOM W/ UPGRADE WALLS/ROOF + STC = 32

FLOOR AREA 152

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	50		41	0.00041
EXT.WALL 2	53		104	0.00052
EXT.WALL 3	60		0	0.00000
INT.WALL			272	
WINDOW 1	30	.05	40	0.04000
WINDOW 2	33	.05	16	0.00802
WINDOW 3	40	.05	0	0.00000
SGD	30	.05	0	0.00000
DOORS	0	.04	0	0.00000
ROOF	50	.04	152	0.00152
FLOOR		.6	152	
ET*S				0.05047
-10LOG(ET*S)				13.0
10LOGA				20.5
NOISE REDUCTION				27.5

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME MULTI-FAM BEDROOM W/ UPGRADE WALLS/ROOF + STC = 34

FLOOR AREA 152

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	50		41	0.00041
EXT.WALL 2	53		104	0.00052
EXT.WALL 3	60		0	0.00000
INT.WALL			272	
WINDOW 1	32	.05	40	0.02524
WINDOW 2	35	.05	16	0.00506
WINDOW 3	42	.05	0	0.00000
SGD	32	.05	0	0.00000
DOORS	0	.04	0	0.00000
ROOF	50	.04	152	0.00152
FLOOR		.6	152	
ET*S				0.03275
-10LOG(ET*S)				14.8
10LOGA				20.5
NOISE REDUCTION				29.4

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME MULTI-FAM BEDROOM W/ UPGRADE WALLS/ROOF + STC = 36

FLOOR AREA 152

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	50		41	0.00041
EXT.WALL 2	53		104	0.00052
EXT.WALL 3	60		0	0.00000
INT.WALL			272	
WINDOW 1	34	.05	40	0.01592
WINDOW 2	37	.05	16	0.00319
WINDOW 3	44	.05	0	0.00000
SGD	34	.05	0	0.00000
DOORS	0	.04	0	0.00000
ROOF	50	.04	152	0.00152
FLOOR		.6	152	
ET*S				0.02157
-10LOG(ET*S)				16.7
10LOGA				20.5
NOISE REDUCTION				31.2

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME MULTI-FAM BEDROOM W/ UPGRADE WALLS/ROOF + STC = 38

FLOOR AREA 152

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	50		41	0.00041
EXT.WALL 2	53		104	0.00052
EXT.WALL 3	60		0	0.00000
INT.WALL			272	
WINDOW 1	36	.05	40	0.01005
WINDOW 2	39	.05	16	0.00201
WINDOW 3	46	.05	0	0.00000
SGD	36	.05	0	0.00000
DOORS	0	.04	0	0.00000
ROOF	50	.04	152	0.00152
FLOOR		.6	152	
ET*S				0.01451
-10LOG(ET*S)				18.4
10LOGA				20.5
NOISE REDUCTION				32.9

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME MULTI-FAM LIVING W/ UPGRADE WALLS/ROOF + STC = 24

FLOOR AREA 144

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	50		71	0.00071
EXT.WALL 2	53		0	0.00000
EXT.WALL 3	60		0	0.00000
INT.WALL			324	
WINDOW 1	22	.05	40	0.25238
WINDOW 2	25	.05	0	0.00000
WINDOW 3	32	.05	0	0.00000
SGD	22	.05	0	0.00000
DOORS	0	.04	0	0.00000
ROOF	50	.04	144	0.00144
FLOOR		.6	144	
ET*S				0.25453
-10LOG(ET*S)				5.9
10LOGA				20.5
NOISE REDUCTION				20.4

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME MULTI-FAM LIVING W/ UPGRADE WALLS/ROOF + STC = 26

FLOOR AREA 144

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	50		71	0.00071
EXT.WALL 2	53		0	0.00000
EXT.WALL 3	60		0	0.00000
INT.WALL			324	
WINDOW 1	24	.05	40	0.15924
WINDOW 2	27	.05	0	0.00000
WINDOW 3	34	.05	0	0.00000
SGD	24	.05	0	0.00000
DOORS	0	.04	0	0.00000
ROOF	50	.04	144	0.00144
FLOOR		.6	144	
ET*S				0.16139
-10LOG(ET*S)				7.9
10LOGA				20.5
NOISE REDUCTION				22.4

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME MULTI-FAM LIVING W/ UPGRADE WALLS/ROOF + STC = 28

FLOOR AREA 144

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	50		71	0.00071
EXT.WALL 2	53		0	0.00000
EXT.WALL 3	60		0	0.00000
INT.WALL			324	
WINDOW 1	26	.05	40	0.10048
WINDOW 2	29	.05	0	0.00000
WINDOW 3	36	.05	0	0.00000
SGD	26	.05	0	0.00000
DOORS	0	.04	0	0.00000
ROOF	50	.04	144	0.00144
FLOOR		.6	144	
ET*S				0.10263
-10LOG(ET*S)				9.9
10LOGA				20.5
NOISE REDUCTION				24.3

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME MULTI-FAM LIVING W/ UPGRADE WALLS/ROOF + STC = 30

FLOOR AREA 144

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	50		71	0.00071
EXT.WALL 2	53		0	0.00000
EXT.WALL 3	60		0	0.00000
INT.WALL			324	
WINDOW 1	28	.05	40	0.06340
WINDOW 2	31	.05	0	0.00000
WINDOW 3	38	.05	0	0.00000
SGD	28	.05	0	0.00000
DOORS	0	.04	0	0.00000
ROOF	50	.04	144	0.00144
FLOOR		.6	144	
ET*S				0.06555
-10LOG(ET*S)				11.8
10LOGA				20.5
NOISE REDUCTION				26.3

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME MULTI-FAM LIVING W/ UPGRADE WALLS/ROOF + STC = 32

FLOOR AREA 144

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	50		71	0.00071
EXT.WALL 2	53		0	0.00000
EXT.WALL 3	60		0	0.00000
INT.WALL			324	
WINDOW 1	30	.05	40	0.04000
WINDOW 2	33	.05	0	0.00000
WINDOW 3	40	.05	0	0.00000
SGD	30	.05	0	0.00000
DOORS	0	.04	0	0.00000
ROOF	50	.04	144	0.00144
FLOOR		.6	144	
ET*S				0.04215
-10LOG(ET*S)				13.8
10LOGA				20.5
NOISE REDUCTION				28.2

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME MULTI-FAM LIVING W/ UPGRADE WALLS/ROOF + STC = 34

FLOOR AREA 144

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	50		71	0.00071
EXT.WALL 2	53		0	0.00000
EXT.WALL 3	60		0	0.00000
INT.WALL			324	
WINDOW 1	32	.05	40	0.02524
WINDOW 2	35	.05	0	0.00000
WINDOW 3	42	.05	0	0.00000
SGD	32	.05	0	0.00000
DOORS	0	.04	0	0.00000
ROOF	50	.04	144	0.00144
FLOOR		.6	144	
ET*S				0.02739
-10LOG(ET*S)				15.6
10LOGA				20.5
NOISE REDUCTION				30.1

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME MULTI-FAM LIVING W/ UPGRADE WALLS/ROOF + STC = 36

FLOOR AREA 144

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	50		71	0.00071
EXT.WALL 2	53		0	0.00000
EXT.WALL 3	60		0	0.00000
INT.WALL			324	
WINDOW 1	34	.05	40	0.01592
WINDOW 2	37	.05	0	0.00000
WINDOW 3	44	.05	0	0.00000
SGD	34	.05	0	0.00000
DOORS	0	.04	0	0.00000
ROOF	50	.04	144	0.00144
FLOOR		.6	144	
ET*S				0.01807
-10LOG(ET*S)				17.4
10LOGA				20.5
NOISE REDUCTION				31.9

WORK SHEET FOR CALCULATING ROOM NOISE REDUCTION VALUE

ROOM NAME MULTI-FAM LIVING W/ UPGRADE WALLS/ROOF + STC = 38

FLOOR AREA 144

SURFACES	TL	@	AREA	T*S
EXT.WALL 1	50		71	0.00071
EXT.WALL 2	53		0	0.00000
EXT.WALL 3	60		0	0.00000
INT.WALL			324	
WINDOW 1	36	.05	40	0.01005
WINDOW 2	39	.05	0	0.00000
WINDOW 3	46	.05	0	0.00000
SGD	36	.05	0	0.00000
DOORS	0	.04	0	0.00000
ROOF	50	.04	144	0.00144
FLOOR		.6	144	
ET*S				0.01220
-10LOG(ET*S)				19.1
10LOGA				20.5
NOISE REDUCTION				33.6

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APPENDIX 6

ATTIC VENT BAFFLE DETAILS

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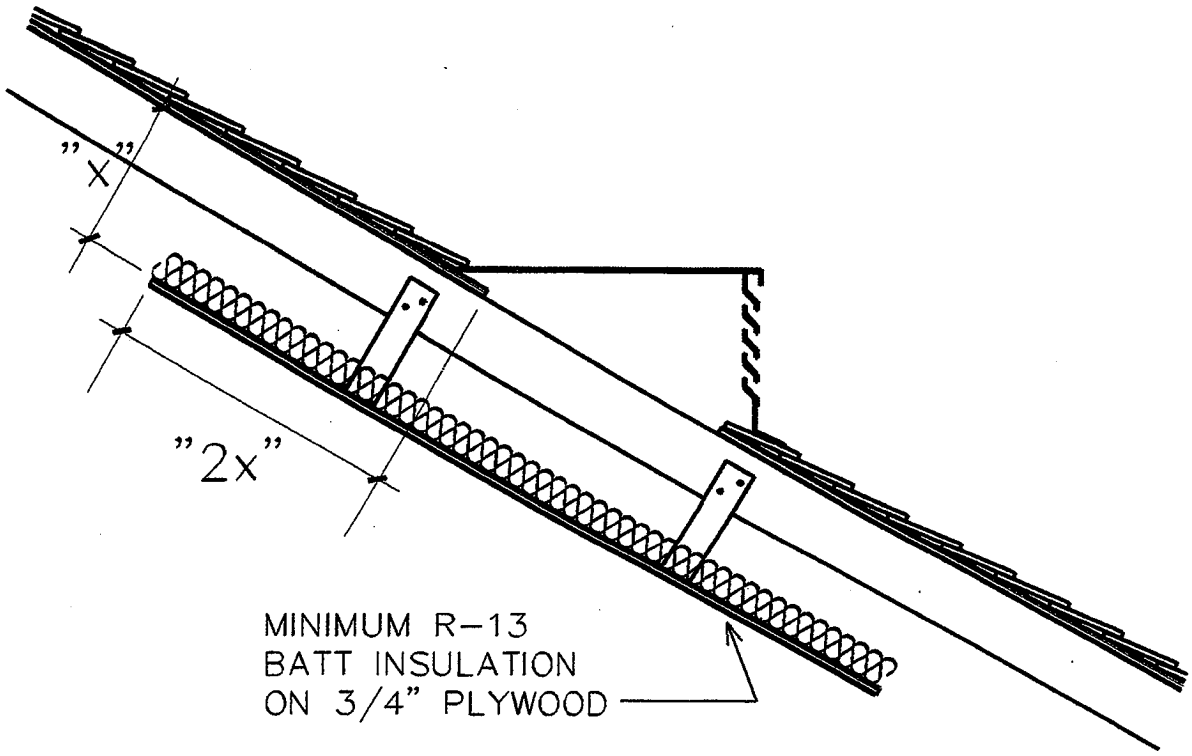

ATTIC VENT BAFFLE AT DORMER VENT

BAFFLE MUST EXTEND BEYOND THE ROOF OPENING TWICE THE DISTANCE BETWEEN THE ROOF SHEATHING AND THE FACE OF THE PLYWOOD BAFFLE IN ALL DIRECTIONS

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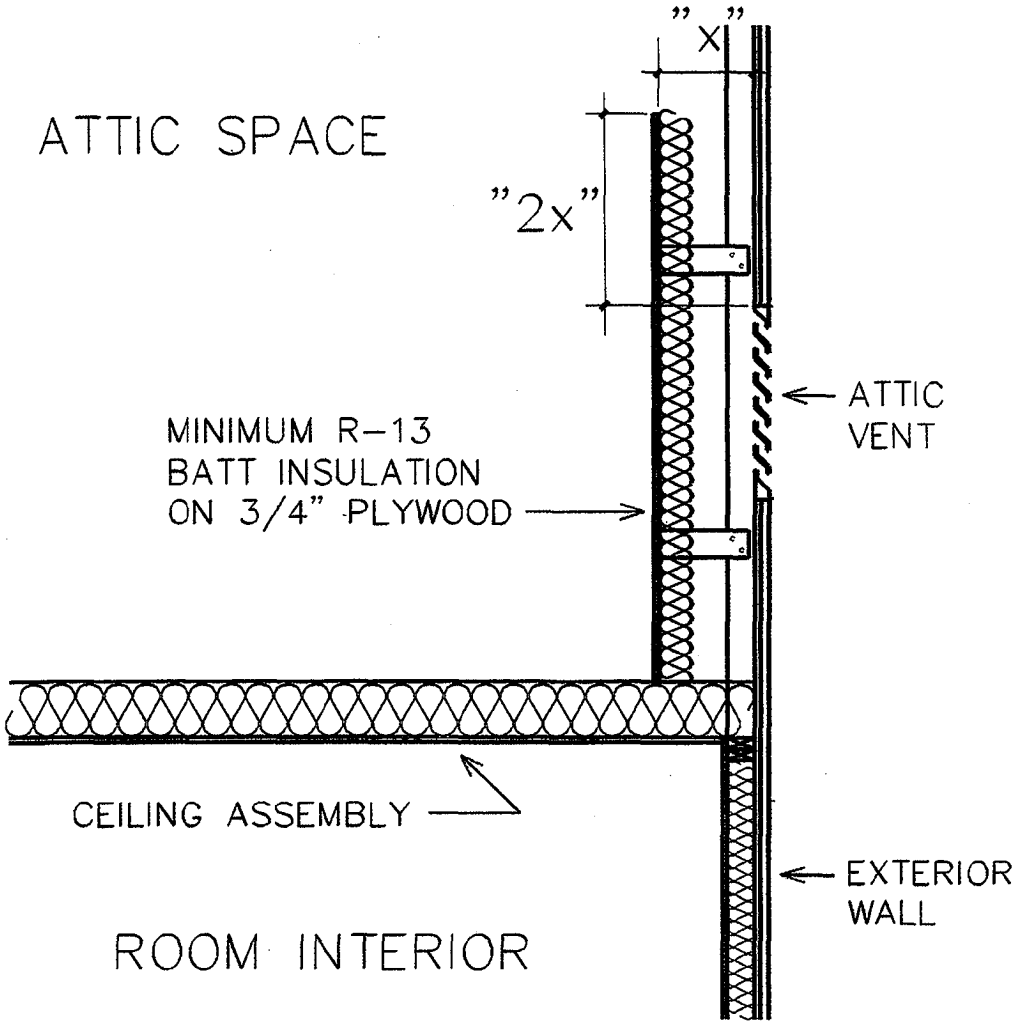

ATTIC VENT BAFFLE AT VERTICAL WALL

BAFFLE MUST EXTEND BEYOND THE VENT OPENING TWICE THE DISTANCE BETWEEN THE SHEAR PANEL/EXTERIOR SIDING AND THE FACE OF THE PLYWOOD BAFFLE IN ALL DIRECTIONS UNLESS THE BAFFLE MEETS THE ROOF OR CEILING FIRST

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APPENDIX 7

PLUMBING AND ELECTRICAL INSTALLATIONS

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PLUMBING NOISE REDUCTION REQUIREMENTS FOR COMPLIANCE WITH THE CALIFORNIA CODE OF REGULATIONS TITLE 24, PART 2, APPENDIX CHAPTER 35

REQUIRED PLUMBING DESIGN FEATURE IN COMON WALL AND FLOOR/CEILING ASSEMBLIES

The plumbing system, by its nature, can degrade the acoustical integrity of a common wall or floor/ceiling assembly. This is primarily due to the fact that the plumbing system, a sound carrier and a sound source, is generally attached to the studs, plates, joists and drywall of a building's walls and floors. In order to alleviate the problem of plumbing system noise, one hundred percent of the plumbing system must be isolated from the building structure (not just at the common assemblies). Special installation requirements are necessary in order to:

(1) reduce the level of noise from the plumbing system, and

(2) isolate the total plumbing system from the building structure.

These special isolation procedures may be accomplished by using an approved commercial isolation system. Hard plastic "isolators" are **NOT** acceptable. Examples of approved commercial isolation systems in order of preference are:

(1) "Acousto-Plumb" ™ system by Specialty Products, Inc. (www.ispproducts.com),

(2) Holdrite Silencer System by Holdrite, Inc. (www.holdrite.com), and

(3) the felt lined series of isolators, clamps and hangers from Tolco, Inc.

Only when appropriate commercial isolation products are not available for unusual applications or extra large pipe sizes, will it be acceptable to use high density, 1/4" thick, 2" wide, adhesive backed felt wrap and/or 1/2" thick pre-formed, self-adhesive foam rubber pipe insulation such as Armaflex or Rubatex. If the felt wrap or pre-formed pipe insulation is used,

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great care must be taken not to compress the insulation material when strapping or anchoring the attachment points. Use of expanding foam products as plumbing isolation is **strictly prohibited**.

SUPPLY LINES

- All hot and cold water pipes, fittings and valves shall NEVER come in direct contact with either the building structure framing or drywall. Supply lines are to be isolated using Acousto-Plumb, Holdrite Silencer System, Tolco I.S.P. felt lined isolator products, 1/4" high density felt wrap or 1/2" pre-formed pipe insulation. Acousto-Plumb products and installation details can be found at www.lspproducts.com. Holdrite Silencer System products and installation details can be found at www.holdrite.com. Tolco I.S.P. products can be found at www. cooperindustries.com. Installation details for use of felt wrap or pre-formed pipe insulation are available upon request and approval. If felt wrap or pre-formed pipe insulation are used (and only with prior written approval by the acoustical consultant when appropriate commercial isolation products cannot be located), these installation details must be followed to the letter. No deviations from these details will be allowed.

- All sink and shower faucets, spouts and risers shall be isolated with resilient gaskets that are positioned between the faucet, spout or riser and its mounting surface.

- Water supply stub-outs shall be temporarily isolated from the drywall using the Acousto-Sleeve ™ during drywall installation, and then permanently isolated using the Acousto-Scutcheon ™ or resilient caulking and a standard plumbing escutcheon.

- Water pressure shall not exceed 65 psi.

- Shower head flow restrictors shall be used to limit water flow to less than three (3) gallons per minute.

- The pipe stubs commonly installed to combat water hammer are not effective. A commercially produced water hammer device consisting of a bellows, similar to that made by Plumbing Products, Inc., is recommended.

- Sections of the plumbing supply system employing PEX (cross linked polyethylene tubing) do not require acoustical isolation except where it transitions to or from conventional copper lines.

WASTE LINES

- The cavity under plastic or fiberglass tubs and showers shall be packed with fiberglass or spray-on insulation materials and/or lightweight concrete pours. The bottoms of such tubs shall be blocked or supported by lightweight concrete to reduce drumming.

- All waste lines above the slab and at the penetrations of any floor/ceiling assemblies and any walls (including non-common walls) shall be cast iron. The use of ABS waste lines is not recommended. If ABS is used, the entire framing cavity surrounding the ABS pipe shall be completely packed with fiberglass, mineral wool or spray–on adhesive cellulose insulation materials. All elbows below toilet and tub waste outlets shall be isolated from all positioning blocks using carpet padding or high-density 1/4" felt material. The entire framing cavity surrounding these elbows shall be completely packed with fiberglass, mineral wool or spray-on adhesive cellulose insulation materials.

- Waste lines of a diameter greater than two and a half inches (2.5") shall never be installed in a wall framed with less than 2" by 6" studs. Walls framed with 2" by 4" studs simply don't allow sufficient clearance to properly insulate and isolate waste lines and/or avoid pipe contact with the drywall.

Failure to COMPLETELY isolate the plumbing system from the building structure will result in a significant transfer of plumbing noise into the building. Therefore, it is important that all of the above measures and techniques are employed. Collectively, these measures and techniques act as parts of a complete system, each designed to perform a particular function of the total effort. Any circumvention of the function of any one component, whether intentional or not, will ultimately lessen the effectiveness of the entire system. **QUALITY CONTROL IS CRITICAL TO PROPER PLUMBING SYSTEM ISOLATION.**

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ELECTRICAL SYSTEM INSTALLATION NOTES

The following items shall be incorporated into the building plans:

COMMON WALLS

- Electrical outlets, switches, phone jacks, television antennae boxes and computer outlet boxes installed in opposite sides of a common wall shall be offset a minimum of 24" to comply with the fire code. This offset is not needed for acoustical reasons if insulation is used in the framing cavities and Lowry's #10 putty pads or 3M fire pads are applied around the backs and sides of all outlets, switches, phone jacks, etc.
- All electrical outlets, switches, phone jacks, television antennae boxes and computer outlet boxes installed in common walls shall be backed by and Lowry's #10 putty pads, 3M fire pads or equivalent. Pads shall be stapled to the studs to insure that they remain in place indefinitely (the adhesive backing of the pads deteriorates over time).
- Wiring shall avoid crossing over the air gap of common walls. Where unavoidable, wiring crossovers between common wall studs shall include a loop where the depth is equal to its width.
- Electrical panel boxes, fixture boxes or outlet boxes greater than 25 square inches shall be set in raised boxes that do not touch the opposite side of the common wall.

COMMON FLOOR/CEILINGS

- Recessed lighting shall be set in recessed and airtight boxes made of plywood or drywall.
- All other precautions applicable to common wall installations shall also apply to common floor/ceiling installations.

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