APPENDIX B

Geotechnical Investigation
(for reference only)
GEOTECHNICAL INVESTIGATION

MCALL BOULEVARD
PIPELINE REPLACEMENT PROJECT,
MCALL BOULEVARD FROM VALLEY BOULEVARD TO BRADLEY ROAD
MENIFEE, CALIFORNIA

PREPARED FOR
EASTERN MUNICIPAL WATER DISTRICT
PERRIS, CALIFORNIA

AUGUST 28, 2019
PROJECT NO. T2768-22-02
Eastern Municipal Water District  
2270 Trumble Road  
Perris, California 92570

Attention: Mr. Jorge Anaya

Subject: GEOTECHNICAL INVESTIGATION  
MCCALL BOULEVARD PIPELINE REPLACEMENT PROJECT  
MCCALL BOULEVARD FROM VALLEY BOULEVARD  
TO BRADLEY ROAD  
MENIFEE, CALIFORNIA

Dear Mr. Anaya:

In accordance with Proposal No. IE-2212 revised August 29, 2018, Geocon West, Inc. (Geocon) has performed a geotechnical investigation of the McCall Boulevard pipeline replacement project within the City of Menifee, California. The accompanying geotechnical report presents the results of our study and includes our conclusions and recommendations pertaining to the geotechnical aspects of the design and construction of the proposed improvements for the McCall Boulevard pipeline replacement. Based on the results of this study, it is our opinion that the site is suitable for the proposed improvements, provided the recommendations of this report are followed.

Geocon should be afforded the opportunity to review the final project design and plans and to revise this report and provide additional geotechnical recommendations as needed.

Should you have questions regarding this report, or if we may be of further service, please contact the undersigned at your convenience.

Very truly yours,

GEOCON WEST, INC.

Paul D. Theriault  
CEG 2374

Chet Robinson  
GE 2890

Distribution: Addressee (email + 3 hard copies)
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GEOTECHNICAL INVESTIGATION

1. PURPOSE AND SCOPE

This report presents the findings of our geotechnical investigation performed for McCall Boulevard Pipeline Replacement project. The potable water line improvements are planned along McCall Boulevard from Valley Boulevard to Bradley Road, in the City of Menifee, California (see Figure 1, Vicinity Map).

The purpose of the investigation was to perform an assessment of the geologic conditions, identify potential geologic hazards, collect soil samples, perform laboratory testing on select soils samples, and, based on the conditions encountered, provide recommendations regarding the geotechnical aspects of constructing the improvements as presently proposed.

The scope of the field investigation included performing a site reconnaissance and Underground Service Alert mark out and notification, obtaining a City of Menifee encroachment permit for drilling within the roadway, and the drilling and logging of twelve geotechnical borings and two hand auger borings. A summary of the information reviewed for this study is presented in the List of References. Appendix A presents a discussion of the field investigation and logs of the borings. The approximate locations of the exploratory borings have been plotted on the Boring Location Map, Figure 2.

Laboratory testing was performed on samples obtained from the exploratory borings to evaluate maximum dry density and optimum moisture content, corrosivity, grain size distribution, in-situ shear strength properties, consolidation, expansion index, Atterberg limits, and in-situ moisture content and dry density. Appendix B presents the results of our laboratory testing for this project.

2. SITE AND PROJECT DESCRIPTION

The McCall Boulevard potable water main will be installed along McCall Boulevard from Valley Boulevard to Bradley Road south of centerline, and along Bradley Road east of the centerline within the roadway. The 12-inch-diameter pipe is anticipated to be installed at a depth of 4 to 6 feet below existing grades.
3. GEOLOGIC SETTING

The site is located in the Peninsular Ranges Geomorphic Province. The Peninsular Ranges are bounded on the north by the Transverse Ranges (San Gabriel and San Bernardino Mountains) and on the east by the San Andreas fault. The Peninsular Ranges Province extends southward into Mexico and westward past the Channel Islands. Geologic units within the Peninsular Ranges consist of granitic and metamorphic bedrock highlands and deep and broad alluvial valleys.

Locally, the site lies within the Sun City area between Menifee and Perris Valleys. This valley is filled with old alluvial fan materials with very old alluvial fan deposits flanking granitic and metamorphic hills on the east and west and underlying the site at depth.

4. GEOLOGIC MATERIALS

Site geologic materials encountered consists of undocumented artificial fill, old alluvial fan deposits, very old alluvial fan deposits, and granitic bedrock. Metamorphic bedrock is mapped west of the site, but was not encountered during our exploration. Asphaltic concrete (5 to 6 inches thick) was encountered at the surface within the paved roadway. Aggregate base (3 to 5 inches thick) was encountered in two of the borings (B-3 and B-4). Table 4.0 below provides thicknesses of asphaltic concrete and base s encountered in each of the borings. Geologic units and descriptions follow that of Morton (2003). Descriptions of the soil and geologic conditions are shown on the boring logs located in Appendix A and are generally described herein in order of increasing age.

**TABLE 4.0**

<table>
<thead>
<tr>
<th>Boring Number</th>
<th>Location</th>
<th>Thickness (in Inches)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Street</td>
<td>Station</td>
<td>Asphal...</td>
</tr>
<tr>
<td>B-1</td>
<td>McCall Blvd.</td>
<td>36+90</td>
<td>6</td>
</tr>
<tr>
<td>B-3</td>
<td>McCall Blvd.</td>
<td>50+80</td>
<td>6</td>
</tr>
<tr>
<td>B-4</td>
<td>McCall Blvd.</td>
<td>55+80</td>
<td>6</td>
</tr>
<tr>
<td>B-5</td>
<td>McCall Blvd.</td>
<td>60+40</td>
<td>5.5</td>
</tr>
<tr>
<td>B-6</td>
<td>McCall Blvd.</td>
<td>66+80</td>
<td>6</td>
</tr>
<tr>
<td>B-7</td>
<td>McCall Blvd.</td>
<td>71+90</td>
<td>5.5</td>
</tr>
<tr>
<td>B-8</td>
<td>McCall Blvd.</td>
<td>76+25</td>
<td>6</td>
</tr>
<tr>
<td>B-9</td>
<td>McCall Blvd.</td>
<td>81+20</td>
<td>5</td>
</tr>
<tr>
<td>B-10</td>
<td>McCall Blvd.</td>
<td>86+90</td>
<td>5</td>
</tr>
<tr>
<td>B-11</td>
<td>McCall Blvd.</td>
<td>91+50</td>
<td>6</td>
</tr>
<tr>
<td>B-12</td>
<td>McCall Blvd.</td>
<td>96+50</td>
<td>6</td>
</tr>
<tr>
<td>B-13</td>
<td>Bradley Rd.</td>
<td>102+10</td>
<td>5</td>
</tr>
</tbody>
</table>
4.1 Undocumented Artificial Fill (afu)

Undocumented artificial fill was encountered below the ground surface and existing pavement to a depth of approximately 3½ to 4 feet in the geotechnical borings. The artificial fill encountered consists primarily of silty sand, clayey sand, sandy silt, and sandy clay which are medium dense to stiff, damp to moist, and is various shades of brown, with varying amounts of gravel.

4.2 Old Alluvial Fan Deposits (Qof)

Old Alluvial Fan Deposits (late to middle Pleistocene) were encountered below the undocumented artificial fill at a depth of approximately 4 feet within borings B-6 to B-10. Thicknesses range from 9 to 15 feet. These deposits consist primarily of silty sand, poorly-graded sand, and sandy clay, which are medium dense to very dense to stiff, damp to wet, and are various shades of brown and red, with varying amounts of gravel.

4.3 Very Old Alluvial Fan Deposits (Qvof)

Very Old Alluvial Fan Deposits (middle to early Pleistocene) were encountered below the undocumented artificial fill at depths of approximately 3½ to 4 feet within borings B-3 to B-5 and was encountered at the surface in HA-1 and HA-2. Thicknesses range form 4½ to 6 feet. These deposits consist primarily of poorly-graded sand with clay to silty sand, which are medium dense to very dense, moist, and are reddish brown to reddish yellow, with varying amounts of gravel.

4.4 Granodiorite to Tonalite of Domenigoni Valley (Kdvg)

Cretaceous-age granitic bedrock consisting of granodiorite to tonalite was encountered below the alluvial fan deposits at depths ranging from 8 to 19 feet below the existing ground surface to maximum depths explored within the borings. This unit is moderately weathered, strong, reddish yellow to yellowish light brown, medium to coarse-grained, micaceous, and excavates as a poorly graded sand with silt and clay. Refusal was not encountered in the borings excavated for this study.
5. GROUNDWATER

Groundwater was not encountered during this investigation. Several wells less than one mile south and north of McCall Boulevard near Salt Creek indicate water levels 27 to 70 feet below existing ground surface. Based on the valley geometry and sediments, we expect similar groundwater conditions throughout the project. Dewatering is not expected during construction of project. However, perched groundwater on the granitic bedrock may be encountered depending upon timing of the construction. Groundwater elevations are dependent on seasonal precipitation, irrigation, and land use, among other factors, and vary as a result.

6. GEOLOGIC HAZARDS

6.1 Surface Fault Rupture

The numerous faults in southern California include active, potentially active, and inactive faults. The criteria for these major groups are based on criteria developed by the California Geological Survey (CGS, formerly known as CDMG) for the Alquist-Priolo Earthquake Fault Zone Program (Bryant and Hart, 2007). By definition, an active fault is one that has had surface displacement within Holocene time (about the last 11,000 years). A potentially active fault has demonstrated surface displacement during Quaternary time (approximately the last 1.6 million years) but has had no known Holocene movement. Faults that have not moved in the last 1.6 million years are considered inactive.

The site is not located within a State of California or a Riverside County Fault Hazard Zone. The mapped fault closest to the site is the is Glen Ivy segment of the Elsinore fault zone, located approximately 7.9 miles west of the site. Faults within a 50-mile radius of the site are listed in Table 6.1.1. Historic earthquakes in southern California of magnitude 6.0 and greater, their magnitude, distance, and direction from the site are listed in Table 6.1.2.
<table>
<thead>
<tr>
<th>Fault Name</th>
<th>CGS Fault Number</th>
<th>Maximum Magnitude (Mw)</th>
<th>Geometry (Slip Character)</th>
<th>Slip Rate (mm/yr)</th>
<th>Distance from Site (mi)</th>
<th>Direction from Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elsinore (Glen Ivy)</td>
<td>461</td>
<td>6.8</td>
<td>RL-SS</td>
<td>5.0</td>
<td>7.9</td>
<td>W</td>
</tr>
<tr>
<td>Elsinore (Wildomar)</td>
<td>460</td>
<td>6.8</td>
<td>RL-SS</td>
<td>5.0</td>
<td>8.1</td>
<td>S</td>
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<tr>
<td>San Jacinto (Casa Loma)</td>
<td>457</td>
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<td>RL-SS</td>
<td>12.0</td>
<td>12.7</td>
<td>E</td>
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<tr>
<td>San Jacinto (Claremont)</td>
<td>447</td>
<td>6.9</td>
<td>RL-SS</td>
<td>12.0</td>
<td>14.5</td>
<td>NE</td>
</tr>
<tr>
<td>Wolf Valley</td>
<td>469</td>
<td>6.8</td>
<td>RL-SS</td>
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<td>16.4</td>
<td>S</td>
</tr>
<tr>
<td>Elsinore (Main Street)</td>
<td>446</td>
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<td>NW</td>
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<td>San Jacinto (Clark)</td>
<td>459</td>
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<td>26.7</td>
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<td>San Gorgonio Pass</td>
<td>455</td>
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<td>THRUST</td>
<td>n/a</td>
<td>27.0</td>
<td>NE</td>
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<tr>
<td>San Andreas (Cajon Canyon to Burro Flats)</td>
<td>427A</td>
<td>7.5</td>
<td>RL-SS</td>
<td>24</td>
<td>28.0</td>
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<tr>
<td>Chino</td>
<td>431</td>
<td>6.7</td>
<td>RL-R-O</td>
<td>1.0</td>
<td>28.2</td>
<td>NW</td>
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<td>San Jacinto (Glen Helen)</td>
<td>402</td>
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<td>RL-SS</td>
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<td>32.3</td>
<td>N</td>
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<tr>
<td>Elsinore (Whittier)</td>
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<td>RL-SS</td>
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<td>32.4</td>
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<tr>
<td>San Jacinto (San Jacinto)</td>
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<td>RL-SS</td>
<td>12.0</td>
<td>33.9</td>
<td>NW</td>
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<tr>
<td>Red Hill-Etiwanda Avenue</td>
<td>398</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td>35.4</td>
<td>NW</td>
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<td>South Branch San Andreas (Banning)</td>
<td>452</td>
<td>7.5</td>
<td>RL-SS</td>
<td>24</td>
<td>35.5</td>
<td>NE</td>
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<tr>
<td>Pinto Mountain</td>
<td>425</td>
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<td>LL-SS</td>
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<td>37.3</td>
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<tr>
<td>Cucamonga</td>
<td>399</td>
<td>6.9</td>
<td>R</td>
<td>5.0</td>
<td>37.5</td>
<td>NW</td>
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<td>Elsinore (Julian)</td>
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<td>RL-SS</td>
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<td>40.3</td>
<td>SE</td>
</tr>
<tr>
<td>Morongo Valley</td>
<td>451</td>
<td>6.9</td>
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<td>na</td>
<td>40.5</td>
<td>NE</td>
</tr>
<tr>
<td>Newport -Inglewood (North Branch)</td>
<td>440</td>
<td>7.1</td>
<td>RL-SS</td>
<td>na</td>
<td>44.0</td>
<td>W</td>
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<tr>
<td>San Andreas (Palmdale to Cajon Canyon)</td>
<td>358</td>
<td>7.5</td>
<td>RL-SS</td>
<td>24</td>
<td>44.3</td>
<td>NW</td>
</tr>
<tr>
<td>North Branch San Andreas (Coachella)</td>
<td>453</td>
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<td>RL-SS</td>
<td>25.0</td>
<td>44.4</td>
<td>NE</td>
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<td>San Jacinto (Coyote Creek)</td>
<td>479</td>
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<td>RL-SS</td>
<td>4.0</td>
<td>45.8</td>
<td>SE</td>
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<tr>
<td>Ord Mountains</td>
<td>405</td>
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<td>THRUST</td>
<td>na</td>
<td>46.5</td>
<td>N</td>
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<tr>
<td>North Frontal (Northern and Eastern Section)</td>
<td>407</td>
<td>7.2</td>
<td>THRUST</td>
<td>na</td>
<td>47.2</td>
<td>NE</td>
</tr>
<tr>
<td>Long Canyon</td>
<td>451A</td>
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<td>RL-SS</td>
<td>na</td>
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<td>North Frontal (Sky Hi Ranch)</td>
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<td>7.2</td>
<td>THRUST</td>
<td>na</td>
<td>49.0</td>
<td>N</td>
</tr>
</tbody>
</table>

Geometry: BT = blind thrust, LL = left lateral, N = normal, O = oblique, R = reverse, RL = right lateral, SS = strike slip.
TABLE 6.1.2
HISTORIC EARTHQUAKE EVENTS

<table>
<thead>
<tr>
<th>Earthquake (Oldest to Youngest)</th>
<th>Date of Earthquake</th>
<th>Magnitude</th>
<th>Distance to Epicenter (Miles)</th>
<th>Direction to Epicenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>San Jacinto</td>
<td>December 25, 1899</td>
<td>6.7</td>
<td>12</td>
<td>E</td>
</tr>
<tr>
<td>San Jacinto</td>
<td>April 21, 1918</td>
<td>6.8</td>
<td>12</td>
<td>E</td>
</tr>
<tr>
<td>Loma Linda Area</td>
<td>July 22, 1923</td>
<td>6.3</td>
<td>20</td>
<td>N</td>
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<tr>
<td>Long Beach</td>
<td>March 10, 1933</td>
<td>6.4</td>
<td>44</td>
<td>W</td>
</tr>
<tr>
<td>Buck Ridge</td>
<td>March 25, 1937</td>
<td>6.0</td>
<td>58</td>
<td>ESE</td>
</tr>
<tr>
<td>Imperial Valley</td>
<td>May 18, 1940</td>
<td>6.9</td>
<td>58</td>
<td>ENE</td>
</tr>
<tr>
<td>Desert Hot Springs</td>
<td>December 4, 1948</td>
<td>6.0</td>
<td>49</td>
<td>ENE</td>
</tr>
<tr>
<td>Arroyo Salada</td>
<td>March 19, 1954</td>
<td>6.4</td>
<td>71</td>
<td>ESE</td>
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<tr>
<td>Borrego Mountain</td>
<td>April 8, 1968</td>
<td>6.5</td>
<td>77</td>
<td>ESE</td>
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<td>San Fernando</td>
<td>February 9, 1971</td>
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<td>NW</td>
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<td>Joshua Tree</td>
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<td>Landers</td>
<td>June 28, 1992</td>
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<td>59</td>
<td>NE</td>
</tr>
<tr>
<td>Big Bear</td>
<td>June 28, 1992</td>
<td>6.4</td>
<td>41</td>
<td>NE</td>
</tr>
<tr>
<td>Northridge</td>
<td>January 17, 1994</td>
<td>6.7</td>
<td>90</td>
<td>WNW</td>
</tr>
<tr>
<td>Hector Mine</td>
<td>October 16, 1999</td>
<td>7.1</td>
<td>85</td>
<td>NE</td>
</tr>
</tbody>
</table>

6.2 Expansive Soil

The soil units near the ground surface at the site generally consist of silty sand and poorly-graded sand, with local clayey sand and sandy clay, along the water main alignment. Laboratory testing on samples of the alluvial soils performed during our exploration indicates these soils are “non-expansive” (Expansion Index [EI] 20 or less) to “expansive” (EI 21 to 50) as defined by 2016 CBC Section 1803.5.3, with a “low” expansion potential in accordance with ASTM D4829.

6.3 Hydrocompression

Hydrocompression is the tendency of unsaturated soil structure to collapse upon wetting resulting in the overall settlement of the affected soil and overlying foundations or improvements supported thereon. Potentially compressible soils underlying the site are typically removed and compacted during site construction. However, if compressible soil is left in-place, a potential for settlement due to hydrocompression of the soil exists. Select samples of alluvial soils obtained during our investigation were tested for hydrocompression and exhibited a collapse potential of 0.1 percent. Due to laboratory test results, the proposed pipeline location within the public right-of-way, and lack of settlement sensitive structures associated with the project, hydrocompression is negligible and not a design consideration.
6.4 Landslides

The site is located within an alluvial valley. Granitic and metamorphic hills are located near the western terminus of the proposed pipeline alignment. No landslides are geologically mapped in the slopes to the west (Morton, 2003). The potential for landslides along the alignment are not a design consideration.

6.5 Slope Stability

Based on the proposed construction of the water main within the existing roadways, we expect that slopes will not be required in design and construction of the water main improvements. Therefore, global stability of graded slopes is not a design consideration for this project. Recommendations for temporary excavations and shoring are provided in Section 7.7 of this report.

6.6 Rock Fall Hazards

The project area is located within a valley with hills approximately 100 feet to the west. Therefore, rock fall is not considered a hazard for the site.

6.7 Tsunamis and Seiches

A tsunami is a series of long period waves generated in the ocean by a sudden displacement of large volumes of water. Causes of tsunamis include underwater earthquakes, volcanic eruptions, or offshore slope failures. The first order driving force for locally generated tsunamis offshore southern California is expected to be tectonic deformation from large earthquakes (Legg, et al., 2002). The site is located 30 miles from the nearest coastline with a mountain range between, therefore, the risk associated with tsunamis is not a design consideration.

A seiche is a run-up of water within a lake or embayment triggered by fault- or landslide-induced ground displacement. The project site is located near Canyon Lake and Lake Perris. However, existing topography with respect to site is such that seiches are not a design consideration for the site. We understand that the golf course that crosses McCall Boulevard between Grosse Point Drive and Northwood Drive functions as a flood control channel. However, due to the lack of water in the channel, fault- or landslide-induced ground displacements that could cause a seiche within the flood control channel are not a design consideration for the site.

6.8 Dam Inundation

According to the Governor’s Office of Emergency Services, the East, West, and Saddle Dams of Diamond Valley Lake, located approximately 7.4 miles southeast of the site have the potential to flood the site by overflowing existing flood channels in the vicinity (References). However, due to the design of the dams at Diamond Valley Lake, the potential for flooding is considered low.
7. CONCLUSIONS AND RECOMMENDATIONS

7.1 General

7.1.1 Neither soil nor geologic conditions were observed which would preclude the construction of improvements associated with the water main, provided that the recommendations of this report are followed and implemented during design and construction.

7.1.2 Potential geologic hazards at the site includes seismic shaking. Based on our investigation and available geologic information, active, potentially active, or inactive faults are not present underlying or trending toward the site.

7.1.3 Laboratory tests indicate that the site soils are non-expansive to expansive, and have a “very low” (EI of 0 to 20) to “low” (EI of 21 to 50) expansion potential in accordance with ASTM D 4829.

7.1.4 Excavations for the water main are not expected to generate significant amounts of cobbles and boulders. However, the presence of cobbles in the native soils underlying the site should be anticipated. According to EMWD standards, rock greater than 3 inches is not allowed for use as backfill material. Oversize materials and deleterious material encountered should be screened from the site soils prior to their use as fill.

7.1.5 Proper drainage should be maintained in order to preserve the engineering properties of the compacted fill in planned improvement areas. Recommendations for site drainage are provided herein.

7.1.6 Once 90% civil grading or improvement plans are made available, the recommendations within this report should be reviewed and revised, as necessary. Additionally, as the project design progresses toward a final design, changes in the design, location, or elevation of any proposed improvement should be reviewed by this office. Geocon should be contacted to evaluate the necessity for review and possible revision of this report.

7.2 Soil and Excavation Characteristics

7.2.1 The in-situ soils along water main should generally be excavatable with moderate effort, using conventional earth moving equipment in proper functioning order. The presence of cobbles in the native soils may present difficulty in the excavation process. Granitic bedrock will require greater effort and should be expected in the western portion of the site, as indicated on boring B-1.
7.2.2 Trench excavations along the water main alignment are expected to be on the order of 10 feet or less. Excavations should be performed in conformance with OSHA requirements. Some of the site soils have little cohesion and may be subject to caving in un-shored excavations. The contractor should evaluate the necessity for lay back of vertical cut areas. Temporary excavations and shoring recommendations are provided in Section 7.7 of this report.

7.2.3 Based on the material classifications and laboratory testing by Geocon, site soils generally possess a “very low” to “low” expansion potential, EI of 0 to 50, and are considered “expansive” as defined by 2016 CBC Section 1803.5.3. Results of our laboratory test results are presented in Appendix B, Figure B-1 and indicate expansion index test results between 0 and 48 for the materials tested. Table 7.2.3 presents soil classifications based on the EI.

<table>
<thead>
<tr>
<th>Expansion Index (EI)</th>
<th>Expansion Classification</th>
<th>2016 CBC Expansion Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 20</td>
<td>Very Low</td>
<td>Non-Expansive</td>
</tr>
<tr>
<td>21 – 50</td>
<td>Low</td>
<td>Expansive</td>
</tr>
<tr>
<td>51 – 90</td>
<td>Medium</td>
<td></td>
</tr>
<tr>
<td>91 – 130</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>Greater Than 130</td>
<td>Very High</td>
<td></td>
</tr>
</tbody>
</table>

7.2.4 We performed laboratory tests on representative samples of the site materials to measure the percentage of water-soluble sulfate content. Results from these tests indicate that site materials possess a sulfate content range of 0.000% (less than 10 part per million [ppm]), equating to an exposure class of “S0” to concrete structures as defined by 2016 CBC Section 1904.3 and ACI 318. Table 7.2.4 presents a summary of concrete requirements set forth by 2016 CBC Section 1904.3 and ACI 318.

<table>
<thead>
<tr>
<th>Exposure Class</th>
<th>Water-Soluble Sulfate (SO₄) Percent by Weight</th>
<th>Cement Type (ASTM C 150)</th>
<th>Maximum Water to Cement Ratio by Weight¹</th>
<th>Minimum Compressive Strength (psi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>S0</td>
<td>SO₄&lt;0.10</td>
<td>No Type Restriction</td>
<td>n/a</td>
<td>2,500</td>
</tr>
<tr>
<td>S1</td>
<td>0.10≤SO₄&lt;0.20</td>
<td>II</td>
<td>0.50</td>
<td>4,000</td>
</tr>
<tr>
<td>S2</td>
<td>0.20≤SO₄&lt;2.00</td>
<td>V</td>
<td>0.45</td>
<td>4,500</td>
</tr>
<tr>
<td>S3</td>
<td>SO₄&gt;2.00</td>
<td>V+Pozzolan or Slag</td>
<td>0.45</td>
<td>4,500</td>
</tr>
</tbody>
</table>

¹ Maximum water to cement ratio limits do not apply to lightweight concrete
7.2.5 The presence of water-soluble sulfates is not a visually discernible characteristic; therefore, other soil samples from the sites could yield different concentrations. Additionally, over time landscaping activities along the access roads or from nearby developments (i.e., addition of fertilizers and other soil nutrients) may affect the concentration.

7.2.6 Laboratory testing indicates the site soils have a minimum electrical resistivity range of 1,100 to 1,700 ohm-cm, possess less than 10 ppm chloride, 30 to 45 ppm sulfate, and have a pH range of 7.1 to 8.0, as shown in Table 7.2.6, the site would not be classified as “corrosive” to buried improvements in accordance with the Caltrans Corrosion Guidelines (Caltrans, 2018).

<table>
<thead>
<tr>
<th>Corrosion Exposure</th>
<th>Resistivity (ohm-cm)</th>
<th>Chloride (ppm)</th>
<th>Sulfate (ppm)</th>
<th>pH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrosive</td>
<td>&lt;1,100</td>
<td>500 or greater</td>
<td>1,500 or greater</td>
<td>5.5 or less</td>
</tr>
</tbody>
</table>

7.2.7 Geocon does not practice in the field of corrosion engineering. Therefore, further evaluation by a corrosion engineer may be performed if improvements that could be susceptible to corrosion are planned.

7.3 Seismic Design Parameters

We used the computer program *U.S. Seismic Design Maps*, provided by the California Office of Statewide Health Planning and Development (OSHPD) to evaluate the seismic design criteria. We evaluated the seismic design parameters across the length of the pipeline alignment, and the code-based values do not change. Therefore, the recommended seismic design parameters in Table 7.3 and 7.3.1 are applicable along the length of the project.

Table 7.3 summarizes site-specific design criteria obtained from the 2016 California Building Code (CBC; Based on the 2015 International Building Code [IBC] and ASCE 7-10), Chapter 16 Structural Design, Section 1613 Earthquake Loads. The short spectral response uses a period of 0.2 second. The building structure and improvements as currently proposed should be designed using a Site Class C in accordance with ASCE 7-10 Section 20.3.1. We evaluated the Site Class based on the discussion in Section 1613.3.2 of the 2016 CBC and Table 20.3-1 of ASCE 7-10 using blow count data presented on the boring logs in Appendix A. The values presented in Table 7.3 are for the risk-targeted maximum considered earthquake (MCE$_R$).
### Table 7.3
#### 2016 CBC Seismic Design Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>2016 CBC Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site Class</td>
<td>C</td>
<td>Section 1613.3.2</td>
</tr>
<tr>
<td>MCE(_\text{R}) Ground Motion Spectral</td>
<td>1.500g</td>
<td>Figure 1613.3.1(1)</td>
</tr>
<tr>
<td>Response Acceleration – Class B (short), (S_S)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MCE(_\text{R}) Ground Motion Spectral</td>
<td>0.600g</td>
<td>Figure 1613.3.1(2)</td>
</tr>
<tr>
<td>Response Acceleration – Class B (1 sec), (S_I)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Site Coefficient, (F_A)</td>
<td>1.000</td>
<td>Table 1613.3.3(1)</td>
</tr>
<tr>
<td>Site Coefficient, (F_V)</td>
<td>1.300</td>
<td>Table 1613.3.3(2)</td>
</tr>
<tr>
<td>Site Class Modified MCE(_\text{R})</td>
<td>1.500g</td>
<td>Section 1613.3.3 (Eqn 16-37)</td>
</tr>
<tr>
<td>Spectral Response Acceleration (short), (S_{MS})</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Site Class Modified MCE(_\text{R})</td>
<td>0.780g</td>
<td>Section 1613.3.3 (Eqn 16-38)</td>
</tr>
<tr>
<td>Spectral Response Acceleration (1 sec), (S_{M_1})</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5% Damped Design Spectral Response Acceleration (short), (S_{DS})</td>
<td>1.000g</td>
<td>Section 1613.3.4 (Eqn 16-39)</td>
</tr>
<tr>
<td>5% Damped Design Spectral Response Acceleration (1 sec), (S_{D_1})</td>
<td>0.520g</td>
<td>Section 1613.3.4 (Eqn 16-40)</td>
</tr>
</tbody>
</table>

#### 7.3.1
Table 7.3.1 presents additional seismic design parameters for projects located in Seismic Design Categories of D through F in accordance with ASCE 7-10 for the mapped maximum considered geometric mean (MCE\(_G\)).

### Table 7.3.1
#### 2016 CBC Site Acceleration Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>ASCE 7-10 Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site Class</td>
<td>C</td>
<td>Section 1613.3.2</td>
</tr>
<tr>
<td>Mapped MCE(_G) Peak Ground Acceleration, PGA</td>
<td>0.500g</td>
<td>Figures 2 through 42-7</td>
</tr>
<tr>
<td>Site Coefficient, (F_{PGA})</td>
<td>1.000</td>
<td>Table 11.8-1</td>
</tr>
<tr>
<td>Site Class Modified MCE(_G) Peak Ground Acceleration, PGAM</td>
<td>0.500g</td>
<td>Section 11.8.3 (Eqn 11.8-1)</td>
</tr>
</tbody>
</table>

#### 7.3.2
Conformance to the criteria in Tables 7.3 and 7.3.1 for seismic design does not constitute any kind of guarantee or assurance that significant structural damage or ground failure will not occur if a large earthquake occurs. The primary goal of seismic design is to protect life, not to avoid all damage, since such design may be economically prohibitive.
7.4 **Earthwork**

7.4.1 Earthwork should be observed, and compacted trench backfill tested by representatives of Geocon.

7.4.2 Earthwork for the water main improvements should be performed in accordance with the current edition of the *Standard Specifications for Public Works Construction* (Greenbook), the City of Menifee *Road Improvement Standards and Specifications*, and EMWD *Standard Detailed Provisions*.

7.4.3 Prior to commencing grading operations, a preconstruction conference should be held at the site with an agency representative, the contractor, geotechnical engineer, and other applicable parties in attendance.

7.4.4 Geotechnical conditions should be observed by the geotechnical engineer during construction and additional recommendations provided during construction as needed based on the conditions encountered. When site earthwork is interrupted by heavy rain, fill placement operations should not resume until the geotechnical consultant has tested the moisture and density of the previously placed fill, and excavations are approved for placement of additional fill.

7.4.5 Site preparation should begin with the removal of previous structures and infrastructure as show on the plans, deleterious material, debris, buried trash, and vegetation. The depth of removal should be such that material exposed in trench bottom is relatively free of organic matter. Material generated during stripping and/or site demolition should be exported from the site. The contractor should expect to encounter cobbles over 3 inches in dimension, during the construction of the water main. Rock over 3 inches in diameter should be screened and removed, and not used in trench backfill.

7.4.6 Geocon should observe the exposed trench bottoms to evaluate the competency of the exposed soil. Deeper excavations may be required if loose or soft materials are present at the trench bottom.

7.4.7 Where relatively loose, soft, or wet soils are encountered within trench excavations, soil stabilization will be required prior to placing bedding material, installing utilities, or placing backfill material. Where required, subgrade stabilization can be achieved by over excavating the loose or soft materials and replacing with compacted backfill, placing 1½-inch diameter rock in the soft bottom and working it into soil until it is stabilized, or placing gravel wrapped in filter fabric at the bottom of the excavation. Where used, gravel should consist of 12 to 18 inches of washed angular ¾ inch gravel atop a filter fabric (Mirafi 500X or equivalent) on the excavation bottom. The filter fabric should be placed in a manner so that the gravel does not have direct contact with the soil. Once the gravel is placed and vibrated to a relatively dense state, a top layer of filter fabric should be placed to cover the gravel. Recommendations for stabilizing excavation bottoms should be based on an evaluation in the field by Geocon at the time of construction.
7.4.8 If perched groundwater or saturated materials are encountered during trenching, extensive drying and mixing with dryer soil may be required, if the saturated material is to be utilized as backfill material in achieving finished grades. The excavated materials should then be moisture conditioned at 0 to 2 percent above optimum moisture content prior to placement as compacted backfill.

7.4.9 If ponding water is encountered, dewatering may be required to achieve an acceptable working environment. Water should be pumped from the excavation and drained into a suitable inlet in accordance with the project WQMP and dewatering plan. The need for and procedures to pretreat the water should be determined by the WQMP and dewatering plan.

7.4.10 Oversize material (greater than 3 inches in dimension) should be removed from the excavated soils prior to use as backfill. Layers of backfill should be no thicker than will allow for adequate bonding and compaction. Backfill should be compacted to a dry density of at least 90 percent of the laboratory maximum dry density and moisture conditioned at 0 to 2 percent above optimum moisture content as evaluated by ASTM D 1557. Backfill within the upper 3 feet should be compacted to a dry density of at least 95 percent of the laboratory maximum within the 3 feet of pavement subgrade in accordance with the City of Menifee Standard Plan No. 812, Trench Backfill and Road Repair or EMWD Standard Drawing B-286B (see Appendix C). Backfill materials placed below the recommended moisture content may require additional moisture conditioning prior to placing additional fill.

7.4.11 If needed, import fill should consist of granular materials with a “low” expansion potential (EI of 50 or less), be non-corrosive, free of deleterious material, and contain rock no larger than 3 inches. Geocon should be notified of the import soil source and should be afforded the opportunity to perform laboratory testing of the import soil prior to its arrival at the site to evaluate its suitability as fill material.

7.5 Utility Design and Trench Backfill

7.5.1 Utility trenches should be properly backfilled in accordance with the requirements of EMWD and the latest edition of the Standard Specifications for Public Works Construction (Greenbook). The pipes should be bedded with well-graded crushed rock or clean sands (Sand Equivalent greater than 30) to a depth of at least one foot over the pipe. The bedding material must be inspected and approved for conformance with EMWD Standard Drawing B-286B (see Appendix C) or the details in the project plans. The use of open-graded crushed rock with voids is only acceptable if used in conjunction with filter fabric to prevent the gravel from having direct contact with soil and reduce the potential for piping of the native soils into the crushed rock. If open-graded crushed rock is proposed as pipe bedding, the material should be evaluated for filtration criteria against the native soils, and recommendations for use of a filter fabric provided if needed. Number 67 crushed rock is
acceptable without the use of filter fabric. The remainder of the trench backfill may be derived from onsite soil or approved import soil, provided it is processed to meet the EMWD minimum recommendations and requirements for backfill in the City of Menifee Standard plan No. 812 Trench Backfill and Road Repair or EMWD Standard Drawing B-286B (see Appendix C). Backfill of utility trenches should not contain rocks greater than 3 inches in dimension. The use of 2-sack slurry and controlled low strength material (CLSM) are also acceptable as backfill. However, consideration should be given to the possibility of differential settlement where the slurry ends and earthen backfill begins. These transitions should be minimized by sloping the end of the slurry or CLSM backfill at an inclination of 3:1 (h:v) or less rather than using a vertical transition.

7.5.2 Trench excavation bottoms must be observed and approved in writing by a representative of Geocon, prior to placement of bedding materials, fill, gravel, or concrete.

7.5.3 Utility trench backfill should be placed in layers, no thicker than will allow for adequate bonding and compaction (typically 6- to 8-inch lifts). Utility backfill should be compacted to a dry density of at least 90 percent of the laboratory maximum dry density and moisture conditioned 0 to 2 percent above optimum moisture content as evaluated by ASTM D 1557. The upper 3 feet of subgrade beneath new pavements should be compacted to at least 95 percent of the maximum dry density. Backfill materials placed below the recommended moisture content may require additional moisture conditioning prior to placing additional fill.

7.5.4 Thrust Restraint for buried pipelines may be achieved by transferring the thrust forces to the soil outside the pipe through a thrust block. Thrust blocks may be designed using the lateral earth pressures from a passive resistance exerted by an equivalent fluid weight of 350 pounds per cubic foot (pcf) with a maximum earth pressure of 3,500 psf. The passive resistance may be calculated from the ground surface, and applied across the height of the thrust block. Thrust blocks should be backfilled in accordance with recommendations presented in this report.

7.5.5 The modulus of soil reaction is used to characterize the stiffness of soil backfill placed at the sides of buried flexible pipelines for the purpose of evaluating deflection caused by the weight of backfill above the pipe. We recommend that a modulus of soil reaction of 2,000 psi be used for design, provided that the pipes are bedded in accordance with EMWD requirements and the recommendations of this report.
7.5.6 Backfill of subterranean structures should be compacted to a dry density of at least 90 percent of the laboratory maximum dry density and moisture conditioned at 0 to 2 percent above optimum moisture content as evaluated by ASTM D1557. Backfill within the upper 3 feet should be compacted to a dry density of at least 95 percent of the laboratory maximum within the 3 feet of pavement subgrade in accordance with the City of Menifee Standard Plan No. 812, Trench Backfill and Road Repair or EMWD Standard Drawing B-286B (see Appendix C). Backfill materials placed below the recommended moisture content may require additional moisture conditioning prior to placing additional fill.

7.6 Pavement Replacement

7.6.1 Following backfill of the utility trenches, the roadway pavement should be restored in general accordance with Standard Plan No. 812, Trench Backfill and Road Repair of the City of Menifee Road Improvement Standards and Specifications or EMWD Standard B-286B (see Appendix C). Aggregate base should be placed to a thickness that is equal the existing adjacent base thickness or a minimum of 4 inches, whichever is greater. Asphalt concrete should be placed to a thickness at least 1 inch greater than the existing adjacent pavement.

7.6.2 The crushed aggregate base and asphalt concrete materials should conform to Section 200-2.2 and Section 203-6, respectively, of the Standard Specifications for Public Works Construction (Greenbook) and the City of Menifee Road Improvement Standards and Specifications. Base materials should be compacted to a dry density of at least 95 percent of the laboratory maximum dry density near or slightly above optimum moisture content. Asphalt concrete should be compacted to a density of 95 percent of the laboratory Hveem density in accordance with ASTM D1561.

7.6.3 Based on the materials encountered during our exploration, samples were tested to determine preliminary R-values for the onsite material and are presented in Table 7.6.3. R-value samples should be taken and tested when subgrade soils are in place. Final pavement recommendations can then be made confirm the replacement pavement sections will be adequate for the anticipated traffic loading.

**TABLE 7.6.3**

<table>
<thead>
<tr>
<th>Street Station</th>
<th>Approximate Location</th>
<th>Assumed Road Classification / Traffic Index</th>
<th>Preliminary R-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>35+25 to 46+00</td>
<td>Valley Boulevard to Radford Drive</td>
<td>Major Highway / 9.0</td>
<td>70</td>
</tr>
<tr>
<td>46+00 to 100+00</td>
<td>Radford Drive to Bradley Road</td>
<td>Major Highway / 9.0</td>
<td>39</td>
</tr>
<tr>
<td>98+40 to 102+40</td>
<td>Bradley Road</td>
<td>Major Highway / 9.0</td>
<td>75</td>
</tr>
</tbody>
</table>
7.7 **Temporary Excavations and Shoring**

7.7.1 Excavations of up to 10 feet in vertical height are expected during the water main construction. The contractor’s competent person should evaluate the necessity for lay back of vertical cut areas. Vertical excavations up to 5 feet may be attempted where loose soils or caving sands are not present, and where not surcharged by existing structures or vehicle/construction equipment loads.

7.7.2 Vertical excavations greater than 5 feet will require sloping or shoring measures in order to provide a stable excavation. Due to the existing improvements within the roadways, we expect that shoring will be needed.

7.7.3 We expect that braced shoring, such as conventionally braced shields or cross-braced hydraulic shoring, will be utilized; however, the selection of the shoring system is the responsibility of the contractor. Shoring systems should be designed by a California licensed civil or structural engineer with experience in designing shoring systems.

7.7.4 We recommend that an equivalent fluid pressure based on the table below be utilized for design of shoring. These pressures are based on the assumption that the shoring is supporting a level backfill and there are no hydrostatic pressures above the bottom of the excavation.

<table>
<thead>
<tr>
<th>HEIGHT OF SHORED EXCAVATION (FEET)</th>
<th>EQUIVALENT FLUID PRESSURE (Pounds Per Cubic Foot) (ACTIVE PRESSURE)</th>
<th>EQUIVALENT FLUID PRESSURE (Pounds Per Cubic Foot) (ACTIVE PRESSURE with 2:1 Slope)</th>
<th>EQUIVALENT FLUID PRESSURE (Pounds Per Cubic Foot) (AT-REST PRESSURE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 10</td>
<td>30</td>
<td>55</td>
<td>60</td>
</tr>
</tbody>
</table>

7.7.5 Active pressures can only be achieved when movement in the soil (earth wall) occurs. If movement in the soil is not acceptable, such as adjacent to an existing structure or where braced shoring will be utilized, the at-rest pressure should be considered for design purposes. Shoring pressures were evaluated using a safety factor of 1.1.

7.7.6 Additional active pressure should be added for a surcharge condition due to sloping ground, construction equipment, vehicular traffic, or adjacent structures and should be designed for each condition as the project progresses.
7.7.7 In addition to the recommended earth pressure, the height of the shored excavation adjacent to roadways or driveway areas should be designed to resist a uniform lateral pressure of 100 psf, acting as a result of an assumed 300 psf surcharge behind the shoring due to normal street traffic (not including construction traffic). If the traffic is kept back at least 15 feet from the shoring, the traffic surcharge may be neglected. Higher surcharge loads may be required to account for construction equipment and should be considered by the designer of the shoring.

7.7.8 It is difficult to accurately predict the amount of deflection of a shored embankment. Some deflection will occur. We recommend that the deflection be minimized to prevent damage to existing structures and adjacent improvements. Where public right-of-ways are present or adjacent offsite structures do not surcharge the shoring excavation, the shoring deflection should be limited to less than 1 inch at the top of the shored embankment. Where offsite structures are within the shoring surcharge area, we recommend the beam deflection be limited to less than ½ inch at the elevation of the adjacent offsite foundation, and no deflection at all if deflections will damage existing structures. The allowable deflection is dependent on many factors, such as the presence of structures and utilities near the top of the embankment and will be assessed and designed by the project shoring engineer.

7.8 Site Drainage and Moisture Protection

7.8.1 Adequate site drainage is critical to reduce the potential for soil saturation and erosion of exposed trench walls and bottoms during construction of the water main. Under no circumstances should water be allowed to pond within trenches. Surface drainage should be directed away from the top of open excavations through the use of best management practices utilized by the contractor. The contractor should utilize dewatering measures to mitigate ponding water within trenches if needed.

7.9 Plan Review

7.9.1 Geocon should be provided the opportunity to review the 90% plans prior to final submittal to verify substantial conformance with the recommendations of this report.
LIMITATIONS AND UNIFORMITY OF CONDITIONS

1. The recommendations of this report pertain only to the site investigated and are based upon the assumption that the soil conditions do not deviate from those disclosed in the investigation. If any variations or undesirable conditions are encountered during construction, or if the proposed construction will differ from that expected herein, Geocon should be notified so that supplemental recommendations can be given. The evaluation or identification of the potential presence of hazardous or corrosive materials was not part of the scope of services provided by Geocon.

2. This report is issued with the understanding that it is the responsibility of the owner, or of their representative, to ensure that the information and recommendations contained herein are brought to the attention of the architect and engineer for the project and incorporated into the plans, and that the necessary steps are taken to see that the contractor and subcontractors carry out such recommendations in the field.

3. The findings of this report are valid as of the date of this report. However, changes in the conditions of a site can occur with the passage of time, whether they are due to natural processes or the works of man on this or adjacent properties. In addition, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and should not be relied upon after a period of three years.

4. The firm that performed the geotechnical investigation for the project should be retained to provide testing and observation services during construction to provide continuity of geotechnical interpretation and to check that the recommendations presented for geotechnical aspects of site development are incorporated during site grading, construction of improvements, and excavation of foundations. If another geotechnical firm is selected to perform the testing and observation services during construction operations, that firm should prepare a letter indicating their intent to assume the responsibilities of project geotechnical engineer of record. A copy of the letter should be provided to the regulatory agency for their records. In addition, that firm should provide revised recommendations concerning the geotechnical aspects of the proposed development, or a written acknowledgement of their concurrence with the recommendations presented in our report. They should also perform additional analyses deemed necessary to assume the role of Geotechnical Engineer of Record.
REFERENCES


Source: Google Earth Pro, 2019
APPENDIX A

FIELD INVESTIGATION

The field investigation was conducted on March 26, 27, and August 6, 2019, and consisted of a site reconnaissance and the advancement of twelve exploratory borings and two hand auger borings. The borings were drilled to the maximum depth explored of approximately 21.5 feet below the existing ground surface utilizing a truck mounted hollow-stem augur drill rig. We collected bulk samples, and relatively undisturbed samples from the borings by driving a 3-inch O. D. California Modified Sampler into the “undisturbed” soil mass with blows from a 140-pound auto-hammer falling 30 inches. The California Modified Sampler was equipped with 1-inch high by 2½-inch inside diameter brass sampler rings to facilitate removal and testing. Two hand auger borings were advanced near the western terminus of the alignment. Relatively undisturbed samples and bulk samples of disturbed soils were transported to our laboratory for testing.

The soil conditions encountered in the borings were visually examined, classified and logged in general accordance with the Unified Soil Classification System (USCS). Figures A-1 through A-14 present logs of the borings. The logs depict the soil and geologic conditions encountered and the depth at which samples were obtained. Figure 2 indicates the approximate locations of the borings.
**HAND PIT HA-1**

**LITHOLOGY**

<table>
<thead>
<tr>
<th>DEPTH IN FEET</th>
<th>SAMPLE NO.</th>
<th>SOIL CLASS (USCS)</th>
<th>MATERIAL DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>SM</td>
<td>Very Old Alluvial Fan Deposits (Qvof)</td>
</tr>
</tbody>
</table>

Silty SAND with gravel and cobbles, dense, damp, light reddish brown; fine to coarse sand

- Total depth 4” (Refusal)
- Backfilled with cuttings 3/27/2019

**PROJECT NO. T2768-22-02**

**Figure A-1, Log of Hand Pit HA-1, Page 1 of 1**

**SAMPLE SYMBOLS**

- □... SAMPLING UNSUCCESSFUL
- □... STANDARD PENETRATION TEST
- □... DRIVE SAMPLE (UNDISTURBED)
- ✗... DISTURBED OR BAG SAMPLE
- □... CHUNK SAMPLE
- ▼... WATER TABLE OR SEEPAGE

**NOTE:** THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.
<table>
<thead>
<tr>
<th>DEPTH IN FEET</th>
<th>SAMPLE NO.</th>
<th>LITHOLOGY</th>
<th>SOIL CLASS (USCS)</th>
<th>PENETRATION RESISTANCE (BLOWS/FT.)</th>
<th>DRY DENSITY (P.C.F.)</th>
<th>MOISTURE CONTENT (%)</th>
<th>MATERIAL DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>SM</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Very Old Alluvial Fan Deposits (Qvof)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Silty SAND, medium dense, damp, reddish brown; fine to coarse sand</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Becomes dense</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Total depth 2' (Refusal)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Backfilled with cuttings 3/27/2019</td>
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**Figure A-2, Log of Hand Pit HA-2, Page 1 of 1**

<table>
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<th>T2768-22-02</th>
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**NOTE:** THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON
### BORING B-1

**ELEV. (MSL):** 1482  **DATE COMPLETED:** 08/06/219

**EQUIPMENT:** HOLLOW STEM AUGER  **BY:** PDT

<table>
<thead>
<tr>
<th>DEPTH IN FEET</th>
<th>SAMPLE NO.</th>
<th>LITHOLOGY</th>
<th>SOIL CLASS (USCS)</th>
<th>GROUNDWATER</th>
<th>PENETRATION RESISTANCE (BLOWS/FT.)</th>
<th>DRY DENSITY (P.C.F.)</th>
<th>MOISTURE CONTENT (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>CL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>B-1@1-5'</td>
<td>+ + +</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>B-1@5'</td>
<td>+ + +</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>B-1@7.5'</td>
<td>+ + +</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>B-1@10'</td>
<td>+ + +</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>B-1@15'</td>
<td>+ + +</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
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<tr>
<td>16</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>18</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>B-1@20</td>
<td>+ + +</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**MATERIAL DESCRIPTION**

- *Asphaltic Concrete:* 6" thick
- *Aggregate Base:* 6" thick
- *Undocumented Fill (afu):* Clayey SAND, medium dense, moist, yellowish brown; fine to coarse sand
- *Granodiorite to Tonalite of Domenigoni Valley (Kdvg)*
  - Moderately weathered, strong, reddish yellow, GRANITIC BEDROCK, fine- to medium-grained; micaceous; excavates as a poorly-graded sand

---

**Figure A-3, Log of Boring B-1, Page 1 of 1**

**Sample Symbols**
- □... SAMPLING UNSUCCESSFUL
- □... STANDARD PENETRATION TEST
- □... DRIVE SAMPLE (UNDISTURBED)
- □... DISTURBED OR BAG SAMPLE
- □... CHUNK SAMPLE
- □... WATER TABLE OR SEEPAGE

**NOTE:** THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.
# BORING B-3

<table>
<thead>
<tr>
<th>DEPTH IN FEET</th>
<th>SAMPLE NO.</th>
<th>LITHOLOGY</th>
<th>SOIL CLASS (USCS)</th>
<th>GROUNDWATER</th>
<th>PENETRATION RESISTANCE (BLOWS/FT.)</th>
<th>DRY DENSITY (P.C.F.)</th>
<th>MOISTURE CONTENT (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>B-3 @ 0-5'</td>
<td>SC</td>
<td>Agg</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>B-3 @ 5'</td>
<td>SP-SC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>B-3 @ 10'</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>B-3 @ 15'</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**MATERIAL DESCRIPTION**

- **Asphaltic Concrete** 6” thick
- **Aggregate Base** 3” thick
- **Undocumented Fill (afu)**
  - Clayey SAND, medium dense, moist, reddish yellow; fine to coarse sand
- **Very Old Alluvial Fan Deposits (Qvof)**
  - Poorly graded SAND with clay, dense, moist, reddish yellow; fine to medium sand; some coarse sand
- **Granodiorite to Tonalite of Domenigoni Valley (Kdvg)**
  - Moderately weathered, strong, reddish yellow, GRANITIC BEDROCK, medium- to coarse-grained; micaceous; excavates as a poorly-graded sand

- Total depth 15.5’
- Groundwater not encountered
- Penetration resistance for 140-lb hammer falling 30” by auto-hammer
- Backfilled with cuttings and patched with AC 3/26/2019

---

**NOTE:**

The log of subsurface conditions shown hereon applies only at the specific boring or trench location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

---

GEOCON
**BORING B-4**

**DATE COMPLETED:** 03/26/2019

**ELEV. (MSL):** 1429

**EQUIPMENT:** HOLLOW STEM AUGER

**BY:** PDT

<table>
<thead>
<tr>
<th>DEPTH IN FEET</th>
<th>SAMPLE NO.</th>
<th>SOIL CLASS (USCS)</th>
<th>LITHOLOGY</th>
<th>GROUNDWATER</th>
<th>PENETRATION RESISTANCE (BLOWS/FT.)</th>
<th>DRY DENSITY (P.C.F.)</th>
<th>MOISTURE CONTENT (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>SM</td>
<td>Asphaltic Concrete 6&quot; thick</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>SM</td>
<td>Aggregate Base 5&quot; thick</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>SM</td>
<td>Undocumented Fill (afu) Silty SAND, medium dense, damp, yellowish light brown; fine to medium sand</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>B-4 @ 5'-10'</td>
<td>SM</td>
<td>Very Old Alluvial Deposits (Qvof) Silty SAND, very dense, moist, reddish brown; fine to medium sand; some coarse sand; trace gravel 50-5&quot; 117.5 16.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>B-4 @ 5'</td>
<td></td>
<td>Granodiorite to Tonalite of Domenigoni Valley (Kdvg) Moderately weathered, strong, reddish yellow, GRANITIC BEDROCK, medium- to coarse-grained; micaceous; excavates as a poorly-graded sand with clay 50-5&quot; 126.9 10.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>B-4 @ 10'</td>
<td></td>
<td>Total depth 15.4' Groundwater not encountered Penetration resistance for 140-lb hammer falling 30&quot; by auto-hammer Backfilled with cuttings and patched with AC 3/26/2019</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>B-4 @ 15'</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:** The log of subsurface conditions shown hereon applies only at the specific boring or trench location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

**SAMPLE SYMBOLS**

- .. SAMPLING UNSUCCESSFUL
- .. STANDARD PENETRATION TEST
- .. DRIVE SAMPLE (UNDISTURBED)
- .. DISTURBED OR BAG SAMPLE
- .. CHUNK SAMPLE
- .. WATER TABLE OR SEEPAGE
### MATERIAL DESCRIPTION

<table>
<thead>
<tr>
<th>Depth</th>
<th>Sample No.</th>
<th>Lithology</th>
<th>Soil Class (USCS)</th>
<th>Groundwater</th>
<th>Penetration Resistance (Bows/ft.)</th>
<th>Dry Density (P.c.f.)</th>
<th>Moisture Content (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>B-5 @ 0-5</td>
<td>SM</td>
<td>SM</td>
<td>Undocumented Fill (afu)</td>
<td>Silty SAND, medium dense, moist, brownish red; fine to medium sand; trace coarse sand</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>B-5 @ 5</td>
<td>SM-SC</td>
<td>SM-SC</td>
<td>Very Old Alluvial Fan Deposits (Qvof)</td>
<td>Silty SAND with clay, dense, moist, reddish brown; fine to medium sand; some coarse sand</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.5</td>
<td>B-5 @ 7.5</td>
<td></td>
<td></td>
<td>Granodiorite to Tonalite of Domenigoni Valley (Kdvg)</td>
<td>Moderately weathered, strong, yellowish light brown, GRANITIC BEDROCK, fine- to coarse-grained; micaceous; excavates as a poorly-graded sand with clay</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.5</td>
<td>B-5 @ 10'</td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
<td>50-5&quot;</td>
<td>123.7</td>
</tr>
<tr>
<td>15</td>
<td>B-5 @ 15'</td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
<td>82-11&quot;</td>
<td></td>
</tr>
<tr>
<td>20.9</td>
<td>B-5 @ 20'</td>
<td>+</td>
<td>+</td>
<td></td>
<td>Total depth 20.9' Groundwater not encountered Penetration resistance for 140-lb hammer falling 30&quot; by auto-hammer Backfilled with cuttings and patched with AC 3/26/2019</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **NOTE:**
  - The log of subsurface conditions shown hereon applies only at the specific boring or trench location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.
### BORING B-6

**DEPTH IN FEET** | **SAMPLE NO.** | **SOIL CLASS (USCS)** | **LITHOLOGY** | **GROUNDDWATER CLASS (USCS)** | **EQUIPMENT** | **DATE COMPLETED** | **PENETRATION RESISTANCE (BLOWS/FT.)** | **DRY DENSITY (P.C.F.)** | **MOISTURE CONTENT (%)**
---|---|---|---|---|---|---|---|---|---
0 | | | | | HOLLOW STEM AUGER | 03/26/2019 | | | |
2 | | | | | | | | | |
4 | | | | | | | | | |
6 | B-6 @ 5' | SM | Asphaltic Concrete 6" thick | | | | | | |
8 | B-6 @ 7.5' | SM | Undocumented Fill (afu) | Silty SAND, medium dense, moist, brownish red; fine to medium sand
10 | B-6 @ 10' | SM | Old Alluvial Fan Deposits (Qof) | Silty SAND, dense, moist, brown; fine to medium sand; some carbonates
| | | | -Becomes medium dense; increase in carbonates | | | 69 | 125.9 | 12.7 |
12 | B-6 @ 15' | SP | Poorly-graded SAND, dense, moist, reddish light brown, fine to coarse sand; trace gravel; micaceous
14 | | | | | | | 72 | 127.1 | 5.1 |
16 | | | | | | | | | |
18 | | | | | | | | | |
20 | B-6 @ 20' | | Granodiorite to Tonalite of Domenigoni Valley (Kdvg) | Moderately weathered, strong, pale yellow, GRANITIC BEDROCK, fine- to coarse-grained; micaceous; excavates as a poorly-graded sand with clay
| | | | Total depth 20.4'
| | | | Groundwater not encountered
| | | | Penetration resistance for 140-lb hammer falling 30" by auto-hammer
| | | | Backfilled with cuttings and patched with AC 3/26/2019

#### Notes:
- The log of subsurface conditions shown hereon applies only at the specific boring or trench location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

---

Figure A-7, Log of Boring B-6, Page 1 of 1

---

- **SAMPLE SYMBOLS**
  - □ Sampling unsuccessful
  - □ Standard penetration test
  - □ Drive sample (undisturbed)
  - ■ Disturbed or bag sample
  - □ Chunk sample
  - ▼ Water table or seepage

---

**PROJECT NO.** T2768-22-02

---

**NOTE:** THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

---

**GEOCON**
<table>
<thead>
<tr>
<th>DEPTH</th>
<th>SAMPLE</th>
<th>LITHOLOGY</th>
<th>SOIL CLASS (USCS)</th>
<th>GROUNDWATER</th>
<th>ELEV. (MSL)</th>
<th>PENETRATION RESISTANCE (BLOWS/FT.)</th>
<th>DRY DENSITY (P.C.F.)</th>
<th>MOISTURE CONTENT (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>B-7 @ 0.5</td>
<td>ML</td>
<td></td>
<td></td>
<td>1420</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>B-7 @ 5</td>
<td>SM</td>
<td></td>
<td></td>
<td></td>
<td>52</td>
<td>124.0</td>
<td>13.1</td>
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<tr>
<td>4</td>
<td>B-7 @ 7.5</td>
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<td></td>
<td>59</td>
<td>124.0</td>
<td>12.8</td>
</tr>
<tr>
<td>6</td>
<td>B-7 @ 10'</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>30</td>
<td>111.6</td>
<td>22.3</td>
</tr>
<tr>
<td>8</td>
<td>B-7 @ 15'</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>33</td>
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<td>10</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>84</td>
<td>116.6</td>
<td>15.7</td>
</tr>
</tbody>
</table>

Total depth 21.5'

**GROUNDWATER**

- Groundwater not encountered
- Penetration resistance for 140-lb hammer falling 30" by auto-hammer
- Backfilled with cuttings and patched with AC 3/26/2019

**LITHOLOGY**

- **Asphaltic Concrete** 5.5" thick
- **Undocumented Fill (afu)** Sandy SILT, stiff, damp, brownish red; fine sand
- **Old Alluvial Fan Deposits (Qof)** Silty SAND, dense, damp, strong brown; fine sand; trace medium sand; trace black staining
  - Few medium sand; moist
  - Becomes medium dense, wet; some carbonates
- **Granodiorite to Tonalite of Domenigoni Valley (Kdvg)** Moderately weathered, strong, light reddish brown, GRANITIC BEDROCK, medium- to coarse-grained; micaceous; excavates as a poorly-graded sand with clay
  - Becomes pale yellow

**MATERIAL DESCRIPTION**

**NOTE:** THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.
## Boring B-8

**Elev. (MSL):** 1420  
**Date Completed:** 03/26/2019  
**Equipment:** Hollow Stem Auger  
**By:** PDT

### Material Description

<table>
<thead>
<tr>
<th>Depth (Feet)</th>
<th>Soil Class (USCS)</th>
<th>Lithology</th>
<th>Groundwater</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>SC</td>
<td>Asphallic Concrete 6&quot; thick</td>
<td></td>
</tr>
</tbody>
</table>
| 2            | SM                | Undocumented Fill (afu)  
Clayey SAND, medium dense, damp, reddish brown; fine sand |
| 4            | SM                | Old Alluvial Fan Deposits (Qof)  
Silty SAND, medium dense, moist, brown; fine sand; trace medium sand; carbonates  
-Becomes dense, strong brown; trace black staining |
| 6            | SM                | Granodiorite to Tonalite of Domenigoni Valley (Kdvg)  
Moderately weathered, strong, yellowish brown, GRANITIC BEDROCK, medium- to coarse-grained; excavates as a poorly-graded sand with clay  
-Becomes pale yellow |
| 8            |                   |           | Groundwater not encountered |
| 10           |                   |           | Penetration resistance for 140-lb hammer falling 30" by auto-hammer |
| 12           |                   |           | Backfilled with cuttings and patched with AC 3/26/2019 |

**Total depth:** 20.4'  
**Groundwater not encountered**

---

**Figure A-9, Log of Boring B-8, Page 1 of 1**

**Sample Symbols**

- .. Sampling Unsuccessful  
- .. Standard Penetration Test  
- .. Drive Sample (Undisturbed)  
- .. Disturbed or Bag Sample  
- .. Chunk Sample  
- .. Water Table or Seepage

**Note:** The log of subsurface conditions shown hereon applies only at the specific boring or trench location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.
### BORING B-9

**ELEV. (MSL):** 1420  **DATE COMPLETED:** 03/26/2019  
**EQUIPMENT:** HOLLOW STEM AUGER  **BY:** PDT

<table>
<thead>
<tr>
<th>DEPTH IN FEET</th>
<th>SAMPLE NO.</th>
<th>LITHOLOGY</th>
<th>SOIL CLASS (USCS)</th>
<th>GROUNDWATER</th>
<th>PENETRATION RESISTANCE (BLOWS/FT.)</th>
<th>DRY DENSITY (P.C.F.)</th>
<th>MOISTURE CONTENT (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>B-9 @ 0-5</td>
<td>SC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>B-9 @ 5</td>
<td>CL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>B-9 @ 7.5</td>
<td>SP-CL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>B-9 @ 10'</td>
<td>CL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>B-9 @ 15'</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>B-9 @ 20'</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**MATERIAL DESCRIPTION**

- **Asphaltic Concrete** 5" thick
- **Undocumented Fill (afu)**
  - Clayey SAND stiff, medium dense, dark reddish brown; fine to medium sand; some coarse sand
- **Old Alluvial Fan Deposits (Qof)**
  - Sandy CLAY, stiff, moist, dark reddish brown; fine sand; trace medium sand; some carbonates
  - Sandy CLAY, stiff, moist, brownish red; fine to medium sand; carbonates; black satining
- **Granodiorite to Tonalite of Domenigoni Valley (Kdvg)**
  - Moderately weathered, strong, yellowish brown, GRANITIC BEDROCK, fine to coarse grained; micaceous; excavates as a poorly-graded sand with silt
  - Total depth 21.5"

- Groundwater not encountered
- Penetration resistance for 140-lb hammer falling 30" by auto-hammer
- Backfilled with cuttings and patched with AC 3/26/2019

---

**Figure A-10, Log of Boring B-9, Page 1 of 1**

**SAMPLE SYMBOLS**

- ... SAMPLING UNSUCCESSFUL
- ... STANDARD PENETRATION TEST
- ... DRIVE SAMPLE (UNDISTURBED)
- ... DISTURBED OR BAG SAMPLE
- ... CHUNK SAMPLE
- ... WATER TABLE OR SEEPAGE

**NOTE:** THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.
## BORING B-10

**ELEV. (MSL):** 1422  |  **DATE COMPLETED:** 03/26/2019

**EQUIPMENT:** HOLLOW STEM AUGER  |  **BY:** PDT

<table>
<thead>
<tr>
<th>DEPTH IN FEET</th>
<th>SAMPLE NO.</th>
<th>LITHOLOGY</th>
<th>GROUNDWATER</th>
<th>PENETRATION RESISTANCE (BLOWS/FT.)</th>
<th>DRY DENSITY (P.C.F.)</th>
<th>MOISTURE CONTENT (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>B-10 @ 0-5</td>
<td>CL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>CL</td>
<td>Asphaltic Concrete 5&quot; thick</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>B-10 @ 5</td>
<td>CL</td>
<td>Undocumented Fill (afu) Sandy CLAY, stiff, damp, reddish brown; fine to medium sand; some coarse sand</td>
<td>35</td>
<td>116.6</td>
<td>15.5</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>CL</td>
<td>Old Alluvial Fan Deposits (Qof) Sandy CLAY dense, moist, brownish red; fine to coarse sand</td>
<td>52</td>
<td>121.7</td>
<td>7.4</td>
</tr>
<tr>
<td>8</td>
<td>B-10 @ 7.5</td>
<td>SP-SC</td>
<td>Poorly graded SAND with clay, dense, moist, light yellowish brown; fine to coarse sand</td>
<td>68</td>
<td>111.4</td>
<td>12.1</td>
</tr>
<tr>
<td>10</td>
<td>B-10 @ 10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>B-10 @ 15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>B-10 @ 20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Granodiorite to Tonalite of Domenigoni Valley (Kdvg)
Moderately weathered, strong, pale yellow, GRANITIC BEDROCK, medium- to coarse-grained; micaceous; excavates as a poorly-graded sand

Total depth 20.3'
Groundwater not encountered
Penetration resistance for 140-lb hammer falling 30" by auto-hammer
Backfilled with cuttings and patched with AC 3/26/2019

### SAMPLE SYMBOLS

- [] .. SAMPLING UNSUCCESSFUL
- [] .. STANDARD PENETRATION TEST
- [] .. DRIVE SAMPLE (UNDISTURBED)
- [] .. DISTURBED OR BAG SAMPLE
- [ ] .. CHUNK SAMPLE
- [ ] .. WATER TABLE OR SEEPAGE

**NOTE:** THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.
# Project No. T2768-22-02

## Boring B-11

<table>
<thead>
<tr>
<th>Depth in Feet</th>
<th>Sample No.</th>
<th>Lithology</th>
<th>Soil Class (USCS)</th>
<th>Groundwater</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>B-11@1'5&quot;</td>
<td>SP</td>
<td>CL</td>
<td></td>
<td>Asphaltic Concrete 6&quot; thick</td>
</tr>
<tr>
<td>2</td>
<td>B-11@2'5&quot;</td>
<td></td>
<td></td>
<td></td>
<td>Aggregate Base 6&quot; thick</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Undocumented Fill (afu)</td>
</tr>
<tr>
<td>6</td>
<td>B-11@5'</td>
<td></td>
<td></td>
<td></td>
<td>Poorly graded SAND, loose, moist, reddish brown; fine to coarse sand; trace clay; trace silt</td>
</tr>
<tr>
<td>8</td>
<td>B-11@7'5&quot;</td>
<td></td>
<td></td>
<td></td>
<td>Sandy CLAY, stiff, moist, reddish brown; fine to medium sand; trace coarse sand</td>
</tr>
<tr>
<td>10</td>
<td>B-11@10'</td>
<td></td>
<td></td>
<td></td>
<td>Old Alluvial Fan Deposits (Qof)</td>
</tr>
<tr>
<td>12</td>
<td>B-11@15'</td>
<td></td>
<td></td>
<td></td>
<td>Sandy SILT, stiff, moist, yellowish brown; fine sand; micaceous</td>
</tr>
<tr>
<td>14</td>
<td>B-11@20'</td>
<td></td>
<td></td>
<td></td>
<td>-Increase in sand; some calcium carbonate stringers</td>
</tr>
<tr>
<td>16</td>
<td>B-11@20'</td>
<td></td>
<td></td>
<td></td>
<td>-Becomes very stiff</td>
</tr>
</tbody>
</table>

**Total depth 21.5'**

Groundwater not encountered

Penetration resistance for 140-lb hammer falling 30" by auto-hammer

Backfilled with cuttings and patched with AC 8/6/2019

---

**Figure A-12, Log of Boring B-11, Page 1 of 1**

**Table Symbols**

- **...** Sampling unsuccessful
- **I** Standard penetration test
- **...** Drive sample (undisturbed)
- **...** Disturbed or bag sample
- **...** Chunk sample
- **...** Water table or seepage

**Note:** The log of subsurface conditions shown hereon applies only at the specific boring or trench location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.
<table>
<thead>
<tr>
<th>DEPTH IN FEET</th>
<th>SAMPLE NO.</th>
<th>LITHOLOGY</th>
<th>SOIL CLASS (USCS)</th>
<th>GROUNDWATER</th>
<th>PENETRATION RESISTANCE (BLOWS/FT.)</th>
<th>DRY DENSITY (P.C.F.)</th>
<th>MOISTURE CONTENT (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>8</td>
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</tr>
</tbody>
</table>

**MATERIAL DESCRIPTION**

- **Asphaltic Concrete (6" thick)**
- **Aggregate Base (15" thick)**
- **Undocumented Fill (afu)**
  - Silty SAND, medium dense, moist, brown; fine to medium sand; some coarse sand
  - SM
  - Moisture Content: 17%
  - Dry Density: 109.9 P.C.F.
  - Penetration Resistance: 19.0 B.L.
  - Data Collection: Hollow Stem Auger

- **Old Alluvial Fan Deposits (Qof)**
  - Silty SAND, medium dense, moist, reddish brown; fine sand; some clay; micaceous
  - SM
  - Moisture Content: 33%
  - Dry Density: 109.9 P.C.F.
  - Penetration Resistance: 19.0 B.L.
  - Data Collection: Hollow Stem Auger

- **Granodiorite to Tonalite of Domenigoni Valley (Kdvg)**
  - Moderately weathered, strong, reddish yellow, GRANITIC BEDROCK, fine- to medium-grained; micaceous; excavates as a poorly-graded sand
  - ML
  - Moisture Content: 44%
  - Dry Density: 109.9 P.C.F.
  - Penetration Resistance: 19.0 B.L.
  - Data Collection: Hollow Stem Auger

**NOTE:**
- The log of subsurface conditions shown hereon applies only at the specific boring or trench location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.

---

**Figure A-13, Log of Boring B-12, Page 1 of 1**

**SAMPLE SYMBOLS**
- ... SAMPLING UNSUCCESSFUL
- ... STANDARD PENETRATION TEST
- ... DRIVE SAMPLE (UNDISTURBED)
- ... DISTURBED OR BAG SAMPLE
- ... CHUNK SAMPLE
- ... WATER TABLE OR SEEPAGE

---

**PROJECT NO. T2768-22-02**

---

**T2768-22-01 BORING LOGS.GPJ**

---

**GEOCON**
### BORING B-13

**ELEV. (MSL.)** 1427  
**DATE COMPLETED** 08/06/219

**EQUIPMENT** HOLLOW STEM AUGER  
**BY:** PDT

<table>
<thead>
<tr>
<th>DEPTH IN FEET</th>
<th>SAMPLE NO.</th>
<th>LITHOLOGY</th>
<th>SOIL CLASS (USCS)</th>
<th>GROUNDWATER</th>
<th>PENETRATION RESISTANCE (BLOWS/FT.)</th>
<th>DRY DENSITY (P.C.F.)</th>
<th>MOISTURE CONTENT (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>B-13 @ 1-2.5</td>
<td>SM</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>B-13 @ 2.5</td>
<td>SM</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>B-13 @ 5</td>
<td>SM</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>B-13 @ 7.5</td>
<td>ML</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>B-13 @ 10</td>
<td>ML</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
<td>B-13 @ 15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td>B-13 @ 20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### MATERIAL DESCRIPTION

- **Asphaltic Concrete 5" thick**
- **Undocumented Fill (afu)**  
  Silty SAND, medium dense, moist, brown; fine to medium sand
- **Alluvium (Qal)**  
  Silty SAND, medium dense, moist reddish brown; fine to medium sand; micaceous; some carbonates
  - Becomes dense
- **Sandy SILT, very stiff, moist, reddish brown; fine sand; micaceous; carbonate stringers**
- **Granodiorite to Tonalite of Domenigoni Valley (Kdvg)**  
  Moderately weathered, strong, reddish yellow, GRANITIC BEDROCK, fine- to medium-grained; micaceous; excavates as a poorly-graded sand
  - Total depth 20.5'
  - Groundwater not encountered
  - Penetration resistance for 140-lb hammer falling 30" by auto-hammer
  - Backfilled with cuttings and patched with AC 8/6/2019

**Figure A-14, Log of Boring B-13, Page 1 of 1**

**NOTE:** The log of subsurface conditions shown hereon applies only at the specific boring or trench location and at the date indicated. It is not warranted to be representative of subsurface conditions at other locations and times.
APPENDIX B
LABORATORY TESTING

Laboratory tests were performed in general accordance with test methods of ASTM International (ASTM), Caltrans test methods, or other suggested procedures. Selected samples were tested to evaluate maximum dry density and optimum moisture content, corrosivity, grain size distribution, in-situ shear strength properties, expansion potential, Atterberg limits, and in-situ moisture and density content.

The results of our laboratory tests are presented on Figures B-1 through B-8. The in-place dry density and moisture content of the samples tested are presented on the boring logs in Appendix A.
### SUMMARY OF LABORATORY MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT TEST RESULTS
ASTM D1557

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Description</th>
<th>Maximum Dry Density (pcf)</th>
<th>Optimum Moisture Content (% of dry wt.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-3 @ 0-5'</td>
<td>Clayey SAND (SC), reddish yellow</td>
<td>121.5</td>
<td>10.5</td>
</tr>
<tr>
<td>B-6 @ 5-10'</td>
<td>Silty SAND (SM), brown</td>
<td>129.0</td>
<td>10.0</td>
</tr>
<tr>
<td>B-9 @ 0-5'</td>
<td>Clayey SAND (SC), dark reddish brown</td>
<td>128.5</td>
<td>10.0</td>
</tr>
<tr>
<td>B-12 @ 5-10'</td>
<td>Silty SAND (SM), reddish brown</td>
<td>125.0</td>
<td>10.0</td>
</tr>
</tbody>
</table>

### SUMMARY OF LABORATORY EXPANSION INDEX TEST RESULTS
ASTM D4829

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Moisture Content</th>
<th>After Test Dry Density (pcf)</th>
<th>Expansion Index</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Before Test (%)</td>
<td>After Test (%)</td>
<td></td>
</tr>
<tr>
<td>B-3 @ 0-5'</td>
<td>10.4</td>
<td>17.7</td>
<td>16</td>
</tr>
<tr>
<td>B-7 @ 0-5'</td>
<td>9.0</td>
<td>15.3</td>
<td>0</td>
</tr>
<tr>
<td>B-10 @ 0-5'</td>
<td>10.2</td>
<td>22.3</td>
<td>48</td>
</tr>
</tbody>
</table>

### SUMMARY OF CORROSIVITY TEST RESULTS

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>Chloride Content (ppm)</th>
<th>Sulfate Content (%)</th>
<th>pH</th>
<th>Resistivity (ohm-centimeter)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-3 @ 0-5'</td>
<td>30</td>
<td>0.000</td>
<td>7.1</td>
<td>1,300</td>
</tr>
<tr>
<td>B-10 @ 0-5'</td>
<td>45</td>
<td>0.000</td>
<td>8.0</td>
<td>1,100</td>
</tr>
<tr>
<td>B-11 @ 1-5'</td>
<td>53</td>
<td>0.001</td>
<td>7.2</td>
<td>1,500</td>
</tr>
</tbody>
</table>

Chloride content determined by California Test 422. Water-soluble sulfate determined by California Test 417. Resistivity and pH determined by Caltrans Test 643.
## SUMMARY OF ONE-DIMENSIONAL CONSOLIDATION (COLLAPSE) TESTS
**ASTM D2435**

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>In-situ Dry Density (pcf)</th>
<th>Moisture Content Before Test (%)</th>
<th>Final Moisture Content (%)</th>
<th>Axial Load with Water Added (psf)</th>
<th>Percent Hydrocompression</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-5 @ 7.5'</td>
<td>117.9</td>
<td>12.3</td>
<td>14.0</td>
<td>2,000</td>
<td>0.1</td>
</tr>
<tr>
<td>B-9 @ 5.0'</td>
<td>121.6</td>
<td>13.1</td>
<td>14.8</td>
<td>2,000</td>
<td>0.1</td>
</tr>
<tr>
<td>B-11 @ 7.5</td>
<td>120.0</td>
<td>13.7</td>
<td>15.0</td>
<td>2,000</td>
<td>0.1</td>
</tr>
<tr>
<td>B-12 @ 2.5'</td>
<td>109.9</td>
<td>19.0</td>
<td>19.8</td>
<td>2,000</td>
<td>0.0</td>
</tr>
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</table>

## SUMMARY OF ATTERBERG LIMIT TEST RESULTS
**ASTM D4318**

<table>
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<th>Sample No.</th>
<th>Liquid Limit</th>
<th>Plastic Limit</th>
<th>Plasticity Index</th>
<th>USCS</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-10 @ 0-5’</td>
<td>46</td>
<td>13</td>
<td>33</td>
<td>CL</td>
</tr>
</tbody>
</table>

## SUMMARY OF LABORATORY R-VALUE TEST RESULTS
**ASTM D2844**

<table>
<thead>
<tr>
<th>Sample No.</th>
<th>R-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-1 @ 1-5’</td>
<td>70</td>
</tr>
<tr>
<td>B-5 @ 0-2’</td>
<td>39</td>
</tr>
<tr>
<td>B-13 @ 1-2.5’</td>
<td>75</td>
</tr>
</tbody>
</table>
### Sample ID and Sample Description

<table>
<thead>
<tr>
<th>Sample ID</th>
<th>Sample Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-4 @ 5-10’</td>
<td>SM - Silty Sand, trace gravel</td>
</tr>
<tr>
<td>B-7 @ 0-5’</td>
<td>ML - Sandy SILT</td>
</tr>
</tbody>
</table>

### Grain Size Distribution

- **MCCALL BOULEVARD PIPELINE REPLACEMENT PROJECT**
- **MCCALL BOULEVARD FROM VALLEY BOULEVARD TO BRADLEY ROAD, MENIFEE, CALIFORNIA**

*Note: The grainsize distribution chart shows the percent passing for different particle sizes, with the x-axis representing particle size in mm and the y-axis representing percent passing.*
DIRECT SHEAR TEST RESULTS

MCCALL BOULEVARD PIPELINE REPLACEMENT PROJECT
MCCALL BOULEVARD FROM VALLEY BOULEVARD TO BRADLEY ROAD MENIFEE, CALIFORNIA

SAMPLE ID | SOIL TYPE | INITIAL DRY DENSITY (pcf) | INITIAL MOISTURE (%) | FINAL MOISTURE (%) | C (psf) | (deg) |
--- | --- | --- | --- | --- | --- | --- |
*B-3 @ 0-5'* | SC | 109.3 | 10.5 | 16.0 | 160 | 34 |
*B-7 @ 5'* | SM | 124.0 | 12.8 | 14.0 | 490 | 36 |
*B-8 @ 5'* | SM | 110.1 | 18.0 | 21.0 | 400 | 32 |

*Sample remolded to approximately 90% of the test maximum dry density at optimum moisture content.
### DIRECT SHEAR TEST RESULTS

**MCCALL BOULEVARD PIPELINE REPLACEMENT PROJECT**
**MCCALL BOULEVARD FROM VALLEY BOULEVARD TO BRADLEY ROAD MENIFEE, CALIFORNIA**

**AUGUST 2019**  PROJECT NO. T2768-22-02  FIG B-5

<table>
<thead>
<tr>
<th>SAMPLE ID</th>
<th>SOIL TYPE</th>
<th>INITIAL DRY DENSITY (pcf)</th>
<th>INITIAL MOISTURE (%)</th>
<th>FINAL MOISTURE (%)</th>
<th>C (psf)</th>
<th>$\phi$ (deg)</th>
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<tbody>
<tr>
<td><em>B-9 @ 0-5</em>'</td>
<td>SC</td>
<td>115.6</td>
<td>10.0</td>
<td>13.9</td>
<td>310</td>
<td>26</td>
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*Sample remolded to approximately 90% of the test maximum dry density at optimum moisture content.*
CONSOLIDATION TEST RESULTS

MCCALL BOULEVARD PIPELINE REPLACEMENT PROJECT
MCCALL BOULEVARD FROM VALLEY BOULEVARD TO BRADLEY ROAD MENIFEE, CALIFORNIA

AUGUST 2019 PROJECT NO. T2768-22-02 FIG B-6

<table>
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<th>SAMPLE ID</th>
<th>SOIL TYPE</th>
<th>DRY DENSITY (PCF)</th>
<th>INITIAL MOISTURE (%)</th>
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<tr>
<td>B-5 @ 7.5’</td>
<td>SM-SC</td>
<td>117.9</td>
<td>12.3</td>
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WATER ADDED AT 2 KSF

Consolidation Pressure (ksf)

Percent Consolidation
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<td>B-9 @ 5'</td>
<td>CL</td>
<td>121.6</td>
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WATER ADDED AT 2 KSF

CONSOLIDATION TEST RESULTS
MCCALL BOULEVARD PIPELINE REPLACEMENT PROJECT
MCCALL BOULEVARD FROM VALLEY BOULEVARD TO BRADLEY ROAD MENIFEE, CALIFORNIA
AUGUST 2019 PROJECT NO. T2768-22-02 FIG B-7
### CONSOLIDATION TEST RESULTS

**MCCALL BOULEVARD PIPELINE REPLACEMENT PROJECT**

**MCCALL BOULEVARD FROM VALLEY BOULEVARD TO BRADLEY ROAD\nMENIFEE, CALIFORNIA**

**AUGUST 2019 \ PROJECT NO. T2768-22-02 \ FIG B-8**

<table>
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<td>B-12 @ 2.5’</td>
<td>SM</td>
<td>109.9</td>
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**WATER ADDED AT 2 KSF**

![Graph showing consolidation test results]
APPENDIX C

AGENCY STANDARD DRAWINGS

EASTERN MUNICIPAL WATER DISTRICT
AND
CITY OF MENIFEE
CLEARANCE "A"

1. PIPE SIZES THROUGH 12" : "A" = 6" - 9"
2. PIPE SIZES OVER 12" : "A" = 1' - 0" MIN.

I. STRUCTURAL ZONE
   II. INTERMEDIATE ZONE
   III. PIPE AND UTILITY ZONE

NOTE: WHEN A FIRM FOUNDATION IS NOT ENCOUNTERED, DUE TO SOFT, SPONGY, OR OTHER UNSUITABLE MATERIAL, SUCH MATERIAL SHALL BE REMOVED TO THE LIMITS DIRECTED BY THE ENGINEER, AND THE RESULTING EXCAVATION BACKFILLED WITH PIPE BEDDING MATERIAL COMPACTED TO 90% RELATIVE COMPACTION.

REVISIONS

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<th>APP'D</th>
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EASTERN MUNICIPAL WATER DISTRICT

STANDARD DRAWING

TRENCH BACKFILL

REFERENCES: REFERENCE 54-408
FILE: D:\RevC896\b.dgn
DRAWN BY JJW
RECOMMENDED: Joseph D. Van Sickel 12/29/94
APPROVED: G. Levente 12/29/94
DIRECTOR OF ENGINEERING: DATE
GENERAL MANAGER: DATE
TRENCH BACKFILL AND ROADWAY REPAIR (CASE I)

TRENCH PERPENDICULAR TO CURB

W = O.D + 24" MIN
O.D. + 36" MAX

COLD MILL 10' MIN. (SEE NOTE 6)

MATCH EXIST. PAVEMENT +1" (4" MINIMUM)

SAWCUT EXISTING PAVEMENT AND APPLY HEAVY ASPHALTIC TACK COAT ON SAWCUT FACE.

95% RELATIVE COMPACTION

TRENCH ZONE

MATCH EXIST. AGGREGATE BASE (4" MINIMUM)

TOP 3'
95% RELATIVE COMPACTION

TRENCH BACKFILL MATERIAL
FROM LIST BELOW OR AS RECOMMENDED BY SOILS ENGINEER
- CRUSHED AGGREGATE BASE
- CRUSHED MISCELLANEOUS BASE (CERTIFIED)
- 1 SACK SLURRY
- NATIVE MATERIAL (WITH A SAND EQUIVALENT OF 30 OR GREATER)

12" MINIMUM

PIPE BEDDING ZONE

6"

SEE SHEET 3 OF 3 FOR NOTES

CITY OF MENIFEE

8/6/2014

DIRECTOR OF PUBLIC WORKS
JONATHAN GEORGE SMITH

812 SHEET 1 OF 4

STANDARD PLAN NO. 61253

APPROVED BY:

REVISION
1
BY:
CG
APPROVED
JS
DATE
11/06/2017
**TRENCH PARALLEL TO CURB**

- **B-PG 70-10** PERMANENT ASPHALT
- **C2-PG 70-10** ASPHALT FINISH COURSE
- **W = O.D + 24" MIN**
  - **O.D. + 36" MAX**
- **TOP 3’**
  - **95% RELATIVE COMPACTION**
- **MATCH EXIST. PAVEMENT +1”**
  - **(4” MINIMUM)**
- **SEE DETAIL "A"**
- **SEE SHEET 3 OF 3 FOR NOTES**

**TRENCH BACKFILL MATERIAL**
- (FROM LIST BELOW OR AS RECOMMENDED BY SOILS ENGINEER)
  - CRUSHED AGGREGATE BASE
  - CRUSHED MISCELLANEOUS BASE (CERTIFIED)
  - 1 SACK SLURRY
  - NATIVE MATERIAL (WITH A SAND EQUIVALENT OF 30 OR GREATER)

- **PIPE BEDDING ZONE**
  - **12” MINIMUM**
  - **6”**

- **EXIST. PAVEMENT**
  - **+1”**
  - **MATCH EXIST. AGGREGATE BASE (4” MINIMUM)**

- **EXIST. PAVEMENT**
  - **SAWCUT EXISTING PAVEMENT AND APPLY HEAVY ASPHALTIC TACK COAT ON SAWCUT FACE.**
  - **C2-PG 70-10 ASPHALT FINISH COURSE**
  - **SEE DETAIL "A"**

- **SEE SHEET 3 OF 3 FOR NOTES**

---

**CITY OF MENIFEE**

**TRENCH BACKFILL AND ROADWAY REPAIR (CASE II)**

**STANDARD PLAN NO.** 812  **SHEET 2 OF 4**

**APPROVED BY:**

**DIRECTOR OF PUBLIC WORKS** JONATHAN GEORGE SMITH  
**DATE** 8/6/2014

**REVISION** 1  **BY:** CG  **APPROVED:** JS  **DATE:** 11/06/2017
NOTES

1. ALL TRENCH EXCAVATIONS SHALL BE COMPLETED BY FIRST SAW-CUTTING THE PAVEMENT BEFORE EXCAVATION. ALL SAW CUT LINES SHALL BE CLEAN AND FREE OF ROUGH EDGES. ADDITIONAL SAW-CUTTING WILL BE REQUIRED BY THE PUBLIC WORKS INSPECTOR IF THE EDGES OF THE TRENCH ARE DAMAGED DURING EXCAVATION OR BACKFILLING OPERATIONS.

2. ALL COMPACTION OF TRENCH BACKFILL MATERIAL SHALL BE ACCOMPLISHED BY MECHANICAL METHODS. JETTING, PONDING OR FLOODING IN LIEU OF MECHANICAL METHODS SHALL NOT BE ALLOWED.

3. ALL TRENCHES SHALL BE BACKFILLED AND A MINIMUM OF 3" OF TEMPORARY ASPHALT PAVEMENT INSTALLED AT THE END OF EACH WORKDAY. THE PUBLIC WORKS INSPECTOR MAY AUTHORIZE STEEL PLATE BRIDGING IN ACCORDANCE WITH STANDARD #813 IN LIEU OF TEMPORARY ASPHALT PAVEMENT.

4. ALL TRAFFIC STRIPING OR MARKINGS REMOVED OR DAMAGED DURING CONSTRUCTION SHALL BE REPLACED USING THERMOPLASTIC COATINGS OR AS DIRECTED BY THE PUBLIC WORKS INSPECTOR. PARTIALLY REMOVED STRIPING SHALL BE REPLACED IN WHOLE.

5. PERMANENT PAVEMENT REPAIR SHALL BE ACCOMPLISHED WITHIN 14 DAYS OF TEMPORARY REPAIR BY REMOVAL OF ALL TEMPORARY AC PAVEMENT, INSTALLATION OF PERMANENT ASPHALT PAVEMENT AS NOTED ON THIS STANDARD, AND COLD MILLING WITH FINISH PAVEMENT.

6. COLD MILLING OF 0.15' SHALL BE REQUIRED FOR ALL TRENCHES. THE PUBLIC WORKS INSPECTOR WILL REQUIRE ADDITIONAL COLD MILLING IF FIELD CONDITIONS SO WARRANT.

7. ADDITIONAL COLD MILLING SHALL BE REQUIRED FOR TRENCHES THAT ARE 2' TO 4' FROM THE CURB & GUTTER.

8. REMOVE AND REPLACE ASPHALT PAVEMENT FULL DEPTH FOR TRENCHES THAT ARE 2' OR LESS FROM CURB & GUTTER.

9. TACK COAT OF PG 70-10 PAVING ASPHALT SHALL BE UNIFORMLY APPLIED TO EXISTING ASPHALT SURFACES PRECEDING PLACEMENT OF NEW ASPHALT CONCRETE. THE SURFACE SHALL BE FREE OF WATER, FOREIGN MATERIAL, OR DUST WHEN THE TACK COAT IS APPLIED.

10. FOR WATER AND SEWER PIPE BEDDING REQUIREMENTS REFER TO EASTERN WATER MUNICIPAL WATER DISTRICT (EMWD) STANDARDS.

NOTES FOR TRENCHES OR OTHER EXCAVATIONS WITHIN PUBLIC RIGHTS-OF-WAY OR EASEMENTS

1. ALL TRENCH EXCAVATIONS SHALL BE COMPLETED BY FIRST SAW-CUTTING THE PAVEMENT BEFORE EXCAVATION. ALL SAW CUT LINES SHALL BE CLEAN AND FREE OF ROUGH EDGES. ADDITIONAL SAW-CUTTING WILL BE REQUIRED BY THE PUBLIC WORKS INSPECTOR IF THE EDGES OF THE TRENCH ARE DAMAGED DURING EXCAVATION OR BACKFILLING OPERATIONS.

2. ALL COMPACTION OF TRENCH BACKFILL MATERIAL SHALL BE ACCOMPLISHED BY MECHANICAL METHODS. JETTING, PONDING OR FLOODING IN LIEU OF MECHANICAL METHODS SHALL NOT BE ALLOWED.

3. ALL TRENCHES SHALL BE BACKFILLED AND A MINIMUM OF 3" OF TEMPORARY ASPHALT PAVEMENT INSTALLED AT THE END OF EACH WORKDAY. THE PUBLIC WORKS INSPECTOR MAY AUTHORIZE STEEL PLATE BRIDGING IN ACCORDANCE WITH STANDARD #813 IN LIEU OF TEMPORARY ASPHALT PAVEMENT.

4. ALL TRAFFIC STRIPING OR MARKINGS REMOVED OR DAMAGED DURING CONSTRUCTION SHALL BE REPLACED USING THERMOPLASTIC COATINGS OR AS DIRECTED BY THE PUBLIC WORKS INSPECTOR. PARTIALLY REMOVED STRIPING SHALL BE REPLACED IN WHOLE.

5. PERMANENT PAVEMENT REPAIR SHALL BE ACCOMPLISHED WITHIN 14 DAYS OF TEMPORARY REPAIR BY REMOVAL OF ALL TEMPORARY AC PAVEMENT, INSTALLATION OF PERMANENT ASPHALT PAVEMENT AS NOTED ON THIS STANDARD, AND COLD MILLING WITH FINISH PAVEMENT.

6. COLD MILLING OF 0.15' SHALL BE REQUIRED FOR ALL TRENCHES. THE PUBLIC WORKS INSPECTOR WILL REQUIRE ADDITIONAL COLD MILLING IF FIELD CONDITIONS SO WARRANT.

7. ADDITIONAL COLD MILLING SHALL BE REQUIRED FOR TRENCHES THAT ARE 2' TO 4' FROM THE CURB & GUTTER.

8. REMOVE AND REPLACE ASPHALT PAVEMENT FULL DEPTH FOR TRENCHES THAT ARE 2' OR LESS FROM CURB & GUTTER.

9. TACK COAT OF PG 70-10 PAVING ASPHALT SHALL BE UNIFORMLY APPLIED TO EXISTING ASPHALT SURFACES PRECEDING PLACEMENT OF NEW ASPHALT CONCRETE. THE SURFACE SHALL BE FREE OF WATER, FOREIGN MATERIAL, OR DUST WHEN THE TACK COAT IS APPLIED.

10. FOR WATER AND SEWER PIPE BEDDING REQUIREMENTS REFER TO EASTERN WATER MUNICIPAL WATER DISTRICT (EMWD) STANDARDS.

11. TESTING: COMPACTION REPORTS SHALL BE SUBMITTED TO THE CITY ENGINEER.

12. PROHIBITION OF PAVEMENT CUTTING: ASPHALT CONCRETE PAVEMENT LESS THAN THREE (3) YEARS OLD SHALL NOT BE CUT EXCEPT FOR EMERGENCY REPAIRS OR AS SPECIFICALLY APPROVED IN WRITING BY THE CITY ENGINEER. SPECIAL REQUIREMENTS WILL BE IMPOSED FOR REPAVING.
1. 190-E-400 CONCRETE, MAXIMUM 8" SLUMP SLURRY BACKFILL TO SURFACE. FOLLOW WITH 12" WIDE BY 1-1/2" DEEP GRIND AND RESURFACING. ALLOW MIN. 72 HOURS CURE BEFORE GRINDING.

2. C2-PG 70-10 ASPHALT CONCRETE.

3. ALL CONDUIT AND CABLE.

4. EXISTING A.C. PAVEMENT.

5. EXISTING BASE MATERIAL.

6. MORTAR SAND COMPACTED TO 95% RELATIVE DENSITY.

7. UNDISTURBED SOIL.

8. SYMMETRICAL ABOUT CENTERLINE OF TRENCH.

9. GRADE SS-1h EMULSIFIED ASPHALT APPLIED AT 0.15 GALLON PER SQUARE YARD.

10. EXISTING ASPHALT PAVEMENT FINISHED GRADE, SMOOTHNESS & COMPACTION OF RESURFACING SHALL MEET THE REQUIREMENTS OF SEC 302-5.6.2 SSPWC EXCEPT THAT THE SMOOTHNESS SHALL BE DETERMINED OVER THE LENGTH & WIDTH OF PAVEMENT AREAS DISTURBED BY THE CONTRACTOR'S/PERMITEE'S OPERATIONS.

11. RESPRAY GRADE SS-1h EMULSIFIED ASPHALT AT 0.15 GALLON PER SQUARE YARD 6" WIDE, CENTERED ON EDGE LINE OF GRIND AFTER PLACING A.C. & BEFORE SURFACE TREATMENT.

12. SURFACE TREATMENT TO MATCH EXISTING PAVEMENT (E.G. SEAL COAT, CHIP SEAL).

13. WHEN THE EDGE OF THE GRIND LINE IS WITHIN 12" OF EDGE OF PAVEMENT, ANY STRUCTURE, AN ADJACENT TRENCH PATCH OR ANY OTHER PAVING JOIN LINE, THE 1-1/2" DEEP GRIND SHALL BE EXTENDED TO THE EXISTING STRUCTURE OR JOIN LINE.

CITY OF MENIFEE
NARROW TRENCH BACKFILL AND ROADWAY REPAIR

APPROVED BY:

DIRECTOR OF PUBLIC WORKS
JONATHAN GEORGE SMITH

REVISION BY: APPROVED DATE
1 CG JS 11/06/2017

STANDARD PLAN NO. 812 SHEET 4 OF 4