**APPENDIX E2**

## GEOTECHNICAL EVALUATION REPORT OF SOIL STOCKPILE

**Converse Consultants**
75 Years of Dedication in Geotechnical Engineering & Consulting, Environmental & Groundwater Science, Materials Testing & Inspection Services

October 20, 2021

Mr. Jason Lee
Vice President
RCCD, Inc.
8101 E. Kaiser Boulevard, Suite 140
Anaheim Hills, California 92808

Subject: **GEOTECHNICAL EVLUATION REPORT OF SOIL STOCKPILE**
**ARTEVAL Property**
Southeast Corner of Euclid Avenue and Schaefer Avenue
City of Ontario, San Bernardino County, California
Converse Project No. 20-81-154-01

Dear Mr. Lee:

Converse Consultants (Converse) is pleased to submit the results of our geotechnical evaluation of the soil stockpile at the subject site for the proposed commercial and residential development. This letter report was prepared in accordance with our Agreement for Geotechnical Services dated March 30, 2020. and your signed Authorization of Agreement, dated June 22, 2021.

## SITE LOCATION AND CURRENT CONDITIONS

The soil stockpile in located within the central potion of an approximately 59.56-acre L-shaped dairy site, which is located at the southeast corner of Euclid Avenue and Schaefer Avenue, in the City of Ontario, San Bernardino, California. The entire property is bounded to the north by Schaefer Avenue, to the west by Euclid Avenue, to the south and east by existing active and abandoned dairies. The approximate location of the site is shown in Figure No. 1, Approximate Soil Stockpile and Test Pit Locations Map.

The soil stockpile is approximately 420 feet 430 feet long, 70 feet to 80 feet wide and 5 feet to 10 feet high. A light growth of weeds and grasses are present on portions of the soil stockpile. Some scattered localized debris and trash is present on the surface.

## PROPOSED DEVELOPMENT AND GRADING

Based on conversations with Mr. Jason Lee of RCCD, Inc. the property will be developed for mixed residential and commercial use. No development or grading plans are available at this time.


Project: ARTEVAL Property
Location: Southeast Corner of Euclid Avenue and Schaefer Avenue
City of Ontario, San Bernardino County, California

For: RCCD, Inc.

# Approximate Soil Stockpile and Test Pit Locations Map

Project No.
**21-81-154-01**

**Converse Consultants**

Figure
**1**

## SCOPE OF WORK

The scope of Converse's investigation is described in the following sections.

### ***Project Set-up***

The project set-up consisted of the following tasks.

- Conducted a site reconnaissance to mark the site for exploration and to verify backhoe access to the proposed locations were available.
- Notified Underground Service Alert (USA) at least 48 hours prior to conducting field work to clear the test pit locations of any conflict with existing underground utilities.
- Engaged a backhoe company to excavate exploratory test pits.

### ***Subsurface Exploration***

Eight exploratory test pits (TP-01 through TP-08) were excavated using a backhoe equipped with 24-inch-wide bucket to investigate the subsurface conditions on July 28, 2021. The test pits were excavated from approximately 9 feet to 12 feet below the existing ground surface (bgs).

### ***Laboratory Testing***

Representative samples of the stockpiled soils were tested in the laboratory to aid in evaluating the suitability of the use of the soil for future development. These tests included the following.

- *In-situ* moisture contents (ASTM D2216)
- Organic Content (ASTM D2974, Methods A and C)
- Expansion Index (ASTM D4829)
- Soils Corrosivity (CTM 643, 422, 417, 532)

## SUBSURFACE PROFILE

Based on the test pits, and previous laboratory test results, the subsurface soil within the stockpile consisted primarily of partially organic artificial fill. Based on observations and exploration the approximate depth of these fill soils is estimated to range in depth from about 5.0 foot to 10.0 feet. These partially organic artificial fill soils were generally comprised of a mixture of silty sand, clayey sand, sandy silt and sandy clay and silty clay, which were fine to coarse-grained, moist to wet and various shades of brown, yellow, gray and black, with some organics/manure.

## LABORATORY TEST RESULTS

Laboratory testing was performed to determine the physical and chemical characteristics and engineering properties of the subsurface soils. Current physical test results are included in Appendix A, *Laboratory Testing Results*. Discussions of the various test results are presented below.

### ***Physical Testing***

- In-situ Moisture: *In-situ* moisture contents of the stockpiled soils were determined in accordance with ASTM Standard D2216. Moisture contents of the soils ranged from 11 to 31 percent.
- *Organic Content*: Six organic content tests were performed in accordance with ASTM Standard D2974 on representative bulk soil samples. The amount of organic material present in the stockpiled soils ranged from 0.8% to 5.6%.
- *Expansion Index:* Two representative bulk soil samples were tested to evaluate the expansion potential stockpiled soils in accordance with ASTM Standard D4829. The test results indicated expansion index is 53 and 79, corresponding to medium expansion potential.

### ***Chemical Testing - Corrosivity Evaluation***

Four representative soil samples were tested to determine minimum electrical resistivity, pH, and chemical content, including soluble sulfate and chloride concentrations. The purpose of this test was to determine the corrosion potential of site soils when placed in contact with common pipe materials. The test was performed by AP Engineering and Testing, Inc. (Pomona, CA) in accordance with California Test Methods 643, 422, and 417. The test result is presented in Appendix A, *Laboratory Testing Results and* is summarized in below.

- The pH measurement of the samples tested ranged from 8.1 to 8.6.
- The sulfate content of the samples tested ranged from 289 ppm to 3672 ppm (0.0289 percent to 0.3672 percent by weight).
- The chloride concentration of the samples tested ranged from 46 ppm to 227 ppm.
- The minimum electrical resistivity when saturated was 332 ohm-cm to 1,031 ppm.

# RECOMMENDATIONS

## ***General***

This section contains our general recommendations regarding the use of the subject stockpiled soil material as engineered fill during future development.

These recommendations are based on the results of our field sampling and laboratory testing as well as our experience with similar projects in the area and data evaluation as presented in the preceding sections. Based on observations of excavations and laboratory test results a portion of the stockpiled fill soils appear to be imported from sources outside of the surrounding area. These recommendations may require modification by the geotechnical consultant based on observations and laboratory testing during grading.

## ***Moisture Content***

Based on the laboratory test results portions of the subject stockpiled fill soils are clayey with a very high moisture content that would require drying back prior to use as compacted fill. Fill soils should be thoroughly mixed, and moisture conditioned to within ±3 percent of optimum moisture content for coarse soils and 0 to 2 percent above optimum moisture content for fine soils. Fill soils should be evenly spread in horizontal lifts not exceeding 8 inches in uncompacted thickness.

## ***Organic Content***

Based on the laboratory test results of the partially organic soils indicated the subject stockpiled fill soils has organic contents of about 0.8 percent to 5.6 percent. This would be an average organic content of about 3.2 percent. Therefore, these stockpiled soils consisting of partially organic artificial fill should be blended with undisturbed natural soils or removed from the site.

Fill materials should contain no more than 2 percent overall organics. The partially organic soils can be blended with the on-site natural soils at a ratio of 2 to 1 (natural soils/clean imported soils to partially organic soils) and placed as compacted fill, provided they are completely mixed during fill placement. The type of equipment and method of placement; blending and mixing of the partially organic materials with onsite natural soils or clean imported soils to be utilized by the grading contractor, should be reviewed and accepted by the geotechnical consultant prior to implementation. A possible method of placement that could be considered would be to place the partially organic materials at an angle to the pattern of the placement of the onsite natural soils or clean imported soils. The testing frequency for verifying the percent organic content should be established by the geotechnical consultant prior to fill placement once the method of blending, placement, and mixing of the partially organic materials with onsite natural soils or clean imported soils.

***Soil Expansion***

Based on the laboratory test results portions of the subject stockpiled fill soil materials exhibited an expansion potential of Medium, in accordance with 2019 CBC. Based on experience in the area the majority of soils on the site are anticipated to be sandier and exhibit expansion potentials of Very low to Low. Therefore, consideration should be made to place these stockpiled fill soils in deeper fills (at least 5 feet below proposed grade), landscape areas or non-structural fills or blended with sandier soils on site, outside of the subject fill stockpile, to reduce the expansion potential. Testing of the soil during rough grading should be performed to determine the actual pad-by-pad expansion potential.

***Soil Corrosivity***

The results of chemical testing of representative stockpiled fill soils are presented in Appendix A, *Laboratory Testing Results*, and a general discussion are presented below.

The sulfate content of the soils tested correspond to American Concrete Institute (ACI) exposure category S2 for this sulfate concentration (ACI 318-14, Table 19.3.1.1). ACI recommends a minimum compressive strength of 4,500 psi for exposure category S2 in ACI 318-14, Table 19.3.2.1. A minimum compressive strength of 4,500 psi is recommended. A maximum water cement ratio of 0.40 is recommended. Cementitious materials should be Type V.

We anticipate that concrete structures such as footings, slab, and concrete pad will be exposed to moisture from precipitation and irrigation. Based on the site location and the results of chloride testing of the stockpiled fill soils, we anticipate that concrete structures will be exposed to external sources of chlorides, such as deicing chemicals, salt, brackish water, or seawater. ACI specifies exposure category C1 where concrete is exposed to moisture, but not to external sources of chlorides (ACI 318-14, Table 19.3.1.1). ACI provides concrete design recommendations in ACI 318-14, Table 19.3.2.1, including a compressive strength of at least 2,500 psi and a maximum chloride content of 0.3 percent.

The measured value of the minimum electrical resistivities when saturated ranged from 300 Ohm-cm to 1,031 Ohm-cm. This indicates that the soils tested are corrosive to severely corrosive to ferrous metals in contact with the soil (Romanoff, 1957). Metal piping should be corrosion-protected, or consideration should be given to using plastic piping metal. Converse does not practice in the area of corrosion consulting. A qualified corrosion consultant should provide appropriate corrosion mitigation measures for ferrous metals in contact with the site soils.

Therefore, consideration should be made to place these stockpiled fill soils in deeper fills (at least 5 feet below proposed grade), landscape areas or non-structural fills or

blended with on-site soils, outside of the subject fill stockpile, to reduce the high corrosion potentials.

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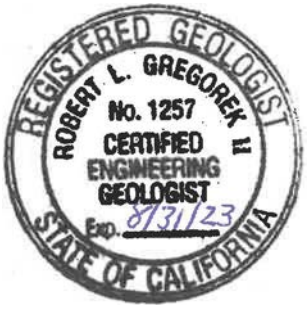
Testing of the soil during rough grading should be performed to determine the pad-by-pad soil corrosivity to common construction materials.

## CLOSING

This letter report is prepared for the project described herein and is intended for use solely by RCCD, Inc and their authorized agents, to assist in the development of the site. Our findings and recommendations were obtained in accordance with generally accepted professional principles practiced in geotechnical engineering. We make no other warranty, either expressed or implied.

We appreciate the opportunity to be of service to RCCD, Inc. If you have any questions, please do not hesitate to contact us at 909-796-0544.

**CONVERSE CONSULTANTS**

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Encl: *Appendix A, Laboratory Testing Results*
RLG/kvg

# Appendix A

## Laboratory Testing Results

# APPENDIX A

# LABORATORY TESTING RESULTS

Tests were conducted in our laboratory on representative soil samples for the purpose of classification and evaluation of their physical properties and engineering characteristics. The amount and selection of tests were based on the geotechnical parameters required for this project. Test results are presented herein. The following is a summary of the various laboratory tests conducted for this project.

## ***In-Situ Moisture Content***

In-situ moisture content tests were performed on disturbed bulk samples, in accordance with ASTM Standard D2216 to aid in soils classification and to provide moisture characteristics of the stockpiled fill soils. Test results are summarized in the table below.

**Table No. A-1, Summary of In-Situ Moisture Content Test Results**

| Test Pit No. | Depth (feet) | Soil Description | Moisture Content (%) |
|---|---|---|---|
| TP-01 | 0.0-7.0 | Silty Sand /Sandy Silt (SM/ML), trace clay | 17 |
| TP-02 | 0.0-7.5 | Silty Sand /Sandy Silt (SM/ML), trace clay | 16 |
| TP-03 | 0.0-8.0 | Silty Sand (SM), trace clay | 15 |
| TP-04 | 0.0-7.0 | Silty Sand/Clayey Sand (SM/SC) | 12 |
| TP-05 | 0.0-7.5 | Silty Sand/Clayey Sand (SM/SC) | 12 |
| TP-06 | 0.0-10.0 | Silty Clay (CL) | 20 |
| TP-07 | 0.0-9.0 | Sandy Clay (CL) | 31 |
| TP-08 | 0.0-5.0 | Silty Sand (SM), trace clay | 11 |

## ***Organic Content***

Tests were performed on eight select samples of stockpiled fill soils to determine the organic content, in accordance with the ASTM Standard D2974 test, Methods A and C. Test results are summarized in the table below.

**Table No. A-2, Summary of Organic Content Test Results**

| Test Pit No. | Depth (feet) | Soil Description | Total Organic Content (%) |
|---|---|---|---|
| TP-01 | 0.0-7.0 | Silty Sand /Sandy Silt (SM/ML), trace clay | 1.7 |
| TP-02 | 0.0-7.5 | Silty Sand /Sandy Silt (SM/ML), trace clay | 2.0 |
| TP-03 | 0.0-8.0 | Silty Sand (SM), trace clay | 0.8 |
| TP-04 | 0.0-7.0 | Silty Sand/Clayey Sand (SM/SC) | 4.2 |
| TP-05 | 0.0-7.5 | Silty Sand/Clayey Sand (SM/SC) | 4.2 |
| TP-06 | 0.0-10.0 | Silty Clay (CL) | 2.8 |
| TP-07 | 0.0-9.0 | Sandy Clay (CL) | 5.6 |
| TP-08 | 0.0-5.0 | Silty Sand (SM), trace clay | 4.2 |

## Expansion Index

Two representative bulk sample was tested to evaluate the expansion potential of materials encountered in the stockpiled fill soils in accordance with ASTM D4829 Standard. The test result is presented in the following table.

**Table No. A-3, Expansion Index Test Result**

| Test Pit No. | Depth feet) | Soil Description | Expansion Index | Expansion Potential |
|---|---|---|---|---|
| TP-06 | 0.0-10.0 | Silty Clay (CL) | 79 | Medium |
| TP-07 | 0.0-9.0 | Sandy Clay (CL) | 53 | Medium |

## Soil Corrosivity

Four representative soil sample was tested to determine minimum electrical resistivity, pH, and chemical content, including soluble sulfate and chloride concentrations. The purpose of this test was to determine the corrosion potential of sites soils when placed in contact with common construction materials. The test was performed by AP Engineering and Testing, Inc. (Pomona, CA) in accordance with Caltrans Test Methods 643, 422 and 417. Test result is presented in the following table.

**Table No. A-4, Soil Corrosivity Test Result**

| Boring No. | Depth (feet) | pH | Soluble Sulfates (CA 417) (ppm) | Soluble Chlorides (CA 422) (ppm) | Min. Resistivity (CA 643) (Ohm-cm) |
|---|---|---|---|---|---|
| TP-01 | 0.0-7.0 | 8.6 | 289 | 48 | 1,031 |
| TP-04 | 0.0-7.0 | 8.3 | 2,073 | 95 | 233 |
| TP-05 | 0.0-7.5 | 8.6 | 2,759 | 146 | 300 |
| TP-07 | 0.0-9.0 | 8.1 | 3,872 | 227 | 322 |