



**RMA GeoScience**  
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*Hayan Liu*

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*Mary Beth Kile*

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*Mark Swanson*

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**GEOTECHNICAL INVESTIGATION  
UPLAND 76  
1400 EAST ARROW HIGHWAY  
UPLAND, CALIFORNIA**

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## FIGURES

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## APPENDICES

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## 1.00 INTRODUCTION

### 1.01 Purpose

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### 1.02 Scope of the Investigation

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### 1.03 Site Location and Description

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### 1.04 Site History

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### 1.05 Record Review Findings

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### 1.06 Planned Development

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### 1.07 Investigation Methods

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## 2.00 FINDINGS

### 2.01 Geologic Setting

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## 2.02 Earth Materials

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## 2.03 Expansive Soils

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## 2.04 Surface and Groundwater Conditions

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## 2.05 Faults

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## 2.06 Landslides

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## 2.07 Liquefaction

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## 2.08 Historic Seismicity

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Large Historic Earthquakes

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## 2.09 Flooding Potential

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## 2.10 Landslides

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## 3.00 CONCLUSIONS AND RECOMMENDATIONS

### 3.01 General Conclusion

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### 3.02 General Earthwork and Grading

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### 3.03 Earthwork Shrinkage and Subsidence

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### 3.04 Removal and Recompaction

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### 3.05 Seismic Design Parameters

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### 2019 California Building Code (CBC) Seismic Parameters

Parameter	Value
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### 3.06 Liquefaction and Secondary Earthquake Hazards

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### 3.08 Slab-On-Grade

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### 3.09 Miscellaneous Concrete Flatwork

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### 3.10 Footing Excavation and Slab Preparation

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### 3.11 Lateral Load Resistance

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**Surface Slope of Retained Materials  
(Horizontal:Vertical)**

**Equivalent Fluid Weight  
(pcf)**

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### 3.12 Cement Type and Corrosion Potential

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### Recommendations for Concrete exposed to Sulfate-containing Soils

Sulfate Exposure	Water Soluble Sulfate ( $\text{SO}_4$ ) in Soil (% by Weight)	Sulfate ( $\text{SO}_4$ ) in Water (ppm)	Cement Type (ASTM C150)	Maximum Water-Cement Ratio (by Weight)	Minimum Compressive Strength (psi)
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### 3.13 Utility Trench Backfill

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### **3.14 Temporary Excavations**

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### **3.15 Drainage**

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### **3.16 Plan Review**

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### **3.17 Geotechnical Observation and Testing**

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### 3.18 Post-Grading Geotechnical Observation and Testing

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#### 4.00 CLOSURE

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## FIGURES

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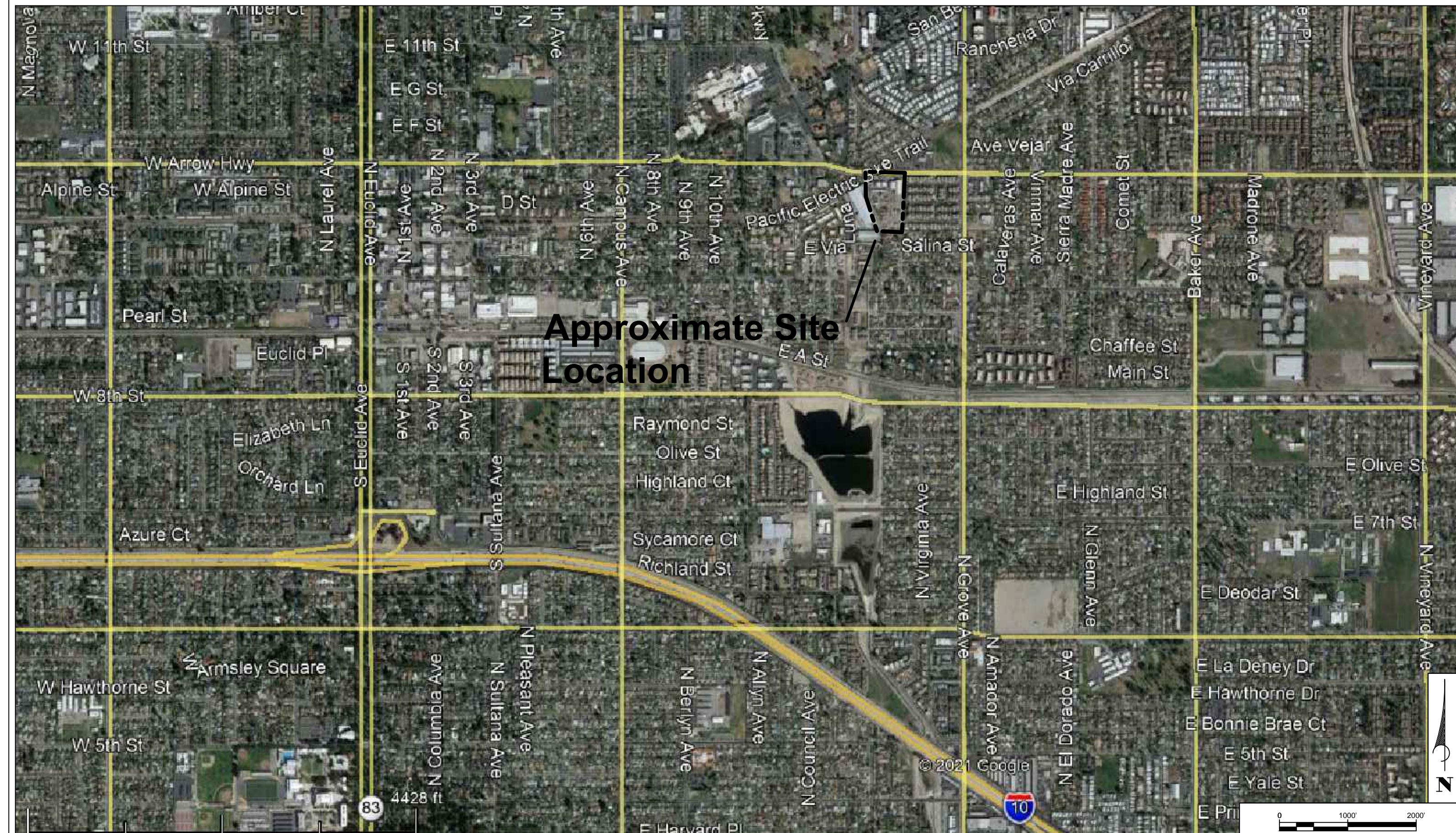


Figure 1

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## Site Plan and Geologic Map

Upland 76  
1400 East Arrow Highway  
Upland, California



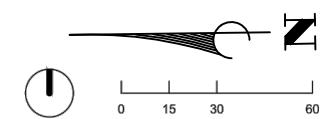
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4695 MacArthur Court, Suite 300  
Newport Beach, CA 92660

**UPLAND 32N**  
UPLAND, CA #2021-0470

**CONCEPT DESIGN**  
May 6, 2021

**Concept Design**  
Upland 76  
1400 East Arrow Highway  
Upland, California



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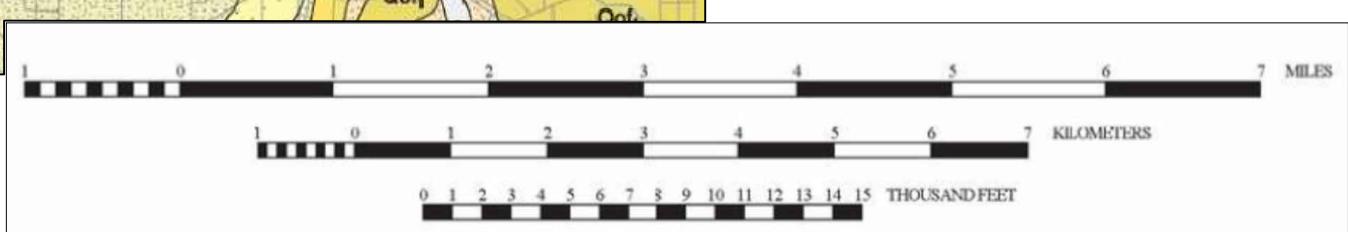
**Figure 3**

**A1.0**

## Partial Explanation

	Very young eolian deposits (late Holocene)
	Very young surficial deposits (late Holocene)
	Very young surficial deposits, Unit 1 (late Holocene)
	Young wash deposits (Holocene and late Pleistocene)
	Young wash deposits, Unit 3 (early Holocene)
	Young wash deposits, Unit 2 (early Holocene)
	Young wash deposits, Unit 1 (early Holocene and late Pleistocene)
	Young alluvial-fan deposits (Holocene and late Pleistocene)
	Young alluvial-fan deposits, Unit 5 (late Holocene)
	Young alluvial-fan deposits, Unit 4 (late Holocene)
	Young alluvial-fan deposits, Unit 3 (middle Holocene)
	Young alluvial-fan deposits, Unit 2 (middle Holocene)
	Young alluvial-fan deposits, Unit 1 (middle Holocene)
	Young alluvial-valley deposits (Holocene and late Pleistocene)

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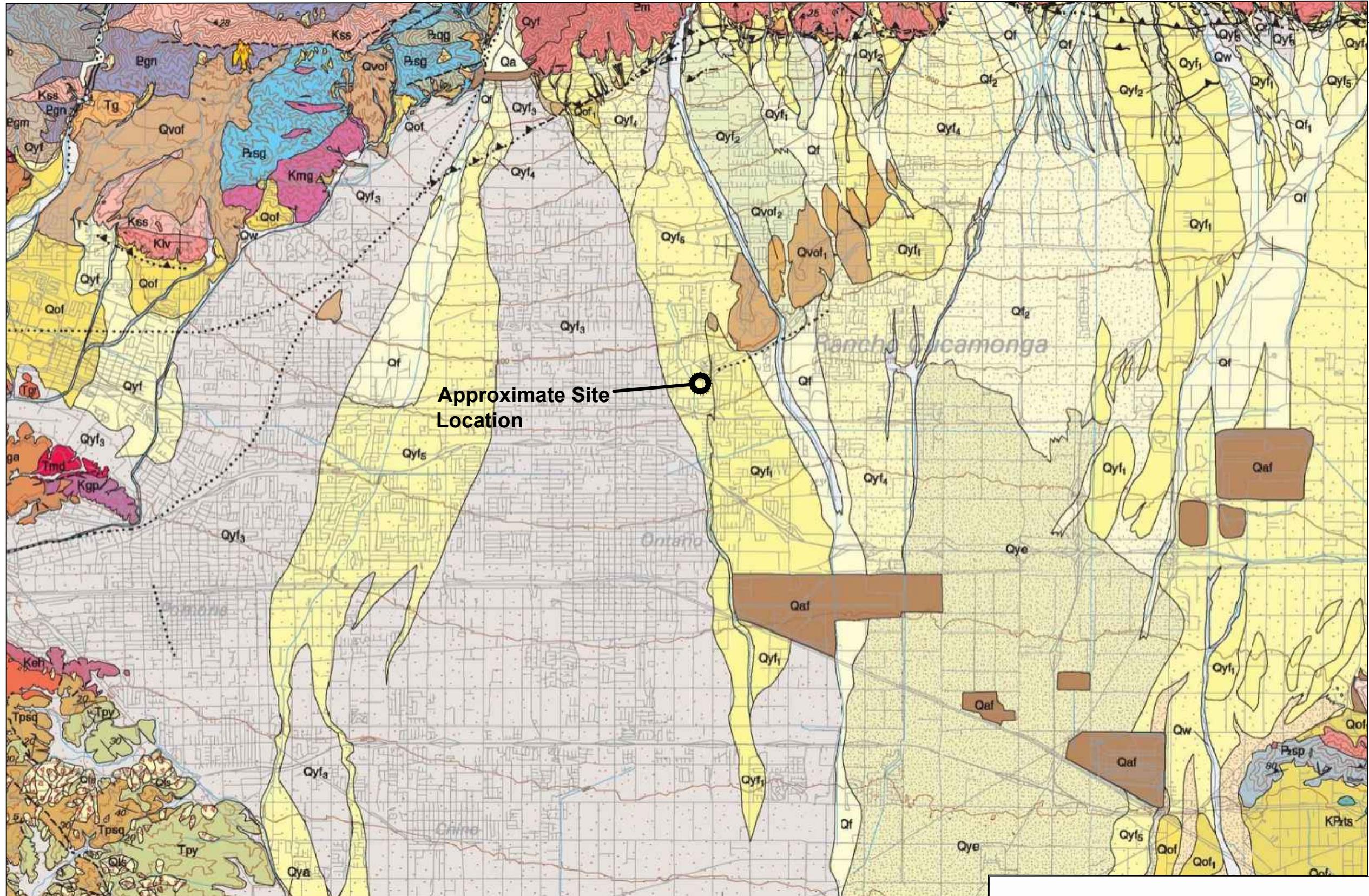


## Regional Geologic Map

Upland 76  
1400 East Arrow Highway  
Upland, California

Figure 4

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## APPENDIX A

### FIELD INVESTIGATION

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## APPENDIX A

### FIELD INVESTIGATION

#### A-1.00 FIELD EXPLORATION

##### A-1.01 Number of Borings

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##### A-1.02 Location of Boring

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##### A-1.03 Boring Logging

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## I. SOIL STRENGTH/DENSITY

### BASED ON STANDARD PENETRATION TESTS

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### BASED ON RELATIVE COMPACTION

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## II. SOIL MOISTURE

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## APPENDIX B

### LABORATORY TESTS

## APPENDIX B

### B-1.00 LABORATORY TESTS

#### B-1.01 Maximum Density

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#### B-1.02 Expansion Tests

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#### B-1.03 Moisture Determination

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#### B-1.04 Density of Split-Barrel Samples

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#### B-1.05 Soluble Sulfates

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#### B-1.06 Soil Reactivity (pH) and Minimum Resistivity

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#### B-1.07 Direct Shear

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#### B-1.08 Test Results

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**DIRECT SHEAR TEST**  
**ASTM D3080**

Project ID: 21G-0337-0

Location: B1

Depth: 0-5 feet

Soil Description: Silty Sand with gravel

Remolded or Undisturbed: Undisturbed

Maximum Dry Density (pcf) = N/A

Optimum Moisture Content (%) = N/A

Initial Dry Density (pcf) = 119.3

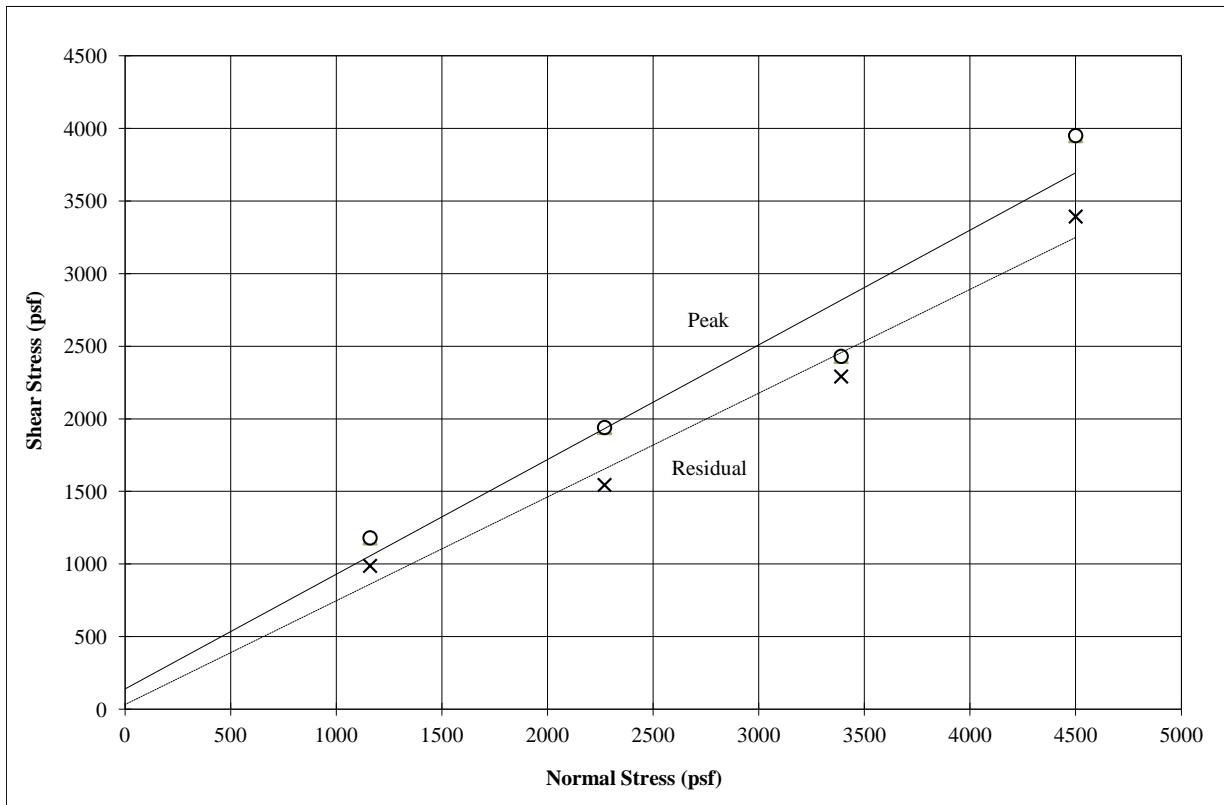
Relative Compaction (%) = N/A

Initial Moisture Content (%) = 6.7%

Final Moisture Content (%) = 15.9%

Diameter (in)	2.41
Area of sample (in <sup>2</sup> )	4.56
Load Ring Constant (lb/in)	4010

Load Applied (g)	Normal Pressure (psf)	Peak		Residual	
		Dial Reading	Shear Resist (psf)	Dial Reading	Shear Resist (psf)
16615	1160	0.0093	1180	0.0078	987
32600	2270	0.0153	1940	0.0122	1544
48674	3390	0.0192	2430	0.0181	2291
64681	4500	0.0312	3950	0.0268	3392
		Peak	Residual		
Cohesion (psf) =		140	30		
Friction Angle (deg) =		38	36		





## APPENDIX C

### GENERAL EARTHWORK AND GRADING SPECIFICATIONS



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**GENERAL EARTHWORK AND GRADING SPECIFICATIONS**

**C-1.00 GENERAL DESCRIPTION**

**C-1.01 Introduction**

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**C-1.02 Laboratory Standard and Field Test Methods**

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**C-2.00 Clearing**

**C-2.01 Surface Clearing**

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**C-2.02 Subsurface Removals**

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**C-2.03 Backfill of Cavities**

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### C-3.00 ORIGINAL GROUND PREPARATION

#### C-3.01 Stripping of Vegetation

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#### C-3.02 Removals of Non-Engineered Fills

#### C-3.03 Overexcavation of Fill Areas

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### C-4.00 FILL MATERIALS

#### C-4.01 General

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#### C-4.02 Oversize Material

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### C-4.03 Import

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## C-5.00 PLACING AND SPREADING OF FILL

### C-5.01 Fill Lifts

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### C-5.02 Fill Moisture

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### C-5.03 Fill Compaction

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C-5.04 Fill Slopes

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### C-5.05 Compaction Testing

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### C-6.00 SUBDRAINS

#### C-6.01 Subdrain Material

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#### C-6.02 Subdrain Installation

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### C-7.00 EXCAVATIONS

#### C-7.01 General

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#### C-7.02 Fill-Over-Cut Slopes

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**C-8.00 TRENCH BACKFILL**

**C-8.01 General**

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**C-9.00 SEASONAL LIMITS**

**C-9.01 General**

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**C-10.00 SUPERVISION**

**C-10.01 Prior to Grading**

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**C-10.02 During Grading**

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## APPENDIX D

### REFERENCES

## REFERENCES

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