Phase 2B Recycled Water Tank Project

Final Supplemental Initial Study – Mitigated Negative Declaration

prepared by

Santa Clarita Valley Water Agency
26504 Summit Circle
Santa Clarita, California 91350
Contact: Rick Vasilopulos, Water Resources Planner

prepared with the assistance of

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180 North Ashwood Avenue
Ventura, California 93003

January 2021

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Environmental Scientists | Planners | Engineers
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1 Introduction

This document is a Supplemental Initial Study – Mitigated Negative Declaration (IS-MND), which is “tiered” from the 2017 IS-MND for the Phase 2B Recycled Water System Project (2017 IS-MND; State Clearinghouse No. 2017051028; Appendix A). This Supplemental IS-MND has been prepared in accordance with relevant provisions of the California Environmental Quality Act (CEQA) of 1970 (as amended) and the State CEQA Guidelines.

In accordance with Section 15163 of the State CEQA Guidelines, a lead agency shall prepare a Subsequent Environmental Impact Report (EIR) or MND if substantial changes are proposed to the project which will require major revisions of the previous EIR or MND due to the involvement of new significant environmental effects or a substantial increase in the severity of previously identified significant effects.

In accordance with Section 15164 of the State CEQA Guidelines, a supplement can be prepared instead of a subsequent document if “only minor additions or changes would be necessary” to make the previous CEQA document adequately apply to the project in the changed situation.

Pursuant to Section 15163 of the State CEQA Guidelines, a supplemental CEQA document need only contain the information necessary to analyze the project modifications, changed circumstances, or new information that triggered the need for additional environmental review. Therefore, this Supplemental IS-MND has been prepared to analyze the potential environmental impacts associated with the modifications to the Original Project, which include a newly proposed graded pad site located approximately 200 feet southeast of the original water tank site, and approximately 350 linear feet of water pipeline in the paved roadway needed to accommodate the new site.

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2 Project Description

2.1 Background

In 2011, Santa Clarita Valley Water (SCV Water), formerly Castaic Lake Water Agency (CLWA), certified the Vista Canyon Final Environmental Impact Report (EIR). Vista Canyon is a 185-acre mixed-use development currently under construction in Santa Clarita with up to 1,100 residential units and up to 950,000 square feet of commercial development. The development's estimated water demand is approximately 300,000 gallons per day (gpd) or 334 acre-feet per year (AFY). To offset some of its potable water demand, the development also includes the Vista Canyon Water Factory (Water Factory), a recycled water facility with a capacity of approximately 415 AFY. Wastewater generated from the Vista Canyon development will be conveyed by gravity flow to the Water Factory, where it will be treated to Title 22 tertiary disinfected recycled water standards for non-potable use at Vista Canyon. The Vista Canyon development is anticipated to use approximately 137 AFY of recycled water. Surplus recycled water will be made available to SCV Water. The 2011 Vista Canyon Final EIR covered the Water Factory, pump station, and recycled water piping within the Vista Canyon development.

In 2016, SCV Water published its Recycled Water Master Plan. The objectives of the Recycled Water Master Plan are to accelerate implementation of recycled water projects, optimize expansion of the recycled water system, and explore opportunities for potable reuse. The Recycled Water Master Plan identifies four specific projects to expand recycled water use within Santa Clarita Valley, which are collectively known as Phase 2. Phases 2A, 2C, and 2D would use recycled water from the Valencia Water Reclamation Plant. Phase 2B would use water produced at the Vista Canyon Water Factory (SCV Water 2016).

In November 2017, SCV Water adopted an Initial Study-Mitigated Negative Declaration (IS-MND) for the Phase 2B Recycled Water System Project (Original Project). The 2017 IS-MND is attached to this Supplemental IS-MND as Appendix A. The Original Project includes a transmission pipeline from the Vista Canyon pump station, a one-million-gallon recycled water tank located approximately 1.25 miles southeast of the Vista Canyon development near existing Cherry Willow potable water tanks, distribution pipelines to serve major customers, and a backup potable water supply line from the existing Cherry Willow potable water tanks to the new recycled water tank in the event of an interruption in recycled water flow. In 2020, the original tank site was deemed unsuitable due to presence of a landslide and slope stability issue that would have required costly engineered buttress fill or drilled cast-in-place concrete piles and shear pins to resolve. Therefore, SCV Water elected to relocate the proposed recycled water tank site to an alternate existing graded pad site approximately 200 feet southeast of the original tank site.

2.2 Project Description

The Phase 2B Recycled Water Tank Project (Modified Project) involves the construction and operation of two 500,000-gallon recycled water tanks on the newly proposed graded pad site located approximately 200 feet southeast of the original tank site. Figure 1 shows the regional location of the Modified Project site, and Figure 2 shows the Original Project water tank site and Modified Project site locations. Similar to the Original Project, the Modified Project would be used to store recycled water generated by the nearby Vista Canyon Water factory and would supply

Figure 1 Regional Location

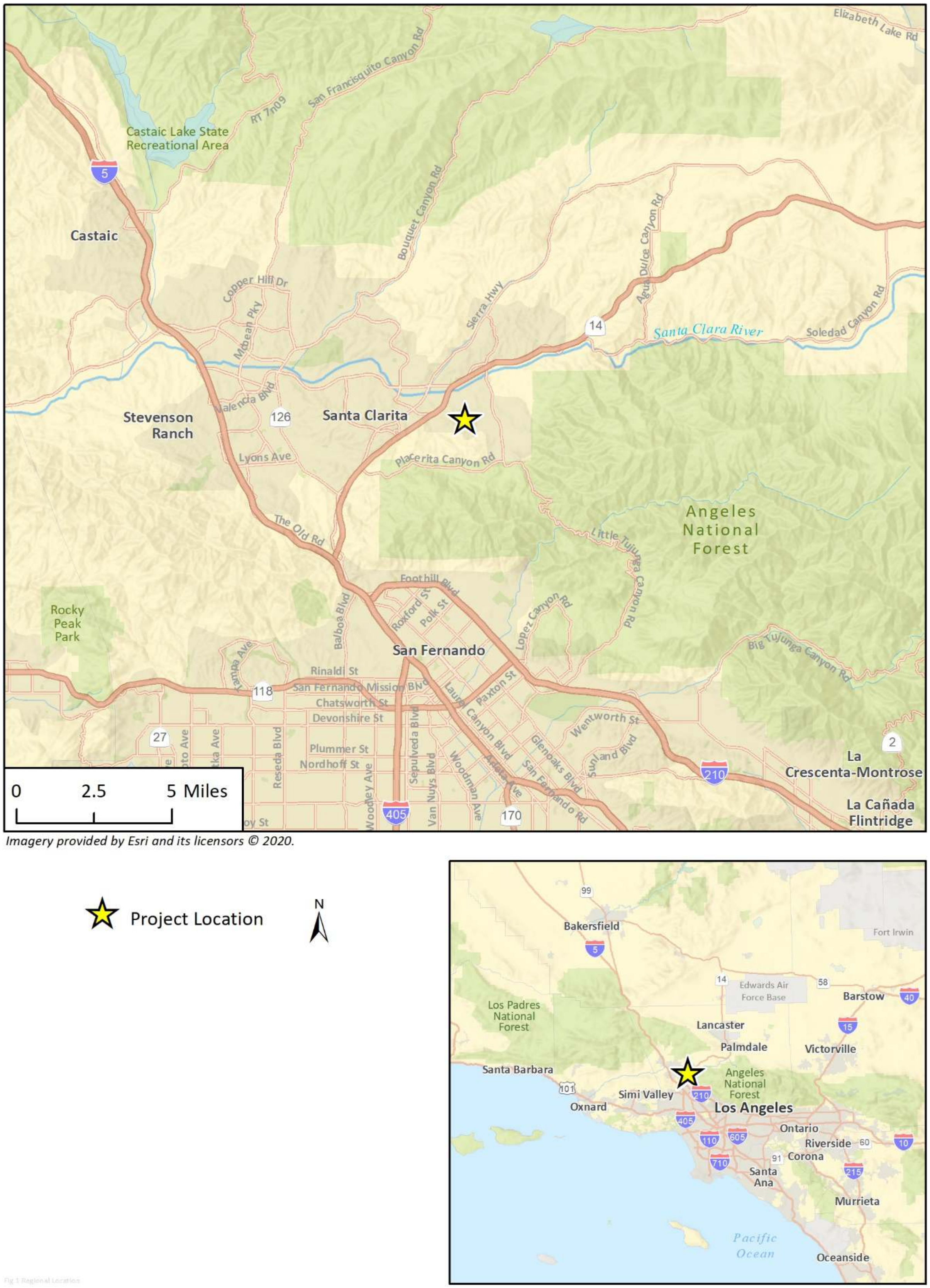


Figure 2 Original and Modified Project Site Locations

irrigation water to customers in the Vista Canyon and Fair Oaks communities. Figure 3 shows site photographs of existing conditions at the Modified Project site. Figure 4 shows the site plan of the Modified Project.

The Modified Project would consist of two aboveground welded steel tanks with an approximate diameter of 55 feet and height of 34 feet each. The 0.55-acre graded pad site is situated on a northwest trending ridgeline, approximately 100 feet northwest of the existing Cherry Willow potable tanks, and 11 feet lower in elevation. The ridgeline descends to the northwest and the north flank of the ridge consists of a 100-foot-high north-facing slope with a series of concrete bench/terrace drains. The top of the slope has been previously graded to create a 15- to 20-foot-high visual berm that partially screens the two existing Cherry Willow potable tanks from the residences below on Cherry Willow Drive.

The proposed recycled water tanks would be painted an earthen tone color typically used by SCV Water to blend with the terrain surrounding the site. The site would include perimeter chain-link fencing for security.

A portion of the existing pad would require the top 20 feet of soil to be removed and recompacted up to a proposed finish grade elevation of 1,810 feet to prepare a suitable pad to support the proposed recycled water tanks. Earth grading would be required to construct perimeter slopes and a vehicular entrance from the existing access road.

As part of the Modified Project, the existing Cherry Willow visual berm would be extended along the north side of the proposed recycled water tank site to provide visual screening from the residences below. It is anticipated that approximately 6,000 cubic yards of soil would be exported from the site.

In order to accommodate the newly proposed tank site, the recycled water transmission pipeline (currently under construction) would need to be extended by approximately 350 linear feet up the paved roadway between the original tank site and the new tank site. All other project components associated with the Original Project would be unchanged.

Final engineering design would incorporate geotechnical design recommendations from the Geotechnical Investigation (Appendix E) and companion Slope Stability Report (Appendix F) prepared for the Modified Project Site in October 2020.

Construction

Construction activities associated with the Modified Project would be similar to the Original Project with the exception of additional activities associated with construction of the visual berm. Construction of the recycled water tanks is anticipated to take approximately nine months, performed in two phases. Like the Original Project, the first phase would include clearing the area, fine grading, and construction of the foundation, site piping and erection of the steel tank structures, and would last approximately six months. Construction activities would involve welding equipment on-site as well as a crane, a concrete pumper, concrete delivery trucks, an excavator, dump trucks, water trucks, and a forklift. A crew of 10 to 15 workers is expected with three utility trucks. The second phase would involve coating the tank, and would last approximately three months. This phase would require painting equipment on-site as well as a crane, scaffolds, sand blasting equipment, and a forklift. A crew of eight workers is expected with three utility trucks. The maximum depth of excavation is twenty feet.

The additional construction activities associated with the 20 foot over-excavation and visual berm under the Modified Project would require use of an excavator, bulldozer, backhoe, front end loader, skid steer loader, water truck, utility truck, and dump trucks. Construction of the visual berm would occur over approximately 40 working days in May 2021, and approximately 6,000 cubic yards of soil would be exported from the project site over the course of approximately five working days using 16-cubic-yard trucks.

The proposed pipeline extension would be installed at the end of the pipeline construction phase, as pipeline construction is progressing on a linear pathway towards the proposed recycled water tanks. Similar to the Original Project, the pipeline extension required by the Modified Project would be constructed using traditional cut-and-cover methods. First, an excavator would excavate a three foot-wide by 6.5 foot-deep trench and temporarily store the removed soils along the trench. Work crews would place the pipe in the trench, which would be backfilled by a loader or backhoe, and then compacted to match the existing grade. The temporary disturbance zone associated with pipe installation would be about 10 feet wide. The roadway would be restored to pre-construction conditions after pipeline installation. The expected rate of progress for pipeline installation is approximately 200 linear feet per day.

Construction of the new recycled water tanks and pipeline extension would occur between March 2021 and December 2021. Construction activities would typically occur between 7:00 a.m. and 7:00 p.m. Monday through Friday. No nighttime construction is proposed.

Construction personnel vehicles would be parked on the Modified Project site. Constructional materials would also be staged at the Modified Project site.

Operation and Maintenance

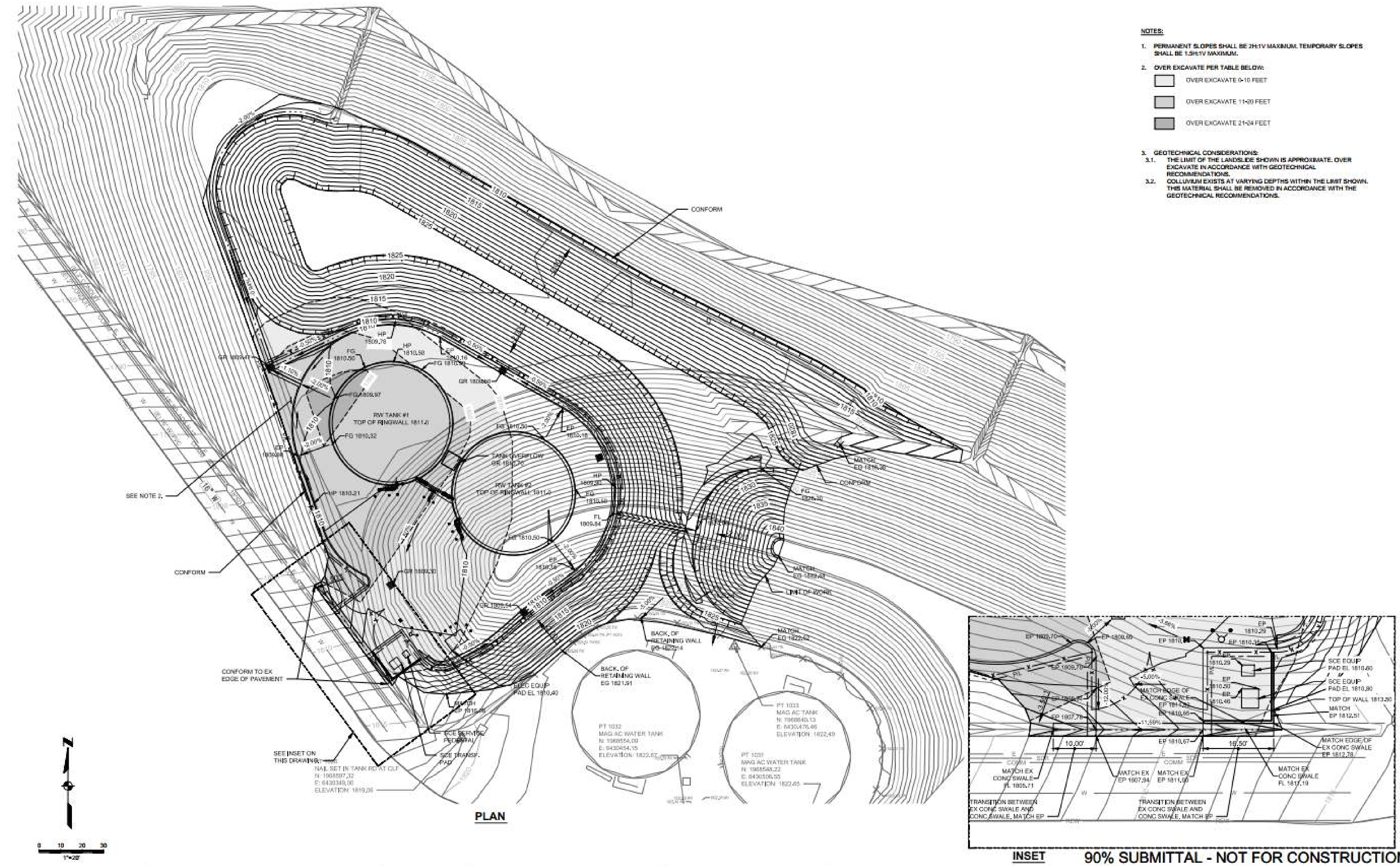
Operation and maintenance activities associated with the Modified Project would be the same as the Original Project. Similar to the Original Project, the Modified Project may include the installation of security lighting at the proposed water tanks.

Figure 3 Site Photographs

Photograph 1. View of Modified Project graded pad site, taken from southwestern portion of site facing northeast.

Photograph 2. View of Modified Project graded pad site in foreground, access road and pipeline corridor and Original Project graded pad site in mid-ground, and Fair Oaks residential community in background. Photo taken from existing berm directly south of Modified Project site, facing northwest.

Figure 4 Site Plan



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3 Environmental Checklist and Impacts of Modified Project

This Supplemental IS-MND evaluates potential environmental impacts which could result from the Modified Project.

Appendix G of the State CEQA Guidelines provides a checklist of environmental issues areas which are suggested as the issue areas which should be assessed in CEQA analyses. The 2017 IS-MND addressed all suggested environmental issue areas included in the version of Appendix G of the CEQA Guidelines in effect at the time of publication. In December 2018, the State CEQA Guidelines were updated. Checklist questions were revised and two new issue areas were added to the Appendix G checklist: Energy and Wildfire.

To provide a thorough and conservative analysis of potential impacts associated with the Modified Project, this Supplemental IS-MND addresses the updated list of Appendix G environmental issue areas, as listed below.

1. Aesthetics
2. Agriculture and Forestry
3. Air Quality
4. Biological Resources
5. Cultural Resources
6. Energy
7. Geology/Soils
8. Greenhouse Gas Emissions
9. Hazards & Hazardous Materials
10. Hydrology/Water Quality
11. Land Use/Planning
12. Mineral Resources
13. Noise
14. Population/Housing
15. Public Services
16. Recreation
17. Transportation
18. Tribal Cultural Resources
19. Utilities/Service Systems
20. Wildfire
21. Mandatory Findings of Significance

Potential environmental impacts of the Modified Project are analyzed to determine whether impacts are consistent with the impact analyses provided in the 2017 IS-MND, and whether additional mitigation measures are required to minimize or avoid potential impacts. For each checklist question in each issue area, this Supplemental IS-MND evaluates the four questions below to document consistency with Section 15164 of the State CEQA Guidelines:

- Do proposed changes require major revisions to the 2017 IS-MND?
- Do new circumstances require major revisions to the 2017 IS-MND?
- Any new information resulting in new or substantially more severe significant impacts?
- Do 2017 IS-MND mitigation measures address and/or resolve impacts?

Determination

Based on this initial evaluation:

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

- ■ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions to the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.

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

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

- ☐ I find that although the proposed project could have a significant effect on the environment, because all potential significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

Matthew S

Signature

1/8/2021

Date

Matthew Stone

Printed Name

General Manager

Title

3.1 Aesthetics

	Do Proposed Changes Require Major Revisions to the 2017 IS-MND?	Do New Circumstances Require Major Revisions to the 2017 IS-MND?	Any New Information Resulting in New or Substantially More Severe Significant Impacts?	Do 2017 IS-MND Mitigation Measures Address and/or Resolve Impacts?
Would the project:				
a. Have a substantial adverse effect on a scenic vista?	No	No	No	Yes
b. Substantially damage scenic resources, including but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	No	No	No	N/A
c. In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from a publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?	No	No	No	Yes
d. Create a new source of substantial light or glare that would adversely affect daytime or nighttime views in the area?	No	No	No	N/A

According to the City of Santa Clarita's General Plan Conservation and Open Space Element (2011), "scenic resources" can include "natural open spaces, topographic formations, and landscapes that contribute to a high level of visual quality." The General Plan describes scenic resources in the Santa Clarita Valley, including mountains and canyons, woodlands, water bodies, and Vasquez Rocks County Park. The City's General Plan does not specifically define scenic vistas and therefore there are no identified scenic vistas in the vicinity of the Original or Modified Project sites.

The City's General Plan identifies the following goals and policies to protect and preserve the City's scenic resources:

Goal CO 6: Preservation of scenic features that keep the Santa Clarita Valley beautiful and enhance quality of life, community identity, and property values.

Objective 6.1: Protect the scenic character of local topographic features

Objective 6.2: Protect the scenic character of view corridors

Objective 6.3: Protect the scenic character of major water bodies.

Objective 6.4: Protect the scenic character of oak woodlands, coastal sage, and other habitats unique to the Santa Clarita Valley.

Objective 6.5: Maintain the scenic character of designated routes, gateways, and vista points along roadways.

Objective 6.6: Limit adverse impacts by humans on the scenic environment

The City specifically identifies several large mountain and canyon regions that are of aesthetic importance to the community, including Placerita Canyon, Whitney Canyon, Elsmere Canyon, Bouquet Canyon, San Francisquito Canyon, Sand Canyon, Pico Canyon, and Towsley Canyon (City of Santa Clarita 2011). Neither the Original Project site nor the Modified Project site are located in any of these identified regions of aesthetic importance.

Two existing City of Santa Clarita and County of Los Angeles recreational trails meander near the Original and Modified Project water tank sites.

Similar to the Original Project, the Modified Project water tank site is located on the southern edge of urban development in Santa Clarita and borders non-urbanized area to the direct south. The Original and Modified Project water tank sites are located approximately 200 feet apart from each other on graded pad sites situated on previously disturbed, north-facing terraced hillsides directly south of the Fair Oaks residential community. The Modified Project site is located approximately 100 feet northwest of the existing Cherry Willow potable tanks, and 11 feet lower in elevation. The ridgeline descends to the northwest and the north flank of the ridge consists of a 100-foot-high north-facing slope with a series of concrete bench and terrace drains. The top of the slope has been previously graded to create a 15- to 20-foot-high visual berm partially screening the two existing Cherry Willow potable tanks from the residences below on Cherry Willow Drive.

a. Would the project have a substantial adverse effect on a scenic vista?

c. Would the project, in non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from a publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?

The 2017 IS-MND determined the Original Project's impacts to scenic vistas and the existing visual character would be less than significant with implementation of Mitigation Measure AES-1, requiring the exterior of above-ground facilities to be finished with a non-reflective material in an earth tone that blends in with the natural environment.

Visual impacts associated with the water tanks under the Modified Project would be similar or reduced in comparison to those analyzed under the Original Project. As previously discussed, the Modified Project site is not located in an area specifically identified as a scenic vista in the City of Santa Clarita's General Plan (2011).

The Original and Modified Project sites are located in between urbanized and non-urbanized land uses. Similar to the Original Project, the Modified Project would not substantially degrade the existing visual character or quality of public views of the site and would not conflict with applicable zoning and other regulations governing scenic quality. The existing hillside has been previously graded and extensively terraced. In comparison to the Original Project, the Modified Project includes the construction of a visual berm to partially screen the proposed water tanks from the residences below on Cherry Willow Drive. The proposed visual berm would further reduce visual impacts of the water tanks on the residences below. In addition, as required by Mitigation Measure AES-1 from the 2017 IS-MND, the exterior of the water tanks would be finished with a non-reflective material in an earth tone that blends in with the natural environment.

Similar to the Original Project, the Modified Project would be visible from the nearby City and County recreational trails. The existing Cherry Willow potable tanks, located 100 feet southeast of the Modified Project site, are currently visible from these adjacent recreational trails. The proposed tanks would be visually consistent with the existing Cherry Willow potable tanks. As such, the Modified Project would not substantially degrade the existing visual character or quality of public views of the site.

The Modified Project would not degrade the scenic character of local topographic features; view corridors; major water bodies; oak woodlands, coastal sage, and other habitats unique to the Santa Clarita Valley; or designated routes, gateways, and vista points along roadways. Aesthetic impacts would be minimized such that the Modified Project would not introduce significant adverse impacts on the scenic environment. In comparison to the Original Project, aesthetic impacts related to the Modified Project would be slightly reduced due to the construction of a visual berm. Impacts related to scenic quality would be less than significant with mitigation.

Accordingly, the Modified Project would not introduce new impacts or substantially increased impacts related to scenic quality and would be consistent with the impact analysis provided in the 2017 IS-MND.

Mitigation Measures from 2017 IS-MND

AES-1: The exterior of above-ground facilities shall be finished with a non-reflective material in an earth tone that blends in with the natural environment.

Effects and Mitigation Measures

No new or substantially more severe effects would occur related to scenic quality, and no new mitigation measures are necessary.

Conclusion

LESS THAN SIGNIFICANT WITH MITIGATION INCORPORATED

(Same as adopted 2017 IS-MND)

b. *Would the project substantially damage scenic resources, including but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?*

The 2017 IS-MND determined impacts to scenic resources within a state scenic highway would be less than significant without mitigation. Similar to the Original Project, the Modified Project site is not located within the viewshed of a state scenic highway. Furthermore, as discussed under item a, visual impacts associated with the water tanks under the Modified Project would be similar or reduced in comparison to those analyzed under the Original Project. The Modified Project would not substantially damage scenic resources within a state scenic highway. Impacts would be less than significant.

Accordingly, the Modified Project would not introduce new impacts or substantially increased impacts related to scenic resources within state scenic highways and would be consistent with the impact analysis provided in the 2017 IS-MND.

Effects and Mitigation Measures

No new or substantially more severe effects would occur related to scenic resources within state scenic highways, and no new mitigation measures are necessary.

Conclusion

LESS THAN SIGNIFICANT IMPACT

(Same as adopted 2017 IS-MND)

d. *Would the project create a new source of substantial light or glare that would adversely affect daytime or nighttime views in the area?*

The 2017 IS-MND determined light and glare impacts associated with construction and operation of the Original Project would be less than significant without mitigation.

Similar to the Original Project, construction of the Modified Project may result in temporary light and glare due to the presence of construction vehicles and equipment. Construction activities would be temporary, and no nighttime construction is proposed. Also similar to the Original Project, the Modified Project may include the installation of security lighting at the proposed water tanks. Lighting would be shielded to reduce potential glare impacts to local areas, consistent with SCV Water design standards. Impacts related to light and glare would be less than significant.

Accordingly, the Modified Project would not introduce new impacts or substantially increased impacts related to light and glare and would be consistent with the impact analysis provided in the 2017 IS-MND.

Effects and Mitigation Measures

No new or substantially more severe effects would occur related to light and glare, and no new mitigation measures are necessary.

Conclusion

LESS THAN SIGNIFICANT IMPACT

(Same as adopted 2017 IS-MND)

3.2 Agriculture and Forestry Resources

	Do Proposed Changes Require Major Revisions to the 2017 IS-MND?	Do New Circumstances Require Major Revisions to the 2017 IS-MND?	Any New Information Resulting in New or Substantially More Severe Significant Impacts?	Do 2017 IS-MND Mitigation Measures Address and/or Resolve Impacts?
Would the project:				
a. Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	No	No	No	N/A
b. Conflict with existing zoning for agricultural use or a Williamson Act contract?	No	No	No	N/A
c. Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 12220(g)); timberland (as defined by Public Resources Code Section 4526); or timberland zoned Timberland Production (as defined by Government Code Section 51104(g))?	No	No	No	N/A
d. Result in the loss of forest land or conversion of forest land to non-forest use?	No	No	No	N/A
e. Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use?	No	No	No	N/A

a. *Would the project convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?*

b. *Would the project conflict with existing zoning for agricultural use or a Williamson Act contract?*

c. *Would the project conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 12220(g)); timberland (as defined by Public Resources Code Section 4526); or timberland zoned Timberland Production (as defined by Government Code Section 51104(g))?*

d. *Would the project result in the loss of forest land or conversion of forest land to non-forest use?*

e. *Would the project involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use?*

The 2017 IS-MND determined no agricultural and forestry resources impacts associated with construction and operation of the Original Project would occur.

According to the California Department of Conservation, the Modified Project site is located on land designated as “Other Land.” The Modified Project site is not on land currently in agricultural production and do not contain Prime Farmland, Unique Farmland, and Farmland of Statewide Importance (Farmland), or land with a Williamson Act contract (California Department of Conservation 2016). No portion of the Modified Project site is located on forest land or timber land.

Due to the absence of agricultural land on the Modified Project site or surrounding area, the Modified Project would not involve changes to the existing environment which could result in a new or substantially more severe impact related to conversion of Farmland to non-agricultural uses. Therefore, similar to the Original Project analyzed in the 2017 IS-MND, the Modified Project would result in no impact to agriculture and forestry resources.

Effects and Mitigation Measures

No new or substantially more severe effects would occur related to agriculture and forestry resources, and no new mitigation measures are necessary.

Conclusion

NO IMPACT

(Same as adopted 2017 IS-MND)

3.3 Air Quality

	Do Proposed Changes Require Major Revisions to the 2017 IS-MND?	Do New Circumstances Require Major Revisions to the 2017 IS-MND?	Any New Information Resulting in New or Substantially More Severe Significant Impacts?	Do 2017 IS-MND Mitigation Measures Address and/or Resolve Impacts?
Would the project:				
a. Conflict with or obstruct implementation of the applicable air quality plan?	No	No	No	N/A
b. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?	No	No	No	N/A
c. Expose sensitive receptors to substantial pollutant concentrations?	No	No	No	N/A
d. Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	No	No	No	N/A

a. Would the project conflict with or obstruct implementation of the applicable air quality plan?

The 2017 IS-MND determined air quality impacts associated with implementation of the applicable air quality plan under the Original Project would be less than significant with no mitigation required.

The purpose of the Modified Project would be the same as that of the Original Project - to store recycled water generated by the nearby Vista Canyon Water factory and supply irrigation water to customers in the Vista Canyon and Fair Oaks communities. As such, similar to the Original Project, the Modified Project would not directly or indirectly induce population growth. In addition, similar to the Original Project, the Modified Project would not include new or modified permitted sources of air pollutant emissions. Therefore, the Modified Project would not exceed the Southern California Association of Governments' (SCAG) projected growth forecasts, which underlie the emissions forecasts in the South Coast Air Quality Management District's (SCAQMD) 2016 Air Quality Management Plan (SCAQMD 2017). Therefore, the Modified Project would not conflict with or obstruct implementation of the 2016 Air Quality Management Plan. Similar to the Original Project analyzed in the 2017 IS-MND, impacts would be less than significant.

Effects and Mitigation Measures

No new or substantially more severe effects related to consistency with the applicable air quality plan would occur, and no new mitigation measures are necessary.

Conclusion

LESS THAN SIGNIFICANT IMPACT

(Same as adopted 2017 IS-MND)

b. *Would the project result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?*

c. *Would the project expose sensitive receptors to substantial pollutant concentrations?*

The 2017 IS-MND determined the Original Project's air criteria pollutant emissions would be less than significant with no mitigation required.

Additional air pollutant emissions associated with the Modified Project would include temporary construction emissions generated by additional construction equipment and vehicle trips for construction of the visual berm beyond those required for the Original Project. Modeling of additional construction-related air pollutant emissions was performed using the California Emissions Estimator Model (CalEEMod) version 2016.3.2 in accordance with project details provided by SCV Water, including the construction schedule and construction equipment list.

As with the Original Project site, the Modified Project site lies within the South Coast Air Basin. The SCAQMD has developed quantitative regional and localized significance thresholds that apply to projects within the South Coast Air Basin. The applicable thresholds adopted by the SCAQMD, which were also utilized in the 2017 IS-MND, are shown in Table 1.

Table 1 SCAQMD Regional Significance Mass Daily Thresholds

Pollutant	Construction Thresholds (pounds/day)	Operation Thresholds (pounds/day)
NO_X	100	55
VOC	75	55
PM_{10}	150	150
$PM_{2.5}$	55	55
SO_X	150	150
CO	550	550
Lead	3	3

NO_X: nitrogen oxides; VOC: volatile organic compounds; PM_{10}: particulate matter 10 microns or less in size; $PM_{2.5}$: particulate matter 2.5 microns or less in size; SO_X: sulfur oxides; CO: carbon monoxide; SCAQMD = South Coast Air Quality Management District

Source: SCAQMD 2019

In addition to the above regional thresholds, SCAQMD has developed Localized Significance Thresholds (LSTs) in response to the Governing Board's Environmental Justice Enhancement Initiative (1-4), which was prepared to update the CEQA Air Quality Handbook (SCAQMD 1993). LSTs were devised in response to concern regarding exposure of individuals to criteria pollutants in local communities and have been developed for nitrogen oxides, carbon monoxide, particulate matter measuring 10 microns or less in diameter (PM_{10}), and particulate matter measuring 2.5 microns or less in diameter ($PM_{2.5}$). LSTs represent the maximum emissions from a project that would not cause or contribute to an air quality exceedance of the most stringent applicable federal or state ambient air quality standard at the nearest sensitive receptor, taking into consideration ambient concentrations in each source receptor area (SRA), distance to the sensitive receptor, and project size. LSTs have been developed for emissions generated in construction areas up to five acres in size. However, LSTs only apply to emissions in a fixed stationary location and are not applicable to mobile sources, such as cars on a roadway (SCAQMD 2008). As such, LSTs are typically applied only to construction emissions because the majority of operational emissions are associated with project-generated vehicle trips.

LSTs have been developed for emissions generated by construction sites up to five acres in size. The Modified Project site is located in SRA 13 (Santa Clarita Valley) and is approximately 0.55 acre. SCAQMD provides lookup tables for sites that measure up to one, two, or five acres. Pursuant to SCAQMD guidance, the one-acre LSTs were utilized for this analysis (SCAQMD 2008). LSTs are provided for receptors at a distance of 25 to 500 meters (82 to 1,640 feet) from the Modified Project site boundary. The closest sensitive receptors to the Original Project site were residences and a school located adjacent to the pipeline alignments. The closest sensitive receptors to the location of the proposed water tanks under the Modified Project are residences located approximately 230 feet to the north. Nevertheless, the same LSTs utilized in the 2017 IS-MND for receptors at a distance of 82 feet (the most restrictive thresholds available) were utilized for the purposes of a conservative analysis of the Modified Project. LSTs for construction on a one-acre site in SRA 13 for a receptor at 82 feet are shown in Table 2.

Table 2 SCAQMD LSTs for Construction

Pollutant	Allowable Emissions from a 1-acre Site in SRA 13 for a Receptor at 82 Feet (pounds/day)
Gradual conversion of NO_x to NO_2	114
CO	590
PM_{10}	4
$PM_{2.5}$	3

NO_X = nitrogen oxides; NO_2 = nitrogen dioxide; CO = carbon monoxide; SO_X = sulfur oxides; PM_{10} = particulate matter measuring 10 microns or less in diameter; $PM_{2.5}$ = particulate matter measuring 2.5 microns or less in diameter; SCAQMD = South Coast Air Quality Management District

Source: SCAQMD 2009

Construction Emissions

Additional temporary construction activities associated with the visual berm included in the Modified Project would generate criteria pollutant emissions, which would contribute to the existing non-attainment status of the SCAQMD region for the National Ambient Air Quality Standards for ozone and $PM_{2.5}$ and the California Ambient Air Quality Standards for ozone, PM_{10}, and $PM_{2.5}$ (SCAQMD 2016). Table 3 presents the estimated short-term emissions generated by the additional construction activities associated with the Modified Project. These emissions are combined with emissions associated with construction of the Original Project, which results in a conservative emissions estimate that assumes additional construction activities for the Original Project would occur simultaneously with those additional construction activities required for the Modified Project. The combined emissions are then compared the total maximum daily and on-site maximum daily emissions to the applicable SCAQMD thresholds. As shown in Table 3, additional construction activities required for the Modified Project would result in greater emissions than those estimated for the Original Project. However, the combined maximum construction emissions would not exceed the SCAQMD regional thresholds or LSTs and would be substantially lower than the thresholds (between approximately 43 to 96 percent below the thresholds, depending on the pollutant). Therefore, construction-related air quality impacts associated with the Modified Project would be less than significant, similar to the Original Project analyzed in the 2017 IS-MND.

Table 3 Estimated Construction Maximum Emissions (pounds/day)

Year	VOC	NO_x	CO	SO_2	PM_{10}	$PM_{2.5}$
Maximum Daily Construction Emissions						
Emissions Associated with the Original Project	2.7	29.5	18.1	< 0.1	1.7	1.3
Additional Emissions Associated with the Modified Project	1.9	46.2	17.7	0.1	3.7	1.4
Total Maximum Daily Construction Emissions	**4.6**	**75.7**	**35.8**	**0.1**	**5.4**	**2.7**
SCAQMD Regional Thresholds	75	100	550	150	150	55
Threshold Exceeded?	No	No	No	No	No	No
Maximum Daily On-site Construction Emissions						
Emissions Associated with the Original Project	N/A	26.4	16.9	N/A	1.3	1.2
Additional Emissions Associated with the Modified Project	N/A	7.4	8.6	N/A	0.7	0.5
Total Maximum Daily On-site Emissions	**N/A**	**33.8**	**25.5**	**N/A**	**2.0**	**1.7**
SCAQMD Localized Significance Thresholds (LSTs)	N/A	114	590	N/A	4	3
Threshold Exceeded?	N/A	No	No	N/A	No	No

VOC = volatile organic compounds; NO_X = nitrogen oxides; CO = carbon monoxide; SO_2 = sulfur dioxide; PM_{10} = particulate matter measuring 10 microns or less in diameter; $PM_{2.5}$ = particulate matter measuring 2.5 microns or less in diameter; SCAQMD = South Coast Air Quality Management District; N/A = not applicable; CalEEMod = California Emissions Estimator Model

Notes: All emissions modeling was completed using CalEEMod. See Appendix B for modeling results. Some numbers may not add up due to rounding. Emission data is pulled from "mitigated" results, which account for compliance with regulatory compliance measures such as SCAQMD Rule 403. Emissions presented are the highest of the winter and summer modeled emissions. Maximum on-site emissions are the highest emissions that would occur on the Modified Project site from on-site sources such as heavy construction equipment and architectural coatings and exclude off-site emissions from sources such as construction worker vehicle trips and haul truck trips.

Operational Emissions

Operation and maintenance of the Modified Project would be similar to that of the Original Project and would result in similar off gassing of coatings and similar routine maintenance trips. Therefore, operational emissions associated with the Modified Project would be similar to those of the Approved Project and would not exceed SCAQMD thresholds. As such, the operational air quality impacts of the Modified Project would be less than significant, similar to the Original Project analyzed in the 2017 IS-MND.

Effects and Mitigation Measures

No new or substantially more severe effects related to criteria air pollutant emissions or exposure of sensitive receptors to substantial pollutant concentrations would occur, and no new mitigation measures are necessary.

Conclusion

LESS THAN SIGNIFICANT IMPACT

(Same as adopted 2017 IS-MND)

d. *Would the project result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?*

The 2017 IS-MND determined the Original Project's other emissions would be less than significant with no mitigation required.

The general nature of construction and operation of the Modified Project as recycled water infrastructure would be the same as that of the Original Project. As such, odors sources associated with construction (e.g., equipment exhaust) and operation (none) of the Modified Project would be similar to those of the Original Project. Therefore, similar to the Original Project analyzed in the 2017 IS-MND, odor impacts would remain less than significant.

Effects and Mitigation Measures

No new or substantially more severe effects related to other emissions (such as those leading to odors) would occur, and no new mitigation measures are necessary.

Conclusion

LESS THAN SIGNIFICANT IMPACT

(Same as adopted 2017 IS-MND)

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3.4 Biological Resources

	Do Proposed Changes Require Major Revisions to the 2017 IS-MND?	Do New Circumstances Require Major Revisions to the 2017 IS-MND?	Any New Information Resulting in New or Substantially More Severe Significant Impacts?	Do 2017 IS-MND Mitigation Measures Address and/or Resolve Impacts?
Would the project:				
a. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	No	No	Yes	No – New Mitigation Required
b. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	No	No	No	N/A
c. Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	No	No	No	N/A
d. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	No	No	No	N/A

		Do Proposed Changes Require Major Revisions to the EIR?	Do New Circumstances Require Major Revisions to the EIR?	Any New Information Resulting in New or Substantially More Severe Significant Impacts?	Do EIR Mitigation Measures Address and/or Resolve Impacts?
e.	Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	No	No	No	N/A
f.	Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	No	No	No	N/A

The Modified Project includes a newly proposed graded pad site located approximately 200 feet southeast of the original water tank site, and approximately 350 linear feet of water pipeline in the paved roadway needed to accommodate the new site. Rincon biologist Robin Murray conducted a biological reconnaissance survey of the Modified Project site plus a 100-foot buffer on September 24, 2020. Biological conditions in the Modified Project site were observed to be substantially similar to those reported in the 2017 IS-MND and the Biological/Regulatory Overview for the Original Project (Glenn Lukos Associates 2016).

a. Would the project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?

The 2017 IS-MND determined biological resources impacts associated with construction and operation of the Original Project would be less than significant with mitigation incorporated.

The new tank site location and visual berm under the Modified Project would be situated within 250 feet from critical habitat for the coastal California gnatcatcher (*Polioptila californica californica*). The gnatcatcher is designated by the U.S. Fish and Wildlife Service (USFWS) as threatened under the federal Endangered Species Act. The Modified Project site is situated at the northern extent of the species' geographic range where occurrences are sparsely scattered and is also situated near the upper limit of the species' elevation range. Vegetation within the Modified Project does not provide the density or structural complexity the species requires for suitable nesting habitat. However, one coastal California gnatcatcher sighting is reported from 1998 within approximately one mile south of the Modified Project, within intact California sagebrush scrub (California Department of Fish and Wildlife [CDFW] 2020).

Nevertheless, if the species is present near the Modified Project during construction activities, the Modified Project has the potential to indirectly impact the species (through construction noise, dust, or other human disturbances that may cause a nest to fail). The Modified Project would introduce new potentially significant impacts related to special-status biological resources not analyzed in the 2017 IS-MND. Implementation of new Mitigation Measure BIO-1 would include nine non-breeding season (July 1 through March 14) surveys conducted in accordance with USFWS protocol to determine presence/absence of coastal California gnatcatchers near the Modified Project site. As of October 2020, these surveys are in progress; the first survey conducted October 29 did not detect the species. As the California buckwheat scrub within the Modified Project footprint is not expected to support coastal California gnatcatcher territory, its removal is not expected to impact the species. Implementation of Mitigation Measure BIO-1 would maintain avoidance of potential indirect effects to coastal California gnatcatcher; accordingly, impacts to the species would be less than significant with mitigation incorporated.

Migratory or other common nesting birds, while not designated as special-status species, are protected by the California Fish and Game Code (CFGC) and Migratory Bird Treaty Act (MBTA) and may nest on site in vegetation. Therefore, construction of the Modified Project has the potential to directly (by destroying a nest) or indirectly (through construction noise, dust, and other human disturbances that may cause a nest to fail) impact nesting birds protected under the CFGC and MBTA. Implementation of new Mitigation Measure BIO-2 would include a pre-construction nesting bird survey if vegetation removal or construction occurs during the nesting bird season (typically February 1 to August 31). If active nests are identified, buffers would be implemented to minimize impacts to nesting birds. Implementation of Mitigation Measure BIO-2 would maintain compliance with CFGC 3503 and the MBTA.

Effects and Mitigation Measures

With implementation of the following new mitigation measures, potential impacts related to special-status species would be reduced to a less than significant level.

BIO-1 Coastal California Gnatcatcher Avoidance

The project proponent shall conduct USFWS protocol surveys in suitable habitat within the Modified Project site and all areas within 500 feet of access or construction-related disturbance areas. Suitable habitats, according to the protocol, include "coastal sage scrub, alluvial fan, chaparral, or intermixed or adjacent areas of grassland and riparian habitats." A permitted biologist shall perform these surveys according to the USFWS Coastal California Gnatcatcher Presence/Absence Survey Guidelines (USFWS 1997). If the species is not detected during these surveys, no further action is required.

If a territory or nest is confirmed during protocol surveys, the USFWS shall be notified to determine whether take authorization is necessary. USFWS may require the implementation of additional impact avoidance measures including temporary sound barriers, noise attenuation devices, and/or additional dust control measures. Final impact avoidance measures would be determined based on the location of the territory or nest, and in coordination with USFWS. No clearing of occupied habitat (as determined by the presence of a nest or territory) shall occur during the breeding season (February – August). Clearing of occupied habitat during the non-breeding season must be conducted at the discretion of a qualified monitoring biologist and authorized by the USFWS.

BIO-2 Nesting Birds

Project-related activities shall occur outside of the bird breeding season (generally February 1 to August 31) to the extent practicable. If construction must occur within the bird breeding season, then no more than three days prior to initiation of ground disturbance and/or vegetation removal, a nesting bird pre-construction survey shall be conducted by a qualified biologist within the disturbance footprint plus a 100-foot buffer (300-for for raptors), where feasible. If the proposed Modified Project is phased or construction activities stop for more than one week, a subsequent pre-construction nesting bird survey shall be required prior to each phase of construction.

Pre-construction nesting bird surveys shall be conducted during the time of day when birds are active and shall factor in sufficient time to perform this survey adequately and completely. A report of the nesting bird survey results, if applicable, shall be submitted SCV Water for review and approval prior to ground and/or vegetation disturbance activities.

If nests are found, their locations shall be flagged. An appropriate avoidance buffer ranging in size from 25 to 50 feet for passerines, and up to 300 feet for raptors depending upon the species and the proposed work activity, shall be determined and demarcated by a qualified biologist with bright orange construction fencing or other suitable flagging. Active nests shall be monitored at a minimum of once per week until it has been determined that the nest is no longer being used by either the young or adults. No ground disturbance shall occur within this buffer until the qualified biologist confirms that the breeding/nesting is completed and all the young have fledged. If Modified Project activities must occur within the buffer, they shall be conducted at the discretion of the qualified biologist. If no nesting birds are observed during pre-construction surveys, no further actions would be necessary.

Conclusion

The Modified Project would introduce new potentially significant impacts related to special-status biological resources not analyzed in the 2017 IS-MND. However, with implementation of Mitigation Measures BIO-1 and BIO-2, these impacts would be reduced to a less than significant level. For all other biological resources, the Modified Project would not introduce new unmitigable significant impacts or substantially increased significant impacts, and would be consistent with the impact analysis provided in the 2017 IS-MND.

LESS THAN SIGNIFICANT WITH MITIGATION INCORPORATED

(Differs from adopted 2017 IS-MND)

b. *Would the project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?*

The 2017 IS-MND determined the Original Project's biological resources impacts related to riparian habitat or other sensitive natural communities would be less than significant.

Neither the Original Project nor the Modified Project is situated within riparian habitat or a sensitive natural community. Therefore, construction of the new tank site and visual berm would not result in a new or substantially more severe impact related to riparian habitat or other sensitive natural community, when compared to the Original Project. Impacts would be less than significant under both the Original Project and the Modified Project.

Effects and Mitigation Measures

No new or substantially more severe effects related to riparian habitat or sensitive natural communities would occur, and no new mitigation measures are necessary.

Conclusion

LESS THAN SIGNIFICANT IMPACT

(Same as adopted 2017 IS-MND)

c. *Would the project have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?*

The 2017 IS-MND determined the Original Project's biological resources impacts related to state or federally protected wetlands would be less than significant.

No state or federally protected wetlands or other water features that may be considered jurisdictional by CDFW, United States Army Corps of Engineers, or the Los Angeles Regional Water Quality Control Board occur within the Original or Modified Project. Therefore, no impact to jurisdictional waters or wetlands would occur.

Effects and Mitigation Measures

No new or substantially more severe effects related to state or federally protected wetlands would occur, and no new mitigation measures are necessary.

Conclusion

NO IMPACT

(Same as adopted 2017 IS-MND)

d. *Would the project interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?*

The 2017 IS-MND determined the Original Project's biological resources impacts related to movement or native resident or migratory fish or wildlife species, or migratory wildlife corridors would be less than significant.

Neither the Original Project nor the Modified Project is expected to hinder wildlife movement in the region, considering none of the Modified Project components are designed in such a way as to create a barrier to wildlife movement. The additional pipeline segment would be located within previously developed infrastructure, and the new tank location would not impede wildlife movement between open space areas. Impacts to wildlife movement would be less than significant under both the Original Project and Modified Project.

Effects and Mitigation Measures

No new or substantially more severe effects related to movement or native resident or migratory fish or wildlife species, or migratory wildlife corridors would occur, and no new mitigation measures are necessary.

Conclusion

LESS THAN SIGNIFICANT IMPACT

(Same as adopted 2017 IS-MND)

e. *Would the project conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?*

The 2017 IS-MND determined the Original Project's biological resources impacts related to local policies and ordinances protecting biological resources would be less than significant.

As with the Original Project, the Modified Project would be subject to all City of Santa Clarita established environmental protection guidelines, and the project would not conflict with any local policies or ordinances protecting biological resources. The City of Santa Clarita has an Oak Tree Ordinance that includes restrictions on oak tree removal; however, no oak trees meeting the threshold requiring a tree permit for removal (six inches circumference measured 4.5 feet above natural grade) exist within the impact area of the Modified Project (or the Original Project), and therefore no conflicts with the Oak Tree Ordinance would occur.

Effects and Mitigation Measures

No new or substantially more severe effects related to local policies and ordinances protecting biological resources would occur, and no new mitigation measures are necessary.

Conclusion

LESS THAN SIGNIFICANT IMPACT

(Same as adopted 2017 IS-MND)

f. *Would the project conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?*

The 2017 IS-MND determined the Original Project's biological resources impacts related to local, regional, or state habitat conservation plans would be less than significant.

The Modified Project site does not occur within any Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan areas. Therefore, the Modified Project would not conflict with the provisions of any such plans, and no impact would occur, similar to the Original Project.

Effects and Mitigation Measures

No new or substantially more severe effects related to local, regional, or state habitat conservation plans would occur, and no new mitigation measures are necessary.

Conclusion

NO IMPACT

(Same as adopted 2017 IS-MND)

3.5 Cultural Resources

	Do Proposed Changes Require Major Revisions to the 2017 IS-MND?	Do New Circumstances Require Major Revisions to the 2017 IS-MND?	Any New Information Resulting in New or Substantially More Severe Significant Impacts?	Do 2017 IS-MND Mitigation Measures Address and/or Resolve Impacts?
Would the project:				
a. Cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5?	No	No	No	Yes
b. Cause a substantial adverse change in the significance of an archaeological pursuant to §15064.5?	No	No	No	Yes
c. Disturb any human remains, including those interred outside of formal cemeteries?	No	No	No	Yes

In support of the modification to the Original Project site, Rincon prepared a Cultural Resources Study in support of the Modified Project in November 2020, which included: a cultural resources records search at the California Historical Resources Information System (CHRIS) South Central Coastal Information Center (SCCIC) located at California State University, Fullerton; a pedestrian field survey; and historical topographic map and aerial imagery review (Appendix C).

The SCCIC cultural resources records search was performed to identify previously conducted cultural resources studies, as well as previously recorded cultural resources within the Modified Project site and a 0.5-mile radius surrounding it. The CHRIS search included a review of available records at the SCCIC, as well as the National Register of Historic Places (NRHP), the California Register of Historical Resources (CRHR), the Office of Historic Preservation Historic Properties Directory, the California Inventory of Historic Resources, the Archaeological Determinations of Eligibility list, and historic maps. Rincon received the SCCIC cultural resources records search results on October 15, 2020.

The SCCIC records search identified seven cultural resources studies conducted within a 0.5-mile radius of the Modified Project site, one of which evaluated portions of the Modified Project site. The study did not identify any cultural resources within the Modified Project site itself. The cultural resource study conducted for the Original Project (Foster 2017) was not identified by the SCCIC and is, therefore, most likely not in the SCCIC files. The Foster 2017 study did not record or observe any cultural resources within the Original Project site.

The SCCIC search identified one previously recorded cultural resource within the 0.5-mile radius surrounding the Modified Project site; no recorded cultural resources are within the Modified Project site.

a. *Would the project cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?*

b. *Would the project cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?*

The 2017 IS-MND determined the Original Project would not cause a substantial adverse change in the significance of historical or archeological resources. Similar to the Original Project site, the Modified Project site has been previously disturbed by extensive grading and terracing. The Modified Project site is comprised of a flat pad and a 15- to 20-foot high visual berm on the southern side of the site.

Rincon completed a review of historical topographic maps and aerial imagery to confirm the site land use history as described in the 2017 IS-MND. Historical topographic maps from 1900 to 1955 depict the Modified Project site as undeveloped land (NETR Online 2020) and aerial imagery from 1947 to 1954 confirms the Modified Project site was undeveloped. Historical topographic maps and aerial imagery show the Modified Project site was planted with trees and a possible orchard from approximately 1959 to 1988, with a road developed to the south-east between 1974 and 1978 (NETR Online 2020). Imagery from 2002 to 2005 shows the continued development of the area and imagery from 2009 depicts the Cherry Willow potable tank site as developed and the Modified Project site in its current graded and terraced condition (NETR Online 2020).

Rincon conducted a pedestrian field survey of the Modified Project site on October 20, 2020. Pedestrian transects were spaced no more than 15 meters apart, where accessible, within the Modified Project site and a 100-foot buffer surrounding the site. A visual reconnaissance of the graded slopes was also conducted. Ground visibility ranged from poor (less than 15 percent) on vegetated, graded slopes to excellent (100 percent) in recently graded and flat areas. Exposed ground surfaces were inspected for prehistoric cultural materials (e.g., flaked stone tools, tool-making debris, stone milling tools, ecofacts [marine shell and bone]), soil discoloration that might indicate the presence of a prehistoric midden deposit, historic-period debris (e.g., metal, glass, ceramics), and features that indicate the presence of former historic-period structures or buildings (e.g., standing exterior walls, foundations). Rodent burrows allowed visual inspection of subsurface soils. The Modified Project site has been heavily disturbed by previous construction grading and terracing that created a flat, graded pad and a 15- to 20-foot high berm around the Cherry Willow potable tank site. These extensive previous construction disturbances likely removed the upper soil layers that might have contained cultural resources. Visible soils within the Modified Project site consisted of light brown to tan colored sandy and silty loam with imported gravel likely due to recent modification and site use. The Modified Project site exhibited modifications and archaeological sensitivity similar to conditions reported for the 2017 Original Project site, during which Greenwood and Associates noted a low sensitivity for archaeological resources due to heavy disturbance of the project site.

As with the 2017 IS-MND, although no historical or archaeological resources are known to exist within the Modified Project site, there is the potential for unanticipated discoveries during ground disturbance. In the unlikely event of an unanticipated discovery, impacts to unknown archaeological resources would be potentially significant and mitigation measures would be required, as determined and included in the 2017 IS-MND. The Modified Project would implement Mitigation Measure CUL-1, as identified in the 2017 IS-MND, to reduce potential impacts to a less than significant level.

Mitigation Measures from 2017 IS-MND

CUL-1: In the event that any historical, archeological or tribal cultural resources are discovered during excavation activities, work shall be stopped immediately and temporarily diverted from the vicinity of the discovery until a qualified archeologist and a member of the Fernandeño Tataviam Band of Mission Indians are notified and can identify and evaluate the importance of the find, conduct an appropriate assessment, and implement measures to mitigate impacts on significant resources.

Effects and Mitigation Measures

No new or substantially increased impacts to cultural resources would occur, and no new mitigation measures are necessary.

Conclusion

LESS THAN SIGNIFICANT WITH MITIGATION INCORPORATED

(Same as adopted 2017 IS-MND)

c. *Would the project disturb any human remains, including those interred outside of formal cemeteries?*

The 2017 IS-MND determined no cemeteries are known to exist within the Original Project and the Original Project would likely not impact or disturb human remains.

Similar to the Original Project, the Modified Project is not likely to impact human remains. Although unlikely, if human remains are unexpectedly found, the State of California Health and Safety Code Section 7050.5 states that no further disturbance shall occur until the coroner has made a determination of origin and disposition pursuant to Public Resources Code Section 5097.98. In the event of an unanticipated discovery of human remains, the Los Angeles County Department of Medical Examiner-Coroner would be notified immediately. If the human remains are determined to be prehistoric, the Medical Examiner-Coroner will notify the Native American Heritage Commission (NAHC), which will determine and notify a most likely descendant (MLD). The MLD will complete an inspection of the site within 48 hours of being granted access to the site. With adherence to existing regulations, impacts to human remains would be less than significant.

Effects and Mitigation Measures

No new or substantially increased impacts to cultural resources would occur, and no new mitigation measures are necessary.

Conclusion

LESS THAN SIGNIFICANT IMPACT

(Same as adopted 2017 IS-MND)

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3.6 Energy

	Do Proposed Changes Require Major Revisions to the 2017 IS-MND?	Do New Circumstances Require Major Revisions to the 2017 IS-MND?	Any New Information Resulting in New or Substantially More Severe Significant Impacts?	Do 2017 IS-MND Mitigation Measures Address and/or Resolve Impacts?
Would the project:				
a. Result in a potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?	No	No	No	N/A
b. Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	No	No	No	N/A

a. Would the project result in a potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?

b. Would the project conflict with or obstruct a state or local plan for renewable energy or energy efficiency?

The 2017 IS-MND did not directly evaluate the energy impacts associated with construction and operation of the Original Project because this impact area was added to the CEQA Guidelines Appendix G checklist in December 2018, after adoption of the 2017 IS-MND. However, the environmental impacts of energy consumption such as air pollutant and greenhouse gas (GHG) emissions, were indirectly evaluated in the 2017 IS-MND. As discussed in Section 3.3, *Air Quality*, and Section 3.8, *Greenhouse Gas Emissions*, the 2017 IS-MND determined air quality and GHG emissions impacts would be less than significant. Therefore, the 2017 IS-MND indirectly concluded that the energy impacts of the Original Project would be less than significant with no mitigation required.

Energy use during construction of the Modified Project would be generally similar to the Original Project; however, the additional construction equipment usage and vehicle trips associated with construction of the visual berm under the Modified Project would require approximately 157 more gallons of gasoline and 3,418 gallons of diesel fuel (see Appendix D for energy consumption calculations that were based on the CalEEMod modeling results in Appendix B). Energy use during construction would be temporary in nature, and construction equipment used would be typical of construction projects in the region. In addition, construction contractors would be required to comply with the provisions of 13 California Code of Regulations Sections 2449 and 2485, which prohibit diesel-fueled commercial motor vehicles and off-road diesel vehicles from idling for more than five minutes, which would minimize unnecessary fuel consumption. Construction equipment would be subject to the United States Environmental Protection Agency's Construction Equipment

Fuel Efficiency Standard (40 Code of Federal Regulations Parts 1039, 1065, and 1068), which would minimize inefficient fuel consumption. Therefore, similar to the Original Project, construction of the Modified Project would not result in a potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources.

Operation of the Modified Project would be similar to that of the Original Project and would result in similar energy consumption associated with recycled water pumping and vehicle trips for routine maintenance activities. The California Air Resources Board's (CARB) 2017 Climate Change Scoping Plan, which was adopted to establish a pathway to achieving the State's GHG emission reduction target of 40 percent below 1990 levels by 2030, acknowledges that "the water-energy nexus provides opportunities for conservation of these natural resources as well as reductions of GHG emissions" (CARB 2017). Statewide GHG emissions reduction strategies for the water sector are aimed are reducing the energy intensity of water, which is "the amount of energy required to take a unit of water from its origin (such as a river or aquifer) and extract and convey it to its end use" (CARB 2017). Similar to the Original Project, the Modified Project would facilitate the use of recycled water in the project area. In doing so, the Modified Project would support the necessary provision of a new source of local water supply and would preclude the need for additional imports of future water supplies (beyond those already planned to accommodate growth), which would have a greater energy intensity than local recycled water. Accordingly, energy consumption during operation of the Modified Project would not be unnecessary. Furthermore, in the interest of cost savings, pump station equipment would be designed to minimize the wasteful and inefficient consumption of energy, and staff would not make unnecessary vehicle trips to the site for operation and maintenance activities. As a result, similar to the Original Project, energy consumption by the Modified Project during operation would not be wasteful, inefficient, or unnecessary. Therefore, impacts would be less than significant.

SCV Water does not have a specific renewable energy or energy efficiency plan. The Santa Clarita General Plan and City of Santa Clarita Climate Action Plan include several goals and policies related to renewable energy and energy efficiency (City of Santa Clarita 2011 and 2012). Similar to the Original Project, the Modified Project would support implementation of Measure WSW-1 (Use Reclaimed Water) of the City's Climate Action Plan, which encourages the use of reclaimed water for non-potable purposes because it is less energy intensive than other water supply sources. Furthermore, as discussed above, the Modified Project would be consistent with the energy conservation goals of the 2017 Climate Change Scoping Plan. Therefore, similar to the Original Project analyzed in the 2017 IS-MND, the Modified Project would not conflict with or obstruct the statewide or local plans for renewable energy and energy efficiency, and impacts would be less than significant.

Effects and Mitigation Measures

No new or substantially more severe effects related to energy would occur, and no new mitigation measures are necessary.

Conclusion

LESS THAN SIGNIFICANT IMPACT

(Same as adopted 2017 IS-MND)

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3.7 Geology and Soils

	Do Proposed Changes Require Major Revisions to the 2017 IS-MND?	Do New Circumstances Require Major Revisions to the 2017 IS-MND?	Any New Information Resulting in New or Substantially More Severe Significant Impacts?	Do 2017 IS-MND Mitigation Measures Address and/or Resolve Impacts?
Would the project:				
a. Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:				
1. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault?	No	No	No	N/A
2. Strong seismic ground shaking?	No	No	No	N/A
3. Seismic-related ground failure, including liquefaction?	No	No	No	N/A
4. Landslides?	No	No	No	N/A
b. Result in substantial soil erosion or the loss of topsoil?	No	No	No	N/A
c. Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?	No	No	No	N/A

		Do Proposed Changes Require Major Revisions to the IS-MND?	Do New Circumstances Require Major Revisions to the IS-MND?	Any New Information Resulting in New or Substantially More Severe Significant Impacts?	Do IS-MND Mitigation Measures Address and/or Resolve Impacts?
d.	Be located on expansive soil, as defined in Table 1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?	No	No	No	N/A
e.	Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?	No	No	No	N/A
f.	Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	No	No	No	N/A

In October 2020, a Geotechnical Investigation (Appendix E) and companion Slope Stability Report (Appendix F) were prepared for the Modified Project Site. The Geotechnical Investigation and companion Slope Stability Report evaluate the soils and geological materials at the Modified Project site and provide geotechnical design criteria for the Modified Project. In addition, slope stability analyses were performed to evaluate the adequacy of slope stability to accommodate the proposed infrastructure (Kennedy/Jenks Consultants 2020; Geolabs – Westlake Village 2020).

The Modified Project site contains an existing building pad that was graded atop a bedrock ridgeline between 2003 and 2006 as a part of Tract 28833 for the Fair Oaks residential development. The building pad is underlain by Towsley Formation bedrock. The northeast and western edges of the pad consist of compacted fill. A sloped stability fill ascends from the south side of the pad approximately 30 feet to the visual berm separating the building pad from the existing Cherry Willow tanks site (Geolabs – Westlake Village 2020).

The Modified Project site is located within the seismically active Southern California region. However, the Modified Project site contains no known active or potentially active faults, nor is it located within a state-mandated Earthquake Fault Zone (Geolabs – Westlake Village 2020).

The Modified Project components are not located in a Liquefaction Hazard Zone. Like the Original Project site, the Modified Project site is located in an Earthquake-Induced Landslide Hazard Zone (City of Santa Clarita 2020a).

According to the Geotechnical Investigation, some of the near-surface soils on the Modified Project site are expansive (Kennedy/Jenks Consultants 2020).

a. *Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:*

   a.1 *Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault?*

   a.2 *Strong seismic ground shaking?*

   a.3 *Seismic-related ground failure, including liquefaction?*

   a.4 *Landslides?*

The 2017 IS-MND determined geology and soils impacts associated with construction and operation of the Original Project would be less than significant with no mitigation required. However, during the course of final engineering design, it was determined there were landslide and slope stability risks at the Original Project site that would have required costly engineered buttress fill or drilled cast-in-place concrete piles and shear pins to resolve. Therefore, SCV Water elected to relocate the proposed recycled water tank site to the Modified Project site, located approximately 200 feet southeast of the original tank site.

Similar to the Original Project site, the Modified Project site is located in a seismically-active area of Southern California. However, also similar to the Original Project site, no portion of the Modified Project site is located in an Alquist-Priolo earthquake fault zone. As discussed in the 2017 IS-MND, the region is prone to occasional seismic ground shaking. Like the Original Project, the Modified Project would incorporate appropriate seismic safety design measures as required by the latest California Building Code (CBC), including shut-off valve requirements in the case of a pipeline rupture. As with the Original Project, regulatory compliance with the CBC would reduce seismic hazards associated with the Modified Project to a less than significant level. Impacts related to seismic-related ground failure, including liquefaction, would be less than significant with adherence to the CBC.

Additional geologic investigative work was completed to determine whether the Modified Project site was subject to similar geologic hazards as the Original Project site. Geologic findings in the Geotechnical Investigation (Appendix E) and companion Slope Stability Report (Appendix F) indicated evidence of fractured soil and rock within the upper 20 feet of soil material at the Modified Project site. The geological report recommends removing and recompacting the upper 20 feet of soil material to obtain an acceptable slope stability factor of safety and provide adequate soil bearing capacity for the proposed water tanks. As discussed in the *Project Description*, final engineering design would incorporate the geotechnical design recommendations from the Geotechnical Investigation and companion Slope Stability Report. The Slope Stability Report concludes the Modified Project, with incorporation of recommendations identified therein, would be safe against hazard from landslide, settlement, or slippage, and would have no adverse effect on the geologic stability of properties outside of the Modified Project site.

In addition, like the Original Project, the Modified Project does not include habitable structures and would therefore not expose people to loss, injury, or death involving landslides. Implementation of the 20-foot earth over-excavation and re-compaction of a portion of the existing pad at the Modified Project would alleviate the existing risk of earthquake-induced landslides in the immediate vicinity. In the event an earthquake compromised any project component due to landslides during operation, SCV Water would temporarily shut off the water supply and conduct emergency repairs as soon as possible. Impacts related to landslides would be less than significant.

Effects and Mitigation Measures

No new or substantially more severe effects would occur to seismic hazards, and no new mitigation measures are necessary.

Conclusion

LESS THAN SIGNIFICANT IMPACT

(Same as adopted 2017 IS-MND)

b. *Would the project result in substantial soil erosion or the loss of topsoil?*

The 2017 IS-MND determined geology and soils impacts associated with construction and operation of the Original Project would be less than significant with no mitigation required.

As discussed in Section 3.10, *Hydrology and Water Quality*, similar to the Original Project, grading, excavation, and other construction activities associated with the Modified Project could result in soil erosion. In comparison to the Original Project, the Modified Project would involve increased excavation and soil movement to accommodate creation of a visual berm. Grading, excavation, and other construction activities associated with the Modified Project could result in soil erosion due to exposed and stockpiled soils.

As discussed in Section 3.10, *Hydrology and Water Quality*, the Modified Project would be subject to the National Pollutant Discharge Elimination System (NPDES) Construction General Permit, which requires implementation of a Stormwater Pollution Prevention Plan (SWPPP) outlining project-specific best management practices (BMPs) to control erosion. Erosion control BMPs may include measures such as silt fencing, temporary sediment basins, and an on-site supply of erosion control materials (gravel, straw bales, shovels, etc.). Implementation of a SWPPP as required by the Construction General Permit would reduce the Modified Project's potential impacts related to soil erosion to a less than significant level.

Effects and Mitigation Measures

No new or substantially more severe effects would occur to soil erosion, and no new mitigation measures are necessary.

Conclusion

LESS THAN SIGNIFICANT IMPACT

(Same as adopted 2017 IS-MND)

c. *Would the project be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?*

The 2017 IS-MND determined the Original Project's impacts to unstable geologic units or soils would be less than significant with no mitigation required.

Ground subsidence and associated fissuring have occurred in Los Angeles County due to falling and rising groundwater tables. Subsidence is caused by a variety of activities, which include, but are not limited to: withdrawal of groundwater, pumping of oil and gas from underground, the collapse of underground mines, liquefaction, and hydro-compaction. Like the Original Project, the Modified

Project would not increase the amount of water pumped from the underlying groundwater basin. Based on the Modified Project's elevated location on a hillside, construction activities are unlikely to encounter groundwater.

As discussed in the *Project Description*, final engineering design would incorporate the geotechnical design recommendations from the Geotechnical Investigation and companion Slope Stability Report. The Slope Stability Report concludes the Modified Project, with incorporation of recommendations identified therein, would be safe against hazard from landslide, settlement, or slippage, and would have no adverse effect on the geologic stability of properties outside of the Modified Project site.

Additionally, as discussed in the 2017 IS-MND, the CBC contains provisions for soil preparation to minimize hazards from liquefaction and other unstable geologic features. In the event landslides, lateral spreading, subsidence, liquefaction, or collapse compromised any Modified Project component during operation, SCV Water would temporarily shut off the facility and conduct emergency repairs as soon as possible. Therefore, the Modified Project would not result in on- or off-site landslides, lateral spreading, subsidence, liquefaction, or collapse.

Effects and Mitigation Measures

No new or substantially more severe effects would occur to seismic hazards or unstable geologic units or soils, and no new mitigation measures are necessary.

Conclusion

LESS THAN SIGNIFICANT IMPACT

(Same as adopted 2017 IS-MND)

d. *Would the project be located on expansive soil, as defined in Table 1-B of the Uniform Building Code (1994), creating substantial risks to life or property?*

The 2017 IS-MND determined the Original Project's impacts related to expansive soils would be less than significant with no mitigation required. A soil's potential to shrink and swell depends on the amount and types of clay in the soil. The additional segment of pipeline constructed under the Modified Project would involve construction of a water pipeline beneath the existing roadway on engineered fill, which is not subject to significant expansion.

According to the Geotechnical Investigation, some of the near-surface soils on the Modified Project water tanks site are expansive (Kennedy/Jenks Consultants 2020). As discussed in the *Project Description*, final engineering design would incorporate the geotechnical design recommendations from the Geotechnical Investigation and companion Slope Stability Report. The Geotechnical Investigation includes design recommendations to address risks associated with expansive soils. Design criteria are presented for pre-saturation of the supporting subgrade soils prior to placing concrete. With implementation of design criteria recommended in the Geotechnical Investigation, impacts related to expansive soils would be less than significant.

Effects and Mitigation Measures

No new or substantially more severe effects would occur to expansive soils, and no new mitigation measures are necessary.

Conclusion

LESS THAN SIGNIFICANT IMPACT

(Same as adopted 2017 IS-MND)

e. *Would the project have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?*

Neither the Original Project nor the Modified Project would involve septic tanks or alternative wastewater disposal systems, and therefore, no related impact would occur.

Effects and Mitigation Measures

No new or substantially more severe effects would occur to septic tanks, and no new mitigation measures are necessary.

Conclusion

LESS THAN SIGNIFICANT IMPACT

(Same as adopted 2017 IS-MND)

f. *Would the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?*

The 2017 IS-MND determined there were no unique paleontological resources located on or near the Original Project site, and no impact would occur to paleontological resources. In the 2017 IS-MND, this analysis was located in the Cultural Resources section. This checklist question was moved to the Geology and Soils section in the December 2018 CEQA Guidelines updates, after adoption of the 2017 IS-MND.

The Modified Project site is located within the same vicinity as the Original Project site. Similar to the Original Project site, the Modified Project water tank site was originally part of a ridge that has been subsequently graded to a level pad. Similar to the 2017 IS-MND, impacts would be less than significant.

Effects and Mitigation Measures

No new or substantially more severe effects would occur to paleontological resources, and no new mitigation measures are necessary.

Conclusion

LESS THAN SIGNIFICANT IMPACT

(Same as approved 2017 IS-MND)

3.8 Greenhouse Gas Emissions

	Do Proposed Changes Require Major Revisions to the 2017 IS-MND?	Do New Circumstances Require Major Revisions to the 2017 IS-MND?	Any New Information Resulting in New or Substantially More Severe Significant Impacts?	Do 2017 IS-MND Mitigation Measures Address and/or Resolve Impacts?
Would the project:				
a. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	No	No	No	N/A
b. Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	No	No	No	N/A

a. *Would the project generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?*

b. *Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases?*

The 2017 IS-MND determined GHG emissions impacts associated with construction and operation of the Original Project would be less than significant with no mitigation required.

Additional GHG emissions associated with the Modified Project would include temporary emissions generated by additional equipment and vehicle trips for construction of the visual berm beyond those required for the Original Project. Modeling of additional construction-related GHG emissions was performed using CalEEMod version 2016.3.2 in accordance with project details provided by SCV Water, including the construction schedule and construction equipment list. Operation of the Modified Project would be the same as that of the Original Project and would result in similarly minimal levels of GHG emissions.

Consistent with the approach of the 2017 IS-MND, this analysis utilizes a threshold of 10,000 metric tons (MT) of carbon dioxide equivalents (CO_2e) because the Modified Project is considered a utility project and this threshold was adopted by the SCAQMD as a screening level threshold for stationary source/industrial projects for which the SCAQMD is the lead agency. As shown in Table 4, total GHG emissions associated with the Modified Project combined with those of the Original Project would be approximately 202 MT of CO_2e, which would not exceed the threshold of 10,000 MT of CO_2e. Therefore, similar to the Original Project, the Modified Project would not generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment, and impacts would be less than significant.

Table 4 Estimated GHG Emissions

Emission Source	Emissions (MT of CO_2e)
Emissions Associated with the Original Project	160
Additional Emissions Associated with the Modified Project	42
Total	**202**
Threshold	10,000
Threshold Exceeded?	No

MT = metric tons; CO_2e = carbon dioxide equivalents; SCAQMD = South Coast Air Quality Management District
See Appendix B for modeling results.

SCV Water does not have a specific GHG emission reduction plan. The Santa Clarita General Plan and City of Santa Clarita Climate Action Plan include several goals and policies related to GHG emission reductions (City of Santa Clarita 2011 and 2012). As discussed in Section 3.6, *Energy*, similar to the Original Project, the Modified Project would support implementation of Measure WSW-1 (Use Reclaimed Water) of the City's Climate Action Plan, which encourages the use of reclaimed water for non-potable purposes because it is less energy intensive and results in fewer GHG emissions than other water supply sources. In addition, as discussed in Section 3.6, *Energy*, the Modified Project would be consistent with the GHG emission reduction goals of the 2017 Climate Change Scoping Plan related to water recycling (CARB 2017). Therefore, similar to the Original Project analyzed in the 2017 IS-MND, the Modified Project would be consistent with applicable plans for GHG emission reductions, and impacts would be less than significant.

Effects and Mitigation Measures

No new or substantially more severe effects related to GHG emissions would occur, and no new mitigation measures are necessary.

Conclusion

LESS THAN SIGNIFICANT IMPACT

(Same as adopted 2017 IS-MND)

3.9 Hazards and Hazardous Materials

	Do Proposed Changes Require Major Revisions to the 2017 IS-MND?	Do New Circumstances Require Major Revisions to the 2017 IS-MND?	Any New Information Resulting in New or Substantially More Severe Significant Impacts?	Do 2017 IS-MND Mitigation Measures Address and/or Resolve Impacts?
Would the project:				
a. Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	No	No	No	N/A
b. Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	No	No	No	N/A
c. Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school?	No	No	No	N/A
d. Be located on a site that is included on a list of hazardous material sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	No	No	No	N/A
e. For a project located in an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?	No	No	No	N/A

		Do Proposed Changes Require Major Revisions to the IS-MND?	Do New Circumstances Require Major Revisions to the IS-MND?	Any New Information Resulting in New or Substantially More Severe Significant Impacts?	Do IS-MND Mitigation Measures Address and/or Resolve Impacts?
f.	Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	No	No	No	N/A
g.	Expose people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires?	No	No	No	N/A

a. Would the project create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?

b. Would the project create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?

c. Would the project emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school?

d. Would the project be located on a site that is included on a list of hazardous material sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?

e. For a project located in an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?

f. Would the project impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?

g. Would the project expose people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires?

The 2017 IS-MND determined hazards and hazardous materials impacts from the Original Project would be less than significant.

Hazardous materials conditions in and around the Modified Project site have not changed since the analysis included in the 2017 IS-MND. The Modified Project is located in the close vicinity of the Original Project and would not introduce any new or substantially more severe effects related to hazards near schools, airports, or mapped hazardous materials sites. Construction activities and materials associated with the Modified Project would be similar to those analyzed under the Original Project. There is the potential for an accidental spill or release of hazardous or potentially hazardous materials such as vehicle and equipment fuels to occur during Modified Project construction. Similar to the Original Project, the Modified Project would comply with all relevant regulations, including the enforcement of hazardous materials treatment, handling, notification, and transportation regulations and implementation of best management practices (BMPs). Compliance with appropriate regulations and policies, specifically California Title 22 and Regional Water Quality Control Board recycled water permitting, would minimize risk associated with release of hazardous or potentially hazardous materials. Impacts would be less than significant.

Effects and Mitigation Measures

No new or substantially more severe effects would occur related to hazards and hazardous materials and no new mitigation measures are necessary.

Conclusion

LESS THAN SIGNIFICANT IMPACT

(Same as approved 2017 IS-MND)

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3.10 Hydrology and Water Quality

	Do Proposed Changes Require Major Revisions to the 2017 IS-MND?	Do New Circumstances Require Major Revisions to the 2017 IS-MND?	Any New Information Resulting in New or Substantially More Severe Significant Impacts?	Do 2017 IS-MND Mitigation Measures Address and/or Resolve Impacts?
Would the project:				
a. Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?	No	No	No	N/A
b. Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?	No	No	No	N/A
c. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:	No	No	No	N/A
(i) Result in substantial erosion or siltation on- or off-site	No	No	No	N/A
(ii) Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site	No	No	No	N/A
(iii) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff	No	No	No	N/A

		Do Proposed Changes Require Major Revisions to the IS-MND?	Do New Circumstances Require Major Revisions to the IS-MND?	Any New Information Resulting in New or Substantially More Severe Significant Impacts?	Do IS-MND Mitigation Measures Address and/or Resolve Impacts?
	(iv) Impede or redirect flood flows?	No	No	No	N/A
d.	In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?	No	No	No	N/A
e.	Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	No	No	No	N/A

a. Would the project violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?

c. Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:

i. Result in substantial erosion or situation on- or off-site?

The 2017 IS-MND determined hydrology and water quality impacts from implementation of the Original Project would be less than significant without mitigation required.

Construction

Similar to the Original Project, grading, excavation, and other construction activities associated with the Modified Project could adversely affect water quality due to erosion resulting from exposed soils and the generation of water pollutants, including trash, construction materials, and equipment fluids. Additionally, spills, leakage, or improper handling and storage of substances such as oils, fuels, chemicals, metals, and other substances from vehicles, equipment, and materials used during Modified Project construction could contribute to stormwater pollutants or leach to underlying groundwater. In comparison to the Original Project, the Modified Project would involve increased excavation and soil movement to accommodate creation of a visual berm.

Construction-related stormwater pollutant discharges are regulated pursuant to the NPDES Construction General Permit, which requires visual monitoring of stormwater and non-stormwater discharges, sampling, analysis, and monitoring of non-visible pollutants, and compliance with all applicable water quality standards established for receiving waters potentially affected by construction discharges. Furthermore, the Construction General Permit requires implementation of a SWPPP outlining project-specific BMPs to control erosion. Such BMPs include the use of temporary de-silting basins, construction vehicle maintenance in staging areas to avoid leaks, and installation of silt fences and erosion control blankets. Coverage under the Construction General Permit occurs for projects resulting in greater than one acre of disturbance area. The Modified

Project site would be greater than one acre in size and would therefore be subject to the Construction General Permit requirements.

As required by the Construction General Permit and as discussed in Section 3.7, *Geology and Soils*, the Modified Project would prepare and implement a SWPPP containing construction BMPs to reduce construction-related stormwater discharges and minimize potential downstream water quality impacts. As such, construction-related impacts related to the Modified Project would be less than significant.

Operation

Modified Project operation would not involve ground disturbance, limiting the potential for off-site migration of sediment and adsorbed pollutants in runoff. Similar to the Original Project, the Modified Project would increase impervious surface cover on the site due to the construction of the water tanks and foundation, but the majority of the Modified Project site would remain unpaved and pervious. Consistent with the Original Project, upon completion of construction, the roadway over the installed pipeline would be repaved and returned to pre-construction conditions.

Like the Original Project site, stormwater would flow from the Modified Project site into the existing series of concrete bench/terrace drains on the hillside. Increased impervious area on the Modified Project site could result in increased stormwater runoff flow and volume, which can carry pollutants to downstream water bodies and adversely affect water quality.

Effects and Mitigation Measures

No new or substantially more severe effects would occur related to water quality and soil erosion and no new mitigation measures are necessary.

Conclusion

LESS THAN SIGNIFICANT IMPACT

(Same as approved 2017 IS-MND)

b. *Would the project substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?*

The 2017 IS-MND determined groundwater impacts from implementation of the Original Project would be less than significant without mitigation required. Similar to the Original Project, the Modified Project would not involve pumping of groundwater and would not interfere with groundwater recharge. No impact to groundwater supplies or recharge would occur.

Effects and Mitigation Measures

No new or substantially more severe effects would occur to groundwater, and no new mitigation measures are necessary.

Conclusion

NO IMPACT

(Same as approved 2017 IS-MND)

c. Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:

ii. Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?

iii. Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?

iv. Impede or redirect flood flows?

d. In flood hazard, tsunami, or seiche zones, would the project risk release of pollutants due to project inundation?

The 2017 IS-MND determined the Original Project's impacts related to hydrology and flooding would be less than significant without mitigation required.

Consistent with the Original Project, upon completion of pipeline construction, the Modified Project would include repaving of the roadway to return it to pre-construction conditions. In comparison to the Original Project, the Modified Project would construct a visual berm on the Modified Project water tank site, which could slightly alter the existing drainage pattern of the site. However, the Modified Project would not substantially increase the rate or amount of surface runoff in a manner which would result in flooding, exceed the capacity of stormwater drainage systems, provide substantial additional sources of polluted runoff, or impede or redirect flood flows. Stormwater runoff from the Modified Project site would continue to flow into the existing series of concrete bench/terrace drains on the hillside. As previously discussed, the Modified Project would increase impervious surface cover on the site due to the construction of the water tanks and foundation, but the majority of the Modified Project site would remain unpaved and pervious.

Similar to the Original Project, the Modified Project site would not be located in an identified flood zone. According to the Federal Emergency Management Agency (2008), the Modified Project site is located in Zone X, an area of minimal flood hazard (Map Panel No. 06037C0845F). Like the Original Project, the Modified Project site is elevated on a hillside. As such, the Modified Project would not impede or redirect flood flows, nor would it risk release of pollutants due to inundation.

Effects and Mitigation Measures

No new or substantially more severe effects would occur to hydrology and flooding, and no new mitigation measures are necessary.

Conclusion

LESS THAN SIGNIFICANT IMPACT

(Same as approved 2017 IS-MND)

e. Would the project conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

The 2017 IS-MND did not directly evaluate whether the Original Project would conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan because this checklist question was added to the Appendix G checklist of the CEQA Guidelines in December 2018, after adoption of the 2017 IS-MND.

The Los Angeles RWQCB's Basin Plan designates beneficial uses for surface waters in the Los Angeles region and associated water quality objectives to fulfill such uses. The Original Project and Modified Project site locations are within the Santa Clara River watershed and drain to Reach 6 of the Santa Clara River. Reach 6 and all downstream reaches have designated beneficial uses of Municipal and Domestic Supply (potential), Industrial Service Supply, Industrial Process Supply, Agricultural Supply, Groundwater Recharge, Freshwater Replenishment, Warm Freshwater Habitat, Wildlife Habitat, Rare, Threatened and Endangered Species, Wetland Habitat, Water Contact Recreation, and Non-contact Water Recreation (Los Angeles RWQCB 2020).[1] Multiple reaches of the Santa Clara River downstream of the Modified Project site are listed as impaired for numerous pollutants.

As described above, the Modified Project would implement stormwater BMPs to minimize potential temporary, construction-related water quality impacts as required under the Construction General Permit. Furthermore, Modified Project operation would not involve ground disturbance that would contribute to runoff of sediment or sediment-bound pollutants, and the Modified Project does not involve use of septic systems, pet parks, agricultural land, or other land uses commonly associated with high concentrations of nutrients, indicator bacteria, or chemical toxicity. The Modified Project would not conflict with Los Angeles RWQCB's Basin Plan. No impact would occur.

The Original Project and Modified Project sites do not overlie a defined Department of Water Resources Bulletin 118 groundwater basin. As such, there are no sustainable groundwater management plans in place for the Modified Project site. In addition, as previously discussed, similar to the Original Project, the Modified Project would not involve pumping of groundwater and would not interfere with groundwater recharge. No impact to sustainable groundwater management planning efforts would occur.

Effects and Mitigation Measures

No new or substantially more severe effects would occur related to a water quality control plan or sustainable groundwater management plan and no new mitigation measures are necessary.

Conclusion

LESS THAN SIGNIFICANT IMPACT

(Same as approved 2017 IS-MND)

[1] Santa Clara River Reach 4B and downstream reaches also have a designated beneficial use of Migration of Aquatic Organisms. Santa Clara River Reach 2 and Reach 1 also have a designated beneficial use of Cold Freshwater Habitat.

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3.11 Land Use and Planning

	Do Proposed Changes Require Major Revisions to the 2017 IS-MND?	Do New Circumstances Require Major Revisions to the 2017 IS-MND?	Any New Information Resulting in New or Substantially More Severe Significant Impacts?	Do 2017 IS-MND Mitigation Measures Address and/or Resolve Impacts?
Would the project:				
a. Physically divide an established community?	No	No	No	N/A
b. Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?	No	No	No	N/A

a. *Would the project physically divide an established community?*

b. *Would the project cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?*

The 2017 IS-MND determined no land use and planning impacts associated with construction and operation of the Original Project would occur. Similar to the Original Project, the Modified Project would not physically divide an established community given that the two water tanks would be located on an existing graded pad site. The land use plans, policies, and regulations applicable to the Modified Project have not changed substantially since the analysis included in the 2017 IS-MND, and the Modified Project proposes the same type of land use as the Original Project on a site with the same land use designation (SP – Specific Plan) and zoning (SP – Specific Plan) as the Original Project site. Therefore, similar to the Original Project analyzed in the 2017 IS-MND, the Modified Project would result in no impacts related to land use and planning.

Effects and Mitigation Measures

No new or substantially more severe effects related to land use and planning would occur, and no new mitigation measures are necessary.

Conclusion

NO IMPACT

(Same as adopted 2017 IS-MND)

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3.12 Mineral Resources

	Do Proposed Changes Require Major Revisions to the 2017 IS-MND?	Do New Circumstances Require Major Revisions to the 2017 IS-MND?	Any New Information Resulting in New or Substantially More Severe Significant Impacts?	Do 2017 IS-MND Mitigation Measures Address and/or Resolve Impacts?
Would the project:				
a. Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	No	No	No	N/A
b. Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?	No	No	No	N/A

a. Would the project result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?

b. Would the project result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?

The 2017 IS-MND determined no mineral resources impacts associated with construction and operation of the Original Project would occur. According to Exhibit CO-2 of the City of Santa Clarita General Plan Conservation and Open Space Element, the Modified Project site is not located within an area designated as a Mineral Resource Zone 2 (i.e., an area of significant mineral resources; City of Santa Clarita 2011). Therefore, similar to the Original Project analyzed in the 2017 IS-MND, the Modified Project would result in no impacts related to mineral resources.

Effects and Mitigation Measures

No new or substantially more severe effects related to mineral resources would occur, and no new mitigation measures are necessary.

Conclusion

NO IMPACT

(Same as adopted 2017 IS-MND)

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3.13 Noise

	Do Proposed Changes Require Major Revisions to the 2017 IS-MND?	Do New Circumstances Require Major Revisions to the 2017 IS-MND?	Any New Information Resulting in New or Substantially More Severe Significant Impacts?	Do 2017 IS-MND Mitigation Measures Address and/or Resolve Impacts?
Would the project:				
a. Generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	No	No	No	Yes
b. Generate excessive groundborne vibration or groundborne noise levels?	No	No	No	N/A
c. For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, expose people residing or working in the project area to excessive noise levels?	No	No	No	N/A

a. Would the project result in generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

The 2017 IS-MND determined construction noise impacts associated with the Original Project would be less than significant with incorporation of Mitigation Measure Noise-1 and operational noise impacts would be less than significant with no mitigation required.

Operation and maintenance activities associated with the Modified Project would be the same as those of the Original Project and would be limited to daytime hours. Therefore, as with the Original Project, operation of the Modified Project would not result in a substantial permanent increase of ambient noise levels in the local area, and impacts would be less than significant.

The Modified Project would require similar types of construction equipment as the Original Project and would therefore generate similar levels of construction noise as those analyzed in the 2017 IS-MND. Therefore, the temporary increase in ambient noise levels associated with construction of the Modified Project would be significant, similar to the Original Project analyzed in the 2017 IS-MND. Implementation of Mitigation Measure Noise-1, as required for the Original Project in the 2017 IS-

MND, would continue to be required for the Modified Project. As with the Original Project, implementation of this mitigation measure would reduce construction noise impacts to a less than significant level.

Mitigation Measure from 2017 IS-MND

Noise-1: [SCV Water] and its contractors shall implement the following measures when project-related construction is planned to occur within the City limits and/or within 1,500 feet of sensitive receptors:

- Construction activities shall meet municipal code requirements related to noise. Construction activities shall be limited to between 7:00 a.m. and 7:00 p.m. Monday through Friday and 8:00 a.m. to 6:00 p.m. Saturday to avoid noise-sensitive hours of the day. Construction activities shall be prohibited on Sundays and holidays.
- Construction equipment noise shall be minimized by muffling and shielding intakes and exhaust on construction equipment (per the manufacturer's specifications) and by shrouding or shielding impact tools.
- Construction contractors shall locate fixed construction equipment (such as compressors and generators) and construction staging areas as far as possible from nearby sensitive receptors including residences, schools, and hospitals.
- If construction were to occur near a school, the construction contractor shall coordinate with the most noise producing construction activities with school administration in order to limit disturbance to the campus.

Effects and Mitigation Measures

No new or substantially more severe effects related to noise would occur, and no new mitigation measures are necessary.

Conclusion

LESS THAN SIGNIFICANT WITH MITIGATION INCORPORATED

(Same as adopted 2017 IS-MND)

b. Would the project generate excessive groundborne vibration or groundborne noise levels?

The 2017 IS-MND determined vibration impacts associated with construction and operation of the Original Project would be less than significant with no mitigation required.

The Modified Project would require similar types of construction equipment as the Original Project and would therefore generate similar levels of vibration during construction activities. As such, construction vibration impacts would be the same as those of Original Project analyzed in the 2017 IS-MND and would be less than significant. Neither the Original Project nor the Modified Project would include operational sources of vibration; therefore, no operational vibration impacts would occur.

Effects and Mitigation Measures

No new or substantially more severe effects related to vibration would occur, and no new mitigation measures are necessary.

Conclusion

LESS THAN SIGNIFICANT IMPACT

(Same as adopted 2017 IS-MND)

c. *Would the project be located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, and expose people residing or working in the project area to excessive noise levels?*

The 2017 IS-MND determined there would be no impact related to aircraft noise due to the proximity of the Original Project site to a public or private airport.

The Modified Project site is located approximately 200 feet southwest of the Original Project site and is approximately 12 miles southwest of the Agua Dulce Airpark, similar to the Original Project site. As with the Original Project, the Modified Project would not accommodate residents or permanent on-site employees. Therefore, similar to the Original Project analyzed in the 2017 IS-MND, the Modified Project would not expose people residing or working in the Modified Project area to excessive noise levels from aircraft operations, and no impact would occur.

Effects and Mitigation Measures

No new or substantially more severe effects related to aircraft noise would occur, and no new mitigation measures are necessary.

Conclusion

NO IMPACT

(Same as adopted 2017 IS-MND)

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3.14 Population and Housing

	Do Proposed Changes Require Major Revisions to the 2017 IS-MND?	Do New Circumstances Require Major Revisions to the 2017 IS-MND?	Any New Information Resulting in New or Substantially More Severe Significant Impacts?	Do 2017 IS-MND Mitigation Measures Address and/or Resolve Impacts?
Would the project:				
a. Induce substantial unplanned population growth in an area, either directly (e.g., by proposing new homes and businesses) or indirectly (e.g., through extension of roads or other infrastructure)?	No	No	No	N/A
b. Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	No	No	No	N/A

a. *Would the project induce substantial unplanned population growth in an area, either directly (e.g., by proposing new homes and businesses) or indirectly (e.g., through extension of roads or other infrastructure)?*

b. *Would the project displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?*

The 2017 IS-MND determined no population and housing impacts associated with construction and operation of the Original Project would occur. The purpose of the Modified Project would be the same as that of the Original Project – to store recycled water generated by the nearby Vista Canyon Water factory and supply irrigation water to customers in the Vista Canyon and Fair Oaks communities. As such, similar to the Original Project, the Modified Project would not directly or indirectly induce substantial unplanned population growth. In addition, the Modified Project site is an existing graded pad site located approximately 200 feet southwest of the Original Project site and does not currently contain housing. Therefore, the Modified Project would not displace people or housing. As such, similar to the Original Project analyzed in the 2017 IS-MND, the Modified Project would result in no impact related to population and housing.

Effects and Mitigation Measures

No new or substantially more severe effects related to population and housing would occur, and no new mitigation measures are necessary.

Conclusion

NO IMPACT

(Same as adopted 2017 IS-MND)

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3.15 Public Services

		Do Proposed Changes Require Major Revisions to the 2017 IS-MND?	Do New Circumstances Require Major Revisions to the 2017 IS-MND?	Any New Information Resulting in New or Substantially More Severe Significant Impacts?	Do 2017 IS-MND Mitigation Measures Address and/or Resolve Impacts?
Would the project:					
a.	Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or the need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:				
1	Fire protection?	No	No	No	N/A
2	Police protection?	No	No	No	N/A
3	Schools?	No	No	No	N/A
4	Parks?	No	No	No	N/A
5	Other public facilities?	No	No	No	N/A

a. *Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or the need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for:*

1. *Fire protection?*
2. *Police protection?*
3. *Schools?*
4. *Parks?*
5. *Other public facilities?*

The 2017 IS-MND determined public services impacts associated with construction and operation of the Original Project would be less than significant with no mitigation required. The nature of the Modified Project as recycled water infrastructure would be the same as that of the Original Project;

therefore, the minimal level of police protection and fire protection services required to serve the Modified Project would be the same. Therefore, similar to the Original Project analyzed in the 2017 IS-MND, the Modified Project would result in less than significant impacts to public services.

Effects and Mitigation Measures

No new or substantially more severe effects related to public services would occur, and no new mitigation measures are necessary.

Conclusion

NO IMPACT

(Same as adopted 2017 IS-MND)

3.16 Recreation

	Do Proposed Changes Require Major Revisions to the 2017 IS-MND?	Do New Circumstances Require Major Revisions to the 2017 IS-MND?	Any New Information Resulting in New or Substantially More Severe Significant Impacts?	Do 2017 IS-MND Mitigation Measures Address and/or Resolve Impacts?
Would the project:				
a. Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	No	No	No	N/A
b. Include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	No	No	No	N/A

a. Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?

b. Would the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?

The 2017 IS-MND determined no recreation impacts associated with construction and operation of the Original Project would occur. The purpose of the Modified Project would be the same as that of the Original Project – to store recycled water generated by the nearby Vista Canyon Water factory and supply irrigation water to customers in the Vista Canyon and Fair Oaks communities. As such, similar to the Original Project, the Modified Project would not directly or indirectly induce population growth that would increase demand for parks and recreational facilities. In addition, the Modified Project site is an existing graded pad site located approximately 200 feet southwest of the Original Project site and does not contain existing parks or recreational facilities. Therefore, similar to the Original Project analyzed in the 2017 IS-MND, the Modified Project would result in no impact related to recreation.

Effects and Mitigation Measures

No new or substantially more severe effects would occur related to recreation, and no new mitigation measures are necessary.

Conclusion

NO IMPACT

(Same as adopted 2017 IS-MND)

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3.17 Transportation

	Do Proposed Changes Require Major Revisions to the 2017 IS-MND?	Do New Circumstances Require Major Revisions to the 2017 IS-MND?	Any New Information Resulting in New or Substantially More Severe Significant Impacts?	Do 2017 IS-MND Mitigation Measures Address and/or Resolve Impacts?
Would the project:				
a. Conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?	No	No	No	Yes
b. Conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?	No	No	No	Yes
c. Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible use (e.g., farm equipment)?	No	No	No	N/A
d. Result in inadequate emergency access?	No	No	No	Yes

a. *Would the project conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?*

The 2017 IS-MND determined impacts from the Original Project related to plans addressing the circulation system would be less than significant with no mitigation required.

The Modified Project would require similar construction and operational activities as the Original Project and similar quantities of associated vehicle trips, with the exception of additional construction worker, water truck, utility truck, and haul truck trips required temporarily for pad over-excavation and construction of the visual berm at the Modified Project site. These additional trips would be limited to an approximately 40-working-day period during construction of the visual berm. This temporary, minimal addition of vehicle trips to roadways in the Modified Project area would not result in a conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities. Therefore, similar to the Original Project analyzed in the 2017 IS-MND, the impacts of the Modified Project related to plans addressing the circulation system would be less than significant.

Effects and Mitigation Measures

No new or substantially more severe effects related to plans addressing the circulation system would occur, and no new mitigation measures are necessary.

Conclusion

LESS THAN SIGNIFICANT IMPACT

(Same as adopted 2017 IS-MND)

b. *Would the project conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?*

CEQA Guidelines Section 15064.3(b) identifies criteria for evaluating transportation impacts. Specifically, the guidelines state vehicle miles traveled (VMT) exceeding an applicable threshold of significance may indicate a significant impact. According to Section 15064.3(b)(3) of the CEQA Guidelines, a lead agency may include a qualitative analysis of operational and construction traffic. A VMT calculation is typically conducted on a daily or annual basis for long-range planning purposes. Currently, official measures and significance thresholds related to VMT are still being developed and have not yet been adopted by SCV Water or the City of Santa Clarita. However, SCV Water has elected to apply the provisions of CEQA Guidelines Section 15064.3(b) and utilize guidance provided by the Governor's Office of Planning and Research *Technical Advisory on Evaluating Transportation Impacts in CEQA* (2018) to evaluate the significance of project impacts related to VMT.

The 2017 IS-MND did not directly evaluate the VMT impacts associated with construction and operation of the Original Project because this checklist question was added to the Appendix G checklist of the CEQA Guidelines in December 2018, after adoption of the 2017 IS-MND. However, the environmental impacts of VMT such as air pollutant and GHG emissions, were indirectly evaluated in the 2017 IS-MND. As discussed in Section 3.3, *Air Quality*, and Section 3.8, *Greenhouse Gas Emissions*, the 2017 IS-MND determined air quality and GHG emissions impacts would be less than significant.

As discussed above, traffic on local roadways may be temporarily increased during construction under the Modified Project as compared to the Original Project due to additional construction worker, water truck, utility truck, and haul truck trips associated with construction of the visual berm. Increases in VMT associated with construction activities would be short-term, minimal, and temporary. Operation of the Modified Project would be the same as that of the Original Project and would require occasional operation and maintenance trips by SCV Water staff, which would result in a minimal increase in areawide VMT as compared to existing conditions. The Governor's Office of Planning and Research *Technical Advisory on Evaluating Transportation Impacts in CEQA* (2018) states, "Absent substantial evidence indicating that a project would generate a potentially significant level of VMT, or inconsistency with a Sustainable Communities Strategy or general plan, projects that generate or attract fewer than 110 trips per day generally may be assumed to cause a less than significant VMT impact." As discussed in the 2017 IS-MND, staff vehicle trips for operation and maintenance activities would not occur on a regular daily basis. One daily vehicle trip would be sufficient on days when operation and maintenance activities are required, which would not exceed the screening criteria of 110 trips per day.

The implementation strategies of the SCAG 2020-2045 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) include focusing growth near destinations and mobility options, promoting diverse housing choices, leveraging technology innovations, and supporting implementation of sustainability policies (SCAG 2020). In addition, the goals and policies of the Santa Clarita General Plan focus on reducing vehicle trips and VMT through smart growth concepts, travel demand and parking management, and use of alternative travel modes (City of Santa Clarita 2011). The project would not be inconsistent with the goals of the SCAG 2020-2045 RTP/SCS or Santa Clarita General Plan, which are aimed at reducing vehicle trips, VMT, and associated GHG emissions from typical land use development projects such as residential and commercial development rather than from maintenance and operation of water infrastructure such as would occur under the proposed project.

Because the project would not exceed the Office of Planning and Research's recommended screening criteria of 110 trips per day for small projects, would generate a nominal increase in VMT, and would not be inconsistent with the SCAG 2020-2045 RTP/SCS or Santa Clarita General Plan, impacts associated with VMT per CEQA Guidelines Section 15064.3 would be less than significant.

Effects and Mitigation Measures

No new or substantially more severe effects related to VMT would occur, and no new mitigation measures are necessary.

Conclusion

LESS THAN SIGNIFICANT IMPACT

(Same as adopted 2017 IS-MND)

c. Would the project substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible use (e.g., farm equipment)?

The 2017 IS-MND determined no impacts related to traffic hazards associated with construction and operation of the Original Project would occur.

The Modified Project facilities consist of recycled water tanks that would be located on an existing graded pad site, which would have no impact on street design. The tanks would be located along a private access road and would not have the potential to block motorists' line-of-sight on public roadways. The Modified Project would therefore not create or substantially increase a traffic hazard due to a design feature, and similar to the Original Project analyzed in the 2017 IS-MND, no impact would occur.

Effects and Mitigation Measures

No new or substantially more severe effects related to traffic hazards would occur, and no new mitigation measures are necessary.

Conclusion

NO IMPACT

(Same as adopted 2017 IS-MND)

d. Would the project result in inadequate emergency access?

The 2017 IS-MND determined impacts from the Original Project related to emergency access would be less than significant with no mitigation required.

Construction activities associated with the Modified Project would occur on the Modified Project site and the adjacent private access road and therefore would not impede emergency access in the Modified Project area. As such, similar to the Original Project analyzed in the 2017 IS-MND, impacts related to emergency access would be less than significant.

Effects and Mitigation Measures

No new or substantially more severe effects related to emergency access would occur, and no new mitigation measures are necessary.

Conclusion

LESS THAN SIGNIFICANT IMPACT

(Same as adopted 2017 IS-MND)

3.18 Tribal Cultural Resources

	Do Proposed Changes Require Major Revisions to the 2017 IS-MND?	Do New Circumstances Require Major Revisions to the 2017 IS-MND?	Any New Information Resulting in New or Substantially More Severe Significant Impacts?	Do 2017 IS-MND Mitigation Measures Address and/or Resolve Impacts?
Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in a Public Resources Code Section 21074 as either a site, feature, place, or cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:				
a. Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code Section 5020.1(k), or	No	No	No	N/A
b. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	No	No	No	N/A

Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in a Public Resources Code Section 21074 as either a site, feature, place, or cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:

a. Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code Section 5020.1(k), or

b. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe?

The 2017 IS-MND determined the Original Project would have a less than significant impact on tribal cultural resources with mitigation incorporated (Mitigation Measure CUL-1). As part of the 2017 IS-MND, SCV Water sent Assembly Bill 52 (AB 52) letters to three Native American tribes who are traditionally and culturally affiliated with the Project area: the Fernandeño Tataviam Band of Mission Indians (FTBMI) sent on June 7, 2017, the Gabrieleño Tongva San Gabriel Band of Mission Indians sent on May 30, 2017, and the Torres Martinez Desert Cahuilla Indians sent on June 7, 2017. FTBMI was the only tribe to respond to the Original Project.

The FTBMI responded to consult to the 2017 Original Project on August 1, 2017. In the FTBMI response, Kimia Fatehi, Tribal Historic and Cultural Preservation Officer (THCPO), stated that the Original Project was located within traditional and historical tribal territory and was associated with culturally sensitive spaces. The response additionally noted that due to the heavy development of the area, the Tribal Historical and Cultural Preservation Department did not identify potential impacts to tribal cultural resources at that time. FTMBI requested that should any tribal cultural resources discovered upon project excavation or project plans change, the agency immediately notify THCPO Fatehi. Consultation was concluded on August 8, 2017 when SCV Water sent a letter to FTBMI agreeing to incorporate a mitigation measure stating that the FTBMI would be notified in the event of inadvertent archaeological resource finds during the Original Project or Original Project changes (SCV Water 2017).

The AB 52 consultation determined that the Original Project would not potentially impact tribal cultural resources.

As a result of modifications to the Original Project, SCV Water sent AB 52 notification to the FTBMI on October 27, 2020 to inform them of the modifications. On November 4, 2020, Jairo Avila, Tribal Historic and Cultural Preservation Officer of the FTBMI, responded to the SCV Water outreach effort and stated the FTBMI has no further questions or concerns regarding the Modified Project site. Additionally, Mr. Avila requested that Mitigation Measure CUL-1 from the 2017 IS-MND be included for the Modified Project. Appendix C contains the correspondence between SCV Water and Mr. Avila on the Modified Project.

Similar to the Original Project, no tribal cultural resources have been identified within the Modified Project site, located approximately 200 feet southeast of the Original Project site. Mitigation Measure CUL-1 from the 2017 IS-MND would be required for the Modified Project. As such, similar to the Original Project analyzed in the 2017 IS-MND, impacts would be less than significant with mitigation incorporated.

Mitigation Measures from 2017 IS-MND

CUL-1: In the event that any historical, archeological or tribal cultural resources are discovered during excavation activities, work shall be stopped immediately and temporarily diverted from the vicinity of the discovery until a qualified archeologist and a member of the Fernandeño Tataviam Band of Mission Indians are notified and can identify and evaluate the importance of the find, conduct an appropriate assessment, and implement measures to mitigate impacts on significant resources.

Effects and Mitigation Measures

No new or substantially increased effects would occur to tribal cultural resources, and no new mitigation measures are necessary.

Conclusion

LESS THAN SIGNIFICANT WITH MITIGATION INCORPORATED

(Same as approved 2017 IS-MND)

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3.19 Utilities and Service Systems

	Do Proposed Changes Require Major Revisions to the 2017 IS-MND?	Do New Circumstances Require Major Revisions to the 2017 IS-MND?	Any New Information Resulting in New or Substantially More Severe Significant Impacts?	Do 2017 IS-MND Mitigation Measures Address and/or Resolve Impacts?
Would the project:				
a. Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?	No	No	No	N/A
b. Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?	No	No	No	N/A
c. Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	No	No	No	N/A
d. Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?	No	No	No	N/A
e. Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?	No	No	No	N/A

a. Would the project require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?

b. Would the project have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?

c. Would the project result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?

e. Would the project comply with federal, state, and local management and reduction statutes and regulations related to solid waste?

The 2017 IS-MND determined the Original Project would have no impacts related to relocating or constructing new or expanded utilities, water supplies, wastewater treatment, and compliance with solid waste regulations.

The Modified Project would include construction of two recycled water tanks on the Modified Project site and would not require the relocation or construction of new or expanded utilities beyond those included as part of the Original Project. As such, no impact would occur. The nature of the Modified Project as recycled water infrastructure would be the same as that of the Original Project - . As such, the Modified Project would also provide a source of long-term non-potable water supply to the project area, which would enhance water supply reliability and decrease demand for potable water. Thus, no impact would occur. Similar to the Original Project, the Modified Project would not require additional wastewater treatment, and no impact would occur. In addition, similar to the Original Project, the Modified Project would implement local code requirements related to solid waste disposal and would not affect the City of Santa Clarita's ability to continue to meet the requirements of Assembly Bill 939. No impact related to solid waste regulations would occur. Overall, similar to the Original Project analyzed in the 2017 IS-MND, the Modified Project would result in no impacts related to relocating or constructing new or expanded utilities, water supplies, wastewater treatment, and compliance with solid waste regulations.

Effects and Mitigation Measures

No new or substantially more severe effects related to relocating or constructing new or expanded utilities, water supplies, wastewater treatment, and compliance with solid waste regulations would occur, and no new mitigation measures are necessary.

Conclusion

NO IMPACT

(Same as adopted 2017 IS-MND)

d. Would the project generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?

The 2017 IS-MND determined the solid waste generation associated with the Original Project would be less than significant with no mitigation incorporated.

The Modified Project would generate more construction waste associated with soil export for the visual berm; however, this solid waste generation would be temporary. Assuming that one cubic yard of soil is equivalent to 1.5 tons (SoilDirect 2020), additional construction activities associated with the visual berm under the Modified Project would generate approximately 9,000 tons of waste (6,000 cubic yards of soil * 1.5 tons per cubic yard), or 1,800 tons per day over the course of the five-day export period. Exported soil would be disposed of at local landfills including the Sunshine Canyon Landfill, the Antelope Valley Landfill, and the Chiquita Canyon Landfill. These three landfills have a combined maximum permitted throughput of 22,316 tons per day and currently accept a combined average of 12,646 tons per day (County of Los Angeles 2019). Therefore, these landfills have a combined excess capacity of 9,670 tons per day, which would be sufficient to accommodate the project's disposal of 1,800 tons of exported soil per day over the five-day soil hauling period. As such, similar to the Original Project, construction waste generated by the Modified Project would not exceed the permitted capacity of local landfills.

Operation and maintenance activities for the Modified Project would be the same as those of Original Project and would not generate solid waste. Accordingly, similar to the Original Project analyzed in the 2017 IS-MND, the impacts of the Modified Project related to solid waste generation would be less than significant.

Effects and Mitigation Measures

No new or substantially more severe effects related to solid waste generation would occur, and no new mitigation measures are necessary.

Conclusion

LESS THAN SIGNIFICANT IMPACT

(Same as adopted 2017 IS-MND)

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3.20 Wildfire

	Do Proposed Changes Require Major Revisions to the 2017 IS-MND?	Do New Circumstances Require Major Revisions to the 2017 IS-MND?	Any New Information Resulting in New or Substantially More Severe Significant Impacts?	Do 2017 IS-MND Mitigation Measures Address and/or Resolve Impacts?
If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:				
a. Substantially impair an adopted emergency response plan or emergency evacuation plan?	No	No	No	N/A
b. Due to slope, prevailing winds, and other factors, exacerbate wildfire risks and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	No	No	No	N/A
c. Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?	No	No	No	N/A
d. Expose people or structures to significant risks, including downslopes or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?	No	No	No	N/A

If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:

a. Substantially impair an adopted emergency response plan or emergency evacuation plan?

b. Due to slope, prevailing winds, and other factors, exacerbate wildfire risks and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?

c. *Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?*

d. *Expose people or structures to significant risks, including downslopes or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?*

The 2017 IS-MND did not directly evaluate the wildfire impacts associated with construction and operation of the Original Project because this impact area was added to the Appendix G checklist of the CEQA Guidelines in December 2018, after adoption of the 2017 IS-MND. Impacts related to wildland fires were evaluated under question (h) in Section 8, *Hazards and Hazardous Materials*, of the 2017 IS-MND.

Similar to the Original Project, the Modified Project site is located in a Very High Fire Hazard Severity Zone in the State Responsibility Area (California Department of Forestry and Fire Protection 2020). Construction activities associated with the Modified Project would occur on the Modified Project site and the adjacent private roadway and therefore would not impede emergency access in the project area. Construction activities associated with the Modified Project would be similar in nature to those of the Original Project and would include similar sources of potential sparks/flames, such as welding torches or other tools. However, similar to the Original Project site, the Modified Project site has been graded and is largely devoid of natural vegetation that might result in increased wildfire risk (see Section 3.4, *Biological Resources*, for further discussion of on-site vegetation conditions). In addition, similar to the Original Project, recycled water storage and conveyance under the Modified Project would not include ignitable materials or processes. As with the Original Project, the Modified Project would not include housing that would accommodate on-site occupants who could be exposed to wildfire hazards or require installation or maintenance of associated infrastructure such as roads, fuel breaks, emergency water sources, or power lines that would exacerbate fire risk or result in temporary or ongoing impacts to the environment. Furthermore, as discussed in Section 3.7, *Geology and Soils*, and Section 3.10, *Hydrology and Water Quality*, construction of the Modified Project would not result in changes to hydrology and drainage patterns or slope stability that would expose people or structures in the nearby residential communities to significant risks associated with downslope flooding or landslides as a result of runoff, post-fire slope instability, or drainage changes. Therefore, similar to the Original Project analyzed in the 2017 IS-MND, the Modified Project would result in less than significant impacts related to wildfires.

Effects and Mitigation Measures

No new or substantially more severe effects related to wildfires would occur, and no new mitigation measures are necessary.

Conclusion

LESS THAN SIGNIFICANT IMPACT

(Same as adopted 2017 IS-MND)

3.21 Mandatory Findings of Significance

	Do Proposed Changes Require Major Revisions to the 2017 IS-MND?	Do New Circumstances Require Major Revisions to the 2017 IS-MND?	Any New Information Resulting in New or Substantially More Severe Significant Impacts?	Do 2017 IS-MND Mitigation Measures Address and/or Resolve Impacts?
a. Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	No	No	No	No – New Mitigation Required
b. Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	No	No	No	N/A
c. Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	No	No	No	Yes

a. *Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?*

The 2017 IS-MND determined the Original Project would have no impact to the above mandatory finding of significance checklist question.

Potential impacts to biological resources are addressed in Section 3.4, *Biological Resources*. As described therein, there is low to moderate potential for certain special-status plant and wildlife species to occur on the Modified Project site, including the federally-threatened coastal California gnatcatcher. Implementation of new Mitigation Measures BIO-1 and BIO-2 would mitigate direct and indirect impacts to special-status plant and wildlife species to a less than significant level. Therefore, the Modified Project would not substantially reduce the habitat of fish and wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, eliminate a plant or animal community, or reduce the number or restrict the range of a rare or endangered plant or animal. With mitigation incorporated, this impact would be reduced to a less than significant level.

In addition, as discussed in Section 3.5, *Cultural Resources*, the Modified Project would not eliminate important examples of the major periods of California history or prehistory because none are known to be present in the Modified Project area. No impact would occur.

Effects and Mitigation Measures

With implementation of Mitigation Measures BIO-1 and BIO-2, this impact would be reduced to a less than significant level.

Conclusion

LESS THAN SIGNIFICANT WITH MITIGATION INCORPORATED

(Differs from adopted 2017 IS-MND)

b. *Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?*

The 2017 IS-MND determined the Original Project would have no impact to the above mandatory finding of significance checklist question.

According to the City of Santa Clarita (2020), no new major development projects are proposed, approved, or under construction in the vicinity of the Modified Project site since the 2017 IS-MND was adopted. As described in the discussion of environmental checklist Sections 3.1 through 3.20, with respect to all environmental issues, the Modified Project would have no impact, a less than significant impact, or a less than significant impact with mitigation incorporated. Therefore, similar to the Original Project, the Modified Project would not result in a considerable contribution to any cumulative impact significant or otherwise. No impact would occur.

Effects and Mitigation Measures

No new or substantially more severe effects would occur, and no new mitigation measures are necessary.

Conclusion

NO IMPACT

(Same as adopted 2017 IS-MND)

c. Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?

The 2017 IS-MND determined impacts related to the above mandatory finding of significance checklist question from the Original Project would be less than significant.

As detailed in the preceding sections, the Modified Project would not result, either directly or indirectly, in substantial adverse effects. Where potential environmental impacts would occur, mitigation measures would be implemented to reduce or avoid an impact. With adherence to the mitigation program, the Modified Project would not result in substantial adverse effects on either the environment or human beings.

Effects and Mitigation Measures

No new or substantially more severe effects would occur, and no new mitigation measures are necessary.

Conclusion

LESS THAN SIGNIFICANT IMPACT

(Same as adopted 2017 IS-MND)

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4 Conclusion

The 2017 IS-MND for the Original Project identified potentially significant but mitigable impacts to aesthetics, cultural resources, noise, and tribal cultural resources. With implementation of Mitigation Measures AES-1, CUL-1, and Noise-1 from the 2017 IS-MND, all environmental impacts associated with the Original Project would be reduced to a less than significant level.

In addition to the impacts identified in the 2017 IS-MND, this Supplemental IS-MND determines the Modified Project would have potentially significant but mitigable impacts to biological resources. With implementation of new Mitigation Measures BIO-1 and BIO-2, all environmental impacts associated with the Modified Project would be reduced to a less than significant level. As discussed in detail in the preceding sections, major revisions to the 2017 IS-MND are not necessary because no new unmitigable significant impacts or significant impacts of substantially greater severity than previously described would occur as a result of the Modified Project.

Therefore, the following determinations have been found to be applicable:

- No further evaluation of environmental impacts is required for the Modified Project;
- No Subsequent MND is necessary per State CEQA Guidelines Section 15162; and
- This Supplemental IS-MND is the appropriate level of environmental analysis and documentation for the Modified Project.

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5.2 List of Preparers

This Supplemental IS-MND was prepared by Rincon Consultants, Inc. under contract to SCV Water. Persons and firms involved in data gathering, analysis, project management, and quality control include:

SANTA CLARITA VALLEY WATER AGENCY (LEAD AGENCY)

Rick Vasilopulos, Water Resources Planner

RINCON CONSULTANTS, INC.

Jennifer Haddow, Principal Environmental Scientist
Megan Jones, Principal
Amanda Antonelli, Environmental Planner/Project Manager
Annaliese Miller, Environmental Planner
Ken Victorino, Senior Principal Investigator
Courtney Montgomery, Archaeologist
Steven Hongola, Principal Biologist
Lindsay Griffin, Senior Biologist
Robin Murray, Senior Biologist
Allysen Valencia, GIS Analyst

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Appendix A

2017 Phase 2B Recycled Water System Project IS-MND

RESOLUTION NO. 3211

RESOLUTION OF THE BOARD OF DIRECTORS OF THE CASTAIC LAKE WATER AGENCY ADOPTING THE MITIGATED NEGATIVE DECLARATION AND MITIGATION MONITORING AND REPORTING PROGRAM UNDER THE CALIFORNIA ENVIRONMENTAL QUALITY ACT FOR THE RECYCLED WATER VISTA CANYON EXTENSION (PHASE 2B) PROJECT

WHEREAS, the Castaic Lake Water Agency (Agency) determined that recycled water is an important component of future water supplies; and

WHEREAS, the proposed Recycled Water Vista Canyon Extension (Phase 2B) Project is a component of the Draft 2016 Recycled Water Master Plan; and

WHEREAS, the proposed Recycled Water Vista Canyon Extension (Phase 2B) Project is a collaborative project between the Agency and the Santa Clarita Water Division (SCWD); and

WHEREAS, the Agency, acting as lead agency under the California Environmental Quality Act ("CEQA") circulated for public comment a proposed Initial Study and draft Mitigated Negative Declaration (collectively, the "Draft MND") for the Recycled Water Vista Canyon Extension Project (Phase 2B) ("Project"); and

WHEREAS, in accordance with State CEQA Guidelines Section 15072(b), on September 6, 2017 Agency mailed a Notice of Intent to Adopt the Draft MND to all responsible and reviewing agencies, the Office of Planning and Research, and members of the public that have requested notice; the Agency also published the Notice of Intent to Adopt the Draft MND in the *Santa Clarita Valley Signal*, a newspaper of general circulation; and

WHEREAS, as required by State CEQA Guidelines section 15072(d), the Notice of Intent to Adopt the Draft MND was concurrently posted by the Clerk of the Board for the County of Los Angeles; and

WHEREAS, in accordance with State CEQA Guidelines section 15073, the Draft MND was circulated for at least 30 days, from September 6, 2017 through October 5, 2017; and

WHEREAS, the Agency received no written public comments during the comment period; and one letter from the State of California Governor's Office of Planning and Research, State Clearinghouse after the close of the comment period indicating that no state agencies submitted comments by the closing date and that the Agency has complied with the State Clearinghouse review requirements for draft environmental documents pursuant to CEQA; and

WHEREAS, the Draft MND, the comments thereto and the Agency's responses to comments were incorporated into and together constitute the Final MND (hereinafter, the "MND"), and are attached as Exhibit A; and

WHEREAS, a notice of public meeting relating to the MND was duly given and posted in the manner and for the time frame prescribed by law, and the Planning and Engineering Committee held a public meeting on the Project at the Castaic Lake Water Agency located at 27234 Bouquet Canyon Road, Santa Clarita, CA 91350, in the Training Room on October 31, 2017, at 5:30 P.M., as part of its decision process concerning the Project, at which time no public comments were received; and

WHEREAS, the Planning and Engineering Committee recommended that the Agency's Board of Directors ("Board") approve a resolution adopting the MND and Mitigation Monitoring and Reporting Program ("MMRP"); and

WHEREAS, a notice of public meeting relating to the MND was duly given and posted in the manner and for the time frame prescribed by law, and the Agency's Board held a public meeting on the Project at its Boardroom, 27234 Bouquet Canyon Road, Santa Clarita, CA 91350 on November 20, 2017, at 6:15 P.M., as part of its decision process concerning the Project, at which time all persons wishing to comment in connection the MND were heard; and

WHEREAS, no comments made during the public review period, and no additional information submitted to the Agency have produced substantial new information requiring recirculation of the MND or additional environmental review of the Project under State CEQA Guidelines section 15073.5; and

WHEREAS, all the requirements of the Public Resources Code and the State CEQA Guidelines have been satisfied in connection with the preparation of the MND, which is sufficiently detailed so that all of the potentially significant environmental effects of the Project, as well as feasible mitigation measures, have been adequately evaluated; and

WHEREAS, the Agency Board reviewed the MND and MMRP; and

WHEREAS, the Agency Board, acting as a Lead Agency, will need to adopt the IS/MND; and

WHEREAS, the Agency's Board has determined that the proposed Project can be approved because there is no substantial evidence in light of the whole record that the Project may have a significant effect on the environment; and

WHEREAS, the Agency and its Board have considered all of the information presented to it as set forth above and this Resolution and action taken hereby is a result of the Board's independent judgment and analysis.

NOW, THEREFORE, BE IT RESOLVED that the Agency Board does hereby find and determine as follows:

SECTION 1. RECITALS. The Agency finds that the foregoing recitals are true and correct and are incorporated herein as substantive findings of this Resolution.

SECTION 2. COMPLIANCE WITH THE CALIFORNIA ENVIRONMENTAL QUALITY ACT. As a decision-making body for the Project, the Agency has reviewed and considered the information contained in the MND, comments received, and other documents contained in the administrative record for the Project. Based on the

Agency's independent review and analysis, the Agency finds that the MND and administrative record contain a complete and accurate reporting of the environmental impacts associated with the Project, and that the MND has been completed in compliance with CEQA and the State CEQA Guidelines.

SECTION 3. FINDINGS ON ENVIRONMENTAL IMPACTS. Based on the whole record before it, including the MND, the administrative record, and all other written and oral evidence presented to the Agency, the Agency finds that all environmental impacts of the Project are either less than significant or can be mitigated to a level of less than significant under the mitigation measures outlined in the MND and the MMRP. The Agency finds that substantial evidence fully supports the conclusion that no significant and unavoidable impacts will occur and that, alternatively, there is no substantial evidence in the administrative record supporting a fair argument that the Project may result in any significant environmental impacts. The Agency finds that the MND contains a complete, objective, and accurate reporting of the environmental impacts associated with the Project and reflects the independent judgment and analysis of the Agency.

SECTION 4. ADOPTION OF THE MITIGATED NEGATIVE DECLARATION. The Agency hereby approves and adopts the MND as the Lead Agency.

SECTION 5. ADOPTION OF THE MITIGATION MONITORING AND REPORTING PROGRAM. In accordance with Public Resources Code section 21081.6, the Agency hereby adopts the MMRP, attached hereto as Exhibit "A". In the event of any inconsistencies between the Mitigation Measures as set forth in the MND and the MMRP, the MMRP shall control.

SECTION 6. LOCATION AND CUSTODIAN OF RECORDS. The documents and materials associated with the Project and the MND that constitute the record of proceedings on which these findings are based are located at the offices of Santa Clarita Water, a Division of the Castaic Lake Water Agency, 26521 Summit Circle, Santa Clarita, CA 91350. The Custodian of Record is Keith Abercrombie.

SECTION 7. NOTICE OF DETERMINATION. The Agency hereby directs staff to prepare, execute, and file a Notice of Determination with the Los Angeles County Clerk's office and the Office of Planning and Research within five (5) working days of adoption of this Resolution.

Robert J DiPrimio

President

I, the undersigned, hereby certify: That I am the duly appointed and acting Secretary of the Castaic Lake Water Agency, and that at a special meeting of the Board of Directors of said Agency held on November 20, 2017, the foregoing Resolution No. 3211 was duly and regularly adopted by said Board, and that said resolution has not been rescinded or amended since the date of its adoption, and that it is now in full force and effect.

DATED: November 20, 2017

CASTAIC LAKE WATER AGENCY INCORPORATED APRIL 20, 1962 CALIFORNIA

April Jacobs

Secretary

EXHIBIT "A"

Final Mitigated Negative Declaration
and
Mitigation Monitoring and Reporting Program

Recycled Water Vista Canyon Extension (Phase 2B) Project

Prepared for:

Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, California 91350

Prepared by:

Tebo Environmental Consulting, Inc.
300 E. Esplanade Drive, Suite 1660
Oxnard, CA 93036

October 2017

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MITIGATION MONITORING AND REPORTING PROGRAM

A Mitigation Monitoring and Reporting Program (MMRP) has been prepared, pursuant to the requirements of the State CEQA Guidelines,[1] identifying the monitoring of mitigation measures that would reduce potential significant impacts as stated in the Draft IS for the Project.

The State CEQA Guidelines[2] require public agencies adopting an IS/MND also adopt a program for monitoring or reporting to ensure that the mitigation measures it has imposed to mitigate or avoid significant environmental effects are implemented.

The MMRP will be required to be adopted by the CLWA should the Board of Directors approve the proposed Project.

The MMRP is available at the Castaic Lake Water Agency, Santa Clarita Water Division office, located at 26521 Summit Circle, Santa Clarita, CA 91350.

The MMRP may be modified by SCWD in response to changing conditions or circumstances. A summary table **(Table 1, Mitigation Monitoring and Report Program Matrix)** will guide SCWD in its evaluation and documentation of the implementation of mitigation measures. The MMRP is organized as follows:

- **Mitigation Measure**: Provides the text of the mitigation measures identified in the IS/MND.
- **Timing of Mitigation Monitoring**: Identifies the timeframe in which the mitigation will take place.
- **Responsible Entity**: Identifies the entity responsible for complying with mitigation measure requirements.
- **Verification Action**: Describes the type of action taken to verify implementation.
- **Date Completed**: Provides for the acknowledgement of completion of each mitigation measure as it is implemented. Entries should be dated and initialed by SCWD personnel based on the documentation noted in the mitigation measure and provided by the individual or entity responsible for implementing the measure.

Unless otherwise specified herein, SCWD is responsible for taking all actions necessary to implement the mitigation measures according to the provided specifications and for demonstrating that each action has been successfully completed. The CLWA and subsequently the SCWD, at its discretion, may delegate implementation responsibility or portions thereof to a licensed contractor.

1 California Code of Regulations, sec. 15074(b)(6), State CEQA Guidelines.
2 California Code of Regulations, sec. 15097, State CEQA Guidelines.

Mitigation Monitoring and Reporting Program Matrix

Mitigation Measure	Timing of Mitigation Monitoring	Responsible Entity	Verification Action	Date Completed
Impact – Aesthetics				
AES-1: The exterior of above-ground facilities shall be finished with a non-reflective material in an earth tone that blends in with the natural environment.	Prior to and during construction	SCWD	SCWD will approve the exterior tank coating/color prior to construction.	
Impact – Cultural Resources				
CUL-1 – In the event that any historical, archeological or tribal cultural resources are discovered during excavation activities, work shall be stopped immediately and temporarily diverted from the vicinity of the discovery until a qualified archeologist and a member of the Fernandeño Tataviam Band of Mission Indians (Tribe) are notified and can identify and evaluate the importance of the find, conduct an appropriate assessment, and implement measures to mitigate impacts on significant resources.	During excavation activities	SCWD and Construction Contractor	The SCWD Project Manager or their designee shall monitor excavations during construction. If resources are found, SCWD will stop construction, notify a qualified archeologist and a member of the Tribe for an assessment, and modify construction activities as required.	

Mitigation Measure	Timing of Mitigation Monitoring	Responsible Entity	Verification Action	Date Completed
Impact – Noise				
Noise-1: SCWD and its contractors shall implement the following measures when Project-related construction is planned to occur within the City limits and/or within 1,500 feet of sensitive receptors:	Prior to and during construction	SCWD and Construction Contractor		
• Construction activities shall meet municipal code requirements related to noise. Construction activities shall be limited to between 7:00 a.m. and 7:00 p.m. Monday through Friday and 8:00 a.m. to 6:00 p.m. Saturday to avoid noise-sensitive hours of the day. Construction activities shall be prohibited on Sundays and holidays.			• Contractor shall comply with City encroachment permit conditions, with verification by SCWD inspector.	
• Construction equipment noise shall be minimized by muffling and shielding intakes and exhaust on construction equipment (per the manufacturer's specifications) and by shrouding or shielding impact tools.			• Contractor shall shield or muffle noise-generating equipment from nearby receptors where possible, with verification by SCWD inspector.	
• Construction contractors shall locate fixed construction equipment (such as compressors and generators) and construction staging areas as far as possible from nearby sensitive receptors including residences, schools, and hospitals.			• Contractor shall locate fixed equipment that generates noise as far as possible from sensitive receptors, with verification by SCWD inspector.	
• If construction were to occur near a school, the construction contractor shall coordinate with the most noise producing construction activities with school administration in order to limit disturbance to the campus.			• SCWD inspector will coordinate with the school and contractor to limit disturbance to the campus to the extent possible.	
Impact – Tribal Cultural Resources				
CUL-1 - Implementation of mitigation measure CUL-1 would reduce potentially significant impacts to less than significant.	During excavation activities	SCWD and Construction Contractor	The SCWD Project Manager or their designee shall monitor excavations during construction. If resources are found, SCWD will stop construction, notify a qualified archeologist and a member of the Tribe for an assessment, and modify construction activities as required.	

STATE OF CALIFORNIA
Governor's Office of Planning and Research
State Clearinghouse and Planning Unit

Edmund G. Brown Jr.
Governor

Ken Alex
Director

October 6, 2017

Brent Payne
Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, CA 91350

Subject: Recycled Water Program - Phase 2B - Pipeline, Pump Station and Tank
SCH#: 2017051028

Dear Brent Payne:

The State Clearinghouse submitted the above named Mitigated Negative Declaration to selected state agencies for review. The review period closed on October 5, 2017, and no state agencies submitted comments by that date. This letter acknowledges that you have complied with the State Clearinghouse review requirements for draft environmental documents, pursuant to the California Environmental Quality Act.

Please call the State Clearinghouse at (916) 445-0613 if you have any questions regarding the environmental review process. If you have a question about the above-named project, please refer to the ten-digit State Clearinghouse number when contacting this office.

Sincerely,

Scott Morgan
Director, State Clearinghouse

Santa Clarita Water Division
OCT 10 2017
RECEIVED

1400 TENTH STREET P.O. BOX 3044 SACRAMENTO, CALIFORNIA 95812-3044
TEL (916) 445-0613 FAX (916) 323-3018 www.opr.ca.gov

Document Details Report
State Clearinghouse Data Base

SCH# **2017051028**
Project Title Recycled Water Program - Phase 2B - Pipeline, Pump Station and Tank
Lead Agency Castaic Lake Water Agency

Type **MND** Mitigated Negative Declaration

Description Note: refer to SCH #2011051020

The CLWA Phase 2B recycled system will include a recycled water tank (approx 1 MG), a transmission pipeline from the Vista Canyon pump station to the proposed recycled water tank, distribution pipelines to serve major customers, and a backup potable water supply line from the existing Cherry Willow potable water tanks to the new recycled water tank to maintain flow through the recycled water distribution system if recycled water supply is interrupted. In addition to the Vista Canyon development, recycled water supply will be used to serve irrigation customers with landscaped areas in the Fair Oaks Ranch community. CLWA's goal for the phase 2B project is to use all of the available recycled water to offset potable water demands.

Lead Agency Contact

Name Brent Payne
Agency Castaic Lake Water Agency
Phone 661-259-2737 ***Fax***
email
Address 27234 Bouquet Canyon Road
City Santa Clarita ***State*** CA ***Zip*** 91350

Project Location

County Los Angeles
City Santa Clarita
Region
Lat / Long
Cross Streets Medley Ridge Dr and Cherry Willow Dr
Parcel No.
Township ***Range*** ***Section*** ***Base***

Proximity to:

Highways SR 14
Airports
Railways
Waterways
Schools
Land Use Z & GP: SP

Project Issues Noise; Aesthetic/Visual; Archaeologic-Historic

Reviewing Agencies Resources Agency; Department of Fish and Wildlife, Region 5; Department of Parks and Recreation; Department of Water Resources; California Highway Patrol; Caltrans, District 7; Native American Heritage Commission; State Water Resources Control Board, Division of Drinking Water; State Water Resources Control Board, Division of Drinking Water, District 15; State Water Resources Control Board, Divison of Financial Assistance; State Water Resources Control Board, Division of Water Rights; Regional Water Quality Control Board, Region 4

Date Received 09/06/2017 ***Start of Review*** 09/06/2017 ***End of Review*** 10/05/2017

Note: Blanks in data fields result from insufficient information provided by lead agency.

Environmental Checklist Form

1. Project title:
   Recycled Water Program—Phase 2B – Pipeline, Pump Station and Tank

2. Lead agency name and address:
   Castaic Lake Water Agency (CLWA)
   27234 Bouquet Canyon Road
   Santa Clarita, CA 91350

3. Contact person and phone number:
   Brent Payne
   Senior Engineer, (661) 259-2737

4. Project location:
   The proposed Project is located in the City of Santa Clarita, as shown in **Figure 1 – Regional Location** Map. In addition, the proposed Project is located in the middle of the CLWA boundaries and service area, as shown in **Figure 2 – CLWA Service Area and Water Purveyor Boundaries.** The CLWA service area encompasses approximately 195 square miles of land in incorporated and unincorporated areas in the Santa Clarita Valley area of Los Angeles County, as well as into eastern Ventura County.

5. Project sponsor's name and address:
   Same as Lead Agency

6. General plan designation: SP (Specific Plan)

7. Zoning: SP (Specific Plan)

8. Description of project: (Describe the whole action involved, including but not limited to later phases of the project, and any secondary, support, or off-site features necessary for its implementation. Attach additional sheets if necessary.)

Proposed Project

The proposed Project is called Phase 2B of the CLWA Recycled Water System and includes pipelines and a Cherry Willow RW Tank to be constructed by CLWA. The Project will provide recycled water in the vicinity of the Vista Canyon development using recycled water from the Vista Canyon Water Factory as shown in **Figure 3 – Proposed Project: CLWA Phase 2B Recycled Water System**. The Water Factory is being constructed by Vista Canyon to provide a source of recycled water to the Vista Canyon development with surplus recycled water that will be available to CLWA. The Vista Canyon Final EIR was certified on April 26, 2011 and covered the Water Factory, the pump station, and recycled piping within the Vista Canyon development (Tract 69164); accordingly, this Initial Study/Negative Declaration only addresses potential impacts related to the CLWA Phase 2B recycled water project.

Vista Canyon is a 185-acre mixed-use development currently under construction in Santa Clarita that includes up to 1,100 residential units and up to 950,000 square feet of commercial units. The estimated potable water demand for Vista Canyon is approximately 300,000 gallons per day (gpd) or 334 acre-feet per year (AFY). To offset some of Vista Canyon's potable water demand, the Project includes a recycled water facility, herein referred to as the Vista Canyon Water Factory, which will produce Title 22 tertiary disinfected recycled water for non-potable use with an approximate capacity of about 371,000 gpd or 415 AFY (RWQCB-LA Order R4-2016-0220). Wastewater generated from the Vista Canyon development will be conveyed by gravity flow to the Water Factory. The project includes provisions to divert wastewater from an existing sewer interceptor that serves existing development upstream of the Project site in order to provide for sustainable plant operation during the initial development period for Vista Canyon, and as a supplement source of wastewater feed as needed.

Figure 1 – Regional Location Map

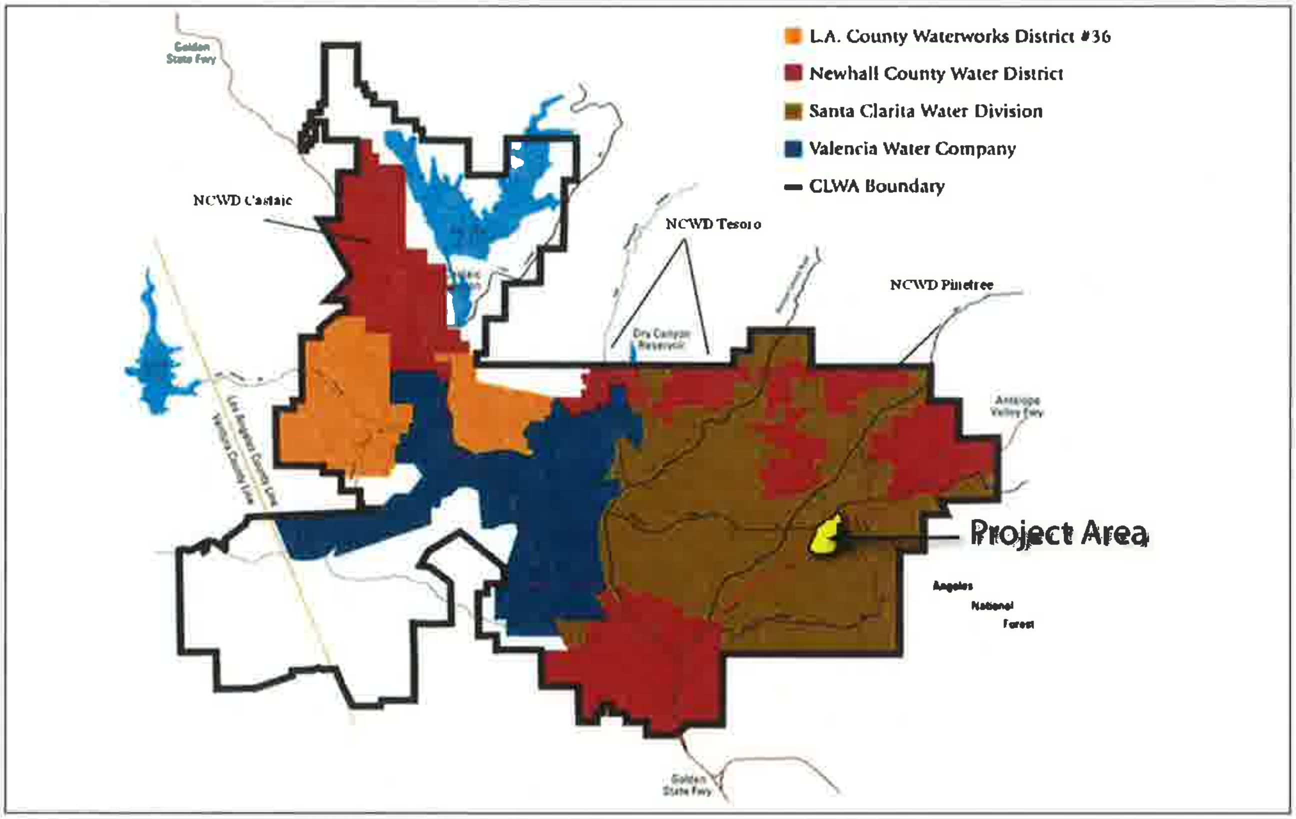

Figure 2 – CLWA Service Area and Water Purveyor Boundaries

The Vista Canyon development is estimated to use about 137 AFY of recycled water. The surplus recycled water is about 278 AFY and could be used to supply the CLWA Phase 2B recycled water system. Recycled water facilities associated with the Vista Canyon development were analyzed in the Vista Canyon Environmental Impact Report (April 2011) and included the Vista Canyon Water Factory, a 100,000-gallon effluent storage tank, effluent pumps sized for the requirements of the recycled system within the Vista Canyon development, and a recycled water distribution system within the Vista Canyon development. The scope of this Initial Study covers the infrastructure that extends outside the Vista Canyon development to be constructed by CLWA for the Phase 2B recycled system as shown in **Figure 3**.

The CLWA Phase 2B recycled system will include a recycled water Cherry Willow RW Tank with an approximate capacity of 1,000,000 gallon (1 MG), a transmission pipeline from the Vista Canyon pump station to the proposed recycled water Cherry Willow RW Tank, distribution pipelines to serve major customers, and a backup potable water supply line from the existing Cherry Willow potable water tanks to the new recycled water tank (with air gap separation) to maintain flow to the recycled water distribution system if recycled water supply is interrupted. In addition to the Vista Canyon development, major customers will include the Fair Oaks Ranch Park, the Fair Oaks Ranch Community School, and could be expanded to include other nearby irrigation customers with landscaped areas in the Fair Oaks Ranch community. CLWA's goal for the Phase 2B project is to use all of the available recycled water to serve existing irrigation customers to offset potable demands. The average annual recycled water demand for the Vista Canyon development is estimated to be about 137 AFY as stated above. The initial build-out of Phase 2B would include major SCWD irrigation customers with an estimated demand of approximately 163 AFY, and could be expanded to serve other SCWD customers to use the additional supply of 115 AFY in the near vicinity as needed[1].

The proposed 1.0 MG storage Cherry Willow RW Tank site (referred to as the Cherry Willow RW Tank herein) will be located approximately 1.25 miles southeast of the Vista Canyon development at a pad elevation of approximately 1,755 feet.

Access to the Cherry Willow RW Tank site is through existing paved roads and a fire trail road. The transmission pipeline will be 12-inch diameter and will extend approximately 5,400 lineal feet from the Vista Canyon pump station to the Cherry Willow RW Tank and will be routed along Lost Canyon Road, Medley Ridge Drive, and Cherry Willow Drive. A network of 8-inch- and 6-inch-diameter distribution lines will initially extend about 6,300 lineal feet to irrigation (recycled) water customers, with possible expansion of an additional 9,800 lineal feet to other nearby irrigation (recycled) water customers. For all proposed pipeline construction, the pipelines would be constructed using traditional cut and cover methods over the entire length. The typical trench would be approximately 3 feet wide with a depth of approximately 6.5 feet. Pipelines and infrastructure would be constructed in existing easements and in the public-right-of-way. The potential staging areas are located on **Figure 4 – Proposed Staging Areas**.

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1 Recycled water demands for Phase 2B were estimated using 2013 meter data provided by SCWD as reported in the Final Preliminary Design Report for the Recycled Water System Phase 2B (Kennedy/Jenks, October 2015). Estimated demands for the Vista Canyon development were reported in the Engineering Report for the Vista Canyon Water Factory (Dexter Wilson, November 2015). The Vista Canyon Specific Plan area was addressed in a previously prepared Final EIR; therefore, this Initial Study/Mitigated Negative Declaration only addresses those potential impacts related to the CLWA Phase 2B project.

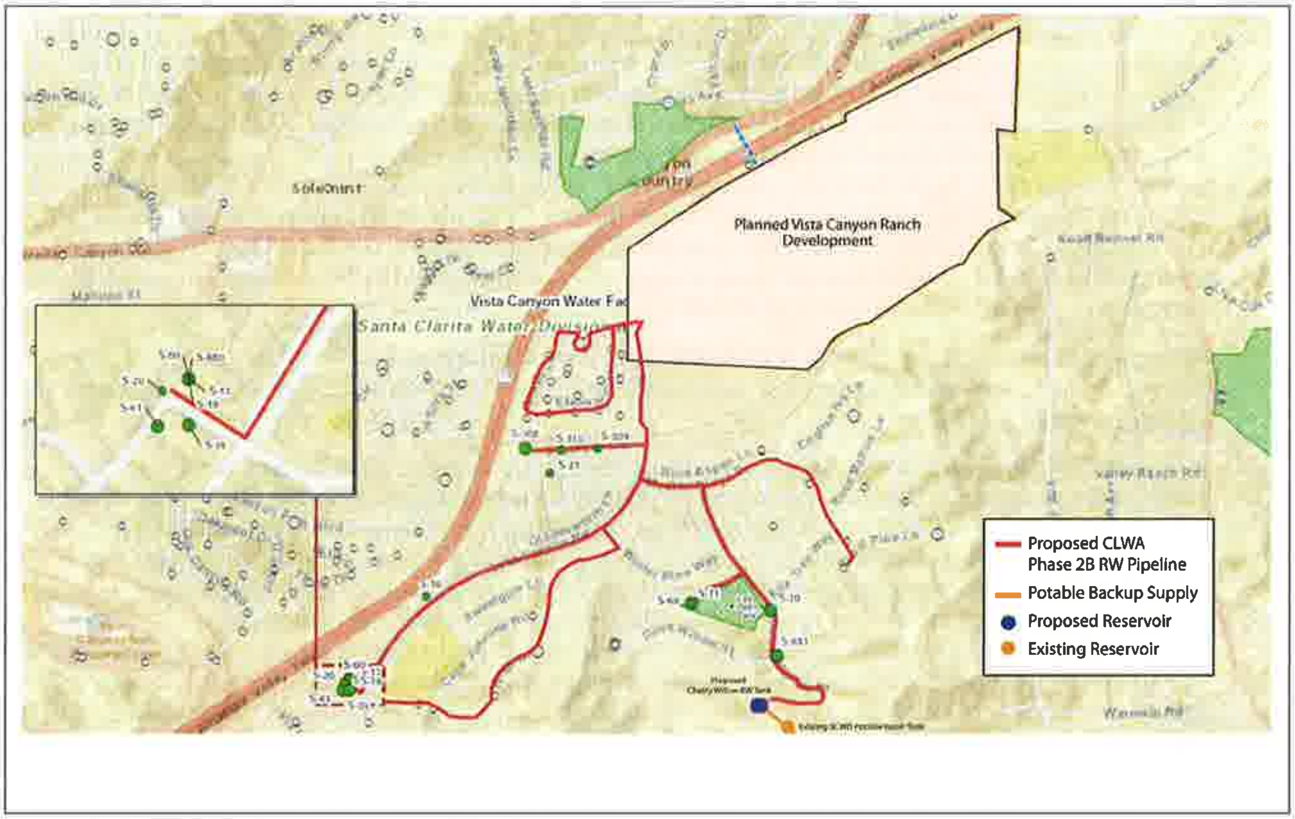

Figure 3 – Proposed Project: CLWA Phase 2B Recycled Water System

Figure 4 – Proposed Staging Areas

Construction

For all proposed pipeline construction, the pipelines would be constructed using traditional cut-and-cover methods over the entire length. The proposed pipelines would be installed with an excavator that would excavate a 3-foot-wide by 6.5-foot-deep trench and temporarily store the removed soils along the trench. Work crews would place the pipe in the trench, which would be backfilled by a loader or backhoe, and then compacted to match the existing grade. The temporary disturbance zone associated with pipe installation would be about 10 feet wide. The road would be restored to preconstruction conditions after pipe installation and trench backfill. The expected rate of progress for pipeline installation is approximately 200 lineal feet per day.

The Cherry Willow RW Tank site has been graded and is generally flat with an elevation of approximately 1,755 feet above mean sea level (msl). The pad elevation of the new Cherry Willow RW Tank will be approximately 1,755 feet (msl) with an approximate diameter of 70 feet and wall height of 32-feet. The Cherry Willow RW Tank will be painted an earthen tone color typically used by SCWD to blend with the terrain surrounding the site. The site will include perimeter chain-link fencing for security.

It is anticipated that construction of the Cherry Willow RW Tank will be approximately nine months performed in two phases. The first phase will include clearing the area, fine grading, and construction of the Cherry Willow RW Tank foundation, site piping and erection of the steel Cherry Willow RW Tank structure and will be approximately 6 months. There will be welding equipment on-site as well as a crane, a concrete pumper, concrete delivery trucks, an excavator, dump trucks, water trucks, and a fork lift. A crew of 10 to 15 workers is expected with three utility trucks. The second phase will be coating the tank and will be approximately 3 months. There will be painting equipment on-site as well as a crane, scaffolds, sand blasting equipment, and a forklift. A crew of eight workers is expected with three utility trucks.

9. Surrounding land uses and setting: Briefly describe the project's surroundings:

   The Project site is adjacent to existing development. Major uses include Fair Oaks Ranch Community School, single family homes, open space (adjacent to the Cherry Willow RW Tank site) and parks and recreation fields.

10. Other public agencies whose approval is required (e.g., permits, financing approval, or participation agreement.)

   The proposed Project would occur in the public roadway right-of-way. An encroachment permit from the City of Santa Clarita Department of Public Works would also be required. Other permits that would be required for the proposed Project—that could be the contractor's responsibility—are a General Construction Storm Water Permit and recycled water project permit from the Los Angeles Regional Water Quality Control Board, and a Trenching and Excavation Permit from the California Division of Occupational Safety and Health. The Project will be designed in accordance with the Water Main Separation requirements of Chapter 16, California Water Works Standards of Title 22, California Code of Regulations (CCR) and Section 7585 of Title 17, CCR for adequate backflow protection for the proposed backup potable water supply to the Cherry Willow Recycled Water Tank. Design plans will be submitted to the State Water Resources Control Board (SWRCB), Division of Drinking Water (DDW) for approval. No work will be performed within the State Right-of-Way, however, any over-sized transport vehicles performing project work that travel on State highways will require a Caltrans transportation permit.

   The following approvals and actions are required:

   - Adoption of the Mitigated Negative Declaration by CLWA
   - City of Santa Clarita encroachment permit
   - SWRCB, DDW approval of design plans

Environmental Factors Potentially Affected

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a "Potentially Significant Impact" as indicated by the checklist on the following pages.

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

DETERMINATION: (To be completed by the Lead Agency)

On the basis of this initial evaluation:

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

☒ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.

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

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

☐ I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

Keith Abercrombie 9/5/17

Signature Date

Signature Date

Evaluation of Environmental Impacts:

1) A brief explanation is required for all answers except "No Impact" answers that are adequately supported by the information sources a lead agency cites in the parentheses following each question. A "No Impact" answer is adequately supported if the referenced information sources show that the impact simply does not apply to projects like the one involved (e.g., the project falls outside a fault rupture zone). A "No Impact" answer should be explained where it is based on project-specific factors as well as general standards (e.g., the project will not expose sensitive receptors to pollutants, based on a project-specific screening analysis).
2) All answers must take account of the whole action involved, including off-site as well as on-site, cumulative as well as project-level, indirect as well as direct, and construction as well as operational impacts.
3) Once the lead agency has determined that a particular physical impact may occur, then the checklist answers must indicate whether the impact is potentially significant, less than significant with mitigation, or less than significant. "Potentially Significant Impact" is appropriate if there is substantial evidence that an effect may be significant. If there are one or more "Potentially Significant Impact" entries when the determination is made, an EIR is required.
4) "Negative Declaration: Less Than Significant With Mitigation Incorporated" applies where the incorporation of mitigation measures has reduced an effect from "Potentially Significant Impact" to a "Less Than Significant Impact." The lead agency must describe the mitigation measures, and briefly explain how they reduce the effect to a less than significant level (mitigation measures from "Earlier Analyses," as described in (5) below, may be cross-referenced).
5) Earlier analyses may be used where, pursuant to the tiering, program EIR, or other CEQA process, an effect has been adequately analyzed in an earlier EIR or negative declaration. Section 15063(c)(3)(D). In this case, a brief discussion should identify the following:
   a) Earlier Analysis Used. Identify and state where they are available for review.
   b) Impacts Adequately Addressed. Identify which effects from the above checklist were within the scope of and adequately analyzed in an earlier document pursuant to applicable legal standards, and state whether such effects were addressed by mitigation measures based on the earlier analysis.
   c) Mitigation Measures. For effects that are "Less than Significant with Mitigation Measures Incorporated," describe the mitigation measures which were incorporated or refined from the earlier document and the extent to which they address site-specific conditions for the project.
6) Lead agencies are encouraged to incorporate into the checklist references to information sources for potential impacts (e.g., general plans, zoning ordinances). Reference to a previously prepared or outside document should, where appropriate, include a reference to the page or pages where the statement is substantiated.
7) Supporting Information Sources: A source list should be attached, and other sources used or individuals contacted should be cited in the discussion.
8) This is only a suggested form, and lead agencies are free to use different formats; however, lead agencies should normally address the questions from this checklist that are relevant to a project's environmental effects in whatever format is selected.
9) The explanation of each issue should identify:
   a) the significance criteria or threshold, if any, used to evaluate each question; and
   b) the mitigation measure identified, if any, to reduce the impact to less than significance

Pursuant to the California Environmental Quality Act (CEQA) Guidelines, [2] an Initial Study is a preliminary environmental analysis that is used by the lead agency as a basis for determining whether an Environmental Impact Report (EIR), a Mitigated Negative Declaration, or a Negative Declaration is required for a project. The State CEQA Guidelines require that an Initial Study contain a project description; a location map; a description of the environmental setting; an identification of environmental effects by checklist or other similar form; an explanation of environmental effects; a discussion of mitigation for potentially significant environmental effects; an evaluation of the project's consistency with existing, applicable land use controls; and the names of persons who prepared the study.

This section provides an evaluation of the various topics considered for environmental review.

A brief explanation for the determination of significance is provided for all impact determinations except "No Impact" determinations that are adequately supported by the information sources the Lead Agency (Castaic Lake Water Agency) cites in the parentheses following each question. A "No Impact" determination is adequately supported if the referenced

2 California Code of Regulations, Title 14, §15063.

information sources show that the impact simply does not apply to the proposed project (e.g., the project falls outside a fault rupture zone). A "No Impact" determination includes an explanation of its bases relative to project-specific factors as well as general standards (e.g., the project will not expose sensitive receptors to pollutants, based on a project-specific screening analysis).

Explanations take account of the whole action involved, including off-site as well as on-site, cumulative as well as project-level, indirect as well as direct, and construction as well as operational impacts.

Once the Lead Agency has determined that a particular physical impact may occur, then the checklist indicates whether the impact is potentially significant, less than significant with mitigation, or less than significant. "Potentially Significant Impact" is appropriate if there is substantial evidence that an effect may be significant.

"Mitigated Negative Declaration: Less than Significant with Mitigation Incorporated" applies where the incorporation of mitigation measures has reduced an effect from "Potentially Significant Impact" to a "Less than Significant Impact." The lead agency must describe the mitigation measures, and briefly explain how they reduce the effect to a less-than-significant level.

Earlier analyses may be used where, pursuant to the tiering of a program EIR, or other CEQA process, an effect has been adequately analyzed in an earlier EIR or negative declaration. In this case, a brief discussion should identify the following:

a) Earlier Analysis Used. Identify and state where they are available forreview.
b) Impacts Adequately Addressed. Identify which effects from the above checklist were within the scope of and adequately analyzed in an earlier document pursuant to applicable legal standards, and state whether such effects were addressed by mitigation measures based on the earlieranalysis.
c) Mitigation Measures. For effects that are "Less than Significant with Mitigation Measures Incorporated," describe the mitigation measures which were incorporated or refined from the earlier document and the extent to which they address site-specific conditions for theproject.

1. Aesthetics

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
I. **AESTHETICS**. Would the project:				
a) Have a substantial adverse effect on a scenic vista?	☐	☒	☐	☐
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☒	☐
c) Substantially degrade the existing visual character or quality of the site and its surroundings?	☐	☒	☐	☐
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☒	☐

Discussion

a) Would the project have a substantial adverse effect on a scenic vista?

A scenic vista is a scene, view, or panorama and it is typically seen when climbing to the top of a mountain, or at a "scenic view" highway rest stop. Major facilities include a 1.0 MG recycled water Cherry Willow RW Tank and an associated transmission line to the proposed recycled water Cherry Willow RW Tank, distribution lines, and a backup potable water backup supply line from the existing Cherry Willow water tanks to the new recycled water tank to maintain flow through the recycled water distribution system in case recycled water supply is interrupted.

The major new facility that will be visible with the Project is the Cherry Willow RW Tank (a 1.0 MG storage tank site that is located approximately 1.25 miles southeast of the Vista Canyon development), having a pad elevation of approximately 1,755 feet.

Impacts to scenic vistas can occur when the visible scenic landscape itself is altered or when a new contrasting object is introduced that blocks or obstructs a scenic vista from a particular public vantage point.

Construction of proposed plan-related facilities, including a Cherry Willow RW Tank and pipelines could, result in short-term impacts to aesthetics and visual resources. Construction activities would require the use of heavy equipment and storage of materials on-site. During construction, excavated areas, stockpiled soils, and other materials at the construction site and staging areas would constitute negative aesthetics elements in the visual landscape. Although these temporary effects would be limited to construction, they could result in potentially significantly impacts to the long-term visual character of the area if not restored. However, any native or landscaped vegetation that was disturbed during construction would be restored upon completion of construction activities.

Pipelines would be located underground and would have no long-term visual impacts. The only significant above-ground facility is the Cherry Willow RW Tank which could contrast with existing surroundings. As a result, it would be painted with non-reflective earthen tones consistent with other SCWD water tanks in the vicinity to blend with the surrounding environment according to **Mitigation Measure AES-1**. Impacts related to scenic vistas would be less than significant with mitigation.

Mitigation Measures

AES-1: The exterior of above-ground facilities shall be finished with a non-reflective material in an earth tone that blends in with the natural environment.

Significance Determination

Less than significant with mitigation incorporated

State Scenic Highway

b) Would the project substantially damage scenic resources, including but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?

There are no substantial rock outcroppings that would be impacted by the project and no mature trees will be removed. Based on review of the California Department of Transportation (Caltrans) Scenic Highway Mapping System, there are no officially designated State Scenic Highways in the vicinity of the proposed plan area (Caltrans, 2015). As a result, the proposed plan would not degrade scenic resources within a state scenic highway. The SR-126 is considered an eligible state scenic highway (Caltrans, 2015). Pipelines, once constructed, would be underground and would not be visible from the SR-126. Currently the plan does not include any above-ground structures within the SR-126 corridor. As a result, impacts associated with implementation of the proposed plan would not visually impact an officially designated State Scenic Highway. Impacts would be less than significant.

Mitigation Measures

No mitigation is required.

Significance Determination

Less than significant impact

Visual Character

c) Would the project substantially degrade the existing visual character or quality of the site and its surroundings?

Construction activities associated with the Project facilities would require the use of construction equipment and storage of materials on-site, thus introducing contrasting features into the visual landscape that would affect the visual quality of proposed plan area. Contrasting features would include demolition materials, excavated areas, stockpiled soils, and other materials generated and stored on-site during construction. However, adverse effects to visual character associated with construction would be temporary and are considered less than significant.

The Cherry Willow RW Tank has been graded and is generally flat with an elevation of approximately 1,755 feet above mean sea level (msl), and will have an approximate diameter of 70 feet and wall height of 32 feet. The Cherry Willow RW Tank will be painted an earthen tone color typically used by SCWD to blend with the terrain surrounding the site. The Project area is located within the SCWD service area in previously disturbed areas, adjacent to potable water storage tanks that are also visible. There are two existing SCWD water 0.5 MG potable water tanks located approximately 550 feet southeast of the proposed recycled water (Cherry Willow RW Tank). Because the proposed recycled Cherry Willow RW Tank site is near existing SCWD potable water tanks, and the design is consistent with other tanks in the SCWD service area, there would be less-than-significant effect on the visual character of the surroundings. In addition, the Cherry Willow RW Tank site is partially screened from homes, based upon its setback from slopes and homes below the Cherry Willow RW Tank site.

Project pipelines would be installed underground and would not result in any long-term visual impacts. However, above-ground proposed plan facilities could have the potential to create long-term effects upon visual character of the area. Implementation of **Mitigation Measure AES-1** would require the painting of above-ground facilities with earth tone colors that would blend with the surrounding environment. Implementation of this mitigation measure would reduce impacts related to visual character to less than significant levels.

Mitigation Measures

Implement Mitigation Measure AES-1.

Significance Determination

Less than significant with mitigation incorporated

Light and Glare

d) Would the project create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

If security lighting is necessary during the construction or operation of the Project facilities, it may introduce new sources of light and glare to the proposed plan area. It is not anticipated that nighttime construction would occur or that above-ground facilities would require the installation of permanent new outdoor lighting. However, if security lighting is needed for Project facilities, lighting would be shielded to reduce potential glare impacts to local areas, consistent with implementing agency design standards. Impacts associated with light and glare would be less than significant.

Any necessary security lighting during construction or operation of proposed facilities shall be designed to be consistent with City zoning code and applicable design guidelines and to minimize glare to adjacent areas. To mitigate potential impacts due to nighttime lighting for construction activities near sensitive receptors, such as residential homes, construction activities shall be restricted to daytime hours on residential streets. If nighttime construction is required, temporary lighting must be directed onto the worksite and avoid any spill-over light or glare onto adjacent properties. Compliance with these codes and Project design will reduce any light and glare impacts to less than significant.

Mitigation Measures

No mitigation is required.

Significance Determination

Less than significant impact

2. Agriculture and Forestry Resources

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

Discussion

a) Would the project convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?

The Project area is primarily residential or commercial and is not currently used for agricultural operations. According to the California Department of Conservation "Los Angeles County Important Farmland 2014" map, the proposed construction staging areas are designated as "Grazing Land" or "Urban and Built-Up Land." The Project Site is designated as "Urban and Built-Up Land," "Grazing Land," and "Other Land." The Project Site is not designated as Farmland of Statewide Importance, Unique Farmland, or Farmland of Local Importance. Accordingly, no impacts would occur.[3]

Mitigation Measures

No mitigation is required.

Significance Determination

No impact

3 California Department of Conservation (DOC), Division of Land Resource Protection, "Los Angeles County Important Farmland 2014" http://maps.conservation.ca.gov/ciff/ciff.html. Accessed November 2016. 8 DOC, Division of Land Resource Protection, "State of California Williamson Act Contract Land Statewide Map" (2012), ftp://ftp.consrv.ca.gov/pub/dlrp/wa/2012%20Statewide%20Map/WA_2012_11x17.pdf . Accessed November 2016.

b) Would the project conflict with existing zoning for agricultural use, or a Williamson Act contract?

None of the staging areas, proposed transmission pipeline, and Cherry Willow RW Tank site are zoned for agricultural uses. The proposed Project and the proposed construction staging areas are not zoned for agricultural uses. The proposed pipelines and Cherry Willow RW Tank would not conflict with the existing zoning designations. Therefore, impacts would be less than significant.

The location of the proposed Project is not subject to a Williamson Act contract. Accordingly, no impacts would occur.

Mitigation Measures

No mitigation is required.

Significance Determination

No impact

c) Would the project conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?

The Project area is not currently designated as, or located near land designated for, forest, timberland, or timberland zoned Timberland Production. The land uses surrounding the Project Site include residential and commercial uses. Accordingly, no impacts would occur.

Mitigation Measures

No mitigation is required.

Significance Determination

No impact

d) Would the project result in the loss of forest land or conversion of forest land to non-forest use?

As previously discussed, the Project Site is not located within a forest area. All construction activities would occur within the public roadway right-of-way or on land to be deeded to CLWA by the developer, and the storage of construction equipment would not result in the loss of existing trees. The Project would not result in the loss of forestland or in the conversion of forestland to non-forest use.[4] Accordingly, no impacts would occur.

Mitigation Measures

No mitigation is required.

Significance Determination

No impact

4 City of Santa Clarita General Plan, "Zoning Map" (updated November 2016), http://www.santa-clarita.com/home/showdocument?id=6970.

e) Would the project involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?

As previously noted, the Project site is not designated as either farmland or forestland and does not involve farming or forestry operations. Furthermore, there are no agriculture or forestry operations in the vicinity of the Project site. Therefore, no such land would be converted and no impacts would occur.

Mitigation Measures

No mitigation measures are required.

Significance Determination

No impact

3. Air Quality

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
III. **AIR QUALITY**. Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. Would the project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☒	☐
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	☐	☐	☒	☐
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?	☐	☐	☒	☐
d) Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☒	☐
e) Create objectionable odors affecting a substantial number of people?	☐	☐	☒	☐

Discussion

a. Would the project conflict with or obstruct implementation of the applicable air quality plan?

The SCAQMD is the regional agency that provides air quality guidance with jurisdiction over the entire County. The most recently adopted comprehensive plan applicable to the proposed Project is the 2016 AQMP (March 2017). Regional growth projections are used by SCAQMD to forecast future emission levels in the South Coast Air Basin. The AQMP is implemented to meet the federal and State emission standards identified in both Clean Air Acts.

The Project does not include any changes to housing or population and would therefore not have the potential to conflict with the regional growth projections utilized in the formulation of the AQMP. In addition, and further discussed herein, the Project would not violate any air quality standard or contribute substantially to an existing or projected air quality violation. The proposed Project would meet the objectives and policies of the AQMP and would not establish new or modified permitted sources of non-attainment air contaminants or precursors, and would not conflict with the population projections identified within the latest SCAQMD AQMP. Therefore, impacts would be less than significant.

Mitigation Measures

No mitigation is required.

Significance Determination

Less than significant impact

b) Would the project violate any air quality standard or contribute substantially to an existing or projected air quality violation?

The Project Site is located in the Santa Clarita Valley (Source Receptor Area 13) within the South Coast Air Basin, which is designated as nonattainment for ozone and fine particulate matter ($PM_{2.5}$) under the National Ambient Air Quality Standards (AAQS), as well as particulate matter (PM_{10}) under the California Air Quality Standards.[5] To address potential impacts from construction and operational activities, the SCAQMD currently recommends that impacts from projects with mass daily emissions that exceed any of the thresholds outlined in **Table 1** below be

5 California Environmental Protection Agency (CalEPA), Air Quality Standards and Area Designation (December 2015), http://www.arb.ca.gov/desig/adm/adm.htm.

considered significant. The Lead Agency defers to these thresholds for the evaluation of construction and operational air quality impacts.

Table 1 – SCAQMD Thresholds of Significance

Pollutant	Construction Thresholds (pounds/day)	Operational Thresholds (pounds/day)
Reactive Organic Gases (ROG)	75	55
Nitrogen Oxides (NO_X)	100	55
Carbon Monoxide (CO)	550	550
Sulfur Oxides (SO_X)	150	150
Particulate Matter (PM_{10})	150	150
Fine Particulate Matter ($PM_{2.5}$)	55	55

Source: SCAQMD CEQA Handbook (SCAQMD, 1993), SCAQMD Air Quality Significance Thresholds, website: http://aqmd.gov/docs/default-source/ceqa/handbook/scaqmd-air-quality-significance-thresholds.pdf?sfvrsn=2; accessed April 2017.

Regional Construction Emissions

For purposes of analyzing impacts associated with air quality, this analysis assumes a construction schedule of approximately 7 to 8 months. With a maximum of 21,500 total lineal feet of water line installation and an average of 200 lineal feet installed per day, approximately 108 construction days would be needed for line installation and approximately 60 days would be needed for paving. Thus, a total of 168 construction days is estimated in this analysis, which equates to approximately 7 to 8 months of construction (based on an average of 22 construction days available per month). For purposes of this analysis, the following equipment mix would be considered the worst-case daily scenario: two excavators, one tractor/loader/backhoe, one paver, one grinder, up to five daily haul truck trips for spoils, concrete for slurry backfill, asphalt and sand. See **Appendix I** to this Draft IS/MND for additional details regarding construction assumptions.

These construction activities would temporarily create emissions of dusts, fumes, equipment exhaust, and other air contaminants. Trenching and line installation activities would primarily generate $PM_{2.5}$ and PM_{10} emissions. Mobile sources (such as diesel-fueled equipment on-site and traveling to and from the Project Site) would primarily generate NO_X emissions. The amount of emissions generated on a daily-basis would vary, depending on the amount and types of construction activities occurring at the same time. The analysis of daily construction emissions has been prepared utilizing the California Emissions Estimator Model (CalEEMod 2016.3.1) recommended by the SCAQMD. **Table 2, Estimated Peak Daily Construction Emissions**, identifies the Project's peak daily construction emissions.

These calculations assume that appropriate dust control measures would be implemented as part of the Project during each phase of development, as required by SCAQMD Rule 403 - Fugitive Dust. Specific Rule 403 control requirements include, but are not limited to, applying water in sufficient quantities to prevent the generation of visible dust plumes (two times per day), applying soil binders to uncovered areas, reestablishing ground cover as quickly as possible, and maintaining effective cover over exposed areas. As shown in **Table 2** associated with the project would not exceed any regional SCAQMD thresholds of significance. Therefore, construction impacts would be less than significant.

Table 2 – Estimated Peak Daily Construction Emissions

	Emissions in Pounds per Day					
Calendar Year	ROG	NO_X	CO	SO_X	PM_{10}	$PM_{2.5}$
2018 Peak Day	2.66	29.50	18.14	0.04	1.65	1.32
SCAQMD Thresholds	75.00	100.00	550.00	150.00	150.00	55.00
Significant Impact?	**No**	**No**	**No**	**No**	**No**	**No**

Note: Calculations assume compliance with SCAQMD Rule 403 – Fugitive Dust.
Calculation sheets are provided in Appendix I to this IS/MND.

Operational Emissions

The operation of the proposed pipeline and Cherry Willow RW Tank would not generate substantive air quality emissions, and any air quality emissions associated with motor vehicle trips for maintenance and operations would be minimal. Motor vehicle trips associated with routine maintenance would not occur on a regular daily basis, and a single daily motor vehicle trip would be sufficient for project operation and would be less than the worker trips analyzed under the more impactful construction scenario above. As shown above, all construction emissions, including emissions associated with daily worker trips, would be under the SCAQMD thresholds of significance. The proposed Project would also be required to comply with SCAQMD Rule 1113 to limit VOC content of architectural coatings, consistent with RWMP PEIR RR 3.3-1; SCAQMD Rule 201 which requires a Permit To Construct if a backup generator or an engine would be installed at either the pump station or Cherry Willow RW Tank that is greater than 50 brake horsepower; and SCAQMD Rule 402, which prohibits the discharge from a facility of air pollutants that cause injury, detriment, nuisance, or annoyance to the pubic or that damage business or property. Accordingly, impacts would be less than significant.

Mitigation Measures

No mitigation is required.

Significance Determination

Less than significant impact

c) Would the project result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?

Los Angeles County is in nonattainment for ozone, PM_{10}, and $PM_{2.5}$ at the state level. Related projects may exceed an air quality standard or contribute to an existing or projected air quality exceedance. With respect to determining the significance of the Project contribution, the SCAQMD neither recommends quantified analyses of construction and/or operational emissions from multiple projects nor provides methodologies or thresholds of significance to be used to assess the cumulative emissions generated by multiple cumulative projects. Instead, the SCAQMD recommends that a project's potential contribution to cumulative impacts be assessed utilizing the same significance criteria as those for project specific impacts. Furthermore, the SCAQMD states that if an individual development project generates less-than-significant construction or operational emissions impacts, then the development project would not contribute to a cumulatively considerable increase in emissions for those pollutants for which the Basin is in nonattainment.

As discussed above, the mass daily construction and operational emissions generated by the Project would not exceed any of thresholds of significance recommended by the SCAQMD. Also, as discussed below, localized emissions generated by the Project would not exceed the SCAQMD's Localized Significance Thresholds (LSTs). Therefore, the Project would not contribute a cumulatively considerable increase in emissions for the pollutants which the Basin is in nonattainment. Thus, cumulative air quality impacts associated with the Project would be less than significant.

Mitigation Measures

No mitigation is required.

Significance Determination

Less than significant impact

d) Would the project expose sensitive receptors to substantial pollutant concentrations?

Sensitive receptors are defined as schools, residential homes, hospitals, resident care facilities, daycare centers, or other facilities that may house individuals with health conditions that would be adversely impacted by changes in air quality. The proposed Project and its alternatives would be sited adjacent to the Fair Oaks Ranch Community School and single-family homes.

Emissions from construction activities have the potential to generate localized emissions that may expose sensitive receptors to harmful pollutant concentrations. The SCAQMD has developed localized significance threshold (LST) look-up tables for project sites that are one, two, and five acres in size to simplify the evaluation of localized emissions at small sites. LSTs are provided for each Source Receptor Area (SRA) and various distances from the source of emissions. SCAQMD, White Paper on Potential Control Strategies to Address Cumulative Impacts from Air Pollution, Appendix D: Cumulative Impact Analysis Requirements Pursuant to CEQA, August 2003, page D-3.

In the case of this analysis, the Project site is located within SRA 13 covering the Santa Clarita Valley area. The nearest sensitive receptors to the Project site are the adjacent residences and school use identified above. The closest receptor distance in the SCAQMD's mass rate look-up tables is 25 meters (about 82 feet). Projects that are located closer than 25 meters to the nearest receptor are directed to use the LSTs for receptors located within 25 meters. For the purposes of a conservative analysis, this analysis applies the 1-acre LSTs with sensitive receptors located within 25 meters of the Project area (this is the most restrictive threshold available).

As shown in **Table 3** below, peak daily emissions generated on-site during construction activities would not exceed the applicable construction LSTs for a 1-acre site in SRA 13. Therefore, localized air quality impacts from Project construction activities on the off-site sensitive receptors would be less than significant.

Table 3 – Localized On-Site Peak Daily Construction Emissions

	Total On-Site Emissions (pounds per day)			
Construction Phase [a]	**NO_x [b]**	**CO**	**PM_{10}**	**$PM_{2.5}$**
On-Site Trenching/Grading Emissions	16.04	6.61	0.74	0.68
On-Site Paving Emissions	10.31	10.26	0.58	0.54
Total On-Site Emissions	**26.35**	**16.87**	**1.32**	**1.22**
SCAQMD Localized Thresholds	*114.00*	*590.00*	*4.00*	*3.00*
Potentially Significant Impact?	No	No	No	No

Note: Calculations assume compliance with SCAQMD Rule 403 – Fugitive Dust.

a The localized thresholds for all phases are based on a one-acre site with a receptor distance of 25 meters (82 feet) in SCAQMD's SRA 13.

b The localized thresholds listed for NO_x in this table takes into consideration the gradual conversion of NO_x to NO_2, and are provided in the mass rate look-up tables in the "Final Localized Significance Threshold Methodology" document prepared by the SCAQMD. As discussed previously, the analysis of localized air quality impacts associated with NO_x emissions is focused on NO_2 levels as they are associated with adverse health effects.

Calculation sheets are provided in Appendix I to this IS/MND.

With respect to localized operational emissions, the LST methodology typically applies to operational projects such as warehouse/transfer facilities.[6] As the Project would include a Cherry Willow RW Tank and pipeline with minimal operational air emissions, an operational analysis against the LST methodology would not be applicable and these impacts would be considered less than significant.

Mitigation Measures

No mitigation is required.

Significance Determination

Less than significant impact

6 SCAQMD, Sample Construction Scenarios for Projects Less than Five Acres in Size, February 2005, page 1-3.

e) Would the project create objectionable odors affecting a substantial number of people?

According to the California Air Resources Board's Air Quality and Land Use Handbook[7], odors are the most common sources of air pollution complaints, and as with other types of air pollution, a number of factors need to be considered when determining potential effects on land use. Land uses that are more likely to produce odors include agriculture, chemical plants, composting operations, dairies, fiberglass molding, landfills, refineries, rendering plants, rail yards, and wastewater treatment plants. None of these uses are adjacent to the proposed Project.

Construction activities associated with the proposed Project (including the pipeline and the Cherry Willow RW Tank) would generate odors from heavy-duty equipment exhaust, including diesel and gasoline. Construction related odors associated with diesel and gasoline fumes will be transitory in nature and would not create objectionable odors affecting a substantial number of people. The impacts from these odors would be short term and would cease upon the completion of the pipeline and Cherry Willow RW Tank. The Project's operational use would not have any significant emission sources and would not result in odor complaints, considering the distance between the Cherry Willow RW Tank site and sensitive receptors, and is not categorized as a use typically associated with odor generation or complaints (see the list of these uses noted above). Accordingly, odor impacts during construction and operation would be less than significant.

Mitigation Measures

No mitigation is required.

Significance Determination

Less than significant impact

7 California Air Resources Board (CARB), Air Quality and Land Use Handbook: A Community Health Perspective (2005), p. 32.

4. Biological Resources

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
IV. **BIOLOGICAL RESOURCES**: Would the project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☐	☒	☐
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service?	☐	☐	☒	☐
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☐	☒
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	☒	☐
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☒	☐
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☒

Discussion

a) Would the project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?

The Project site is largely located in residential areas surrounded by landscaping with ornamental plant communities and largely devoid of habitat. Developed areas represent the majority of the ROW along the proposed alignment. These areas consist of paved areas, including the road and the paved shoulder, gutters, curbs, and sidewalks. The proposed pipeline and the staging areas would be located within the ROW and were determined to have minimal to no potential impact on federally threatened or endangered species (California Natural Diversity Database (CNDDB) based on the Results of a Biological/Regulatory Overview for the Recycled Water Program-Phase 2B, Santa Clarita, Los Angeles County, California prepared by Glenn Lukos Associates, December 6, 2016 (available from CLWA upon request)). The Biological/Regulatory Overview included site reconnaissance of the entire study area, and a review of CNDDB for the Mint Canyon quadrangle and surrounding quadrangles, a review of the 2016 California Native Plant Society on-line inventory, and a soil map review. The Vista Canyon EIR addressed the impacts from the Vista Canyon Water Factory, pump station and on-site pipelines. The Cherry Willow RW Tank site was addressed in the Fair Oaks Ranch EIR.

Species were considered based on a number of factors, including: 1) species identified by the November 2016 California Natural Diversity Database (CNDDB) as occurring (either currently or historically) on or in the vicinity of the proposed alignment; and 2) any other species that are known to occur within the vicinity of the proposed alignment, or for which potentially suitable habitat occurs on-site.

No special-status plants were observed on-site during the general survey. Twenty-three special- status plant species were identified by the CNDDB as occurring within the vicinity of the study area. Of these, eleven species were determined to have reasonable potential to occur within the study area, with a likelihood of occurrence ranging from very low to moderate. These species range in regulatory status and include San Fernando Valley spineflower (*Chorizanthe parryi* var. *fernandina*; federal candidate [FC] and SE; California Rare Plant Rank [CRPR] 1B.1), Parry's spineflower (*Chorizanthe parryi* var. *parryi*; CRPR 1B.1), mesa horkelia (*Horkelia cuneate* var. *puberula*; CRPR 1B.1), slender mariposa lily (*Calochortus clavatus* var. *gracilis*; CRPR 1B.2), Santa Susana tarplant (*Deinandra minthornii*; CRPR 1B.2), Davidson's bush-mallow (*Malacothamnus davidsonii*; CRPR 1B.2), white rabbit-tobacco (*Pseudognaphalium leucocephalum*; CRPR 2B.2), chaparral ragwort (*Senecio aphanactis*; CRPR 2B.2), Plummer's mariposa lily (*Calochortus plumerias*; CRPR 4.2), Peirson's morning-glory (*Calystegia peirsonii*; CRPR 4.2), and Palmer's grapplinghook (*Harpagonella palmeri*; CRPR 4.2).

Species were considered based on a number of factors, including: 1) species identified by the November 2016 CNDDB as occurring (either currently or historically) on or in the vicinity of the proposed alignment; and 2) any other special-status species that are known to occur within the vicinity of the proposed alignment, or for which potentially suitable habitat occurs on-site.

No special-status animals were observed on-site during the general survey (based on Results of a Biological/Regulatory Overview for the Recycled Water Program-Phase 2B, Santa Clarita, Los Angeles County, California; Glenn Lukos Associates, December 6, 2016 (available from CLWA upon request)). Thirty-five special-status animal species were identified by CNDDB as occurring within the vicinity of the study area. Of these, fifteen species were determined to have reasonable potential to occur within the study area, with a likelihood of occurrence ranging from very low to moderate, and for some of which use of the study area is restricted to foraging opportunities. These species range in regulatory status and include coastal California gnatcatcher (*Polioptila californica*; FT and SSC), white-tailed kite (*Elanus leucurus*; FP), Swainson's hawk (*Buteo swainsoni*; ST), pallid bat (*Antrozous pallidus*; foraging only; SSC), coastal whiptail (*Aspidoscelis tigris stejnegeri*; SSC), burrowing owl (*Athene cunicularia*; SSC), spotted bat (*Euderma maculatum*; foraging only; SSC), western mastiff bat (*Eumops perotis calfornicus*; foraging only; SSC), loggerhead shrike (*Lanius ludovicianus*; SSC), hoary bat (*Lasiurus cinereus*; foraging only; SSC), San Diego black-tailed jackrabbit (*Lepus californicus bennettii*; SSC), California leaf- nosed bat (*Macrotus californicus*; foraging only; SSC), San Diego desert woodrat (*Neotoma lepida intermedia*; SSC), southern grasshopper mouse (*Onychomys torridus ramona*; SSC), and coast horned lizard (*Phrynosoma blainvillii*; SSC).

A review of the November 2016 CNDDB identified the following special-status habitats as occurring within the vicinity of the proposed alignment: California walnut woodland, mainland cherry forest, Riversidean alluvial fan sage scrub, Southern California threespine stickleback stream, southern coast live oak riparian forest, southern cottonwood willow riparian forest, southern mixed riparian forest, southern riparian scrub, southern sycamore alder riparian forest, southern willow scrub, and valley oak woodland. These habitats are not present within the site, and no additional special-status habitats were observed based on the Results of a Biological/Regulatory Overview for the Recycled Water Program – Phase 2B, Santa Clarita, Los Angeles County, California (available from CLWA upon request). The Cherry Willow Tank pad site and access road is relatively void of vegetation and was previously graded. No vegetational resources exist on the Cherry Willow RW Tank pad site.

Mitigation Measures

No mitigation is required.

Significance Determination

Less than significant impact

b) Would the project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service?

The proposed Project would locate recycled water pipeline beneath existing streets and therefore would not have an impact on riparian areas. The proposed pump station would not result in significant direct or indirect impacts to riparian habitat and would be located in the developed part of the Vista Canyon project, as described and analyzed in Vista Canyon Draft EIR. The proposed Cherry Willow RW Tank location would be located on a hillside with open space. The footprint would be approximately 0.5 acres in size and there are no riparian resources located at the site or along the proposed alignment of the pipeline serving the Cherry Willow site. The site is a previously graded pad and the impacts of the proposed tank site were evaluated in the Fair Oaks Ranch EIR. Operation of the Vista Canyon Water Factory will result in less than significant impacts to downstream discharges to the Santa Clara river since the Water Factory is sized to treat only wastewater from the Vista Canyon development. Any intercepted flows from existing upstream sewer flows would only be required to provide for plant operation during the initial development of Vista Canyon, and as a supplemental source of wastewater as needed for sustainable plant operations. Any potential flow reductions in downstream wastewater plants would be offset by future growth in effluent at the Saugus Water Reclamation Plant and Valencia Water Reclamation Plant and considered de minimus with less than significant impacts.

Mitigation Measures

No mitigation is required.

Significance Determination

Less than significant impact

c) Would the project have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?

Section 404 of the Federal Clean Water Act authorizes the State of California to certify that federal permits and licenses do not violate the state's water quality standards. Executive Order 11990 aids in the protection of wetlands existing or under evaluation by the U.S. Army Corps of Engineers. The proposed recycled water pipelines would not adversely affect federally protected wetlands, because the pipelines will be located in developed areas with residential land uses. Construction activities for the proposed Cherry Willow RW Tank would be located in the disturbed area west of the existing Cherry Willow tank site. Because this area is not designated as a federally protected wetland (based on Results of a Biological/Regulatory Overview for the Recycled Water Program-Phase 2B, Santa Clarita, Los Angeles County, California; available from CLWA upon request), no impacts to wetlands would occur.

Mitigation Measures

No mitigation is required.

Significance Determination

No impact

d) Would the project interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?

Construction of the proposed Project would last approximately nine months beginning in the second quarter of 2017. All activities except for the construction of the tank would occur within existing paved roadway right-of-way. No trees would be removed as a result of construction activities. At the completion of construction, the pipeline would be located below ground and would not interfere with the movement of wildlife.

This hillside location for the Cherry Willow RW Tank is surrounded nearby by residential development to the south, west, east, and north and the tank would not impede movement between open space areas. Areas available as opportunities for wildlife movement would include the Santa Clara River located north of the proposed Project. The South Coast Missing Linkages (SCML) project has developed a comprehensive plan for a regional network that would maintain and restore critical habitat linkages between existing open space reserves.[8] As described in the SCML project, the Santa Clarita Valley contains portions of three linkages identified in the Missing Linkages project: the Santa Monica-Sierra Madre Mountains Connection, the Sierra Madre-Castaic Connection, and the San Gabriel-Castaic Connection. The Project would not impinge on any of these linkages. Therefore, impacts would be less than significant.

Mitigation Measures

No mitigation is required.

Significance Determination

Less than significant impact

e) Would the project conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

The City of Santa Clarita's Oak Tree Preservation ordinance requires the preservation of all healthy oak trees, including scrub oaks, within the City, unless compelling reasons justify the cutting, pruning, encroachment, and/or removal of such trees. Additionally, the ordinance states that no person shall cut, prune, remove, relocate, endanger, damage, or encroach into the protected zone of any oak on any public or private property within the City except in accordance with the conditions of a valid oak tree permit issued by the City. This generally applies to trees that are 6 inches or more in circumference (2 inches in diameter). The proposed pipelines would be located within urbanized and paved areas. Therefore, there would be no impact.

The area near the proposed Cherry Willow RW Tank site does not contain any trees. No other local policies or ordinances protecting biological resources would be applicable to the Project. Impacts would be less than significant.

Mitigation Measures

No mitigation is required.

Significance Determination

Less than significant impact

f) Would the project conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?

The Project site does not lie within the boundaries of any adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan. No impacts would occur from the proposed Project.

Mitigation Measures

No mitigation is required.

Significance Determination

No impact

8 South Coast Wildlands, South Coast Missing Linkages: A Wildland Network for the South Coast Ecoregion (2008), http://www.scwildlands.org/reports/SCMLRegionalReport.pdf.

5. Cultural Resources

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
V. **CULTURAL RESOURCES.** Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?	☐	☒	☐	☐
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	☐	☒	☐	☐
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☐	☐	☒
d) Disturb any human remains, including those interred outside of formal cemeteries?	☐	☐	☐	☒

Discussion

a) Would the project cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?

An Archaeological Inventory was performed by Greenwood and Associates. The effort included an archaeological record search and field survey. The field survey was conducted on November 21, 2016 by John M. Foster, Register of Professional Archaeologists (RPA), Greenwood and Associates. Transects were spaced at 10-meter intervals based on the potential for archaeological resources, and visibility within the Project site was excellent. Rodent and ground squirrel activity provided adequate supporting evidence of the absence of buried cultural resources in the impact areas.

The area had favorable environmental conditions to sustain or attract historical populations. California was claimed by Spain during the sixteenth century as part of the empire it was establishing in the New World. Europeans arrived in Los Angeles in 1769 with the Gaspar de Portolá expedition. To solidify their claims, the Spanish government fortified San Diego and Monterey and started to establish Mission outposts. San Fernando Mission was established in 1797, and by the early 1800s, most of the Tataviam population, with the exception of those who had fled into the interior mountains and valleys, had come into the Mission system. There is one known historical site (CA-LAN 4356H, the 1860 Mitchell Ranch) in the vicinity (i.e., within 1 mile) of the project area. Based on results of the Archaeological Inventory, there was no evidence of historical resources in the project area; therefore, the Project would not impact any historical resources.

While the Archeological Inventory did not identify any historical or archeological resources recorded or observed in the project area, the following mitigation measure (described below) is included to ensure that the potential for impact is less than significant.

Mitigation Measures

CUL-1 – In the event that any historical, archeological or tribal cultural resources are discovered during excavation activities, work shall be stopped immediately and temporarily diverted from the vicinity of the discovery until a qualified archeologist and a member of the Fernandeño Tataviam Band of Mission Indians are notified and can identify and evaluate the importance of the find, conduct an appropriate assessment, and implement measures to mitigate impacts on significant resources.

Significance Determination

Less than significant impact with mitigation.

b) Would the project cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?

An Archaeological Inventory was performed by Greenwood and Associates. The effort included an archaeological record search and a field survey. The field survey was conducted on November 21, 2016 by John M. Foster, Register of Professional Archaeologists (RPA), Greenwood and Associates. Transects were spaced at 10-meter intervals based on the potential for archaeological resources, and visibility within the Project site was excellent. Rodent and ground squirrel activity provided adequate supporting evidence of the absence of buried cultural resources in the impact areas.

The pipelines, pumping station, and Cherry Willow RW Tank sites are located in previously disturbed areas that have been graded The Cherry Willow RW Tank area was originally part of a ridge that has been subsequently graded to a level pad. The various pipelines are in new residential neighborhoods that have been terraced to create building pads. The pump station is located within the Vista Canyon development. No evidence of archaeological deposits or features were observed.

Recommended mitigation measures indicate that if archaeological resources are encountered during ground-disturbing activities, work should be temporarily diverted from the vicinity of the discovery until a qualified archaeologist and a member of the Fernandeño Tataviam Band of Mission Indians can identify and evaluate the importance of the find, conduct any appropriate assessment, and implement measures to mitigate impacts on significant resources.

Mitigation Measures

Implementation of mitigation measure CUL-1 would reduce potentially significant impacts to less than significant.

Significance Determination

Less than significant impact with mitigation

c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

There are no unique paleontological resources or unique geologic resources on or near the Project site (field survey conducted on November 21, 2016 by John M. Foster, RPA, Greenwood and Associates).

Mitigation Measures

No mitigation is required.

Significance Determination

No impact

d) Disturb any human remains, including those interred outside of formal cemeteries?

The Archaeology Inventory prepared by Greenwood and Associates did not identify any human remains or cemeteries in either the literature or the field survey. In the event that any human remains are found, the steps and procedures specified in the *California Health and Safety Code 7050.5*, CEQA Guidelines §15064.5 (d), and the *California Public Resources Code* 5097.98 shall be implemented.

Mitigation Measures

No mitigation is required.

Significance Determination

No impact

6. Geology and Soils

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
VI. **GEOLOGY AND SOILS**. Would the project:				
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:	☐	☐	☒	☐
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.?	☐	☐	☒	☐
ii) Strong seismic ground shaking?	☐	☐	☒	☐
iii) Seismic-related ground failure, including liquefaction?	☐	☐	☒	☐
iv) Landslides?	☐	☐	☒	☐
b) Result in substantial soil erosion or the loss of topsoil?	☐	☐	☒	☐
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	☐	☐	☒	☐
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?	☐	☐	☒	☐
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	☐	☐	☐	☒

Discussion

a) Would the project expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:

i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42?

The nearest regional faults are the San Gabriel and Holser faults with numerous regional faults in the Valley that are capable of producing strong seismically induced ground shaking. The San Gabriel Fault travels from the northwest to the southeast through Santa Clarita and crosses the proposed Project through the northeast end of Rye Canyon Road, which is not located close to the Project.[9] The development of the proposed Project would involve trenching a non-potable water pipeline approximately 5 feet below ground, and would not expose people to risks from earthquakes, because there are no proposed habitable structures intended for human occupancy—including the pump station and the Cherry Willow RW Tank. Additionally, the Project site is not located within an Alquist-Priolo Earthquake Fault Rupture Zone, as delineated by the California Geological Survey[10] and therefore there would be less than significant impact.

Mitigation Measures

No mitigation is required.

Significance Determination

Less than significant impact

9 Southern California Earthquake Data Center, "Faults of Southern California: Los Angeles Region" (2013), http://scedc.caltech.edu/significant/losangeles.html. Accessed June 2016.

10 DOC, California Geological Survey, CGS Information Warehouse: Regulatory Maps (2015), http://www.quake.ca.gov/gmaps/WH/regulatorymaps.htm.

a) Would the project expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:

ii) Strong seismic ground shaking?

The area is subject to ground shaking and potential damage in the event of earthquakes. As noted previously, the most likely source of strong ground shaking within the region would be a major earthquake along the San Andreas Fault Zone or from the San Gabriel or Holser faults. Because the Project site is located in a seismically active area, occasional seismic ground shaking is likely to occur within the lifetime of the proposed Project. One potential adverse effect on the Project from strong seismic ground shaking would be a fracture or rupture in the pipeline causing limited water flow. Implementation of appropriate engineering design measures as required by the latest California Building Code (CBC), including shut-off valve requirements, would minimize potential structural failures caused by earthquakes or other geologic hazards. The proposed Project, including the tank design, would be required to adhere to the provisions of the latest CBC. Compliance with the requirements of the latest CBC for structural safety during a seismic event would reduce hazards from strong seismic ground shaking. Impacts would be less than significant.

Mitigation Measures

No mitigation is required.

Significance Determination

Less than significant impact

a) Would the project expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:

iii) Seismic-related ground failure, including liquefaction?

Liquefaction refers to loose, saturated sand or gravel deposits that lose their load-supporting capability when subjected to intense shaking. Liquefaction usually occurs during or shortly after a large earthquake. The movement of saturated soils during seismic events from ground shaking can result in soil instability and possible structural damage.[11]

The Project Site is located within an identified liquefaction zone.[12] However, the project does not have structures that would be habitable or occupied thereby the potential for adverse effects is significantly reduced. Furthermore, the pipeline would be located in paved right-of-way and surrounded by certified base and fill, and the design and construction of the proposed pipeline and Cherry Willow RW Tank would be required to adhere to the latest CBC, which contains provisions for soil preparation to minimize hazards from liquefaction and other seismic-related ground failures. Accordingly, potential liquefaction impacts would be less than significant.

Mitigation Measures

No mitigation is required.

Significance Determination

Less than significant impact

11 City of Santa Clarita General Plan, "Safety Element" (2011), S-9.
12 DOC, "Newhall Quadrangle Zones of Required Investigations GIS Data," newh_lq layer.

a) Would the project expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:

iv) Landslides?

Landslides are the downslope movement of geologic materials that occur when the underlying geological support on a hillside can no longer maintain the load of material above it, causing a slope failure. The term "landslide" also commonly refers to a falling, sliding, or flowing mass of soil, rocks, water, and debris that may include mudslides and debris flows. The risks associated with landslides occur when buildings or structures are placed on slopes. The Project site is located within an area susceptible to landslides. However, the project does not have structures that would be habitable or occupied thereby the potential for adverse effects is significantly reduced. Furthermore, the proposed pipeline would be buried beneath right-of-way and would be designed and constructed to adhere to the latest CBC, which contains provisions for soil preparation to minimize hazards from seismically induced landslides, including that area associated with the Cherry Willow RW Tank pad. With adherence to the latest CBC, potential landslide impacts would be less than significant.

Mitigation Measures

No mitigation is required.

Significance Determination

Less than significant impact

b) Would the project result in substantial soil erosion or the loss of topsoil?

Erosion is the movement of rock fragments and soil from one place to another. Precipitation, running water, waves, and wind are all agents of erosion. Significant erosion typically occurs on steep slopes where storm water and high winds can carry topsoil down hillsides.

Construction of the proposed Project would result in the removal of soils from existing paved right-of-way and removal of topsoil for construction of the Cherry Willow RW Tank. Any topsoil removed from the pipeline trench would be stockpiled on-site and replaced after the pipeline is installed and the tank constructed. Standard best management practices as required under the National Pollutant Discharge Elimination System (NPDES) permit would require covering exposed material to minimize erosion impacts. Impacts would be less than significant.

Because this would not occur within open space areas, no loss of topsoil or soil erosion would occur. No impact would occur during operation of the proposed Project.

Mitigation Measures

No mitigation is required.

Significance Determination

Less than significant impact

c) Would the project be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?

The proposed pipeline would be located within the roadway right-of-way. Where the pipeline would be installed beneath the paved road, the asphalt surface would be saw cut, and a backhoe would be used to excavate a trench for the pipe. The road would be restored to preconstruction conditions after installing the pipe and backfilling the trench. The proposed Cherry Willow RW Tank will also be constructed as part of the project. The proposed Project would not result in substantial hazards from unstable or expansive soils and would be required to adhere to the latest CBC, which contains provisions for soil preparation to minimize hazards from liquefaction and other unstable geologic features. With adherence to the latest CBC standards, impacts would be less than significant.

Mitigation Measures

No mitigation is required.

Significance Determination

Less than significant impact

d) Would the project be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?

Expansive soils contain significant amounts of clay particles that have the ability to give up water (shrink) or take on water (swell). When these soils swell, the change in volume can exert pressures that are placed on them, and structural distress and damage to buildings could occur. The proposed pipeline would be constructed beneath the existing roadway and right-of-way, which are constructed on engineered fill. This fill material is not subject to significant expansion. Moreover, the impervious cover would minimize water infiltration, thereby minimizing soil expansion. Finally, proposed Cherry Willow RW Tank would be subject to a geotechnical study and would be required to adhere to the latest CBC, which contains provisions for soil preparation to minimize hazards from soil expansion. Accordingly, impacts would be less than significant.

Mitigation Measures

No mitigation is required.

Significance Determination

Less than significant impact

e) Would the project have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?

Development of the proposed Project would not require the installation of a septic tank or alternative wastewater disposal system. No impacts would occur.

Mitigation Measures

No mitigation is required.

Significance Determination

No impact

7. Greenhouse Gas Emissions

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

Discussion

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

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

Gases that trap heat in the atmosphere are called greenhouse gases (GHGs). Greenhouse gases are emitted by natural processes and human activities. The accumulation of greenhouse gases in the atmosphere regulates the earth's temperature. The State of California has undertaken initiatives designed to address the effects of greenhouse gas emissions, and to establish targets and emissions reduction strategies for greenhouse gas emissions in California. Activities associated with the Project would have the potential to generate greenhouse gas emissions.

The principal GHGs are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride (SF_6), perfluorocarbons (PFCs), hydrofluorocarbons (HFCs), and water vapor (H_2O). CO_2 is the reference gas for climate change, because it is the predominant greenhouse gas emitted. To account for the varying warming potential of different GHGs, GHG emissions are often quantified and reported as CO_2 equivalents (CO_2e).

GHG Significance Threshold

In December 2008, the SCAQMD adopted an interim 10,000 metric tons CO_2e (MT CO_2e) per year screening level threshold for stationary source/industrial projects for which the SCAQMD is the lead agency. Because the Project is considered a utility project, this threshold will be utilized for the purposes of illustrating the scope of the Project's GHG emissions.

Project GHG Emissions

Construction emissions represent an episodic, temporary source of GHG emissions. Emissions are generally associated with the operation of construction equipment and the disposal of construction waste. To be consistent with the guidance from the SCAQMD for calculating criteria pollutants from construction activities, only GHG emissions from on-site construction activities and off-site hauling and construction worker commuting are considered as Project-generated. Emissions of GHGs were calculated using CalEEMod 2016.3.1 for construction of the Project. As shown in **Appendix II** to this IS/MND, the construction of the Project would generate a one-time total of 160 metric tons of CO_2e.

The operation of the Project would not generate substantive GHG emissions, and any GHG emissions associated with motor vehicle trips for maintenance and operations of the project would be minimal. In addition, GHG impacts generated by a pump station would be less than significant through compliance with all applicable rules and regulations, including but not limited to SCAQMD Rule 201 (Permit to Construct) and Rule 402 (Nuisance). It should also be noted that implementation and ongoing operation of the project would allow the Lead Agency to provide recycled water within its jurisdiction to offset importing state water. As a result, the Project could decrease the use of relatively energy-intensive imported water, thereby reducing energy-related GHG emissions. Based on the above, it is clear the Project would not have the potential to exceed the 10,000 MT CO_2e per year screening level threshold adopted by the SCAQMD, and the Project would not have the potential to conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases. Therefore, impacts would be less than significant.

Mitigation Measures

No mitigation is required.

Significance Determination

Less than significant impact

8. Hazards and Hazardous Materials

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

Discussion

a) Would the project create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?

Development under proposed Project would not increase density and population within the Project area as the Project would only supply recycled water in place of potable water for existing large landscaped areas. Routine transportation of hazardous materials, including through traffic, poses a risk to residents within the City as a result of potential accidents involving trucks, rail, and other modes that are used to transport hazardous materials and wastes and are shared with the public. The proposed Project involves the use of recycled water and will not involve the routine use, transport, or disposal of significant amounts of hazardous materials, including hazardous chemical, radioactive, and biohazardous materials.

The operation of land uses that use, create, or dispose of hazardous materials is regulated and monitored by federal, state, and local regulations and policies. Specifically, future development within the City of Santa Clarita would be subject to compliance with the programs administered by the Agency and the County of Los Angeles. The owners or operators of businesses that handle or store hazardous materials equal to or above the reportable quantities would be subject to compliance with regulatory agencies. These programs, as well as other federal, state, and local regulations and policies, provide a high level of protection to the public and the environment. Compliance with appropriate regulations and policies would limit the impact from routine use, transport, or disposal of significant amounts of hazardous materials to less than significant.

Mitigation Measures

No mitigation is required.

Significance Determination

Less than significant impact

b) Would the project create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?

Because the proposed Project is in a residential area and is either in or adjacent to developed right-of-way, there is a potential for accident conditions to occur during construction. However, compliance with the traffic management requirements of the City of Santa Clarita's encroachment permit and the RWQCB's storm water permitting will reduce the risk of any hazard during construction. As a result, the impact to construction workers or the public would be less than significant.

Operation

Businesses that store large quantities of hazardous materials (e.g., fuel storage facilities, chemical warehouses) can be subject to accidents that result from transporting, pumping, pouring, emptying, injecting, spilling, and dumping or disposing of hazardous materials and wastes and that could be released into the environment. The severity of potential effects varies with the activity conducted and the concentration and type of waste involved. However, as discussed above, the proposed Project would not significantly increase the amount of hazardous materials used as it is conveying and storing California Title 22 disinfected tertiary recycled water in accordance with applicable regulations and permits. Additionally, federal, state, and local regulations and policies governing the use of hazardous materials strictly regulate the proper handling of such materials and their containers to ensure that accidents involving the release of toxic materials into the environment do not occur. Compliance with appropriate regulations and policies, specifically Title 22 and RWQCB recycled water permitting, would limit the impact from release of hazardous materials to less than significant.

Mitigation Measures

No mitigation is required.

Significance Determination

Less than significant impact

c) Would the project emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?

Fair Oaks Community School is located at the edge of being within the proposed Project area. Hazardous materials could be used during construction of pavement and uses within the specific plan area, including the use of standard construction materials (e.g., paints, solvents, and fuels), cleaning and other maintenance products (used in the maintenance of pumps, pipes, and equipment), and diesel and other fuels (used in construction and maintenance equipment and vehicles). The Cherry Willow RW Tank site is more than one-quarter mile from the Fair Oaks Community School and not anticipated to store hazardous waste.

Federal, state, and local regulations and policies governing the use of hazardous materials strictly regulate the proper handling of such materials and their containers to ensure that accidents involving the release of toxic materials into the environment do not occur. Compliance with appropriate regulations and policies would limit the impact from release of hazardous materials to less than significant.

Mitigation Measures

No mitigation is required.

Significance Determination

Less than significant impact

d) Would the project be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?

A geographical search for hazardous materials sites, as defined in *California Government Code* §65962.5, utilizing the online environmental database GeoTracker,[13] produced no locations of potential hazardous material within 1 mile of the Project site. Therefore, would be no hazard to the public or environment.

Mitigation Measures

No mitigation is required.

Significance Determination

No impact

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?

The closest airport to the Project site is the Agua Dulce Airpark located approximately 13 miles to the northeast. Therefore, the proposed pipeline would not be located within an airport land use plan or within 2 miles of a public airport or public use airport. No safety hazard impacts would occur to people residing or working in the area of the proposed Project.

All structures would be subsurface; no structures will be constructed aboveground that would obstruct any airport operations. Therefore, no safety hazards resulting from airport proximity are expected. No impact would occur.

Mitigation Measures

No mitigation is required.

Significance Determination

No impact

f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?

The nearest airport, public or private, is the Agua Dulce Airpark located approximately 12 miles to the northeast. The proposed Project site would not be located near a private airstrip; therefore, the Project would not create a safety hazard for those working within the Project site. No impact would occur.

Mitigation Measures

No mitigation is required.

Significance Determination

No impact

13 State Water Resources Control Board, GeoTracker, http://geotracker.waterboards.ca.gov/. Accessed November 21, 2016.

g) Would the project impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?

When installed, the Project would not interfere with traffic flow or otherwise hamper emergency response or evacuation plans because all of the components will be located in the streets or rights-of-way. The Cherry Willow RW Tank site is not located where it might interfere with the movement of emergency vehicles. The Project construction (pump station, pipelines, and the Cherry Willow RW Tank) would be consistent with the Traffic Control Plan to ensure that no excavations result in road closure or lane shutdown that interfere with emergency evacuation plans. The size and number of maintenance vehicles present at these components would not interfere with traffic flow. Operation-related impacts would be less than significant.

Mitigation Measures

No mitigation is required.

Significance Determination

No impact

h) Would the project expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?

The Project pipelines will be located in existing streets and rights-of-way with irrigated landscaping and there wouldn't be an increased risk of wildfire. The proposed tank site is in a Very High Fire Hazard Severity Zone (VHFHSZ).34. Construction activities (e.g., the use of welding torches or other tools) within these areas may increase fire danger. The use of flames/sparks in hillside brushy areas would likewise increase the risk of wildfire. However, the tank site has been graded and is largely devoid of natural vegetation that might result in an increased wildfire risk. Operation of the proposed Project would not exacerbate the potential for wildfires because there are no ignitable materials or processes from moving recycled water that would have the potential to create a fire. Therefore, impacts related to exposing people or structures to adverse effects from wildfires would be less than significant.

Mitigation Measures

No mitigation is required.

Significance Determination

Less than significant impact

9. Hydrology and Water Quality

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
IX. **HYDROLOGY AND WATER QUALITY**. Would the project:				
a) Violate any water quality standards or waste discharge requirements?	☐	☐	☒	☐
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?	☐	☐	☐	☒
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?	☐	☐	☒	☐
d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?	☐	☐	☒	☐
e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	☐	☐	☒	☐
f) Otherwise substantially degrade water quality?	☐	☐	☒	☐
g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	☐	☐	☐	☒
h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?	☐	☐	☐	☒
i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?	☐	☐	☒	☐
j) Inundation by seiche, tsunami, or mudflow?	☐	☐	☐	☒

Discussion

a) Would the project violate any water quality standards or waste discharge requirements?

Water quality in surface and groundwater bodies is regulated by the State Water Quality Control Board (SWQCB) and Regional Water Quality Control Boards (RWQCBs). The Los Angeles RWQCB is responsible for implementation of State and federal water quality protection guidelines near the Project Site.[14] The proposed Project is located within paved and urbanized areas within existing City street right-of-way. No construction will occur within State Right of Way, and no discharge to state highway facilities will be permitted. Construction of the recycled water pipeline and Cherry Willow RW Tank would include excavation activities that would have the potential to generate sediment-laden runoff during rain events. Storm water runoff from construction sites is regulated by the General Permit for Storm Water Discharges Associated with Construction Activity from Small Linear Underground Projects (Water Quality Order 2009-0009-DWQ, amended by 2010-0014-DWQ & 2012-0006-DWQ) issued by the SWQCB. According to the fact sheet for Order 2012-0006-DWQ, construction activities associated with small linear underground projects that result in land disturbances greater than one acre (referred to as linear utility projects [LUPs]), are not like traditional construction projects. Small LUPs have a lower potential to impact receiving waters because these projects are typically short in duration and are constructed within or around

14 CalEPA, State Water Control Board, "State and Regional Water Boards," http://www.waterboards.ca.gov/waterboards_map.shtml. Accessed June 2016.

hard-paved surfaces that result in minimal disturbed land areas being exposed at the close of the construction day.[15] Therefore, Water Quality Order 2012-0006-DWQ, and the NPDES General Permit have been adopted statewide for storm water discharges associated with construction activity from small linear underground/overhead projects.

Construction of the recycled water system Cherry Willow RW Tank would be located within an elevated open space area. Grading activities for the construction of the Cherry Willow RW Tank will occur at a previously rough graded pad and the immediately surrounding vegetation has been removed. Construction activities that impact more than 1 acre are subject to the requirements of the NPDES Construction General Permit. The area disturbed by the Cherry Willow RW Tank would be between 0.25 acre and 0.75 acres, including the Cherry Willow RW Tank footprint, staging areas, and access roadways. Therefore, the Cherry Willow RW Tank construction would not be subject to the NPDES Construction General Permit.

Furthermore, the proposed Project would be required to comply with all applicable federal, state, and local regulations including the California Water Code, CCR Title 22, CCR Title 17, California Department of Public Health Guidelines, the Los Angeles Regional Water Quality Control Board, and the Los Angeles County Department of Health Services Cross-Connection and Water Pollution Control Program. For construction activities that are regulated by the NPDES permit, coverage under and compliance with the NPDES Construction General Permit would ensure that the impacts would be less than significant.

Mitigation Measures

No mitigation is required.

Significance Determination

Less than significant impact

b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?

The construction of the pipeline would occur under existing roadways and would not result in an increase in the amount of impervious surface that would interfere with groundwater recharge. The proposed Cherry Willow RW Tank would be located in the eastern portion of the site. The footprint of the Cherry Willow RW Tank would range from 0.25 to 0.75 acre in size. As described in Section 6, Geology and Soils (beginning on page 28), the soils of the hillside west and adjacent to the Cherry Willow RW Tank facilities are well drained. The proposed Project would not involve pumping of groundwater and would not otherwise have an impact on the depletion of groundwater supplies or interfere with groundwater recharge. The purpose of the proposed Project is to provide retail recycled water to users in the City of Santa Clarita. The project includes provisions to divert wastewater from an existing sewer interceptor that serves existing development upstream of the Project site in order to provide for sustainable plant operation during the initial development period for Vista Canyon, and as a supplement source of wastewater feed as needed. The Project will treat wastewater generated from the Vista Canyon development, and will only use sewage intercepted for initial startup of the Vista Canyon Water Factory, or to sustain plant operations as required. Accordingly, any potential flow reductions in downstream wastewater plants would be offset by future growth in effluent at the Saugus Water Reclamation Plant and Valencia Water Reclamation Plant and considered de minimus. Therefore, the proposed Project would have no impact on the groundwater basin.

Mitigation Measures

No mitigation is required.

15 Los Angeles Regional Water Quality Control Board. Water Quality Order 2009-0009-DWQ, as amended by 2012-0006

Significance Determination

No impact

c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?

The construction of the proposed pipeline would occur within the existing roadways and the construction of the Cherry Willow RW Tank would occur on a previously graded pad atop a small knoll. Storm water runoff from the Project Site during construction could contain soils and sediments from these activities. Spills or leaks from heavy equipment and machinery, construction staging areas, or building sites can also enter runoff, which typically include petroleum products such as fuel, oil and grease, and heavy metals. According to the requirements of the NPDES permit, appropriate BMPs would be applied during construction activities to minimize water quality impacts.

The BMPs most often used during construction activities include surrounding the construction site with sand bags and/or silt fencing (to minimize sediment-laden runoff entering the storm drain system or downstream waters) and timing the grading activities to avoid the rainy season. Construction activities associated with the proposed Project would be less than significant.

Operation of the recycled water pipeline and Cherry Willow RW Tank would not alter the existing drainage pattern of the Project site. Existing drainage would only be slightly modified until the pipes have been inserted and soil replaced and then the area will be returned to its previous grade. The tank access road would be modified and after construction any excavated soils would be replaced. Impacts would be less than significant.

Mitigation Measures

No mitigation is required.

Significance Determination

Less than significant impact

d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?

As described in Section 9.c, the BMPs most often used during construction activities include surrounding the construction site with sand bags and/or silt fencing (to minimize sediment-laden runoff from entering the storm drain system or downstream waters) and timing the grading activities to avoid the rainy season. Compliance with the NPDES Construction General Permit, the preparation and implementation of an SWPPP, and implementation of erosion and treatment control BMPs would ensure that any impacts to downstream waters resulting from construction activities associated with the proposed Project would be less than significant.

The use of recycled water instead of potable water for irrigation purposes would not change existing irrigation application practices, and the application of recycled water for landscape irrigation would be managed to meet the transpiration demand. Therefore, the use of recycled water would not alter the rate or amount of surface runoff in a manner that would result in flooding.

Additionally, the design of the proposed Project pipelines would allow post-construction water runoff to continue in existing directions since the grades will be restored. The development of the tank site and access road would not alter the rate or amount of surface runoff in a manner that would result in flooding due to the modest increase in impermeable surface and the restoration of the grade for the tank. As such, the proposed Project would not alter the existing drainage pattern of the site or area, including through the alternation of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding on or off site. Less than significant impacts would occur.

Mitigation Measures

No mitigation is required.

Significance Determination

Less than significant impact

e) Would the project create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?

The proposed Project would construct a pipeline within City roadway right-of-way. Large areas of impervious surfaces would not be created as a result of the proposed Project including the tank site and the access road. Construction would be temporary and implementation of BMPs to during a rain event would minimize the amount of runoff entering the existing storm drain system. Construction impacts would be less than significant.

The roadways would be restored to existing conditions to ensure that the existing surface water runoff is not altered. Impacts during operation would be less than significant.

Mitigation Measures

No mitigation is required.

Significance Determination

Less than significant impact

f) Otherwise substantially degrade water quality?

Construction activities would include BMPs to minimize erosion and surface water runoff from the site. The amount of impervious surface on-site at Project completion would be similar to that for existing conditions. The amount of runoff from the site would not be substantially changed to that of existing conditions because Project development would not increase the amount of runoff or contribute to the degradation of water quality. Recycled water would meet applicable federal, state, and local regulations including the California Water Code, CCR Title 17, and CCR Title 22 water quality standards and the Los Angeles County Department of Health Services Cross-Connection and Water Pollution Control Program. Therefore, no new pollutants that would degrade water quality would be added to the Project Site. Impacts would be less than significant.

Mitigation Measures

No mitigation is required.

Significance Determination

Less than significant impact

g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?

h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?

According to the City of Santa Clarita Digital Flood Insurance Rate Map (DFIRM) Flood Zones the proposed pipeline or pump station would not redirect flood flows. The Cherry Willow RW Tank would be located on a hillside outside of the identified flood zone along Santa Clarita River. Impacts would be less than significant.

Furthermore, the proposed Project would not construct any new homes and would not have any aboveground structures that would impede or redirect flood flows. There would be no impacts.

Mitigation Measures

No mitigation is required.

Significance Determination

No impact

i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?

The proposed Project would construct a recycled water pipeline within the roadway right-of-way, a Cherry Willow RW Tank and a pump station adjacent to Vista Canyon WTP facilities. The recycled water pipelines would be located beneath the street right-of-way. As a result, they would not expose people or structures to flooding. The proposed Cherry Willow RW Tank would be located on a hillside. There would be potential to expose the residential land uses to the south to flooding from structural failure as a result of Cherry Willow RW Tank failure. The design of the Cherry Willow Tank site would be based on the most current CBC standards to minimize the potential for structural failure in compliance with the UBC. As a result, the proposed Project would not expose people or structures to a significant risk of flooding.

The proposed Project would not involve the construction of any housing, or inhabitable structures. As such, it would not expose people or structures to flooding. Impacts would be less than significant.

Mitigation Measures

No mitigation is required.

Significance Determination

Less than significant impact

j) Inundation by seiche, tsunami, or mudflow?

Tsunamis are large-scale sea waves produced from tectonic activities along the ocean floor. Seiches are freestanding or oscillatory waves associated with large enclosed or semi-enclosed bodies of water. Given that the Project Site is not located near the ocean or any large enclosed or semi-enclosed bodies of water, the proposed Project would not be located within designated tsunami or seiche zones. Debris and mudflows are typically a hazard experienced in the floodplains of streams that drain very steep hillsides within the watershed. These types of hazards are not expected to impact the Project because the proposed Project would not place people or structures at risk of inundation by seiche, tsunami, or mudflow. No impacts would occur.

Mitigation Measures

No mitigation is required.

Significance Determination

No impact

10. Land Use and Planning

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
X. **LAND USE AND PLANNING**. Would the project:				
a) Physically divide an established community?	☐	☐	☐	☒
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☐	☒
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?	☐	☐	☐	☒

Discussion

a) Would the project physically divide an established community?

b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?

c) Conflict with any applicable habitat conservation plan or natural community conservation plan?

The proposed Project would not physically divide an established community as the pipelines are proposed to be constructed underground in the right-of-way. There would be no impacts due to the Cherry Willow Tank site or the pump station. No plan conflicting with jurisdiction over the site plan would be applicable. Additionally, no habitat conservation or plan natural community conservation plan is applicable to the proposed Project site.

Mitigation Measures

No mitigation is required.

Significance Determination

No impact

11. Mineral Resources

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

Discussion

a) Would the project result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?

The proposed Project pipelines would be constructed within existing roadways and within the public right-of-way., The Cherry Willow Tank site and pump station are structures that are not significantly long and might, thereby, divide a community. None of the project components would restrict access to resources due to the limited footprints. Mineral resources conditions would remain unchanged from how they currently exist, and therefore, no impact would occur.

Mitigation Measures

No mitigation is required.

Significance Determination

No impact

b) Would the project result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?

The proposed Project would be constructed within the public right-of-way in existing roadways, and mineral resources conditions would remain unchanged from how they currently exist. Both the pipelines and the Cherry Willow RW Tank site are not delineated as mineral resource recovery sites in any local plans. Therefore, the proposed Project would not result in the loss of availability of locally important mineral resource recover sites delineated on the Santa Clarita Valley Area Plan and no impact would occur.

Mitigation Measures

No mitigation is required.

Significance Determination

No impact

12. Noise

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XII. **NOISE** -- Would the project result in:				
a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☒	☐	☐
b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☒	☐
c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☒	☐
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☒	☐	☐
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒
f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒

Discussion

a) Would the project result in exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

The Santa Clarita General Plan requires that construction noise is controlled adjacent to sensitive uses through hours of operation, noise reduction requirements on equipment, and other appropriate measures. The City has developed standards for construction noise and limits construction work which requires a building permit from the City on sites within 300 feet of a residentially zoned property except between the hours of 7:00 a.m. to 7:00 p.m. (Monday through Friday), and 8:00 a.m. to 6:00 p.m. on Saturday. As shown in **Table 4** below, the maximum allowable level for noise received on a property during the day ranges from 65 dBA at residential uses to 80 dBA at commercial/manufacturing uses.

Table 4 – City of Santa Clarita Noise Limits (dBA)

Construction Time	Residential	Commercial/ Manufacturing
7:00 a.m. to 8:00 p.m. except Sundays and legal holidays	65	80
8:00 p.m. to 7:00 a.m. except Sundays and legal holidays	55	70

Construction

It should be noted that the California Government Code exempts the development of water and wastewater infrastructure projects initiated by water agencies from County and City building and zoning ordinances. However, for analysis purposes construction noise levels will be compared to City of Santa Clarita Municipal Code.

Estimated noise levels associated with the trenching activities are presented in **Table 5** below.

Table 5 – Typical Maximum Noise Levels for Construction Equipment

	Approximate Leq (Equivalent Sound Level)			
Equipment	**25 feet**	**50 feet**	**100 feet**	**200 feet**
Grader	91 dBA	85 dBA	79 dBA	73 dBA
Truck	90 dBA	84 dBA	78 dBA	72 dBA
Backhoe	86 dBA	80 dBA	74 dBA	68 dBA

Source: U.S. Department of Transportation, Construction Noise Handbook, ch. 9.0, August 2006.

As previously discussed, the City does not have specific construction noise limits, only construction timeframes. No uses of a commercial nature are located in close proximity to the Project.

Pipeline construction is proposed for the right-of-way on existing streets. The nearest residential use to the proposed pipeline alignment is located approximately 100 feet to the south. Only a truck and backhoe would be utilized in this location.

Due to the temporary nature of the construction activities, the proposed Project construction phase, including the tank and access road, would not expose residents to noise levels exceeding the established standards for more than several days at a time.

To minimize construction noise levels on adjacent sensitive receptors, policies within the Santa Clarita General Plan require noise attenuating buffers near residential areas and orienting stationary sources to direct noise way from sensitive uses. With mitigation consistent with the Santa Clarita General Plan, the proposed construction noise levels would result in less than significant impacts during construction.

Mitigation Measure

Noise-1: SCWD and its contractors shall implement the following measures when Project-related construction is planned to occur within the City limits and/or within 1,500 feet of sensitive receptors:

- Construction activities shall meet municipal code requirements related to noise. Construction activities shall be limited to between 7:00 a.m. and 7:00 p.m. Monday through Friday and 8:00 a.m. to 6:00 p.m. Saturday to avoid noise-sensitive hours of the day. Construction activities shall be prohibited on Sundays and holidays.
- Construction equipment noise shall be minimized by muffling and shielding intakes and exhaust on construction equipment (per the manufacturer's specifications) and by shrouding or shielding impact tools.
- Construction contractors shall locate fixed construction equipment (such as compressors and generators) and construction staging areas as far as possible from nearby sensitive receptors including residences, schools, and hospitals.
- If construction were to occur near a school, the construction contractor shall coordinate with the most noise producing construction activities with school administration in order to limit disturbance to the campus.

Significance Determination

Less than significant with mitigation incorporated

Operation

Sound associated with pipeline maintenance would result in short-term, random incidences that would not result in an increase of ambient noise levels within the surrounding area. In addition, pipeline work would be limited to daylight hours to avoid disturbing any sensitive receptors. Therefore, operation-related impacts would be less than significant. The operation activities associated with the Cherry Willow RW Tank would be limited to routine inspections and maintenance during daylight hours and would be less than significant.

Mitigation Measures

No mitigation is required.

Significance Determination

Less than significant impact

b) Would the project result in exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?

Construction activities could generate varying degrees of ground vibration, depending on the construction procedures, construction equipment used, and proximity to vibration-sensitive uses. Operation of construction equipment generates vibrations that spread through the ground and diminish in amplitude with distance from the source. Ground vibrations from construction activities rarely reach levels that could damage structures, but can achieve the perceptible ranges in buildings close to a construction site.

The closest receptor to the proposed pipeline is approximately 100 feet east of the pipeline. Both the proposed Cherry Willow RW Tank and pump station are located further away from sensitive uses. It is assumed for the purpose of analysis that a loaded truck would generate the highest vibration levels at the sensitive receptor. The Federal Transit Administration (FTA) threshold for architectural damage to nonengineered timber and masonry buildings is approximately 94 VdB (vibration decibels). Loaded trucks are capable of producing approximately 92 VdB at 15 feet. Vibration levels attenuate (decrease) 6 decibels every doubling of distance. Vibration levels would be approximately 50 VdB at the commercial use to the east, below the FTA vibration threshold. Impacts would be less than significant.

Mitigation Measures

No mitigation is required.

Significance Determination

Less than significant impact

c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?

As stated above, the construction phase of the proposed Project would be considered temporary and would not result in a substantial permanent increase in the ambient noise levels in the proposed Project's vicinity. Operation of the pipeline portions of the proposed Project would occur below ground. As discussed in Section 12.a above, the proposed operation-related activities at the Cherry Willow RW Tank would fall below 65 dBA at the nearest sensitive receptor property line and would be less than significant. Therefore, the proposed Project would not result in the permanent increase in ambient noise levels.

Mitigation Measures

No mitigation is required.

Significance Determination

Less than significant

d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?

As stated in Section 12.a above, the proposed Project would generate temporary elevated noise levels due to the construction phase of the proposed Project. These levels were determined to be consistent with Santa Clarita Noise Ordinances with implementation of Mitigation Measure Noise-1. Therefore, temporary or periodic noise impacts would be less than significant with mitigation.

Mitigation Measures

With mitigation, impacts would be less than significant.

Significance Determination

Less than significant with mitigation incorporated

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

The closest airport to the Project Site is the Agua Dulce Airpark located approximately 12 miles to the northeast. Therefore, the proposed Project would not be located within an airport land use plan or within 2 miles of a public airport or public use airport. The project would not create new residents or have any permanent workers on-site. The proposed Project would not expose people residing or working in the area to excessive noise levels. No impact would occur.

Mitigation Measures

No mitigation is required.

Significance Determination

No impact

f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?

The proposed Project is located 12 miles to the southwest of the Agua Dulce Airpark. Therefore, the proposed Project would not expose people residing or working in the Project area to excessive noise levels. The project would not create new residents or have any permanent workers on-site. No impacts would occur.

Mitigation Measures

No mitigation is required.

Significance Determination

No impact

13. Population and Housing

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

Discussion

a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?

The proposed Project would include the construction of a recycled water pipeline that would serve already established residential/public developments that are currently using potable water for non-potable use. The proposed Project would include the construction of a Cherry Willow RW Tank to store the recycled water for daily use. As previously discussed in the Project Description, there is a push towards use of non-potable water to help offset use of potable water. The 2015 UWMP identified the need for a cost-effective recycled water system. As a result, the proposed Project has been appropriately placed and sized as a 12-inch-diameter water pipeline to provide recycled water service to existing and future developments in the Santa Clarita Water Division service area. No impacts would occur.

Mitigation Measures

No mitigation is required.

Significance Determination

No impact

b) Would the project displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?

Construction and operation of the proposed Project would occur within the roadway right-of-way and would utilize three existing open areas for construction staging areas and for a Cherry Willow RW Tank site. A site has been reserved in the Vista Canyon site for a pump station. Accordingly, the proposed Project would not displace existing housing, necessitating the construction of replacement housing elsewhere. No impacts would occur.

Mitigation Measures

No mitigation is required.

Significance Determination

No impact

c) Would the project displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?

As mentioned above, construction and operation of the proposed Project would occur within the roadway right-of-way and would utilize three existing open areas for construction staging areas. A site has been reserved in the Vista Canyon site for a pump station. Accordingly, the proposed Project would not displace people, necessitating the construction of replacement housing elsewhere. No impacts would occur.

Mitigation Measures

No mitigation is required.

Significance Determination

No impact

14. Public Services

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

Discussion

a) Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:

- **i) Fire protection?**
- **ii) Police protection?**
- **iii) Schools?**
- **iv) Parks?**
- **v) Other public facilities?**

The proposed Project would normally not require services from the Los Angeles County Sheriff's Department, except in the cases of trespass, theft, and/or vandalism. Construction activity could increase traffic in the Project area and conceivably could incrementally increase response times and incrementally increase vehicle accident potential. During construction of the Project the Department would require ample access for emergency vehicles including routine patrol vehicles. With adequate access, response times would not be extended and the ability of officers to provide proactive policing and efficient crime suppression would not be diminished. In addition, as necessary the Project would be required to include standard construction-traffic control procedures such as flagmen and signage. These measures would further reduce any potential impacts to police services during construction activities. Therefore, impacts related to police services during construction of the Project would be less than significant.

If the Project site requires emergency or fire services, the Los Angeles County Fire Department would be able to provide adequate response. Therefore, the proposed Project would not increase demand on the existing Los Angeles County Fire Department services. Indirect impacts to public services would be reduced to less than significant if the local government implements the policies of the Santa Clarita General Plan as it contains adequate measures to reduce or avoid potential impacts to public services including Sheriff's Department, Fire Department, schools, and libraries. Specific mechanisms for implementing these policies would be determined in the course of Project specific environmental review, as required by CEQA. Implementation of the adopted policies would reduce indirect Project impacts to less than significant.

Mitigation Measures

No mitigation is required.

Significance Determination

Less than significant impact

15. Recreation

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XV. **RECREATION.**				
a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☒
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☐	☐	☐	☒

Discussion

a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?

The City of Santa Clarita provides local and regional parks within City boundaries. The implementation of the proposed Project would not directly result in short-term growth in the Project area, and therefore would not directly increase the use of recreational facilities. The project would not add any residents or permanent workers on-site. No impacts would occur.

Mitigation Measures

No mitigation is required.

Significance Determination

No impact

b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?

The implementation of the proposed Project would not directly result in growth in the Project area, and therefore would not require the construction or expansion of recreational facilities. No impacts would occur.

Mitigation Measures

No mitigation is required.

Significance Determination

No impact

16. Transportation/Traffic

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XVI. **TRANSPORTATION/TRAFFIC.** Would the project:				
a) Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?	☐	☐	☒	☐
b) Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?	☐	☐	☐	☒
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	☐	☐	☐	☒
d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☐	☒
e) Result in inadequate emergency access?	☐	☐	☒	☐
f) Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?	☐	☐	☐	☒

Discussion

a) Would the project conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?

The proposed Project would not conflict with an applicable plan, ordinance of policy affecting performance of the circulation system, including mass transit and non-motorized travel including intersections, highways and freeways, pedestrian and bicycle paths and streets.

Mitigation Measures

No mitigation is required.

Significance Determination

Less than significant impact

b) Would the project conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?

The 2010 Congestion Management Program (CMP) in effect in Los Angeles County was adopted by the Los Angeles County Metropolitan Transportation Authority on October 28, 2010. The nearest CMP- designated roadway is the I-5 Freeway. The proposed Project would generate an incremental increase in additional construction-related trips during off-peak hours and would not affect intersections along I-5. During project operation, there would be no impacts to the I-5 Freeway. Therefore, there would be no impact.

Mitigation Measures

No mitigation is required.

Significance Determination

No impact

c) Would the project result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?

The Project is located approximately 12 miles to the southwest of Agua Dulce Airpark. The proposed Project would not result in a change in air traffic patterns since facilities would either be underground or less than 30 feet in height. Airplane takeoffs and landing are at a sufficient distance from the locations not to pose as a safety risk. No impacts would occur.

Mitigation Measures

No mitigation is required.

Significance Determination

No impact

d) Would the project substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

The construction activities of the proposed pipeline would require excavations and trenching within existing roadways, which would require traffic to be re-routed around the construction site.

No changes are proposed as part of the proposed Project to the surrounding road system upon completion of construction activities. Clear and uninterrupted access to the pipeline for emergency response vehicles would continue to be provided. The proposed Project would be compatible with the surrounding zoning designations and the existing uses. No impacts would occur during operation.

Mitigation Measures

No mitigation is required.

Significance Determination

Less than significant impact

e) Would the project result in inadequate emergency access?

The construction of the proposed Project could temporarily impact emergency access from construction activities within the roadways and could impact normal traffic flow and create roadway conditions that may delay emergency response times. However, the City of Santa Clarita employs a traffic control plan, and the implementation of construction zone traffic control measures would reduce potential impacts to less than significant.

No changes are proposed as part of the proposed Project to the surrounding road system upon completion of construction activities. Clear and uninterrupted access to the pipeline for emergency response vehicles would continue to be provided. The proposed Project would be compatible with the surrounding zoning designations and the existing uses. No impacts would occur during operation.

Mitigation Measures

No mitigation is required.

Significance Determination

Less than significant impact

f) Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?

As previously stated, the proposed Project would not result in the increase of people, thereby eliminating the need for additional public transit services, nor would it result in straining the current system. Because the proposed Project would not result in any changes to the roadway system, current bus routes would remain the same.

No changes to any of the roadway systems along the pipeline are proposed with respect to the proposed Project upon completion of construction. The proposed Project would not involve the alteration of or conflict with any policies, plans, or programs regarding public transit or other pedestrian facilities. No impacts would occur.

Mitigation Measures

No mitigation is required.

Significance Determination

No impact

17. Tribal Cultural Resources

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

Discussion

a) Would the project cause a substantial adverse change in the significance of a tribal cultural resource that is listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1 (k)?

An Archaeological Inventory was performed by Greenwood and Associates. The effort included an archaeological record search and field survey. The field survey was conducted on November 21, 2016 by John M. Foster, Register of Professional Archaeologists (RPA), Greenwood and Associates. Transects were spaced at 10-meter intervals based on the potential for archaeological resources, and visibility within the Project site was excellent. Rodent and ground squirrel activity provided adequate supporting evidence of the absence of buried cultural resources in the impact areas. Based on the Archaeological Inventory by Greenwood and Associates, no historical or archeological resources were recorded or observed.

Mitigation Measures

No mitigation is required.

Significance Determination

Less than significant impact

b) Would the project cause a substantial adverse change in the significance of a tribal cultural resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American Tribe?

An Archaeological Inventory was performed by Greenwood and Associates. The effort included an archaeological record search and field survey. The field survey was conducted on November 21, 2016 by John M. Foster, Register of Professional Archaeologists (RPA), Greenwood and Associates. Based on the Archaeological Inventory by Greenwood and Associates, the area had favorable environmental conditions to sustain or attract historical populations.

The Project Site has been disturbed and excavated in the past, and construction would occur within previously disturbed areas. As a result, the potential for any impact to Tribal Cultural Resources is considered low.

While the Archeological Inventory did not identify any historical or archeological resources recorded or observed, the mitigation measure CUL-1 identified in Section 5.a) of this MND is included to ensure that the potential for impact is less than significant.

Mitigation Measures

Implementation of mitigation measure CUL-1 would reduce potentially significant impacts to less than significant.

Significance Determination

Less than significant impact

Native American Consultation, Assembly Bill 52 (AB 52)

Have California Native American tribes traditionally and culturally affiliated with the project area requested consultation pursuant to *California Public Resources Code* §21080.3.1? If so, has consultation begun?

Assembly Bill 52 (AB 52) establishes a formal consultation process for California Native American tribes to identify potential significant impacts to tribal cultural resources, as defined in Public Resources Code Section 21074 as part of CEQA. In accordance with AB 52, the CLWA notified three tribes that are traditionally and culturally affiliated within the CLWA service area.

June 7, 2017
Caitlin B. Gulley, Tribal Historic and Cultural Preservation Officer
Fernandeño Tataviam Band of Mission Indians
1019 Second Street, Suite 1
San Fernando, CA 91340

May 30, 2017
The Honorable Anthony Morales, Chief
Gabrieleno Tongva
San Gabriel Band of Mission Indians
P.O. Box 693
San Gabriel, CA 91778

June 7, 2017
Michael Mirelez, Cultural Resource Coordinator
Torres Martinez Desert Cahuilla Indians
P.O. Box 1160
Thermal, CA 92274

On July 7, 2107, the Fernandeño Tataviam Band of Mission Indians (Tribe) requested consultation and a lead contact person was designated, Kimia Fatehi, Tribal Historic and Cultural Preservation Officer. CLWA and the Tribe agreed to one measure to include notification to the Fernandeño Tataviam Band of Mission Indians in the event that archeological resources are found inadvertently. This mitigation measure is incorporated into the mitigation measure CUL-1 in Section 5.a) of this MND. Conclusion of the Consultation was documented on August 1, 2017. No responses from the other two Tribes that were notified were received as of August 21, 2017. Documentation of the AB 52 notifications and consultation is included in Appendix III of this MND.

18. Utilities and Service Systems

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
XVIII. **UTILITIES AND SERVICE SYSTEMS**. Would the project:				
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	☐	☐	☒	☐
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☒
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☒
d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	☐	☐	☐	☒
e) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☐	☒
f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	☐	☐	☒	☐
g) Comply with federal, state, and local statutes and regulations related to solid waste?	☐	☐	☐	☒

Discussion

a) Would the project exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?

The proposed Project would construct a recycled water pipeline and the Cherry Willow RW Tank. The proposed Project would result in the delivery of recycled water to customers in the City of Santa Clarita and would not result in wastewater generation. The proposed Project would not generate industrial wastewater or new point sources of wastewater such as mining, animal feed lots, or wastewater treatment facilities that would require an individual permit beyond the capabilities of the existing wastewater treatment facilities serving the City of Santa Clarita. The Regional Water Quality Control Board will issue a permit project only if the project meets all of its requirements. Accordingly, impacts would be less than significant.

Mitigation Measures

No mitigation is required.

Significance Determination

Less than significant impact

b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?

The proposed Project would not result in the expansion of wastewater treatment facilities other than those proposed by the SCVSD in the 2015 Joint Facilities Plan. The proposed Project would construct a recycled water pipeline, pump station and Cherry Willow RW Tank to transport and supply the Project area with recycled water for use as irrigation. The 2015 UWMP identifies the future need for recycled water within the CLWA service area. Therefore, proposed Project development would not require the construction or expansion of existing water treatment facilities other than those proposed in the latest 2015 UWMP. No other additional facilities are required. No impacts would occur.

Mitigation Measures

No mitigation is required.

Significance Determination

No impact

c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?

The proposed Project would not produce substantial amounts of additional runoff to the existing storm water drainage facilities. There would not be a substantial increase in impervious surfaces from implementation of the proposed Project as the roadway would be restored to existing conditions. The proposed Cherry Willow RW Tank would be located on approximately 8,000-square-foot development pad, as discussed in Section 9, Hydrology and Water Quality (beginning on page 38). The increase in impervious area would not impact the offsite storm drain system as runoff would be collected and percolated naturally on-site. Project development would not require the construction or expansion of storm water drainage facilities. No impacts would occur.

Mitigation Measures

No mitigation is required.

Significance Determination

No impact

d) Would the project have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?

The proposed Project would construct a pipeline to transmit non-potable water to offset potable water demands for SCWD customers and construct a Cherry Willow RW Tank. The proposed Project would provide a source of long-term non-potable water supply for the area, as projected in the 2015 UWMP to enhance water supply reliability and decrease demand for potable water. The project itself would not require a water supply during operation. Accordingly, there would be no impact.

Mitigation Measures

No mitigation is required.

Significance Determination

No impact

e) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?

The proposed Project would not generate any potential wastewater. No direct impact to wastewater treatment capacity would occur. As a result, no impacts would occur.

Mitigation Measures

No mitigation is required.

Significance Determination

No impact

f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?

The proposed Project would generate small amounts of solid waste construction debris from the disposal of excess soils or other debris. The nominal amount of construction debris generated by the proposed Project would not be expected to exceed the permitted capacity of the Sunshine Canyon Landfill, the Antelope Valley Landfill, or the Chiquita Canyon Landfill. Impacts would be less than significant.

Operation of the Project would not generate solid waste and would not require additional landfill capacity. No impacts would occur.

Mitigation Measures

No mitigation is required.

Significance Determination

Less than significant impact

g) Comply with federal, state, and local statutes and regulations related to solid waste?

CLWA SCWD is not required to comply with local zoning and building permits and ordinances. However, to reduce potential impacts to solid waste facilities that could result from the disposal of construction debris, implementation of approved code requirements would ensure that potential impacts would be less than significant. The proposed Project would not affect the City's ability to continue to meet the required AB 939 waste diversion requirements. The project would not conflict with federal, state, and local statues and regulations. No impacts would occur.

Mitigation Measures

No mitigation is required.

Significance Determination

No impact

19. Mandatory Findings of Significance

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

Discussion:

a) The Project does not have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal as the Project can be considered infill and is immediately adjacent to SR-14 which would not provide for suitable habitat for endangered species. There are no indications that the site has the potential to eliminate important examples of the major periods of California history or prehistory. The Project will use wastewater from the Vista Canyon development to produce recycled water, with provisions to intercept wastewater from existing developments upstream as needed for initial startup and to sustain on-going operations as required. Any potential reductions in flow in downstream Water Reclamation Plants would be offset by future growth and be considered de minimus with less than significant impacts as discussed in the Biological Resources Section.

b) No past, current, or probable future projects were identified in the Project vicinity that, when added to Project-related impacts, would result in significant cumulative impacts on any other environmental resources. Based on the analysis provided in this Initial Study, the proposed Project would not make a cumulatively considerable incremental contribution to any significant cumulative adverse impact. To offset some of Vista Canyon's potable water demand, the Project includes a recycled water facility, herein referred to as the Vista Canyon Water Factory, which will produce Title 22 tertiary disinfected recycled water for non-potable use with an approximate capacity of about 371,000 gpd or 415 AFY (RWQCB-LA Order R4-2016-0220). The Vista Canyon Water Factory will treat wastewater flows from the Vista Canyon development which are estimated to be approximately 392000 gpd or 440 AFY at build-out (Dexter Wilson November 2015). The project includes provisions to divert wastewater from an existing sewer interceptor that serves existing development upstream of the Project site in order to provide for sustainable plant operation during the initial development period for Vista Canyon, and as a supplement source of wastewater feed as needed. Any potential reductions in flow in downstream Water Reclamation Plants would be offset by future growth in effluent and be considered de minimus with less than significant impacts.

c. The proposed Project does not have the Environmental effects which will cause substantial adverse effects on human beings either directly or indirectly. The Initial Study outlined above did not conclude that the proposed Project would impact short term environmental goals to the disadvantage for long-term environmental goals.

Note: Authority cited: Sections 21083 and 21083.05, Public Resources Code. Reference: Section 65088.4, Gov. Code; Sections 21080(c), 21080.1, 21080.3, 21083, 21083.05, 21083.3, 21093, 21094, 21095, and 21151, Public Resources Code; *Sundstrom v. County of Mendocino,*(1988) 202 Cal.App.3d 296; *Leonoff v. Monterey Board of Supervisors,* (1990) 222 Cal.App.3d 1337; *Eureka Citizens for Responsible Govt. v. City of Eureka* (2007) 147 Cal.App.4th 357; *Protect the Historic Amador Waterways v. Amador Water Agency* (2004) 116 Cal.App.4th at 1109; *San Franciscans Upholding the Downtown Plan v. City and County of San Francisco* (2002) 102 Cal.App.4th 656.

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  Kennedy/Jenks Consultants

Tebo Environmental Consulting
  Susan Tebo, President

Appendix I – Air Quality Analysis, Los Angeles-South Coast County – Winter and Summer

Phase 2B Recycled Water
Los Angeles-South Coast County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Industrial	21,500.00	User Defined Unit	1.00	0.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	33
Climate Zone	9			**Operational Year**	2021
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	702.44	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Project includes up to approximately 21,500 total linear feet of water line installation on a daily maximum of one acre

Construction Phase - estimated schedule

Off-road Equipment - estimated equipment

Off-road Equipment - equipment estimate

Trips and VMT - estimate of 13 daily worker trips, and 5 haul trucks per day for 108 trenching days.

Construction Off-road Equipment Mitigation -

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	0
tblConstructionPhase	NumDays	5.00	60.00
tblConstructionPhase	PhaseEndDate	4/30/2019	9/27/2019
tblConstructionPhase	PhaseEndDate	4/30/2019	9/27/2019
tblConstructionPhase	PhaseStartDate	5/1/2019	7/8/2019
tblLandUse	LotAcreage	0.00	1.00
tblOffRoadEquipment	HorsePower	65.00	132.00
tblOffRoadEquipment	LoadFactor	0.78	0.36
tblOffRoadEquipment	OffRoadEquipmentType	Paving Equipment	Crushing/Proc. Equipment
tblOffRoadEquipment	OffRoadEquipmentType		Excavators
tblOffRoadEquipment	OffRoadEquipmentType		Tractors/Loaders/Backhoes
tblProjectCharacteristics	OperationalYear	2018	2021
tblTripsAndVMT	HaulingTripNumber	0.00	1,080.00
tblTripsAndVMT	WorkerTripNumber	15.00	5.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2019	2.6570	29.4980	18.1362	0.0395	0.3202	1.3307	1.6509	0.0865	1.2303	1.3167	0.0000	3,957.961 2	3,957.961 2	0.9346	0.0000	3,981.325 6
Maximum	**2.6570**	**29.4980**	**18.1362**	**0.0395**	**0.3202**	**1.3307**	**1.6509**	**0.0865**	**1.2303**	**1.3167**	**0.0000**	**3,957.961 2**	**3,957.961 2**	**0.9346**	**0.0000**	**3,981.325 6**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2019	2.6570	29.4980	18.1362	0.0395	0.3202	1.3307	1.6509	0.0865	1.2303	1.3167	0.0000	3,957.961 2	3,957.961 2	0.9346	0.0000	3,981.325 6
Maximum	**2.6570**	**29.4980**	**18.1362**	**0.0395**	**0.3202**	**1.3307**	**1.6509**	**0.0865**	**1.2303**	**1.3167**	**0.0000**	**3,957.961 2**	**3,957.961 2**	**0.9346**	**0.0000**	**3,981.325 6**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.2058	0.0202	2.2037	1.6000e-004		7.8800e-003	7.8800e-003		7.8800e-003	7.8800e-003		4.7053	4.7053	0.0125		5.0177
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.2058**	**0.0202**	**2.2037**	**1.6000e-004**	**0.0000**	**7.8800e-003**	**7.8800e-003**	**0.0000**	**7.8800e-003**	**7.8800e-003**		**4.7053**	**4.7053**	**0.0125**	**0.0000**	**5.0177**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.2058	0.0202	2.2037	1.6000e-004		7.8800e-003	7.8800e-003		7.8800e-003	7.8800e-003		4.7053	4.7053	0.0125		5.0177
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.2058**	**0.0202**	**2.2037**	**1.6000e-004**	**0.0000**	**7.8800e-003**	**7.8800e-003**	**0.0000**	**7.8800e-003**	**7.8800e-003**		**4.7053**	**4.7053**	**0.0125**	**0.0000**	**5.0177**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Grading	Trenching	5/1/2019	9/27/2019	5	108	
2	Paving	Paving	7/8/2019	9/27/2019	5	60	

Acres of Grading (Site Preparation Phase): 0

:res of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Excavators	2	6.00	158	0.38
Paving	Cement and Mortar Mixers	1	6.00	9	0.56
Architectural Coating	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Paving	Paving Equipment	1	8.00	132	0.36
Paving	Rollers	1	7.00	80	0.38
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Grading	Graders	1	6.00	187	0.41
Paving	Pavers	1	6.00	130	0.42
Paving	Crushing/Proc. Equipment	1	4.00	132	0.36
Grading	Rubber Tired Dozers	1	6.00	247	0.40
Grading	Tractors/Loaders/Backhoes	1	7.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Grading	3	8.00	0.00	1,080.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	5.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Clean Paved Roads

3.2 Grading - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.4197	16.0357	6.6065	0.0141		0.7365	0.7365		0.6775	0.6775		1,396.390 9	1,396.390 9	0.4418		1,407.435 9
Total	**1.4197**	**16.0357**	**6.6065**	**0.0141**		**0.7365**	**0.7365**		**0.6775**	**0.6775**		**1,396.390 9**	**1,396.390 9**	**0.4418**		**1,407.435 9**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0963	3.1037	0.6972	7.8500e-003	0.1748	0.0115	0.1863	0.0479	0.0110	0.0589		849.8497	849.8497	0.0618		851.3949
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0443	0.0325	0.3540	9.2000e-004	0.0894	7.7000e-004	0.0902	0.0237	7.1000e-004	0.0244		91.3705	91.3705	3.1400e-003		91.4491
Total	**0.1406**	**3.1362**	**1.0511**	**8.7700e-003**	**0.2643**	**0.0122**	**0.2765**	**0.0716**	**0.0117**	**0.0833**		**941.2202**	**941.2202**	**0.0650**		**942.8439**

3.2 Grading - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2 5	Exhaust PM2.5	PM2 5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.4197	16.0357	6.6065	0.0141		0.7365	0.7365		0.6775	0.6775	0.0000	1,396.390 9	1,396.390 9	0.4418		1,407.435 9
Total	**1.4197**	**16.0357**	**6.6065**	**0.0141**		**0.7365**	**0.7365**		**0.6775**	**0.6775**	**0.0000**	**1,396.390 9**	**1,396.390 9**	**0.4418**		**1,407.435 9**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2 5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0963	3.1037	0.6972	7.8500e-003	0.1748	0.0115	0.1863	0.0479	0.0110	0.0589		849.8497	849.8497	0.0618		851.3949
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0443	0.0325	0.3540	9.2000e-004	0.0894	7.7000e-004	0.0902	0.0237	7.1000e-004	0.0244		91.3705	91.3705	3.1400e-003		91.4491
Total	**0.1406**	**3.1362**	**1.0511**	**8.7700e-003**	**0.2643**	**0.0122**	**0.2765**	**0.0716**	**0.0117**	**0.0833**		**941.2202**	**941.2202**	**0.0650**		**942.8439**

3.3 Paving - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.0690	10.3057	10.2573	0.0161		0.5816	0.5816		0.5406	0.5406		1,563.243 7	1,563.243 7	0.4259		1,573.890 2
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	1.0690	10.3057	10.2573	0.0161		0.5816	0.5816		0.5406	0.5406		1,563.243 7	1,563.243 7	0.4259		1,573.890 2

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0277	0.0203	0.2212	5.7000e-004	0.0559	4.8000e-004	0.0564	0.0148	4.4000e-004	0.0153		57.1065	57.1065	1.9600e-003		57.1557
Total	0.0277	0.0203	0.2212	5.7000e-004	0.0559	4.8000e-004	0.0564	0.0148	4.4000e-004	0.0153		57.1065	57.1065	1.9600e-003		57.1557

3.3 Paving - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.0690	10.3057	10.2573	0.0161		0.5816	0.5816		0.5406	0.5406	0.0000	1,563.243 7	1,563.243 7	0.4259		1,573.890 2
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.0690**	**10.3057**	**10.2573**	**0.0161**		**0.5816**	**0.5816**		**0.5406**	**0.5406**	**0.0000**	**1,563.243 7**	**1,563.243 7**	**0.4259**		**1,573.890 2**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0277	0.0203	0.2212	5.7000e-004	0.0559	4.8000e-004	0.0564	0.0148	4.4000e-004	0.0153		57.1065	57.1065	1.9600e-003		57.1557
Total	**0.0277**	**0.0203**	**0.2212**	**5.7000e-004**	**0.0559**	**4.8000e-004**	**0.0564**	**0.0148**	**4.4000e-004**	**0.0153**		**57.1065**	**57.1065**	**1.9600e-003**		**57.1557**

4.0 Operational Detail - Mobile

Phase 2B Recycled Water - Los Angeles-South Coast County, Winter

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
User Defined Industrial	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
User Defined Industrial	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
User Defined Industrial	0.547192	0.045177	0.202743	0.121510	0.016147	0.006143	0.019743	0.029945	0.002479	0.002270	0.005078	0.000682	0.000891

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.2058	0.0202	2.2037	1.6000e-004		7.8800e-003	7.8800e-003		7.8800e-003	7.8800e-003		4.7053	4.7053	0.0125		5.0177
Unmitigated	0.2058	0.0202	2.2037	1.6000e-004		7.8800e-003	7.8800e-003		7.8800e-003	7.8800e-003		4.7053	4.7053	0.0125		5.0177

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	0.2058	0.0202	2.2037	1.6000e-004		7.8800e-003	7.8800e-003		7.8800e-003	7.8800e-003		4.7053	4.7053	0.0125		5.0177
Total	**0.2058**	**0.0202**	**2.2037**	**1.6000e-004**		**7.8800e-003**	**7.8800e-003**		**7.8800e-003**	**7.8800e-003**		**4.7053**	**4.7053**	**0.0125**		**5.0177**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	0.2058	0.0202	2.2037	1.6000e-004		7.8800e-003	7.8800e-003		7.8800e-003	7.8800e-003		4.7053	4.7053	0.0125		5.0177
Total	**0.2058**	**0.0202**	**2.2037**	**1.6000e-004**		**7.8800e-003**	**7.8800e-003**		**7.8800e-003**	**7.8800e-003**		**4.7053**	**4.7053**	**0.0125**		**5.0177**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Phase 2B Recycled Water
Los Angeles-South Coast County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Industrial	21,500.00	User Defined Unit	1.00	0.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	33
Climate Zone	9			**Operational Year**	2021
ility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	702.44	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Project includes up to approximately 21,500 total linear feet of water line installation on a daily maximum of one acre

Construction Phase - estimated schedule

Off-road Equipment - estimated equipment

Off-road Equipment - equipment estimate

Trips and VMT - estimate of 13 daily worker trips, and 5 haul trucks per day for 108 trenching days.

Construction Off-road Equipment Mitigation -

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	0
tblConstructionPhase	NumDays	5.00	60.00
tblConstructionPhase	PhaseEndDate	4/30/2019	9/27/2019
tblConstructionPhase	PhaseEndDate	4/30/2019	9/27/2019
tblConstructionPhase	PhaseStartDate	5/1/2019	7/8/2019
tblLandUse	LotAcreage	0.00	1.00
tblOffRoadEquipment	HorsePower	85.00	132.00
tblOffRoadEquipment	LoadFactor	0.78	0.36
tblOffRoadEquipment	OffRoadEquipmentType	Paving Equipment	Crushing/Proc. Equipment
tblOffRoadEquipment	OffRoadEquipmentType		Excavators
tblOffRoadEquipment	OffRoadEquipmentType		Tractors/Loaders/Backhoes
tblProjectCharacteristics	OperationalYear	2018	2021
tblTripsAndVMT	HaulingTripNumber	0.00	1,080.00
tblTripsAndVMT	WorkerTripNumber	15.00	5.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2019	2.6476	29.4520	18.1436	0.0397	0.3202	1.3305	1.6507	0.0865	1.2301	1.3165	0.0000	3,981.830 1	3,981.830 1	0.9326	0.0000	4,005.145 6
Maximum	**2.6476**	**29.4520**	**18.1436**	**0.0397**	**0.3202**	**1.3305**	**1.6507**	**0.0865**	**1.2301**	**1.3165**	**0.0000**	**3,981.830 1**	**3,981.830 1**	**0.9326**	**0.0000**	**4,005.145 6**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2019	2.6476	29.4520	18.1436	0.0397	0.3202	1.3305	1.6507	0.0865	1.2301	1.3165	0.0000	3,981.830 1	3,981.830 1	0.9326	0.0000	4,005.145 6
Maximum	**2.6476**	**29.4520**	**18.1436**	**0.0397**	**0.3202**	**1.3305**	**1.6507**	**0.0865**	**1.2301**	**1.3165**	**0.0000**	**3,981.830 1**	**3,981.830 1**	**0.9326**	**0.0000**	**4,005.145 6**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.2058	0.0202	2.2037	1.6000e-004		7.8800e-003	7.8800e-003		7.8800e-003	7.8800e-003		4.7053	4.7053	0.0125		5.0177
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.2058**	**0.0202**	**2.2037**	**1.6000e-004**	**0.0000**	**7.8800e-003**	**7.8800e-003**	**0.0000**	**7.8800e-003**	**7.8800e-003**		**4.7053**	**4.7053**	**0.0125**	**0.0000**	**5.0177**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.2058	0.0202	2.2037	1.6000e-004		7.8800e-003	7.8800e-003		7.8800e-003	7.8800e-003		4.7053	4.7053	0.0125		5.0177
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.2058**	**0.0202**	**2.2037**	**1.6000e-004**	**0.0000**	**7.8800e-003**	**7.8800e-003**	**0.0000**	**7.8800e-003**	**7.8800e-003**		**4.7053**	**4.7053**	**0.0125**	**0.0000**	**5.0177**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Grading	Trenching	5/1/2019	9/27/2019	5	108	
2	Paving	Paving	7/8/2019	9/27/2019	5	60	

Acres of Grading (Site Preparation Phase): 0

cres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase 2B Recycled Water - Los Angeles-South Coast County, Summer

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Excavators	2	6.00	158	0.38
Paving	Cement and Mortar Mixers	1	6.00	9	0.56
Architectural Coating	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Paving	Paving Equipment	1	8.00	132	0.36
Paving	Rollers	1	7.00	80	0.38
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Grading	Graders	1	6.00	187	0.41
Paving	Pavers	1	6.00	130	0.42
Paving	Crushing/Proc. Equipment	1	4.00	132	0.36
Grading	Rubber Tired Dozers	1	6.00	247	0.40
Grading	Tractors/Loaders/Backhoes	1	7.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Grading	3	8.00	0.00	1,080.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	5.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Clean Paved Roads

3.2 Grading - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.4197	16.0357	6.6065	0.0141		0.7365	0.7365		0.6775	0.6775		1,396.390 9	1,396.390 9	0.4418		1,407.435 9
Total	**1.4197**	**16.0357**	**6.6065**	**0.0141**		**0.7365**	**0.7365**		**0.6775**	**0.6775**		**1,396.390 9**	**1,396.390 9**	**0.4418**		**1,407.435 9**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0940	3.0628	0.6530	7.9900e-003	0.1748	0.0112	0.1861	0.0479	0.0108	0.0587		864.5118	864.5118	0.0595		866.0002
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0400	0.0294	0.3857	9.7000e-004	0.0894	7.7000e-004	0.0902	0.0237	7.1000e-004	0.0244		97.0362	97.0362	3.3300e-003		97.1196
Total	**0.1339**	**3.0922**	**1.0388**	**8.9600e-003**	**0.2643**	**0.0120**	**0.2763**	**0.0716**	**0.0115**	**0.0831**		**961.5480**	**961.5480**	**0.0629**		**963.1198**

3.2 Grading - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2 5	Exhaust PM2.5	PM2 5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.4197	16.0357	6.6065	0.0141		0.7365	0.7365		0.6775	0.6775	0.0000	1,396.390 9	1,396.390 9	0.4418		1,407.435 9
Total	**1.4197**	**16.0357**	**6.6065**	**0.0141**		**0.7365**	**0.7365**		**0.6775**	**0.6775**	**0.0000**	**1,396.390 9**	**1,396.390 9**	**0.4418**		**1,407.435 9**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2 5	Exhaust PM2.5	PM2 5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0940	3.0628	0.6530	7.9900e-003	0.1748	0.0112	0.1861	0.0479	0.0108	0.0587		864.5118	864.5118	0.0595		866.0002
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0400	0.0294	0.3857	9.7000e-004	0.0894	7.7000e-004	0.0902	0.0237	7.1000e-004	0.0244		97.0362	97.0362	3.3300e-003		97.1196
Total	**0.1339**	**3.0922**	**1.0388**	**8.9600e-003**	**0.2643**	**0.0120**	**0.2763**	**0.0716**	**0.0115**	**0.0831**		**961.5480**	**961.5480**	**0.0629**		**963.1198**

3.3 Paving - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.0690	10.3057	10.2573	0.0161		0.5816	0.5816		0.5406	0.5406		1,563.243 7	1,563.243 7	0.4259		1,573.890 2
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.0690**	**10.3057**	**10.2573**	**0.0161**		**0.5816**	**0.5816**		**0.5406**	**0.5406**		**1,563.243 7**	**1,563.243 7**	**0.4259**		**1,573.890 2**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0250	0.0184	0.2411	6.1000e-004	0.0559	4.8000e-004	0.0564	0.0148	4.4000e-004	0.0153		60.6476	60.6476	2.0800e-003		60.6997
Total	**0.0250**	**0.0184**	**0.2411**	**6.1000e-004**	**0.0559**	**4.8000e-004**	**0.0564**	**0.0148**	**4.4000e-004**	**0.0153**		**60.6476**	**60.6476**	**2.0800e-003**		**60.6997**

3.3 Paving - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.0690	10.3057	10.2573	0.0161		0.5816	0.5816		0.5406	0.5406	0.0000	1,563.2437	1,563.2437	0.4259		1,573.8902
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.0690**	**10.3057**	**10.2573**	**0.0161**		**0.5816**	**0.5816**		**0.5406**	**0.5406**	**0.0000**	**1,563.2437**	**1,563.2437**	**0.4259**		**1,573.8902**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0250	0.0184	0.2411	6.1000e-004	0.0559	4.8000e-004	0.0564	0.0148	4.4000e-004	0.0153		60.6476	60.6476	2.0800e-003		60.6997
Total	**0.0250**	**0.0184**	**0.2411**	**6.1000e-004**	**0.0559**	**4.8000e-004**	**0.0564**	**0.0148**	**4.4000e-004**	**0.0153**		**60.6476**	**60.6476**	**2.0800e-003**		**60.6997**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
User Defined Industrial	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
User Defined Industrial	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
User Defined Industrial	0.547192	0.045177	0.202743	0.121510	0.016147	0.006143	0.019743	0.029945	0.002479	0.002270	0.005078	0.000682	0.000891

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.2058	0.0202	2.2037	1.6000e-004		7.8800e-003	7.8800e-003		7.8800e-003	7.8800e-003		4.7053	4.7053	0.0125		5.0177
Unmitigated	0.2058	0.0202	2.2037	1.6000e-004		7.8800e-003	7.8800e-003		7.8800e-003	7.8800e-003		4.7053	4.7053	0.0125		5.0177

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	0.2058	0.0202	2.2037	1.6000e-004		7.8800e-003	7.8800e-003		7.8800e-003	7.8800e-003		4.7053	4.7053	0.0125		5.0177
Total	**0.2058**	**0.0202**	**2.2037**	**1.6000e-004**		**7.8800e-003**	**7.8800e-003**		**7.8800e-003**	**7.8800e-003**		**4.7053**	**4.7053**	**0.0125**		**5.0177**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	0.2058	0.0202	2.2037	1.6000e-004		7.8800e-003	7.8800e-003		7.8800e-003	7.8800e-003		4.7053	4.7053	0.0125		5.0177
Total	**0.2058**	**0.0202**	**2.2037**	**1.6000e-004**		**7.8800e-003**	**7.8800e-003**		**7.8800e-003**	**7.8800e-003**		**4.7053**	**4.7053**	**0.0125**		**5.0177**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Appendix II – Greenhouse Gas Emissions Analysis, Los Angeles-South Coast County – Annual

Phase 2B Recycled Water
Los Angeles-South Coast County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Industrial	21,500.00	User Defined Unit	1.00	0.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	33
Climate Zone	9			**Operational Year**	2021
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	702.44	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Project includes up to approximately 21,500 total linear feet of water line installation on a daily maximum of one acre

Construction Phase - estimated schedule

Off-road Equipment - estimated equipment

Off-road Equipment - equipment estimate

Trips and VMT - estimate of 13 daily worker trips, and 5 haul trucks per day for 108 trenching days.

Construction Off-road Equipment Mitigation -

Table Name	Column Name	Default Value	New Value
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	40	0
tblConstructionPhase	NumDays	5.00	60.00
tblConstructionPhase	PhaseEndDate	4/30/2019	9/27/2019
tblConstructionPhase	PhaseEndDate	4/30/2019	9/27/2019
tblConstructionPhase	PhaseStartDate	5/1/2019	7/8/2019
tblLandUse	LotAcreage	0.00	1.00
tblOffRoadEquipment	HorsePower	85.00	132.00
tblOffRoadEquipment	LoadFactor	0.78	0.36
tblOffRoadEquipment	OffRoadEquipmentType	Paving Equipment	Crushing/Proc. Equipment
tblOffRoadEquipment	OffRoadEquipmentType		Excavators
tblOffRoadEquipment	OffRoadEquipmentType		Tractors/Loaders/Backhoes
tblProjectCharacteristics	OperationalYear	2018	2021
tblTripsAndVMT	HaulingTripNumber	0.00	1,080.00
tblTripsAndVMT	WorkerTripNumber	15.00	5.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2019	0.1168	1.3484	0.7272	1.7400e-003	0.0157	0.0579	0.0735	4.2400e-003	0.0534	0.0577	0.0000	159.1304	159.1304	0.0364	0.0000	160.0407
Maximum	0.1168	1.3484	0.7272	1.7400e-003	0.0157	0.0579	0.0735	4.2400e-003	0.0534	0.0577	0.0000	159.1304	159.1304	0.0364	0.0000	160.0407

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2019	0.1168	1.3484	0.7272	1.7400e-003	0.0157	0.0579	0.0735	4.2400e-003	0.0534	0.0577	0.0000	159.1303	159.1303	0.0364	0.0000	160.0405
Maximum	0.1168	1.3484	0.7272	1.7400e-003	0.0157	0.0579	0.0735	4.2400e-003	0.0534	0.0577	0.0000	159.1303	159.1303	0.0364	0.0000	160.0405

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	5-1-2019	7-31-2019	0.7774	0.7774
2	8-1-2019	9-30-2019	0.6649	0.6649
		Highest	0.7774	0.7774

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0257	2.5300e-003	0.2755	2.0000e-005		9.9000e-004	9.9000e-004		9.9000e-004	9.9000e-004	0.0000	0.5336	0.5336	1.4200e-003	0.0000	0.5690
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0257**	**2.5300e-003**	**0.2755**	**2.0000e-005**	**0.0000**	**9.9000e-004**	**9.9000e-004**	**0.0000**	**9.9000e-004**	**9.9000e-004**	**0.0000**	**0.5336**	**0.5336**	**1.4200e-003**	**0.0000**	**0.5690**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0257	2.5300e-003	0.2755	2.0000e-005		9.9000e-004	9.9000e-004		9.9000e-004	9.9000e-004	0.0000	0.5336	0.5336	1.4200e-003	0.0000	0.5690
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0257**	**2.5300e-003**	**0.2755**	**2.0000e-005**	**0.0000**	**9.9000e-004**	**9.9000e-004**	**0.0000**	**9.9000e-004**	**9.9000e-004**	**0.0000**	**0.5336**	**0.5336**	**1.4200e-003**	**0.0000**	**0.5690**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Grading	Trenching	5/1/2019	9/27/2019	5	108	
2	Paving	Paving	7/8/2019	9/27/2019	5	60	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Excavators	2	6.00	158	0.38
Paving	Cement and Mortar Mixers	1	6.00	9	0.56
Architectural Coating	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Paving	Paving Equipment	1	8.00	132	0.36
Paving	Rollers	1	7.00	80	0.38
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Grading	Graders	1	6.00	187	0.41
Paving	Pavers	1	6.00	130	0.42
Paving	Crushing/Proc. Equipment	1	4.00	132	0.36
Grading	Rubber Tired Dozers	1	6.00	247	0.40
Grading	Tractors/Loaders/Backhoes	1	7.00	97	0.37

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Grading	3	8.00	0.00	1,080.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	5.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Clean Paved Roads

3.2 Grading - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0767	0.8659	0.3568	7.6000e-004		0.0398	0.0398		0.0366	0.0366	0.0000	68.4064	68.4064	0.0216	0.0000	68.9474
Total	0.0767	0.8659	0.3568	7.6000e-004		0.0398	0.0398		0.0366	0.0366	0.0000	68.4064	68.4064	0.0216	0.0000	68.9474

3.2 Grading - 2019

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	5.1300e-003	0.1709	0.0363	4.3000e-004	9.2800e-003	6.1000e-004	9.8900e-003	2.5500e-003	5.9000e-004	3.1300e-003	0.0000	42.0490	42.0490	2.9700e-003	0.0000	42.1231
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.1600e-003	1.8000e-003	0.0196	5.0000e-005	4.7300e-003	4.0000e-005	4.7800e-003	1.2600e-003	4.0000e-005	1.3000e-003	0.0000	4.5505	4.5505	1.6000e-004	0.0000	4.5544
Total	**7.2900e-003**	**0.1727**	**0.0559**	**4.8000e-004**	**0.0140**	**6.5000e-004**	**0.0147**	**3.8100e-003**	**6.3000e-004**	**4.4300e-003**	**0.0000**	**46.5995**	**46.5995**	**3.1300e-003**	**0.0000**	**46.6776**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0767	0.8659	0.3568	7.6000e-004		0.0398	0.0398		0.0366	0.0366	0.0000	68.4063	68.4063	0.0216	0.0000	68.9474
Total	**0.0767**	**0.8659**	**0.3568**	**7.6000e-004**		**0.0398**	**0.0398**		**0.0366**	**0.0366**	**0.0000**	**68.4063**	**68.4063**	**0.0216**	**0.0000**	**68.9474**

3.2 Grading - 2019

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	5.1300e-003	0.1709	0.0363	4.3000e-004	9.2800e-003	6.1000e-004	9.8900e-003	2.5500e-003	5.9000e-004	3.1300e-003	0.0000	42.0490	42.0490	2.9700e-003	0.0000	42.1231
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.1600e-003	1.8000e-003	0.0196	5.0000e-005	4.7300e-003	4.0000e-005	4.7800e-003	1.2600e-003	4.0000e-005	1.3000e-003	0.0000	4.5505	4.5505	1.6000e-004	0.0000	4.5544
Total	**7.2900e-003**	**0.1727**	**0.0559**	**4.8000e-004**	**0.0140**	**6.5000e-004**	**0.0147**	**3.8100e-003**	**6.3000e-004**	**4.4300e-003**	**0.0000**	**46.5995**	**46.5995**	**3.1300e-003**	**0.0000**	**46.6776**

3.3 Paving - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0321	0.3092	0.3077	4.8000e-004		0.0175	0.0175		0.0162	0.0162	0.0000	42.5445	42.5445	0.0116	0.0000	42.8343
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0321**	**0.3092**	**0.3077**	**4.8000e-004**		**0.0175**	**0.0175**		**0.0162**	**0.0162**	**0.0000**	**42.5445**	**42.5445**	**0.0116**	**0.0000**	**42.8343**

3.3 Paving - 2019

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.5000e-004	6.3000e-004	6.8100e-003	2.0000e-005	1.6400e-003	1.0000e-005	1.6600e-003	4.4000e-004	1.0000e-005	4.5000e-004	0.0000	1.5800	1.5800	5.0000e-005	0.0000	1.5814
Total	**7.5000e-004**	**6.3000e-004**	**6.8100e-003**	**2.0000e-005**	**1.6400e-003**	**1.0000e-005**	**1.6600e-003**	**4.4000e-004**	**1.0000e-005**	**4.5000e-004**	**0.0000**	**1.5800**	**1.5800**	**5.0000e-005**	**0.0000**	**1.5814**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0321	0.3092	0.3077	4.8000e-004		0.0175	0.0175		0.0162	0.0162	0.0000	42.5445	42.5445	0.0116	0.0000	42.8342
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0321**	**0.3092**	**0.3077**	**4.8000e-004**		**0.0175**	**0.0175**		**0.0162**	**0.0162**	**0.0000**	**42.5445**	**42.5445**	**0.0116**	**0.0000**	**42.8342**

3.3 Paving - 2019

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.5000e-004	6.3000e-004	6.8100e-003	2.0000e-005	1.6400e-003	1.0000e-005	1.6600e-003	4.4000e-004	1.0000e-005	4.5000e-004	0.0000	1.5800	1.5800	5.0000e-005	0.0000	1.5814
Total	7.5000e-004	6.3000e-004	6.8100e-003	2.0000e-005	1.6400e-003	1.0000e-005	1.6600e-003	4.4000e-004	1.0000e-005	4.5000e-004	0.0000	1.5800	1.5800	5.0000e-005	0.0000	1.5814

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
User Defined Industrial	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
User Defined Industrial	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
User Defined Industrial	0.547192	0.045177	0.202743	0.121510	0.016147	0.006143	0.019743	0.029945	0.002479	0.002270	0.005078	0.000682	0.000891

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000
Total		0.0000	0.0000	0.0000	0.0000

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0257	2.5300e-003	0.2755	2.0000e-005		9.9000e-004	9.9000e-004		9.9000e-004	9.9000e-004	0.0000	0.5336	0.5336	1.4200e-003	0.0000	0.5690
Unmitigated	0.0257	2.5300e-003	0.2755	2.0000e-005		9.9000e-004	9.9000e-004		9.9000e-004	9.9000e-004	0.0000	0.5336	0.5336	1.4200e-003	0.0000	0.5690

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0257	2.5300e-003	0.2755	2.0000e-005		9.9000e-004	9.9000e-004		9.9000e-004	9.9000e-004	0.0000	0.5336	0.5336	1.4200e-003	0.0000	0.5690
Total	**0.0257**	**2.5300e-003**	**0.2755**	**2.0000e-005**		**9.9000e-004**	**9.9000e-004**		**9.9000e-004**	**9.9000e-004**	**0.0000**	**0.5336**	**0.5336**	**1.4200e-003**	**0.0000**	**0.5690**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0257	2.5300e-003	0.2755	2.0000e-005		9.9000e-004	9.9000e-004		9.9000e-004	9.9000e-004	0.0000	0.5336	0.5336	1.4200e-003	0.0000	0.5690
Total	**0.0257**	**2.5300e-003**	**0.2755**	**2.0000e-005**		**9.9000e-004**	**9.9000e-004**		**9.9000e-004**	**9.9000e-004**	**0.0000**	**0.5336**	**0.5336**	**1.4200e-003**	**0.0000**	**0.5690**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

7.2 Water by Land Use

<u>**Unmitigated**</u>

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
User Defined Industrial	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
User Defined Industrial	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		0.0000	0.0000	0.0000	0.0000

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
User Defined Industrial	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

SANTA CLARITA WATER, A DIVISION OF CASTAIC LAKE WATER AGENCY

SCWD

26521 SUMMIT CIRCLE • SANTA CLARITA, CALIFORNIA 91350-3049 • (661) 259-2737
MAILING ADDRESS: P.O. BOX 903 • SANTA CLARITA, CALIFORNIA 91380-9003

June 7, 2017

Caitlin B. Gulley
Tribal Historic and Cultural Preservation Officer
Fernandeño Tataviam Band of Mission Indians
1019 Second Street, Suite 1
San Fernando, CA 91340

Re: Formal Notification of Castaic Lake Water Agency Phase 2B Recycled Water Project

Dear Ms. Gulley:

In response to your request dated July 1, 2015 for formal notification of projects for which Castaic Lake Water Agency (CLWA) prepares a Mitigated Negative Declaration pursuant to Public Resources Code section 21080.3.1(b), this letter serves as formal notification of the CLWA's consideration of the CLWA Phase 2B Recycled Water Project (Project).

Accordingly, as required by Public Resources Code section 21080.3.1(d), this letter provides a brief description of the Project and its location:

The Project would provide recycled water in the vicinity of the Vista Canyon Development by using recycled water from the Vista Canyon Water Factory (Water Factory). The project would construct a recycled water tank (approximately one million gallons), a transmission pipeline to the tank from a pump station at the Water Factory, distribution pipelines to serve existing CLWA irrigation customers in the Fair Oaks Ranch community, and a backup potable water supply from the existing Santa Clarita Water Division (SCWD) potable water tanks near Cherry Willow Drive.

The Project site is located in the City of Santa Clarita, Los Angeles County, California and is within the CLWA service area. The proposed recycled water tank will be located approximately one mile south of the Vista Canyon Development near the existing SCWD Cherry Willow potable water tanks. The transmission pipeline will be routed along Lost Canyon Road, Medley Ridge Drive, and Cherry Willow Drive. A network of distribution pipelines will be located within public right of way within the Fair Oaks Ranch community. See attached Figure 1 for regional location and Figure 2 for proposed project location.

Pursuant to Public Resources Code section 21080.3.1 (b) and (d), the Gabrieleno Tongva, San Gabriel Band of Mission Indians now has 30 days to inform CLWA, in writing, of its request to consult with CLWA on the Project. Such a request must provide the name of the Tribe's designated lead contact person and should be directed to:

Keith Abercrombie
Retail Manager
26521 Summit Circle
Santa Clarita, CA 91350

Please do not hesitate to contact me with any questions or concerns regarding the above at (661) 259-2737 or kabercrombie@scwater.org.

Sincerely,

Keith Abercrombie

Keith Abercrombie
Retail Manager

KA/tbp/elb
TJA
Attachments

cc: State of California, Native American Heritage Commission, Environmental and Cultural Department, 1550 Harbor Boulevard, Suite 100, West Sacramento, CA 95691

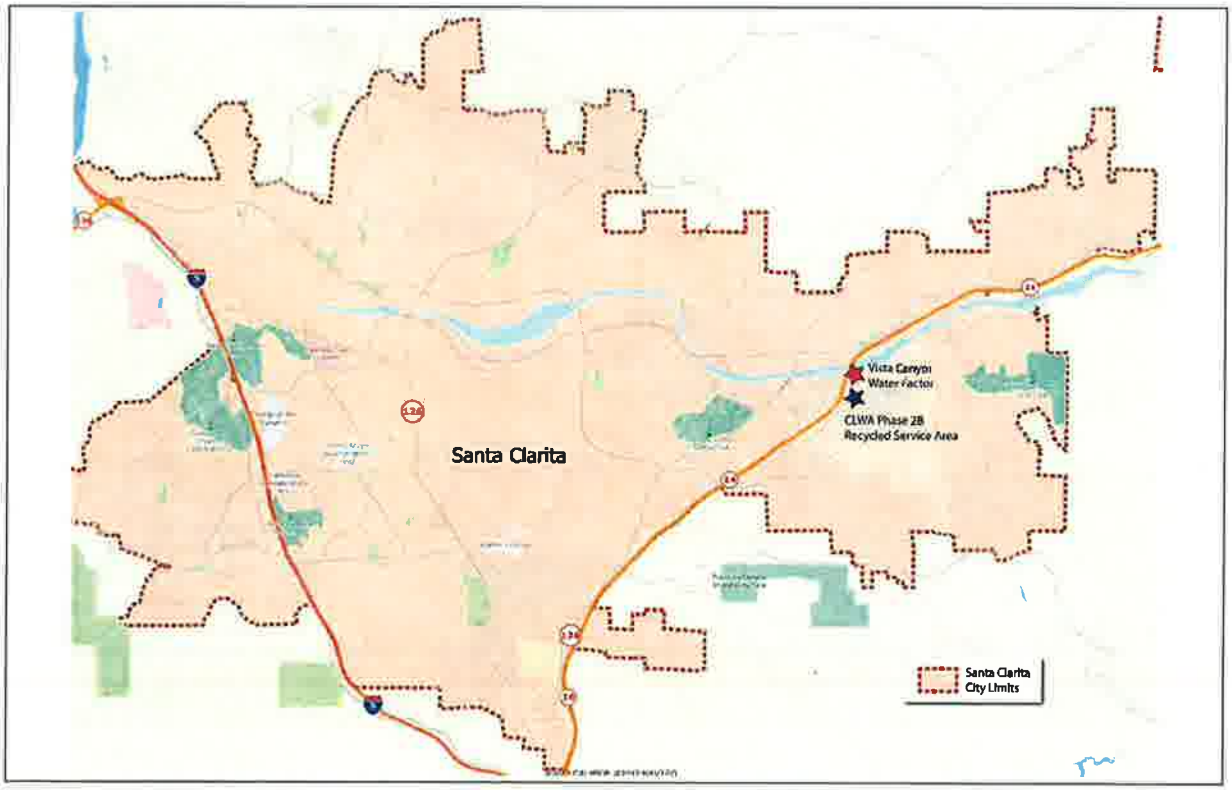

Figure 1 – Regional Location Map

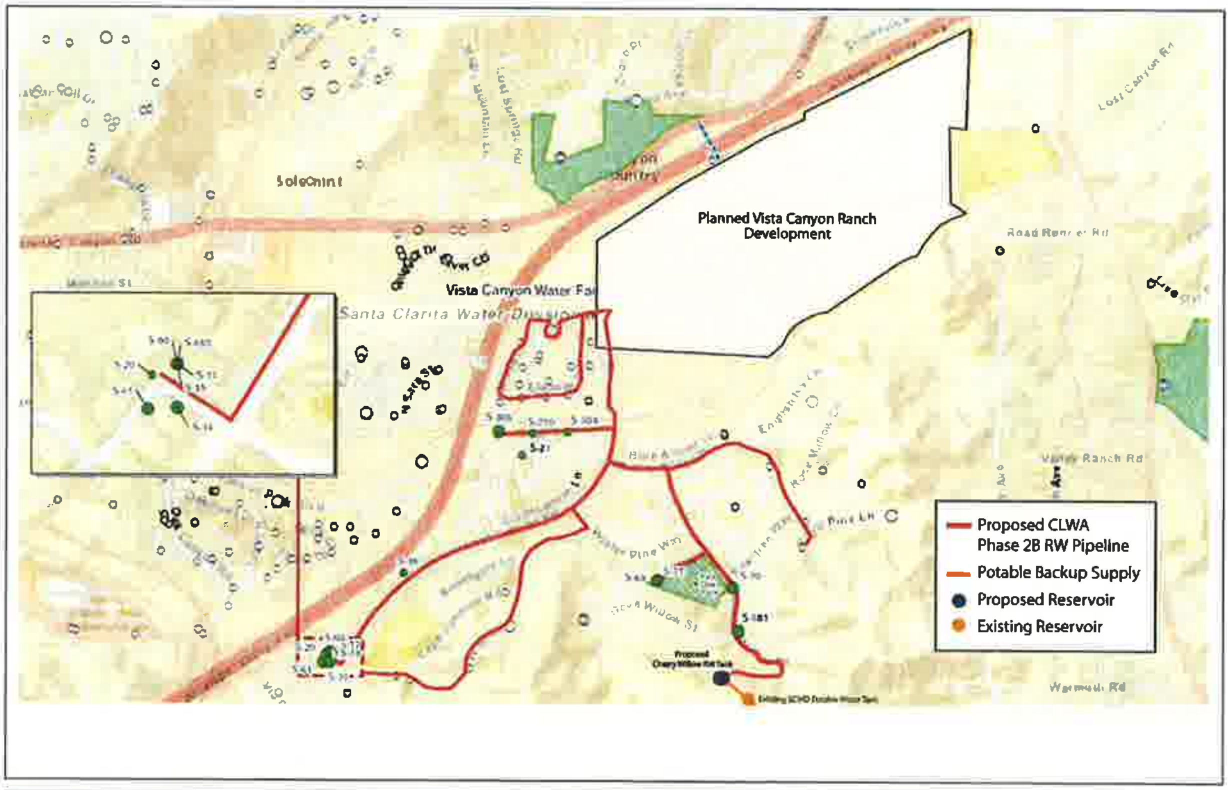

Figure 2 – Proposed Project: CLWA Phase 2B Recycled Water System

Rudy Ortega Jr.
Tribal President

Fernandeño Tataviam Band of Mission Indians
Tribal Historic & Cultural Preservation

Tribal Historic & Cultural Preservation Committee
Steve Ortega
Chairman
David Ortega

July 1, 2015

AUG 3 2015

Dan Masnada, General Manager
Castaic Lake Water Agency
27234 Bouquet Canyon Road
Santa Clarita, California 91350

RE: California Environmental Quality Act Public Resources Code section 21080.3, subd. (b) Request for Formal Notification of Proposed Projects Within the Fernandeño Tataviam Band of Mission Indians Tribe's Geographic Area of Traditional and Cultural Affiliation

Dear Mr. Masnada:

As of July 1, 2015, in accordance with Public Resources Code Section 21080.3.1, subd. (b), Fernandeño Tataviam Band of Mission Indians, which is traditionally and culturally affiliated with a geographic area within or the entirety of your agency's geographic area of jurisdiction, requests formal notice of and information on proposed projects for which your agency will serve as a lead agency under the California Environmental Quality Act (CEQA), Public Resources Code section 21000 et seq.

Pursuant to Public Resources Code section 21080.3.1, subd. (b), and until further notice, we hereby designate the following person as the tribe's lead contact person for purposes of receiving notices of proposed projects from your agency:

Caitlin B. Gulley
Tribal Historic and Cultural Preservation Officer
Fernandeño Tataviam Band of Mission Indians
1019 Second Street
San Fernando CA, 91340
Phone (818) 837-0794
Fax (818) 837-0796
cgulley@tataviam-nsn.us

We request that all notices of proposed projects be sent via certified U.S. Mail with return receipt. Following receipt and review of the information your agency provides, within the 30-day period proscribed by Public Resources Code section 21080.3.1, subd. (d), the Fernandeño Tataviam Band of Mission Indians may request consultation, as defined by Public Resources Code section 21080.3.1, subd. (b), pursuant to Public Resources Code section 21080.3.2 to mitigate any project impacts a specific project may cause to tribal cultural resources.

If you have any questions or need additional information, please contact our lead contact person listed above.

Sincerely,

Caitlin B. Gulley
Tribal Historic and Cultural Preservation Officer

Attachments:

Fernandeño Tataviam Band of Mission Indians:
Historical Tribal Territory

CC: California Native American Heritage Commission

1019 Second Street, Suite 1 | San Fernando | California, 91340 | (818) 837-0794 | Fax (818) 837-0796

Fernandeño Tataviam Band of Mission Indians Historical Tribal Territory

- Tribal boundaries
- County boundaries
- Interstates
- Highways
- Tribal area

CALIFORNIA

Area detailed

Tribal boundary depicted is based on registered tribal citizens' ancestral villages. Due to kinship networks and social exchange, this hard boundary does not include all of the abundant locations associated with Tataviam cultural resources and ancestry. Therefore, the overlap yellow boundary accommodates the natural mobility of ancestral and contemporary Tataviam people, which are also known to be well associated with the tribe and sensitive cultural resources.

All projects breaking soil within the tribal boundary are subject to Tataviam jurisdiction, whereas any projects occurring within the yellow boundary may be subject to further analysis by other surrounding Tribal Governments.

SANTA CLARITA WATER, A DIVISION OF CASTAIC LAKE WATER AGENCY

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MAILING ADDRESS: P.O. BOX 903 • SANTA CLARITA, CALIFORNIA 91380-9003

May 30, 2017

Gabrieleno Tongva
San Gabriel Band of Mission Indians
P.O. Box 693
San Gabriel, CA 91778

Attention: The Honorable Anthony Morales, Chief

Re: Formal Notification of Castaic Lake Water Agency Phase 2B Recycled Water Project

Dear Mr. Morales:

In response to your request dated December 1, 2016 for formal notification of projects for which Castaic Lake Water Agency (CLWA) prepares a Mitigated Negative Declaration pursuant to Public Resources Code section 21080.3.1(b), this letter serves as formal notification of the CLWA's consideration of the CLWA Phase 2B Recycled Water Project (Project).

Accordingly, as required by Public Resources Code section 21080.3.1(d), this letter provides a brief description of the Project and its location:

The Project would provide recycled water in the vicinity of the Vista Canyon Development by using recycled water from the Vista Canyon Water Factory (Water Factory). The project would construct a recycled water tank (approximately one million gallons), a transmission pipeline to the tank from a pump station at the Water Factory, distribution pipelines to serve existing CLWA irrigation customers in the Fair Oaks Ranch community, and a backup potable water supply from the existing Santa Clarita Water Division (SCWD) potable water tanks near Cherry Willow Drive.

The Project site is located in the City of Santa Clarita, Los Angeles County, California and is within the CLWA service area. The proposed recycled water tank will be located approximately one mile south of the Vista Canyon Development near the existing SCWD Cherry Willow potable water tanks. The transmission pipeline will be routed along Lost Canyon Road, Medley Ridge Drive, and Cherry Willow Drive. A network of distribution pipelines will be located within public right of way within the Fair Oaks Ranch community. See attached Figure 1 for regional location and Figure 2 for proposed project location.

Pursuant to Public Resources Code section 21080.3.1 (b) and (d), the Gabrieleno Tongva, San Gabriel Band of Mission Indians now has 30 days to inform CLWA, in writing, of its request to consult with CLWA on the Project. Such a request must provide the name of the Tribe's designated lead contact person and should be directed to:

Keith Abercrombie
Retail Manager
26521 Summit Circle
Santa Clarita, CA 91350

Please do not hesitate to contact me with any questions or concerns regarding the above at (661) 259-2737 or kabercrombie@scwater.org.

Sincerely,

Keith Abercrombie

Keith Abercrombie
Retail Manager

KA/tbp/elb
TBP
Attachments

cc: State of California, Native American Heritage Commission, Environmental and Cultural Department, 1550 Harbor Boulevard, Suite 100, West Sacramento, CA 95691

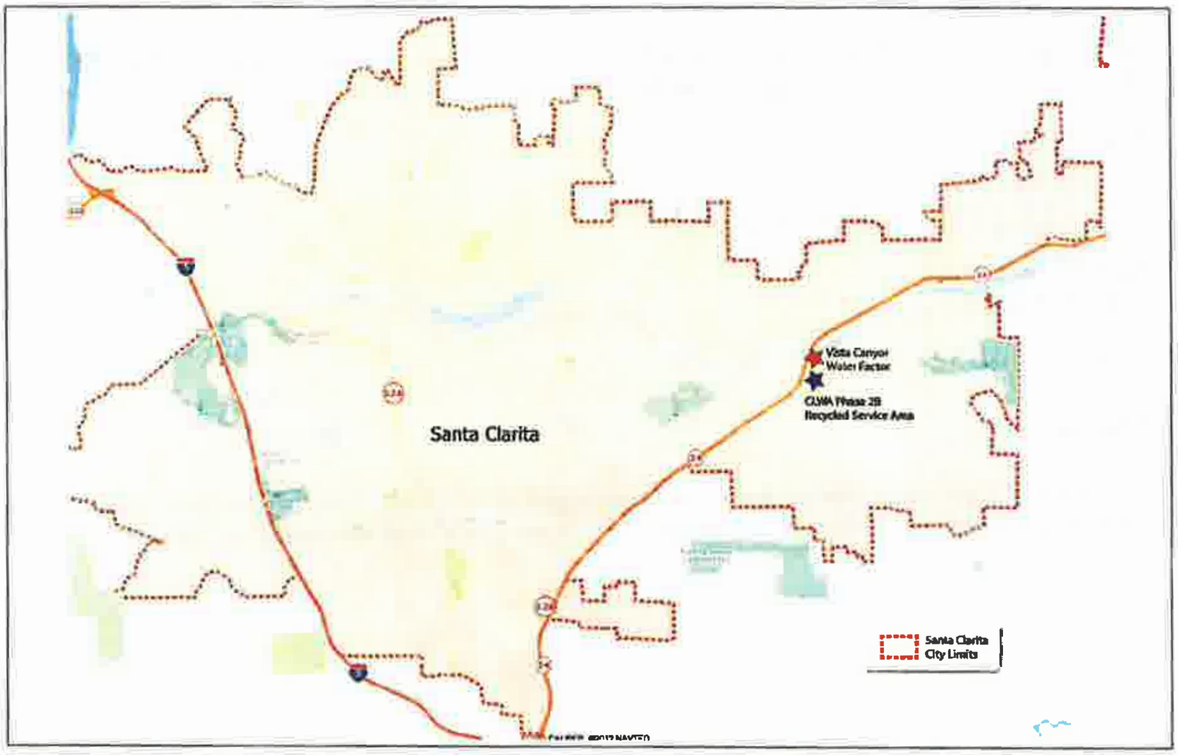

Figure 1 – Regional Location Map

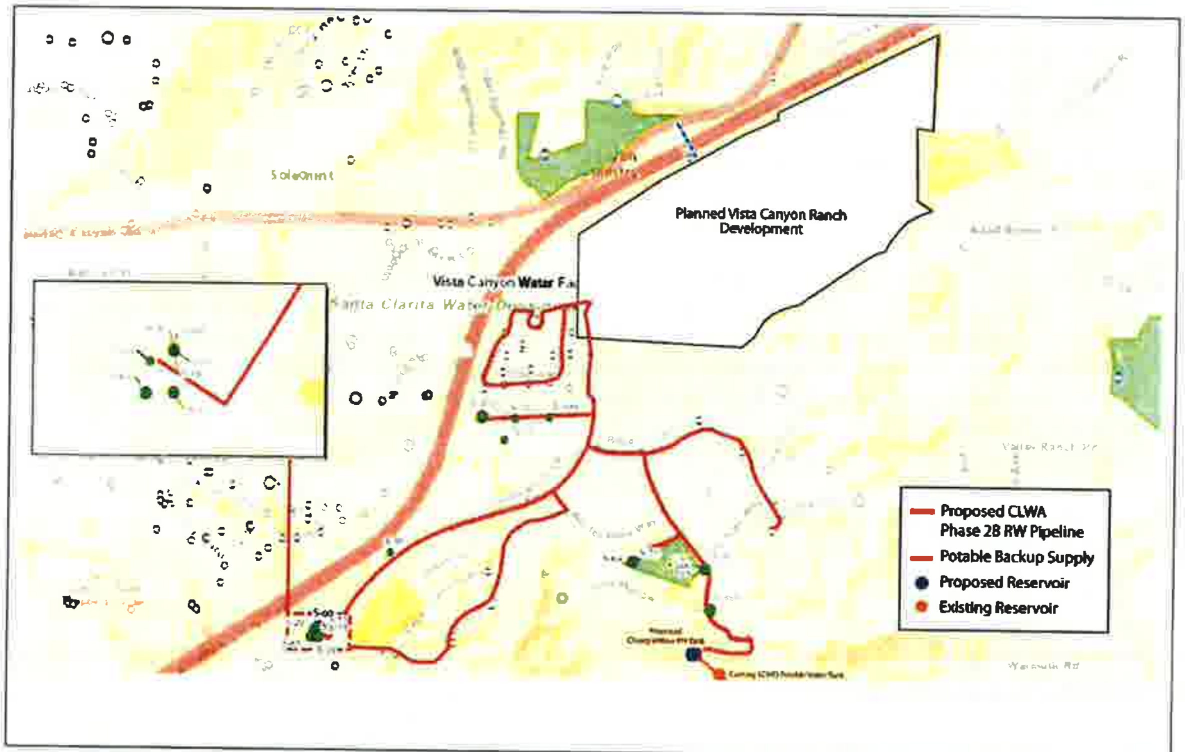

Figure 2 – Proposed Project: CLWA Phase 2B Recycled Water System

GABRIELENO TONGVA
SAN GABRIEL BAND OF MISSION INDIANS

December 1, 2016

Santa Clarita Water Division of the Castaic Lake Water Agency
26521 Summit Circle
Santa Clarita, CA 91350

RE: California Environmental Quality Act Public Resources Code section 21080.3, subd. (b) Request for Formal Notification of Proposed Projects Within the San Gabriel Band of Mission Indians Tribe's Geographic Area of Traditional and Cultural Affiliation

CC: Native American Heritage Commission

To whom it may concern:

As of the date of this letter, in accordance with Public Resources Code Section 21080.3.1, subd. (b), San Gabriel Band of Mission Indians, which is traditionally and culturally affiliated with a geographic area within your agency's geographic area of jurisdiction, requests formal notice of, and information on, proposed projects for which your agency will serve as a lead agency under the California Environmental Quality Act (CEQA), Public Resources Code section 21000 et seq. Pursuant to Public Resources Code section 21080.3.1, subd. (b), and until further notice, we hereby designate the following person as the tribe's lead contact person for purposes of receiving notices of proposed projects from your agency:

San Gabriel Band of Mission Indians
Anthony Morales, Chief
P. O. Box 693
San Gabriel, CA 91778
Fax: (626) 286-1262
Phone: (626) 483-3564
GTTribalcouncil@aol.com

We request that all notices be sent via certified U.S. Mail with return receipt. Following receipt and review of the information your agency provides, within the 30-day period prescribed by Public Resources Code section 21080.3.1, subd. (d), the San Gabriel Band of Mission Indians may request consultation, as defined by Public Resources Code section 21080.3.1, subd. (b), pursuant to Public Resources Code section 21080.3.2 to mitigate any project impacts a specific project may cause to tribal cultural resources.

If you have any questions or need additional information, please contact our lead contact person listed above.

Sincerely,

Anthony Morales

Anthony Morales
San Gabriel Band of Mission Indians
Chief

GABRIELENO TONGVA
SAN GABRIEL BAND OF MISSION INDIANS

October 15, 2016

To Whom It May Concern,

I am sending this letter on behalf of the **Morales family of the San Gabriel Band of Mission Indians** to help facilitate communication regarding the Gabrieleno cultural resources and archaeological studies. The San Gabriel Band of Mission Indians gained recognition from the state of California in 1994 as an indigenous tribe within the Los Angeles basin (California Legislature Assembly Joint Resolution No. 96, adopted in Senate August 11,1994). The Morales family has been an active participant in the preservation of Gabrieleno tribal resources since the early 1970s. As early as 1978, the Native American Heritage Commission identified the Morales family as important Tribal Leaders in Southern California for their tenacious efforts to preserve Gabrieleno cultural resources. Today, the Morales family continues to help preserve their culture through a new partnership with Scientific Resource Surveys, Inc (SRSINC).

SRSINC is recognized as the oldest Cultural Resource Management (CRM) firm in Southern California, if not the United States. For over 43 years, SRSINC has worked side-by-side with the Gabrieleno in the Los Angeles basin to provide support to the Southern California building industry. SRSINC was formed in 1973 (incorporated in 1977) and currently operates as a California and Alaska Small Business, UDBE, DBE, and Woman-owned Corporation out of Orange County, California. As an equal opportunity employer, SRSINC employs a diverse staff of specialists to conduct archaeological, ethnographic, historic, and paleontological studies throughout Southern California. SRSinc is more than a Cultural Resource Management firm; it is a consortium of very talented scientists, artists, and support staff who have worked for decades in the fields of **Archaeology, History, Ethnography, Genealogy, Archival Research, Museum Displays, Graphic Arts, Paleontology, Zoology, Bioarchaeology** and **Forensic Sciences**. Each person has his/her own exceptional skills, which together, overlap and intertwine to form a cohesive team.

The San Gabriel Band of Mission Indians have united with SRSINC to facilitate seamless interaction between developers and the tribe, as dictated by the new CRM laws. The most recent changes to state statutes were put into effect in 2015. Assembly Bill No. 52 (AB-52) was passed late-2014 to amend the current policy surrounding Native American resources. The implementation of AB-52 mandates tribal consultation and emphasizes tribal knowledge during CEQA review. Additionally, AB-52 has broadened the definition of what constitutes as a cultural resource. Previously, a cultural resource was reserved to archaeological and historical objects and buildings. AB-52 has coined a new term, Tribal Cultural Resources (TCR), to be more inclusive of culturally valued resources, whether they be tangible objects or conceptual. The enactment of AB-52 has placed a new emphasis on collaboration with tribal governments to help understand how indigenous populations used, and continue to use, local landscapes.

The San Gabriel Band of Mission Indians have requested to be consulted for all developments located within the Los Angeles Basin. As a partner and qualified expert, SRSINC can provide the required information to help save time and money. **By working together, we can help you navigate through your legal obligations and facilitate all of your cultural resource management needs for the Los Angeles basin.** Please feel free to contact SRSINC's tribal liaison, Kassie Sugimoto, for additional information or with any questions. We look forward to working with you in the near future.

Kassie Sugimoto
Tribal Liaison
Scientific Resource Surveys, Inc.
2324 N. Batavia St. Ste. 109, Orange, CA 92865
Tel: 714-685-0204
Fax: 714-685-0082

Sincerely,

Nancy "Anastasia" Wiley
Scientific Resource Surveys, Inc.

Anthony Morales
San Gabriel Band of Mission Indians

Adrian Morales
San Gabriel Band of Mission Indians

STATE OF CALIFORNIA- EDMUND G. BROWN JR., Governor

NATIVE AMERICAN HERITAGE COMMISSION
915 CAPITOL MALL, ROOM 364
SACRAMENTO, CA 95814
(916) 653-6251
Fax (916) 657-5390

September 2, 1978

Mr. Fred Morales
Gabrieleno/Tongva Tribal Council

211 East Main Street
San Gabriel, CA 91776

Dear Mr. Morales:

As you know, the State of California Native American Heritage Commission was created by AB 4239 in 1976 and the Commission began its work January 1, 1977 with new authority codified in Public Resources Code Section 5097. 9.

You have been identified as an important Tribal Leader in Southern California. The Commission looks forward to working with you and Tribal Elders as it makes plans and services to protect California Native American burial sites and artifacts associated with burials. The Commission is also concerned about development activities that might threaten Native American sacred sites.

Please feel free to contact me with your concerns and your suggestions that will make the work of the Commission effective in cooperation with California Native American Tribes.

Sincerely,

Steve Rios

Steve Rios
Executive Secretary

CALIFORNIA LEGISLATURE

Assembly

RESOLUTION

By Assembly Members Diane Martinez, Barbara Alby, Doris Allen, Dede Alpert, Marguerite Archie-Hudson, Joe Baca, Julie Bornstein, Vivien Bronshvag, Valerie Brown, John Burton, Cruz M. Bustamante, Sal Cannella, Dominic L. Cortese, Denise Moreno Ducheny, Delaine Eastin, Bob Epple, Martha M. Escutia, Robert Frazee, Terry Friedman, Jan Goldsmith, Mike Gotch, Tom Hannigan, Trice Harvey, Dan Hauser, Paul V. Horcher, Betty Karnette, Richard Katz, Barbara Lee, Juanita McDonald, Gwen Moore, Bill Morrow, Richard Mountjoy, Willard Murray, Grace F. Napolitano, Richard Polanco, Charles W. Quackenbush, James Rogan, Andrea Seastrand, Margaret E. Snyder, Hilda L. Solis, Nao Takasugi, Tom Umberg, and Ted Weggeland; Relative to

The Gabrielinos

Whereas, Gabrielino tribal territory encompasses the entire Los Angeles Basin area and the Channel Islands of Santa Catalina, San Nicholas, and San Clemente; and

Whereas, The Gabrielino were, at one time, one of the most prosperous and generous Native American tribes of southern California. Long before European contact, the Gabrielinos already had a major society in place with a government, laws, religion, music, dance, art, a monetary system, and cultural exchange; and

Whereas, The State of California has had consistent interaction with the Gabrielinos, known originally as the San Gabriel Band of Mission Indians; and

Whereas, The State of California recognizes that the Gabrielino Indian community existed and has continued to exist without interruption to the present day; and

Whereas, The State of California recognizes that the Gabrielinos have held general membership meetings in the San Gabriel, California region for over 100 years; and

Whereas, The State of California recognizes that Gabrielino members participate consistently in tribal affairs; now, therefore, be it

Resolved by THE ASSEMBLY AND SENATE OF THE STATE OF CALIFORNIA, JOINTLY, That the State of California recognizes the Gabrielinos as the aboriginal tribe of the Los Angeles Basin and takes great pride in recognizing the Indian inhabitance of the Los Angeles Basin and the continued existence of the Indian community within our state; and be it further

Resolved, That the California Legislature respectfully memorializes the President and Congress of the United States to likewise give recognition to the Gabrielinos as the aboriginal tribe of the Los Angeles Basin; and be it further

Resolved, That the Chief Clerk of the Assembly transmit copies of this resolution to the President and Vice President of the United States, to the Speaker of the House of Representatives, to each Senator and Representative from California in the Congress of the United States.

Assembly Joint Resolution No. 96

Adopted in Assembly August 11, 1994

Signed:

Willie L. Brown, Jr.
Speaker of the Assembly

Attest:

Dotson Wilson
Chief Clerk of the Assembly

Adopted in Senate August 31, 1994

Signed:

Leo T. McCarthy
President of the Senate

Attest:

Rick Rollens
Secretary of the Senate

SANTA CLARITA WATER, A DIVISION OF CASTAIC LAKE WATER AGENCY

SCWD

26521 SUMMIT CIRCLE • SANTA CLARITA, CALIFORNIA 91350-3049 • (661) 259-2737
MAILING ADDRESS: P.O. BOX 903 • SANTA CLARITA, CALIFORNIA 91380-9003

June 7, 2017

Michael Mirelez
Cultural Resource Coordinator
Torres Martinez Desert Cahuilla Indians
P.O. Box 1160
Thermal, CA 92274

Re: Formal Notification of Castaic Lake Water Agency Phase 2B Recycled Water Project

Dear Mr. Mirelez:

In response to your request dated May 9, 2016 for formal notification of projects for which Castaic Lake Water Agency (CLWA) prepares a Mitigated Negative Declaration pursuant to Public Resources Code section 21080.3.1(b), this letter serves as formal notification of the CLWA's consideration of the CLWA Phase 2B Recycled Water Project (Project).

Accordingly, as required by Public Resources Code section 21080.3.1(d), this letter provides a brief description of the Project and its location:

The Project would provide recycled water in the vicinity of the Vista Canyon Development by using recycled water from the Vista Canyon Water Factory (Water Factory). The project would construct a recycled water tank (approximately one million gallons), a transmission pipeline to the tank from a pump station at the Water Factory, distribution pipelines to serve existing CLWA irrigation customers in the Fair Oaks Ranch community, and a backup potable water supply from the existing Santa Clarita Water Division (SCWD) potable water tanks near Cherry Willow Drive.

The Project site is located in the City of Santa Clarita, Los Angeles County, California and is within the CLWA service area. The proposed recycled water tank will be located approximately one mile south of the Vista Canyon Development near the existing SCWD Cherry Willow potable water tanks. The transmission pipeline will be routed along Lost Canyon Road, Medley Ridge Drive, and Cherry Willow Drive. A network of distribution pipelines will be located within public right of way within the Fair Oaks Ranch community. See attached Figure 1 for regional location and Figure 2 for proposed project location.

Pursuant to Public Resources Code section 21080.3.1 (b) and (d), the Gabrieleno Tongva, San Gabriel Band of Mission Indians now has 30 days to inform CLWA, in writing, of its request to consult with CLWA on the Project. Such a request must provide the name of the Tribe's designated lead contact person and should be directed to:

Keith Abercrombie
Retail Manager
26521 Summit Circle
Santa Clarita, CA 91350

Please do not hesitate to contact me with any questions or concerns regarding the above at (661) 259-2737 or kabercrombie@scwater.org.

Sincerely,

Keith Abercrombie

Keith Abercrombie
Retail Manager

KA/tbp/elb
TBP
Attachments

cc: State of California, Native American Heritage Commission, Environmental and Cultural Department, 1550 Harbor Boulevard, Suite 100, West Sacramento, CA 95691

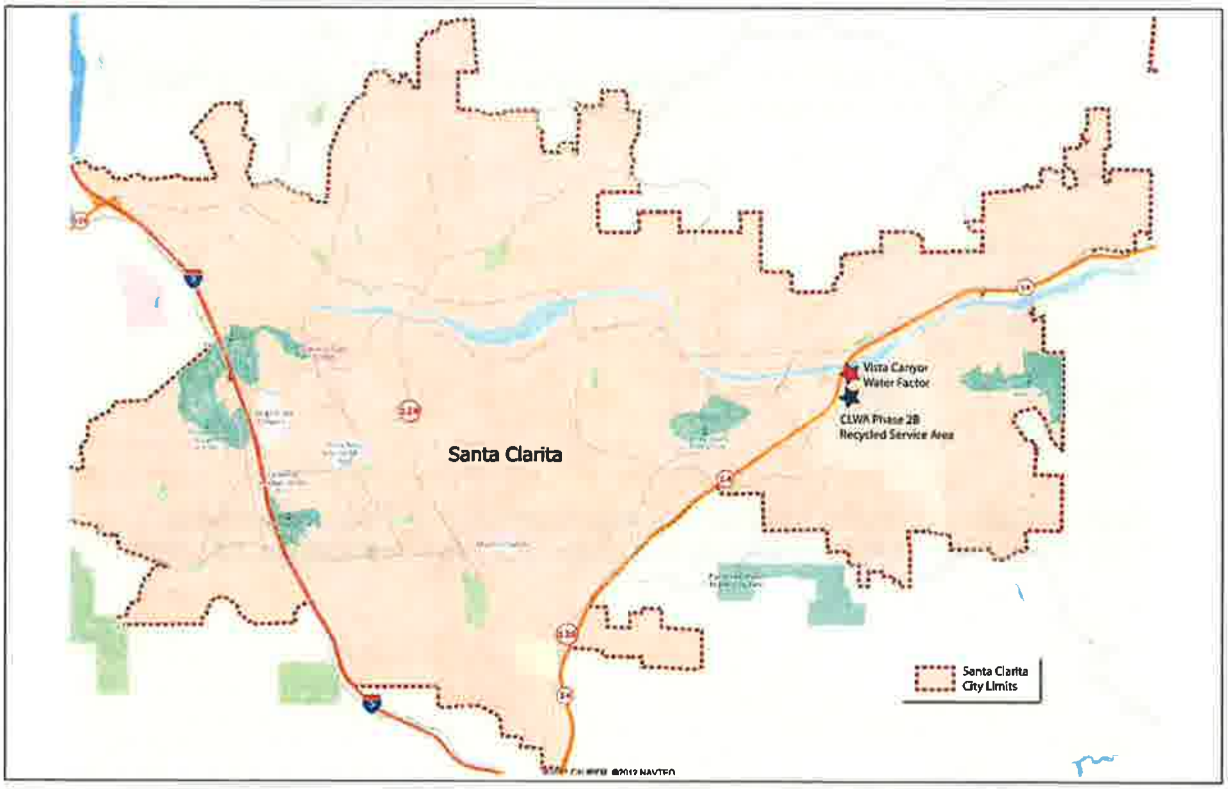

Figure 1 – Regional Location Map

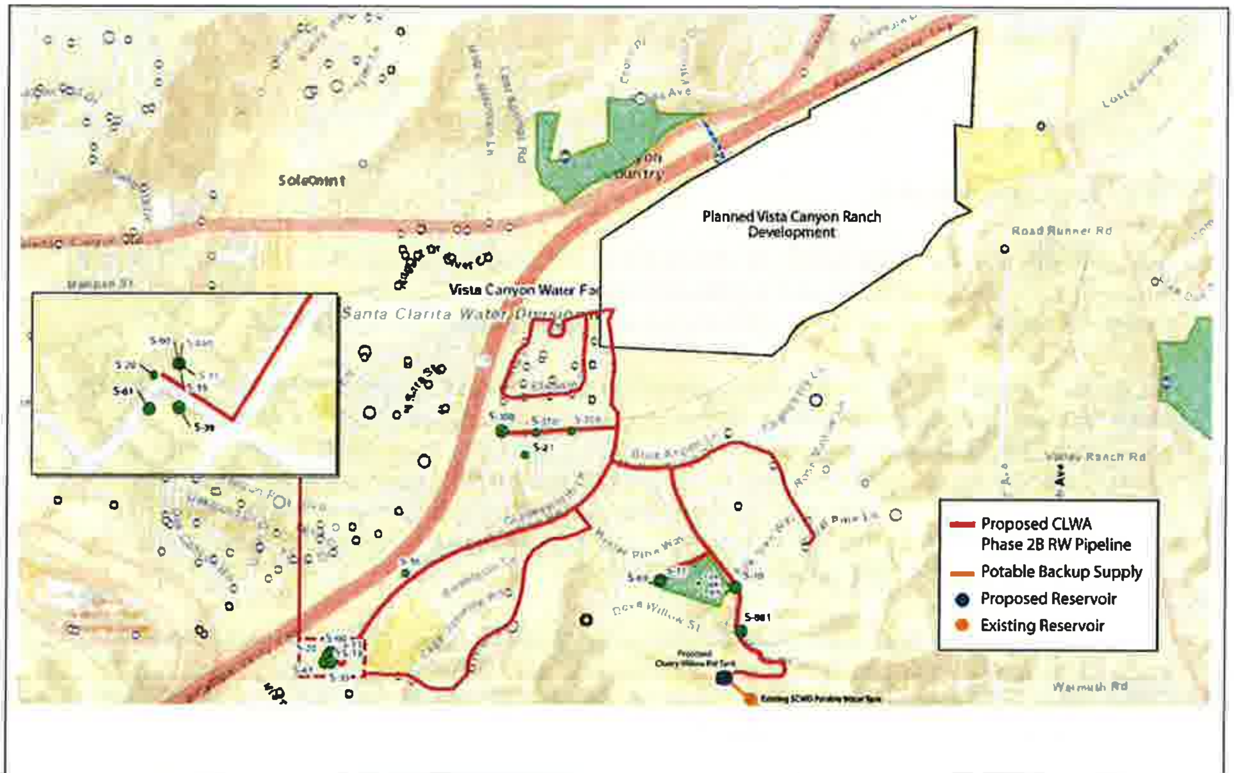

Figure 2 – Proposed Project: CLWA Phase 2B Recycled Water System

TORRES MARTINEZ DESERT CAHUILLA INDIANS
P.O. Box 1160
Thermal, CA 92274
(760) 397-0300 – FAX (760) 397-8146

May 9, 2016

To whom it may concern:

Re: California Environmental Quality Act Public Resources Code section 21080.3, subd. (b) ; California Assembly Bill 52, Request for Formal Notification of Proposed Projects within your jurisdiction that is traditionally and culturally affiliated with the Torres Martinez Desert Cahuilla Indians.

The purpose of this letter is to request formal notification of proposed projects within your jurisdiction that is traditionally and culturally affiliated with the Torres Martinez Desert Cahuilla Indians, in accordance with Public Resources Code Section 21080.3.1, subd. (b). As of the date of this letter, you have been formally notified that the boundaries of your local government's jurisdiction fall within the area that is traditionally and culturally affiliated with the Torres Martinez Desert Cahuilla Indians. Additionally, Torres Martinez Desert Cahuilla Indians has created specific requests and formal procedures in accordance with California Assembly Bill 52:

- Formal notice of and information on proposed projects for which your agency will serve as a lead agency under the California Environmental Quality Act (CEQA), Public Resources Code section 21000 et seq. Pursuant to Public Resources Code section 21080.3.1, subd. (b) shall be sent to Torres Martinez Desert Cahuilla Indians

- Within 14 days of determining that an application for a project is complete or of a decision by your agency to undertake a project, a lead agency must provide formal notification to Cultural Monitoring Coordinator, Michael Mirelez, who is the designated contact and tribal representative for the traditionally and culturally affiliated Torres Martinez Desert Cahuilla Indians regarding notifications pertaining to California Assembly Bill 52

  Contact Information:
  Michael Mirelez
  Cultural Resource Coordinator
  Torres Martinez Desert Cahuilla Indians

Address: P.O. Box 1160 Thermal, CA 92274

Office: 760-397-0300 ext:1213
Cell: 760-399-0022
Email: mmirelez@tmdci.org

This notice shall consist of a formal written letter that includes:

- A description of the proposed project
- The project's location
- The lead agency contact information
- A clear and definitive statement that the tribe has 30 day to request consultation
- An Aerial Photo of the project Area
- Copies of the CHRIS Archaeological Record Search

- Once the Torres Martinez Desert Cahuilla Indians has received the notification, we will respond within 30 days as to whether we wish to initiate consultation as prescribed by Public Resources Code section 21080.3.1, subd. (d), the Torres Martinez Desert Cahuilla Indians, may request consultation, as defined by Public Resources Code section 21080.3.1, subd. (b), pursuant to Public Resources Code section 21080.3.2 to mitigate any project impacts a specific project may cause to tribal cultural resources.

- The lead agency shall begin the consultation process within 30 days of receiving the Torres Martinez Desert Cahuilla Indians request for consultation and prior to the release of a negative declaration, mitigated negative declaration, or environmental impact statement.

- Once a review of inadvertent discoveries has been completed by the Cultural Resource Director, all information will then be transferred to the Torres Martinez Desert Cahuilla Indians Tribal Council for a final decision and directive.

Sincerely,

Michael Mirelez
Cultural Resource Coordinator
Torres Martinez Desert Cahuilla Indians

Rudy J. Ortega, Jr.
Tribal President

Fernandeño Tataviam Band of Mission Indians
Tribal Historic & Cultural Preservation

Tribal Historic & Cultural Preservation Committee
Richard Ortega
Chairman

August 1, 2017

SENT VIA EMAIL to kabercrombie@scwater.org

RE: Formal Comments for *Castaic Lake Water Agency Phase 2B Recycled Water Project* (Project)

Dear Mr. Abercrombie,

Thank you for the opportunity to consult and comment on the above referenced Project. I am writing to you on behalf the Tribal Historic and Cultural Preservation Department ("THCP") of the Fernandeño Tataviam Band of Mission Indians (the "Tribe"), a sovereign Indian nation of northern Los Angeles County.

The Project property is located within the traditional and historic territory of the Tribe. It is associated with culturally sensitive spaces heavily utilized and settled by ancestors of the Tribe near the Santa Clara River drainage and surrounding foothills.

However, due to the facts that (1) all areas previously identified by THCP as areas of concern have been previously and heavily developed, (2) some areas of concern have been previously monitored and given cultural resources oversight by the Tribe for another project entitled *Vista Canyon Development*, whose boundaries overlap with the above referenced Project, (3) no additional ground disturbance is to take place in areas of native soil or areas that have not been graded to 5 to 20 ft in depth, and (4) the Project is a new recycled water pipeline that will not be placed deeper than other existing pipelines (e.g., storm drains, sewer), THCP finds that the project has no potential impact on its tribal cultural resources. Additionally, THCP requests that, should any tribal cultural resources be discovered upon excavation or Project plans be changed, the THCPO Kimia Fatehi shall be notified immediately at (818)837-0794 or kfatehi@tataviam-nsn.us.

Consultation with the Tribe may be considered concluded. Thank you for your time.

Sincerely,

K Fatehi
Kimia Fatehi
Tribal Historic and Cultural Preservation Officer

1019 Second Street, Suite 1 | San Fernando | California, 91340 | (818) 837-0794 | Fax (818) 837-0796 | thcp@tataviam-nsn.us

SANTA CLARITA WATER, A DIVISION OF CASTAIC LAKE WATER AGENCY

SCWD

26521 SUMMIT CIRCLE • SANTA CLARITA, CALIFORNIA 91350-3049 • (661) 259-2737
MAILING ADDRESS: P.O. BOX 903 • SANTA CLARITA, CALIFORNIA 91380-9003

August 8, 2017

Kimia Fatehi
Tribal Historic and Cultural Preservation Officer
Fernandeño Tataviam Band of Mission Indians
1019 Second Street, Suite 1
San Fernando, CA 91340

Re: Formal Comments for Castaic Lake Water Agency Phase 2B Recycled Water Project and Conclusion of Tribal Consultation

Dear Ms. Fatehi,

Thank you for your August 1, 2017 letter with formal comments for the above referenced project concluding Consultation with the Fernandeño Tataviam Band of Mission Indians (the "Tribe"). This letter is to confirm that the Castaic Lake Water Agency (CLWA) will include a recommended mitigation measure in the CLWA Mitigated Negative Declaration to immediately notify the Tribal Historic and Cultural Preservation Department (as noted in your August 1, 2017 letter) should any tribal cultural resources be discovered upon excavation, or if Project plans are changed significantly.

It is our understanding that this concludes our consultation with the Tribe pursuant to AB 52. Thank you for your interest in our project.

Sincerely,

Keith Abercrombie

Keith Abercrombie
Retail Manager

cc: State of California, Native American Heritage Commission, Environmental and Cultural Department, 1550 Harbor Boulevard, Suite 100, West Sacramento, CA 95691

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Appendix B

Air Quality and Greenhouse Gas Modeling

SCV Water Phase 2B Tank Project

South Coast AQMD Air District, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Non-Asphalt Surfaces	0.55	Acre	0.55	23,958.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	31
Climate Zone	9			**Operational Year**	2022
Utility Company	User Defined				
CO2 Intensity (lb/MWhr)	0	**CH4 Intensity (lb/MWhr)**	0	**N2O Intensity (lb/MWhr)**	0

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Construction emissions only.

Land Use - Size of disturbance area

Construction Phase - Provided by SCV Water.

Off-road Equipment - Provided by SCV Water

Off-road Equipment - Grader is proxy to allow for soil export

Trips and VMT - Two trips for water truck, two trips for utility truck

Grading - Provided by SCV Water

Construction Off-road Equipment Mitigation - SCAQMD Rule 403

SCV Water Phase 2B Tank Project - South Coast AQMD Air District, Winter

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	2.00	20.00
tblConstructionPhase	NumDays	2.00	5.00
tblGrading	MaterialExported	0.00	6,000.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	PhaseName		Soil Export
tblTripsAndVMT	VendorTripNumber	0.00	4.00
tblTripsAndVMT	WorkerTripNumber	3.00	0.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2021	1.9075	46.1908	17.7216	0.1281	3.6805	0.5008	4.1812	1.1986	0.4651	1.6637	0.0000	13,708.5462	13,708.5462	1.2818	0.0000	13,740.5919
Maximum	**1.9075**	**46.1908**	**17.7216**	**0.1281**	**3.6805**	**0.5008**	**4.1812**	**1.1986**	**0.4651**	**1.6637**	**0.0000**	**13,708.5462**	**13,708.5462**	**1.2818**	**0.0000**	**13,740.5919**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2021	1.9075	46.1908	17.7216	0.1281	3.1918	0.5008	3.6926	0.9597	0.4651	1.4248	0.0000	13,708.5462	13,708.5462	1.2818	0.0000	13,740.5919
Maximum	**1.9075**	**46.1908**	**17.7216**	**0.1281**	**3.1918**	**0.5008**	**3.6926**	**0.9597**	**0.4651**	**1.4248**	**0.0000**	**13,708.5462**	**13,708.5462**	**1.2818**	**0.0000**	**13,740.5919**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**13.28**	**0.00**	**11.69**	**19.93**	**0.00**	**14.36**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.0103	0.0000	6.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000		1.2000e-004	1.2000e-004	0.0000		1.3000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0103**	**0.0000**	**6.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**1.2000e-004**	**1.2000e-004**	**0.0000**	**0.0000**	**1.3000e-004**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.0103	0.0000	6.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000		1.2000e-004	1.2000e-004	0.0000		1.3000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0103**	**0.0000**	**6.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**1.2000e-004**	**1.2000e-004**	**0.0000**	**0.0000**	**1.3000e-004**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Berm Construction	Grading	5/3/2021	5/28/2021	5	20	
2	Soil Export	Grading	5/3/2021	5/7/2021	5	5	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0.55

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Berm Construction	Excavators	1	8.00	158	0.38
Berm Construction	Rubber Tired Dozers	1	1.00	247	0.40
Berm Construction	Skid Steer Loaders	1	8.00	65	0.37
Berm Construction	Tractors/Loaders/Backhoes	2	6.00	97	0.37
Soil Export	Graders	1	0.00	187	0.41

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Berm Construction	5	13.00	4.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Soil Export	1	0.00	0.00	750.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Berm Construction - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.7528	0.0000	0.7528	0.4138	0.0000	0.4138			0.0000			0.0000
Off-Road	0.7164	7.3721	8.5568	0.0130		0.3795	0.3795		0.3491	0.3491		1,255.159 5	1,255.159 5	0.4059		1,265.308 1
Total	**0.7164**	**7.3721**	**8.5568**	**0.0130**	**0.7528**	**0.3795**	**1.1323**	**0.4138**	**0.3491**	**0.7629**		**1,255.159 5**	**1,255.159 5**	**0.4059**		**1,265.308 1**

3.2 Berm Construction - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0117	0.3803	0.1013	9.9000e-004	0.0256	7.9000e-004	0.0264	7.3700e-003	7.6000e-004	8.1300e-003		105.8201	105.8201	7.0800e-003		105.9971
Worker	0.0600	0.0390	0.4401	1.3500e-003	0.1453	1.0700e-003	0.1464	0.0385	9.9000e-004	0.0395		134.6368	134.6368	3.6100e-003		134.7270
Total	**0.0717**	**0.4193**	**0.5414**	**2.3400e-003**	**0.1709**	**1.8600e-003**	**0.1728**	**0.0459**	**1.7500e-003**	**0.0477**		**240.4569**	**240.4569**	**0.0107**		**240.7241**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.3387	0.0000	0.3387	0.1862	0.0000	0.1862			0.0000			0.0000
Off-Road	0.7164	7.3721	8.5568	0.0130		0.3795	0.3795		0.3491	0.3491	0.0000	1,255.1595	1,255.1595	0.4059		1,265.3081
Total	**0.7164**	**7.3721**	**8.5568**	**0.0130**	**0.3387**	**0.3795**	**0.7182**	**0.1862**	**0.3491**	**0.5353**	**0.0000**	**1,255.1595**	**1,255.1595**	**0.4059**		**1,265.3081**

3.2 Berm Construction - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0117	0.3803	0.1013	9.9000e-004	0.0256	7.9000e-004	0.0264	7.3700e-003	7.6000e-004	8.1300e-003		105.8201	105.8201	7.0800e-003		105.9971
Worker	0.0600	0.0390	0.4401	1.3500e-003	0.1453	1.0700e-003	0.1464	0.0385	9.9000e-004	0.0395		134.6368	134.6368	3.6100e-003		134.7270
Total	**0.0717**	**0.4193**	**0.5414**	**2.3400e-003**	**0.1709**	**1.8600e-003**	**0.1728**	**0.0459**	**1.7500e-003**	**0.0477**		**240.4569**	**240.4569**	**0.0107**		**240.7241**

3.3 Soil Export - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.1357	0.0000	0.1357	0.0206	0.0000	0.0206			0.0000			0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.1357**	**0.0000**	**0.1357**	**0.0206**	**0.0000**	**0.0206**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.3 Soil Export - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	1.1194	38.3995	8.6234	0.1128	2.6211	0.1194	2.7405	0.7183	0.1143	0.8326		12,212.92 98	12,212.92 98	0.8652		12,234.55 97
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**1.1194**	**38.3995**	**8.6234**	**0.1128**	**2.6211**	**0.1194**	**2.7405**	**0.7183**	**0.1143**	**0.8326**		**12,212.92 98**	**12,212.92 98**	**0.8652**		**12,234.55 97**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0611	0.0000	0.0611	9.2500e-003	0.0000	9.2500e-003			0.0000			0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0611**	**0.0000**	**0.0611**	**9.2500e-003**	**0.0000**	**9.2500e-003**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.3 Soil Export - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	1.1194	38.3995	8.6234	0.1128	2.6211	0.1194	2.7405	0.7183	0.1143	0.8326		12,212.92 98	12,212.92 98	0.8652		12,234.55 97
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**1.1194**	**38.3995**	**8.6234**	**0.1128**	**2.6211**	**0.1194**	**2.7405**	**0.7183**	**0.1143**	**0.8326**		**12,212.92 98**	**12,212.92 98**	**0.8652**		**12,234.55 97**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Other Non-Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Other Non-Asphalt Surfaces	0.549559	0.042893	0.201564	0.118533	0.015569	0.005846	0.021394	0.034255	0.002099	0.001828	0.004855	0.000709	0.000896

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0103	0.0000	6.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000		1.2000e-004	1.2000e-004	0.0000		1.3000e-004
Unmitigated	0.0103	0.0000	6.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000		1.2000e-004	1.2000e-004	0.0000		1.3000e-004

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	1.8200e-003					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	8.4900e-003					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.0000e-005	0.0000	6.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000		1.2000e-004	1.2000e-004	0.0000		1.3000e-004
Total	**0.0103**	**0.0000**	**6.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**1.2000e-004**	**1.2000e-004**	**0.0000**		**1.3000e-004**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	1.8200e-003					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	8.4900e-003					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.0000e-005	0.0000	6.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000		1.2000e-004	1.2000e-004	0.0000		1.3000e-004
Total	**0.0103**	**0.0000**	**6.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**1.2000e-004**	**1.2000e-004**	**0.0000**		**1.3000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

SCV Water Phase 2B Tank Project

South Coast AQMD Air District, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Non-Asphalt Surfaces	0.55	Acre	0.55	23,958.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	31
Climate Zone	9			**Operational Year**	2022
Utility Company	User Defined				
CO2 Intensity (lb/MWhr)	0	**CH4 Intensity (lb/MWhr)**	0	**N2O Intensity (lb/MWhr)**	0

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Construction emissions only.

Land Use - Size of disturbance area

Construction Phase - Provided by SCV Water.

Off-road Equipment - Provided by SCV Water

Off-road Equipment - Grader is proxy to allow for soil export

Trips and VMT - Two trips for water truck, two trips for utility truck

Grading - Provided by SCV Water

Construction Off-road Equipment Mitigation - SCAQMD Rule 403

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	2.00	20.00
tblConstructionPhase	NumDays	2.00	5.00
tblGrading	MaterialExported	0.00	6,000.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	PhaseName		Soil Export
tblTripsAndVMT	VendorTripNumber	0.00	4.00
tblTripsAndVMT	WorkerTripNumber	3.00	0.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2021	1.8708	45.7375	17.1700	0.1304	3.6805	0.4990	4.1794	1.1986	0.4634	1.6619	0.0000	13,951.1908	13,951.1908	1.2465	0.0000	13,982.3543
Maximum	**1.8708**	**45.7375**	**17.1700**	**0.1304**	**3.6805**	**0.4990**	**4.1794**	**1.1986**	**0.4634**	**1.6619**	**0.0000**	**13,951.1908**	**13,951.1908**	**1.2465**	**0.0000**	**13,982.3543**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2021	1.8708	45.7375	17.1700	0.1304	3.1918	0.4990	3.6908	0.9597	0.4634	1.4230	0.0000	13,951.1908	13,951.1908	1.2465	0.0000	13,982.3543
Maximum	**1.8708**	**45.7375**	**17.1700**	**0.1304**	**3.1918**	**0.4990**	**3.6908**	**0.9597**	**0.4634**	**1.4230**	**0.0000**	**13,951.1908**	**13,951.1908**	**1.2465**	**0.0000**	**13,982.3543**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**13.28**	**0.00**	**11.69**	**19.93**	**0.00**	**14.37**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.0103	0.0000	6.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000		1.2000e-004	1.2000e-004	0.0000		1.3000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0103**	**0.0000**	**6.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**1.2000e-004**	**1.2000e-004**	**0.0000**	**0.0000**	**1.3000e-004**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.0103	0.0000	6.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000		1.2000e-004	1.2000e-004	0.0000		1.3000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0103**	**0.0000**	**6.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**1.2000e-004**	**1.2000e-004**	**0.0000**	**0.0000**	**1.3000e-004**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Berm Construction	Grading	5/3/2021	5/28/2021	5	20	
2	Soil Export	Grading	5/3/2021	5/7/2021	5	5	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0.55

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Berm Construction	Excavators	1	8.00	158	0.38
Berm Construction	Rubber Tired Dozers	1	1.00	247	0.40
Berm Construction	Skid Steer Loaders	1	8.00	65	0.37
Berm Construction	Tractors/Loaders/Backhoes	2	6.00	97	0.37
Soil Export	Graders	1	0.00	187	0.41

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Berm Construction	5	13.00	4.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Soil Export	1	0.00	0.00	750.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Berm Construction - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.7528	0.0000	0.7528	0.4138	0.0000	0.4138			0.0000			0.0000
Off-Road	0.7164	7.3721	8.5568	0.0130		0.3795	0.3795		0.3491	0.3491		1,255.159 5	1,255.159 5	0.4059		1,265.308 1
Total	**0.7164**	**7.3721**	**8.5568**	**0.0130**	**0.7528**	**0.3795**	**1.1323**	**0.4138**	**0.3491**	**0.7629**		**1,255.159 5**	**1,255.159 5**	**0.4059**		**1,265.308 1**

3.2 Berm Construction - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0111	0.3815	0.0905	1.0200e-003	0.0256	7.7000e-004	0.0264	7.3700e-003	7.3000e-004	8.1000e-003		108.9754	108.9754	6.5900e-003		109.1402
Worker	0.0549	0.0356	0.4897	1.4400e-003	0.1453	1.0700e-003	0.1464	0.0385	9.9000e-004	0.0395		143.9624	143.9624	3.8700e-003		144.0592
Total	**0.0660**	**0.4171**	**0.5803**	**2.4600e-003**	**0.1709**	**1.8400e-003**	**0.1728**	**0.0459**	**1.7200e-003**	**0.0476**		**252.9378**	**252.9378**	**0.0105**		**253.1994**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.3387	0.0000	0.3387	0.1862	0.0000	0.1862			0.0000			0.0000
Off-Road	0.7164	7.3721	8.5568	0.0130		0.3795	0.3795		0.3491	0.3491	0.0000	1,255.1595	1,255.1595	0.4059		1,265.3081
Total	**0.7164**	**7.3721**	**8.5568**	**0.0130**	**0.3387**	**0.3795**	**0.7182**	**0.1862**	**0.3491**	**0.5353**	**0.0000**	**1,255.1595**	**1,255.1595**	**0.4059**		**1,265.3081**

3.2 Berm Construction - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0111	0.3815	0.0905	1.0200e-003	0.0256	7.7000e-004	0.0264	7.3700e-003	7.3000e-004	8.1000e-003		108.9754	108.9754	6.5900e-003		109.1402
Worker	0.0549	0.0356	0.4897	1.4400e-003	0.1453	1.0700e-003	0.1464	0.0385	9.9000e-004	0.0395		143.9624	143.9624	3.8700e-003		144.0592
Total	**0.0660**	**0.4171**	**0.5803**	**2.4600e-003**	**0.1709**	**1.8400e-003**	**0.1728**	**0.0459**	**1.7200e-003**	**0.0476**		**252.9378**	**252.9378**	**0.0105**		**253.1994**

3.3 Soil Export - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.1357	0.0000	0.1357	0.0206	0.0000	0.0206			0.0000			0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.1357**	**0.0000**	**0.1357**	**0.0206**	**0.0000**	**0.0206**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.3 Soil Export - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	1.0884	37.9483	8.0329	0.1150	2.6211	0.1176	2.7387	0.7183	0.1125	0.8308		12,443.0935	12,443.0935	0.8301		12,463.8468
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**1.0884**	**37.9483**	**8.0329**	**0.1150**	**2.6211**	**0.1176**	**2.7387**	**0.7183**	**0.1125**	**0.8308**		**12,443.0935**	**12,443.0935**	**0.8301**		**12,463.8468**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0611	0.0000	0.0611	9.2500e-003	0.0000	9.2500e-003			0.0000			0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0611**	**0.0000**	**0.0611**	**9.2500e-003**	**0.0000**	**9.2500e-003**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.3 Soil Export - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	1.0884	37.9483	8.0329	0.1150	2.6211	0.1176	2.7387	0.7183	0.1125	0.8308		12,443.0935	12,443.0935	0.8301		12,463.8468
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**1.0884**	**37.9483**	**8.0329**	**0.1150**	**2.6211**	**0.1176**	**2.7387**	**0.7183**	**0.1125**	**0.8308**		**12,443.0935**	**12,443.0935**	**0.8301**		**12,463.8468**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Other Non-Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Other Non-Asphalt Surfaces	0.549559	0.042893	0.201564	0.118533	0.015569	0.005846	0.021394	0.034255	0.002099	0.001828	0.004855	0.000709	0.000896

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0103	0.0000	6.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000		1.2000e-004	1.2000e-004	0.0000		1.3000e-004
Unmitigated	0.0103	0.0000	6.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000		1.2000e-004	1.2000e-004	0.0000		1.3000e-004

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	1.8200e-003					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	8.4900e-003					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.0000e-005	0.0000	6.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000		1.2000e-004	1.2000e-004	0.0000		1.3000e-004
Total	**0.0103**	**0.0000**	**6.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**1.2000e-004**	**1.2000e-004**	**0.0000**		**1.3000e-004**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	1.8200e-003					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	8.4900e-003					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.0000e-005	0.0000	6.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000		1.2000e-004	1.2000e-004	0.0000		1.3000e-004
Total	**0.0103**	**0.0000**	**6.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**1.2000e-004**	**1.2000e-004**	**0.0000**		**1.3000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

SCV Water Phase 2B Tank Project

South Coast AQMD Air District, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Non-Asphalt Surfaces	0.55	Acre	0.55	23,958.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	31
Climate Zone	9			**Operational Year**	2022
Utility Company	User Defined				
CO2 Intensity (lb/MWhr)	0	**CH4 Intensity (lb/MWhr)**	0	**N2O Intensity (lb/MWhr)**	0

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Construction emissions only.

Land Use - Size of disturbance area

Construction Phase - Provided by SCV Water.

Off-road Equipment - Provided by SCV Water

Off-road Equipment - Grader is proxy to allow for soil export

Trips and VMT - Two trips for water truck, two trips for utility truck

Grading - Provided by SCV Water

Construction Off-road Equipment Mitigation - SCAQMD Rule 403

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	2.00	20.00
tblConstructionPhase	NumDays	2.00	5.00
tblGrading	MaterialExported	0.00	6,000.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	PhaseName		Soil Export
tblTripsAndVMT	VendorTripNumber	0.00	4.00
tblTripsAndVMT	WorkerTripNumber	3.00	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2021	0.0106	0.1757	0.1118	4.4000e-004	0.0160	4.1100e-003	0.0201	6.4100e-003	3.7900e-003	0.0102	0.0000	41.6068	41.6068	5.6900e-003	0.0000	41.7492
Maximum	**0.0106**	**0.1757**	**0.1118**	**4.4000e-004**	**0.0160**	**4.1100e-003**	**0.0201**	**6.4100e-003**	**3.7900e-003**	**0.0102**	**0.0000**	**41.6068**	**41.6068**	**5.6900e-003**	**0.0000**	**41.7492**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2021	0.0106	0.1757	0.1118	4.4000e-004	0.0117	4.1100e-003	0.0158	4.1100e-003	3.7900e-003	7.9000e-003	0.0000	41.6068	41.6068	5.6900e-003	0.0000	41.7491
Maximum	**0.0106**	**0.1757**	**0.1118**	**4.4000e-004**	**0.0117**	**4.1100e-003**	**0.0158**	**4.1100e-003**	**3.7900e-003**	**7.9000e-003**	**0.0000**	**41.6068**	**41.6068**	**5.6900e-003**	**0.0000**	**41.7491**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.01**	**0.00**	**27.02**	**0.00**	**21.49**	**35.88**	**0.00**	**22.55**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	**5-3-2021**	**8-2-2021**	0.1493	0.1493
		Highest	0.1493	0.1493

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	1.8800e-003	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.0000e-005	1.0000e-005	0.0000	0.0000	1.0000e-005
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**1.8800e-003**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**1.0000e-005**	**1.0000e-005**	**0.0000**	**0.0000**	**1.0000e-005**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	1.8800e-003	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.0000e-005	1.0000e-005	0.0000	0.0000	1.0000e-005
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**1.8800e-003**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**1.0000e-005**	**1.0000e-005**	**0.0000**	**0.0000**	**1.0000e-005**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Berm Construction	Grading	5/3/2021	5/28/2021	5	20	
2	Soil Export	Grading	5/3/2021	5/7/2021	5	5	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0.55

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

<u>OffRoad Equipment</u>

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Berm Construction	Excavators	1	8.00	158	0.38
Berm Construction	Rubber Tired Dozers	1	1.00	247	0.40
Berm Construction	Skid Steer Loaders	1	8.00	65	0.37
Berm Construction	Tractors/Loaders/Backhoes	2	6.00	97	0.37
Soil Export	Graders	1	0.00	187	0.41

<u>Trips and VMT</u>

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Berm Construction	5	13.00	4.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Soil Export	1	0.00	0.00	750.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Berm Construction - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					7.5300e-003	0.0000	7.5300e-003	4.1400e-003	0.0000	4.1400e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	7.1600e-003	0.0737	0.0856	1.3000e-004		3.7900e-003	3.7900e-003		3.4900e-003	3.4900e-003	0.0000	11.3866	11.3866	3.6800e-003	0.0000	11.4787
Total	**7.1600e-003**	**0.0737**	**0.0856**	**1.3000e-004**	**7.5300e-003**	**3.7900e-003**	**0.0113**	**4.1400e-003**	**3.4900e-003**	**7.6300e-003**	**0.0000**	**11.3866**	**11.3866**	**3.6800e-003**	**0.0000**	**11.4787**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.1000e-004	3.8700e-003	9.6000e-004	1.0000e-005	2.5000e-004	1.0000e-005	2.6000e-004	7.0000e-005	1.0000e-005	8.0000e-005	0.0000	0.9766	0.9766	6.0000e-005	0.0000	0.9781
Worker	5.4000e-004	4.0000e-004	4.5300e-003	1.0000e-005	1.4300e-003	1.0000e-005	1.4400e-003	3.8000e-004	1.0000e-005	3.9000e-004	0.0000	1.2424	1.2424	3.0000e-005	0.0000	1.2432
Total	**6.5000e-004**	**4.2700e-003**	**5.4900e-003**	**2.0000e-005**	**1.6800e-003**	**2.0000e-005**	**1.7000e-003**	**4.5000e-004**	**2.0000e-005**	**4.7000e-004**	**0.0000**	**2.2190**	**2.2190**	**9.0000e-005**	**0.0000**	**2.2213**

3.2 Berm Construction - 2021

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					3.3900e-003	0.0000	3.3900e-003	1.8600e-003	0.0000	1.8600e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	7.1600e-003	0.0737	0.0856	1.3000e-004		3.7900e-003	3.7900e-003		3.4900e-003	3.4900e-003	0.0000	11.3866	11.3866	3.6800e-003	0.0000	11.4787
Total	**7.1600e-003**	**0.0737**	**0.0856**	**1.3000e-004**	**3.3900e-003**	**3.7900e-003**	**7.1800e-003**	**1.8600e-003**	**3.4900e-003**	**5.3500e-003**	**0.0000**	**11.3866**	**11.3866**	**3.6800e-003**	**0.0000**	**11.4787**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.1000e-004	3.8700e-003	9.6000e-004	1.0000e-005	2.5000e-004	1.0000e-005	2.6000e-004	7.0000e-005	1.0000e-005	8.0000e-005	0.0000	0.9766	0.9766	6.0000e-005	0.0000	0.9781
Worker	5.4000e-004	4.0000e-004	4.5300e-003	1.0000e-005	1.4300e-003	1.0000e-005	1.4400e-003	3.8000e-004	1.0000e-005	3.9000e-004	0.0000	1.2424	1.2424	3.0000e-005	0.0000	1.2432
Total	**6.5000e-004**	**4.2700e-003**	**5.4900e-003**	**2.0000e-005**	**1.6800e-003**	**2.0000e-005**	**1.7000e-003**	**4.5000e-004**	**2.0000e-005**	**4.7000e-004**	**0.0000**	**2.2190**	**2.2190**	**9.0000e-005**	**0.0000**	**2.2213**

3.3 Soil Export - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					3.4000e-004	0.0000	3.4000e-004	5.0000e-005	0.0000	5.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**3.4000e-004**	**0.0000**	**3.4000e-004**	**5.0000e-005**	**0.0000**	**5.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.7500e-003	0.0977	0.0207	2.9000e-004	6.4500e-003	3.0000e-004	6.7400e-003	1.7700e-003	2.8000e-004	2.0500e-003	0.0000	28.0012	28.0012	1.9200e-003	0.0000	28.0492
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**2.7500e-003**	**0.0977**	**0.0207**	**2.9000e-004**	**6.4500e-003**	**3.0000e-004**	**6.7400e-003**	**1.7700e-003**	**2.8000e-004**	**2.0500e-003**	**0.0000**	**28.0012**	**28.0012**	**1.9200e-003**	**0.0000**	**28.0492**

3.3 Soil Export - 2021

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.5000e-004	0.0000	1.5000e-004	2.0000e-005	0.0000	2.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**1.5000e-004**	**0.0000**	**1.5000e-004**	**2.0000e-005**	**0.0000**	**2.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.7500e-003	0.0977	0.0207	2.9000e-004	6.4500e-003	3.0000e-004	6.7400e-003	1.7700e-003	2.8000e-004	2.0500e-003	0.0000	28.0012	28.0012	1.9200e-003	0.0000	28.0492
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**2.7500e-003**	**0.0977**	**0.0207**	**2.9000e-004**	**6.4500e-003**	**3.0000e-004**	**6.7400e-003**	**1.7700e-003**	**2.8000e-004**	**2.0500e-003**	**0.0000**	**28.0012**	**28.0012**	**1.9200e-003**	**0.0000**	**28.0492**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Other Non-Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Other Non-Asphalt Surfaces	0.549559	0.042893	0.201564	0.118533	0.015569	0.005846	0.021394	0.034255	0.002099	0.001828	0.004855	0.000709	0.000896

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	1.8800e-003	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.0000e-005	1.0000e-005	0.0000	0.0000	1.0000e-005
Unmitigated	1.8800e-003	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.0000e-005	1.0000e-005	0.0000	0.0000	1.0000e-005

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	3.3000e-004					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	1.5500e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.0000e-005	1.0000e-005	0.0000	0.0000	1.0000e-005
Total	**1.8800e-003**	**0.0000**	**1.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**1.0000e-005**	**1.0000e-005**	**0.0000**	**0.0000**	**1.0000e-005**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	3.3000e-004					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	1.5500e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.0000e-005	1.0000e-005	0.0000	0.0000	1.0000e-005
Total	**1.8800e-003**	**0.0000**	**1.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**1.0000e-005**	**1.0000e-005**	**0.0000**	**0.0000**	**1.0000e-005**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Appendix C

Cultural Resources Assessment

Rincon Consultants, Inc.

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Ventura, California 93003

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November 9, 2020
Project No: 20-10278

Mr. Rick Vasilopulos, Water Resources Planner
Santa Clarita Valley Water Agency
26521 Summit Circle
Santa Clarita, California 91350
Via email: rvasilopulos@scvwa.org

Subject: Cultural Resources Assessment for the Phase 2B Recycled Water Tank Project, Santa Clarita, Los Angeles County California

Dear Mr. Vasilopulos:

The Santa Clarita Valley Water Agency (SCV Water) retained Rincon Consultants, Inc. (Rincon) to conduct a cultural resources assessment for the proposed Phase 2B Recycled Water Tank Project (Modified Project), in Santa Clarita, Los Angeles County, California. Rincon understands that an Initial Study-Mitigated Negative Declaration (IS-MND) was adopted by SCV Water for the Phase 2B Recycled Water System Project in 2017 (Original Project). The Modified Project site lies approximately 60 meters (200 feet) east of the Original Project site. This letter report documents the results of a cultural resources records search and pedestrian field survey for the Modified Project. The Modified Project is subject to the California Environmental Quality Act (CEQA). SCV Water is the lead agency under CEQA.

Project Background

The Original Project included a transmission pipeline from the Vista Canyon pump station, a one-million-gallon recycled water tank located approximately 1.25 miles southeast of the Vista Canyon development near the existing Cherry Willow potable water tanks, distribution pipelines to serve major customers, and a backup potable water supply line from the existing Cherry Willow potable water tanks to the new recycled water tank in the event of an interruption in recycled water flow.

Greenwood and Associates conducted an archaeological inventory for the Original Project in 2017. The Greenwood and Associates cultural resources assessment included a records search of the California Historical Resources Information System's (CHRIS) South Central Coastal Information Center (SCCIC) located at California State University, Fullerton, archival research, and a pedestrian field survey of the Original Project site. The records search included a 0.5-mile search radius that encompassed the Modified Project site. The records search identified eight previously conducted cultural resources studies and four previously recorded cultural resources within the 0.5-mile radius of the Original Project site (Foster 2017). Greenwood and Associates do not indicate if the studies and/or resources are within the Original Project site; however, the fact that no resources were recorded or observed during the pedestrian survey suggests that none of the previously recorded resources were within the Original Project site. Greenwood and Associates did identify a known historical resource, CA-LAN-4356H, the remnants of the 1860 Mitchell Ranch, approximately 1,600 meters (5,250 feet) east of the Original Project site.

In 2020, the Original Project tank site was deemed unsuitable due to landslide and slope stability issues that would require costly engineered buttress fill and/or drilled cast-in-place concrete piles/shear pins. SCV Water, therefore, relocated the proposed recycled water tank site to an alternate existing graded pad site approximately 60 meters (200 feet) southeast of the Original Project tank site.

Project Site

The Modified Project site consists of an approximately 0.55-acre graded pad atop a northwest trending ridgeline, approximately 30 meters (100 feet) northwest of the existing Cherry Willow potable tanks. The Modified Project site is north of Cherry Willow Drive in Santa Clarita, Los Angeles County, California. The Modified Project site lies within the United States Geological Survey (USGS) *Mountain Canyon* quadrangle, Township 4 North, Range 15 West, and Section 26, 27, 34, and 35 (Figure 1 and Figure 2, Attachment A). The Modified Project site has been previously disturbed by development and extensive grading and terracing for the Cherry Willow potable tank site.

Project Description

The Modified Project involves the construction and operation of two 500,000-gallon recycled water tanks on the newly proposed graded pad site located approximately 60 meters (200 feet) southeast of the Original Project tank site. The Modified Project would be used to store recycled water generated by the nearby Vista Canyon Water factory and would supply irrigation water to customers in the Vista Canyon and Fair Oaks communities. The Modified Project would consist of two aboveground, welded steel tanks approximately 55 feet in diameter and 34 feet high. The 0.55-acre graded pad site is situated on a northwest trending ridgeline, approximately 30 meters (100 feet) northwest of the existing Cherry Willow potable tanks, and 11 feet lower in elevation. Removal of the top 20 feet of soil (maximum excavation depth) and recompaction would be required in part of the existing pad, to support the proposed recycled water tanks. Grading would be required to construct perimeter slopes and a vehicular entrance from the existing access road. The visual berm will be extended along the north side of the proposed recycled water tanks to provide screening. Approximately 6,000 cubic yards of soil are anticipated to be exported from the site.

To accommodate the newly proposed tank site, the recycled water transmission pipeline (currently under construction) would need to be extended by approximately 105 linear meters (350 linear feet) within the paved roadway from the original tank site to the new tank site. All other project components associated with the Original Project would be unchanged.

Cultural Resources Records Search

Rincon received records search results from the CHRIS SCCIC at California State University, Fullerton on October 15, 2020. The purpose of the records search was to identify previously conducted cultural resources studies and previously recorded cultural resources within the Modified Project site and a 0.5-mile radius extending from the Modified Project site. The records search included a review of the National Register of Historic Places (NRHP), the California Register of Historical Resources (CRHR), the Office of Historic Preservation Historic Properties Directory, the California Inventory of Historic Resources, and the Archaeological Determinations of Eligibility list.

The SCCIC records search identified seven previously conducted cultural resources studies performed within the 0.5-mile radius of the Modified Project site (Table 1 and Attachment B); one of the studies, LA-00467, evaluated portions of the current Modified Project site. LA-00467 is described below. The Greenwood and Associates archaeological inventory conducted for the Original Project, discussed above, was not identified by the SCCIC and is, therefore, most likely not in the SCCIC files.

The SCCIC search identified one previously recorded cultural resource within the 0.5-mile radius extending from the Modified Project site; no cultural resources are within the Modified Project site itself. Resource P-19-101228 was recorded as an isolated rhyolite core tool with a high domed scraper plane by Michael McIntyre in 1978. Due to the location and alteration of the landscape, McIntyre interpreted the deposition as due to current human occupation and tractor use in the area. The survey team collected the resource.

Table 1 Previous Cultural Resource Studies within 0.5-mile of the Modified project Site

Report Number	Author	Year	Title	Relationship to Modified Project Site
LA-00467	McIntyre, M. J. and R. S Greenwood	1979	*Cultural Resource Survey of a Proposed Class I Landfill Near Sand Canyon, Upper Santa Clara River Valley, Los Angeles County, California*	**Within**
LA-01369	Rector, C. H.	1984	*Cultural Resources Inventory for the 1984 and Part of 1985 California Metropolitan Project Area Public Lands Sale Program*	Outside
LA-01515	Bissell, R. M.	1986	*Cultural Resources Assessment of the Mitchell Properties, Santa Clarita Valley Area, Los Angeles County, California*	Outside
LA-02193	Romani, J. F.	1990	*Archaeological Assessment for the Proposed Santa Fe Specific Plan Southeast and Adjacent to the City of Santa Clarita Los Angeles County, California*	Outside
LA-02442	Norwood, R. H.	1991	*Cultural Resource Survey for Tentative Tract No. 50449 12.1 Acres in Canyon Country Los Angeles County California*	Outside
LA-03690	Wlodarski, R. J.	1997	*Cultural Resources Evaluation City of Santa Clarita Circulation Element EIR*	Outside
LA-04058	Wlodarski, R. J.	1998	*Cultural Resources Evaluation: Golden Valley Ranch EIR City of Santa Clarita, Los Angeles County, California*	Outside
*-	Foster, J. M.	2017	*Archeological Inventory – Santa Clarita Water Phase 28 Project – Pipeline, Pump Station and Tank, City of Santa Clarita*	Outside

Source: SCCIC 2020
*Report not on file at the SCCIC; report provided by SCV Water

LA-00467

Michael McIntyre and Roberta S. Greenwood prepared LA-00467, *Cultural Resource Survey of a Proposed Class I Landfill Near Sand Canyon, Upper Santa Clara River Valley, Los Angeles County, California*, in 1979. The study evaluated 307 acres for the development of a Class I Landfill for Liquid Wastes near Sand Canyon. The study included a historical review of the project site and surrounding areas, a review of state landmarks, a review of archaeological surveys in the general area, and a surface reconnaissance survey. The study efforts identified one prehistoric isolate (resource P-19-101228), outside the Modified Project site. The study included the entirety of the current Modified Project site; no cultural resources were identified within the Modified Project site during the study.

Aerial Imagery and Historical Topographic Maps Review

Rincon completed a review of historical topographic maps and aerial imagery to ascertain the development history of the Modified Project site. Historical topographic maps from 1900 to 1955 depict the Modified Project site as undeveloped land (NETR Online 2020). Aerial imagery from 1947 to 1954 confirm the historical topographic mapping. From 1959 to 1978, aerial imagery depicts the Modified Project site planted with trees and a possible orchard, and a road to the south-east appearing in imagery from 1974 to 1978 (NETR Online 2020). Historical topographic maps confirm that from 1961 to 1988 the Modified Project site was lined with trees (NETR Online 2020). Imagery from 2002 to 2005 shows further development of the area and imagery from 2009 depicts the Cherry Willow potable tank site as developed and the Modified Project site in its current condition (NETR Online 2020).

Assembly Bill 52

As part of the Assembly Bill 52 (AB 52) consultation conducted for the Original Project, SCV Water (formerly Castaic Lake Water Agency [CLWA]), sent AB 52 consultation letters to three Native American tribes who are traditionally and culturally affiliated with the Project area; the Fernandeño Tataviam Band of Mission Indians, the Gabrieleno Tongva San Gabriel Band of Mission Indians, and the Torres Martinez Desert Cahuilla Indians. The Fernandeño Tataviam Band of Mission Indians requested consultation for the Original Project. A meeting was held between SCV Water and Kimia Fatehi, Tribal Historical and Cultural Preservation Officer of the Fernandeño Tataviam Band of Mission Indians. Consultation was concluded with the agreement to incorporate a mitigation measure stating that the Fernandeño Tataviam Band of Mission Indians would be notified in the event of inadvertent archaeological resource finds during the Original Project (Tebo Environmental 2017).

As a result of modifications to the Original Project, SCV Water sent AB 52 notification to the Fernandeño Tataviam Band of Mission Indians on October 27, 2020 to inform them of the modifications. On November 4, 2020, Jairo Avila, Tribal Historic and Cultural Preservation Officer of the FTBMI, responded to the SCV Water outreach effort and stated that the FTBMI has no further questions or concerns regarding the Modified Project site. Additionally, Mr. Avila requested that Mitigation Measure CUL-1 from the 2017 IS-MND be included for the Modified Project. Attachment C contains the full correspondence.

Similar to the Original Project, no tribal cultural resources have been identified within the Modified Project site, located approximately 200 feet southeast of the Original Project site.

Pedestrian Field Survey

Rincon Archaeologist Alyssa Newcomb, MS, Registered Professional Archaeologist (RPA), conducted a pedestrian field survey of the Modified Project site on October 20, 2020. Ms. Newcomb walked a series of pedestrian transects spaced no more than 15 meters apart where accessible and also conducted a visual reconnaissance of the graded slopes within the Modified Project site and a 100-foot buffer surrounding the site. Exposed ground surfaces were inspected for prehistoric cultural materials (e.g., flaked stone tools, tool-making debris, stone milling tools, ecofacts [marine shell and bone]), soil discoloration that might indicate the presence of a prehistoric midden deposit, historic-period debris (e.g., metal, glass, ceramics), and features that indicate the presence of former historic-period structures or buildings (e.g., standing exterior walls, foundations). Rodent burrows allowed visual inspection of subsurface soils. The Modified Project site has been extensively terraced with areas that have been heavily used and recently graded. Ground visibility ranged from poor (less than 15 percent) on vegetated, graded slopes to excellent (100 percent) in recently graded and flat areas. The Modified Project site has been heavily disturbed by previous construction grading and terracing that created a flat, graded pad and a 15- to 20-foot high berm around the Cherry Willow potable tank site. These extensive previous construction disturbances likely removed the upper soil layers that might have contained cultural resources. Visible soils within the Modified Project site consisted of light brown to tan colored sandy and silty loam with imported gravel likely due to recent modification and site use. Figure 3 through Figure 6 in Attachment A depict site conditions during the pedestrian field survey.

Findings and Recommendations

The background research did not identify any cultural resources within the Modified Project site and no cultural resources were identified during the October 20, 2020 pedestrian field survey. The Modified Project site has been heavily disturbed, as evidenced by the site's prior land use history including planting and removal of trees and a possible orchard, and extensive grading and terracing during the construction/installation of the Cherry Willow potable tanks. Given the negative results of the background research, the negative results of previous studies in the vicinity, the negative results of the current pedestrian survey of the Modified Project site, and the extent to which the Modified Project site has been disturbed, Rincon recommends a finding of ***less than significant impact to historical and archaeological resources*** for the purposes of CEQA and does not recommend any additional cultural resources work at this time. The following best management practices are recommended in the unlikely case of unanticipated discoveries during ground-disturbing activities.

Unanticipated Discovery of Archaeological Resources

In the unlikely event archaeological resources are unexpectedly encountered during ground-disturbing activities, work in the immediate area should be halted and an archaeologist meeting the Secretary of the Interior's Professional Qualification Standards for archaeology (National Park Service 1983) should be contacted immediately to evaluate the find. If the find is prehistoric, then a Native American representative should also be contacted to participate in the evaluation of the find. If necessary, the evaluation may require preparation of a treatment plan and archaeological testing for California Register of Historical Resources (CRHR) eligibility. If the discovery proves to be eligible for the CRHR and cannot be avoided by the modified project, additional work, such as data recovery excavation, may be warranted to mitigate any significant impacts to historical resources.

Unanticipated Discovery of Human Remains

In the unlikely event of an unexpected discovery of human remains, all ground-disturbing activities in the vicinity of the discovery will be immediately suspended and redirected elsewhere. All steps required to comply with State of California Health and Safety Code Section 7050.5 and Public Resources Code Section 5097.98 will be implemented including contacting the Los Angeles County Department of Medical Examiner-Coroner. If the human remains are determined to be prehistoric, the coroner will notify the NAHC, which will determine and notify a most likely descendant (MLD). The MLD shall complete an inspection of the site and provide recommendations for treatment to the landowner within 48 hours of being granted access.

Please do not hesitate to contact Rincon with any questions regarding this cultural resources assessment.

Sincerely,
Rincon Consultants, Inc.

Courtney Montgomery, MA
Archaeologist

Ken Victorino, MA, RPA
Senior Principal Investigator

Christopher A. Duran, MA, RPA
Principal/Senior Archaeologist

Attachments

Attachment A Figures

Attachment B SCCIC Records Search Results

Attachment C AB 52 Correspondence

References

Foster, John M.

2017. Archaeological Inventory – Santa Clarita Water Phase 2B Project – Pipeline, Pump Station, and Tank, City of Santa Clarita

McIntyre, Michael J. and Roberta S. Greenwood

1979. Cultural Resource Survey of a Proposed Class I Landfill Near Sand Canyon, Upper Santa Clara River Valley, Los Angeles County, California

National Park Service

1983. Archaeological and Historic Preservation: Secretary of the Interior's Standards and Guidelines. Electronic document, online at http://www.nps.gov/history/local-law-Arch_Standards.htmaccessed December 6, 2011.

NETR Online

2020. *Historic* Aerials. https://www.historicaerials.com/viewer. Accessed October 2020.

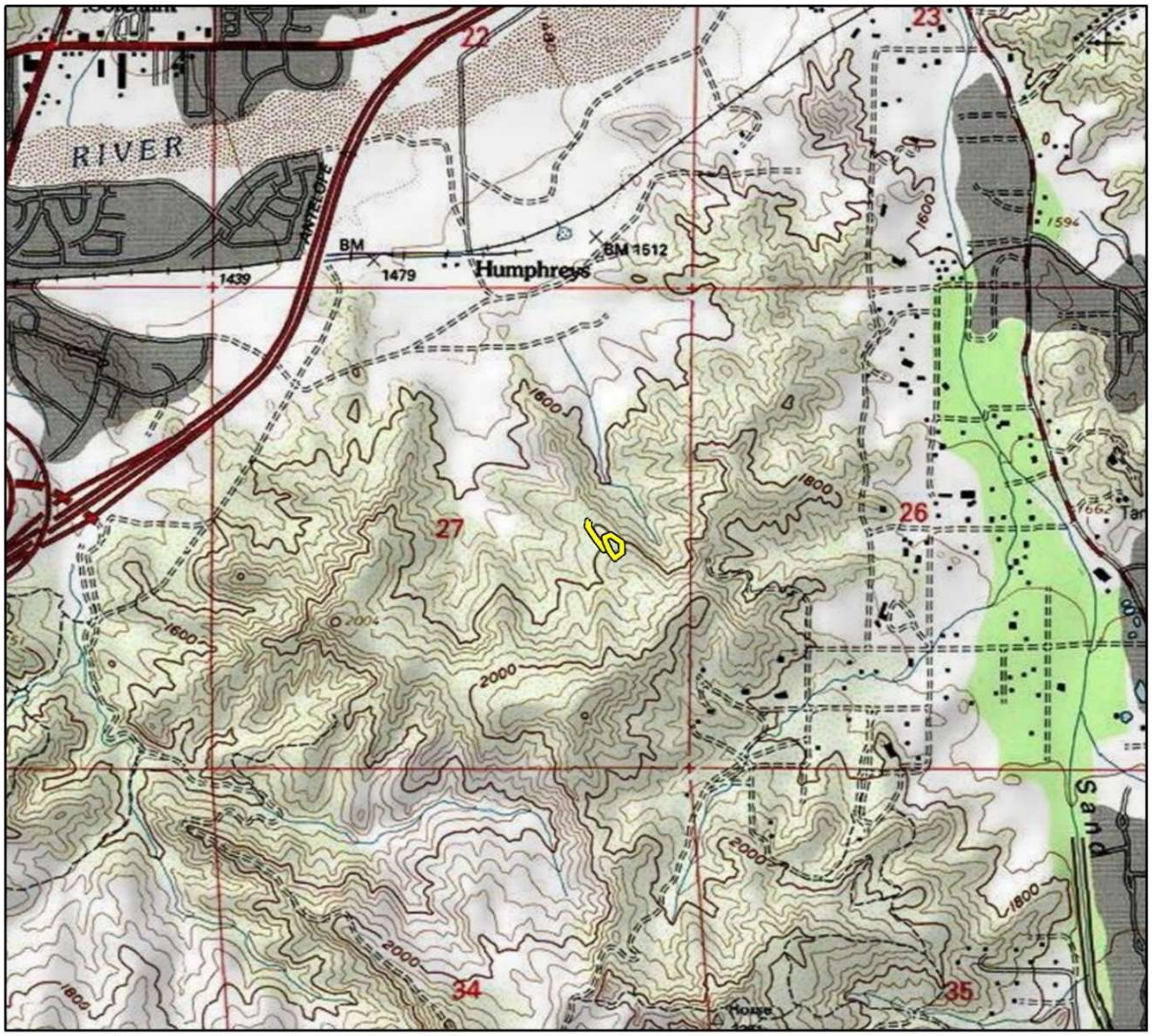
Tebo Environmental Inc.

2017. Final Mitigated Negative Declaration and Mitigation Monitoring and Reporting Program, Recycled Water Vista Canon Extension (Phase 2B) Project

Attachment A

Figures

Figure 1 Project Location Map

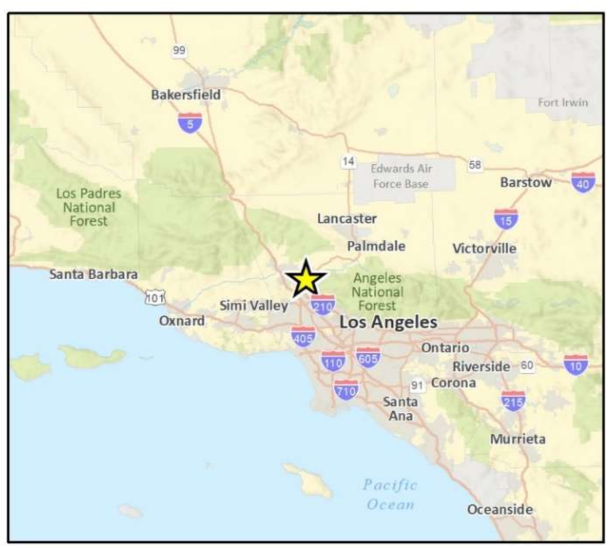


Imagery provided by National Geographic Society, Esri and its licensors © 2020. Mint Canyon Quadrangle. T04N R15W S27. The topographic representation depicted in this map may not portray all of the features currently found in the vicinity today and/or features depicted in this map may havechanged since the original topographic map was assembled.

Project Location

0 1,000 2,000 Feet

N



CRFig 1 Proj Locn Map

Figure 2 Project Boundary Map

Imagery provided by Microsoft Bing and its licensors © 2020.

Figure 3 Overview of Modified Project Site atop Slope, Facing East

Figure 4 Overview of Modified Project Site Down Slope, Facing North

Figure 5 Overview of Modified Project Site, Facing Northeast

Figure 6 Overview of Pipeline Extension Area, Facing North

Attachment B

SCCIC Records Search Results

California Historical Resources Information System

CHRIS Data Request Form

ACCESS AND USE AGREEMENT NO.: 56 **IC FILE NO.:** ______

To: South Central Coastal Information Center

Print Name: Courtney Montgomery Date: September 25, 2020

Affiliation: Rincon Consultants, Inc.

Address: 180 N. Ashwood Avenue

City: Ventura State: CA Zip: 93003

Phone: 805-644-4455 Fax: 805-644-4455 Email: cmontgomery@rinconconsultants.con

Billing Address if different than above): ______

Billing Email: ap@rinconconsultants.com Billing Phone: 805-644-4455

Project Name / Reference: 20-10278 Phase 2B Recycled Water Tank

Project Street Address: 34.401150, -119.435317

County or Counties: Los Angeles

Township/Range/UTMs: T 4N, R 15W, S 26, 27, 36, 35

USGS 7.5' Quad(s): Mnt. Canyon

PRIORITY RESPONSE (Additional Fee): yes ☐ / no ☐

TOTAL FEE NOT TO EXCEED: $600
(If blank, the Information Center will contact you if the fee is expected to exceed $1,000.00)

Special Instructions:

Information Center Use Only

Date of CHRIS Data Provided for this Request: ______

Confidential Data Included in Response: yes ☐ / no ☐

Notes: ______

CHRIS Data Request Form

Mark the request form as needed. Attach a PDF of your project area (with the radius if applicable) mapped on a 7.5' USGS topographic quadrangle to scale 1:24000 ratio 1:1 neither enlarged nor reduced and include a shapefile of your project area, if available. Shapefiles are the current CHRIS standard for submitting digital spatial data for your project area or radius. **Check with the appropriate Information Center for current availability of digital data products.**

- Documents will be provided in PDF format. Paper copies will only be provided if PDFs are not available at the time of the request or under specially arranged circumstances.
- Location information will be provided as a digital map product (Custom Maps or GIS data) unless the area has not yet been digitized. In such circumstances, the IC may provide hand drawn maps.

For product fees, see the CHRIS IC Fee Structure on the OHP website

1. Map Format Choice:

Select One: Custom GIS Maps ☐ GIS Data ☒ Custom GIS Maps **and** GIS Data ☐ No Maps ☐

Any selection below left unmarked will be considered a "no. "

2. Location Information:	Within project area	Within 0.5 mi. radius
ARCHAEOLOGICAL Resource Locations[1]	yes ☒ / no ☐	yes ☒ / no ☐
NON-ARCHAEOLOGICAL Resource Locations	yes ☒ / no ☐	yes ☒ / no ☐
Report Locations[1]	yes ☒ / no ☐	yes ☒ / no ☐
"Other" Report Locations[2]	yes ☐ / no ☒	yes ☐ / no ☒

3. Database Information:
(contact the IC or CHRIS Coordinator for product examples)

ARCHAEOLOGICAL Resource Database[1]	Within project area	Within 0.5 mi. radius
List	yes ☒ / no ☐	yes ☒ / no ☐
Detail	yes ☐ / no ☒	yes ☐ / no ☒
Excel Spreadsheet	yes ☐ / no ☒	yes ☐ / no ☒
NON-ARCHAEOLOGICAL Resource Database		
List	yes ☒ / no ☐	yes ☒ / no ☐
Detail	yes ☐ / no ☒	yes ☐ / no ☒
Excel Spreadsheet	yes ☐ / no ☒	yes ☐ / no ☒
Report Database[1]		
List	yes ☒ / no ☐	yes ☒ / no ☐
Detail	yes ☐ / no ☒	yes ☐ / no ☒
Excel Spreadsheet	yes ☐ / no ☒	yes ☐ / no ☒
Include "Other" Reports [2]	yes ☐ / no ☒	yes ☐ / no ☒

4. Document PDFs (paper copy only upon request):	Within project area	Within 0.5 mi. radius
ARCHAEOLOGICAL Resource Records[1]	yes ☒ / no ☐	yes ☒ / no ☐
NON-ARCHAEOLOGICAL Resource Records	yes ☒ / no ☐	yes ☒ / no ☐
Reports[1]	yes ☒ / no ☐	yes ☐ / no ☒
"Other" Reports[2]	yes ☐ / no ☒	yes ☐ / no ☒

CHRIS Data Request Form

5. Eligibility Listings and Documentation:

	Within project area	Within 0.5 mi. radius
OHP Built Environment Resources Directory[3]: (only available as Excel spreadsheet, digital database rows)		
Directory listing only	yes ☐ / no ☒	yes ☐ / no ☒
Associated documentation[4]	yes ☒ / no ☐	yes ☐ / no ☒
OHP Archaeological Resources Directory[1, 3]: (only available as Excel spreadsheet, digital database rows)		
Directory listing only	yes ☒ / no ☐	yes ☒ / no ☐
Associated documentation[4]	yes ☒ / no ☐	yes ☒ / no ☐
***California Inventory of Historic Resources* (1976):**		
Directory listing only	yes ☐ / no ☒	yes ☐ / no ☒
Associated documentation[4]	yes ☐ / no ☒	yes ☐ / no ☒

6. Additional Information:

The following sources of information may be available through the Information Center. However, several of these sources are now available on the OHP website and can be accessed directly. The Office of Historic Preservation makes no guarantees about the availability, completeness, or accuracy of the information provided through these sources. Indicate below if the Information Center should review and provide documentation (if available) of any of the following sources as part of this request.

Caltrans Bridge Survey	yes ☐ / no ☒
Ethnographic Information	yes ☐ / no ☒
Historical Literature	yes ☐ / no ☒
Historical Maps	yes ☐ / no ☒
Local Inventories	yes ☐ / no ☒
GLO and/or Rancho Plat Maps	yes ☐ / no ☒
Shipwreck Inventory	yes ☐ / no ☒
Soil Survey Maps	yes ☐ / no ☒

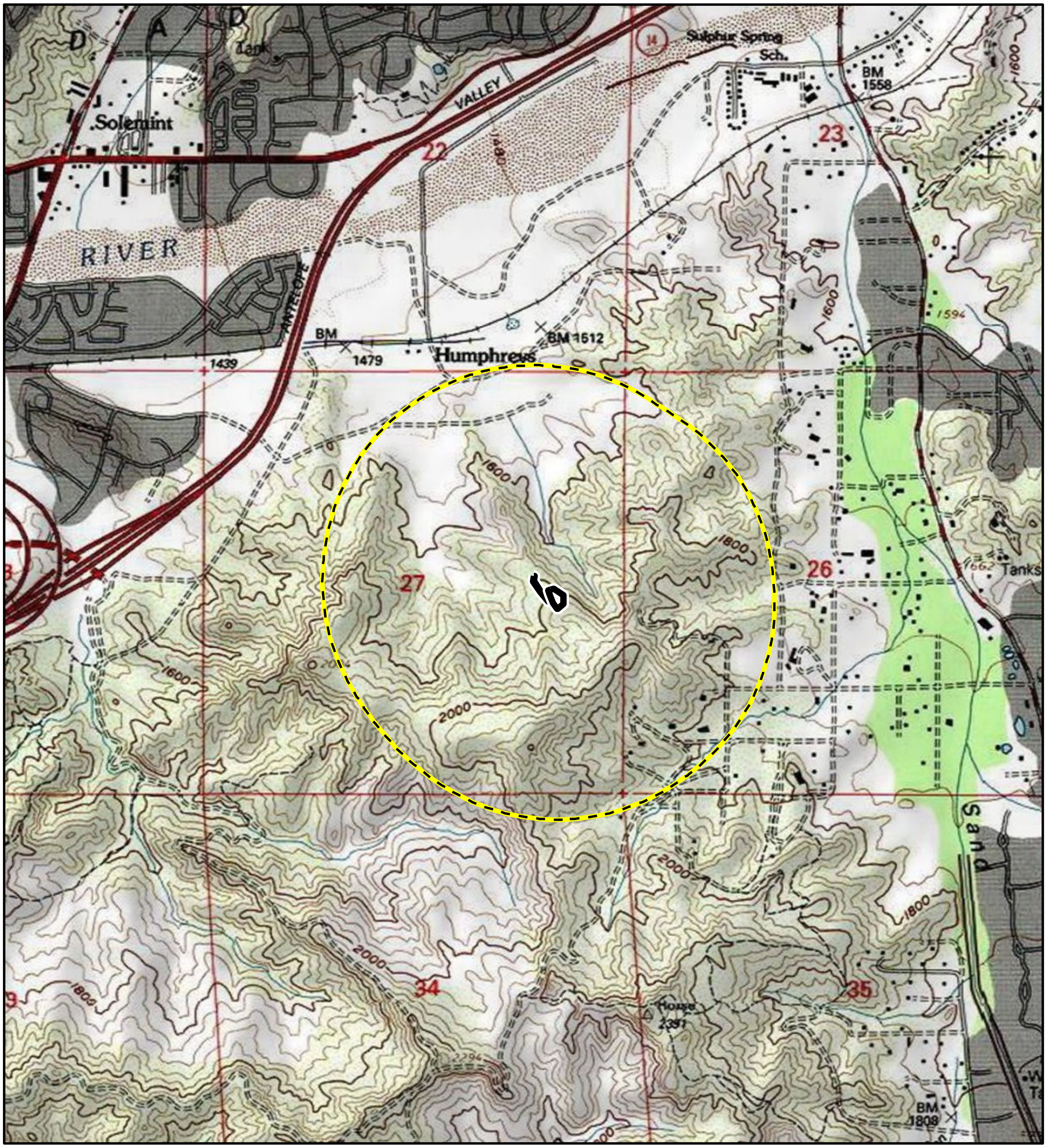
---

[1] In order to receive archaeological information, requestor must meet qualifications as specified in Section III of the current version of the California Historical Resources Information System Information Center Rules of Operation Manual and be identified as an Authorized User or Conditional User under an active CHRIS Access and Use Agreement.

[2] "Other" Reports GIS layer consists of report study areas for which the report content is almost entirely non-fieldwork related (e.g., local/regional history, or overview) and/or for which the presentation of the study area boundary may or may not add value to a record search.

[3] Includes, but is not limited to, information regarding National Register of Historic Places, alifornia Register of Historical Resources, California State Historical Landmarks, California State Points of Historical Interest, and historic building surveys. Previously known as the HRI then as HPD, now it is known as the Built Environment Resources Directory (BERD). Electronic fees will apply at 25¢ per excel line up to 999, 10¢ following. This documentation is the source of the official status codes for evaluated resources and compiled by the Office of Historic Preservation.

[4] Associated documentation will vary by resource. Contact the IC for further details.



Imagery provided by National Geographic Society, Esri and its licensors © 2020. Mnt. Canyon Quadrangle. T04N R15W S26,27,34,35. The topographic representation depicted in this map may not portray all of the features currently found in the vicinity today and/or features depicted in this map may have changed since the original topographic map was assembled.

Half-Mile Buffer

Area of Potential Effects

N

0 1,000 2,000 Feet

0 250 500 Meters

1:24,000

Records Search Map

South Central Coastal Information Center
California State University, Fullerton
Department of Anthropology MH-426
800 North State College Boulevard
Fullerton, CA 92834-6846
657.278.5395 / FAX 657.278.5542
sccic@fullerton.edu
California Historical Resources Information System
Orange, Los Angeles, and Ventura Counties

10/15/2020 Records Search File No.: 21731.7833

Courtney Montgomery
Rincon Consultants, Inc.
180 N. Ashwood Avenue
Ventura CA 93003

Re: Records Search Results for the 20-10278 Phase 2B Recycled Water Tank Project

The South Central Coastal Information Center received your records search request for the project area referenced above, located on the Mint Canyon, CA USGS 7.5' quadrangle). Due to the COVID-19 emergency, we have temporarily implemented new records search protocols. With the exception of some reports that have not yet been scanned, we are operationally digital for Los Angeles, Orange, and Ventura Counties. See attached document for your reference on what data is available in this format. The following reflects the results of the records search for the project area and a ½-mile radius:

As indicated on the data request form, the locations of resources and reports are provided in the following format: ☐ custom GIS maps ☒ shape files ☐ hand drawn maps

Resources within project area: 0	None
Resources within ½-mile radius: 1	SEE ATTACHED LIST
Reports within project area: 1	LA-00467
Reports within ½-mile radius: 6	SEE ATTACHED LIST

Resource Database Printout (list): ☒ enclosed ☐ not requested ☐ nothing listed
Resource Database Printout (details): ☐ enclosed ☒ not requested ☐ nothing listed
Resource Digital Database (spreadsheet): ☐ enclosed ☒ not requested ☐ nothing listed
Report Database Printout (list): ☒ enclosed ☐ not requested ☐ nothing listed
Report Database Printout (details): ☐ enclosed ☒ not requested ☐ nothing listed
Report Digital Database (spreadsheet): ☐ enclosed ☒ not requested ☐ nothing listed
Resource Record Copies: ☒ enclosed ☐ not requested ☐ nothing listed
Report Copies: ☒ enclosed ☐ not requested ☐ nothing listed
OHP Built Environment Resources Directory (BERD) 2019: ☒ available online; please go to https://ohp.parks.ca.gov/?page_id=30338
Archaeo Determinations of Eligibility 2012: ☐ enclosed ☐ not requested ☒ nothing listed
Los Angeles Historic-Cultural Monuments ☐ enclosed ☒ not requested ☐ nothing listed

Historical Maps: ☐ enclosed ☒ not requested ☐ nothing listed
Ethnographic Information: ☒ not available at SCCIC
Historical Literature: ☒ not available at SCCIC
GLO and/or Rancho Plat Maps: ☒ not available at SCCIC
Caltrans Bridge Survey: ☒ not available at SCCIC; please go to
http://www.dot.ca.gov/hq/structur/strmaint/historic.htm
Shipwreck Inventory: ☒ not available at SCCIC; please go to
http://shipwrecks.slc.ca.gov/ShipwrecksDatabase/Shipwrecks_Database.asp
Soil Survey Maps: (see below) ☒ not available at SCCIC; please go to
http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx

Please forward a copy of any resulting reports from this project to the office as soon as possible. Due to the sensitive nature of archaeological site location data, we ask that you do not include resource location maps and resource location descriptions in your report if the report is for public distribution. If you have any questions regarding the results presented herein, please contact the office at the phone number listed above.

The provision of CHRIS Data via this records search response does not in any way constitute public disclosure of records otherwise exempt from disclosure under the California Public Records Act or any other law, including, but not limited to, records related to archeological site information maintained by or on behalf of, or in the possession of, the State of California, Department of Parks and Recreation, State Historic Preservation Officer, Office of Historic Preservation, or the State Historical Resources Commission.

Due to processing delays and other factors, not all of the historical resource reports and resource records that have been submitted to the Office of Historic Preservation are available via this records search. Additional information may be available through the federal, state, and local agencies that produced or paid for historical resource management work in the search area. Additionally, Native American tribes have historical resource information not in the CHRIS Inventory, and you should contact the California Native American Heritage Commission for information on local/regional tribal contacts.

Should you require any additional information for the above referenced project, reference the record search number listed above when making inquiries. Requests made after initial invoicing will result in the preparation of a separate invoice.

Thank you for using the California Historical Resources Information System,

Michelle Galaz
Assistant Coordinator

Enclosures:

(X) Emergency Protocols for LA, Orange, and Ventura County BULK Processing Standards – 2 pages

(X) GIS Shapefiles – 8 shapes

(X) Resource Database Printout (list) – 1 page

(X) Report Database Printout (list) – 1 page

(X) Resource Record Copies – (all) – 3 pages

(X) Report Copies – (within project area) – 30 pages

(X) Invoice # 21731.7833

Report List

Report No.	Other IDs	Year	Author(s)	Title	Affiliation	Resources
LA-00467		1979	McIntrye, Michael J. and Greenwood, Roberta S.	Cultural Resource Survey of a Near Sand Canyon, Upper Santa Clara River Valley, Los Angeles County, California.	Greenwood and Associates	19-101228
LA-01369		1984	Rector, Carol H.	Cultural Resources Inventory for the 1984 and Part of 1985 California Metropolitan Project Area Public Lands Sale Program	Bureau of Land Management	19-001145
LA-01515	Paleo -	1986	Bissell, Ronald M.	Cultural Resources Assessment of the Mitchell Properties, Santa Clarita Valley Area, Los Angeles County, California	RMW Paleo Associates, Inc.	19-002651, 19-002652, 19-002653
LA-02193		1990	Romani, John F.	Archaeological Assessment for the Proposed Santa Fe Specific Plan Southeast and Adjacent to the City of Santa Clarita Los Angeles County, California	Greenwood and Associates	19-001877
LA-02442		1991	Norwood, Richard H.	Cultural Resource Survey for Tentative Tract No. 50449 12.1 Acres in Canyon Country Los Angeles County California	RT Factfinders	
LA-03690		1997	Wlodarski, Robert J.	Cultural Resources Evaluation City of Santa Clarita Circulation Element Eir	Historical, Environmental, Archaeological, Research, Team	19-000065, 19-000951
LA-04058		1998	Wlodarski, Robert J.	Cultural Resources Evaluation: Golden Valley Ranch Eir City of Santa Clarita, Los Angeles County, California	Historical, Environmental, Archaeological, Research, Team	19-002651, 19-002652, 19-002653

Attachment C

AB 52 Correspondence

From: Jairo Avila <jairo.avila@tataviam-nsn.us>
Sent: Wednesday, November 4, 2020 11:46 AM
To: Rick Vasilopulos <rvasilopulos@scvwa.org>
Cc: Kimia Fatehi <kfatehi@tataviam-nsn.us>
Subject: Re: SCV Water Phase 2B Supplemental MND Cultural Resources Update

CAUTION - EXTERNAL SENDER

Hello Rick,

Thank you for the opportunity to comment on the change in Project location and review environmental documents. The Tribal Historic and Cultural Preservation Department is aware of the two cultural resources within 1/2 mile of the project. However, we have no further questions nor concerns regarding the newly proposed tank location. As this Project proceeds, we do request that the previously agreed measure be included under the Tribal Cultural Resources section/consultation of the Supplemental MND (see measure below).

Mitigation Measure from 2017 IS-MNDCUL-1:
In the event that any historical, archeological or tribal cultural resources are discovered during excavation activities, work shall be stopped immediately and temporarily diverted from the vicinity of the discovery until a qualified archeologist and a member of the Fernandeño Tataviam Band of Mission Indians are notified and can identify and evaluate the importance of the find, conduct an appropriate assessment, and implement measures to mitigate impacts on significant resources.

Should you have any questions, please let me know. I appreciate your time and the opportunity to comment on this Project.

Respectfully,

Jairo F. Avila, M.A., RPA.
Tribal Historic and Cultural Preservation Officer
Cultural Resources Management Division
Tribal Historic and Cultural Preservation Department

Fernandeño Tataviam Band of Mission Indians
1019 Second Street, Suite 1
San Fernando, California 91340
Office: (818) 837-0794
Website: http://www.tataviam-nsn.us

From: Rick Vasilopulos <rvasilopulos@scvwa.org>
Sent: Wednesday, November 4, 2020 7:37 AM
To: Jairo Avila <jairo.avila@tataviam-nsn.us>
Cc: Kimia Fatehi <kfatehi@tataviam-nsn.us>
Subject: SCV Water Phase 2B Supplemental MND Cultural Resources Update

[CAUTION] EXTERNAL Email. Exercise caution.

Good Morning Jairo,

Just checking that you received all of the information you needed to make your decision whether you would like to see additional mitigation measures for our Phase 2B Project due to the change in site location?

Please let me know that you received the documents I sent over last week and that they were what you were looking for.

Thanks.

Rick Vasilopulos
Water Resources Planner
Santa Clarita Valley Water Agency
26501 Summit Circle
Santa Clarita, CA 91350
Office: (661) 705-7912
rvasilopulos@scvwa.org

Appendix D

Energy Calculations

SCV Water Phase 2B Tank Project

Last Updated: 10/21/2020

Compression-Ignition Engine Brake-Specific Fuel Consumption (BSFC) Factors **[1]**:

HP: 0 to 100	0.0588	HP: Greater than 100	0.0529

Values above are expressed in gallons per horsepower-hour/BSFC.

CONSTRUCTION EQUIPMENT

Construction Equipment	#	Hours per Day	Horsepower	Load Factor	Construction Phase	Fuel Used (gallons)
Excavators	1	8	158	0.38	Berm Construction	507.78
Rubber Tired Dozers	1	1	247	0.4	Berm Construction	104.45
Skid Steer Loaders	1	8	65	0.37	Berm Construction	226.12
Tractors/Loaders/Backhoes	2	6	97	0.37	Berm Construction	506.17
					Total Fuel Used	**1,344.53 (Gallons)**

Construction Phase	Days of Operation
Berm Construction	20
Total Days	20

WORKER TRIPS

Constuction Phase	MPG [2]	Trips	Trip Length (miles)	Fuel Used (gallons)
Berm Construction	24.4	13	14.7	156.64
		Total		**156.64**

HAULING AND VENDOR TRIPS

Trip Class	MPG [2]	Trips	Trip Length (miles)	Fuel Used (gallons)
		HAULING TRIPS		
Berm Construction	7.5	750	20.0	2000.00
		Total		**2,000.00**
		VENDOR TRIPS		
Berm Construction	7.5	4	6.9	73.60
		Total		**73.60**

Total Gasoline Consumption (gallons)	**156.64**
Total Diesel Consumption (gallons)	**3,418.13**

Sources:

[1] United States Environmental Protection Agency. 2018. *Exhaust and Crankcase Emission Factors for Nonroad Compression-Ignition Engines in MOVES2014b* . July 2018. Available at: https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100UXEN.pdf.

[2] United States Department of Transportation, Bureau of Transportation Statistics. 2019. *National Transportation Statistics 2019* . Available at: https://www.bts.gov/topics/national-transportation-statistics.

Appendix E

Geotechnical Investigation

GEOLABS-WESTLAKE VILLAGE
Foundation and Soils Engineering, Geology

a dba of
R & R Services
Corporation

31119 Via Colinas, Suite 502 • Westlake Village, CA 91362
Voice: (818) 889-2562 (805) 495-2197
Fax: (818) 889-2995 (805) 379-2603

October 30, 2020
W.O. 8485

Kennedy/Jenks Consultants
1676 N. California Blvd., Suite 430
Walnut Creek, California 94596

Attention: Mr. Brandon Hale

SUBJECT: Preliminary Geotechnical Investigation,
Proposed PH2B Recycled Water Storage Tanks,
Lot 940, Tract 52833, Santa Clarita Area,
County of Los Angeles, California

Mr. Hale:

In accordance with your request, our firm has undertaken a geotechnical investigation for proposed recycled water storage tanks at the subject property. Our purpose was to evaluate the engineering characteristics and distribution of subsurface materials at the planned tank site in order to prepare geotechnical design criteria for the project.

This site is adjacent to existing water tanks constructed during the initial development of Tract 52833. A companion report is prepared under separate cover that discusses the geology and stability of this subject site (GWV 23 September 2020). The on-site geology and soil data for this site is available in the companion report. This report addresses geotechnical design criteria pertinent to the design of the subject tanks.

The design guidelines of the American Water Work Association (AWWA) D100-11 have been referenced in preparing design criteria presented in this report.

SITE DESCRIPTION AND PROPOSED IMPROVEMENTS

The subject site includes an approximately half-acre, triangular-shaped building pad that was graded atop a bedrock ridgeline between 2003 and 2006 as a part of Tract 52833. The building pad is underlain by Towsley Formation bedrock. The northeast and west edges of the pad consist of compacted fill placed as part of stability fills that descend from those sides of the pad up to 100 vertical feet at 2:1 (horizontal:vertical) gradients. A 2:1 gradient stability fill ascends from the south side of the pad approximately 30 feet to a berm that separates the building pad from the existing water tank pad. No groundwater was encountered during the field exploration for the companion report, or during grading of the water tank pads.

Based on the Grading Exhibit provided to our office by SCVWD, grading is proposed to move the berm to the north edge of the subject building pad and extend the existing level of the pad toward the south, beneath the existing berm. Two water tanks will be located in the pad area south of the new berm location. Site access is via a new driveway off the existing access road.

It is planned to construct two 0.5 million gallon (MG) recycled water storage steel tanks. Each tank will be 55 feet in diameter, with 27 feet maximum water height, and will be surrounded with asphalt pavement. Information provided by your office assigns the tanks to AWWA seismic use category 1 and ASCE 7 risk category 3. The tanks will be supported by continuous ringwall foundation. A plan showing the tank layout and other pertinent information is provided (Plate 1).

FAULTING AND SEISMICITY

The subject site contains no known active or potentially active faults, nor is it within a State-mandated Earthquake Fault Zone. Therefore, the potential for fault generated ground rupture is considered to be very low. However, the property is situated within the seismically active Southern California region and significant ground shaking is likely to occur due to earthquakes caused by movement along nearby faults.

SEISMIC GROUND MOTION VALUES – (MAPPED)

This report includes preliminary seismic ground motion values in accordance with AWWA Standard D100-11, which follows the methodology of ASCE Standard 7-16. Seismic ground motion values were determined using the U.S. Seismic Design Maps website (https://seismicmaps.org) provided by OSHPD and SEA. These seismic design maps present data for a maximum considered earthquake ground motion, defined by an earthquake with a 2 percent probability of exceedance within a 50-year return period (recurrence interval of 2,475 years). The site class at the project location is considered to be Site Class C – very dense soil and soft rock. Tanks are assigned to AWWA seismic use category 1, and ASCE 7-16 risk category III. Output from these analyses are provided in Appendix B and summarized herein.

Latitude: 34.4014º Longitude: -118.435º	**Factor/Coefficient**	**Value**
Site Profile Type	Site Class	C
Short-Period MCE at 0.2s	S_s	2.226
1.0s Period MCE	S_1	0.803
Site Coefficient	F_a	1.2
Site Coefficient	F_v	1.4
Adjusted MCE Spectral Response Parameters	S_{ms} S_{m1}	2.671 1.124
Design Spectral Acceleration Parameters	S_{DS} S_{D1}	1.781 0.749
Long-Period Transition Period	T_L	8.0 sec
Peak Ground Acceleration	PGA_M	1.13

AWWA D100-11 defines the vertical design acceleration (Av) for use in design of the tank and anchorage to be equal to 0.14 S_{DS} with some exceptions. Based on the mapped seismic ground motion value S_{DS} of1.781, the vertical design acceleration using this methodology is considered to be 0.258g.

The mean earthquake magnitude was approximated using the USGS Unified Hazard Tool website (https://earthquake.usgs.gov/hazards/interactive/index.php). The deaggregated mean earthquake magnitude is estimated at M=6.93 with a mean source distance of 7.75 km.

DISCUSSION AND RECOMMENDATIONS

Data from our field exploration and laboratory testing in the companion report, along with engineering analyses are the bases for the following discussion. Design criteria, based upon the presently available data, are presented for your consideration. The project is feasible from a geotechnical stand point provided the considerations addressed herein and in the companion report are incorporated in the design and construction.

Document AWWA D100-11 discusses five foundation types for ground-supported flat-bottomed tanks, such as those planned for this project. Initial design documents and discussions with your office addressed tanks using Type 1 support consisting of the tank supported on ringwall footings. From a geotechnical perspective, this foundation type appears appropriate for the geotechnical and geologic site conditions.

GRADING-ENGINEERED FILLS

Rough grading is anticipated to be completed as part of this project and is discussed in detail in the companion soil report. Fine grading for pad drainage, establishing pavement subgrade, etc. will be a part of the tank construction project.

The following recommendations pertain to, preparation for, and placement of, engineered fill to support the water tanks;

1. The on-site earth materials are suitable for use as engineered fill. Any import materials that are to be used as structural fill should be approved by this office prior to placement.

2. All vegetation, trash, debris, or other deleterious material should be stripped from the area to be graded and wasted from the site.

3. Exposed surfaces should be scarified, moistened or air dried as appropriate, and compacted to at least 95% of the material's maximum dry density prior to placement of fill.

4. Fill materials to support the water tanks should be placed in thin lifts not to exceed eight inches in thickness prior to compaction, watered to near the material's optimum moisture content, and compacted to at least 95% of the material's maximum dry density prior to placing the next lift.

EXPANSIVE SOILS

Some of the near-surface soils on the site are expansive. Mitigation options typically include such options as: (1) design foundations to penetrate or resist the expansive soils (deep foundations), (2) design for the expansive condition (methods such as Post-Tension-Institute), (3) removal of expansive soil, or (4) stabilization of expansive soil. Considering the type of construction and our experience with expansive soils in this area, design criteria have been presented for pre-saturation of the supporting subgrade soils. In consultation with the design team, mitigation option 3 is the preferred option for this project. Any future site improvements (flatwork, walls, landscaping, etc.) should be designed to accommodate the expansive characteristics of the soil. A final testing for expansion indices should be performed for each structural area at the conclusion of grading.

Subgrades for footings and slab-on-grade should be pre-saturated in accordance with the requirements of the local governing agency prior to placing concrete. Pre-saturation of expansive soils should begin no less than two days prior to the anticipated time of concrete placement. Use of detergent or "thin water" may facilitate moisture penetration.

FOUNDATIONS

A continuous ringwall footing may be used to support the proposed tank walls, while steel plates in the tank bottom typically distribute roof loads with, or without, columns. The ring wall footings should be founded a minimum of 36 inches into the bedrock or engineered fill (not partially in each), with the concrete placed against in-place, undisturbed, engineered fill material. Foundation design criteria are based, in part, upon the expansive properties of the materials anticipated to be present near the pad grade.

FOUNDATION DESIGN PARAMETER	DESIGN CRITERIA	UNITS	NOTES
	EI=21-50		
Pre-Saturation depth below pad subgrade	21	in	
Allowable Bearing Capacity (net) (FS>3)	3000	psf	1
Allowable Lateral Resistance (FS=1.5)	400	psf/ft	1,2
Maximum Allowable Lateral Resistance	2000	psf	1,2
Coefficient of Friction (FS=1.0)	0.35		
Minimum Embedment Below Adjacent Grade			
Ring Ftg	36	in	4
Misc. Appurtenances	18	in	4
Minimum Reinforcement	2 - #4, 1 near top and 1 near bottom		
TANK BEDDING			
Minimum Bedding Thickness	4 in. Oiled Sand On 6 in. CAB	in	
NOTES			
1) May be increased by 1/3 for short duration loading such as by wind or seismic forces.			
2) Decrease by 1/3 when combined with friction.			

SETTLEMENT

The planned foundations will bear on in-place compacted engineered fill soils. The anticipated maximum total static settlement is on the order ¾ inch at the center of the tank. The differential settlement between the center of the tank and the side of the tank may be assumed to be on the order of ½ inch.

CORROSION POTENTIAL

For structural elements, a site is considered to be corrosive if one or more of the following conditions exist for the representative soil samples taken at the site: Chloride concentration is 500 ppm or greater, sulfate concentration is 2000 ppm or greater, or the pH is 5.5 or less (Caltrans, 2015; GMED, 2013). For structural elements, the minimum resistivity of soil and/or water indicates the relative quantity of soluble salts present in the soil or water. In general, a minimum resistivity value for soil and/or water less than 1000 ohm-cm indicates the presence of high quantities of soluble salts and a higher propensity for corrosion.

At the completion of the original rough grading corrosion testing was performed (GWV, 30 June 2006). Those resistivity results indicate resistivity of saturated samples to be in the range of 580 to 790 ohm-cm. Soluble sulfate test results yielded concentrations of 0.01 to 0.45 percent by mass. This level of soluble sulfate ranges from the S0 to the S2 exposure class per Table 19.3.1.1 of ACI 318-14. Chlorides were 20 to 50 ppm or less. The pH was determined to range from 7.6 to 8.2.

Based on these results, the on-site soil does meet some of the corrosion criteria. The on-site soils are considered corrosive to structural elements based on the aforementioned definition. Corrosion potential of the soils will be re-evaluated when the tank pad elevation has been established.

Temporary Excavations

The materials encountered in the geotechnical investigation are considered to be type "C" soils using the OSHA classification system. Cal/OSHA requires the contractor be responsible for providing a "competent person" to evaluate soil conditions. During construction the soil conditions and classification should be confirmed by the "competent person". The excavations should also be observed by the geotechnical consultant. Supplemental geotechnical recommendations may be warranted if soil or groundwater conditions vary from those encountered anticipated in this report.

Excavation for utility trenches will require temporary excavations. Excavation temporary works are typically the responsibility of the contractor to design, install, maintain, and monitor. Temporary excavations may be considered stable if cut vertical, providing they are restricted to a maximum of 5 feet in height, are provided with permanent support as soon as possible, and are protected from erosion and saturation. Portions of temporary excavations in excess of 5 feet high should be laid down to 1.5:1 unless specific alternative treatments, such as shoring or shielding, are evaluated and found acceptable. Spatial restrictions, if present along the alignment may limit the viability of sloping.

Utility Trench Bedding and Backfill

Utility trench bedding and backfill should comply with the SCVWA trench detail standard drawing 101. This trench detail requires six inches of sand bedding below the pipe. The sand should extend to 12 inches minimum over the top of pipe. The sand should be compacted prior to placing soil backfill. The native material is appropriate for use as trench backfill. The material should be free of deleterious material and rocks greater than 6 inches in any dimensions within the depth zone between the bedding up to one foot below the pavement subgrade. Rocks greater than 2½ inches should not be permitted in the upper one foot of the pavement subgrade. Backfill should not be compacted by means of jetting. Backfill should be placed in lifts not exceeding three feet in thickness and compacted by mechanical means in accordance with SSPWC 306-12.3. Backfill for utility trench excavations should be moisture conditioned to at least the optimum moisture and compacted to at least 90% relative compaction in unpaved areas and 95% relative compaction in paved areas. Where installed in sloping areas, the backfill should be properly keyed and benched. Compaction should be tested at least every 100 linear feet. Standard drawing 101 calls for any pipe with less than three feet of cover to be backfilled with one sack slurry per SSPWC Greenbook Standards (latest edition) from invert to subgrade.

PAVEMENT SECTION DESIGN

Final pavement structural sections will be evaluated when the pavement subgrade elevation has been achieved. For preliminary purposes, the following pavement structural sections are provided. Concrete section design utilizes a modulus of subgrade reaction of 150 pci and concrete with a minimum compressive strength of 2500 psi. The following tables present the pavement section recommendations.

AC PAVEMENT RECOMMENDATION

	Thickness of Asphalt Concrete (inches)	Thickness of Crushed Aggregate Base (inches)
Access Pavement at Tank4	3.0	6.0

CONCRETE PAVEMENT RECOMMENDATION

Assumed Traffic Category (per ACI 330R)	Thickness of Concrete (inches)	Thickness of Crushed Aggregate Base (inches)
Entrance and Exterior Lanes – Category C	6.75	4.0

The upper 12 inches of the subgrade soil should be compacted to at least 90% relative compaction. Base materials should be compacted to at least 95% relative compaction.

R-value tests should be performed at the completion of grading and final pavement section designs should be developed at that time.

DRAINAGE

Positive drainage should be established to carry pad waters away from the tank foundations, and to prevent uncontrolled or sheet flow over manufactured slopes. We recommend as steep a gradient as practical be established around the structures. Fine-grade fills placed to create pad drainage should be compacted in order to retard infiltration of surface water.

SERVICES DURING CONSTRUCTION

Grading, foundation, retaining wall or other plans should be forwarded to our office for review as they are developed. We may offer additional discussion and/or design criteria as warranted.

Placement of all fill and backfill should be monitored by representatives of this office. This includes our observation of prepared bottoms prior to filling.

Backfill for utility should be tested per the requirements in SCVWA Standard Drawing 101. Daily compaction reports must be provided to Agency's inspector or representative.

Foundation excavations should be observed by representatives of this office to see if the recommended penetration of proper supporting strata has been achieved. Such observations should be made prior to placing concrete, steel or forms. This office should be notified at least 24 hours prior to placing concrete.

CLOSURE

This geotechnical report has been prepared in accordance with generally accepted engineering practices at this time and location. No other warranties, either express or implied, are made as to the professional advice provided under the terms of our agreement and included in this report.

Thank you for this opportunity to be of service. Please do not hesitate to call if you have any questions regarding this report.

Respectfully submitted,
GEOLABS-WESTLAKE VILLAGE

REGISTERED PROFESSIONAL ENGINEER LAWRENCE K. STARK No. 2772 GEOTECHNICAL STATE OF CALIFORNIA

Lawrence K. Stark
G.E. 2772

Ronald Z. Shmerling
C.E.G. 1047
R.C.E. 35444

REGISTERED PROFESSIONAL ENGINEER RONALD Z. SHMERLING No. 35444 CIVIL STATE OF CALIFORNIA

REGISTERED GEOLOGIST RONALD Z. SHMERLING NO 1047 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

LKS: af

Enclosures:	References	R1
	Site Map	Plate 1
	Trench Detail	SCVWA Standard Drawing 101.
	Seismicity	Appendix A

XC: (2) Addressee

REFERENCES:

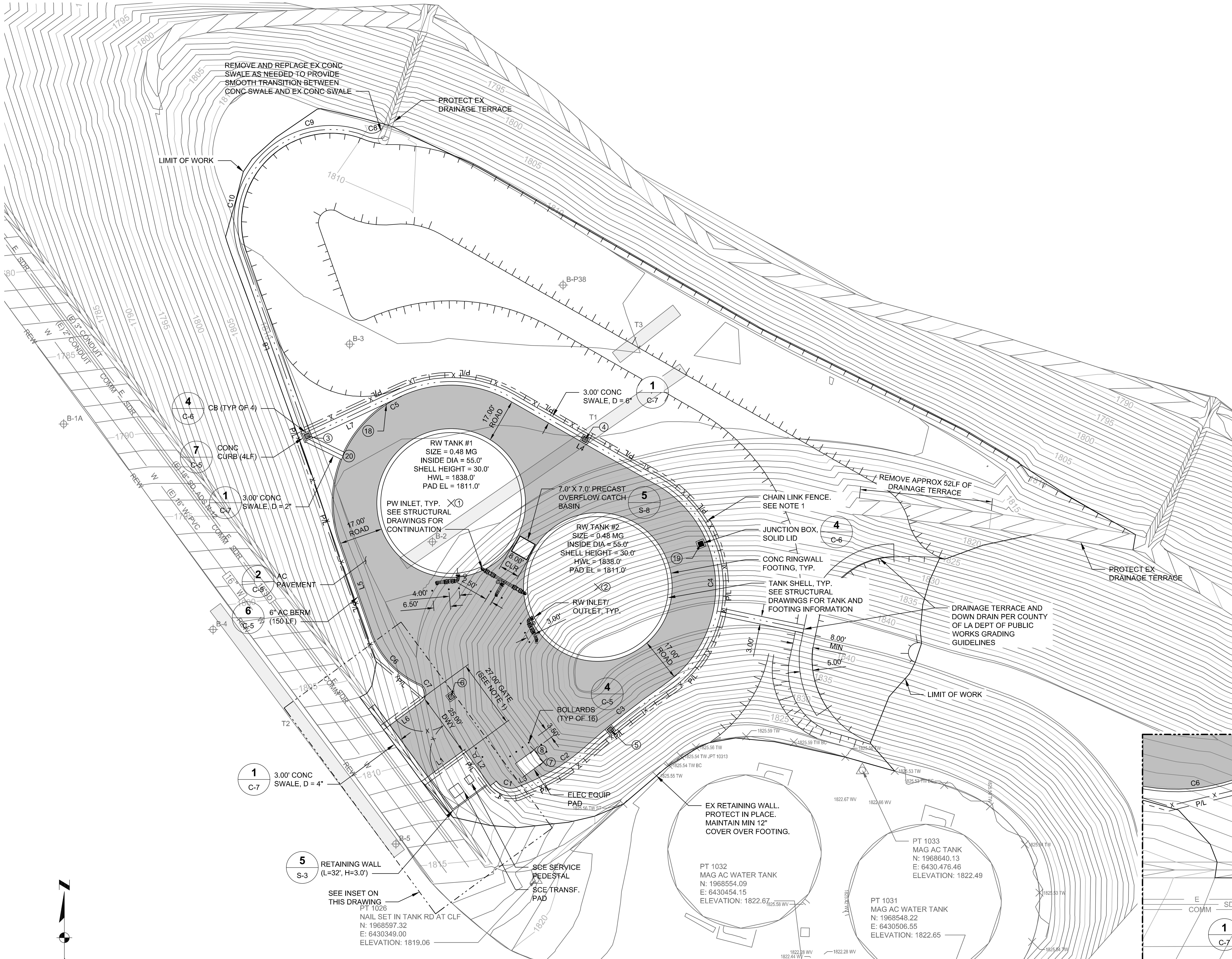
American Water Works Association, July 1, 2011; AWWA Standard for Welded Carbon Steel Tanks for Water Storage. ANSI/AWWA D100-11

Geolabs – Westlake Village, June 29, 2004; Geotechnical Report for Proposed Water Reservoir Site, Portions of Lots 94 and 95 of Tr. 52833, Phase 3B of Fair Oaks Ranch, Santa Clarita Area, County of Los Angeles, California.

..., June 30, 2006; Supervised Final Compacted Fill and Geologic Report for Water Reservoir Site, Lots 94 and 95 and a Portion of Lot 90 (Open Space Lot), of Tr. 52833, Phase 3B of Fair Oaks Ranch, Santa Clarita Area, County of Los Angeles, California.

..., September 23, 2020; Preliminary Geotechnical Investigation, Proposed Vista Canyon Recycled water Tanks (Phase 2), Lot 940 of Tract 52833, Santa Clarita Area, County of Los Angeles, California.

Plot Date: 9/24/2020 9:17 AM
User: CHRISTY SUTTICH



PLAN

NOTES:

1. CHAIN-LINK FENCE AND DRIVE GATE, HEIGHT = 7 FEET, WITH 3 STRANDS OF BARBED WIRE ON 45° ARMS (FACING OUTWARD), PER SPPWC STANDARD PLAN 600-3 (2012).
2. SEE STRUCTURAL DRAWINGS FOR TANK STAIRS AND BRIDGE BETWEEN TANK #1 AND #2.
3. SEE STRUCTURAL DRAWINGS FOR CONTINUATION OF PW TANK INLET PIPING AND TANK OVERFLOW PIPING TO OVERFLOW CATCH BASIN.

Point Table

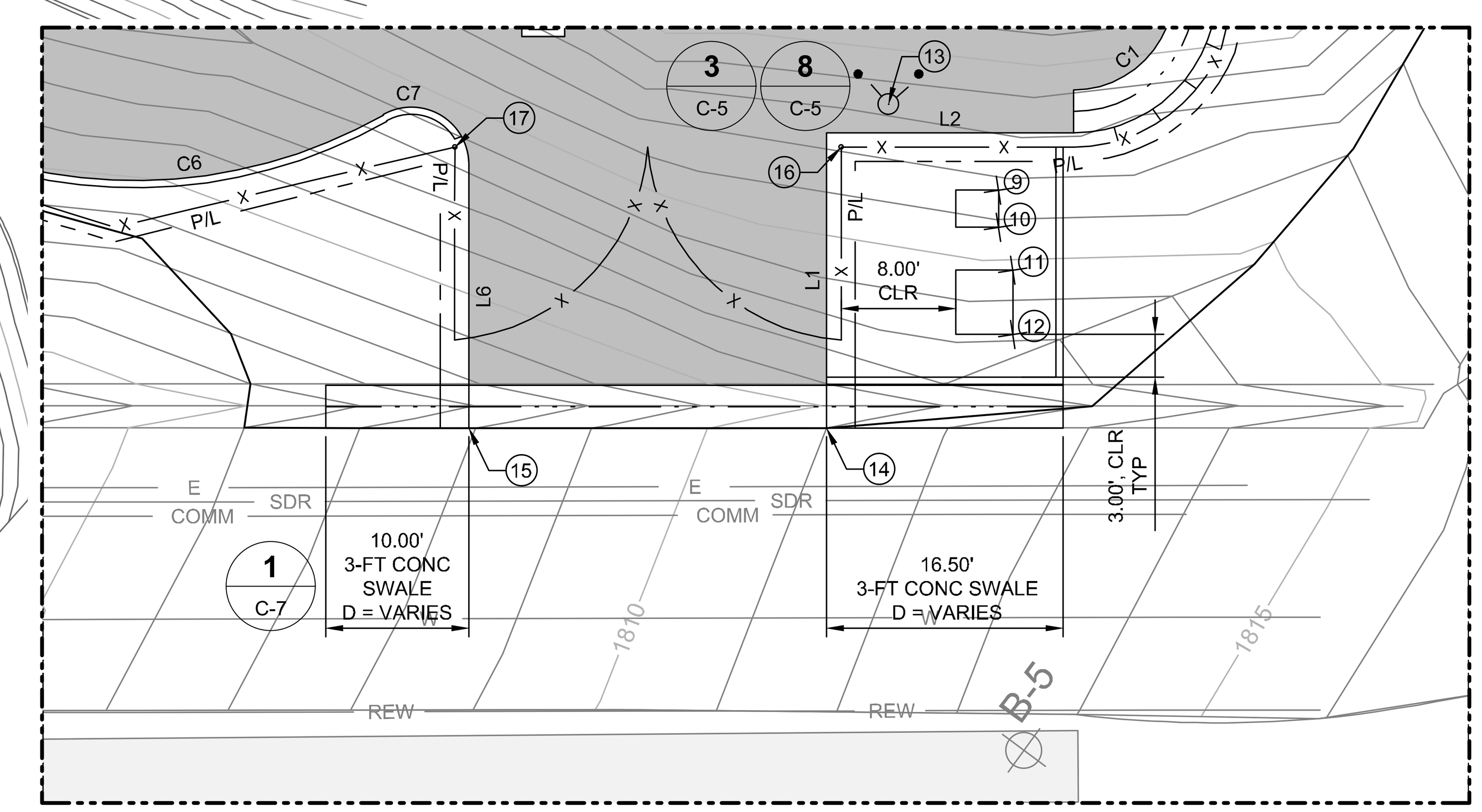
Point #	Description	Northing	Easting
1	CENTER OF TANK #1	1968744.41	6430315.93
2	CENTER OF TANK #2	1968711.60	6430373.20
3	CENTER OF CB #1	1968770.61	6430259.75
4	CENTER OF CB #2	1968769.22	6430368.17
5	CENTER OF CB #3	1968655.84	6430378.09
6	CENTER OF CB #4	1968668.86	6430315.85
7	CORNER OF ELEC EQUIP PAD	1968643.21	6430351.78
8	CORNER OF ELEC EQUIP PAD	1968648.05	6430348.22
9	CORNER OF SCE SERVICE PAD	1968635.97	6430324.84
10	CORNER OF SCE SERVICE PAD	1968634.43	6430322.75
11	CORNER OF SCE TRANSF PAD	1968631.85	6430320.92
12	CORNER OF SCE TRANSF PAD	1968629.19	6430317.30
13	FIRE HYDRANT	1968645.73	6430325.12
14	TIE-IN TO EX RD	1968635.78	6430304.31
15	TIE-IN TO EX RD	1968655.93	6430289.50
16	GATE POST	1968646.61	6430320.75
17	GATE POST/END AC BERM	1968668.37	6430304.77
18	START AC BERM	1968782.80	6430290.58
19	CENTER OF JUNCTION BOX	1968728.45	6430413.38
20	CL OF CONC SWALE	1968762.77	6430273.75

Curve Table

Curve #	Length	Radius	Delta	Chord Direction	Chord Length
C1	9.27	7.00	75.89	S74° 15' 45"E	8.61
C2	26.54	77.00	19.75	N57° 55' 05"E	26.41
C3	39.71	303.00	7.51	N51° 47' 55"E	39.68
C4	92.93	46.00	115.75	N2° 19' 11"W	77.91
C5	111.71	46.00	139.15	S50° 14' 05"W	86.21
C6	28.50	35.00	46.65	S42° 39' 44"E	27.72
C7	8.35	4.00	119.67	N6° 09' 06"W	6.92
C8	7.58	5.00	86.81	S68° 14' 46"W	6.87
C9	45.07	38.00	67.96	S77° 40' 25"W	42.48
C10	41.81	38.00	63.03	S12° 10' 39"W	39.73

Line Table

Line #	Length	Direction
L1	20.66	S53° 40' 59.66"W
L2	17.25	S36° 19' 00.34"E
L3	4.09	S67° 47' 31.28"W
L4	66.00	N60° 11' 33.04"W
L5	37.18	S19° 20' 16.42"E
L6	18.43	S53° 40' 59.66"W
L7	38.61	S64° 58' 38.03"W
L8	74.05	N19° 20' 15.95"W



INSET

DIGALERT
DIAL TOLL FREE 811
AT LEAST TWO DAYS BEFORE YOU DIG
UNDERGROUND SERVICE ALERT(USA) OF SOUTHERN CALIFORNIA

REVISIONS

NO.	DESCRIPTION	APP.	DATE

PLANS PREPARED BY:
Kennedy Jenks
2775 N. VENTURA ROAD, #100
OXNARD, CA. 93036
(805) 973-5700

CHECKED BY:
BRENT PAYNE, PRINCIPAL ENGINEER DATE
RECOMMENDED BY:
KEITH ABERCROMBIE, CHIEF OPERATING OFFICER DATE
APPROVED BY: SANTA CLARITA VALLEY WATER AGENCY
BRIAN J. FOLSOM, CHIEF ENGINEER DATE

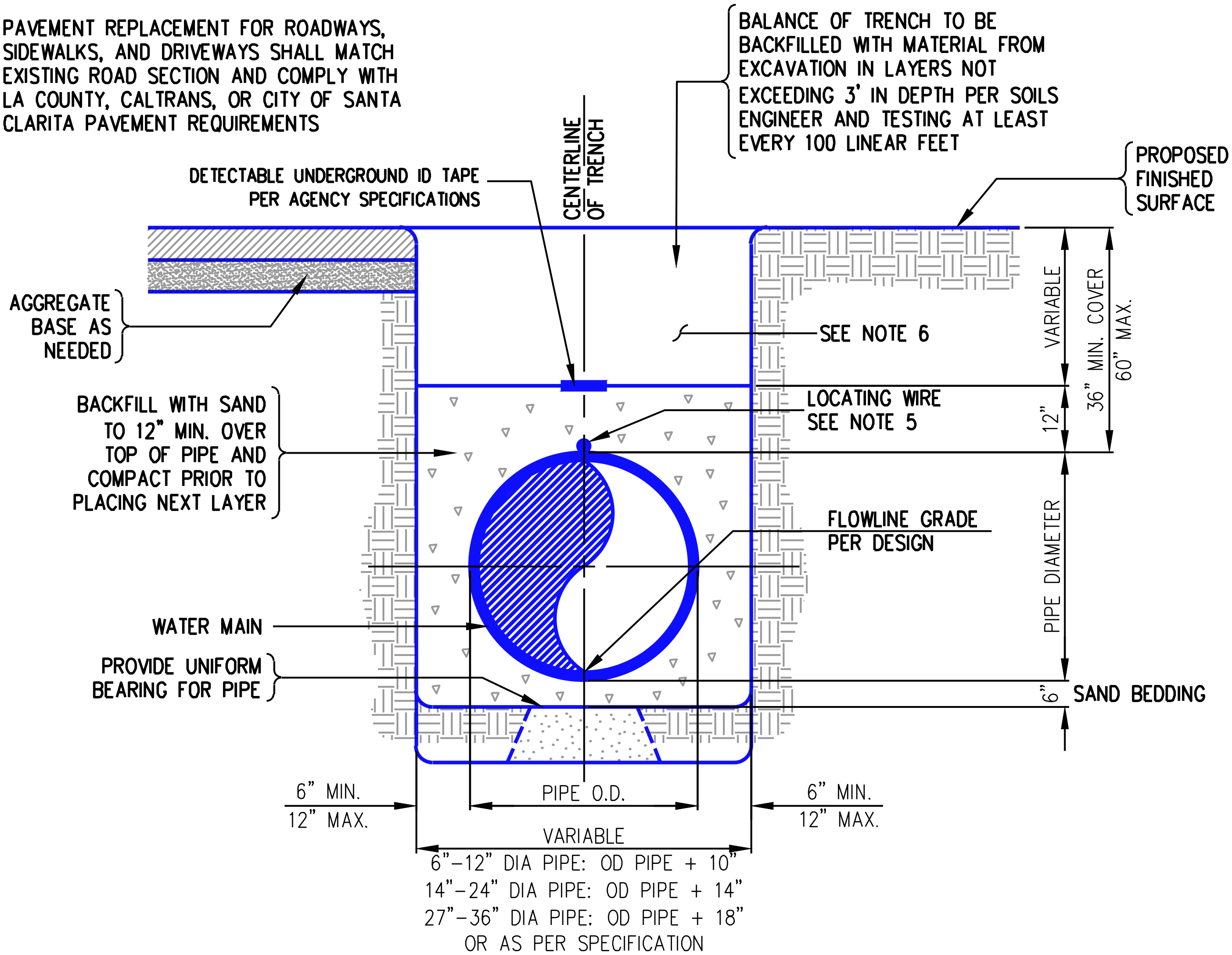
SANTA CLARITA VALLEY WATER AGENCY
ENGINEERING SERVICES SECTION
26521 SUMMIT CIRCLE
SANTA CLARITA, CA. 91350
(661) 259-2737

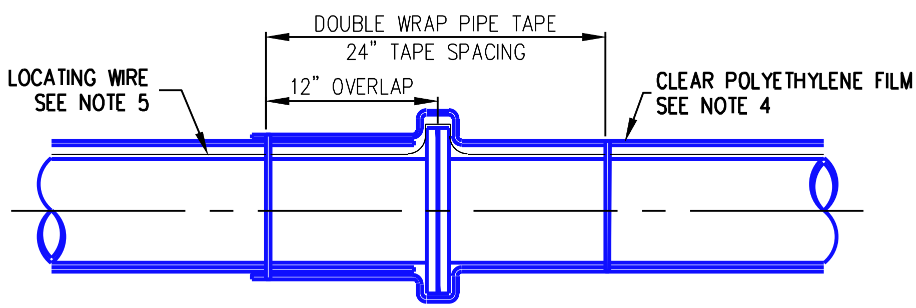
LOT 940, TRACT NO. 52833
PHASE 2B RECYCLED WATER TANKS AT CHERRY WILLOW
SANTA CLARITA, CALIFORNIA
UNINCORPORATED COUNTY OF LOS ANGELES

SITE AND PAVING PLAN

DATE: 08-31-2020
SCALE: 1"=XX'
PROJECT NO. 2044231*00
DRAWN BY: ---
CHECKED BY: ---
SHEET: C-2

PLATE 1





NOTES:

1. ALL PAVEMENT SHALL BE CUT NEATLY PRIOR TO TRENCHING.
2. IMPORTED BACKFILL MATERIAL TO BE INSTALLED AS DIRECTED IN THE FIELD BY THE AGENCY'S INSPECTOR.
3. ALL MATERIALS SUPPLIED BY SCV WATER OR OTHERS SHALL MEET OR EXCEED AWWA SPECIFICATIONS.
4. ENCASE FERROUS OR METALLIC PIPE AND FITTINGS WITH ONE LAYER OF CLEAR 8-MIL POLYETHYLENE FILM.
5. LOCATING WIRE MUST BE HMWPE 12 GAUGE AND SHALL BE INSTALLED ON ALL PIPE. ATTACH WIRE WITH 2" WIDE TAPE AND TAPED AT 12" INTERVALS.
6. COMPACT BACKFILL TO 95% RELATIVE COMPACTION WHEN PIPE IS IN PAVED AREAS AND COMPACT TO 90% RELATIVE COMPACTION WHEN PIPE IS IN UNPAVED AREAS.
7. PROVIDE HAND EXCAVATABLE ONE SACK SLURRY PER GREENBOOK STANDARDS (LATEST EDITION) FOR ANY PIPE WITH LESS THAN 3' COVER. BACKFILL WITH ONE SACK SLURRY FROM INVERT TO SUBGRADE.
8. 12" MINIMUM VERTICAL CLEARANCE SHALL BE MAINTAINED BETWEEN WATER MAIN AND ALL OTHER UTILITIES.
9. WATER MAIN DEPTH SHALL BE 60" MAXIMUM AND 36" MINIMUM UNLESS OTHERWISE DIRECTED BY THE AGENCY.
10. COMPACTION REPORTS MUST BE PROVIDED DAILY TO AGENCY'S INSPECTOR OR AGENCY REPRESENTATIVE.

REV.	DATE	DESCRIPTION	BY

TRENCH DETAIL

SCV WATER

SANTA CLARITA VALLEY WATER AGENCY
ENGINEERING SERVICES SECTION

APPROVED BY:

BJ Folsom

BRIAN J. FOLSOM, R.C.E. 44723
CHIEF ENGINEER

5/15/19
DATE

STD. DWG.
101

SHEET 1 OF 1

APPENDIX A
SEISMICITY

October 30, 2020
W.O. 8485

Proposed Water Tanks, Lot 94-95, Tract 52833

Latitude, Longitude: 34.4014, -118.4.35

Date	8/28/2020, 10:44:20 AM
Design Code Reference Document	ASCE7-16
Risk Category	III
Site Class	C - Very Dense Soil and Soft Rock

Type	Value	Description
S_S	2.226	MCE_R ground motion. (for 0.2 second period)
S_1	0.803	MCE_R ground motion. (for 1.0s period)
S_{MS}	2.671	Site-modified spectral acceleration value
S_{M1}	1.124	Site-modified spectral acceleration value
S_{DS}	1.781	Numeric seismic design value at 0.2 second SA
S_{D1}	0.749	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	E	Seismic design category
F_a	1.2	Site amplification factor at 0.2 second
F_v	1.4	Site amplification factor at 1.0 second
PGA	0.942	MCE_G peak ground acceleration
F_{PGA}	1.2	Site amplification factor at PGA
PGA_M	1.13	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
SsRT	2.226	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	2.456	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	2.492	Factored deterministic acceleration value. (0.2 second)
S1RT	0.803	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.894	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.869	Factored deterministic acceleration value. (1.0 second)
PGAd	1.023	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.906	Mapped value of the risk coefficient at short periods
C_{R1}	0.898	Mapped value of the risk coefficient at a period of 1 s

U.S. Geological Survey - Earthquake Hazards Program

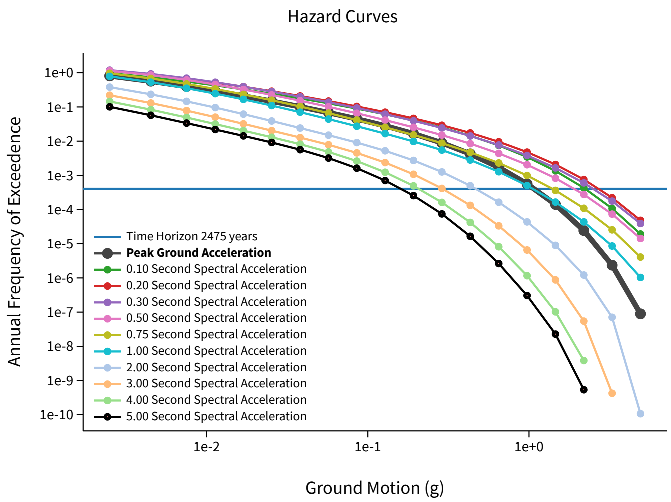
Unified Hazard Tool

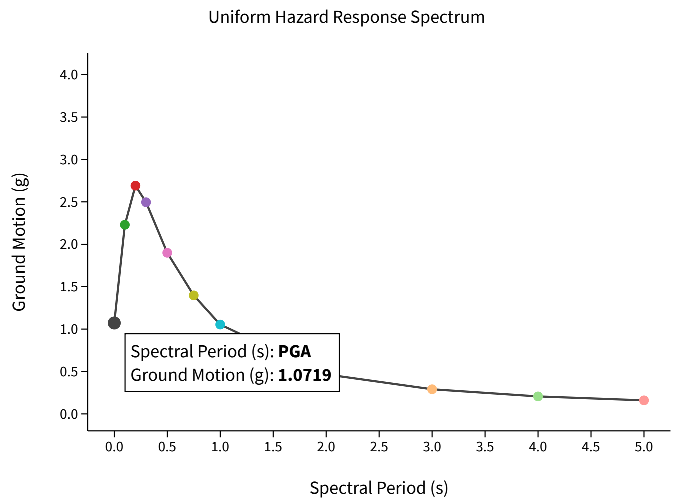
Please do not use this tool to obtain ground motion parameter values for the design code reference documents covered by the U.S. Seismic Design Maps web tools (e.g., the International Building Code and the ASCE 7 or 41 Standard). The values returned by the two applications are not identical.

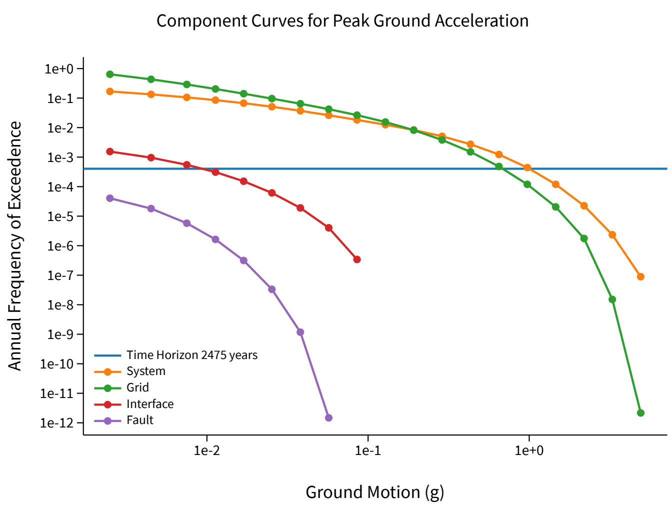
Input

Edition	Spectral Period
Dynamic: Conterminous U.S. 2014 (update) (v4.2.0)	Peak Ground Acceleration
Latitude Decimal degrees	Time Horizon Return period in years
34.4014	2475
Longitude Decimal degrees, negative values for western longitudes	
-118.435	
Site Class	
537 m/s (Site class C)	

Hazard Curve





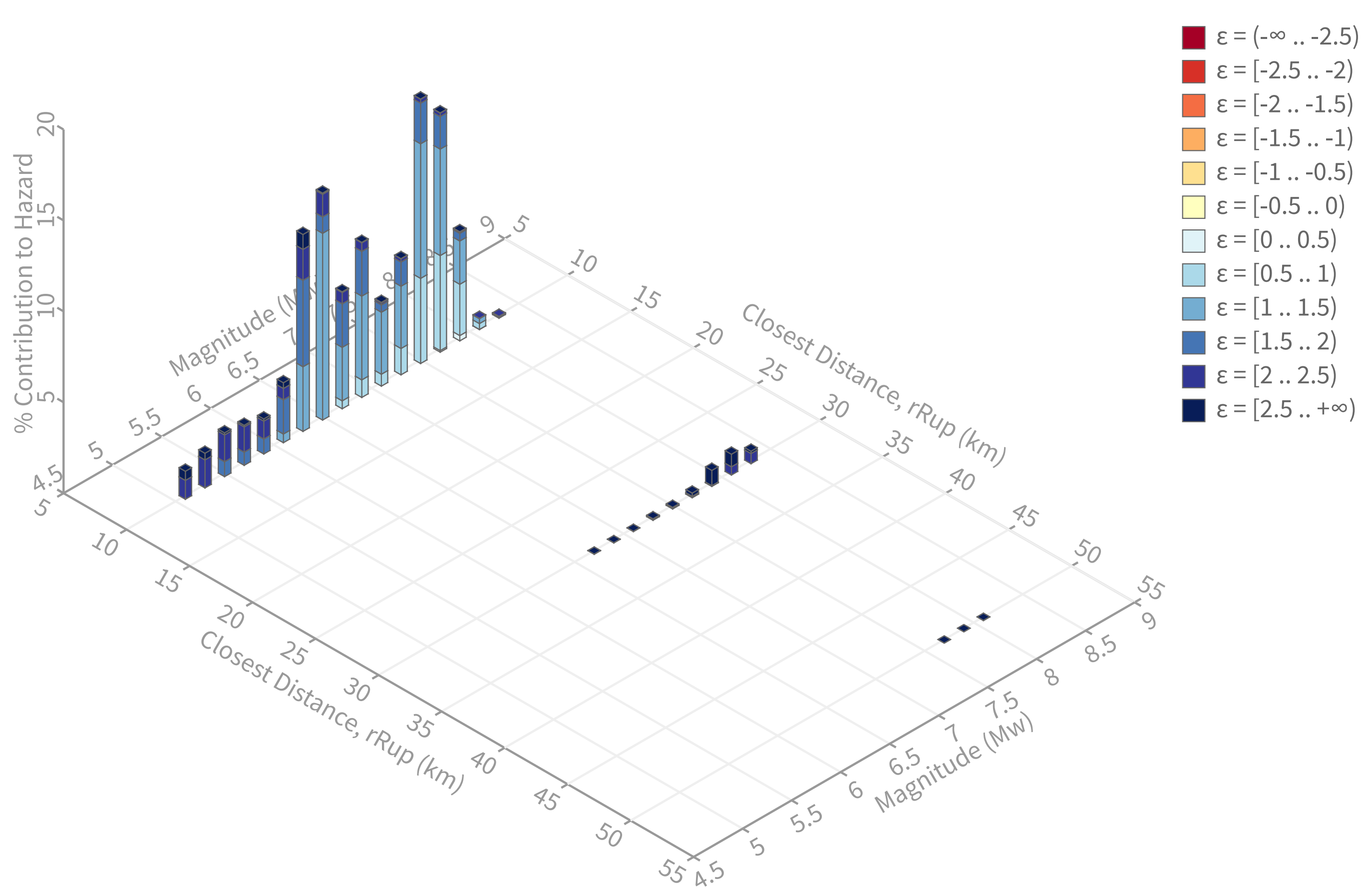


View Raw Data

^ Deaggregation

Component

Total



Summary statistics for, Deaggregation: Total

Deaggregation targets

Return period: 2475 yrs
Exceedance rate: 0.0004040404 yr^{-1}
PGA ground motion: 1.0719359 g

Recovered targets

Return period: 2891.8786 yrs
Exceedance rate: 0.00034579598 yr^{-1}

Totals

Binned: 100 %
Residual: 0 %
Trace: 0.04 %

Mean (over all sources)

m: 6.93
r: 7.75 km
ε_0: 1.45 σ

Mode (largest m-r bin)

m: 7.51
r: 7.78 km
ε_0: 1.16 σ
Contribution: 14.53 %

Mode (largest m-r-ε_0 bin)

m: 6.46
r: 5.58 km
ε_0: 1.3 σ
Contribution: 10.27 %

Discretization

r: min = 0.0, max = 1000.0, Δ = 20.0 km
m: min = 4.4, max = 9.4, Δ = 0.2
ε: min = -3.0, max = 3.0, Δ = 0.5 σ

Epsilon keys

ε0: [-∞ .. -2.5)
ε1: [-2.5 .. -2.0)
ε2: [-2.0 .. -1.5)
ε3: [-1.5 .. -1.0)
ε4: [-1.0 .. -0.5)
ε5: [-0.5 .. 0.0)
ε6: [0.0 .. 0.5)
ε7: [0.5 .. 1.0)
ε8: [1.0 .. 1.5)
ε9: [1.5 .. 2.0)
ε10: [2.0 .. 2.5)
ε11: [2.5 .. +∞]

Deaggregation Contributors

Source Set ↳ Source	Type	r	m	ε_0	lon	lat	az	%
UC33brAvg_FM32	System							50.36
Santa Susana alt 2 [1]		6.47	6.85	1.23	118.438°W	34.336°N	182.24	24.34
Santa Susana alt 2 [2]		7.35	6.95	1.41	118.477°W	34.336°N	207.56	7.72
Sierra Madre (San Fernando) [2]		8.09	7.62	0.98	118.421°W	34.312°N	172.62	5.03
San Gabriel [2]		2.52	7.37	0.96	118.442°W	34.384°N	197.60	3.65
San Gabriel [1]		2.81	7.13	1.00	118.432°W	34.380°N	173.42	2.52
Mission Hills 2011 [0]		11.37	7.14	1.66	118.455°W	34.287°N	188.10	1.73
San Andreas (Mojave S) [2]		27.35	8.08	2.55	118.314°W	34.626°N	23.85	1.33
Northridge Hills [0]		9.55	7.49	1.08	118.503°W	34.269°N	203.05	1.30
Northridge [3]		12.14	7.42	1.88	118.460°W	34.325°N	194.93	1.30
UC33brAvg_FM31	System							31.79
Sierra Madre (San Fernando) [2]		8.09	7.53	1.03	118.421°W	34.312°N	172.62	9.13
Santa Susana alt 1 [0]		8.72	7.32	1.47	118.494°W	34.334°N	215.80	7.00
San Gabriel [2]		2.52	7.49	0.95	118.442°W	34.384°N	197.60	4.45
Mission Hills 2011 [0]		11.37	6.46	1.88	118.455°W	34.287°N	188.10	2.78
San Gabriel [1]		2.81	6.47	1.24	118.432°W	34.380°N	173.42	1.89
Northridge [3]		12.14	7.38	1.87	118.460°W	34.325°N	194.93	1.59
San Andreas (Mojave S) [2]		27.35	8.08	2.55	118.314°W	34.626°N	23.85	1.33
Northridge Hills [0]		9.55	7.40	1.09	118.503°W	34.269°N	203.05	1.20
UC33brAvg_FM31 (opt)	Grid							8.99
PointSourceFinite: -118.435, 34.433		6.07	5.77	1.93	118.435°W	34.433°N	0.00	2.25
PointSourceFinite: -118.435, 34.433		6.07	5.77	1.93	118.435°W	34.433°N	0.00	2.25
PointSourceFinite: -118.435, 34.451		7.00	5.89	2.05	118.435°W	34.451°N	0.00	1.72
PointSourceFinite: -118.435, 34.451		7.00	5.89	2.05	118.435°W	34.451°N	0.00	1.72
UC33brAvg_FM32 (opt)	Grid							8.86
PointSourceFinite: -118.435, 34.433		6.10	5.74	1.95	118.435°W	34.433°N	0.00	2.48
PointSourceFinite: -118.435, 34.433		6.10	5.74	1.95	118.435°W	34.433°N	0.00	2.48
PointSourceFinite: -118.435, 34.451		7.01	5.88	2.06	118.435°W	34.451°N	0.00	1.45
PointSourceFinite: -118.435, 34.451		7.01	5.88	2.06	118.435°W	34.451°N	0.00	1.45

Appendix F

Slope Stability Report

GEOLABS-WESTLAKE VILLAGE
Foundation and Soils Engineering, Geology
a dba of
R & R Services
Corporation
31119 Via Colinas, Suite 502 • Westlake Village, CA 91362
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October 30, 2020
W.O. 8485

SCV Water
26521 Summit Circle
Santa Clarita, California 91350

Attention: Orlando Moreno

SUBJECT: Preliminary Geotechnical Investigation,
Proposed Phase 2B Recycled Water Tanks at Cherry Willow,
Lot 940 of Tract 52833,
Santa Clarita Area, County of Los Angeles, California

Mr. Moreno:

In accordance with your request, Geolabs – Westlake Village (GWV) has undertaken a study of the geotechnical conditions at the subject property (Plate 1.1). Our purpose was to evaluate the distribution and engineering characteristics of the earth materials that occur at the site in order to provide geotechnical design criteria for grading of the proposed development.

This site is adjacent to existing water tanks constructed during the initial development of Tract 52833. A companion report is prepared under separate cover that addresses geotechnical design criteria pertinent to the design of the subject tanks (GWV 24 September 2020).

The scope of work for this project included the following tasks:

- review of previous exploration, testing, and reports for the subject site
- review of the Grading Plans prepared by Kennedy Jenks
- drilling, sampling, and logging of six LoDril borings (WB1A through WB5)
- excavation, sampling, and logging of three backhoe trenches (T1 through T3)
- laboratory testing of select samples
- soils engineering analyses
- and preparation of this report.

Field data and the approximate locations of exploratory excavations are shown on the enclosed Geologic Maps (Plates 1.2 & 1.3). Plate 1.2 uses the grading plan sheet as a base and was drawn at 1"=20' scale; while Plate 1.3 includes all adjacent areas that affect the subject site and was drawn at 1"=40' scale. Cross sections shown on the geologic maps are presented on Plates 2.1 to 2.7. The WT series cross sections were drawn at 1"=40' scale. Plates 2.1 through 2.4 illustrate subsurface geologic information. Plates 2.2E through 2.4E illustrate the subsurface model used for slope stability analyses. Their numbering continues from our preliminary geotechnical investigation of the existing water tank site (GWV 29 June 2004). New cross sections drawn for this study begin with section WT13. The R series cross sections (Plates 2.5 to 2.7) were drawn at 1"=20' scale and were used to illustrate recommended removals and evaluate temporary stability of remedial grading backcuts. General descriptions of earth materials encountered on the site are presented in the "EARTH MATERIALS" section below, while detailed descriptions are provided on the exploratory logs in Appendix A. Logs of relevant excavations from prior on-site studies are included in Appendix A for convenience. A summary of laboratory tests and test results performed on samples collected during this study, as well as laboratory test results from Fugro's work on the westernmost tank pad (Fugro 15 June 2018), are presented in Appendix B. Slope stability calculations performed for this study are presented in Appendix C. Typical details illustrating our grading recommendations are presented in Appendix D. Our findings are presented in the following sections, followed by a discussion of these findings and geotechnical design criteria for the proposed development.

SITE DESCRIPTION AND PROPOSED IMPROVEMENTS

The subject site includes an approximately half-acre, triangular-shaped building pad that was graded atop a bedrock ridgeline between 2003 and 2006 as a part of Tract 52833. The building pad is underlain by Towsley Formation bedrock. The northeast and west edges of the pad consist of compacted fill placed as part of stability fills that descend from those sides of the pad up to 100 vertical feet at 2:1 (horizontal:vertical) gradients. A 2:1 gradient stability fill ascends from the south side of the pad approximately 30 feet to a berm that separates the building pad from the existing water tank pad.

Based on the Grading Exhibit provided to our office by SCVWA, grading is proposed to move the berm to the north edge of the subject building pad and extend the existing level of the pad toward the south, beneath the existing berm. Two water tanks will be located in the pad area south of the new berm location. An access driveway will be provided at the south end of the pad that connects to the existing access road for the adjacent tanks. Proposed grading and tank locations are shown on the enclosed Geologic Maps (Plates 1.2 and 1.3).

It is planned to construct two 0.5 million gallon (MG) recycled water storage steel tanks. Each tank will be 55 feet in diameter, with 27 feet maximum water height, and will be surrounded with asphalt pavement. Information provided by your office assigns the tanks to AWWA seismic use category 1 and ASCE 7 risk category 3. The tanks will be supported by continuous ringwall foundation.

PREVIOUS GEOTECHNICAL STUDIES

The first record of geotechnical work at the subject site and available to our office is of several borings excavated and logged by LeRoy Crandall and Associates in June of 1980. These were a series of 20-inch-diameter bucket-auger borings that were logged from the surface. We surmise they were excavated for the purpose of installing piezometers for groundwater or environmental monitoring. They were located near the proposed water tank site along the ridgeline and in the canyon area to the south (see Plate 1.2). Of the borings for which we were able to obtain logs, only B6 is near the subject site. This log is included in Appendix A.

Various geotechnical studies were performed by Pacific Soils Engineering, Inc. in the late 1980's and early 1990's as Tentative Parcel Map No. 21525. Reports are listed in the enclosed references. Exploratory excavations for those studies included bucket-auger borings with downhole logs, hollow-stem auger borings, and backhoe trenches. Most of their exploration targeted debris-bearing fill soils in the canyon areas of current Tract 52833 and is not useful for this study.

This office has produced a variety of geotechnical studies in support of the grading of Tract 52833, primarily in the 1990's and 2000's (see reference list for relevant studies). These include preliminary investigations, grading plan reviews, response reports, and final compacted fill reports for both tract grading and the water reservoir site, both existing and proposed. Numerous exploratory excavations were conducted as a part of these studies including bucket-auger borings with downhole logs, hollow-stem auger borings, and backhoe trenches. Data gathered from our field work was evaluated and used to provide recommendations for removals, structures, utilities and grading of the site. This office was also contracted to perform grading observation for Tract 52833 and the water reservoir site to see that our recommendations were carried out. This afforded us a unique opportunity to observe the geologic structure and stratigraphy of the site exposed on a large scale. The body of work included as a part of this discussion is listed in the references. Relevant exploratory excavations from this work are shown on the enclosed Geologic Maps (Plates 1.2 and 1.3) and included in Appendix A. Bedding attitudes, geologic contacts, and faults observed during grading operations are also shown on the enclosed Geologic Map.

Fugro produced a draft geotechnical evaluation of the western water tank pad in 2018. Their evaluation was based on review of geologic literature, aerial photos, our published work for the existing water tank site, additional field exploration consisting of two bucket-auger borings with downhole logging, and laboratory testing of retrieved samples. The locations of the exploratory excavations performed by Fugro are shown on the enclosed Geologic Map (Plate 1.3) and included in Appendix A.

Laboratory test data from their work was incorporated into the overall body of data from the subject site; particularly shear test data, atterberg limits, and in-situ moisture and density information.

FIELD INVESTIGATION

Our office selected several exploratory locations in order to characterize the nature of the earth materials throughout the subject site. The locations of exploratory excavations were selected to refine information on geologic structure underlying the subject site and to identify the approximate limits of a possible landslide that was discovered during this recent investigation. Excavations included six borings and three trenches. Locations are shown on the enclosed Geologic Maps (Plates 1.2and 1.3). Borings were excavated using a LoDril with a two-foot-diameter flight auger to depths ranging from 18.5 to 74 feet below ground surface. Each boring was downhole logged by a representative of this office. Trenches were excavated with a backhoe to depths ranging from 5 to 10 feet below ground surface. Total trench length excavated was approximately 275 feet. Both disturbed and relatively undisturbed samples were collected from exploratory excavations, secured, and transported to our laboratory for testing. Relatively undisturbed samples were obtained using a lined modified California Split Spoon sampler (2.375 inch id.) driven by Kelly bar. All excavations were backfilled with spoils.

EARTH MATERIALS

The Geologic Maps included herein as Plates 1.2 and 1.3illustrate the spatial distribution of surficial geologic units across the subject site. General descriptions of these units are provided below, while detailed descriptions of materials encountered in our exploratory excavations are included in logs of those excavations provided in Appendix A.

UNDOCUMENTED ARTIFICIAL FILL (AFU): Undocumented artificial fill is mapped in the drainage that runs along the southern boundary of landslide l7 (see Plate 1.3). It was placed during construction of dozer roads to provide access to exploratory boring locations during previous geotechnical studies.

ENGINEERED FILL (AFE): Engineered fill was encountered in portions of excavations that passed through stability fills. It consists predominantly of yellowish brown to pale brown silty sand with gravel and cobbles, and minor interlayers of grayish brown fine sandy silt. It is dense and moist. This fill was placed during grading of Tract 52833. Documentation of fill placement, including site preparation and compaction, is provided in the referenced reports (GWV 30 June 2006 & 27 October 2006).

COLLUVIUM (QC): Colluvium was encountered within the topographic swale that defines the northern margin of landslide L7 and continues uphill and eastward into the area of the proposed tank pad. It was observed in borings WB1A, WB1B, and WB3 to a maximum depth of 16 feet. It consists of gravel, cobbles, and sparse boulders in a matrix of dark brown clayey sand. Jumbled, boulder-sized blocks of bedrock are also present as yellowish brown silty sandstone. It is loose to medium dense, dry to moist, and pores up to 1/16-inch diameter are common.

ALLUVIUM (QAL): Relatively thin deposits of alluvium, on the order of five to ten feet thick, are present filling the narrow canyons south of the subject site. It was not encountered in any of the exploratory excavations. Observations of this material from our work for the off-site disposal fill indicate it is notably coarse-grained and contains abundant pebbles, cobbles, and boulders (GWV 5 April 2006).

LANDSLIDE DEPOSITS (QLS): Landslide deposits may have been encountered in borings WB1B, WB2, WB4; and in trenches T1 and T2. The maximum depth of these materials in exploratory excavations was 21 feet in boring WB1B. They consist of yellowish brown to brown conglomerate in a silty to clayey sand matrix, and siltstone with sparse sandstone interbeds. Units are predominantly massive. What sparse bedding was observed is discontinuous and truncated by channels or offset along small faults and fractures. Units are medium dense to dense and moist to seeping. A ½ to 1-inch-thick clay shear was observed along the base of this material in WB1B@21' and WB4 @19.3'.

TOWSLEY FORMATION (TT): The Pliocene-age Towsley Formation consists of interbedded marine sandy siltstone, clayey siltstone, and occasional sandstone and conglomerate. These lithologies are typically brownish gray to gray in color, poorly indurated and weakly cemented. Below roughly 20 to 40 feet in depth, these materials are commonly found to be unoxidized. Shearing was observed along fine-grained beds at the base of the possible landslide deposits in WB1B@21' and WB4@18.9' and @19.3', as well as along fine-grained beds in WB3@40.5' and WB4@47'.

GROUNDWATER

Seepage was noted within some of the borings, both from previous and recent work. These occurrences were commonly associated with beds of contrasting permeabilities or along faults or fractures. In the vicinity of the subject site, seepage was encountered at depth within borings P1, P9, P36, P37, WB1B, WB2, WB4, and WB5. Where encountered during grading operations, such seepage shall be mitigated through installation of backdrains. We do not anticipate these seeping zones will impede grading activities nor adversely impact the stability of the site.

REGIONAL GEOLOGY

The site is located in Transverse Ranges geomorphic province of Southern California. The Transverse Ranges are essentially east-west trending elongate mountain ranges and valleys that are geologically complex. Structurally, the province reflects the north-south compressional forces that are the result of a bend in the San Andreas Fault. As the Pacific Plate (westerly side of the fault) and the North American Plate (easterly side) move past one another along the fault the bend creates a deflection which allows for large accumulations of compressional energy. Some of these forces are spent in deforming the crust into roughly east-west trending folds and secondary faults. The most significant of these faults are typically reverse or thrust faults, which allow for crustal shortening taking place regionally.

More locally, the site is situated within the western Soledad Basin portion of the Transverse Ranges. This geologic region is bounded to the east by the San Andreas Fault, to the west by the San Gabriel Fault, to the north by the Sierra Pelona Mountains, and to the south by the San Gabriel Mountains. The geologic history of the Soledad Basin is described by Sexton (1990) and summarized in the following. Original formation of the basin is thought to be a result of continental rifting in the Oligocene epoch as much as 34 Ma (million years ago). The first materials deposited in the basin were volcanic flows as well as debris flows and alluvial fans from the elevated regions surrounding the basin. Basin development continued into the early to middle Miocene epoch due to movement along the San Gabriel fault with sediments from an eastern source being deposited in an alluvial wash and at least one shallow lake which covered much of the western portion of the basin. As deformation in the southern California region continued, the basin was down-warped, allowing a marine transgression which began in the late Miocene epoch and lasted throughout much of the Pliocene epoch. This is the environment in which the onsite Towsley formation was deposited. In the late Pliocene a marine regression occurred and terrestrial sediments have been deposited ever since. Late Pleistocene and Holocene deformation have resulted in uplift and erosion of portions of the formerly buried basin deposits so that they are exposed at the surface today.

GEOLOGIC STRUCTURE

Information on geologic structure in the vicinity of the subject site was obtained from exploratory excavations, both recent and older, and field mapping during grading of Tract 52833. Approximately the upper 20 to 40 feet of bedrock materials exposed in borings tend to have less obvious and less continuous bedding due to a more massive and coarse-grained texture and to numerous small faults with offsets ranging from 1 to 12 inches that disrupt bedding. Attitudes in this upper portion of the bedrock have shallow to moderate dips toward the northwest, east, and south. Below this interval bedding is far more consistent and typically identified by thin sandy interbeds or laminated zones within the otherwise massive siltstone. The orientation of this lower portion of the bedrock is consistently shallowly dipping toward the west and southwest. This is in good agreement with the abundance of attitudes measured during grading as discussed in our impacts report (GWV 5 February 2020). Near the existing tank site, including boring WB5 and portions of trench T2, bedding dips shallow to moderately toward the south and southeast. Finally, to the west and south of the proposed tank site, bedding in borings P8, P34, and P35 exposed shallow southeast, horizontal, and shallow south dips respectively. This indicates there is a structural transition west and south of the proposed tank site and that the shallow westerly dips do not continue beyond the vicinity of borings P8 or WB5.

FAULTING

The subject site contains no known active or potentially active faults, nor is it within a State-mandated Earthquake Fault Zone. Therefore, the potential for fault generated ground rupture is considered to be very low. However, the property is situated within the seismically active Southern California region and significant ground shaking is likely to occur due to earthquakes caused by movement along nearby faults.

LANDSLIDES

Much of the subject site is comprised of sloping terrain within areas designated as slopes susceptible to seismically-induced failures as delineated by the Seismic Hazard Map of the Mint Canyon Quadrangle (CGS, 1999). Cross sections, slope stability analyses, and recommendations presented in this report address this potential hazard. Portions of four landslide deposits are shown on the enclosed Geologic Map in the vicinity of the proposed tank site: L5a and L5c, L7, L8, and L11 adjacent.

LANDSLIDES L5A AND L5C

These landslides are part of the L5 landslide complex that is located along the southwestern edge of the Geologic Map (see Plate 1.3). They were identified based on topography and exploratory excavations that took place for the original grading of Tract 52833. They were placed in a Restricted Use Area during evaluation of the grading plan for Tract 52833 and for the existing water tank site. They are located within a different drainage basin from the proposed water tanks and do not pose a hazard to the proposed project.

LANDSLIDE L7

This slide is located downhill and west of the proposed water tank site. It was identified based on topography and GWV borings P4, P8, and Leroy Crandall and Associates (LCA) boring B6. Its limits are shown on the enclosed Geologic Map (Plate 1.3). It was placed in a Restricted Use Area during evaluation of the grading plan for Tract 52833 and for the adjacent existing water tank site. Where explored it is up to 30 feet thick. The toe area of this slide was partially removed and then replaced with compacted fill during grading for the offsite disposal fill. Documentation of this work is provided in our interim compacted fill report (GWV 5 November 2007).

Our recent exploration encountered earth materials that could be the result of landsliding in borings WB1A, WB1B, WB2 and WB4, and trenches T1 and T2. Hereafter these materials are called postulated landslide materials and they are identified on the enclosed Geologic Maps as "Qls L7?" (see

Plates 1.2 and 1.3). They consist of yellowish brown to brown conglomerate in a silty to clayey sand matrix, and siltstone with sparse sandstone interbeds. Units are predominantly massive. What sparse bedding was observed is discontinuous and truncated by channels or offset along small faults and fractures. The units are moderately to highly weathered, and weathering is laterally inconsistent. Exposures in boring WB4 in particular contained random cobble-sized pockets of silty sand with gravel that appears to have experienced a different weathering environment than adjacent materials in that it was more friable and did not contain clay films on clasts.

Postulated landslide materials extended to depths up to 21 feet below the current ground surface where explored and may be a previously unidentified part of landslide L7. The pre-grading topography between the original headscarp of L7 and the crest of the ridge shows a topographic reversal in the vicinity of recent boring WB5. It is possible the headscarp was located farther up the slope than originally mapped. The lack of any slide debris in boring WB5 indicates that this portion was removed by the grading for Tract 52833. The southern limit of these materials is based on topography and the mapped southern limits of landslide L7. The eastern limit is based on exposures in trenches T1 and T2, and the lack of landslide debris in boring WB5. The northern limit is interpreted to be the colluvium filled swale along the north edge of landslide L7 that extends up into the proposed water tank pad. This is supported by observations from boring WB1B which encountered potential landslide materials below the colluvium between depths of 16 and 21 feet.

The postulated landslide materials could also be related to faulting. Several faults were identified and mapped during the original grading for Tract 52833, and their locations are shown on the enclosed Geologic Maps (Plates 1.2 and 1.3). In Trench T1 there is a zone of near vertical material (Unit 3 on the logs) at station 0+70 with different grain size, sorting, and weathering than the adjacent materials. The zone defines a sharp contact between sandstone on the north, and siltstone on the south. Near the bottom of the trench, the zone has cobble sized blocks of remnants of the adjacent materials. The zone could be fault gouge. On the other hand, it could be infill of a tension crack that opened up during landslide movement. The exact nature of the deposits remains unclear, but for the purposes of this report, they are assumed to be related to landsliding.

LANDSLIDE L8

This slide is located south of the proposed water tank site. Its headscarp is near the crest of the ridge and it toes out into the natural drainage south of the proposed and existing water tank sites. It was placed in a Restricted Use Area during evaluation of the grading plan for Tract 52833 and for the existing water tank site. Since this landslide toes out within a canyon below the water tank site, it is not anticipated to adversely impact the proposed water tank site (GWV 3 October 2003).

LANDSLIDE L11 ADJACENT

This slide is located downhill and east of the proposed tank site. The majority of the slide was removed during grading of Tract 52833 and what remains is buttressed by the fill slope that descends from the northeast side of the proposed tank pad. This small portion of landslide L11 adjacent was placed in a Restricted Use Area during evaluation of the grading plan for Tract 52833 and for the existing water tank site. It does not pose a hazard to the proposed tank site.

LIQUEFACTION AND RELATED SEISMIC HAZARDS

Liquefaction is a condition where the soil undergoes continued deformation at a constant low residual stress due to the build-up of high porewater pressures. The possibility of liquefaction occurring at a given site is dependent upon the occurrence of a significant earthquake in the vicinity; sufficient groundwater to cause high pore pressures; and on the grain size, relative density, and confining pressures of the soil at the site.

The proposed water tank site is not located within a Seismic Hazard Zone for potential liquefaction areas as delineated by the Seismic Hazard Map of the Mint Canyon Quadrangle (CGS, 1999). Groundwater encountered onsite is present as isolated seeps along fractures or in interbedded materials – generally less than one foot thick – with different permeabilities, and is likely of insufficient quantity to cause high pore pressures. Additionally, the area of the proposed water tanks is underlain by bedrock, potential landslide debris, colluvium, and engineered fill. Bedrock and engineered fill are not considered to be susceptible to liquefaction. Potential landslide debris and colluvium will be removed to bedrock in the vicinity of the tanks and replaced with engineered fill. Considering the planned removals and relative lack of groundwater, the potential for liquefaction to affect the proposed project is very remote. The potential for "dry" seismic settlement is also considered remote.

HYDROCONSOLIDATION POTENTIAL

Hydroconsolidation is a condition where dry or moist soils undergo settlement upon being wetted. In many cases, no additional surcharge load is necessary to trigger the hydroconsolidation. Typically, soils that are susceptible to hydroconsolidation include soils containing silt and clay particles, or soils cemented with such agents as iron oxide or calcium carbonate. The geologic environment for these soils is typically loose fills, altered wind-blown sands, or colluvium of loose consistency.

The area of the proposed water tanks is underlain by bedrock, potential landslide debris, colluvium, and engineered fill. Bedrock and engineered fill are not considered to be susceptible to hydroconsolidation. Potential landslide debris and colluvium will be removed to bedrock in the vicinity of the tanks and replaced with engineered fill. Considering the planned removals, the potential for hydroconsolidation to affect the proposed project is very remote.

SLOPE STABILITY

Stability analyses were performed using the Spencer's Method as coded in the computer program SLIDE v8.032 (Rocscience, 1998-2020). Spencer's Method is a limit-equilibrium method of analyses which satisfies moment and force equilibrium. A search of postulated failure surfaces was performed in order to determine the critical failure surface. Except as noted in the discussion below, the Block Search method was used. The results of the analyses are provided as a factor of safety. The factor of safety is defined as the quotient of available shear strength divided by the shear strength mobilized. Per the County of Los Angeles (GMED, 2013), the minimum computed factor of safety for the static permanent case is in excess of 1.5, 1.25 for temporary cases, and 1.1 for the seismic permanent case considering a horizontal pseudo-static coefficient of 0.15. The input parameters and results are presented and discussed in the following sections. The computer output is presented in Appendix C.

SHEAR STRENGTHS

Shear strengths used in the slope stability analyses for this report are the same as the approved strengths used in the underlying reports (GWV 3 October 2003; 29 June 2004; 5 April 2006; 30 June 2006; 5 November 2007). They are summarized in the following table.

MATERIAL	COHESION (PSF)	ANGLE OF INTERNAL FRICTION (DEG)	SATURATED UNIT WEIGHT (PCF)
Engineered Fill	200	32	130
Landslide Debris	200	30	130
Alluvium, Colluvium, & Undocumented Fill	150	35	130
Towsley Fm. – Across Bedding	700	36	135
Towsley Fm. – Parallel to Bedding	150	10	135

The shear strengths for colluvium and undocumented fill were not provided in the underlying reports. Based on the descriptions of the colluvium observed in recent exploratory excavations, it is similar enough to the alluvium that it is reasonable to assign it the same strength. The undocumented fill strength is inconsequential to the slope stability analyses. Multi-cycle direct shear testing from this current investigation, used to evaluate the fine-grained Towsley formation encountered, produced results that were similar, yet stronger than results collected in the underlying report (see Plate B.10 in Appendix B). The residual strength from earlier reports was used for these analyses. Strength of coarse-grained Towsley formation was modeled using ultimate values from direct shear testing. Results from our current testing ranged both higher and lower than some of the previous tests (see Plate B.9 in Appendix B). The coarse-grained Towsley material plays only a minor role in the slope stability analyses. Considering the body of data for this material, the earlier strength values were used.

SLOPE STABILITY RESULTS

Several cross sections were drawn for the purpose of evaluating the stability of slopes that affect or are affected by the proposed grading. Assignment of shear strengths to the various subsurface layers is based on available information on geologic structure and stratigraphy, including observations from downhole logs of exploratory borings and records of geologic field mapping during grading. A shear strength was assigned to each depth interval from the borings as well as a rationale for the strength assignment; these are summarized in Table 2 in Appendix C. Boring and field mapping data were projected to the cross sections to create a geologic model for use with slope stability analyses. Shear strength assignments are illustrated in output from the slope stability analyses (see Appendix C) and on the enclosed cross sections (Plates 2.2E to 2.4E, 2.5 & 2.7). The results of slope stability analyses are provided in Appendix C. A summary of results is provided in the following table. Stability analyses are described in more detail in the following sections.

DESCRIPTION	ANALYSIS TYPE	FACTOR OF SAFETY	COMPUTER OUTPUT LOCATION IN APPENDIX C
WT13-WT13' Base of slide	STATIC PSEUDO-STATIC	2.12 0.98	PLATES C.4 – C.23
WT13-WT13' Deep bedrock	STATIC PSEUDO-STATIC	2.24 1.28	PLATES C.24 – C.43
WT13-WT13' Fill slope	STATIC PSEUDO-STATIC	2.27 1.59	PLATES C.44 – C.61
WT14-WT14' Base of slide	STATIC PSEUDO-STATIC	1.67 0.82	PLATES C.62 – C.82
WT14-WT14' Deep bedrock	STATIC PSEUDO-STATIC	2.58 1.22	PLATES C.83 – C.103

DESCRIPTION	ANALYSIS TYPE	FACTOR OF SAFETY	COMPUTER OUTPUT LOCATION IN APPENDIX C
WT15-WT15' Base of slide	STATIC PSEUDO-STATIC	1.30 0.77	PLATES C.104 – C.123
WT15-WT15' Deep bedrock	STATIC PSEUDO-STATIC	2.08 1.25	PLATES C.124 – C.143
R1-R1' ¾:1 Backcut	TEMPORARY	1.41	PLATES C.144 – C.151
R3-R3' 1:1 Backcut	TEMPORARY	1.51	PLATES C.152 – C.158

BASE OF LANDSLIDE AND POSTULATED LANDSLIDE

As discussed in the LANDSLIDES section above, previously unidentified material that could be associated with Qls L7 was encountered underlying the proposed tank pad. The limits of these materials are illustrated on the enclosed Geologic Maps as unit "Qls L7?" (Plates 1.2 and 1.3). Three cross sections were used to evaluate the impact of these deposits on the proposed project: WT13-WT13', WT14-WT14', and WT15-WT15'. As noted in borings WB1B @21'and WB4 @19.3', an up to one inch thick sheared clay layer was observed at the base of these deposits. To simulate this, a one foot thick layer was added to the slope model along the base of the existing landslide L7 and extending beneath the postulated landslide deposits. This layer was assigned the "Towsley Fm. – Parallel to Bedding" shear strength.

For each cross section, a translational failure mechanism was considered for failures within the "Towsley Fm. – Parallel to Bedding" material modeled along the base of landslide Qls L7 and the postulated landslide materials. Both static and pseudo-static conditions were evaluated. Details of the slope stability evaluation and mitigation are presented in the following sections. For cross sections drawn through proposed water tanks (WT14-WT14' and WT15-WT15'), the tank was modeled as a 2,000 psf vertical distributed load over a length of 55 feet corresponding to the planned diameter of the tank.

Cross Section WT13-WT13'

Factors of safety for the critical slip surface were above the County minimum for static conditions, but below the County minimum for pseudo-static conditions. A search was performed to determine the limit of all surfaces with inadequate pseudo-static factors of safety. A line was added to the cross section to indicate this limit, which is located outside the proposed water tank pad.

Cross Section WT14-WT14'

As discussed in the "REMOVALS" section below, remedial grading is proposed to mitigate potential settlement from postulated landslide debris and/or colluvium situated within a 1:1 projection down and out from the edge of pavement surrounding the proposed water tanks. Slope stability analyses incorporated this removal into the slope model as a zone of engineered fill.

For both static and pseudo-static analyses, failure surfaces generated by the Block Search method had unrealistic interslice forces resulting from tension near the top of each postulated failure mass that extended into the tank pad. This was a result of the block search polyline forcing failures beneath a thin wedge of fill between the edge of the removal (at the north edge of the access road) and the tank pad. To generate more realistic and kinematically valid failure surfaces, the Cuckoo Search method was used for the analyses that considered failures along the base of the landslide and postulated landslide materials along cross section WT14-WT14'. Other search methods available in the software were also used with similar results. For this report, the Cuckoo Search results are produced as representative of these overall results.

Factors of safety for the critical slip surface were above the County minimum for static conditions, but below the County minimum for pseudo-static conditions. A search was performed to determine the limit of all surfaces with inadequate pseudo-static factors of safety. A line was added to the cross section to indicate this limit, which is located outside the proposed water tank pad.

Cross Section WT15-WT15'

As discussed in the "REMOVALS" section below, remedial grading is proposed to mitigate potential settlement from postulated landslide debris and/or colluvium situated within a 1:1 projection down and out from the edge of pavement surrounding the proposed water tanks. Slope stability analyses incorporated this removal into the slope model as a zone of engineered fill.

Factors of safety for the critical slip surface were below County minimums for both static and pseudo-static conditions. A search was performed to determine the limit of all surfaces with inadequate factors of safety. A line was added to the cross section to indicate this limit, which is located at the edge of the proposed water tank pad.

DEEP BEDROCK IN NATURAL SLOPES SOUTHWEST OF TANK PAD

As discussed in the "GEOLOGIC STRUCTURE" section above, measurement of geologic bedding exposed in recent borings excavated in the vicinity of the proposed water tank pad encountered a zone of subsurface bedrock with a bedding orientation dipping shallowly toward the west and southwest. Depending on location, the top of this zone ranges from approximately 20 to 40 feet below the ground surface, and extends to the total depth explored. Fine-grained portions of this zone were assigned anisotropic shear strength with the "Towsley Fm. – Parallel to Bedding" strength being used over a dip range of 6 to 9 degrees, and the "Towsley Fm. – Across Bedding" strength outside that range. The bedding orientation of this zone is unfavorable for the natural slopes that descend to the southwest of the proposed water tank pad.

The zone of unfavorable dips extends westward from boring WB4 some distance before the average bedding orientation changes to dip shallowly toward the east as indicated by the bedding attitudes starting at a depth of 12 feet in boring P8. To simulate the transition to a favorable bedding orientation, the zone of bedrock assigned the anisotropic shear strength is truncated at the approximate location of the transition as indicated by the vertical material boundary in the enclosed geotechnical cross sections (Plates 2.2E to 2.4E).

A prominent fault was identified during grading for the existing water tanks that was found to be continuous from the southern limit of grading to the backcut for the stability fill that descends to the northeast from the tank site. It is shown on the enclosed Geologic Maps (Plates 1.2 and 1.3) as a northeast-southwest trending fault located just east of boring WB5. From field measurements during grading, its orientation is approximately N46E dipping 53 degrees northwest. This feature was incorporated into the slope model for section WT15-WT15'. Bedding attitudes southeast of this fault dip toward the south, which is a favorable orientation for the slope evaluated in cross section WT15-WT15'. Therefore a sloping material boundary was incorporated into that cross section at the apparent dip of the fault which truncates the zone of anisotropic materials used to model bedrock with an unfavorable bedding orientation.

Three cross sections were used to evaluate global slope stability considering parallel to bedding failures in portions of the bedrock with unfavorable bedding orientation: WT13-WT13', WT14-WT14', and WT15-WT15'. They were drawn parallel to the average dip direction of the bedrock zone with an unfavorable bedding orientation. For all three cross sections, factors of safety for the critical slip surface were above County minimums for both static and pseudo-static conditions.

STABILITY FILL SLOPES DESCENDING FROM TANK PAD

Stability fill slopes descend from the proposed water tank pad toward the southwest, west, and northeast. These slopes were constructed as a part of the original grading for Tract 52833. Documentation of grading operations and fill placement is contained in the referenced reports (GWV 30 June 2006 & 27 October 2006). Two cross sections were drawn through these slopes to illustrate critical conditions: WT9-WT9' and WT13-WT13'. Slope stability analyses were performed as needed to demonstrate adequate global stability of these slopes. Details of each cross section are provided in the following sections.

Cross Section WT9-WT9'

This cross section was originally presented in our preliminary evaluation of the existing water tank pad (GWV 29 June 2004). It is reproduced herein and revised to illustrate the additional fill slope height resulting from the proposed berm grading. The berm will increase the height of the stability fill slope that descends to the northeast by approximately 15 feet: from 108 to 123 feet at the location of the cross section. A taller slope (height = 140 feet) with similar subsurface materials was evaluated using cross section WT6-WT6' in our preliminary evaluation of the existing water tank pad (GWV 29 June 2004). WT6-WT6' was considered to be the critical section for this slope at the time of the preliminary evaluation, and remains the tallest and most critical considering the proposed water tank grading. Factors of safety for the critical slip surface were above County minimums for both static and pseudo-static conditions. Considering these results, slope stability analyses were not performed for cross section WT9-WT9' because adequate global slope stability is demonstrated by the results of our analyses from cross section WT6-WT6'.

Cross Section WT13-WT13'

This cross section was drawn through the slope that descends from the southwest side of the proposed water tank pad to the access road. It illustrates the additional slope height that will result from the proposed berm grading: the slope height will increase from approximately 25 feet to 40 feet at the location of the cross section. Despite the small slope height, slope stability analyses were performed because portions of the slope are underlain by colluvium. Rotational analyses were used to evaluate potential circular failures through the berm and descending stability fill slope. Factors of safety for the critical slip surface were above County minimums for both static and pseudo-static conditions.

CUT SLOPE ASCENDING FROM TANK PAD

The grading plan indicates a 2:1 gradient (50%) cut slope is planned ascending as much as 32 feet from the east side of the proposed tank site to the top of the existing berm around the existing tank site. This slope is illustrated in the enclosed cross section R3-R3' (Plate 2.7). It is anticipated the cut slope will expose Towsley Formation bedrock. Bedding attitudes measured in the vicinity during grading indicate bedding dips shallowly toward the south, which is neutral to the proposed cut slope orientation. Considering the short height of the slope, and the high across-bedding strength of the bedrock, slope stability analyses are trivial and were not performed. The proposed slope is anticipated to have adequate global factors of safety.

The majority of the cut slopes exposed during original grading of the existing water tank pads were rebuilt as stability fills to mitigate surficial stability concerns that arose from exposure of friable, erosion-prone bedrock, and unoxidized bedrock (GWV 30 June 2006). Proposed cut slopes should be observed by a representative of this office during grading to determine the need for a stability fill to mitigate surficial stability concerns. Given the performance of the previous slopes, it should be anticipated that the proposed cut slopes will need to be stabilized.

BACKCUTS FOR REMEDIAL GRADING OF TANK PAD

Remedial grading is recommended beneath the proposed water tank pad to mitigate potential settlement of postulated landslide deposits underlying the tank footprints, and material transitions beneath the tanks. It is described in detail in the "REMOVALS" section below. Backcut gradients for this grading range from ¾:1 (133%) to 1:1 (100%). Slope stability analyses were performed to demonstrate factors of safety are above County minimums for the temporary condition. It is important to note that these analyses assume the proposed water tank pad will be cut to grade (approximately elevation 1810) prior to excavation of the backcuts, and that no fills are placed in the areas of the proposed berms. Analyses for other specific grading scenarios can be performed upon request. Details of analyses are discussed in the following sections.

Cross Section R1-R1'

This cross section was drawn through the tallest portion of the ¾:1 gradient (133%) backcut located at the northwest end of the removal adjacent to the existing access road. The backcut is anticipated to expose postulated landslide materials. Nearby borings WB1B and WB4 indicate bedding within the postulated landslide materials is discontinuous and neutral to the proposed backcut, and materials are coarse-grained. Accordingly a rotational failure mechanism was considered for slope stability analyses. The factor of safety of the critical failure surface is above the County minimum for the temporary condition.

Cross Section R3-R3'

This cross section was drawn through the tallest portion of the 1:1 gradient backcut. The backcut is anticipated to expose engineered fill at the top, colluvium in the middle, and Towsley Formation bedrock near the bottom. Bedrock at the depths anticipated to be exposed in the backcut from nearby borings includes massive siltstone in WB3, and primarily sandstone with deeper interbedded siltstone in P38. Bedding attitudes from P38 indicate bedding is neutral to the slope. Accordingly, a rotational failure mechanism was considered for slope stability analyses. The factor of safety for the critical failure surface is above the County minimum for the temporary condition.

DISCUSSION AND RECOMMENDATIONS

Information and analyses from previous and current investigations provide the basis for the following discussion. Recommendations, based on the presently available data, are presented for your consideration.

REMOVALS

The enclosed Removal Map (Plate 1.4) and cross sections R1-R1', R2-R2', and R3-R3' (Plates 2.5 to 2.7), illustrate the recommended remedial grading. The objective of remedial grading is to: (1) remove and recompact all colluvium (Qc), postulated landslide materials (Qls L7?), and weathered bedrock down to firm bedrock within a 1:1 projection down and out from the edge of pavement surrounding the proposed water tanks; and (2) provide a fill cap for the southeast proposed water tank to mitigate against differential fill thickness, variable expansion potential due to the exposure of differing lithologies, and to provide for uniformity of bearing and footing excavation performance. Soils removed as part of remedial grading may be used to construct engineered fills. Criteria for doing so are provided in the following sections.

Backcuts to achieve recommended removals are shown at a ¾:1 gradient, except along the existing access road where they are shown at a ¾:1 gradient (133%).

BACKDRAINS

The proposed grading and recommended remedial grading will sever portions of an existing stability fill backdrain along the northeast side of the existing access road. The upstream portion of the backdrain should be provided with a cutoff wall and solid outlet to a non-erodible device at the ground surface (see Plate D.1). The downstream stub of backdrain should be capped.

The need for a backdrain for the remedial grading shown on the Removal Map (Plate 1.4) should be assessed in the field. Several seeping zones were noted in boring logs in the vicinity. If these are encountered during removals, a backdrain (see Plate D.2) should be installed to collect this water and outlet it to a suitable location. This may be a non-erodible device at the ground surface, or the downstream end of the severed backdrain. The best location for the backdrain outlet should be assessed in the field.

Backdrains should be constructed in all stability fills as shown in the enclosed details (see Plate D.5). The need for backdrains and their spacing should be evaluated by a representative of this office and may be adjusted as field conditions dictate.

COMPACTION SPECIFICATIONS

In order to reduce settlement of deep engineered fills and to provide adequate foundational support for the proposed water tanks, the following compaction criteria are presented for your consideration. These compaction criteria apply to all rough grading for this project. Fine grading for pad drainage, establishing pavement subgrade, etc. are discussed in the companion report.

Fills within the tank footprint and five horizontal feet beyond (tank zone) shall be moistened to near optimum moisture content and compacted to at least 95% relative compaction. This compaction standard applies to the entire vertical column of fill beneath the tanks.

Fills outside the tank zone and within 20 feet from finish grade should be moistened or air-dried to near optimum moisture content and compacted to at least 90% relative compaction.

Fills outside the tank zone placed in excess of 20 feet from finish grade should be moistened or air-dried as necessary to near 2% over optimum moisture content and compacted to at least 92% of the material's maximum dry density prior to placement of the next lift.

Compaction specifications are summarized in the following table.

Fill Location	Fill Depth	Moisture Content	Minimum Relative Compaction
Outside tank zone	0 to 20 feet	near optimum	90%
Outside tank zone	> 20 feet	near 2% over optimum	92%
Within tank zone	All depths	near optimum	95%

ROCK DISPOSAL

Oversize rocks (greater than 12 inches in diameter) were encountered within the colluvium and postulated landslide materials. Oversize rocks should be disposed of in accordance with the Rock Disposal Detail (Plate D.4). All oversize materials should be placed at least 10 feet below finish grade or below the deepest utility, whichever is deeper. No rock disposal should be performed within fills placed for the proposed water tanks.

RIPPABILITY OF CUT AREAS

Past grading experience and recent exploratory excavations indicate onsite bedrock is uncemented to weakly cemented. We anticipate cut operations can be achieved with normal ripping.

UNOXIDIZED BEDROCK

The upper 20 to 40 feet of the Towsley Formation is generally weathered and oxidized. Below this depth, this bedrock formation is generally unoxidized and may contain significant concentrations of sulfides. These sulfide-bearing materials can generate sulfate ions which attack concrete. Accordingly, unoxidized bedrock should be isolated from future concrete foundations or sulfate-resistant concrete (Type V) should be utilized. Isolation of unoxidized bedrock is commonly accomplished by its placement in deeper fills and the overexcavation of unoxidized bedrock and replacement with compacted fill.

Where unoxidized bedrock is exposed in the face of a cut slope, it should be reconstructed as a typical stability fill with backdrains. Fill soils used in the stability fill construction should consist of oxidized soils. Recommendations for capping the proposed water tank pad will be provided should unoxidized bedrock be exposed at pad grade.

LOT CAPS AND EXPANSIVE SOILS

As discussed in the "REMOVALS" section above, the water tank pad should be capped with a blanket of fill material. The thickness of the fill cap depends on the depth of fill under proposed structures, or on the expansion properties of the underlying material, whichever results in a greater thickness. Typical lot cap construction is shown on Plate D.3 of Appendix D. The remedial grading will provide a cap of sufficient thickness for the western tank. At this time, a seven-foot-thick fill cap is anticipated for the eastern tank and is incorporated into the remedial grading design shown on the enclosed Removal Map (Plate 1.4). This thickness may be adjusted depending on the expansion properties of the materials exposed during grading.

STABILITY FILLS

Some cut slopes may expose daylighted bedding, friable sand, unoxidized bedrock, and/or possibly expansive siltstone or claystone beds. We anticipate these slopes will need to be rebuilt as typical stability fills. All stability fills should be provided with backdrains. During construction of stability fills or sliver fill slopes, a minimum 20 foot horizontal distance should be maintained from face of the finished slope to the benches at the back of the fill, other than at the upper and side joins. Typical stability fill and backdrain construction details are shown on Plates D.2 & D.5 of Appendix D. Should a stability fill height exceed the interval between adjoining slope drainage terraces, then the additional width of the terrace(s) should be added to the base width of the stability fill.

GRADING – ENGINEERED FILLS

The following recommendations pertain to the preparation for, and placement of, engineered fills.

1. The onsite soils are suitable for use as structural fill. Any import materials that are to be used as structural fill should be approved by this office prior to placement.
2. Shrinkage refers to the lesser volume of fill that result from a given volume of excavation. The shrinkage of the colluvial materials is anticipated to be between 10% and 15%. Postulated landslide debris is anticipated to shrink between 0% and 5%. Towsley Formation bedrock is anticipated to bulk between 0% and 5%.
3. Subsidence includes the general lowering of the ground due to in-place compaction by construction equipment. Subsidence is anticipated to range from 1.0 to 2.0 tenths of a foot.

4. All vegetation, trash, construction debris, asphalt, or other deleterious material should be stripped from the area to be filled and wasted from the site.
5. Compressible soils that lie within the areas to receive engineered fill should be removed to relatively incompressible material, moisture conditioned, and replaced as properly compacted fill. Portions of the compressible materials that are sufficiently thin may be scarified, watered or air dried to approximately the material's optimum moisture content, and compacted in-place. A combination of removal and recompaction in-place may be used, providing the recommended compaction is obtained throughout the recommended depth interval. Based upon the materials exposed in our exploratory excavations, we anticipate the removals to extend to depths of 10 to 30 feet. Preliminary anticipated removal depths are illustrated on the enclosed Removal Map (Plate 1.4) and cross sections (Plates 2.5 to 2.7). Final removal bottoms must be field verified by a representative of the geotechnical consultant. Where the ground slopes steeper than 5:1 (H:V), the fill should be properly benched into bedrock. Typical benching is illustrated in Plate D.5.
6. Exposed surfaces should be scarified, moistened or air dried as appropriate, and compacted to the appropriate percentage of the material's maximum dry density prior to placement of fill (see "Compaction Specifications" section).
7. Where the ground slopes steeper than 5:1 (H:V), the engineered fill should be properly benched into competent material. Typical benching is illustrated in Appendix D.
8. Fill materials should be placed in lifts of a thickness appropriate to achieve the specified relative compaction throughout the lift considering the equipment used to construct the fill (typically six to eight inches uncompacted), watered to near the material's optimum moisture content (or to near 2% over optimum moisture content), and compacted to the applicable level of relative compaction prior to placing the next lift. Compaction criteria vary depending on the depth of fill as outlined in the "Compaction Specifications" section above.
9. Fill slopes constructed of clean sand are commonly subject to excessive erosion or shallow slope failures. Similarly, fill slopes constructed with clayey soils may be subject to desiccation, cracking, creep or other surficial deterioration. Utilizing mixed soils (sand with some proportion of fines, i.e. clayey sand) in the outer 20 feet of the fill slope may serve to minimize the potential for surficial slope deterioration.

10. The compaction standard applies to the face of fill slopes. This may be achieved by overfilling the constructed slope and trimming to a compacted finished surface, rolling the slope face with a sheepsfoot, or any method that achieves the desired product.
11. All grading should comply with the grading specifications and requirements of the local governing agency.

GRADING – CUT SLOPES

Cut grading proposed at the site will provide more continuous exposure of the subsurface materials. Variations in the structural geology uncovered by the grading may warrant revisions in cut slope grading criteria.

1. Cut slopes exposing surficial soils and/or weathered bedrock should be rebuilt as typical stability fills with backdrains. Typical stability fill construction and backdrain specifications are illustrated in Appendix D.
2. Fill-over-cut slopes should have the fill founded on a 20 foot wide bench cut into the bedrock, or where bedrock is not present in the cut portion of the slope, on a key cut below the toe of the slope. The 20 foot bench should be graded to provide at least 1 foot of fall toward its upslope side. If keyed below the toe of slope, then the key should be at least 20 feet wide, 3 feet deep (below the toe), and tilted (at least 1 foot) into the slope. The cut portion of the slope should be exposed (and observed by a representative of this firm) prior to constructing the fill portion of the slope. Typical fill-over-cut slope construction is illustrated in Appendix D Plate D.6.

TEMPORARY EXCAVATIONS

Temporary excavations (such as backcuts for stability fills, removals, and retaining wall excavations) may be considered stable if cut vertical, providing they are restricted to a maximum of 5 feet in height, are provided with permanent support as soon as possible, and they are protected from erosion and saturation. Portions of temporary excavations in excess of 5 feet high should be laid back to 1.5:1 (67% slope) except for those that have been addressed herein; specifically the ¾:1 backcut (200% slope) along the existing access road, and the 1:1 backcut, both illustrated in the Removal Map (Plate 1.4). Specific alternative treatments can be evaluated upon request.

Temporary excavations (such as utility trenches and backcuts for retaining wall construction) should comply with OSHA requirements. The safety and stability of excavations for the planned improvements are the responsibility of the contractor. The materials encountered in the exploratory excavations are classified as stable bedrock or Type "B" or "C" soils.

FOOTING SETBACKS AND CLEARANCES

Building Adjacent to an Ascending Slope

The California Building Code, as adopted or amended by the local agency, requires buildings to have sufficient clearance from stable, ascending slopes to provide protection form slope drainage, erosion, and shallow failures. A horizontal separation of one-half the height of the slope, but not more than 15 feet, is assumed to provide this level of protection. Retaining walls can be used to achieve this clearance. For this purpose, the height of the ascending slope can be measured from the top of a retaining wall. When freestanding retaining walls or freeboard (un-backfilled portion of a retaining wall) is used, the clearance can be measured at the elevation of the top of the freestanding wall or freeboard. Such retaining walls can also be incorporated into the structure.

Footing Setbacks

Bearing portions of footings should not be closer to nearby descending stable slopes than one-third the height of the slope, measured horizontally, up to a maximum of 40 feet. The height of the slope is commonly taken as that portion of the slope where the gradient is 3:1 (33% slope) or steeper. In no case should the footings be less than five feet to daylight or the Geotechnical Setback line.

Footings may need to be deepened to achieve the setbacks noted above. Portions of the stem wall above the depth where the setback is achieved should be designed to accommodate the unbalanced load that would persist should the downslope material move away from the stemwall.

DRAINAGE

Positive drainage should be established to carry pad waters away from structures and foundations, and to prevent uncontrolled or sheet flow over manufactured slopes. We recommend as steep a gradient as practical be established around the structures, to the street or other non-erosive drainage devices. Fine-grade fills placed to create pad drainage should be compacted in order to retard infiltration of surface water.

Preserving proper surface drainage is also important. Planters, decorative walls, plants, trees or accumulations of organic matter should not be allowed to retard surface drainage. Planters adjacent to a structure should be constructed so that irrigation water will not saturate the soils underlying the footings and slabs. Area drains and roof gutters (if present) should be kept free of obstruction. Roof gutters (if present) and condensation lines from air conditioners should be directed to the street via a non-erodible device (i.e. outlet to a splash block that directs the water to a swale or an area drain, or, tie directly to an area drain). Positive drainage along the backs of retaining walls should be maintained.

Any other measures that will facilitate positive surface drainage should be employed. Maintenance personal should be informed of the need to preserve proper drainage.

LANDSCAPING

All slopes should be planted as soon as possible. It is important to avoid repeated wetting and drying of the slope surface, which may cause the soil to crack and/or loosen. The landscaping process should aid in abating erosion. In addition, efforts should be made to effectively control burrowing rodents. If slopes are not landscaped prior to experiencing a drying season, the condition of their surface should be re-evaluated prior to landscaping.

Raised planter boxes adjacent to building foundations should either be avoided or appropriately sealed so that the irrigation water does not impact the foundations. Sealing may be accomplished by constructing the raised planters with a solid base and side-wall weep holes (exiting on side away from the building), or by providing a cutoff wall adjacent to the foundations. Cutoff walls should be at least 6 inches thick and extend at least 30 inches below the grade.

Control of irrigation water is a necessary part of site maintenance. Soggy ground, near-surface, perched water or seeps may result if irrigation water is excessively or improperly applied. All irrigation systems should be adjusted to provide the minimum water needed to sustain landscaping. Adjustments should be made for changes in the climate. Irrigation should stop when sufficient water is provided by precipitation. Broken, leaking, or plugged sprinklers or irrigation lines should be repaired immediately. Frequent inspections of the irrigation systems should be performed. Maintenance personal should be informed of the need to properly irrigate the properties.

SERVICES DURING CONSTRUCTION

Grading, foundation, retaining wall or other plans should be forwarded to our office for review as they are developed. We may offer additional discussion and/or design criteria as warranted.

Placement of all fill and backfill should be monitored by representatives of this office. This includes our observation of prepared bottoms prior to filling.

Foundation excavations should be observed by representatives of this office to see if the recommended penetration of proper supporting strata has been achieved. Such observations should be made prior to placing concrete, steel or forms. This office should be notified at least 24 hours prior to placing concrete.

111 STATEMENT

Based upon tests conducted as outlined in this and applicable referenced reports, and if constructed in accordance with our recommendations and properly maintained, it is the opinion of the undersigned, a duly registered professional engineer and engineering geologist, that (1) the proposed grading and proposed structure(s) will be safe against hazard from landslide, settlement or slippage, and that (2) the proposed building or proposed grading construction will have no adverse effect on the geologic stability of property outside the building site. The nature and extent of tests conducted for purposes of this declaration are, in the opinion of the undersigned, in conformance with generally accepted practices in this area. Test findings and statements of professional opinion do not constitute a guarantee or warranty, express or implied.

CLOSURE

This geotechnical report has been prepared in accordance with generally accepted engineering practices at this time and location. No other warranties, either express or implied, are made as to the professional advice provided under the terms of our agreement and included in this report.

Thank you for this opportunity to be of service. Please do not hesitate to call if you have any questions regarding this report.

Respectfully submitted,
GEOLABS-WESTLAKE VILLAGE

Ryan M. Prose
C.E.G. 2625

Ronald Z. Shmerling
C.E.G. 1047
R.C.E. 35444

Lawrence K. Stark
G.E. 2772

RMP:af

Enclosures:

XC: (2) Addressee

REFERENCE LIST:

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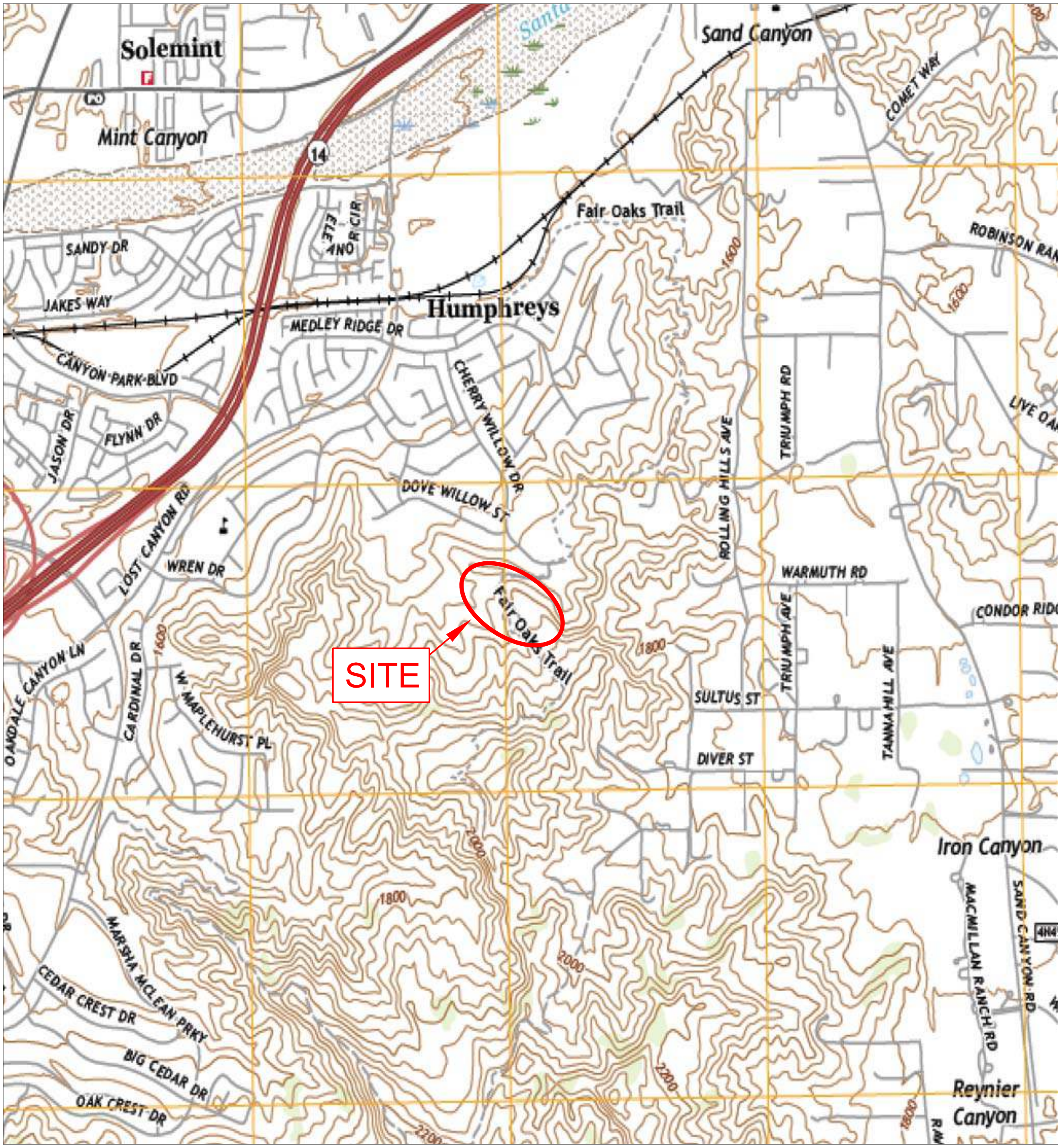
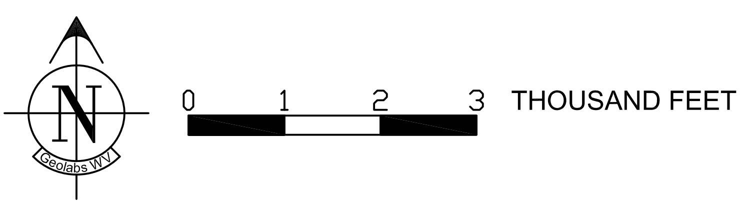
SITE LOCATION MAP

Phase 2B Recycled Water Tanks at Cherry Willow

Lot 940, Tract 52833

Santa Clarita Area, California





Geolabs - Westlake Village

GEOLOGY AND SOIL ENGINEERING

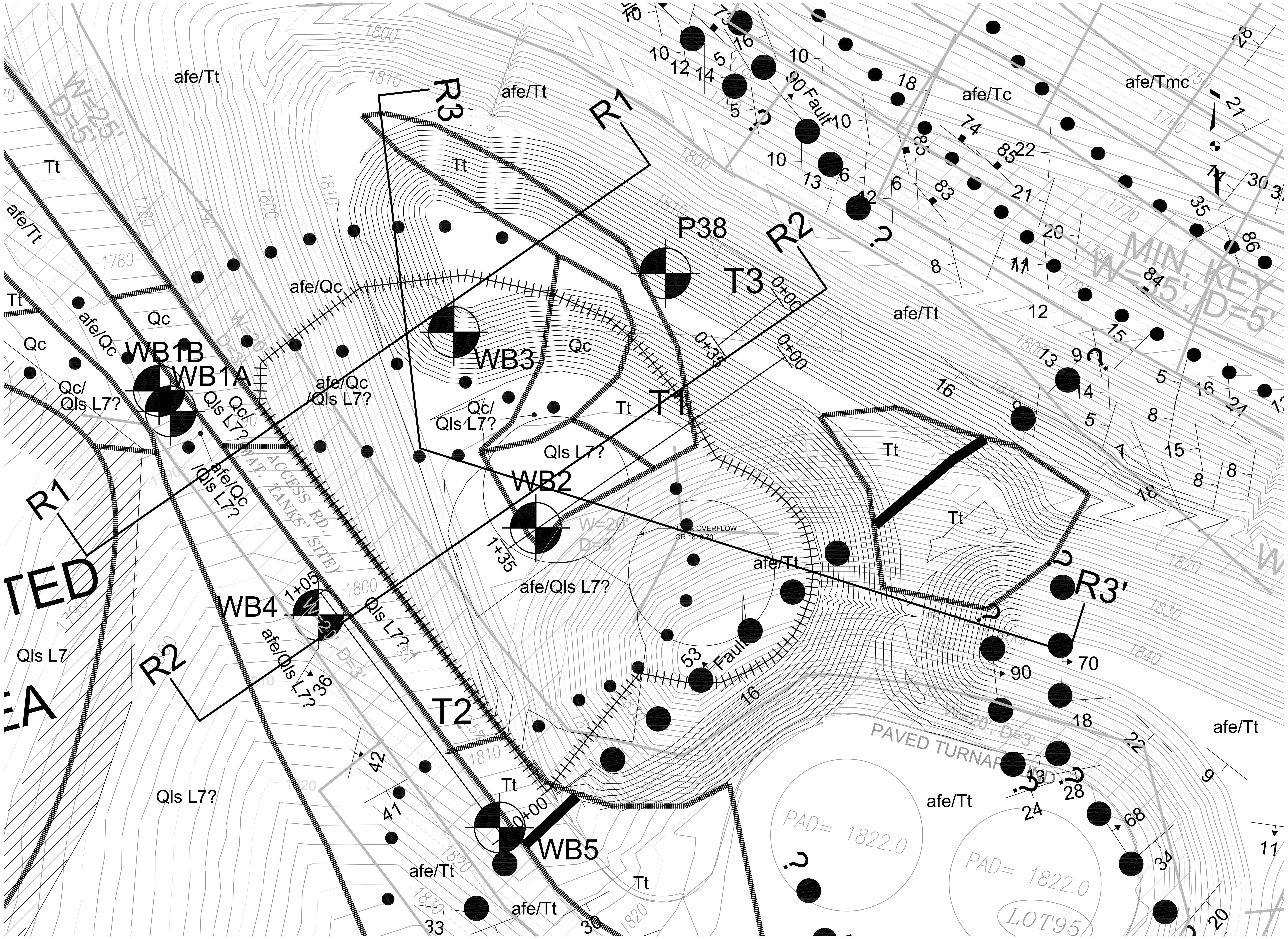
DATE	9/23/2020	BY	RMP
SCALE	1:24,000	W.O.	8485

Base Map: USGS US Topo 7.5-minute map for Mint Canyon, CA 2018

PLATE 1.1

GEOLOGIC MAP

Proposed Phase 2B Recycled Water Tanks
at Cherry Willow
Lot 940, Tract 52833
Santa Clarita Area, California



EXPLANATION

afe ENGINEERED FILL
Qc COLLUVIAL DEPOSITS (/ denotes unit as buried)
Qls LANDSLIDE DEBRIS (/ denotes unit as buried)
Tt TOWSLEY FORMATION (/ denotes unit as buried)
Tc CASTAIC FORMATION (/ denotes unit as buried)
Tmc MINT CANYON FORMATION (/ denotes unit as buried)

GEOLOGIC CONTACT (dotted where buried)
FAULT (DOTTED WHERE BURIED)
APPROXIMATE LIMITS OF REMEDIAL GRADING (see Removal Map, Plate 1.4, for depths)
34 STRIKE AND DIP OF BEDDING
22 STRIKE AND DIP OF APPROXIMATE BEDDING
56 STRIKE AND DIP OF FRACTURE/JOINT
67 STRIKE AND DIP OF FAULT/SHEAR
AS-BUILT KEYWAY
AS-BUILT BACKDRAIN OR SUBDRAIN WITH OUTLET
RESTRICTED USE AREA
R3 R3' CROSS SECTION
P38 WB5 24" DIAMETER BORING BY GWV
0+00 T3 1+00 BACKHOE TRENCH BY GWV

PLAN
0 10 20 30
1"=20'

Geolabs – Westlake Village
GEOLOGY AND SOIL ENGINEERING
DATE 9/23/2020 BY RMP
SCALE 1"=20' W.O. 8485

PLATE 1.2

DIGALERT
DIAL TOLL FREE
811
AT LEAST TWO DAYS BEFORE YOU DIG
UNDERGROUND SERVICE ALERT(USA) OF SOUTHERN CALIFORNIA

NO.	DESCRIPTION	APP.	DATE

REVISIONS

PLANS PREPARED BY:
Kennedy/Jenks Consultants
Engineers & Scientists
2775 N. VENTURA ROAD, #100
OXNARD, CA. 93036
(805) 973-5700

CHECKED BY:
BRENT PAYNE, PRINCIPAL ENGINEER DATE
RECOMMENDED BY:
KEITH ABERCROMBIE, CHIEF OPERATING OFFICER DATE
APPROVED BY: SANTA CLARITA VALLEY WATER AGENCY
BRIAN J. FOLSOM, CHIEF ENGINEER DATE

SANTA CLARITA VALLEY WATER AGENCY
ENGINEERING SERVICES SECTION
26521 SUMMIT CIRCLE
SANTA CLARITA, CA. 91350
(661) 259-2737

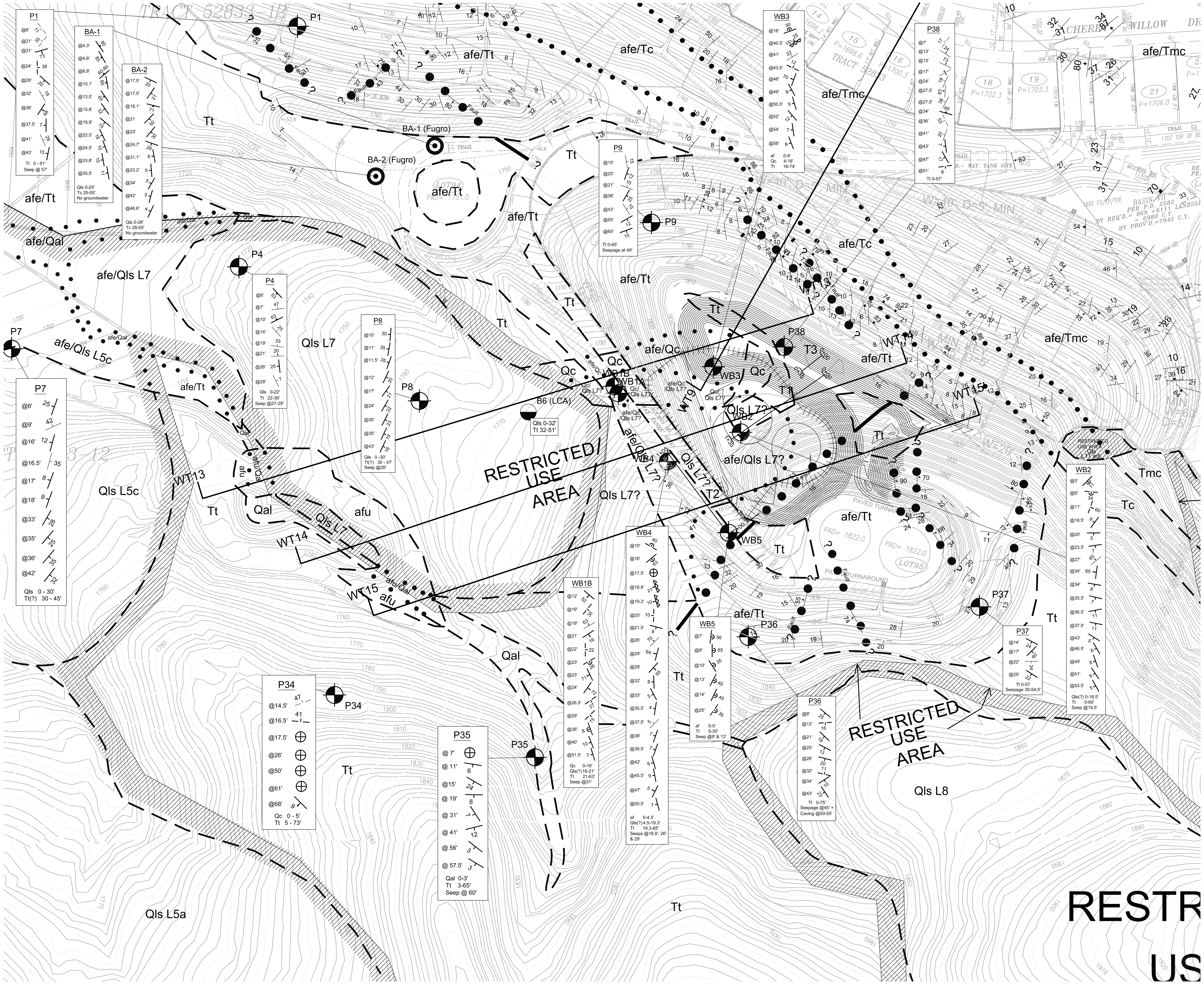
LOT 940, TRACT NO. 52833
PHASE 2B RECYCLED WATER TANKS AT CHERRY WILLOW
SANTA CLARITA, CALIFORNIA
UNINCORPORATED COUNTY OF LOS ANGELES

SITE LAYOUT AND GRADING OPTION B.1
AASHTO SU-30 FROM ACCESS ROAD

DATE: 08-31-2020
SCALE:
PROJECT NO. 1844207*00
DRAWN BY: KENNEDY JENKS
CHECKED BY: CONSULTANT ENGINEER
SHEET: C-1 OPTB.1

GEOLOGIC MAP

Proposed Phase 2B Recycled Water Tanks at Cherry Willow
Lot 940, Tract 52833
Santa Clarita Area, California



EXPLANATION

afu UNDOCUMENTED ARTIFICIAL FILL (dozer road fill)
afe ENGINEERED FILL
Qal ALLUVIAL DEPOSITS (/ denotes unit as buried)
Qc COLLUVIAL DEPOSITS (/ denotes unit as buried)
Qls LANDSLIDE DEBRIS (/ denotes unit as buried)
Tt TOWSLEY FORMATION (/ denotes unit as buried)
Tc CASTAIC FORMATION (/ denotes unit as buried)
Tmc MINT CANYON FORMATION (/ denotes unit as buried)

GEOLOGIC CONTACT (dotted where buried)
FAULT (DOTTED WHERE BURIED)
APPROXIMATE LIMITS OF REMEDIAL GRADING (see Removal Map, Plate 1.4, for depths)
STRIKE AND DIP OF BEDDING
STRIKE AND DIP OF APPROXIMATE BEDDING
STRIKE AND DIP OF FRACTURE/JOINT
STRIKE AND DIP OF FAULT/SHEAR
AS-BUILT KEYWAY
AS-BUILT BACKDRAIN OR SUBDRAIN WITH OUTLET
RESTRICTED USE AREA
WT15 WT15' CROSS SECTION
P38 WB5 24" DIAMETER BORING BY GWV
BA-2(Fugro) BUCKET-AUGER BORING BY FUGRO
B6(LCA) 20" DIAMETER BUCKET-AUGER BORING BY LeROY CRANDALL AND ASSOCIATES
T3 BACKHOE TRENCH BY GWV

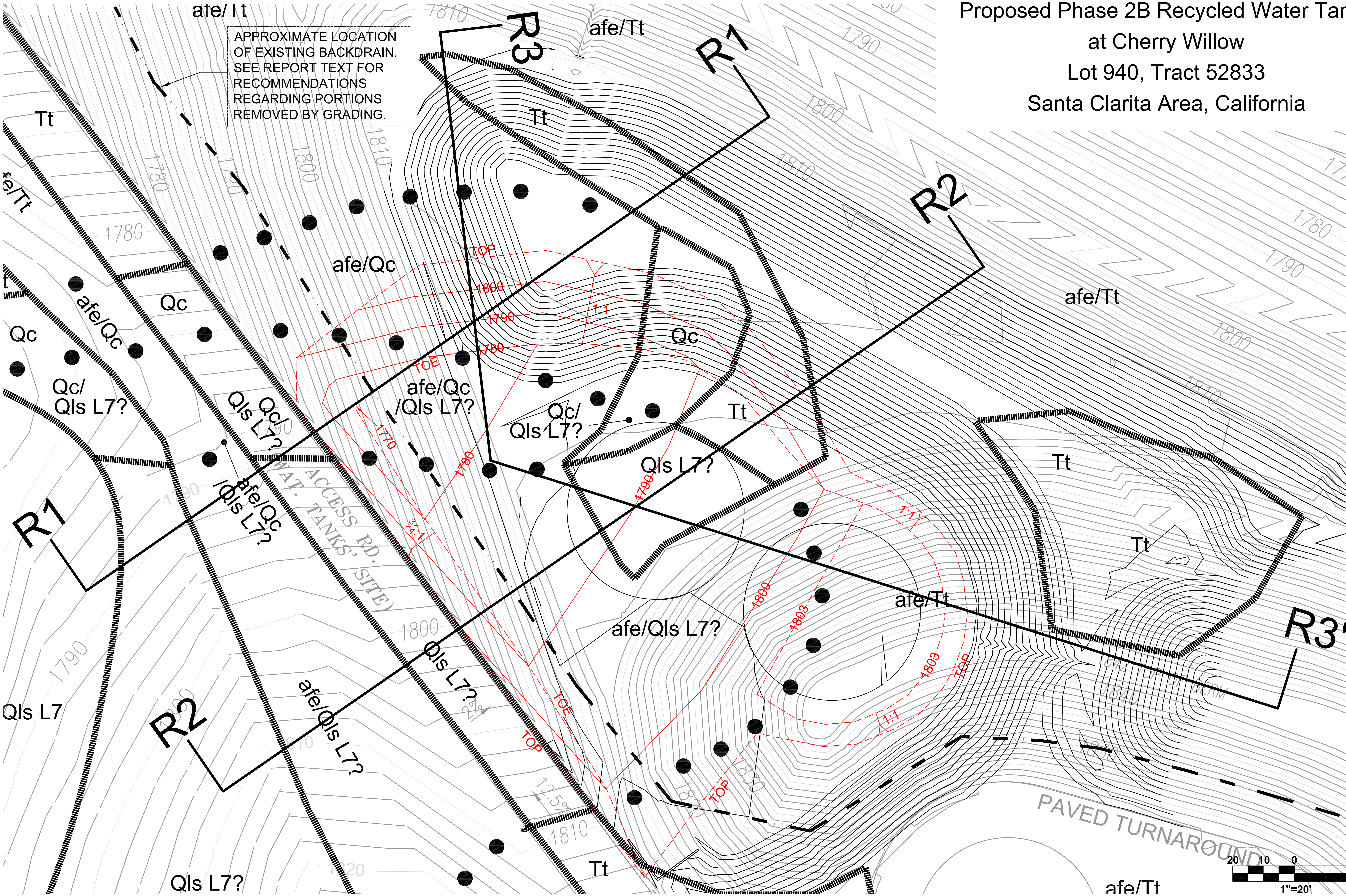
40 20 10 0 40
1"=40'

Geolabs – Westlake Village
GEOLOGY AND SOIL ENGINEERING
DATE 9/23/2020 BY RMP
SCALE 1"=40' W.O. 8485

PLATE 1.3

REMOVAL MAP

Proposed Phase 2B Recycled Water Tanks
at Cherry Willow
Lot 940, Tract 52833
Santa Clarita Area, California



EXPLANATION

afe ENGINEERED FILL

Qc COLLUVIAL DEPOSITS (/ denotes unit as buried)

Qls LANDSLIDE DEBRIS (/ denotes unit as buried)

Tt TOWSLEY FORMATION (/ denotes unit as buried)

GEOLOGIC CONTACT (dotted where buried)

R3 R3' CROSS SECTION

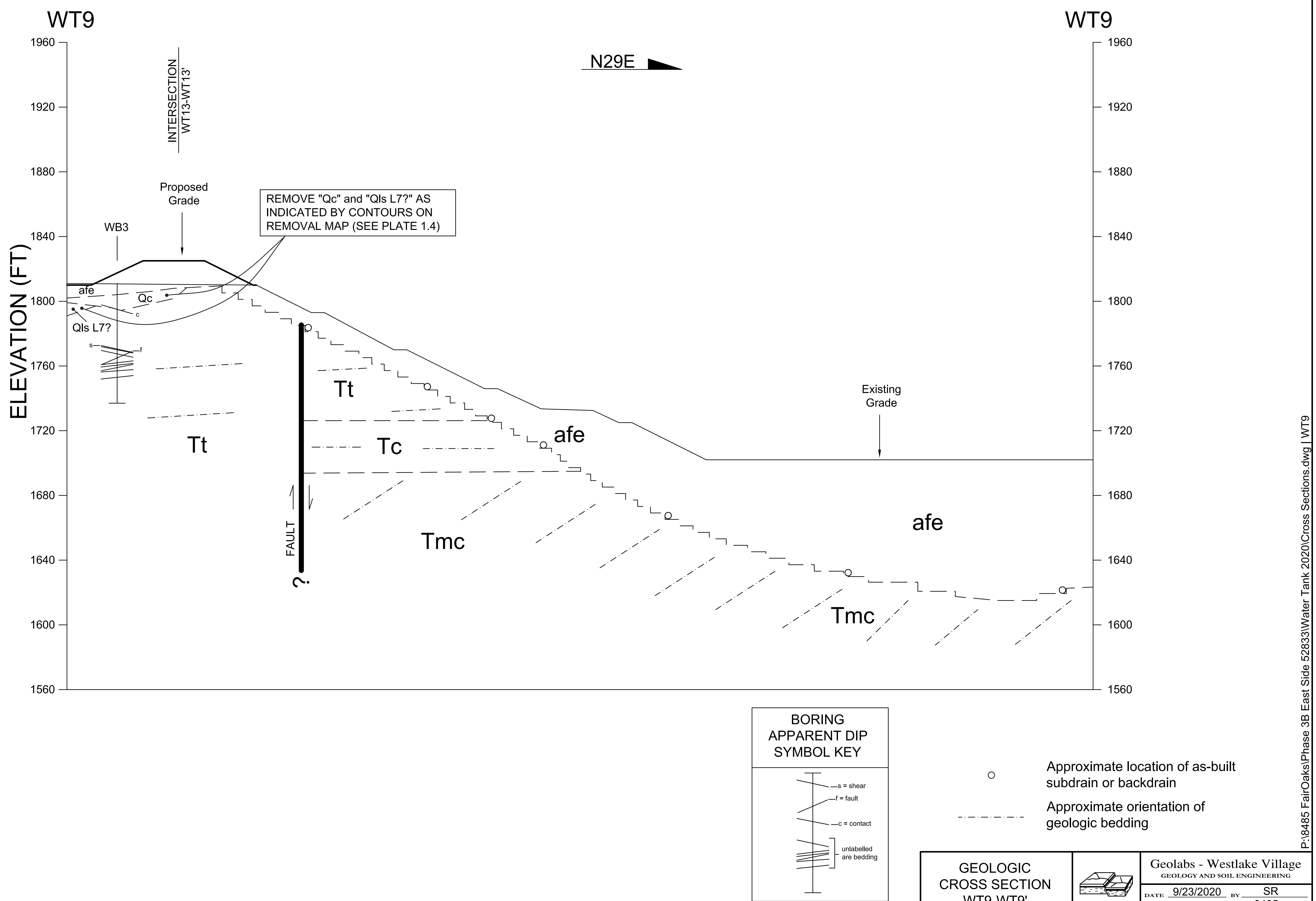
N

Geolabs – Westlake Village
GEOLOGY AND SOIL ENGINEERING

DATE 9/23/2020 BY RMP
SCALE 1"=20' W.O. 8485

PLATE 1.4

P:\8485 FairOaks\Phase 3B East Side 52833\Water Tank 2020\GeologicMap.dwg (Layout: Plate 1.4)



GEOLOGIC
CROSS SECTION
WT9-WT9'

Geolabs - Westlake Village
GEOLOGY AND SOIL ENGINEERING

DATE 9/23/2020 BY SR
SCALE 1" = 40' W.O. 8485

PLATE 2.1

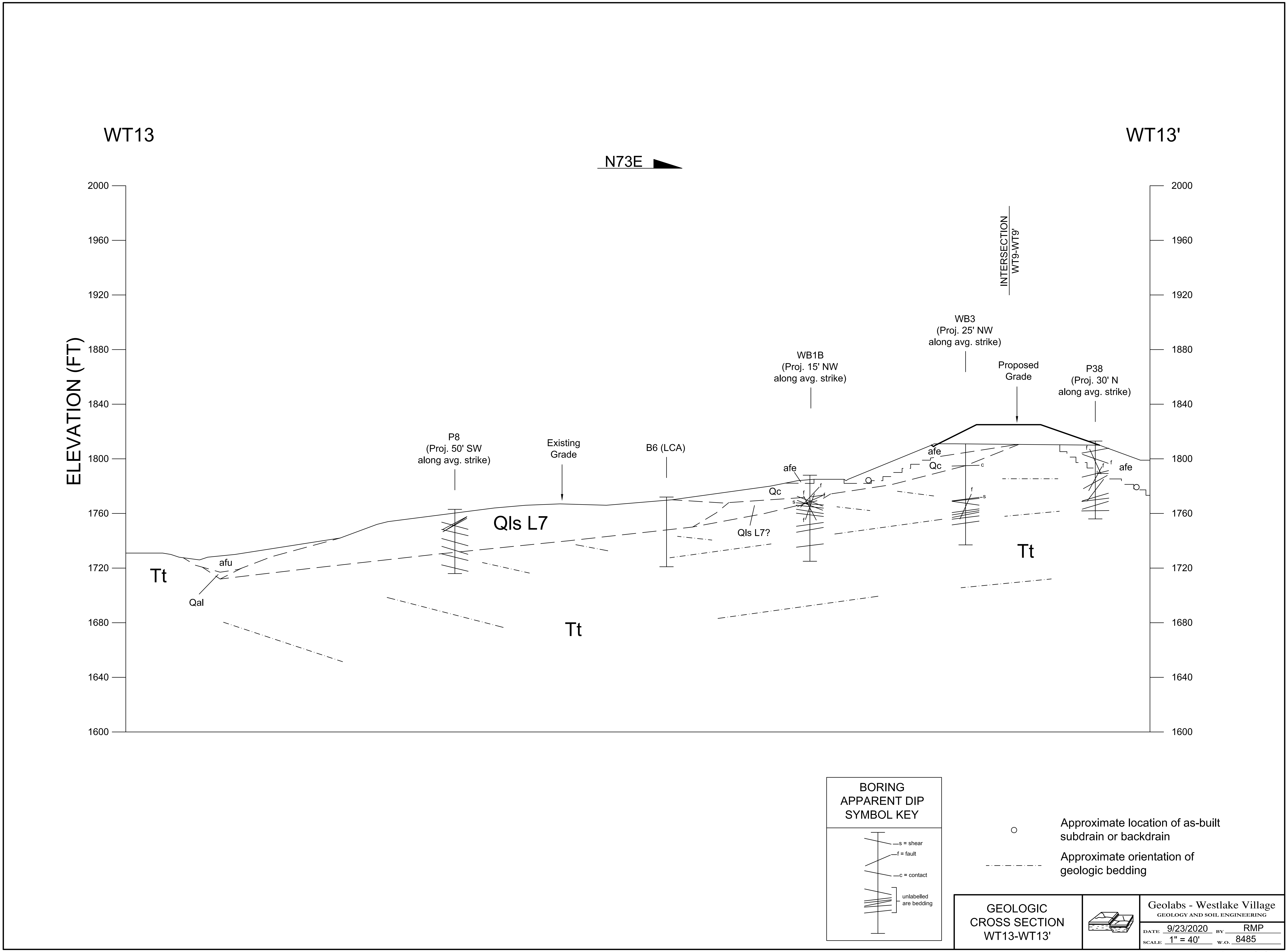
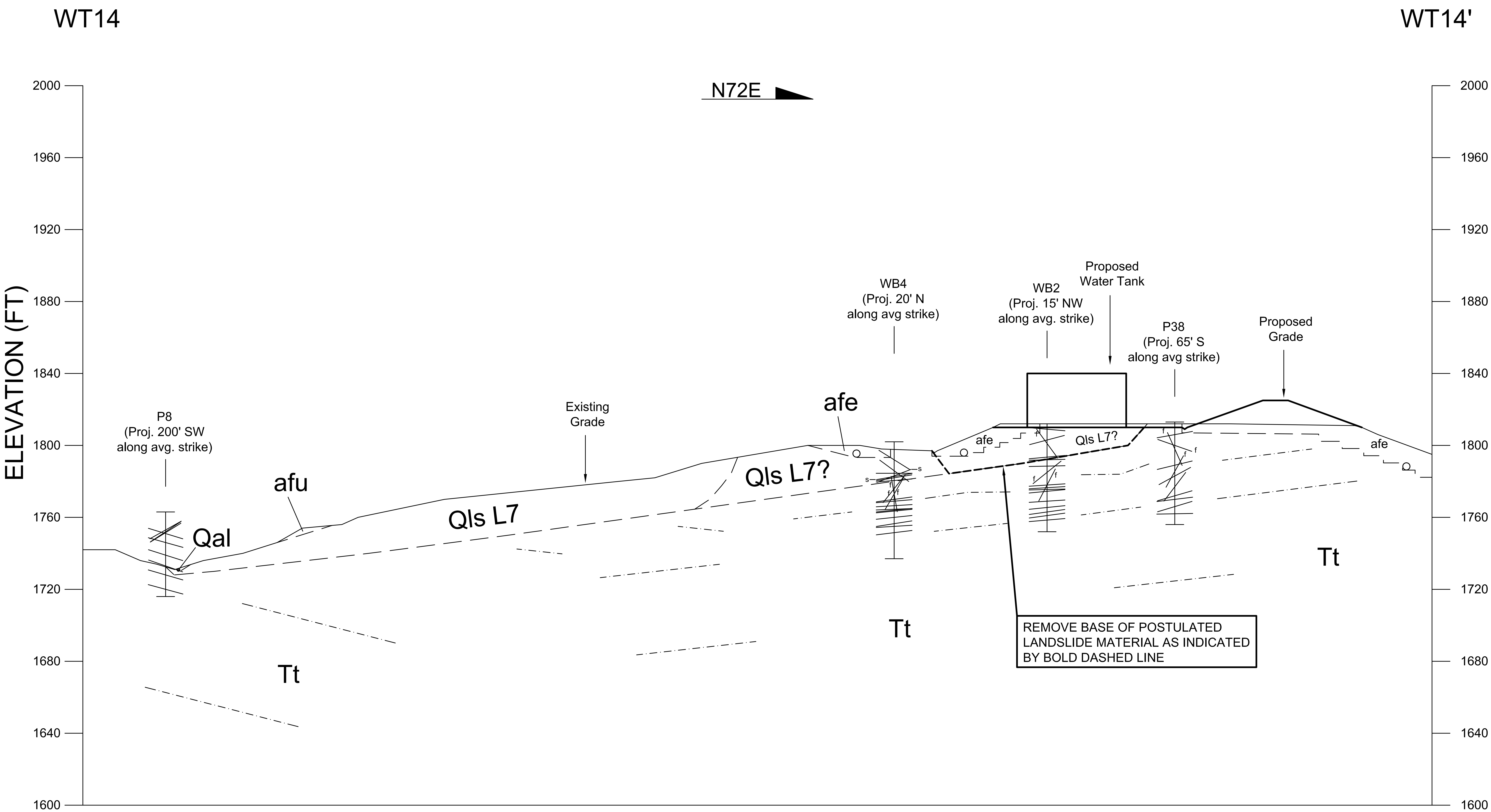
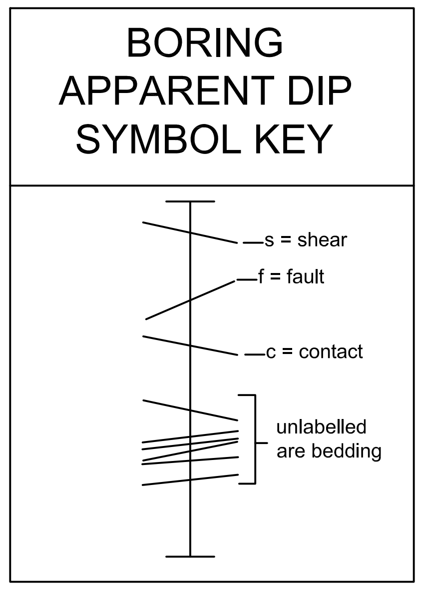

WT13
WT13'
N73E
ELEVATION (FT)
2000
1960
1920
1880
1840
1800
1760
1720
1680
1640
1600
INTERSECTION WT9-WT9'
WB3
(Proj. 25' NW
along avg. strike)
WB1B
(Proj. 15' NW
along avg. strike)
Proposed
Grade
P38
(Proj. 30' N
along avg. strike)
P8
(Proj. 50' SW
along avg. strike)
Existing
Grade
B6 (LCA)
afe
Qc
Qls L7
Qls L7?
Tt
afu
Qal
BORING
APPARENT DIP
SYMBOL KEY
s = shear
f = fault
c = contact
unlabelled
are bedding
Approximate location of as-built
subdrain or backdrain
Approximate orientation of
geologic bedding
GEOLOGIC
CROSS SECTION
WT13-WT13'
Geolabs - Westlake Village
GEOLOGY AND SOIL ENGINEERING
DATE 9/23/2020 BY RMP
SCALE 1" = 40' W.O. 8485

PLATE 2.2



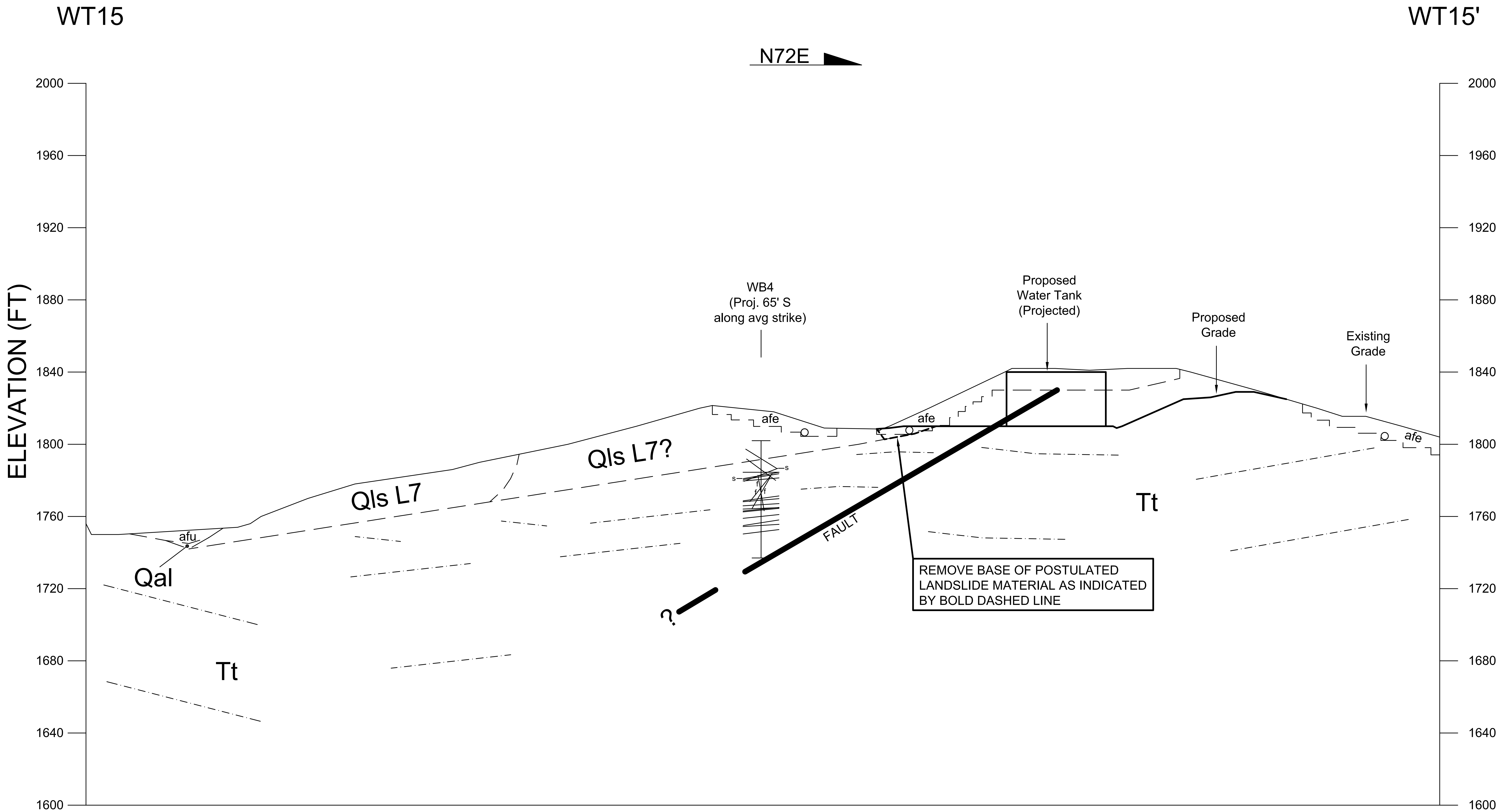


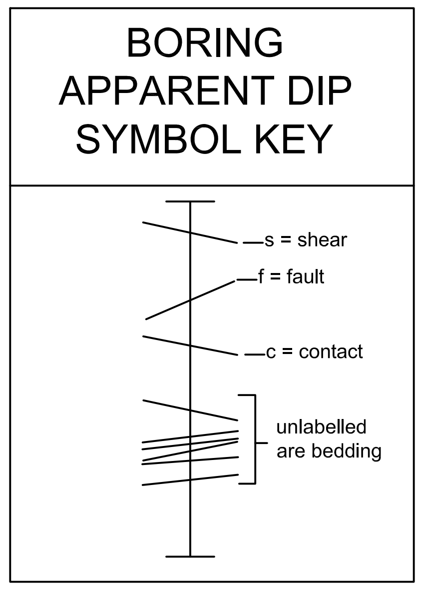
○ Approximate location of as-built subdrain or backdrain

— · — Approximate orientation of geologic bedding

GEOLOGIC CROSS SECTION WT14-WT14'	Geolabs - Westlake Village GEOLOGY AND SOIL ENGINEERING DATE 9/23/2020 BY RMP SCALE 1" = 40' W.O. 8485

PLATE 2.3



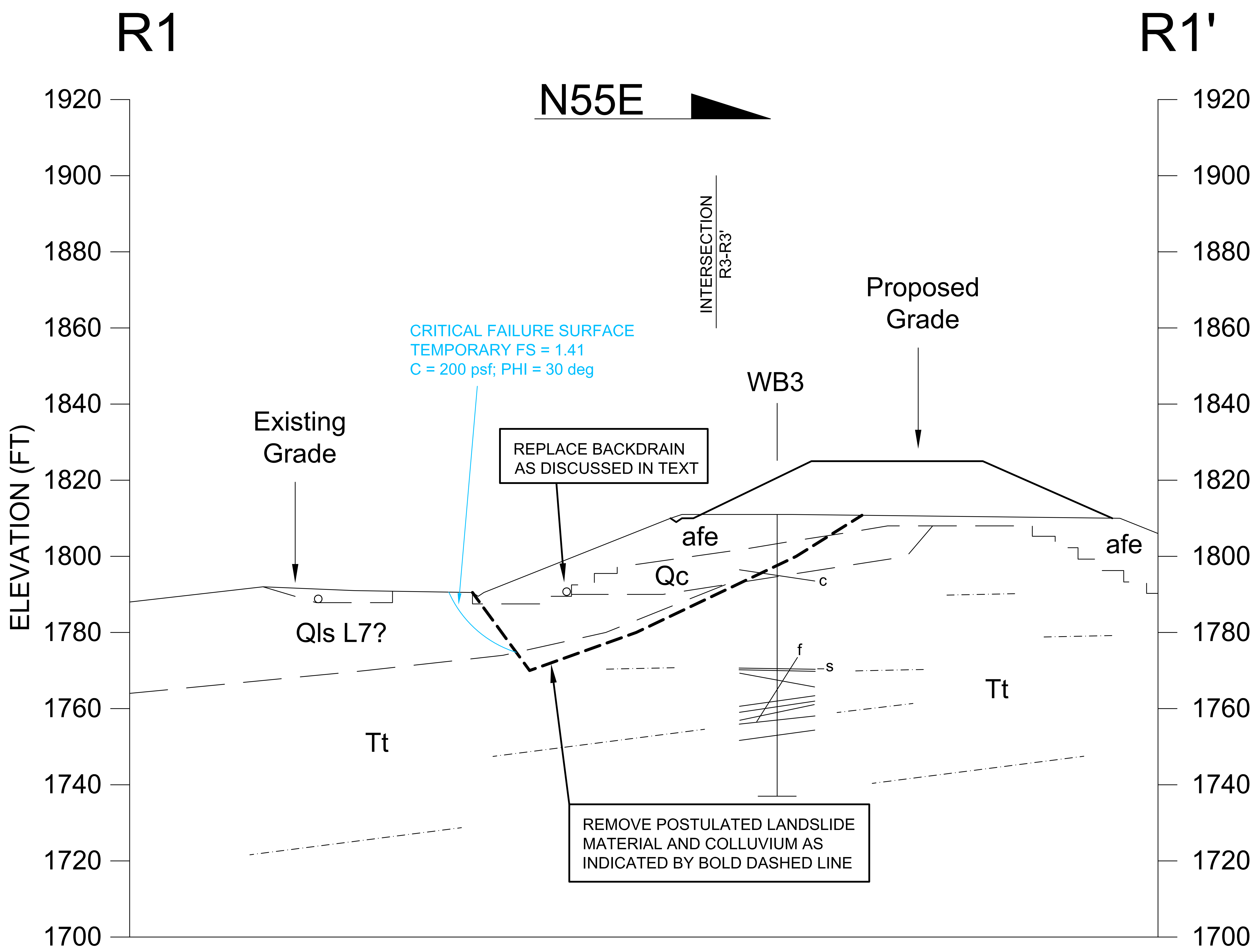


○ Approximate location of as-built subdrain or backdrain

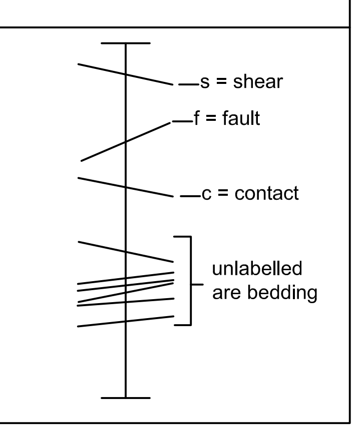
-·- Approximate orientation of geologic bedding

GEOLOGIC CROSS SECTION WT15-WT15'	Geolabs - Westlake Village GEOLOGY AND SOIL ENGINEERING DATE 9/23/2020 BY RMP SCALE 1" = 40' W.O. 8485

PLATE 2.4



BORING APPARENT DIP SYMBOL KEY



Approximate location of as-built subdrain or backdrain

Approximate orientation of geologic bedding

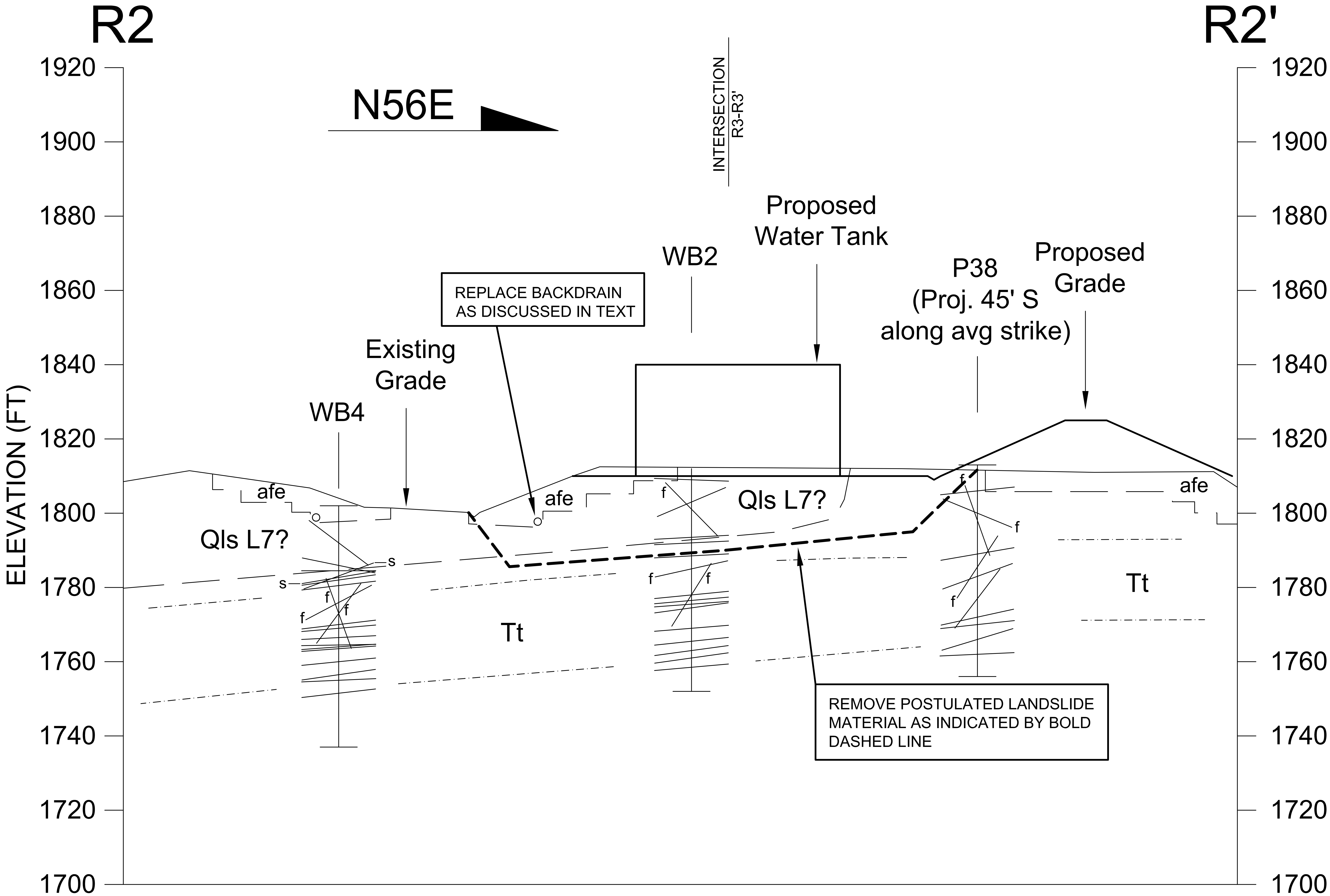
GEOLOGIC CROSS SECTION R1-R1'

Geolabs - Westlake Village
GEOLOGY AND SOIL ENGINEERING

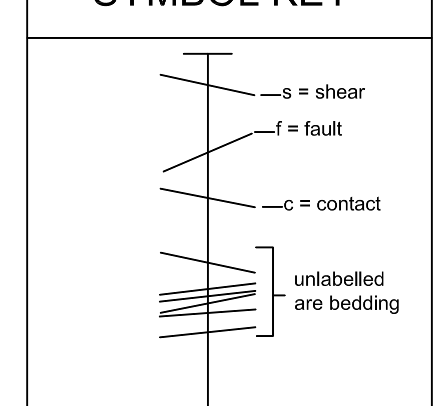
DATE 9/23/2020 BY SR
SCALE 1" = 20' W.O. 8485

PLATE 2.5

P:\8485 FairOaks\Phase 3B East Side 52833\Water Tank 2020\Cross Sections.dwg | R1



BORING APPARENT DIP SYMBOL KEY



Approximate location of as-built subdrain or backdrain

Approximate orientation of geologic bedding

P:\8485 FairOaks\Phase 3B East Side 52833\Water Tank 2020\Cross Sections.dwg | R2

GEOLOGIC CROSS SECTION R2-R2'	Geolabs - Westlake Village GEOLOGY AND SOIL ENGINEERING DATE 9/23/2020 BY SR SCALE 1" = 20' W.O. 8485

PLATE 2.6

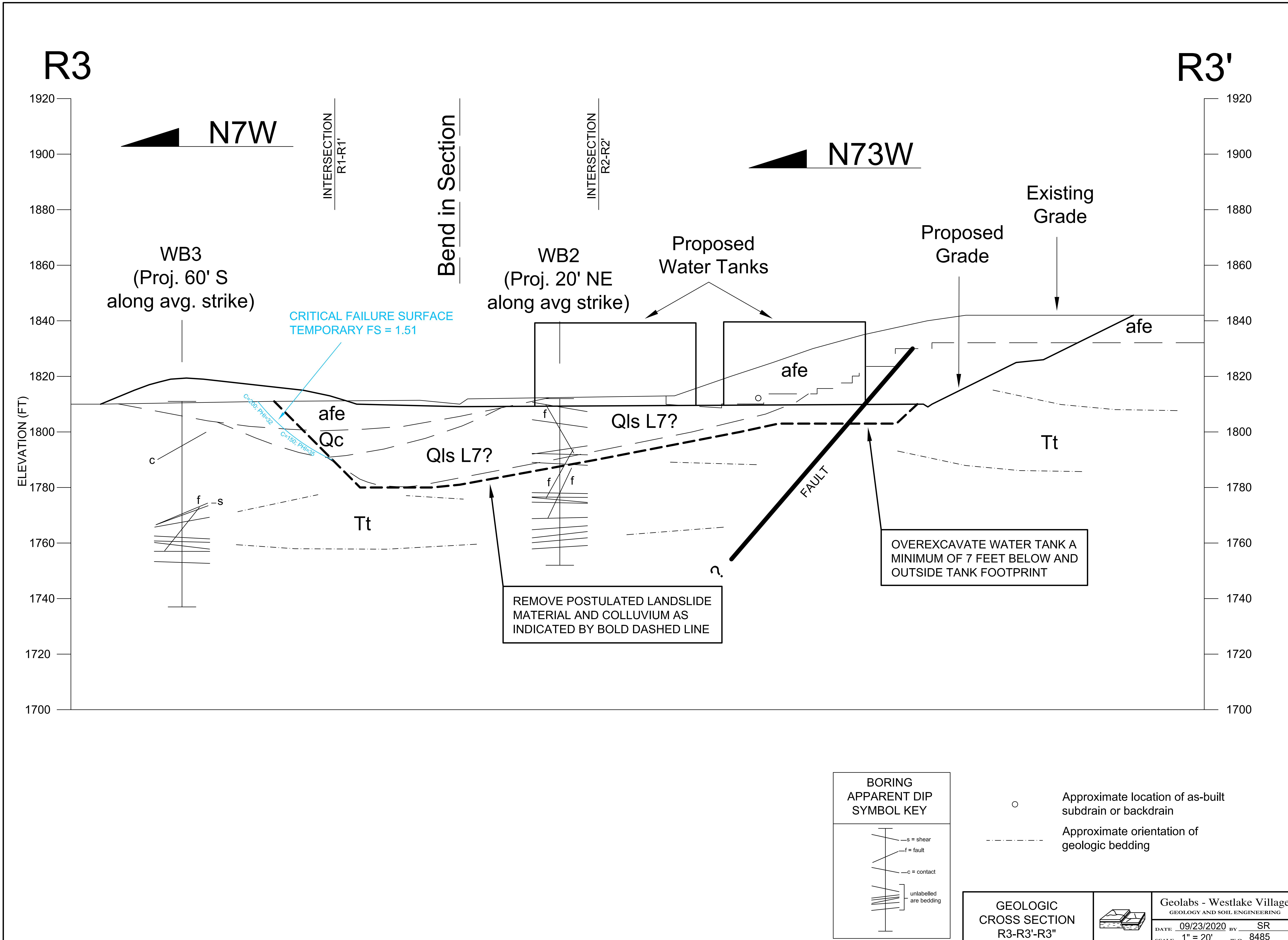
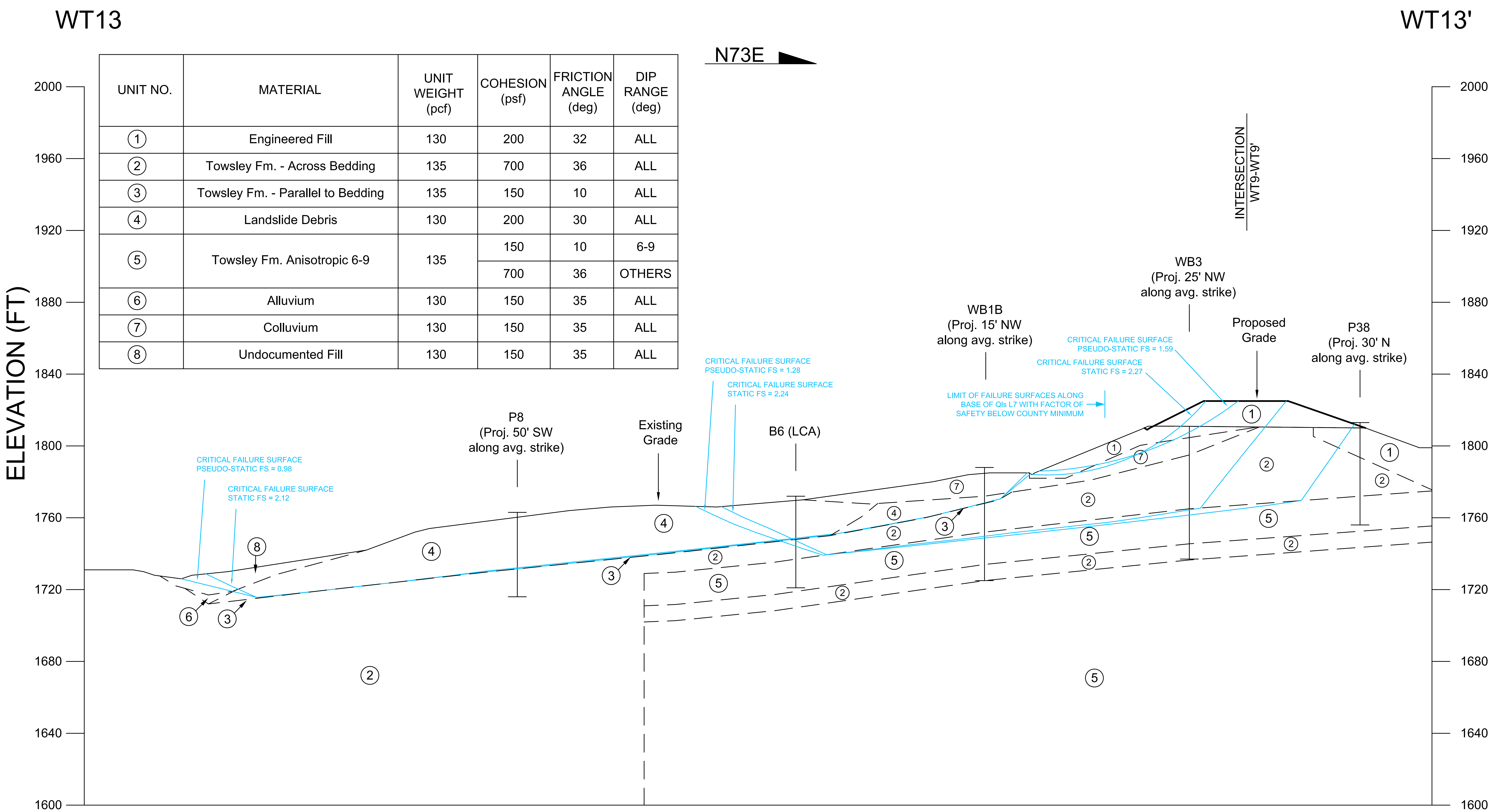

R3
R3'
N7W
N73W
INTERSECTION R1-R1'
Bend in Section
INTERSECTION R2-R2'
WB3 (Proj. 60' S along avg. strike)
WB2 (Proj. 20' NE along avg strike)
Proposed Water Tanks
Proposed Grade
Existing Grade
CRITICAL FAILURE SURFACE
TEMPORARY FS = 1.51
afe
Qc
Qls L7?
Tt
FAULT
ELEVATION (FT)
1920
1900
1880
1860
1840
1820
1800
1780
1760
1740
1720
1700
REMOVE POSTULATED LANDSLIDE MATERIAL AND COLLUVIUM AS INDICATED BY BOLD DASHED LINE
OVEREXCAVATE WATER TANK A MINIMUM OF 7 FEET BELOW AND OUTSIDE TANK FOOTPRINT
BORING APPARENT DIP SYMBOL KEY
s = shear
f = fault
c = contact
unlabelled are bedding
Approximate location of as-built subdrain or backdrain
Approximate orientation of geologic bedding
GEOLOGIC CROSS SECTION R3-R3'-R3"
Geolabs - Westlake Village
GEOLOGY AND SOIL ENGINEERING
DATE 09/23/2020 BY SR
SCALE 1" = 20' W.O. 8485
P:\8485 FairOaks\Phase 3B East Side 52833\Water Tank 2020\Cross Sections.dwg | R3

PLATE 2.7

UNIT NO.	MATERIAL	UNIT WEIGHT (pcf)	COHESION (psf)	FRICTION ANGLE (deg)	DIP RANGE (deg)
1	Engineered Fill	130	200	32	ALL
2	Towsley Fm. - Across Bedding	135	700	36	ALL
3	Towsley Fm. - Parallel to Bedding	135	150	10	ALL
4	Landslide Debris	130	200	30	ALL
5	Towsley Fm. Anisotropic 6-9	135	150	10	6-9
			700	36	OTHERS
6	Alluvium	130	150	35	ALL
7	Colluvium	130	150	35	ALL
8	Undocumented Fill	130	150	35	ALL



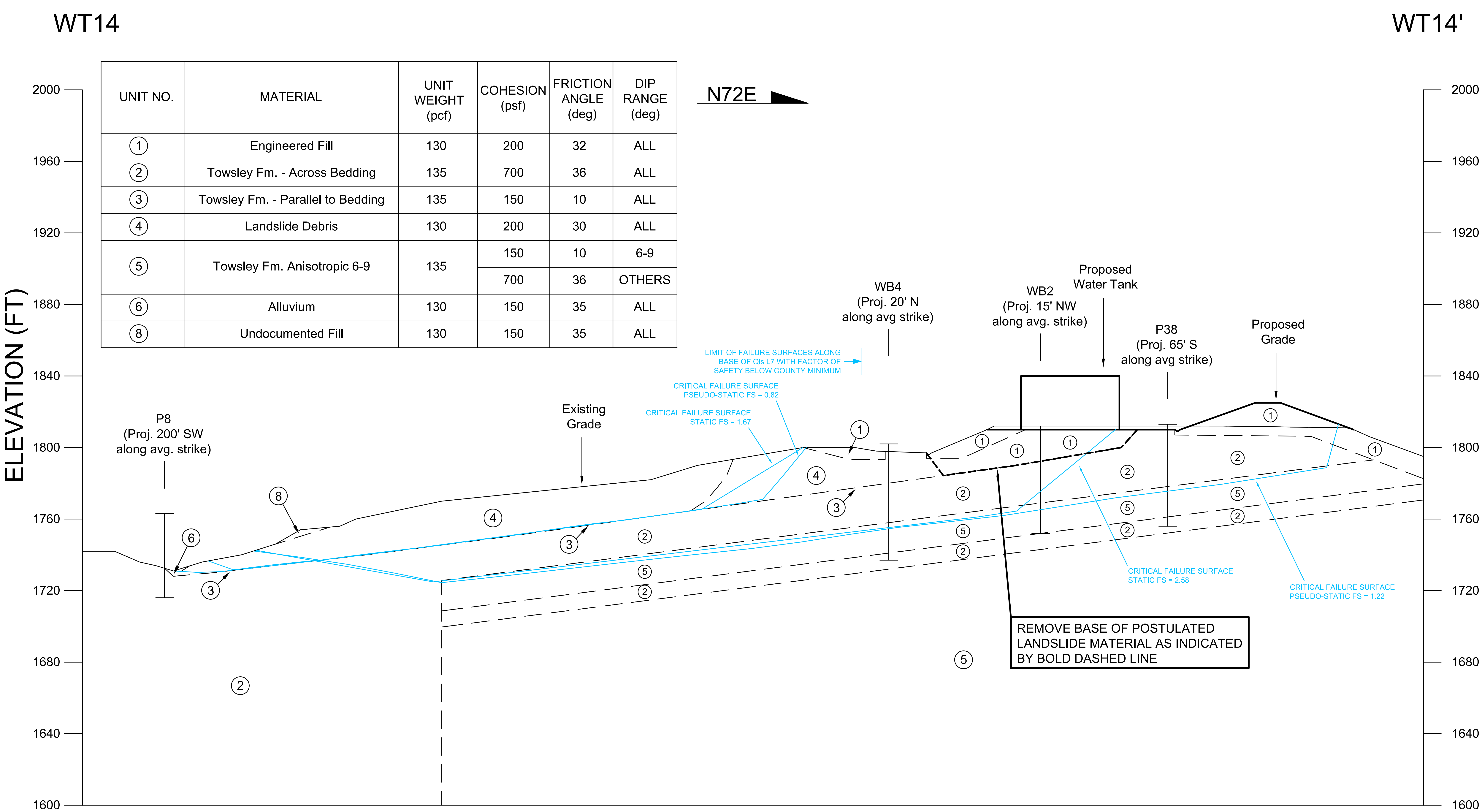
GEOTECHNICAL CROSS SECTION WT13-WT13'

Geolabs - Westlake Village
GEOLOGY AND SOIL ENGINEERING

DATE 9/23/2020 BY RMP
SCALE 1" = 40' W.O. 8485

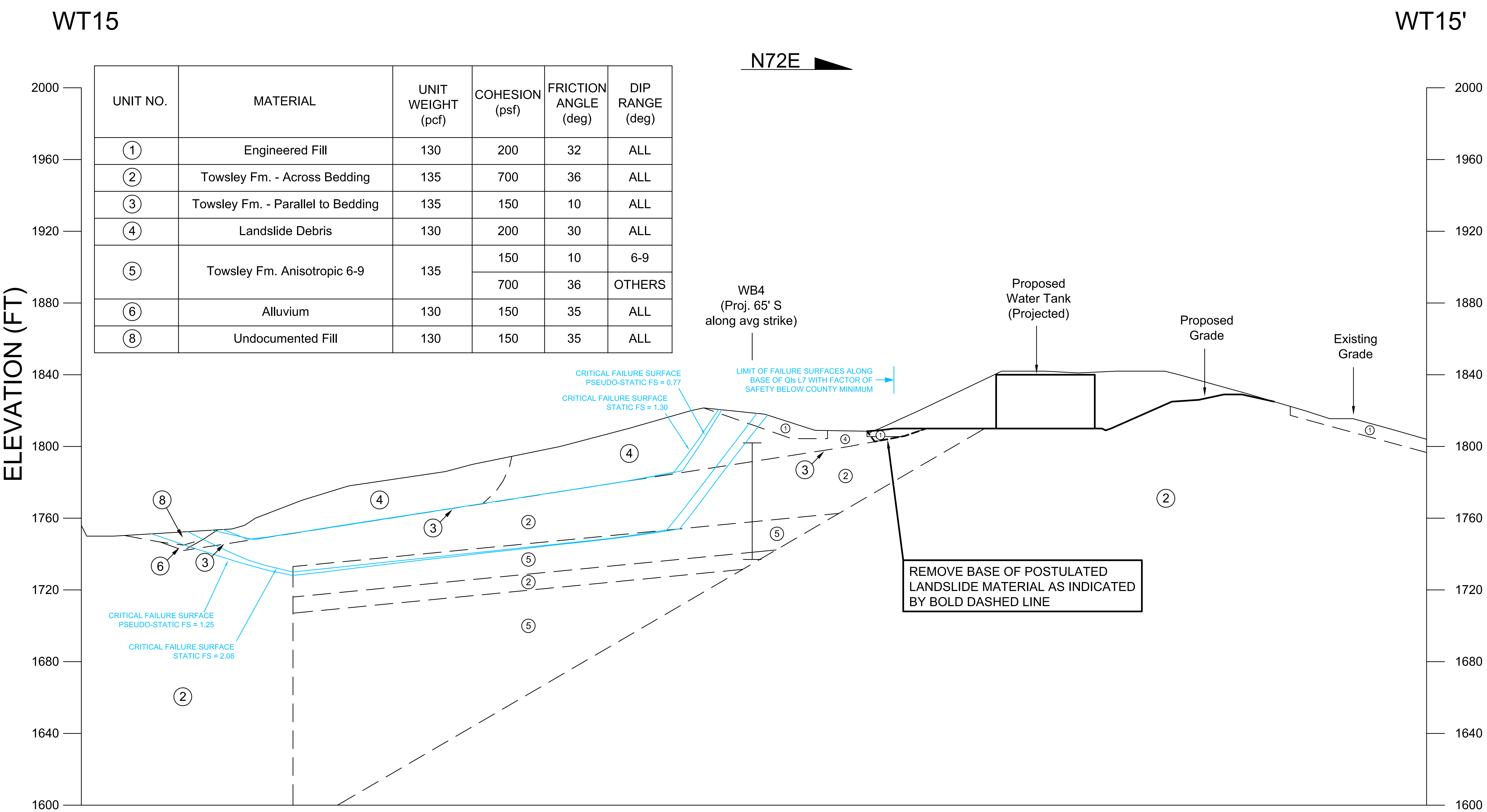
PLATE 2.2E

UNIT NO.	MATERIAL	UNIT WEIGHT (pcf)	COHESION (psf)	FRICTION ANGLE (deg)	DIP RANGE (deg)
1	Engineered Fill	130	200	32	ALL
2	Towsley Fm. - Across Bedding	135	700	36	ALL
3	Towsley Fm. - Parallel to Bedding	135	150	10	ALL
4	Landslide Debris	130	200	30	ALL
5	Towsley Fm. Anisotropic 6-9	135	150	10	6-9
			700	36	OTHERS
6	Alluvium	130	150	35	ALL
8	Undocumented Fill	130	150	35	ALL



GEOTECHNICAL CROSS SECTION WT14-WT14'		Geolabs - Westlake Village GEOLOGY AND SOIL ENGINEERING DATE 9/23/2020 BY RMP SCALE 1" = 40' W.O. 8485

PLATE 2.3E



UNIT NO.	MATERIAL	UNIT WEIGHT (pcf)	COHESION (psf)	FRICTION ANGLE (deg)	DIP RANGE (deg)
1	Engineered Fill	130	200	32	ALL
2	Towsley Fm. - Across Bedding	135	700	36	ALL
3	Towsley Fm. - Parallel to Bedding	135	150	10	ALL
4	Landslide Debris	130	200	30	ALL
5	Towsley Fm. Anisotropic 6-9	135	150	10	6-9
			700	36	OTHERS
6	Alluvium	130	150	35	ALL
8	Undocumented Fill	130	150	35	ALL

GEOTECHNICAL
CROSS SECTION
WT15-WT15'

Geolabs - Westlake Village
GEOLOGY AND SOIL ENGINEERING

DATE 9/23/2020 BY RMP
SCALE 1" = 40' W.O. 8485

PLATE 2.4E

APPENDIX A

Excavation Logs

October 30, 2020

W.O. 8485

Boring Logs by GWV

BORING	DATE EXCAVATED	GROUND SURFACE ELEVATION (feet above mean sea level)	TOTAL DEPTH (feet)
WB1A	6/15/2020	1788	18.5
WB1B	6/15/2020	1788	63
WB2	6/16/2020	1812.5	60
WB3	6/17/2020	1811	74
WB4	6/18/2020	1802	65
WB5	6/19/2020	1814	30
P1	10/26/1998	1768	68
P4	10/28/1998	1710	36
P7	11/30/1998	1705	45
P8	12/1/1998	1766	47
P9	12/8/1998	1860	65
P34	5/12/1999	1790	73
P35	5/14/1999	1789	65
P36	5/18/1999	1855	75
P37	5/18/1999	1865	57
P38	5/20/1999	1806	57

CLIENT: SCVWA	PROJECT: Recycled water tank	W.O.: 8485
LOCATION: Lot 95	ELEVATION: 1788 ± 0.5 feet	DATE: 6/15/20
RIG TYPE: 24" LoDril	HAMMER WEIGHTS: Kelly Bar	DROP: ~12"

Depth	N	U	B	M	DD	DESCRIPTION	ATTITUDES
0						0 - 3.5' - Artificial Fill: Yellowish brown silty fine to coarse SAND with 10-25% gravel and cobbles, moist.	
						3.5 - 10' - Colluvium: Brown to dark brown silty SAND with clay and gravel, highly weathered, pores up to ⅛" in diameter below 4 feet, vertical irregular fractures infilled with dark brown soil, increase in pores and vertical root casts in infill.	
5	10	C		8.9	107.4		
						7' - Discontinuous blocks of yellowish brown gravelly SANDSTONE and orange silty fine SANDSTONE bounded by soil infilled fractures.	
10						10' - Very dark brown clayey gravel with SAND on north, adjacent to 10 - 18.5' - Landslide Debris (?): mottled light gray and orangish brown slightly silty fine SANDSTONE on south. 10' - SAMPLE: interlaminated brown SILTSTONE and gray fine SANDSTONE, sparse orange oxidation along sandy lamimantions. 12' - Very dark brown gravel with cobbles, silty sand matrix.	
15							@15' - Fracture (N40W/75 SW) exit
20						Total Depth = 18.5' - Refusal on boulder No groundwater No caving	

ADDITIONAL COMMENTS:

@17-18.5': switch to core barrel

CLIENT: SCVWA	PROJECT: Recycled water tank	W.O.: 8485
LOCATION: Lot 95	ELEVATION: 1788 ± 0.5 feet	DATE: 6/15/20
RIG TYPE: 24" LoDril	HAMMER WEIGHTS: Kelly Bar	DROP: ~12"

Depth	N	U	B	M	DD	DESCRIPTION	ATTITUDES
0						0-4' - <u>Artificial Fill:</u> Yellowish brown silty fine to coarse SAND with 10-25% gravel and up to 6" cobbles, moist.	
						4-16' - <u>Colluvium:</u> Brown clayey fine to coarse SAND with 10-25% gravel and cobbles, medium dense, moist, massive, structureless, pinhole to ¼" pores	
5						and subvertical root casts common.	
						8' - Block of yellowish brown silty fine SANDSTONE in west wall of borehole, massive, weathers orange.	
10							
						11.5' - Another block of sandstone truncated by contact to structureless dark brown clayey SAND with gravel.	
15							
						16-21' - <u>Landslide Debris</u> (?): Pale brown gravelly SANDSTONE with silt, 20-30% clasts, massive, friable.	@16' C (N50W/52 SW)
						19' - Approximate bedding on discontinuous orange weathered zone in pale brown silty fine to medium SANDSTONE, black mineral laminations common	@19' Approx. B
20	12	C		8.1	120.4	but offset up to 2 inches by numerous randomly oriented faults, upper contact of this bed offset 14" by normal fault. 20' - SAMPLE: Yellowish brown silty fine to medium SANDSTONE.	(N40E/35 SE) @19' F (N60E/63 NW)

ADDITIONAL COMMENTS:

SUBSURFACE DATA LOG OF BORING WB1B

CLIENT:	SCVWA	PROJECT: Recycled water tank	W.O.: 8485
LOCATION:	Lot 95	ELEVATION: 1788 ± 0.5 feet	DATE: 6/15/20
RIG TYPE:	24" LoDril	HAMMER WEIGHTS: Kelly Bar	DROP: ~12"

	N	U	B	M	DD	DESCRIPTION	ATTITUDES
20							
			X			21' - Landslide Plane (?): ⅛" thick brown clay, soft, plastic, carbonate staining and nodules common along clay bed.	@21' S (N57E/16 SE)
						21'-63' - Towsley Formation:	
						21'-36' Interbedded SANDSTONE and SILTSTONE: sandstone pale brown, silty, fine-grained, dark mineral laminations offset up to 2" by numerous randomly oriented faults; siltstone gray and massive with randomly oriented discountinuous weak surfaces (likely from same type of minor faulting as in the sandstones).	@22' - Approx. B (N/22 E) @23' Approx. C (N60E/26 SE) @23' F (N25W/71 SW)
25						23' - Sharp scoured contact at base of sandstone, ⅛" thick rusty red oxidation staining on contact surface.	@24' F (N35E/72 SE)
						23' - Contact offset 5" in normal direction by fault.	
						24' - 8" thick SANDTONE bed, truncated and thinned by fault with 8" normal offset.	@26.5' Approx. B (N55E/27 SE)
						26.5' - Approximate bedding on dark mineral laminations in 6" thick SANDSTONE bed, lenticular, discontinuous, very moist, light gray.	
						29' - Approximate bedding on base of 1-3" thick orange SANDSTONE bed, offset several times by small faults.	@29' Approx. B (N46E/15 SE)
30	15	C		19.3	110.4	30' - SAMPLE: Gray sandy SILTSTONE, weathered olive brown in matrix, or orange along pervasive fractures, slightly plastic, moist.	
						31' - Sidewall weeping water along fractures and shattered cemented nodule on North wall.	
35							
						36-63' - Unoxidized SILTSTONE, dark gray, very hard, massive, indurated.	@36' C (N20W/8 SW)
40	20	C		16.4	112.7	40' - SAMPLE: Olive gray and dark gray SILTSTONE with sparse light gray fine sand laminations, coarse sand sized shell (gastropod?) fragments and lenticular compacted burrows infilled with sand, indurated.	@40 B (N21W/10 SW)
						40' - Bedding on ½-1" thick band of cemented siltstone, cementation laterally discontinuous.	

ADDITIONAL COMMENTS:

CLIENT:	SCVWA	PROJECT: Recycled water tank	W.O.: 8485
LOCATION:	Lot 95	ELEVATION: 1788 ± 0.5 feet	DATE: 6/15/20
RIG TYPE:	24" LoDril	HAMMER WEIGHTS: Kelly Bar	DROP: ~12"

	N	U	B	M	DD	DESCRIPTION	ATTITUDES
40							
45							
50	28	C		12.5	111.9	50' SAMPLE: Gray fine sandy SILTSTONE, massive, indurated.	
						51.5' - Bedding on 1" thick band of siltstone with light gray sandy laminations.	@51.5' B (N17W/7 SW)
						54' - Lighter gray very silty fine SANDSTONE.	
55							
60	28	C		10.0	103.6	60' - SAMPLE: Thoroughly mottled gray and light gray very sandy SILTSTONE, to silty fine SANDSTONE, massive. 60.5-61' - Cemented zone, hard drilling	
						62' - Sparse rounded gravel in light gray SANDSTONE.	

ADDITIONAL COMMENTS: Total Depth = 63'
Seep @ 31'
No caving

CLIENT: SCVWA	PROJECT: Recycled Water Tank	W.O.: 8485
LOCATION: Lot 95	ELEVATION: 1812.5 ± 0.5 feet	DATE: 6/16/20
RIG TYPE: 24" LoDril	HAMMER WEIGHTS: Kelly Bar	DROP: ~12"

Depth	N	U	B	M	DD	DESCRIPTION	ATTITUDES
0			X			0-18.5' - <u>Landslide Debris</u> (?):	
			X			0-2.5' - Brown to yellowish brown silty to clayey fine to coarse SANDSTONE	
			X			with 10-20% gravel and cobbles, massive, highly weathered, rootlets common,	
			X			some loosely infilled rodent burrows.	
						2.5-5' - Interbedded pale brown to yellowish brown silty fine to medium	
						SANDSTONE, orange oxidation stains, semi friable; and brown to tan SILTSTONE,	
						massive; beds less than 1 foot thick, continuity disrupted by rodent burrows.	
						3' - Slightly scoured contact at base of sandstone.	@3' C
						4' - Contacts broken and difficult to follow, abundant subvertical fractures	(N45E/11 SE)
						lined with carbonate and rootlets.	
5						5-15' - Gray SILTSTONE, abundant orange oxidation staining and subvertical	
						carbonate and root-lined fractures, massive, rock appears shattered, firm.	
							@9' Approx. C
						9' - Approximate contact on top of 10" thick sandstone interbed, pale brown,	(N85W/34 SW)
						silty, fine to medium-grained, oxidized contacts, tiger strip oxidation near base	
10						offset up to 1 inch by numerous randomly oriented faults, upper contact	
						disrupted by fault at 11'.	@11' Approx. F
	10	C		22.7	105.2	11' - SAMPLE: interbedded tan clayey SILTSTONE, plastic; and yellowish brown	(N20E/60 SE)
						to orangish brown silty fine to medium SANDSTONE.	
15						15-18.5' - Gray SILTSTONE, less weathered, less shattered, stiff, still has	
						pervasive orange oxidation staining along fractures and burrows.	
						18.5-60' - <u>Towsley Formation:</u>	
						18.5-40' - Interbedded SILTSTONE and SANDSTONE: siltstone is gray to olive	@18.5' B
20						brown with orange oxidation stains, massive, hard; sandstone yellowish brown,	(N36E/9 NW)
						silty, fine to medium grained.	
						18.5' - First continuous bedding of boring on 1" thick band of clay and silt	
						laminations (slide plane?)	

ADDITIONAL COMMENTS:

CLIENT: SCVWA	PROJECT: Recycled Water Tank	W.O.: 8485
LOCATION: Lot 95	ELEVATION: 1812.5 ±0.5 feet	DATE: 6/16/20
RIG TYPE: 24" LoDril	HAMMER WEIGHTS: Kelly Bar	DROP: ~12"

	N	U	B	M	DD	DESCRIPTION	ATTITUDES
20	11	C		21.2	105.1	19.5-20.5' - Slow seeps from multiple less than 1" thick fine sandstone interbeds. 20' - SAMPLE: Gray clayey SILTSTONE with fine sand, slightly plastic, pervasive orange weathering.	@20'B (N90E/5 S)
						23.5' - Bedding on 2" thick band of olive brown siltstone with haloed white sand stringers over 1" thick unoxidized massive blue siltstone bed.	@23.5' B (N82E/7 SE)
25							
						27' - Fault offsets siltstone beds, 4" normal sense of motion.	@27' F (N50E/65 NW) exit
30	15	C		18.3	107.0	30' - SAMPLE: unoxidized dark blue gray SILTSTONE, hard, massive, indurated.	
						34' - Fault offsets 4" thick yellowish brown silty fine sandstone bed; 6" normal sense of motion.	@34' F (N8E/65 W) @34' Approx. B (N80W/8 SW)
35							
						35.5' - Bedding on orange rind at top of 12" thick sandstone bed.	@35.5' B (N77W/7 SW)
						36.5' - Bedding on 1" thick sandstone.	@36.5' B (N79E/11 SE)
						37.5' - Bedding at top of 10" thick sandstone.	@37.5' B (N79W/11 SW)
40	26	C		17.6	108.9	40-60' - Unoxidized SILTSTONE with sandstone interbeds, very hard. 40' - SAMPLE: Unoxidized dark blue gray SILTSTONE, indurated, massive, ⅛" thick steep gypsum-lined fracture in shoe.	

ADDITIONAL COMMENTS:

CLIENT: SCVWA	PROJECT: Recycled Water Tank	W.O.: 8485
LOCATION: Lot 95	ELEVATION: 1812.5 ±0.5 feet	DATE: 6/16/20
RIG TYPE: 24" LoDril	HAMMER WEIGHTS: Kelly Bar	DROP: ~12"

	N	U	B	M	DD	DESCRIPTION	ATTITUDES
40							
						43' - 3" thick sandstone over 1" siltstone over 1" sandstone.	@43' B (N58W/5 SW)
						44-46.5' - Thinly interbedded siltstone and sandstone, beds less than 5" thick.	@44' B (N30W/6 SW)
45							
						49' - ½" thick band of fine sand laminations.	@49' B (N19W/8 SW)
50	27	C		15.5	111.3	50' SAMPLE: Dark blue gray SILTSTONE with fine sand, massive, indurated.	
						51' - ½" thick Siltstone interbed near base of sandstone section from 50-51.	@51' B (N34W/8 SW)
						53.5' - 1" thick band of sandy laminations.	@53.5' B (N29W/5SW)
55			X				
60	31	C		15.5	106.1	60' SAMPLE: same as 50'	
						Total Depth = 60' Seep @ 19.5' No caving	

ADDITIONAL COMMENTS:

CLIENT: SCVWA	PROJECT: Recycled Water Tank	W.O.: 8485
LOCATION: Lot 95	ELEVATION: 1811 ± 0.5 feet	DATE: 6/17/20
RIG TYPE: 24" LoDril	HAMMER WEIGHTS: Kelly Bar	DROP: ~12"

Depth	N	U	B	M	DD	DESCRIPTION	ATTITUDES
0						0-4' - Artificial Fill: Distinct lifts of yellowish brown and dark brown silty fine to coarse SAND with gravel and cobbles, dense, dry in upper 2.5', 3-6" thick lifts except upper 1.5 feet which is all uniform.	
						4-16' - Colluvium: Uniform dark brown silty to clayey SAND with 10-20% gravel and cobbles, loose, dry, abundant rootlets.	
5							
						6' - More clay, stiff, moist, some pinhole pores and 1/16" root casts, some roothairs, very weak clay films, crude subangular blocky ped structure.	
10	11	C		5.4	102.9	10' SAMPLE: Brown to dark brown silty SAND.	
						12' - Very little clay, more friable, color lightens to brown.	
						13.5' - More clasts 20-30%, random pockets of yellowish brown silty SAND with gravel and cobbles, and dark brown completely weathered silty SAND with gravel, one void infilled with loose sand grains.	
15							
						16-74' - Towsley Formation: 16-40.5' - Light gray SILTSTONE, rock is shattered with pervasive orange red and black oxidation stains on fracture surfaces and extending out into rock mass, massive, very stiff; upper contact sharp and irregular, moderately to highly weathered.	@16' C (N70E/30 NW)
20	6	C		14.5	108.8	20' SAMPLE: Light gray to olive brown fine sandy SILTSTONE, highly weathered, moist.	

ADDITIONAL COMMENTS:

CLIENT: SCVWA	PROJECT: Recycled Water Tank	W.O.: 8485
LOCATION: Lot 95	ELEVATION: 1811 ± 0.5 feet	DATE: 6/17/20
RIG TYPE: 24" LoDril	HAMMER WEIGHTS: Kelly Bar	DROP: ~12"

	N	U	B	M	DD	DESCRIPTION	ATTITUDES
20							
						24' - Two subrounded quartzite cobbles floating in siltstone (dropstone?)	
25							
						28' - Cobble sized nodule of well cemented material.	
						29.5-30' - Sandier	
30	18	C		14.0	112.9	30' SAMPLE: same as 20', massive, moderately weathered.	
35						35' - Fewer fractures, rock slightly to moderately weathered.	
40	27	C		20.0	105.9	40' SAMPLE: Very dark gray SILTSTONE, massive, indurated, fresh except along fractures which are stained with orange oxidation; interbedded with yellowish brown silty fine SANDSTONE.	

ADDITIONAL COMMENTS:

CLIENT: SCVWA		PROJECT: Recycled Water Tank	W.O.: 8485
LOCATION: Lot 95		ELEVATION: 1811 ± 0.5 feet	DATE: 6/17/20
RIG TYPE: 24" LoDril		HAMMER WEIGHTS: Kelly Bar	DROP: ~12"

Depth	N	U	B	M	DD	DESCRIPTION	ATTITUDES
40			X			40.5-46' - Interbedded SILTSTONE and SANDSTONE; siltstone gray and massive, hard; sandstone silty and fine to medium grained, yellowish brown.	@40.5' S (N57E/25 NW) slicks (N74W/15)
						40.5' - Shear paper thin and parallel to underlying bedding, shear encountered at top of 1-2" thick band of laminated siltstone, slickensided.	
						41' - Bedding on 4" sandstone.	@41' B (N58E/22NW)
						43' - Sharp, scoured, wavy, oxidized contact along base of 4-8" thick sandstone.	
						43.5' - ¼" thick dark brown claystone bed, cornflaky, bed disrupted by inch scale fault and partially scoured out by overlying sandstone.	@43.5' Approx. B (N65W/12 NE)
45						44-45' - Discontinuous lenses of sandstone.	
						46-65.5 - Unoxidized SILTSTONE, very hard, massive, indurated with SANDSTONE interbeds.	@46' F (N20E/70 NW)
						46' - Fault offsets 3" thick SANDSTONE; 4" normal sense of motion.	
						49' - 1" thick sandstone bed	@49' B (N29W/8 SW)
50	26	C		17.6	110.3	50' SAMPLE: dark gray SILTSTONE with fine sand, indurated, massive, fresh, hard.	
						50.5' - ½" clayey SILTSTONE in 12" thick laminated sandstone.	@50.5' B (N16W/9 SW)
						52' - 2" thick band of sandy laminations.	@52' B (N41W/12 SW)
						54' - 1" thick band of sandy laminations.	@54' B (N8W/7 SW)
55							
						58' - 1" thick band of sandy laminations over sharp contact to ¼" thick dark gray fissile clay over silstone.	@58' B (N21W/8 SW)
60	31	C		15.5	108.7	60' SAMPLE: dark gray sandy SILTSTONE, massive, fresh.	

ADDITIONAL COMMENTS:

CLIENT: SCVWA	PROJECT: Recycled Water Tank	W.O.: 8485
LOCATION: Lot 95	ELEVATION: 1811 ± 0.5 feet	DATE: 6/17/20
RIG TYPE: 24" LoDril	HAMMER WEIGHTS: Kelly Bar	DROP: ~12"

Depth	N	U	B	M	DD	DESCRIPTION	ATTITUDES
60							
						63' - Cemented band with rounded fine gravel, hard drilling to 64'.	
65						65.5-74' - Grades to light gray very silty fine SANDSTONE, massive, 5% rounded fine gravel, sparse cobble sized cemented nodules.	
70						71-72' - Rock cemented, hard drilling.	
						74' - Rock cemented, hard drilling.	
75							
						Total Depth = 74' No groundwater	
80						No caving	

ADDITIONAL COMMENTS:

@65' began stemming

CLIENT: SCVWA	PROJECT: Recycled Water Tank	W.O.: 8485
LOCATION: Lot 95	ELEVATION: 1802 ± 1 feet	DATE: 6/18/20
RIG TYPE: 24" LoDril	HAMMER WEIGHTS: Kelly Bar	DROP: ~12"

	N	U	B	M	DD	DESCRIPTION	ATTITUDES
0						0' - Artificial Fill: Yellowish brown silty fine to coarse SAND with 20% gravel and cobbles, dense, moist to very moist.	
						4.5-19.3' - Landslide Debris (?):	
5						4.5-13' - Yellowish brown conglomerate with silty sand matrix, medium dense, very moist, moderately to highly weathered, easy to excavate, massive, clay rinds on clasts. 6' - Discontinuous lens of gray SILTSTONE, subhorizontal orientation, highly weathered, pervasive orange oxidation mottles, firm, plastic, moist, up to 4" thick; below this depth there are random frequent cobbled-sized pockets of brown silty sand with gravel, contacts with surrounding conglomerate are diffuse, no clay rinds on clasts in brown pockets.	
10	9	C		8.0	--	10' - Vague abrupt contact to discontinuous zone in west quadrant with orange oxidation bands.	@10' Approx. C (N60W/40 NE)
						13-16' - Brown silty SAND with gravel and cobbles, medium dense, massive, structureless, moist, base of unit is ¼"-1" thick gouge zone along contact at 16' that appears to be ground up grains of adjacent materials.	
15						16-19.3' - Silty fine to medium SANDSTONE: Yellow with orange oxidation common along discontinuous bedding, bedding truncated by contact at 16' and by internal channels within sandstone, material harder and less weathered than above contact at 16', micaceous. 17.5' - 4" thick clayey SILTSTONE, tan vague contacts, subhorizontal orientation. 18.9' - SHEAR: brown clay, ½-1" thick, highly plastic, polished and cornflaky, bends and merges with shear at 19.3; weak seep in sandstone six	@16' C (N50E/63 SE) exit @17.5' Approx. B horizontal @18.9' S (N20W/21 SW) @19.3' S (N16W/10SW)
20	12	C		18.2	109.8	inches above and between shears.	
						19.3-65' - Towsley Formation: 19.3' - Landslide plane: ¼" thick dark brown clay with entrained sand grains, soft, plastic, rock below shear is noticably harder.	

ADDITIONAL COMMENTS:

CLIENT: SCVWA	PROJECT: Recycled Water Tank	W.O.: 8485
LOCATION: Lot 95	ELEVATION: 1802 ± 1 feet	DATE: 6/18/20
RIG TYPE: 24" LoDril	HAMMER WEIGHTS: Kelly Bar	DROP: ~12"

	N	U	B	M	DD	DESCRIPTION	ATTITUDES
20						19.4-38.5' - SILTSTONE with frequent SANDSTONE interbeds: siltstone is gray	@20' Approx. B
						with orange oxidation mottles and bands, hard, massive to laminated and moist;	(N2E/10 NW)
						sandstone is silty and fine grained, massive, semifriable, and yellowish brown.	
						20' - SAMPLE: gray SILTSTONE with fine sand.	@21.5' B
						20' - Bedding on 2" thick band of laminated brown clayey siltstone.	(N75W/9 SW)
						21.5' - Two 1" thick beds of orange and tan oxidized fine sandstone.	
25							
						26' - FAULT: 2" wide band of orange oxidation within siltstone, offsets a	@26' F
						purplish bed 4" with normal sense of motion.	(N45E/70 NW)
						29' - FAULT: 5" normal offset of 3" thick orange sandstone interbed, weak	@29' F
						seep from sandstone, grades laterally to light gray.	(N15E/64 NW)
30	15	C		24.1	99.9	30' - SAMPLE: gray clayey SILTSTONE over very moist gray fine SANDSTONE.	@29' F
							(N42E/85 SE)
						32' - Bedding on base of 12" thick unoxidized sandstone interbed.	@32' B
							(N2W/8 W)
							@33' B
						33' - Bedding on top of 4" thick unoxidized sandstone bed.	(N28W/5 SW)
35							
						35.5' - Bedding on 1" thick band of laminated siltstone near base of 12" thick	@35.5' B
						oxidized orangish brown sandstone.	(N9E/4 W)
						37.5' - Bedding on 1" thick band of unoxidized sandstone in center of 14"	@37.5 B
						thick oxidized sandstone.	(N45E/6 NW)
						38' - Bedding on dark mineral lamination near bottom of oxidized sandstone.	@38' B
						38.5' - Bedding on 1" thick siltstone band in 6" thick unoxidized sandstone.	(N19E/7 NW)
						38.5-65' - Unoxidized.	@38.5' B
							(N19E/7 NW)
40	17	C		16.6	112.3	40' SAMPLE: dark gray silty very fine SANDSTONE and very sandy SILTSTONE.	
						40-50' - gastropod shell fragments	

ADDITIONAL COMMENTS:

CLIENT: SCVWA	PROJECT: Recycled Water Tank		W.O.: 8485
LOCATION: Lot 95	ELEVATION: 1802 ± 1 feet		DATE: 6/18/20
RIG TYPE: 24" LoDril	HAMMER WEIGHTS: Kelly Bar		DROP: ~12"

	N	U	B	M	DD	DESCRIPTION	ATTITUDES
40							
						42' - Bedding on 1" sandstone bed.	@42' B (N16W/6 SW)
						43' - 4" SANDSTONE bed.	
45							
						45.5' - 1" SANDSTONE bed over ¼" dark gray fissile claystone.	@45.5' B (N10W/9 W)
			X			47' - 1" thick to paper thin CLAYSTONE, dark gray, sheared, highly plastic, cemented tabular nodules common, bag sample obtained; overlying 6" thick sandstone is wet.	@47' S (N26E/5 NW)
50		C		13.8	110.9	50' - SAMPLE: bluish gray silty fine SANDSTONE over fine sandy SILTSTONE.	@50.5' B (N15W/7 W)
						50.5' - Bedding on ¼" thick cemented band in sandstone from 50-51.	
55							
						57' - 6" thick band of white sandstone laminations truncated by channel margin (?).	
60	25	C		14.8	112.1	60' - SAMPLE: bluish gray silty very fine SANDSTONE.	
						61-65' - Gray to light gray silty very fine SANDSTONE with <5% subrounded to rounded 4" cobbles.	

ADDITIONAL COMMENTS:
@50' harder drilling

TD = 65'
Seep @ 19, 29, 47
No caving

CLIENT:	SCVWA	PROJECT: Recycled Water Tank	W.O.: 8485
LOCATION:	Lot 95	ELEVATION: 1814 ± 1 feet	DATE: 6/19/20
RIG TYPE:	24" LoDril	HAMMER WEIGHTS: Kelly Bar	DROP: ~12"

	N	U	B	M	DD	DESCRIPTION	ATTITUDES
0						0' - <u>Artificial Fill:</u> Tan fine sandy SILT, stiff, moist.	
						1' - Six inch layers of yellowish brown silty SAND with 15% gravels and cobbles,	
						dense, moist.	
5						5-30' - <u>Towsley Formation:</u>	
						5-14' - SANDSTONE with SILTSTONE interbed; sandstone beds are yellowish	
						brown and pale brown with orange oxidation bands and splotches, medium	@7' C
						dense, semifriable, very moist to wet, contacts between units are sharp and	(N7E/56 E)
						slightly scoured, some are oxidized, moderately weathered.	@9' C
10	10	C		29.2	99.3	5' - Orange oxidation bands truncated by lower contact and offset up to 2"	(N/65 E)
						by numerous randomly oriented faults.	@10' C
						7' - Base of orange banded SANDSTONE exits borehole; some cobble sized mud	(N32W/35 NE)
						clasts .	@13' C
						9' - Contact to gravelly SANDSTONE, 20% clasts, weak seep in lower 3 inches.	(N28E/40 SE)
15						10' - SILTSTONE interbed; brown to light gray, clayey, plastic, moist,	@14' C
						pervasive orange oxidation mottles.	(N25E/45 SE)
						10' SAMPLE: Olive brown SILTSTONE in upper rings over yellow brown	
						SANDSTONE in tip, sandstone very moist.	
						13' - Sharp contact to gravelly SANDSTONE 20-30% clasts, wet, strong seep	
20	14	C		17.9	112.2	causing sands to run and saturating material caked to borehole wall by auger,	
						drill cake sloughing off during downhole log.	
						14-18' - SILTSTONE: Gray, massive, indurated, pervasive orange oxidation	
						mottles, slightly scoured and dark reddish brown oxidized upper contact,	
						moist, slightly weathered.	
25						18-30' - Unoxidized SILTSTONE with SANDSTONE interbed; dark gray, massive,	@25' Approx. C
						indurated, hard, sparse gastropod shell fragments, fresh.	(N35E/35 SE)
						20' - SAMPLE:Dark gray SILTSTONE with lighter sandy laminations.	
						25' - Silty fine to medium SANDSTONE interbed: two feet thick, light gray,	
						massive, friable, moist to very moist, dense.	
30	18	C		20.5	107.6	30' - SAMPLE: dark gray SILTSTONE, massive, indurated, sparse gastropod	
						shell fragments (coarse sand sized).	
35						TD = 30'	
						Seep at 9' and 13'	
						No caving	
40							
45							

ADDITIONAL COMMENTS:

CLIENT: Pardee	PROJECT: Fair Oaks Ranch	W.O. : 8485
LOCATION: Phases 2 & 3	ELEVATION: 1768' ±	DATE: 10/26/98
RIG TYPE: 24" Bucket Auger	HAMMER WEIGHTS: See below	DROP: 12"

Depth	N	U	B	M	DD	C	DESCRIPTION	ATTITUDES
0							<u>Towsley Formation:</u> Light brownish gray to tan gravelly fine to coarse grained SANDSTONE, poorly sorted, scattered subangular to subrounded pebbles of predominantly coarse grained granitics, uncemented and friable, poorly indurated, damp and dense, massive indistinct bedding.	
2.5								
5								@6' BN37W/ 11SW Approx.
7.5							@8' - Grades into light gray coarse to very coarse grained SANDSTONE, uncemented and friable, with abundant scattered gravel.	
10	3	X		4.7	117.5			
12.5								
15							Occasional scattered pebbles and cobbles of granite, K-feldspar granite, subangular up to 8" diameter, massive, indistinct bedding, localized channelization.	
17.5								
20	5	X	X	4.8	116.5		Graded bedding-fining upward sequences ranging from very coarse to very fine grained SAND, 1" thick sequences, offset against massive gravelly SANDSTONE by steep south dipping fault, fault exits hole at 25', 1cm thick, FeO stained, no clay.	@21' BN40E/ 35NW Approx. @21' Fault - N74E/73SE
22.5								

ADDITIONAL COMMENTS:
0 - 25', 4000 lbs.
25 - 48', 2800 lbs.
48 - 65', 1600 lbs.
65'±, 800 lbs.

Blows per 12"

CLIENT: Pardee	PROJECT: Fair Oaks Ranch	W.O. : 8485
LOCATION: Phases 2 & 3	ELEVATION: 1768' ±	DATE: 10/26/98
RIG TYPE: 24" Bucket Auger	HAMMER WEIGHTS:	DROP: 12"

Depth	N	U	B	M	DD	C	DESCRIPTION	ATTITUDES
22.5								
								@24' BN1W/38NE Approx.
25							@25 - 29', Grayish brown sandy gravelly CONGLOMERATE, massive, uncemented and friable, damp and dense.	
27.5								
							@29 - 32', Well bedded medium grained SANDSTONE, underlain by grayish green clayey SILTSTONE, 1cm thick, damp and stiff.	@29' Channel - N48W/20SW
30								
			X	small	bag		@32' - 1', Light grayish brown silty gravelly SANDSTONE, poorly sorted, poor to no cementation, moist and dense.	@32' BN30W/ 18NE
32.5								
35								
							@36' - Fault offsets yellowish tan gravelly SANDSTONE and well sorted medium grained SANDSTONE, near horizontal very fine bedding within well sorted SANDSTONE, underlain by 1" thick SILTSTONE, grading into yellowish gray fine grained SANDSTONE below 38'.	@36' Fault - N33E/68SE @37.5' BDueN/7W
37.5								
40	20	X	X	16.3	114.4			@41' BN23W/ 29NE on sheared clay
			X	small	bag			
							@41' - Sheared CLAY bed, 1-2cm thick, well polished upper surface.	
							@41 - 42', Yellowish tan very fine to fine grained SANDSTONE, well bedded, uncemented, moist and dense.	
42.5							@42 - 43', Sheared clayey SILTSTONE, fractured, sheared on upper surface, decreasing clay content to 43'.	@43' BN11E/ 15NW on clayey SILT
45								

ADDITIONAL COMMENTS:

CLIENT: Pardee	PROJECT: Fair Oaks Ranch	W.O. : 8485
LOCATION: Phases 2 & 3	ELEVATION: 1768' ±	DATE: 10/26/98
RIG TYPE: 24" Bucket Auger	HAMMER WEIGHTS:	DROP: 12"

Depth	N	U	B	M	DD	C	DESCRIPTION	ATTITUDES
47.5								
	21	X		19.9	110.0			
50								
52.5							Seepage starting at 53'. Light yellowish tan to yellowish gray very fine to fine grained SANDSTONE with sparse granules and subangular gravel, poor to no cementation, very moist and dense, occasional FeO staining.	
55			X	small	bag			
	21	X		17.9	112.0		Dark gray (unoxidized) sandy SILTSTONE interbedded with grayish brown very fine to fine grained SANDSTONE, uncemented and friable, beds 1-3' thick, siltstone is slightly indurated, strong seepage from sandstones below 53'.	
57.5								
60			X				Total Depth - 68' Caving of Sandstones below 56' No downhole logging below 50' ±	
62.5								
65							On 10/27/98: Total Depth - 61' Groundwater at 57'	
67.5								
	23	X		18.9	111.6			
70								

ADDITIONAL COMMENTS:

CLIENT: Pardee	PROJECT: Fair Oaks Ranch	W.O. : 8485
LOCATION: Phases 2 & 3	ELEVATION: 1710' ±	DATE: 10/28/98
RIG TYPE: 24" Bucket Auger	HAMMER WEIGHTS: See Below	DROP: 12"

Depth	N	U	B	M	DD	C	DESCRIPTION	ATTITUDES
0							Landslide Debris: Mottled gray and light brown sandy SILTSTONE, strongly weathered and fractured, roots and roothairs to 5', abundant gypsum and carbonates along fractures.	
2.5								
5								@6' FN43W/ 53SW @7' BN83E/ 47NW
7.5								
10	2	X		25.2	99.0		Mottled olive gray and rusty orange sandy SILTSTONE, abundant gypsum, sparse white carbonates, disaggregated and weathered, sparse fractures open to 1mm or less, damp and very firm. Weathered and localized shearing.	@10' FN63E/ 63NW
12.5								
15							Mottled olive gray and rusty orange sandy SILTSTONE to very silty very fine grained SAND, abundant gypsum filled joints, up to 1/4" thick.	@14' BN42W/ 25NE
17.5								
20	5	X		19.0	111.2		Gravel stringer, abundant gypsum. Bedding obscured by pervasive sinuous jointing with FeO weathering gypsum infills. Increasingly competent with depth below 25'. Slide Plane: Dark olive gray sheared CLAY, underlies 3" thick orange medium grained SANDSTONE, friable, 3-5 mm thick, gradationl change to dark gray unoxidized SILTSTONE from 25-30', increasingly competent and indurated.	@19', BN82W/ 33NE @21', Slide Plane N88E/20NW
22.5								

ADDITIONAL COMMENTS: 0 - 25', 4000 lbs. / 25 - 48', 2800 lbs. / 48 - 65', 1600 lbs. / 65'+, 800 lbs. — Blows per 12"

CLIENT: Pardee	PROJECT: Fair Oaks Ranch	W.O. : 8485
LOCATION: Phases 2 & 3	ELEVATION: 1710' ±	DATE: 10/28/98
RIG TYPE: 24" Bucket Auger	HAMMER WEIGHTS:	DROP: 12"

Depth	N	U	B	M	DD	C	DESCRIPTION	ATTITUDES
22.5							@22'± - <u>Towsley Formation:</u> Dark gray unoxidized sandy SILTSTONE and minor interbedded yellowish brown fine grained SANDSTONE, uncemented and friable, very moist and dense, minor shearing within unoxidized slightly clayey SILTSTONE.	
25								@26', BN6W/25SW
27.5							@27-29.5', Yellowish brown fine grained SANDSTONE underlain and overlain by unoxidized sandy SILTSTONE. Seepage 27'-29' from SANDSTONE.	
							@29-36', Dark gray massive SILTSTONE, unoxidized, indurated, slightly moist and stiff, very competent.	@29', BN26W/7NE on bottom of SANDSTONE
30	13	X		18.3	113.1			
32.5								
35							Total Depth - 36' Seepage 27' - 29' No caving	
	19	X		18.9	113.1			
37.5								
40								
42.5								
45								

ADDITIONAL COMMENTS:

SUBSURFACE DATA

LOG OF BORING P7

CLIENT: Pardee	PROJECT: Fair Oaks Ranch	W.O. : 8485
LOCATION: Phases 2 and 3	ELEVATION: 1705'	DATE: 11/30/98
RIG TYPE: Bucket Auger	HAMMER WEIGHTS: See below	DROP: 12"

Depth	N	U	B	M	DD	C	DESCRIPTION	ATTITUDES
0							Colluvium: 0-6', Tan medium to coarse grained SAND with abundant rounded granitic pebbles and cobbles.	
5							Landslide Debris (?): 6-17', 2-3" thick interbeds of oxidized fine SANDSTONE and reduced SILTSTONE.	@6' Contact N20E/25W
10								@9' Bedding N65E/42NW
15	3	X		17.8	109.8			@16' Bedding N15E/12W
							17-18', Light brown silty SANDSTONE.	@16.5' Contact N15E/35E
							18-32', Tan to light brown sandy SILTSTONE with occasional thin beds of reduced SILTSTONE.	
20								@17' Bedding N20E/8W
								@18' Contact N20E/9W
25	3	X					25-27', Zones of reduced slightly clayey SILTSTONE.	
30							@30' - Towsley Formation (?): Becoming unoxidized below 30' ±	
							32-33', Dark gray to black clayey SILTSTONE with thin interbeds of fine SANDSTONE.	
	8	X					@33'- 2" of dark gray to black CLAY with sheared waxy texture.	@33' Bedding N30E/28E
35							33-42', Dark gray sandy SILTSTONE, moist and very firm to hard.	@35' Bedding N40E/25SE
40								@36' Bedding N40E/35SE
							@42'-2" of gray black CLAY, sheared very waxy texture.	@42' N38E/32SE
	14	X					42-45', Dark gray sandy SILTSTONE, moist and very firm.	
45								

ADDITIONAL COMMENTS:

Total Depth - 45'	0 - 25', 4000 lbs.
No groundwater	25 - 48', 2800 lbs.
No caving	48 - 65', 1600 lbs.
	65'+, 800 lbs.

CLIENT: Pardee	PROJECT: Fair Oaks Ranch	W.O. : 8485
LOCATION: Phases 2 and 3	ELEVATION: 1766'	DATE: 12/1/98
RIG TYPE: Bucket Auger	HAMMER WEIGHTS: See Below	DROP: 12"

Depth	N	U	B	M	DD	C	DESCRIPTION	ATTITUDES
0							Colluvium: 0-10', Brown to light brown clayey SILT with trace of sand, moist, dense, firm, abundant granitic rounded pebbles and cobbles.	
2.5								
5								
7.5								
10							Landslide Debris: 10-12', Tan sandy SILTSTONE with trace of clay, moist, weakly friable, sparse granitic subround pebbles and cobbles.	@10' bedding N5E/30W @11' bedding N10E/35W
12.5							@12-17', Interbedded tan and gray SILTSTONE with trace of clay, moist, dense, firm.	@11.5' bedding N20E/35W @12' bedding N25E/20SE
15	2	X						
17.5							@17-25', Tan sandy SILTSTONE, slightly friable, moist, dense, slightly firm.	@17' bedding N35E/21SE
20								
22.5								

ADDITIONAL COMMENTS: 0 - 24', 4000 lbs.
24 - 47', 2800 lbs.

CLIENT: Pardee	PROJECT: Fair Oaks Ranch	W.O. : 8485
LOCATION: Phases 2 and 3	ELEVATION: 1766'	DATE: 12/1/98
RIG TYPE: Bucket Auger	HAMMER WEIGHTS:	DROP: 12"

Depth	N	U	B	M	DD	C	DESCRIPTION	ATTITUDES
22.5								@24' bedding N30E/22SE
25	1	X					@25' - Irregular contact with above. @25-30', Tan clayey SILTSTONE, moist, dense, firm, with frequent ripup clasts 6" diameter gray SILTSTONE. @26' - Weeping water.	
27.5								
30							@30' - Landslide Plane(?) at oxidized-unoxidized contact. @30-43', Dark gray to bluish gray SILTSTONE, moist, dense, very firm to hard.	@30' bedding N27E/23SE
32.5								
35	7	X		21.5	107.9			@35' bedding N25E/19SE
37.5								
40								
42.5							@43-47', Dark gray to bluish gray SILTSTONE, dense, very hard.	@43' bedding N25E/18SE
45								

ADDITIONAL COMMENTS: Total Depth - 47'
No caving
Standing water at 45' on 12/3/98

CLIENT: Pardee	PROJECT: Fair Oaks Ranch	W.O. : 8485
LOCATION: Phases 2 and 3	ELEVATION: 1860' ±	DATE: 12/8/98
RIG TYPE: Bucket Auger	HAMMER WEIGHTS: See Below	DROP: 12"

Depth	N	U	B	M	DD	C	DESCRIPTION	ATTITUDES
0							Colluvium: 0-1', Dark brown sandy SILT, sparse granitic rounded pebbles, damp to dry. Towsley Formation: 1-10', Brown fine to medium grained silty SAND, moist, friable, abundant granitic rounded pebbles and cobbles.	
2.5								
5								
7.5								
10							@10-21', Brown to tan fine to medium grained SANDSTONE, moist, very friable, abundant granitic rounded pebbles, cobbles, and boulders, poorly indurated.	
12.5								
15	2	X		3.1	116.8			@15' bedding N10W/15E
17.5								
20								@20' bedding N20E/12E
							@21-38', Brown and tan interbedded SILTSTONE, moist, dense, sparse granitic rounded pebbles.	@21' bedding N70W/10NE
22.5								

ADDITIONAL COMMENTS:
0 - 24', 4000 lbs.
24 - 47', 2800 lbs.
47 - 72', 1600 lbs.
72 - 98', 800 lbs.

CLIENT: Pardee	PROJECT: Fair Oaks Ranch	W.O. : 8485
LOCATION: Phases 2 and 3	ELEVATION: 1860' ±	DATE: 12/8/98
RIG TYPE: Bucket Auger	HAMMER WEIGHTS:	DROP: 12"

Depth	N	U	B	M	DD	C	DESCRIPTION	ATTITUDES
22.5								
25	3	X		19.0	106.3		Light gray fine to medium grained silty clayey SANDSTONE, moist and dense.	
27.5								
30								
32.5								
35	2	X		12.5	112.5			
37.5							@38-43', Brownish to grayish clayey SILTSTONE, moist, dense, irregular, discontinuous zones of slightly waxy clayey SILTSTONE.	@38' contact N30E/25SE
40								
42.5							@43-55', Tan to brown SANDSTONE, moist, very friable, abundant granitic founded pebbles, cobbles, and boulders.	@43' contact N32W/15NE
45								

ADDITIONAL COMMENTS:

CLIENT: Pardee	PROJECT: Fair Oaks Ranch	W.O. : 8485
LOCATION: Phases 2 and 3	ELEVATION: 1860' ±	DATE: 12/8/98
RIG TYPE: Bucket Auger	HAMMER WEIGHTS:	DROP: 12"

Depth	N	U	B	M	DD	C	DESCRIPTION	ATTITUDES
42.5								
45	6	X		15.7	113.0		Light gray silty SANDSTONE with minor clay, slightly moist and dense.	
47.5								
							@49' - Weeping water.	
50								
52.5								
55							@55-58', Dark gray to blue slightly sandy SILTSTONE, moist, very dense, very firm.	@55' contact N60E/12S
57.5							@58-65', Dark gray to blue SILTSTONE with trace of clay, moist, very dense, very firm to hard.	
60	20	X		17.2	112.1			@60' bedding N70E/15S
62.5							Total Depth - 65' Frequent caving 0-38' and 43-55' Weeping water at 49'	
65								

ADDITIONAL COMMENTS:

CLIENT: Pardee	PROJECT: Fair Oaks Ranch	W.O. : 8485
LOCATION: Phase 2	ELEVATION: 1790′	DATE: 5/12/99
RIG TYPE: 24" Bucket	HAMMER WEIGHTS: See below	DROP: 12"

Depth	N	U	B	M	DD	C	DESCRIPTION	ATTITUDES
0–2.5							Slopewash/Colluvium: Mottled tan to medium gray brown very fine grained silty SAND, rootlets, frequent angular fragments of gray siltstone up to 4" diameter, porous to 1/16 diameter, krotovina, dry to damp, medium dense.	
5–7.5							Weathered Towsley Formation: Mottled medium brown to light gray BRECCIA, angular siltstone and sandstone fragments in a matrix of medium brown fine grained silty sand, abundant pinpoint gypsum crystals, becoming less weathered with depth, moist, dense.	
10–12.5							@11′ - No distinct contact.	
12.5–15							@14.5′ - Attitude of imbrication of angular fragments.	@14.5′ BN70E/ 47NW Approx.
15–22.5							@16.5′ - Irregular contact/transition to Towsley Formation: @17.5′ - Near horizontal bed of tan to rust brown medium to fine grained SANDSTONE, continuous around hole, scoured, fractured. Interbedded medium brown to light gray fine to coarse grained SANDSTONE and sandy SILTSTONE, rythmically bedded, horizontal finer grained units have fractures normal to the bedding, beds are typically 1-6" thick, finer grained beds have abundant pinpoint gypsum crystals and carbonate flecks, coarse grained beds have abundant mica flakes.	@16.5′ BN85W/ 41NE Approx. @17.5′ Horizont. Bedding

ADDITIONAL COMMENTS: Blows per 6"
0 - 25′, 4000 lbs.
25 - 48′, 2800 lbs.

CLIENT: Pardee	PROJECT: Fair Oaks Ranch	W.O. : 8485
LOCATION: Phase 2	ELEVATION: 1790'	DATE: 5/12/99
RIG TYPE: 24" Bucket	HAMMER WEIGHTS:	DROP: 12"

Depth	N	U	B	M	DD	C	DESCRIPTION	ATTITUDES
22.5								
							@24' - Normal to bedding fractures infilled by gypsum.	
25								
							Light tan to light gray fine to medium grained SANDSTONE, continuous around hole, horizontal bedding, friable, micaceous.	@26' Horizont. Bedding
27.5							Light gray to medium brown fine grained silty SANDSTONE, abundant closely spaced fractures infilled with gypsum and normal to bedding, moist, dense, well sorted.	
30								
32.5								
35								
							Reddish brown to medium gray clayey SILTSTONE, continuous around hole.	
37.5								
							Becoming predominantly dark gray.	
40								
42.5								
							Grading into dark gray fine grained silty SANDSTONE, very tight, moist.	
45								

ADDITIONAL COMMENTS:

CLIENT: Pardee	PROJECT: Fair Oaks Ranch	W.O. : 8485
LOCATION: Phase 2	ELEVATION: 1790'	DATE: 5/12/99
RIG TYPE: 24" Bucket	HAMMER WEIGHTS:	DROP: 12"

Depth	N	U	B	M	DD	C	DESCRIPTION	ATTITUDES
42.5								
45								
47.5							Transitions to tan to rust fine grained silty SANDSTONE, slightly friable, micaceous, numerous gypsum filled fractures, possibly soft sediment deformation, dense, moist.	
50							Well cemented fossiliforous zone, gastropods, gray, roughly horizontal, discontinuous around hole. @50' - Becomes gray fine to medium grained very silty SANDSTONE, massive.	@50' Approx. Horizont. Bedding
52.5								
55								
57.5								
60							Medium gray pockets of silty CLAY to clayey SILTSTONE, 1-6" thick, moist, dense.	
62.5							Flat lying bed, continuous around hole, gradation from fine to medium grained SANDSTONE to very fine grained sity SANDSTONE, occasional gastropods.	@61' Horizont. Bedding
65								

ADDITIONAL COMMENTS:

CLIENT: Pardee	PROJECT: Fair Oaks Ranch	W.O. : 8485
LOCATION: Phase 2	ELEVATION: 1790'	DATE: 5/12/99
RIG TYPE: 24" Bucket	HAMMER WEIGHTS:	DROP: 12"

Depth	N	U	B	M	DD	C	DESCRIPTION	ATTITUDES
65								
67.5							3/4" thick dark to medium gray CLAY bed, highly sheared, unidirectional slickensides.	@68' N45W/9SW Shear
70								
72.5							Medium gray silty CLAY to clayey SILTSTONE, moist, stiff.	
75								
77.5							Total Depth - 73' No groundwater No caving	
80								
82.5								
85								
85.5								

ADDITIONAL COMMENTS:

CLIENT: Pardee	PROJECT: Fair Oaks Ranch	W.O. : 8485
LOCATION: Phase 2	ELEVATION: 1789'	DATE: 5/14/99
RIG TYPE: 24" Bucket Auger	HAMMER WEIGHTS:	DROP:

Depth	N	U	B	M	DD	C	DESCRIPTION	ATTITUDES
0 2.5							<u>Alluvium:</u> Abundant quartz, feldspar and K-spar, plagioclast rich granite cobbles and boulders (up to 2' diameter), subrounded to subangular, in a matrix of medium to light brown clayey silty SAND, porous with pinholes up to 1cm, dry, rootlets, becoming compact with depth.	
5							<u>Towsley Formation:</u> Interbedded mottled brown and gray fine grained SANDSTONE and clayey SILTSTONE fragments, moist, compact, dense, horizontal bedding.	
7.5 10							3" bed of light gray fine grained SANDSTONE, with pyrite and mica flakes, some thin rust brown stringers.	@7' Horizont.
12.5 15 17.5 20 22.5							Gypsum stringers, interbedded orangish brown sandy SILTSTONE to very fine grained silty SANDSTONE and gray clayey SILTSTONE, continuous around hole, competent, sparse gypsum filled fractures, beds typically 2-12" thick, firm. @12' - 2" bed of light to rust brown silty SANDSTONE, well sorted, flat lying, compact. @12-13.5', Gray clayey SILTSTONE, well sorted, moist, firm, some small angular Cm scale fragments of light to medium brown sandstone. @13.5' - 1" bed of medium brown fine grained SANDSTONE with gypsum, increasingly more gray SILTSTONE with depth, irregular contact gypsum. @15' - Bedding on 1" thick layer of tan very fine grained sandstone. @16' - Massive gray SILTSTONE, moist, firm, competent. @19-19.5', Tan and rusty orange fine grained silty SANDSTONE, moist, uncemented, continuous around hole. @19.5' - Massive gray SILTSTONE to clayey SILTSTONE, gradational contacts, moist, firm, unoxidized, micaceous, abundant broken shells, mostly Cm scale bivalves and gastropods.	@11' BN81W/6SW @15' BN60W/ 24SW @19' BN89W/8SW

ADDITIONAL COMMENTS:

CLIENT: Pardee	PROJECT: Fair Oaks Ranch	W.O. : 8485
LOCATION: Phase 2	ELEVATION: 1789'	DATE: 5/14/99
RIG TYPE: 24" Bucket Auger	HAMMER WEIGHTS:	DROP:

Depth	N	U	B	M	DD	C	DESCRIPTION	ATTITUDES
22.5								
25							@25' - Abundant broken shells. @26' - Sparse fractures with minor seepage.	
27.5								
30							Bedding on contact between dark gray clayey SILTSTONE and light gray sandy SILTSTONE.	@31' BN33W/7SW
32.5							Two isolated rip-up clasts of cemented gray siltstone, subrounded pebble size.	
35								
37.5								
40							Distinct zone of cemented SILTSTONE rip-up clasts, massive up to 55', light gray fine grained SANDSTONE, continuous around hole, uncemented, underlain by dark gray clayey SILTSTONE.	@41' BN76E/ 12SE
42.5								
45								

ADDITIONAL COMMENTS:

CLIENT: Pardee	PROJECT: Fair Oaks Ranch	W.O. : 8485
LOCATION: Phase 2	ELEVATION: 1789'	DATE: 5/14/99
RIG TYPE: 24" Bucket Auger	HAMMER WEIGHTS:	DROP:

Depth	N	U	B	M	DD	C	DESCRIPTION	ATTITUDES
42.5								
45								
47.5								
50								
52.5								
55								
							Grades into gray SILTSTONE. Below 56.5' small shears along base of sandstone, multiple glossy shears on 4" thick gray sandstone at 57.5'.	@56' BN52W/3SW
57.5							Discontinuous light gray sheared and fractured sandy SILTSTONE, 4" thick, on west sidewall. Below 58', massive gray sandy SILTSTONE, micaceous, competent, minor seepage from tight fractures.	@57.5' BN59W/3SW
60							@60' - Increasing seepage.	
62.5							Total Depth - 65' No caving Groundwater at 60'	
65								

ADDITIONAL COMMENTS:

CLIENT: Pardee	PROJECT: Fair Oaks Ranch	W.O. : 8485
LOCATION: Phase 2	ELEVATION: 1855'	DATE: 5/18/99
RIG TYPE: 24" Bucket Auger	HAMMER WEIGHTS:	DROP:

Depth	N	U	B	M	DD	C	DESCRIPTION	ATTITUDES
0							Colluvium: Light gray to grayish brown silty SAND with sparse gravel, poorly sorted, abundant burrows infilled with soil.	
2.5								
							Weathered Towsley Formation: Light gray to white fine to medium grained SANDSTONE, uncemented, friable.	
5								
7.5								@8' BN50W/ 25SW
10								
12.5							Light gray gravelly SANDSTONE, poorly sorted, no cementation, friable, dry and dense.	@12' BN86E/ 16SE Approx.
							Grades into sandy CONGLOMERATE, pebble to gravel size subangular to subrounded clasts, matrix supported by poorly sorted sand, friable, poorly bedded.	
15								
17.5								
20							@21' - Grades into light brownish gray poorly sorted SANDSTONE.	@21' BN46W/ 19SW
22.5								

ADDITIONAL COMMENTS:

CLIENT: Pardee	PROJECT: Fair Oaks Ranch	W.O. : 8485
LOCATION: Phase 2	ELEVATION: 1855′	DATE: 5/18/99
RIG TYPE: 24" Bucket Auger	HAMMER WEIGHTS:	DROP:

Depth	N	U	B	M	DD	C	DESCRIPTION	ATTITUDES
22.5								
25							Interbedded poorly sorted SANDSTONE and gravelly SANDSTONE, scattered pebbles, uncemented and friable, occasional channelization, minor ash content, tuffaceous, gritty texture.	@25′ BN63W/ 13SW @26′ BN75W/ 20SW
27.5								
30								
32.5							Light gray fine grained gravelly SANDSTONE, uncemented and friable, damp and dense.	@32′ BN77W/ 11NE Approx.
							Light gray fine to medium grained SANDSTONE, friable, damp and dense.	@34′ BN57E/ 10SE
35								
37.5								
40								
42.5								@43′ BN34W/ 23SW
45								

ADDITIONAL COMMENTS:

CLIENT: Pardee	PROJECT: Fair Oaks Ranch	W.O. : 8485
LOCATION: Phase 2	ELEVATION: 1855'	DATE: 5/18/99
RIG TYPE: 24" Bucket Auger	HAMMER WEIGHTS:	DROP:

Depth	N	U	B	M	DD	C	DESCRIPTION	ATTITUDES
42.5								
45							@45' - Seepage.	
47.5							Light gray poorly sorted SANDSTONE, friable and uncemented, minor sloughing due to seepage.	
50							@50' - Increasing seepage, caving within friable sandstone to 55'.	
52.5							Gray interbedded sandy SILTSTONE and fine grained SANDSTONE, unoxidized.	
55							Localized sloughing of sandstones due to seepage, generally competent and dense.	
57.5								
60								
62.5								
65								

ADDITIONAL COMMENTS:

CLIENT: Pardee	PROJECT: Fair Oaks Ranch	W.O. : 8485
LOCATION: Phase 2	ELEVATION: 1855'	DATE: 5/18/99
RIG TYPE: 24" Bucket Auger	HAMMER WEIGHTS:	DROP:

Depth	N	U	B	M	DD	C	DESCRIPTION	ATTITUDES
65							Interbedded gray fine grained silty SANDSTONE and SILTSTONE, unoxidized, moist and stiff, dense.	
67.5								
70							@71' - Cemented bed of gray SILTSTONE.	
72.5								
75							Total Depth - 75' Seepage at 45'+ Caving 50'-55' due to seepage from friable sandstones.	
77.5								
80								
82.5								
85								
85.5								

ADDITIONAL COMMENTS:

CLIENT: Pardee	PROJECT: Fair Oaks Ranch	W.O. : 8485
LOCATION: Phase 2	ELEVATION: 1865′	DATE: 5/18/99
RIG TYPE: 24" Bucket Auger	HAMMER WEIGHTS:	DROP:

Depth	N	U	B	M	DD	C	DESCRIPTION	ATTITUDES
0							Colluvium: Medium to dark brown clayey silty SAND with abundant angular to subangular granitic pebbles (up to 6" diameter), matrix supported, compact, dry, rootlets, pinholes in upper 2′.	
2.5								
5							Weathered Towsley Formation: Light to medium brown fine to medium grained SANDSTONE and sandy SILTSTONE with abundant weathered granitic pebble fragments, disturbed, abundant krotovina, sparse rootlets, no distinct bedding, some pebble clasts are decomposed and granular, becoming more competent with depth, uncemented, damp and medium dense.	
7.5								
10								
12.5							Towsley Formation: Crudely interbedded light to medium brown medium to coarse grained pebbly/cobbly SANDSTONE, cobbles up to 9" diameter and gray sandy clayey SILTSTONE with occasional rust orange stringers, abundant scours and channeling with mostly irregular contacts, moist, friable, some cobbles are decomposed, pebbles and cobbles are angular to subrounded and are randomly disturbed.	
15							@14′ - 2′ thick bed of gradational medium grained SANDSTONE.	@14′ BN62W/ 24SW
17.5								@17′ BN45E/ 60SE
20								
22.5							@22′ - Bedding dipping to south.	@22′ BdueE/34S

ADDITIONAL COMMENTS:

CLIENT: Pardee	PROJECT: Fair Oaks Ranch	W.O. : 8485
LOCATION: Phase 2	ELEVATION: 1865'	DATE: 5/18/99
RIG TYPE: 24" Bucket Auger	HAMMER WEIGHTS:	DROP:

Depth	N	U	B	M	DD	C	DESCRIPTION	ATTITUDES
22.5								
25								@25' BN57W/ 22SW
27.5								
30							Caving and seepage within friable sandstones below 30'; downholed only to 27' ±.	
32.5							Interbedded light gray sandy SILTSTONE and fine grained silty SANDSTONE, sands commonly seeping and sloughing, moist and dense, stiff, uncemented.	
35								
37.5								
40								
42.5								
45								

ADDITIONAL COMMENTS:

CLIENT: Pardee	PROJECT: Fair Oaks Ranch	W.O. : 8485
LOCATION: Phase 2	ELEVATION: 1865'	DATE: 5/18/99
RIG TYPE: 24" Bucket Auger	HAMMER WEIGHTS:	DROP:

Depth	N	U	B	M	DD	C	DESCRIPTION	ATTITUDES
42.5								
45								
47.5								
50								
52.5							Massive gray sandy SILTSTONE and clayey SILTSTONE with gradational contacts, moist, firm, well sorted, competent, unoxidized.	
55								
57.5							@57' - Hard cemented bed.	
60								
62.5							Total Depth - 57' Seepage at 30' to 54.5' Caving between 30' - 57' within sandstones Hole filled to 37' overnight	
65								

ADDITIONAL COMMENTS:

CLIENT: Pardee	PROJECT: Fair Oaks Ranch	W.O. : 8485
LOCATION: Phase 2	ELEVATION: 1806' ±	DATE: 5/20/99
RIG TYPE: 24" Bucket Auger	HAMMER WEIGHTS:	DROP:

Depth	N	U	B	M	DD	C	DESCRIPTION	ATTITUDES
0							<u>Colluvium:</u> Dark brown silty SAND with gravel, occasional pebbles, minor clay, sparse carbonate veinlets, damp and medium dense, abundant soil filled burrows.	
2.5								
5							<u>Towsley Formation:</u> Tan fine grained silty SANDSTONE, friable, uncemented, irregular scoured contact with underlying medium to very coarse grained SANDSTONE at 7'.	
7.5								@7' BN36E/ 17NW Approx.
10							Irregular, scoured contact with underlying gravelly SANDSTONE, friable, uncemented, dry and dense.	
12.5							Light brown very fine grained clayey silty SANDSTONE, slightly scoured upper contact, interbedded/juxtaposed with medium to coarse sandstone by numerous faults.	@13' Fault N56W/ 24NE
15								@15' Fault N65W/ 73NE
17.5								@17' Fault N60E/ Vert.
20							Light gray fine to very coarse grained gravelly SANDSTONE, poorly sorted, massively bedded, uncemented and slightly friable, damp and dense.	
22.5								

ADDITIONAL COMMENTS:

CLIENT: Pardee	PROJECT: Fair Oaks Ranch	W.O. : 8485
LOCATION: Phase 2	ELEVATION: 1806' ±	DATE: 5/20/99
RIG TYPE: 24" Bucket Auger	HAMMER WEIGHTS:	DROP:

Depth	N	U	B	M	DD	C	DESCRIPTION	ATTITUDES
20								
22.5							Steep fault juxtaposes gravelly SANDSTONE over gray and mottled rusty orange sandy SILTSTONE, fault enters hole on east side, bedding within siltstone dips shallowly to NW, abundant FeO staining.	
25								@24' BN24E/ 18NW
27.5							Fault exits hole on west side, mottled light brownish gray sandy SILTSTONE to slightly clayey SILTSTONE below 27.5', moderately fractured with occasional gypsum, abundant FeO staining, crude fissility, damp and stiff.	@27.5' FN5E/63NW Fault exits hole
30								@30' BN28E/ 38NW
32.5								
35							Predominantly sandy SILTSTONE, micaceous, massively bedded, bedding also locally indiscernible due to fracturing.	@34' FN74W/ 60NE Fracture @36' BN24W/ 53SW Approx.
37.5								
40							Abundant gypsum.	@41' BN19E/ 20NW
42.5								

ADDITIONAL COMMENTS:

CLIENT: Pardee	PROJECT: Fair Oaks Ranch	W.O. : 8485
LOCATION: Phase 2	ELEVATION: 1806' ±	DATE: 5/20/99
RIG TYPE: 24" Bucket Auger	HAMMER WEIGHTS:	DROP:

Depth	N	U	B	M	DD	C	DESCRIPTION	ATTITUDES
42.5							Grades into unoxidized gray SILTSTONE, competent, massively bedded, localized crude fissility, damp and stiff.	@43' BN7W/7SW
45								
47.5							4" thick light gray fine grained silty SANDSTONE interbed, slight cementation, damp and dense.	@47' BN29W/ 17SW
50							Dark gray SILTSTONE, massive, unoxidized, occasional gypsum, damp and very stiff, sparse light gray silty sandstone interbeds.	@51' BN82E/6SE Approx.
52.5								
55							Total Depth - 57' No groundwater No caving	
57.5								
60								
62.5								
65								

ADDITIONAL COMMENTS:

	N	U	B	M	DD	KEY TO ABBREVIATIONS USED ON BORING LOGS DESCRIPTION	ATTITUDES
0						N = BLOW COUNT	B = BEDDING
						U = UNDISTURBED SAMPLE	C = CONTACT
						B = BULK SAMPLE	S = SHEAR
						M = MOISTURE CONTENT	F = FAULT
						DD = DRY DENSITY	J = JOINT
5							
						C = MODIFIED CALIFORNIA SAMPLER	
						S = STANDARD PENETRATION TEST SAMPLER	
						X = INDICATES DEPTH OF BULK SAMPLE	
10							
15							
20							
25							
30							
35							
40							
45							

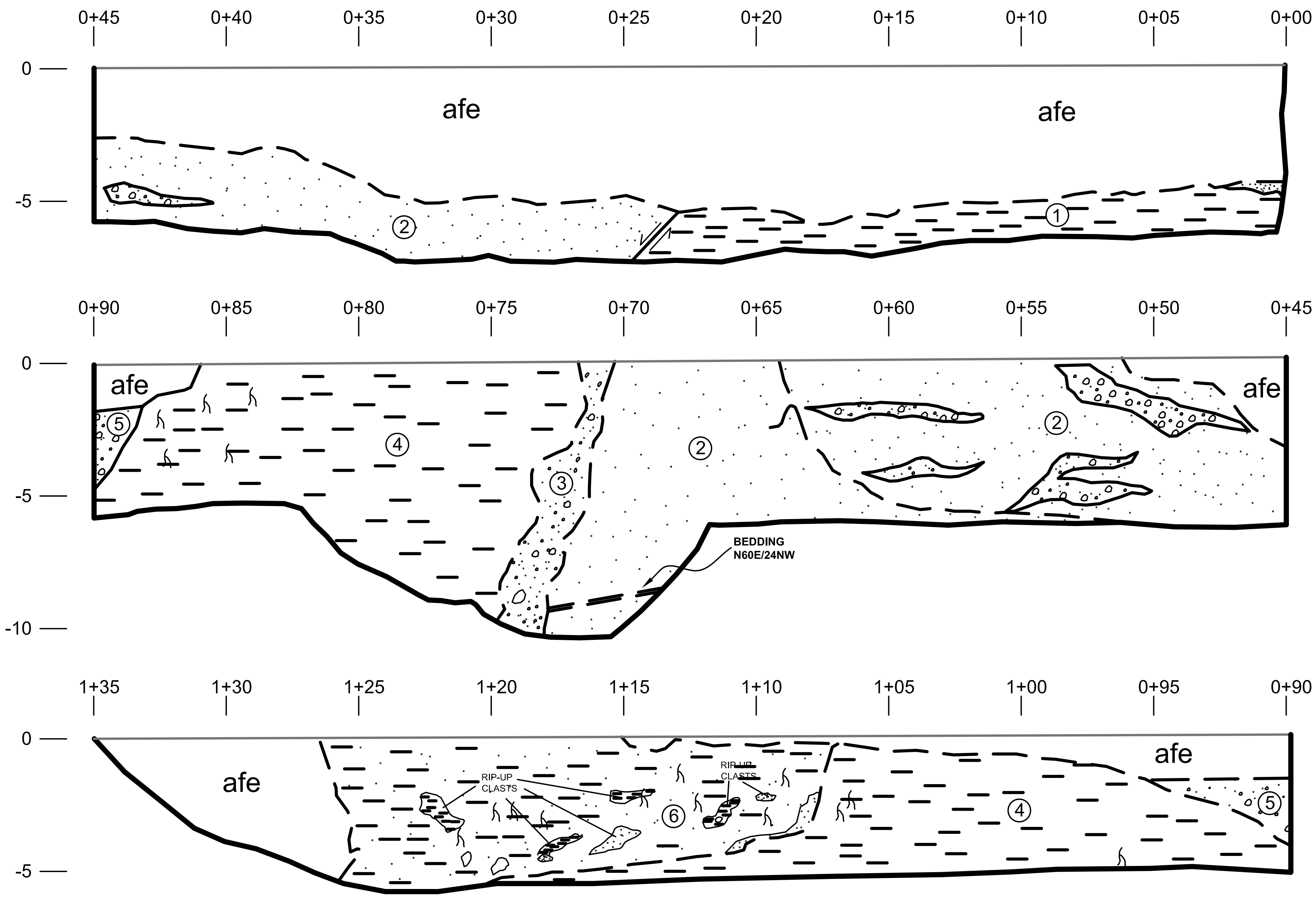
ADDITIONAL COMMENTS:

Trench Logs by GWV

TRENCH	DATE EXCAVATED	GROUND SURFACE ELEVATION (feet above mean sea level)	TOTAL LENGTH (feet)
T1	7/7/2020	1812	135
T2	7/7/2020	1814 to 1802	105
T3	7/7/2020	1812	35

LOG OF TRENCH T1

S65W



EXPLANATION

Roots

Cobble

Geologic Conact

Fault

Lithologic Units

Engineered Fill (afe):
Pale brown to buff silty fine to coarse SAND with gravel and cobbles, moist, massive, well graded. Gravel and cobbles are made of volcanics, gneiss, anorthosite, granite, and are subrounded to rounded. Angular medium and coarse sand grains of white feldspar are abundant. Sporadic roots up to ¼" and rootlets infilled with carbonates.

Landslide? (Qls L7?):
3. Brown clayey medium to coarse SAND with gravel and few cobbles, dense, moist, well graded, massive. Gravel and cobbles are rounded to subrounded, less weathered and more yellowish brown with depth.

4. SILTSTONE Gray SILT and clayey SILT, moist, dense to loose, massive. Highly fractured with hematite staining along fractures. Material becomes porous, less dense and coarser, to the south.

5. CONGLOMERATE Pale brown to buff silty fine to coarse SAND with gravel and cobbles, moist, massive, well graded. Gravel and cobbles are subrounded to rounded.

6. Brown silty sand matrix with gravel and cobbles, loose; many pieces up to small boulder size of cream colored sandstone similar to 2 and gray siltstone similar to 4.

Towsley Formation (Tt):
1. SILTSTONE Gray SILT and fine SAND with clay, dense moist and massive. Ped development in silty portions highly angular and variable in size. Surface of peds discolored by hematite staining.

2. SANDSTONE Pale gray to cream silty fine to coarse SAND, medium dense to loose, moist, channelized. Coarser material is cream colored, generally and contains some rounded gravel and cobbles, is friable. Finer grained portions have hematite staining. Around station 64 there is a paleosol development characterized by concentration of silt and brown colorization.

5 2.5 0 5

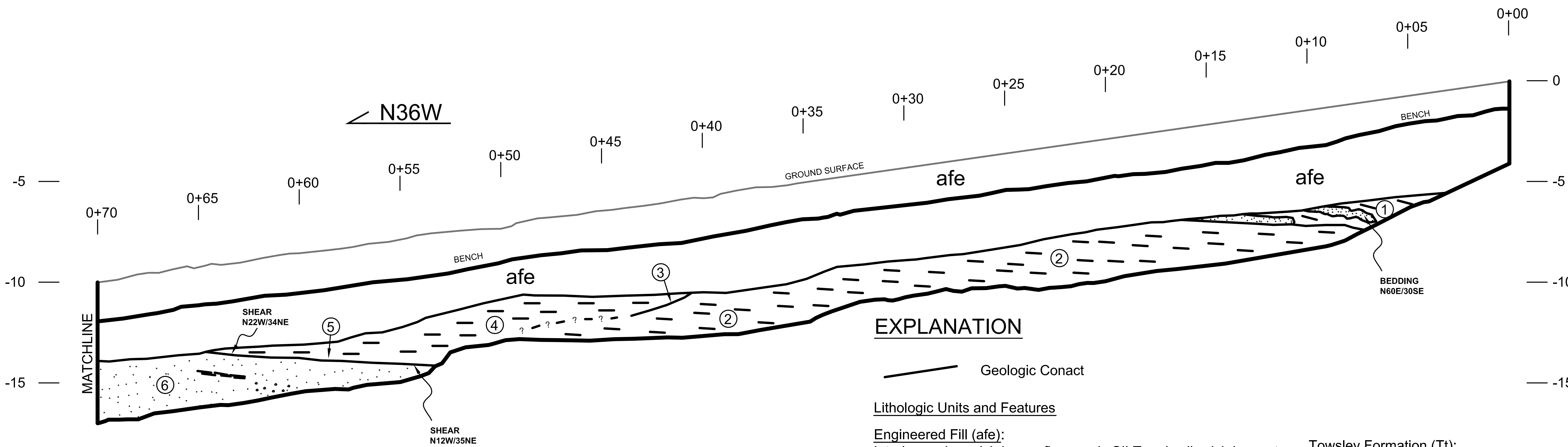
1"=5'

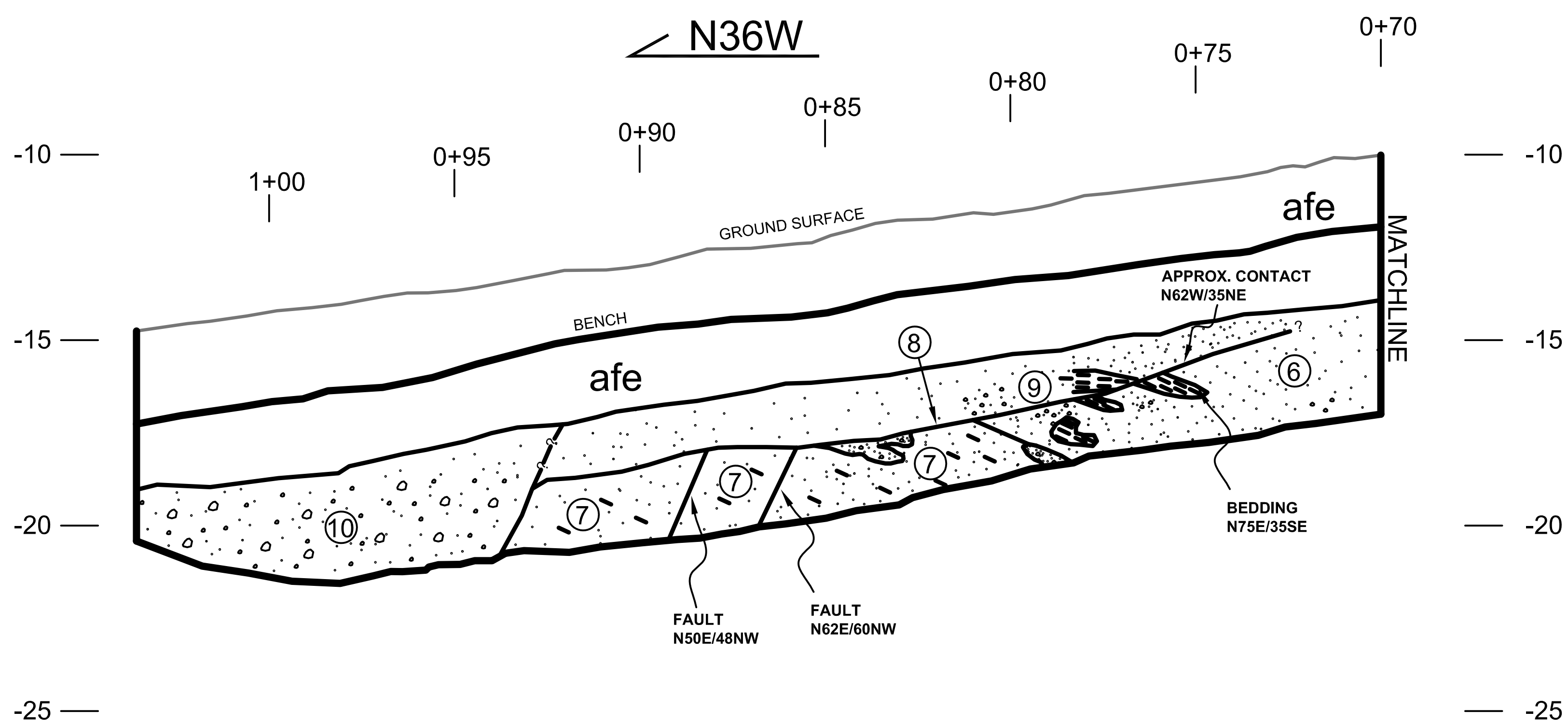
Geolabs - Westlake Village
GEOLOGY AND SOIL ENGINEERING

DATE 07/07/2020 BY AL

SCALE 1" = 5' W.O. 8485

PLATE T1





EXPLANATION

Geologic Conact

Lithologic Units and Features

Engineered Fill (afe):
Interlayered grayish brown fine sandy SILT and yellowish brown to pale brown silty SAND with gravel and cobbles, dense, moist.

Landslide? (Qls L7?):
3. CONTACT: two to three inch thick band of ground up silt, slightly plastic, stiff.

4. SILTSTONE: grayish brown, firm to stiff, moist, slightly plastic, massive, mottled with orange oxidation stains, contains entrained sands and gravels as random pockets and individual grains, several random rounded cemented nodules up to five inches in diameter.

5. SHEAR: up to half inch thick clay seam, dark brown, soft, highly plastic, locally cornflaky and polished, separates Units 4 and 6.

8. CONTACT: sharp contact along upper surface of Units 6 and 7 separating them from Unit 9; contact steepens near Station 0+95 where it separates Unit 7 from Unit 10; beds and channels within Units 6 and 7 are truncated or offset on the order of two feet across the contact.

9. SANDSTONE: orangish brown, pale brown, and brown, fine to coarse grained, silty, medium dense, massive, pockets of material within unit 9 appear to be offset, deformed, and more weathered remnants of individual beds from unit 6.

10. CONGLOMERATE: yellowish brown, orangish brown, and brown, silty sand matrix, clasts up to twelve inches in maximum dimension, medium dense, moist, moderately to highly weathered, easy to excavate, massive.

Towsley Formation (Tt):
1. SILTSTONE: grayish brown, sandy, micaceous, stiff, moist, massive, orange oxidation stains common along fractures; interbedded with SANDSTONE: pale brown, gravelly, friable, massive, sparse blue siltstone ripups, streaks of greenish yellow and orange weathering, scoured and oxidized lower contacts.

2. SILTSTONE: grayish brown, hard, moist, massive, blocky, orange oxidation stains common along fractures.

6. SANDSTONE: pale brown, fine to medium grained, massive, dense, moist, orange weathering stains pervasive to banded along vague bedding near Station 0+75, numerous randomly oriented faults with offsets of up to one inch, sparse gravelly pockets and mud ripups.

7. SANDSTONE: light gray to olive brown, fine to medium grained, silty, massive, dense, moist, numerous randomly oriented faults with offsets of up to one inch, sparse cleaner pale brown fine to coarse sand channels with gravel and reddish orange oxidized contacts. Two more planar faults with larger offsets identified as a half inch thick purple weathered zone along the fault trace; offset and sense of motion undetermined.

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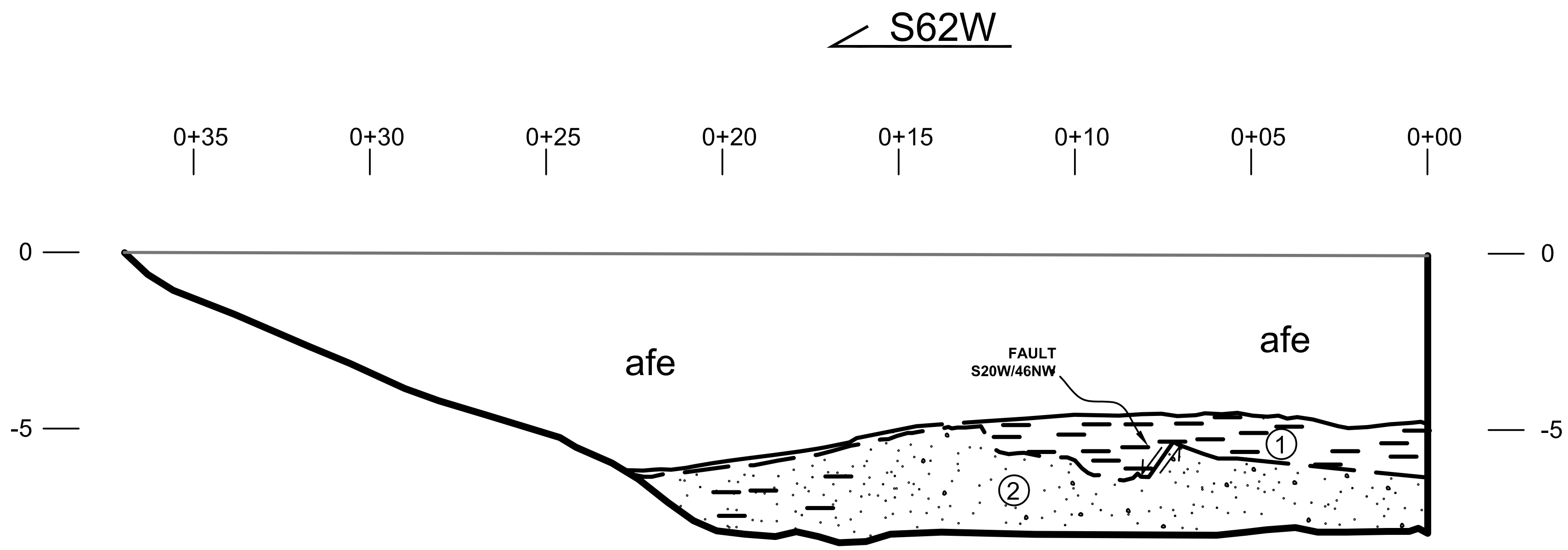
GEOLOGY AND SOIL ENGINEERING

DATE 07/07/2020 BY RMP
SCALE 1" = 5' W.O. 8485

PLATE T2

LOG OF TRENCH T3



EXPLANATION

Geologic Conact

Fault

Lithologic Units

Engineered Fill (afe):
Pale brown to buff silty fine to coarse SAND with gravel and cobbles, moist, massive, well graded. Gravel and cobbles are made of volcanics, gniesses, anorthosite, granite and are subrounded to rounded. Angular medium and coarse sand grains of white feldspar is abundant. Sporadic roots up to ¼" and rootlet infilled with carbonates.

Towsley Formation (Tt):
1. SILTSTONE Gray SILT and fine SAND with clay, dense moist and massive. Ped development in silty portions highly angular and variable in size. Surface of peds discolored by hematite staining.

2. SANDSTONE Pale gray to cream silty fine to coarse SAND, medium dense to loose, moist, channelized. Coarser material is cream colored, generally and contains some rounded gravel and cobbles, is friable. Finer grained portions have hematite staining.

5 2.5 0 5

1"=5'

Geolabs - Westlake Village

GEOLOGY AND SOIL ENGINEERING

DATE 07/07/2020 BY AL

SCALE 1" = 5' W.O. 8485

PLATE T3

Boring Logs by LeRoy Crandall & Assoc.

BORING	DATE EXCAVATED	GROUND SURFACE ELEVATION (feet above mean sea level)	TOTAL DEPTH (feet)
B6	6/17/1980	1775	50

BORING 6AB

DATE DRILLED: June 17, 1980

EQUIPMENT USED: 20"-Diameter Bucket

ELEVATION 1775

ELEVATION (ft.)	DEPTH (ft.)	"N" VALUE STD. PEN. TEST	MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	DRIVE ENERGY (ft.-kips/ft.)	SAMPLE LOC.	Description
							CLAYEY SILT - SOIL ZONE - few gravel, some sand, dark brown
1770	5						CLAYEY SAND - fine. About 30% gravel and cobbles, light brown
							SANDSTONE - MIDDLE TOWSLEY FORMATION - LAND-SLIDE MATERIAL - fine to medium, some silt ~~very moist,~~ light brown
1765	10						
1760	15						Fractures, Silty layers
							MUDSTONE - MIDDLE TOWSLEY FORMATION - LAND-SLIDE MATERIAL - weathered, moist, grey and brown
1755	20						Sandy interbeds
							Seeps
1750	25						

(CONTINUED ON FOLLOWING PLATE)

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

LOG OF BORING

LeROY CRANDALL AND ASSOCIATES

BORING 6AB (CONTINUE

DATE DRILLED: June 17, 1980

EQUIPMENT USED: 20"-Diameter Bucket

ELEVATION (ft.)	DEPTH (ft.)	"N" VALUE STD. PEN. TEST	MOISTURE (% of dry wt.)	DRY DENSITY (lbs./cu. ft.)	DRIVE ENERGY (ft.-kips/ft.)	SAMPLE LOC.
1745	30					
1740	35					
1735	40					
1730	45					
1725	50					

Seeps

Seeps

Seeps
Possible slip surface

MUDSTONE - MIDDLE TOWSLEY FORMATION - massiv
moist, bluish-grey

Sandy thin interbeds

NOTE: Total depth Piezometer A - 50.4 feet.
Total depth Piezometer B - 31.4 feet.

Depth to top of Bentonite Clay Seal - 32 feet.

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

LOG OF BORING

LeROY CRANDALL AND ASSOCIATES

Boring Logs by Fugro

BORING	DATE EXCAVATED	GROUND SURFACE ELEVATION (feet above mean sea level)	TOTAL DEPTH (feet)
BA-1	5/21/2018	1752	55
BA-2	5/22/2018	1752	55

LOCATION: N 34.40227 W 118.43668

SURFACE EL: Approx. 1752 ft +/- (rel. NAVD88 datum)

ELEVATION, ft	DEPTH, ft	SAMPLE NO.	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
		B		**LANDSLIDE DEPOSITS (Qls)** Clayey SILTSTONE to CLAYSTONE: moderately weathered, soft, greenish brown with orange oxide staining, moist, trace gypsum nodules up to 1/5"							
1750	2										
1748	4			- 4.33': Joint, N35W/80 NE, smooth							
		S1	(7)	- 4.58': Joint, N30W/85 SW, planar, smooth, rootlets present along joint face	129	110	17				
1746	6	S2	54/6"	- greenish gray, fresh							
				- slightly weathered							
1744	8			- 6.75': Joint, N50E/ from 60-80 NW, from planar to wavy, gypsum infill up to 1/8" thick							
1742	10	S3	(4)	- slight increase in plasticity and fissility, gypsum present in spoils from 10-15 ft bgs	128	105	22		51	28	
				- 10.08': Joint, N10W/85 SW, <1mm, clay in-fill							
1740	12										
1738	14			- 13.5': Joint, N35W/65 SW, clay in-fill, ~1/32"							
		S4	(4)	- slightly weathered	130	105	24				
1736	16	S5	30	- 15.75': Bedding, N35W/32 SW, 1/4" orange oxide contact layer							
				15.75': clay bed, dark gray, slightly weathered, very soft, laminated							
1734	18			- 18.6'-19.0': clay bed with interbedded orange, fine sandy siltstones up to 2" thick							
1732	20	S6	(10)	- 19.75': Bedding, N50W/15SW with laminated fine sands	131	112	17		46	24	
1730	22			- CLAYSTONE, slightly weathered, soft, dark gray to gray, laminated, with 1/4" widely spaced laminated layers of silty fine sand, med gray, moist							
				- 22.5': Bedding, N25W/16 SW							
1728	24			- 24.33': Becomes predominantly fine sandy claystone, gray to dark gray, slightly weathered, laminated							
1726	26	S7	(9)	- 24.5': clay bed, N20W/10SW, base is wavy with up to 1/2" at relief	129	104	24		83	54	
1724	28			**CASTAIC FORMATION (Tc)** SEDIMENTARY ROCK (CLAYEY SILTSTONE to CLAYSTONE): slightly weathered to fresh, moderately soft, modurately indurated, dark gray to gray, thickly bedded, very slightly fractured [Lean to Fat CLAY, hard]							
1722	30	S8	(20)					98	53	31	u 23
1720	32			- 32.25'-35.5': with laminated to thinly bedded fine sand, light gray							
1718	34			33.75': Bedding, N10W/10 SW, sand lamination							
		S9	(18)	- increase in frequency of silty fine sand layers	138	118	17				
1716	36			35.5' Bedding, N10W/11SW, clay bed, dark gray to brown, 1/2" thick							
1714	38										

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 55.0 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Sand/Cement Slurry
DRILLING DATE: May 21, 2018

DRILLING METHOD: 24-inch-dia. Bucket Auger
HAMMER TYPE: Kelly Bar
KELLY BAR WEIGHTS: 0-26ft: 3,390 lbs
26-52ft: 2,230 lbs
DRILLED BY: Tri-Valley Drilling
LOGGED BY: J Goodman
CHECKED BY: G S Denlinger

LOG OF DRILL HOLE NO. BA-1
Cherry Willow Tank
Santa Clarita, California

PLATE A-1a

Kennedy Jenks
Project No. 04.61180021

LOCATION: N 34.40227 W 118.43668

SURFACE EL: Approx. 1752 ft +/- (rel. NAVD88 datum)

ELEVATION, ft	DEPTH, ft	SAMPLE NO.	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
		S10	(23)		139	120	16				
1710	42										
				Silty SANDSTONE: fresh, soft, gray, moist, trace gravel to 4", upper contact is subhorizontal and wavy with up to 2" of relief/amplitude							
1708	44										
		S11	(20/8")								
1706	46										
1704	48										
				downhole logged to 49'							
1702	50	S12	(29)	Sandy SILTSTONE: fresh, soft, gray, moist	135	119	13				
1700	52										
1698	54										
				Boring Completed to 55 ft bgs.							
1696	56										
1694	58										
1692	60										
1690	62										
1688	64										
1686	66										
1684	68										
1682	70										
1680	72										
1678	74										
1676	76										
1674	78										

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 55.0 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Sand/Cement Slurry
DRILLING DATE: May 21, 2018

DRILLING METHOD: 24-inch-dia. Bucket Auger
HAMMER TYPE: Kelly Bar
KELLY BAR WEIGHTS: 0-26ft: 3,390 lbs
26-52ft: 2,230 lbs
DRILLED BY: Tri-Valley Drilling
LOGGED BY: J Goodman
CHECKED BY: G S Denlinger

LOG OF DRILL HOLE NO. BA-1

Cherry Willow Tank
Santa Clarita, California

PLATE A-1b

LOCATION: N 34.40218 W 118.43689

SURFACE EL: Approx. 1752 ft +/- (rel. NAVD88 datum)

ELEVATION, ft	DEPTH, ft	SAMPLE NO.	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
		B		**COLLUVIUM (Qc)** Silty SAND (SM): dense, light brown and reddish brown, dry, medium to coarse sand, with trace fine to coarse gravel and cobbles to 8", gravel to cobble sized clasts, poorly stratified, locally channelized							
1750	2										
1748	4			- moist							
		S1	(10)	- cobbles absent below 5 ft bgs	137	129	6				
1746	6			Well-graded SAND (SW): dense, light brown, moist, micaceous, trace fine gravel, subangular to subrounded							
1744	8										
1742	10										
		S2	(5)		132	122	9				
		S3	39	- 11.17'-14.33': moderately spaced silty fine sand layers, from 1/2" to 2" thick, wavy, subhorizontal							
1740	12										
1738	14										
		S4	(8)		140	127	10				
1736	16			Silty SAND (SM): reddish brown, moist, fine to medium micaceous sand, weakly cemented, laminated, upper contact is wavy, subhorizontal							
1734	18			- 17.5': Bedding, from N65W/20SW to N35E/21SE, plastic clay, greenish gray, very moist, from 1/4" to 1/2", wavy							
1732	20										
		S5	(3)	- 18.08'-20.67': Joint, N76W/71SW, FR, from 1/16" to 1/8", infilled with dark gray silt, joint set, very closely spaced	124	113	10				
		S6	25								
1730	22			Poorly graded SAND (SP): orangish brown, interval of thinly bedded to laminated fine sand, basal contact is subhorizontal and wavy, black and at a high angle to basal contact, Bedding N45E/50SE							
1728	24										
		S7	(4)	**LANDSLIDE DEPOSITS (Qls)** Lean CLAY (CL): very soft, light gray to reddish orange,	132	113	17		47	26	
1726	26			23.0'-24.0', N40E/30SE, closely spaced Fat CLAY layers from 1" to 2" thick, varies from wavy to planar							
1724	28			- N70W/26SW,1/4" thick clay layer							
				fine SAND (SP), Silty fine SAND (SM), and Elastic SILT (MH), trace gravel, orange, light gray and dark gray, crude layering, basal contact is wavy with up to 3" of relief/amplitude, subhorizontal							
1722	30										
		S8	(21)		137	115	19		55	31	
1720	32			**CASTAIC FORMATION (Tc)** Fine SEDIMENTARY ROCK (CLAYEY SILTSTONE to CLAYSTONE): moderately to slightly weathered, soft, dark gray, laminated, with fine sand laminae, upper contact is wavy and subhorizontal, with interebedded silty fine sandstone [Lean to Fat CLAY, hard]							
1718	34										
		S9	(20)	- 31.08': Bedding, N10W/06SW, base of 2" thick laminated silty fine sandstone interval							u 24
1716	36			- 33.17', Bedding, N05W/05SW, 1/8" thick clay layer							
1714	38			- 34': Bedding, N30E/05NW, slightly weathered to fresh							

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 55.0 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Sand/Cement Slurry
DRILLING DATE: May 22, 2018

DRILLING METHOD: 24-inch-dia. Bucket Auger
HAMMER TYPE: Kelly Bar
KELLY BAR WEIGHTS: 0-26ft: 3,390 lbs
26-52ft: 2,230 lbs
DRILLED BY: Tri-Valley Drilling
LOGGED BY: J Goodman
CHECKED BY: G S Denlinger

LOG OF DRILL HOLE NO. BA-2

Cherry Willow Tank
Santa Clarita, California

PLATE A-2a

Kennedy Jenks
Project No. 04.61180021

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	LOCATION: N 34.40218 W 118.43689 SURFACE EL: Approx. 1752 ft +/- (rel. NAVD88 datum) MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	UNDRAINED SHEAR STRENGTH, S_u, ksf
			S10		(27)		132	112	18				
1710	42					- 42': Bedding, N15E/05NW, base of laminated fine sandstone							
1708	44												
			S11		(24)								
1706	46												
						- 46.5': Bedding, N25E/04NW, 1/4" thick clay layer							
1704	48												
1702	50		S12		(19)								
1700	52												
1698	54												
						- Boring Completed to 55 ft bgs.							
1696	56												
1694	58												
1692	60												
1690	62												
1688	64												
1686	66												
1684	68												
1682	70												
1680	72												
1678	74												
1676	76												
1674	78												

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 55.0 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Sand/Cement Slurry
DRILLING DATE: May 22, 2018

DRILLING METHOD: 24-inch-dia. Bucket Auger
HAMMER TYPE: Kelly Bar
KELLY BAR WEIGHTS: 0-26ft: 3,390 lbs
26-52ft: 2,230 lbs
DRILLED BY: Tri-Valley Drilling
LOGGED BY: J Goodman
CHECKED BY: G S Denlinger

LOG OF DRILL HOLE NO. BA-2
Cherry Willow Tank
Santa Clarita, California

PLATE A-2b

LOCATION: The drill hole location referencing local landmarks or coordinates
SURFACE EL: Using local, MSL, MLLW or other datum

Group	MATERIAL DESCRIPTION	ELEVATION, ft	DEPTH, ft
COARSE GRAINED	Well graded GRAVEL (GW)	-12	2
COARSE GRAINED	Poorly graded GRAVEL (GP)	-14	4
COARSE GRAINED	Well graded SAND (SW)	-16	6
COARSE GRAINED	Poorly graded SAND (SP)	-18	8
COARSE GRAINED	Silty SAND (SM)	-20	10
COARSE GRAINED	Clayey SAND (SC)	-22	12
COARSE GRAINED	Silty, Clayey SAND (SC-SM)	-24	14
FINE GRAINED	Elastic SILT (MH)	-26	16
FINE GRAINED	SILT (ML)	-28	18
FINE GRAINED	Silty CLAY (CL-ML)	-30	20
FINE GRAINED	Fat CLAY (CH)	-32	22
FINE GRAINED	Lean CLAY (CL)	-34	24
ROCK	CONGLOMERATE	-36	26
ROCK	SANDSTONE	-38	28
ROCK	SILTSTONE	-40	30
ROCK	MUDSTONE	-42	32
ROCK	CLAYSTONE	-44	34
ROCK	BASALT	-46	36
ROCK	ANDESITE BRECCIA	-48	38
	Paving and/or Base Materials		

SAMPLE NO.	BLOW COUNT / REC"/DRIVE"
1	25
2	(25)
3	(25)
4	(25)
5	18"/ 30"
6	
7	
8	20"/ 24"
9	(25)
10	30"/ 30"
11	20"/ 24"
12	
13	

General Notes

Soil Texture Symbol

Sloped line in symbol column indicates transitional boundary

Samplers and sampler dimensions
(unless otherwise noted in report text) are as follows:

Symbol for:

1. SPT Sampler, driven 1-3/8" ID, 2" OD
2. CA Liner Sampler, driven 2-3/8" ID, 3" OD
3. CA Liner Sampler, disturbed 2-3/8" ID, 3" OD
4. Thin-walled Tube, pushed 2-7/8" ID, 3" OD
5. Bulk Bag Sample (from cuttings)
6. CA Liner Sampler, Bagged
7. Hand Auger Sample
8. CME Core Sample
9. Pitcher Sample
10. Lexan Sample
11. Vibracore Sample
12. No Sample Recovered
13. Sonic Soil Core Sample

Sampler Driving Resistance

Number of blows with 140 lb. hammer, falling 30" to drive sampler 1 ft. after seating sampler 6"; for example,

Blows/ft	Description
25	25 blows drove sampler 12" after initial 6" of seating
86/11"	After driving sampler the initial 6" of seating, 36 blows drove sampler through the second 6" interval, and 50 blows drove the sampler 5" into the third interval
50/6"	50 blows drove sampler 6" after initial 6" of seating
Ref/3"	50 blows drove sampler 3" during initial 6" seating interval

Blow counts for California Liner Sampler shown in ( )

Length of sample symbol approximates recovery length

Classification of Soils per ASTM D2487 or D2488

Geologic Formation noted in bold font at the top of interpreted interval

Strength Legend

Q = Unconfined Compression
u = Unconsolidated Undrained Triaxial
t = Torvane
p = Pocket Penetrometer
m = Miniature Vane

Water Level Symbols

Initial or perched water level
Final ground water level
Seepages encountered

Rock Quality Designation (RQD) is the sum of recovered core pieces greater than 4 inches divided by the length of the cored interval.

KEY TO TERMS & SYMBOLS USED ON LOGS

PLATE A-3

APPENDIX B
Laboratory Summary and Tests

October 30, 2020
W.O. 8485

LABORATORY TESTING

Undisturbed and bulk samples of soil and rock materials encountered at the site were collected during the course of our field work. Selected laboratory tests completed on the retrieved samples are described below.

MOISTURE-DENSITY

The field moisture content and dry unit weight were determined for each undisturbed sample. Dry unit weight is expressed in pounds per cubic foot and the moisture content represents a percentage of the dry unit weight. These results are presented on the boring logs.

SHEAR TEST

Shear tests were performed in a Direct Shear Machine of the strain control type commensurate with ASTM D3080. The rate of deformation is approximately 0.01 inches per minute for tests to determine peak and ultimate strength values. Multi-cycle testing evaluate residual strength were sheared at reduced rates of deformation of 0.0025 inches per minute. Shearing occurred under a variety of confining loads in order to determine the Coulomb shear strength parameters. The test was performed on undisturbed and remolded (@ field dry density) samples in an artificially saturated condition.

Stress-strain curves are presented in each shear test diagram. It should be noted that for the case of undisturbed single-cycle shear tests the value at the end of the stress-strain curve were selected.

COMPACTION AND EXPANSION TESTS

To determine the compaction characteristics of the onsite materials, compaction tests are performed in accordance with ASTM D 1557. The maximum dry density is reported in pounds per cubic foot and the optimum moisture content as a percentage of the maximum dry density. Expansion index tests were performed in accordance with ASTM D4829. The results of these tests are included in Laboratory Test Summary table in this appendix.

ATTERBERG LIMITS AND PARTICLE SIZE ANALYSES

The distribution of various particle sizes in selected representative samples was determined using both mechanical sieves and hydrometer tests. The percentage and distribution of particles larger than a #200 sieve (0.075 mm) are determined using mechanical processes per ASTM D6913. Particle distributions for fine-grained soils are determined using sedimentation (hydrometer) methods per ASTM D7928. The particle distribution is presented as the relative percentages of sand, silt and clay particles in each sample tested.

A cohesive plastic soil may go through four consistency states as the moisture content of the soil is increased. These states are the solid state, the semisolid state, the plastic state, and the liquid state. The limits between these consistency states are the Shrinkage limit, Plastic limit, and the Liquid Limit (respectively). These limits are often referred to as the Atterberg limits. The Plasticity Index is defined as the numeric value of the Liquid limit minus the numeric value of the Plastic limit (see Plate AL). The Liquid Limit, Plasticity Limit, and Plasticity Index for selected cohesive soil samples were determined in the laboratory. The Standard Test Method ASTM D4318 was utilized. These parameters are used in the classification of cohesive soils.

CORROSIVITY

For structural elements, a site is considered to be corrosive if one or more of the following conditions exist for the representative soil samples taken at the site: Chloride concentration is 500 ppm or greater, sulfate concentration is 2000 ppm or greater, or the pH is 5.5 or less (Caltrans, 2015; GMED, 2013). For structural elements, the minimum resistivity of soil and/or water indicates the relative quantity of soluble salts present in the soil or water. In general, a minimum resistivity value for soil and/or water less than 1000 ohm-cm indicates the presence of high quantities of soluble salts and a higher propensity for corrosion.

At the completion of rough grading for the tank pads, samples of soil were provided to consulting corrosion engineers, Schiff Associates for testing. Resistivity results indicate resistivity of saturated samples of ranging from 580 to 1700 ohm-cm. Soluble sulfate test results yielded concentrations of 0.01 to 0.45 percent by mass. This level of soluble sulfate is in the S0 to S2 exposure class per Table 19.3.1.1 of ACI 318-14. Chlorides were ranged from ND (not detected) to 50 ppm. The pH was determined to be approximately in the range of 7.6 to 8.2.

Laboratory Test Summary

Depth	Geology	Sample Description	ST	w	DD	S	Max	Opt	EI	LL	PI	% Gravel	% Sand	%Fines
Excavation: T1 (TD= 10 ft, No GW)														
5	Landslide Debris		(B)						79					
Excavation: WB1A (TD= 30 ft, No GW)														
10	Landslide Debris	clayey SILT	(U)	8.9	107.4	43								
Excavation: WB1B (TD= 63 ft, No GW)														
20	Landslide Debris	silty SAND	(U)	8.1	120.4	56								
30	Alluvium	clayey SILT	(U)	19.3	110.4	100								
40	Alluvium	lean CLAY	(U)	16.4	112.7	91								
50	Alluvium	lean CLAY	(U)	12.5	111.9	68								
60	Alluvium	lean CLAY	(U)	10	103.6	44								
Excavation: WB2 (TD= 60 ft, No GW)														
10	Landslide Debris	clayey SILT	(U)	22.7	105.2	100								
20	Alluvium	lean CLAY	(U)	21.2	105.1	96								
30	Alluvium	lean CLAY	(U)	18.3	107	87								
40	Alluvium	lean CLAY	(U)	17.6	108.9	88								
50	Alluvium	lean CLAY	(U)	15.5	111.3	83								
60	Alluvium	lean CLAY	(U)	15.5	106.1	72								
Excavation: WB3 (TD= 74 ft, No GW)														
10	Colluvium	silty SAND	(U)	5.4	102.9	23								
20	Alluvium	clayey SILT	(U)	14.5	108.8	72								
30	Alluvium	clayey SILT	(U)	14	112.9	78								
40	Alluvium	clayey SILT	(U)	20	105.9	92								
50	Alluvium	lean CLAY	(U)	17.6	110.3	91								
60	Alluvium	lean CLAY	(U)	15.5	108.7	77								

For abbreviation explanation see Legend on Page 2 of 2

Excavation: WB4 (TD= 65 ft, No GW)

Depth	Geology	Sample Description	ST	w	DD	S	Max	Opt	EI	LL	PI	% Gravel	% Sand	%Fines
10	Landslide Debris	silty SAND	(U)	8										
19.3	Towsley Formation	Claystone	(B)							62	44		13	87
20	Alluvium	lean CLAY	(U)	18.2	109.8	93								
30	Alluvium	lean CLAY	(U)	24.1	99.9	96								
40	Alluvium	lean CLAY	(U)	16.6	112.3	91								
47	Towsley Formation	Claystone	(B)							86	66		4	96
50	Alluvium	lean CLAY	(U)	13.8	110.9	73								
60	Alluvium	lean CLAY	(U)	14.8	112.1	81								

Excavation: WB5 (TD= 30 ft, No GW)

Depth	Geology	Sample Description	ST	w	DD	S	Max	Opt	EI	LL	PI	% Gravel	% Sand	%Fines
10	Alluvium	clayey SILT	(U)	29.2	99.3	100								
20	Alluvium	lean CLAY	(U)	17.9	112.2	98								
30	Alluvium	lean CLAY	(U)	20.5	107.6	99								

LEGEND

Depth = Sample Depth (ft) below ground surface
ST = Sample Type*
w = Initial Moisture Content (%)
DD = Initial Dry Unit Weight (pcf)
Max = Maximum Dry Unit Weight (pcf)
Opt = Optimum Moisture Content (%)
EI = Expansion Index
S = Degree of Saturation (%)

LL = Liquid Limit
PI = Plasticity Index
e = Void Ratio
n = Porosity (%)
WD = Initial Wet Unit Weight (pcf)
SD = Saturated Unit Weight (pcf)
BD = Bouyant (Submerged) Unit Weight (pcf) - Assuming water unit weight of 62.4 pcf

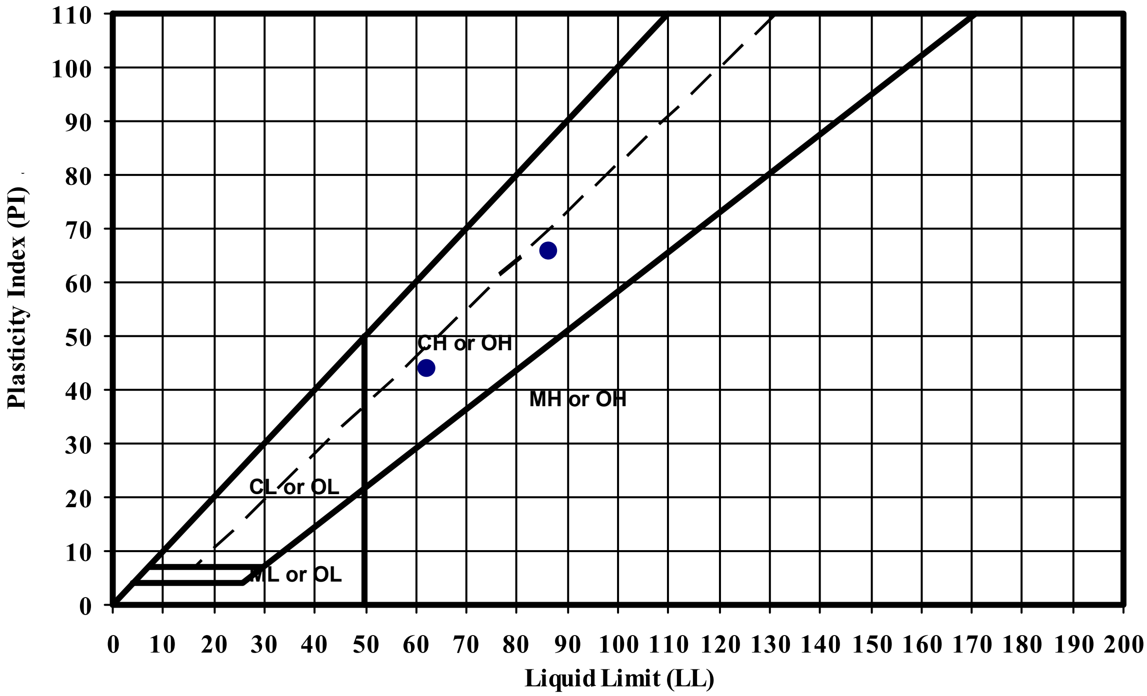
Consol = Consolidation Test Diagram (Plate No.)
Shear = Shear Test Diagram (Plate No.)

*** Sample Types: (U) = relatively Undisturbed; (S) = SPT; (B) = Bulk; (N) = Nuclear; (SC) = Sand Cone**

ATTERBERG LIMITS

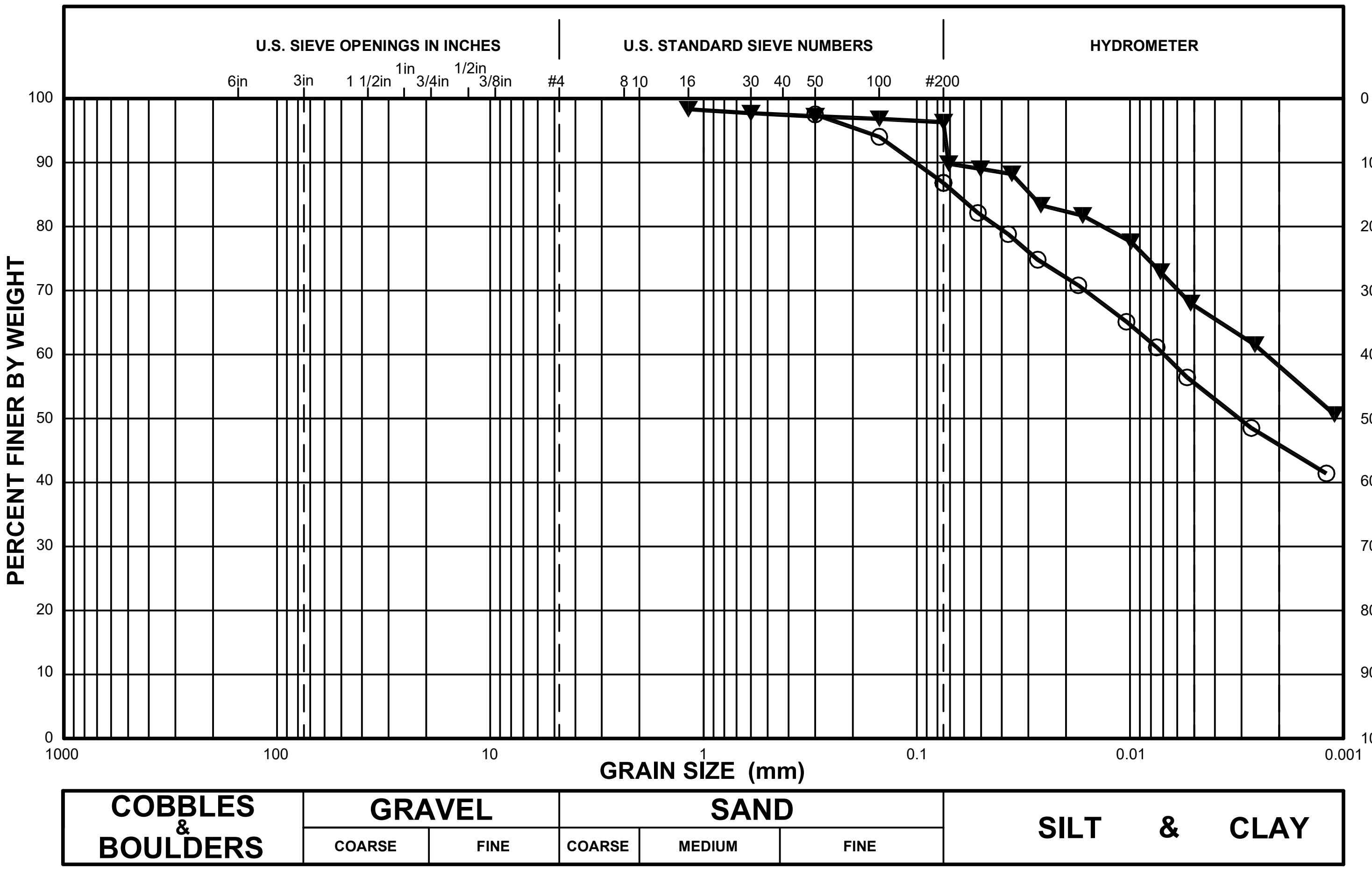
PLASTICITY CHART

ASTM D 4318



Excavation	Depth (ft)	Geology	Soil Description	LL	PI	% Clay (0.002mm)	Fines Class	w	w/LL
WB4	19.3	Tt	Claystone	62	44	46	CH		
WB4	47	Tt	Claystone	86	66	58	CH		

PARTICLE SIZE ANALYSIS

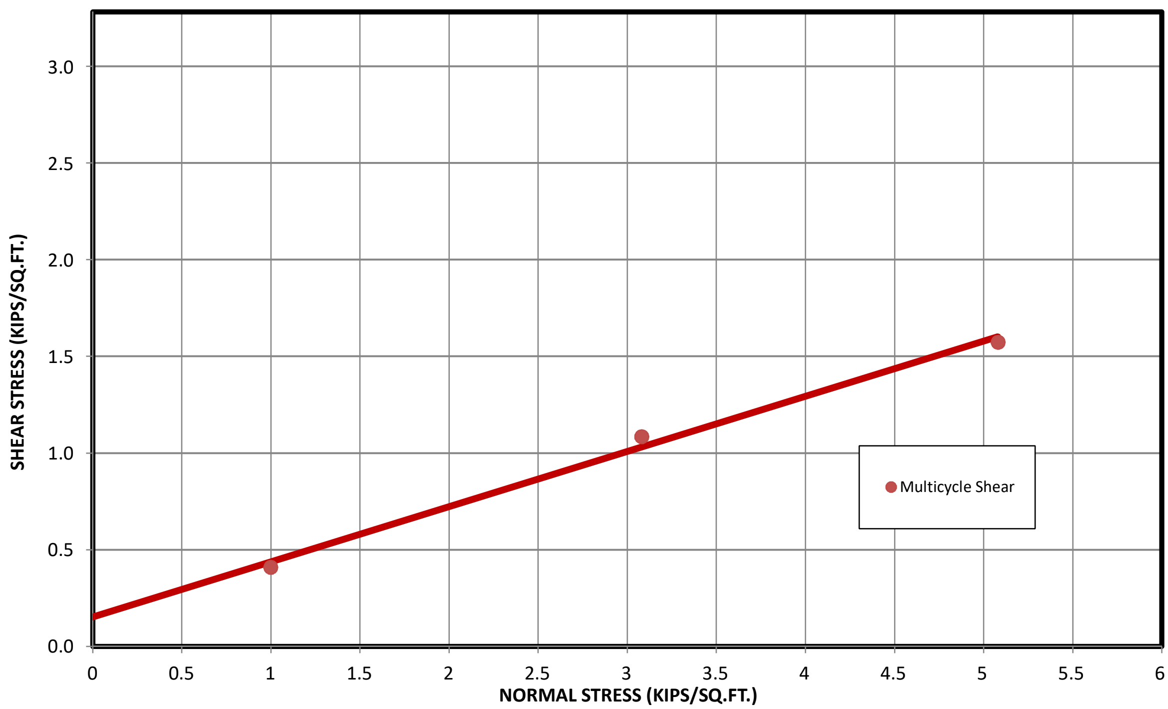


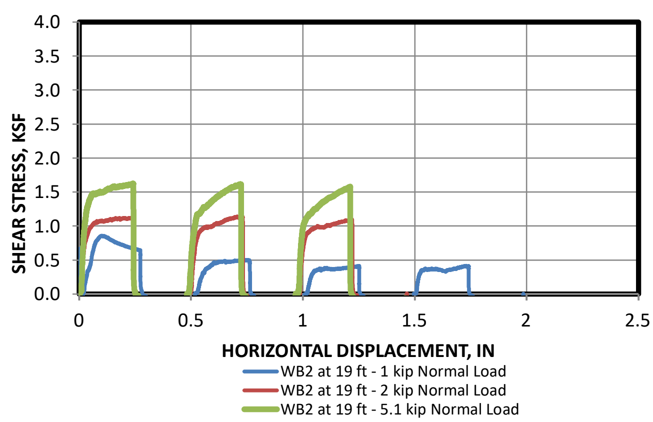
	SAMPLE	DESCRIPTION	%GRAVEL	%SAND	%FINES	D60	D30	D10	Cu	Cc	LL	PI
○	WB4 @ 19.3'	Fat Clay with Sand (CH)	---	13	87	0.007	---	---	---	---	62	44
▼	WB4 @ 47'	Fat Clay with Sand (CH)	---	4	96	0.002	---	---	---	---	86	66

8485.103.094

DIRECT SHEAR TEST RESULTS

Remolded to Field Density





Displacement at 0.0025 inches per minute

TEST DATA:	#1	#2	#3
NORM. PRES. (KSF)	1.0	3.0	5.0
SHEAR STRESS (KSF):	0.410	1.086	1.573
H.DISPL. (IN)	0.25	0.147	0.187
PEAK			
SHEAR STRESS (KSF):			
H.DISPL. (IN)			

PROJECT:	SCVW Recycled Water Tanks
W.O:	8485.103.095
EXCAVATION:	WB2
DEPTH:	19 ft

Multi-cycle Residual

COHESION (KSF):	0.150
PHI (DEG):	16

INITIAL DRY DENSITY (PCF):	105
INITIAL MOISTURE (% OF DD):	29.0
EST.VOID RATIO, e (preshear):	0.59

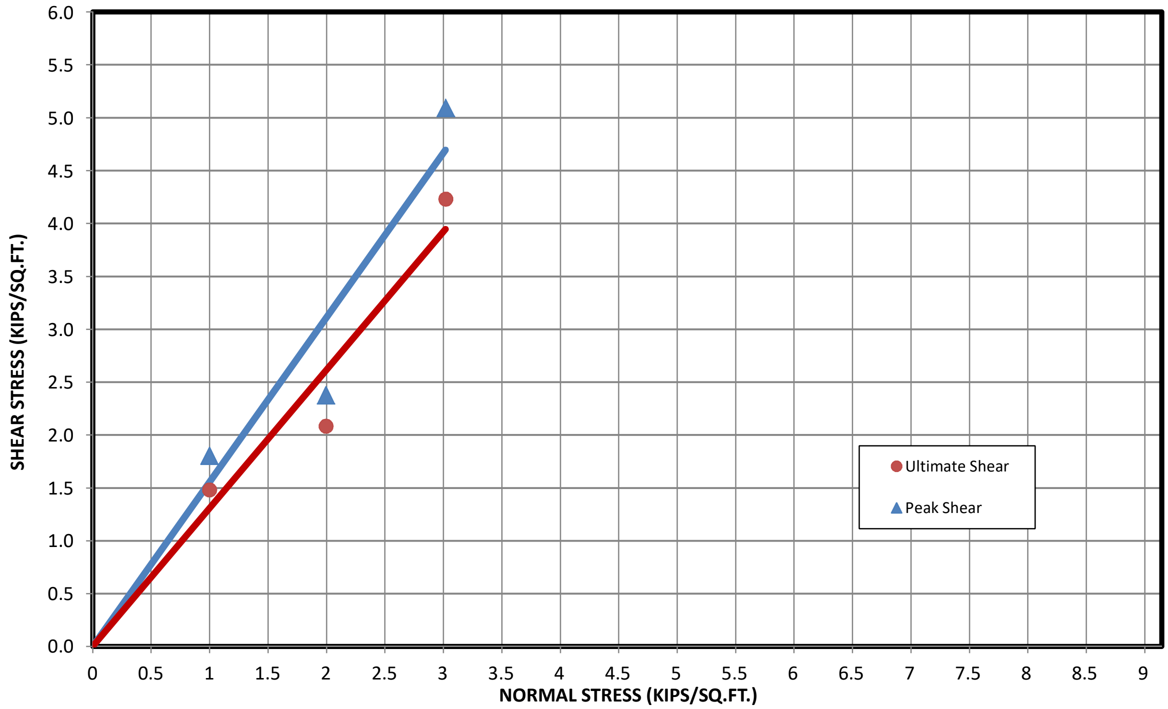
TEST FILES:

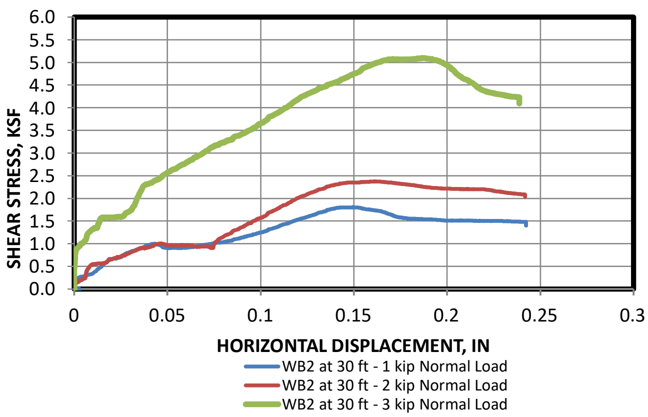
S:\GEOTEST\shears\9481.001\TEST281.DAT
S:\GEOTEST\shears\9481.001\TEST282.DAT
S:\GEOTEST\shears\9481.001\TEST283.DAT

a dba of R & R Services Corporation

DIRECT SHEAR TEST RESULTS

Undisturbed Sample





TEST DATA:	#1	#2	#3
NORM. PRES. (KSF)	1.0	2.0	3.0
ULTIMATE			
SHEAR STRESS (KSF):	1.482	2.084	4.232
H.DISPL. (IN)	0.24	0.242	0.239
PEAK			
SHEAR STRESS (KSF):	1.804	2.376	5.093
H.DISPL. (IN)	0.15	0.16	0.19

PROJECT:	SCVW Recycled Water Tanks
W.O:	8485.103.095
EXCAVATION:	WB2
DEPTH:	30 ft

	ULTIMATE	PEAK
COHESION (KSF):	0.000	0.000
PHI (DEG):	53	57

INITIAL DRY DENSITY (PCF):	107
INITIAL MOISTURE (% OF DD):	25.5
EST.VOID RATIO, e (preshear):	0.56

TEST FILES:

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S:\GEOTEST\shears\8485.103.094\TEST325.DAT
S:\GEOTEST\shears\8485.103.094\TEST326.DAT

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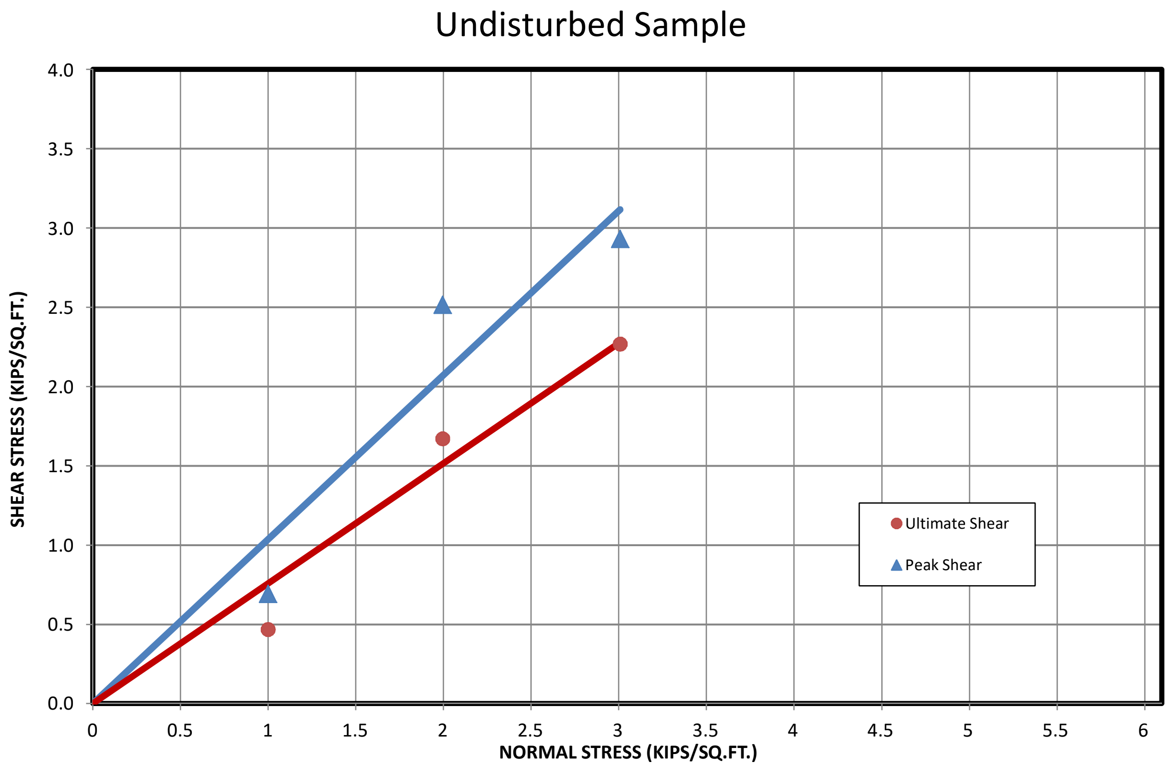
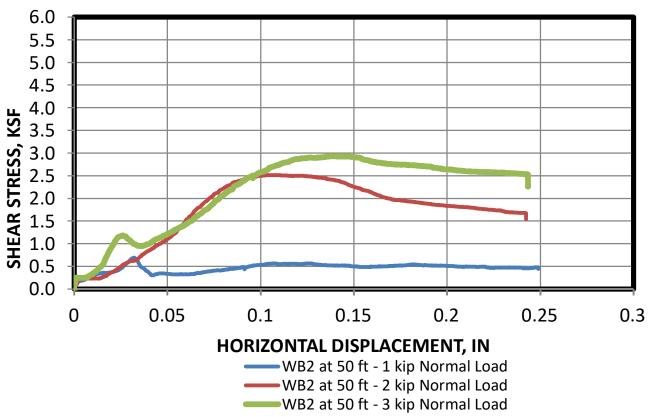
Corporation

DIRECT SHEAR TEST RESULTS





PROJECT:	SCVW Recycled Water Tanks
W.O:	8485.103.095
EXCAVATION:	WB2
DEPTH:	50 ft

TEST DATA:	#1	#2	#3
NORM. PRES. (KSF)	1.0	2.0	3.0
ULTIMATE			
SHEAR STRESS (KSF):	0.468	1.671	2.269
H.DISPL. (IN)	0.25	0.242	0.243
PEAK			
SHEAR STRESS (KSF):	0.692	2.516	2.932
H.DISPL. (IN)	0.03	0.10	0.14

	ULTIMATE		PEAK
COHESION (KSF):	0.000		0.000
PHI (DEG):	37		46

INITIAL DRY DENSITY (PCF):	111.5
INITIAL MOISTURE (% OF DD):	25.5
EST.VOID RATIO, e (preshear):	0.50

TEST FILES:

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S:\GEOTEST\shears\8485.103.094\TEST328.DAT
S:\GEOTEST\shears\8485.103.094\TEST329.DAT

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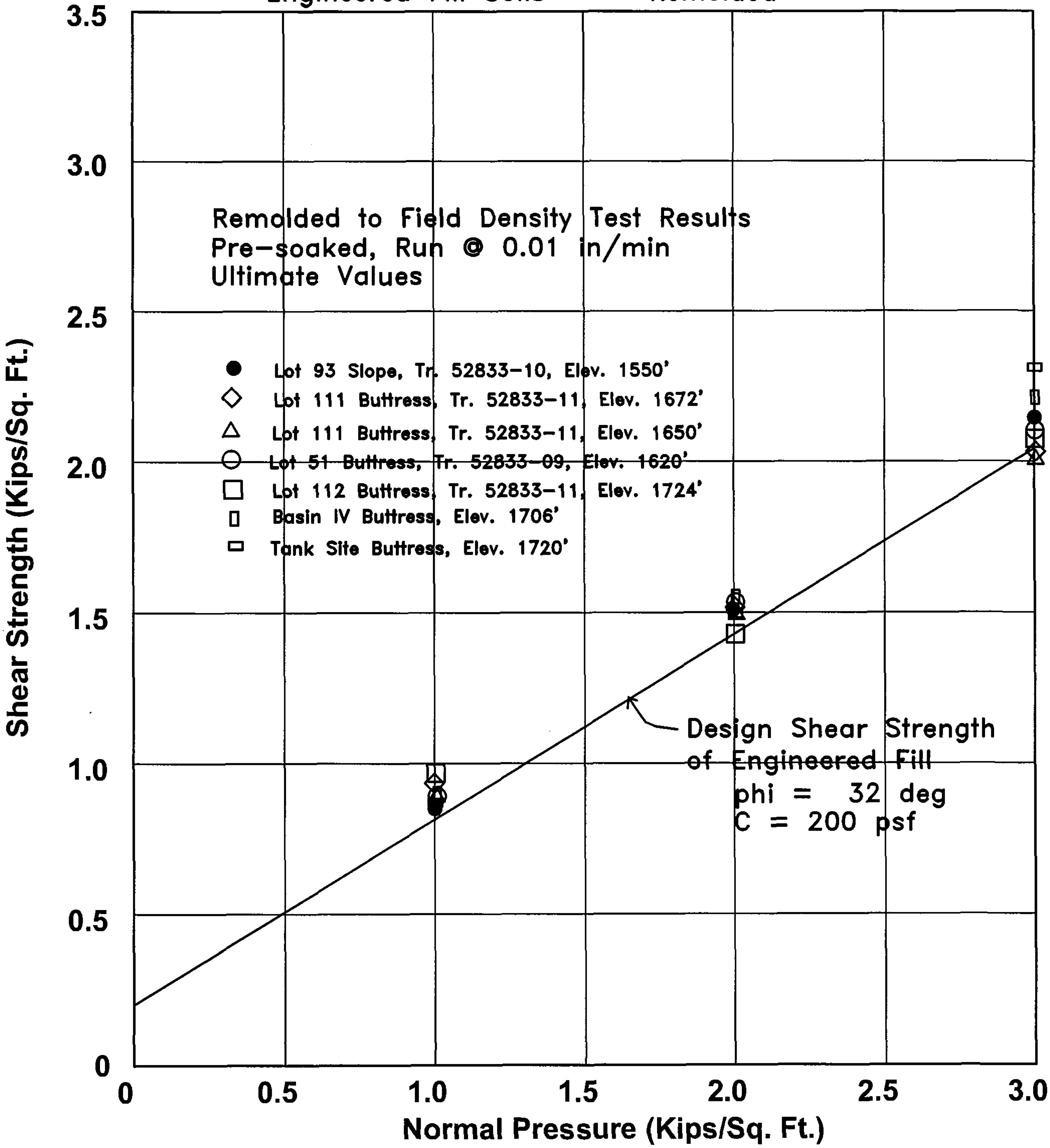
SHEAR TEST DIAGRAM

Material: Engineered Fill Soils Remolded



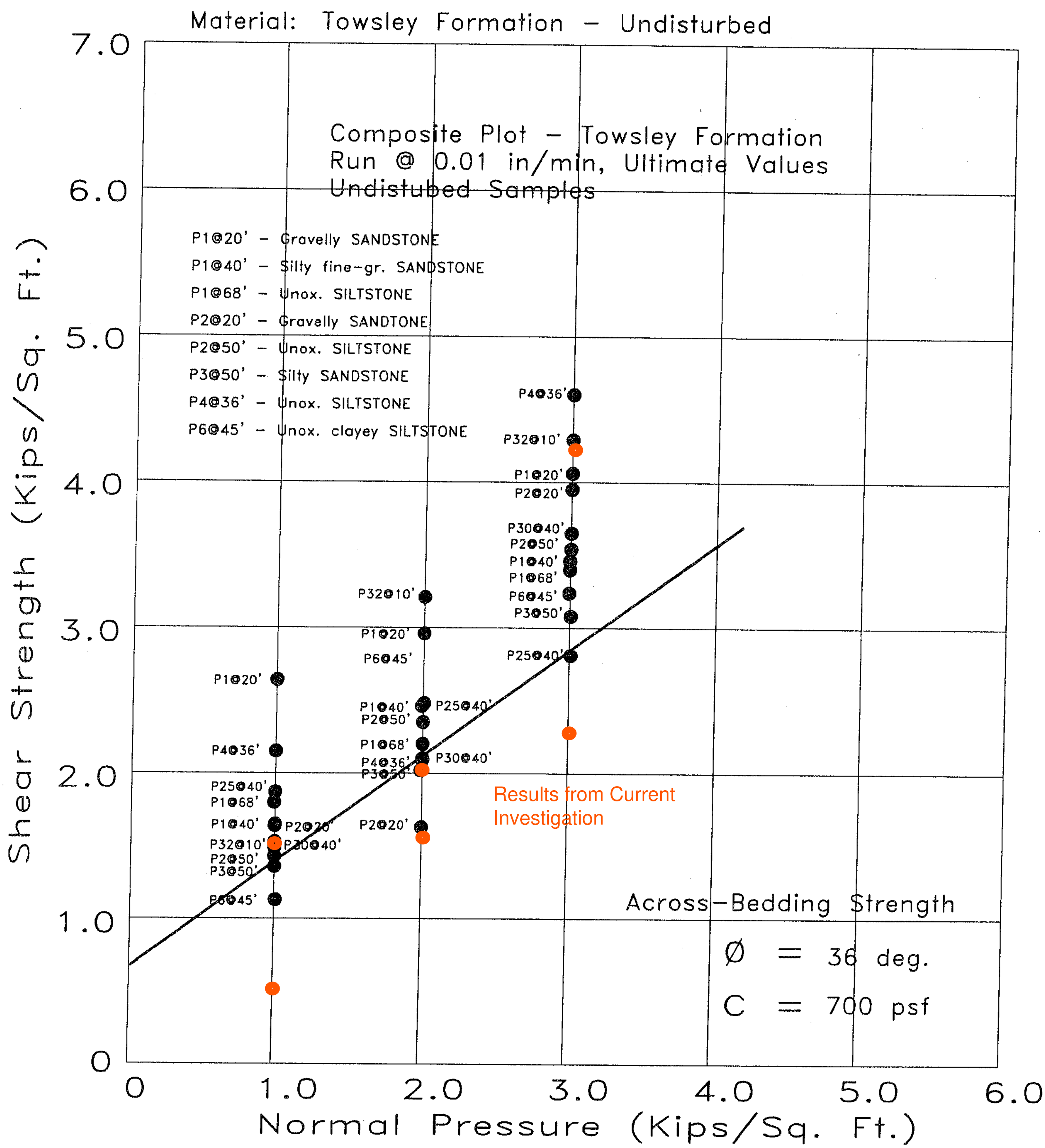
Project Fair Oaks Ranch, Ph.3B
Excavation Misc.
Depth Misc.

Geolabs – Westlake Village
GEOLOGY AND SOIL ENGINEERING

BY DS
DATE
W.O. 8485.300

PLATE S1

SHEAR TEST DIAGRAM



Project Tr. 52833, Ph.3B
Excavation Misc.
Depth Misc.

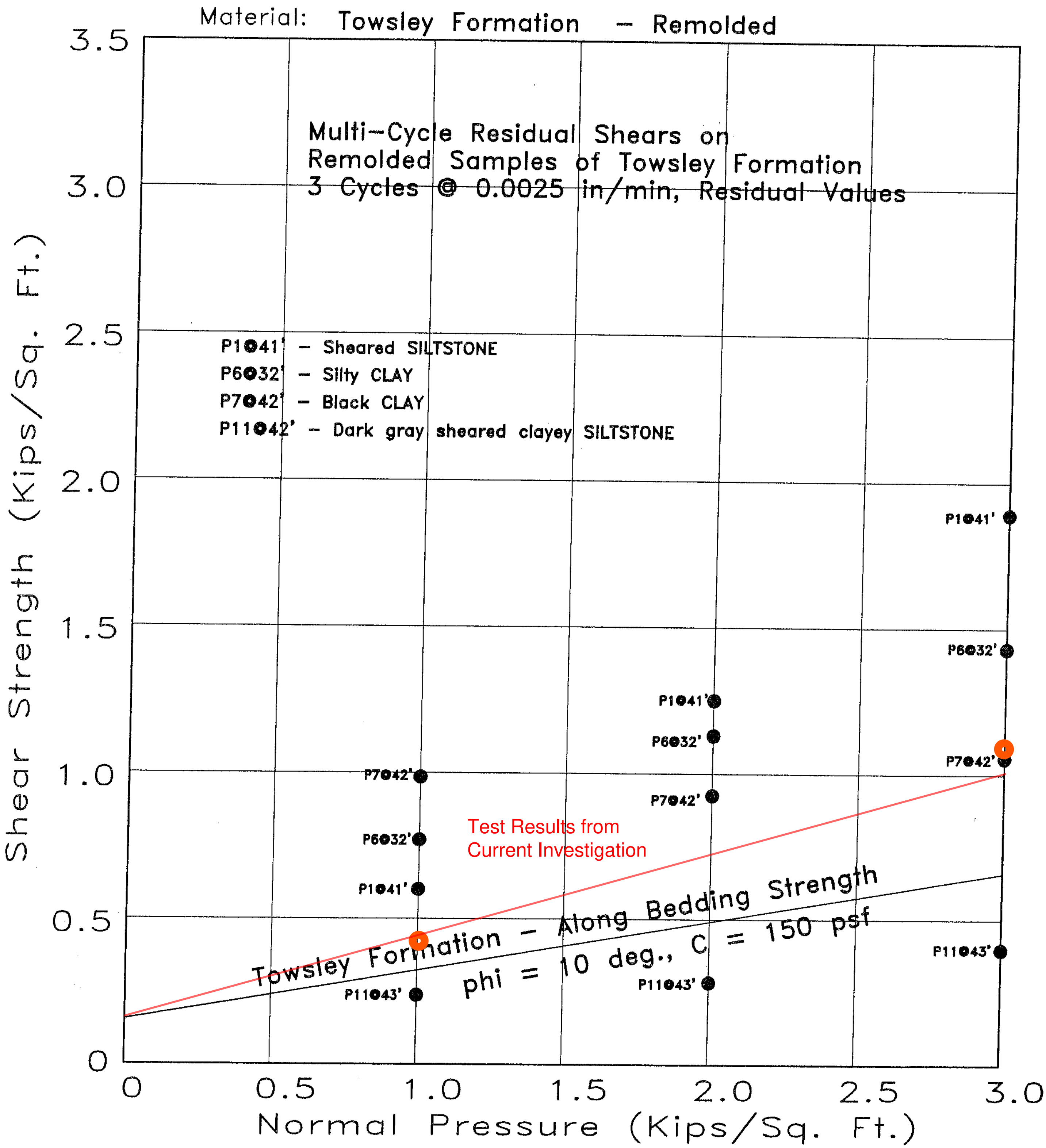
Geolabs – Westlake Village
GEOLOGY AND SOIL ENGINEERING
DATE ______ BY DS
SCALE ______ W.O. 8485–52833E

PLATE S.2

SCV Water

SHEAR TEST DIAGRAM

W.O. 8485



Project Tr. 52833, Ph.3B
Excavation Misc.
Depth Misc.

Geolabs – Westlake Village
GEOLOGY AND SOIL ENGINEERING

DATE

BY DS
W.O. 8485-52833E

PLATE S.5

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Consulting Corrosion Engineers – Since 1959

Table 1 - Laboratory Tests on Soil Samples

Geolabs
Fair Oaks
Your #8485.300, MJS&A #06-0435LAB
15-Mar-06

Sample ID			Water Tank @ ~~1917'~~ 1817'	Water Tank @ ~~1853'~~ 1753	Lot 14, Tr 12
Resistivity		**Units**			
as-received		ohm-cm	25,000	6,300	3,800
saturated		ohm-cm	580	790	1,700
pH			8.2	7.6	8.1
Electrical Conductivity		mS/cm	0.71	1.66	0.22
Chemical Analyses					
Cations					
calcium	Ca^{2+}	mg/kg	32	1,379	24
magnesium	Mg^{2+}	mg/kg	ND	352	7
sodium	Na^{1+}	mg/kg	662	ND	176
Anions					
carbonate	CO_3^{2-}	mg/kg	56	ND	23
bicarbonate	HCO_3^{1-}	mg/kg	345	98	320
chloride	Cl^{1-}	mg/kg	50	20	ND
sulfate	SO_4^{2-}	mg/kg	1,032	4,566	166
Other Tests					
ammonium	NH_4^{1+}	mg/kg	na	na	na
nitrate	NO_3^{1-}	mg/kg	na	na	na
sulfide	S^{2-}	qual	na	na	na
Redox		mV	na	na	na

Electrical conductivity in millisiemens/cm and chemical analysis were made on a 1:5 soil-to-water extract.
mg/kg = milligrams per kilogram (parts per million) of dry soil.
Redox = oxidation-reduction potential in millivolts
ND = not detected
na = not analyzed

431 West Baseline Road · Claremont, CA 91711
Phone: 909.626.0967 · Fax: 909.626.3316

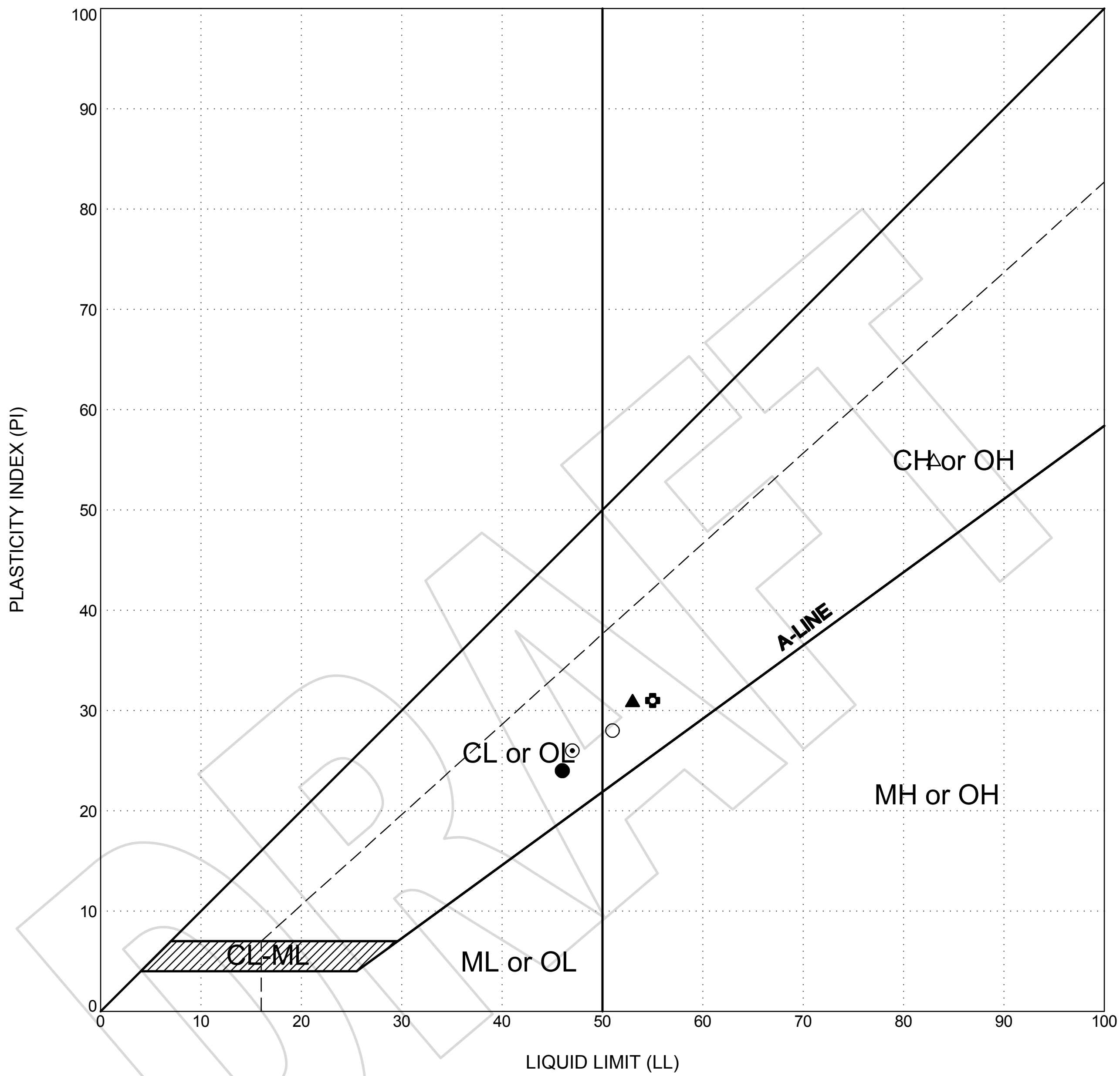
Fugro Labwork

Kennedy Jenks
Project No. 04.61180021

DRILL HOLE	DEPTH, ft	SAMPLE NUMBER	MATERIAL DESCRIPTION	UWW pcf	UDW pcf	MC %	FINES %	ATTERBERG LIMITS LL	ATTERBERG LIMITS PI	COMPACTION TEST MAX DD pcf	COMPACTION TEST OPT MC %	DIRECT SHEAR C ksf	DIRECT SHEAR PHI deg	COMPRESSIVE STRENGTH TESTS Qu, ksf	COMPRESSIVE STRENGTH TESTS S_u (Cell Prs.) ksf	CORROSIVITY TESTS R	CORROSIVITY TESTS pH	CORROSIVITY TESTS Cl	CORROSIVITY TESTS So_4 (ppm)	R-VALUE	EXPANSION INDEX	SAND EQUIVALENT (SE)	Specific Gravity
BA-1	0.0		CLAYSTONE													832	7.60	31	6230.0		75.0		
BA-1	5.0		CLAYSTONE	129	110	17																	
BA-1	10.0		CLAYSTONE	128	105	22		51	28														
BA-1	15.0		CLAYSTONE	130	105	24																	
BA-1	20.0		CLAYSTONE	131	112	17		46	24			3.3	34										
BA-1	24.7		CLAYSTONE					83	55														
BA-1	25.0		CLAYSTONE	129	104	24																	
BA-1	30.0		CLAYSTONE				98	53	31						22.7(3.8)								
BA-1	35.0		CLAYSTONE	138	118	17																	
BA-1	40.0		CLAYSTONE	139	120	16																	
BA-1	50.0		Sandy SILTSTONE	135	119	13																	
BA-2	5.0		Silty SAND (SM)	137	129	6																	
BA-2	10.0		Well-graded SAND (SW)	132	122	9																	
BA-2	15.0		Well-graded SAND (SW)	140	127	10																	
BA-2	20.0		Silty SAND (SM)	124	113	10																	
BA-2	25.0		Lean CLAY (CL)	132	113	17		47	26			1.9	50										
BA-2	30.0		CLAYSTONE	137	115	19		55	31														
BA-2	35.0		CLAYSTONE												23.7(4.5)								
BA-2	40.0		CLAYSTONE	132	112	18																	

SUMMARY OF LABORATORY TEST RESULTS

Cherry Willow Tank
Santa Clarita, California



LEGEND	location	depth, ft	CLASSIFICATION	LIQUID LIMIT(LL)	PLASTIC LIMIT(PL)	PLASTICITY INDEX (PI)
○	BA-1	10.0	CLAYSTONE	51	23	28
●	BA-1	20.0	CLAYSTONE	46	22	24
△	BA-1	24.7	CLAYSTONE	83	28	55
▲	BA-1	30.0	CLAYSTONE	53	22	31
⊙	BA-2	25.0	Lean CLAY (CL)	47	21	26
✿	BA-2	30.0	CLAYSTONE	55	24	31

ATTERBERG LIMITS TEST RESULTS

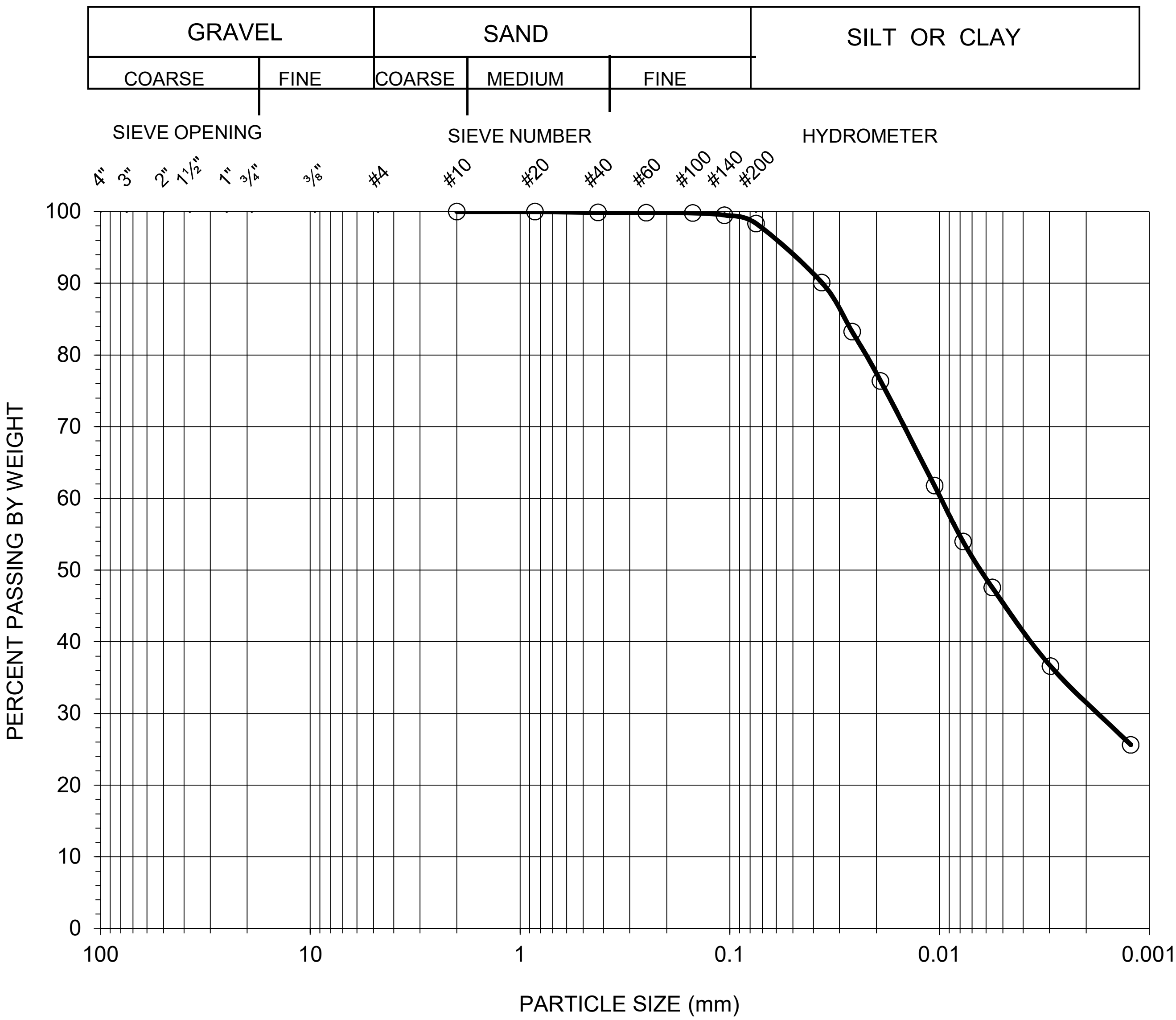
PLASTICITY CHART
Cherry Willow Tank
Santa Clarita, California

PLATE B-2

AP Engineering and Testing, Inc.
DBE|MBE|SBE
2607 Pomona Boulevard | Pomona, CA 91768
t. 909.869.6316 | f. 909.869.6318 | www.aplaboratory.com

GRAIN SIZE DISTRIBUTION CURVE
ASTM D 6913 & D 7928

Client Name:	Fugro Consultants, Inc.	Tested by:	NG	Date:	06/20/18
Project Name:	Cherry Willow Tank	Computed by:	JP	Date:	06/20/18
Project Number:	04.61180021	Checked by:	AP	Date:	06/20/18



Symbol	Boring No.	Sample No.	Sample Depth (feet)	Percent			Atterberg Limits LL:PL:PI	Soil Type U.S.C.S
				Gravel	Sand	Silt & Clay		
○	BA-1	S7	30	0	2	98	53:22:31	CH

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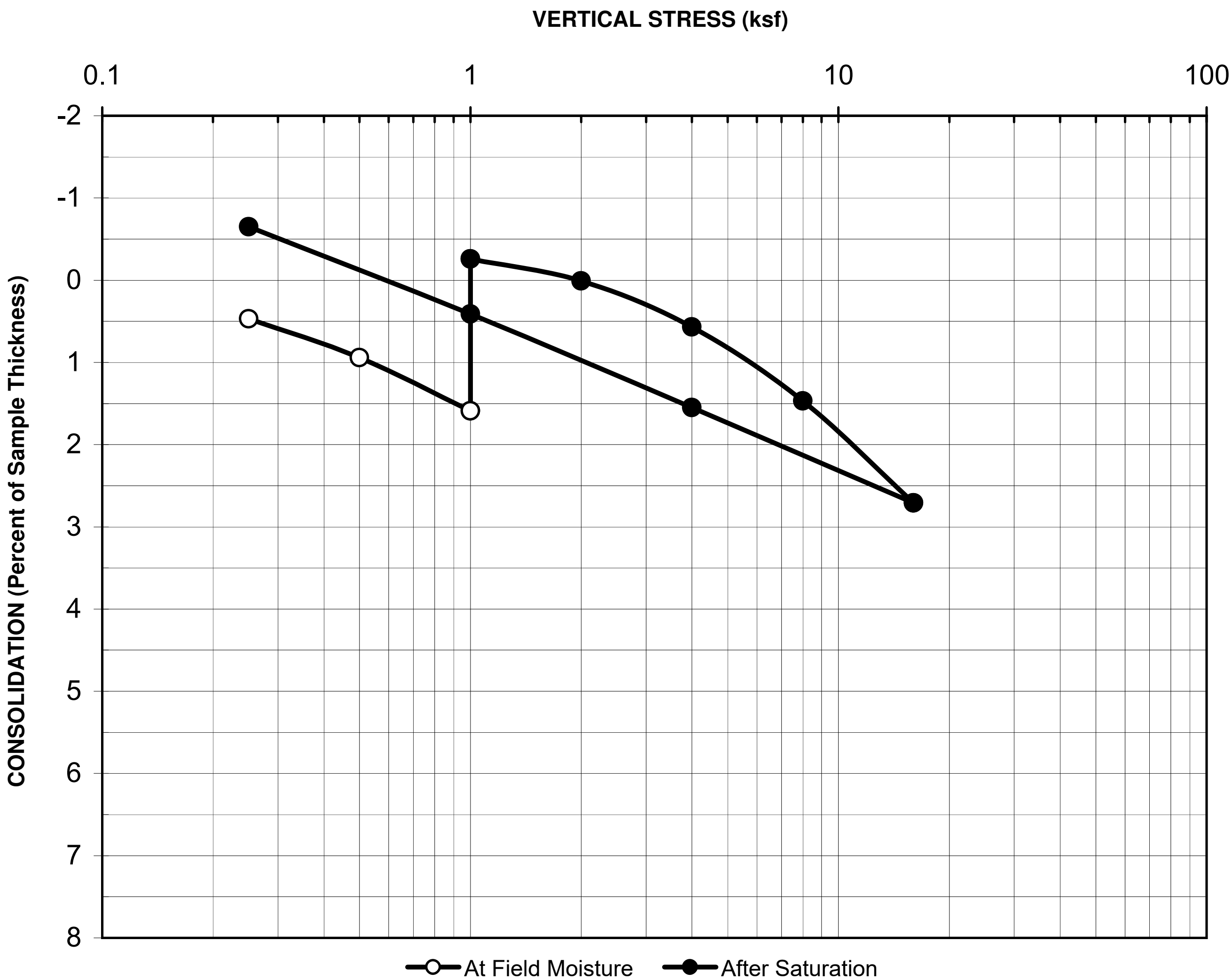

Boring No. :	BA-1	Initial Dry Unit Weight (pcf):	102.2
Sample No.:	S3	Initial Moisture Content (%):	22.1
Depth (feet):	10	Final Moisture Content (%):	27.4
Sample Type:	Mod Cal	Assumed Specific Gravity:	2.7
Soil Description:	Fat Clay	Initial Void Ratio:	0.65
Remarks:	Swell= 1.85% upon inundation		

CONSOLIDATION CURVE
ASTM D 2435

Project Name: Cherry Willow Tank
Project No.: 04.61180021
Date: 6/20/2018
AP No: 18-0622 **Figure No:** 1

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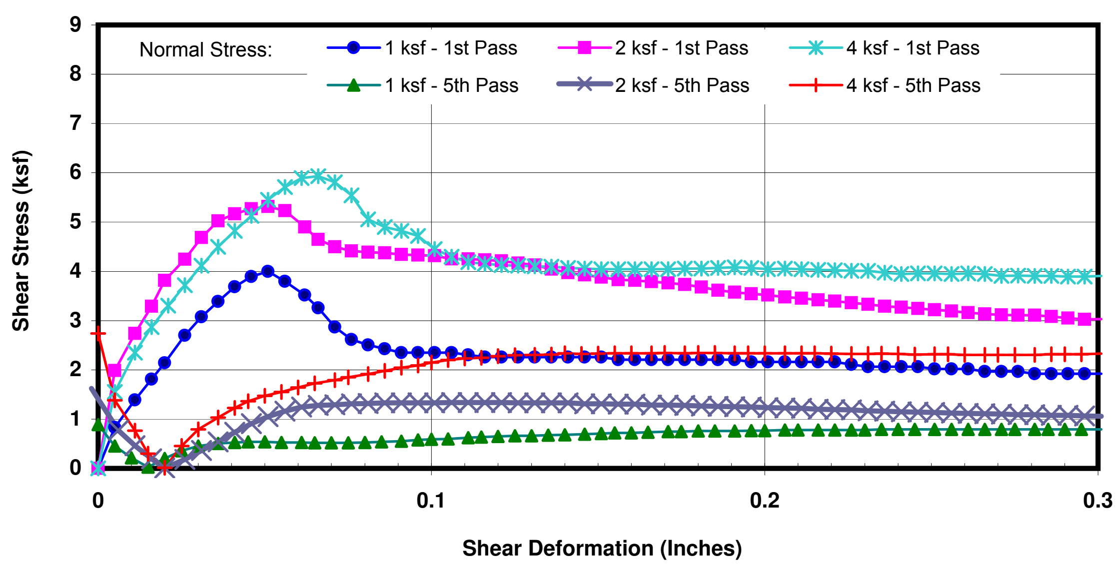
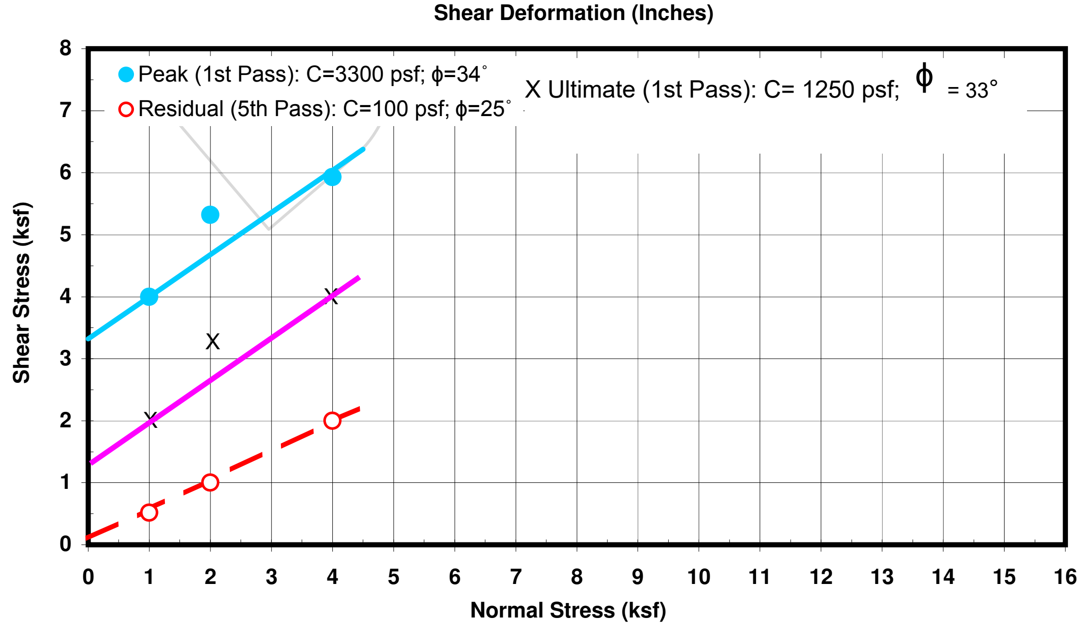
DIRECT SHEAR TEST RESULTS
ASTM D 3080

Project Name: Cherry Willow Tank
Project No.: 04.61180021
Boring No.: BA-1
Sample No.: S5 **Depth (ft):** 20
Sample Type: Mod. Cal.
Soil Description: Claystone
Test Condition: Inundated **Shear Type:** 5-Pass Residual

Tested By: LS **Date:** 06/12/18
Computed By: JP **Date:** 06/14/18
Checked by: AP **Date:** 06/14/18

Wet Unit Weight (pcf)	Dry Unit Weight (pcf)	Initial Moisture Content (%)	Final Moisture Content (%)	Initial Degree Saturation (%)	Final Degree Saturation (%)	Normal Stress (ksf)	Peak Shear (1st Pass) (ksf)	Residual Shear (5th Pass) (ksf)
128.9	109.9	17.2	19.9	87	101	1	3.997	0.516
						2	5.317	1.000
						4	5.928	2.000





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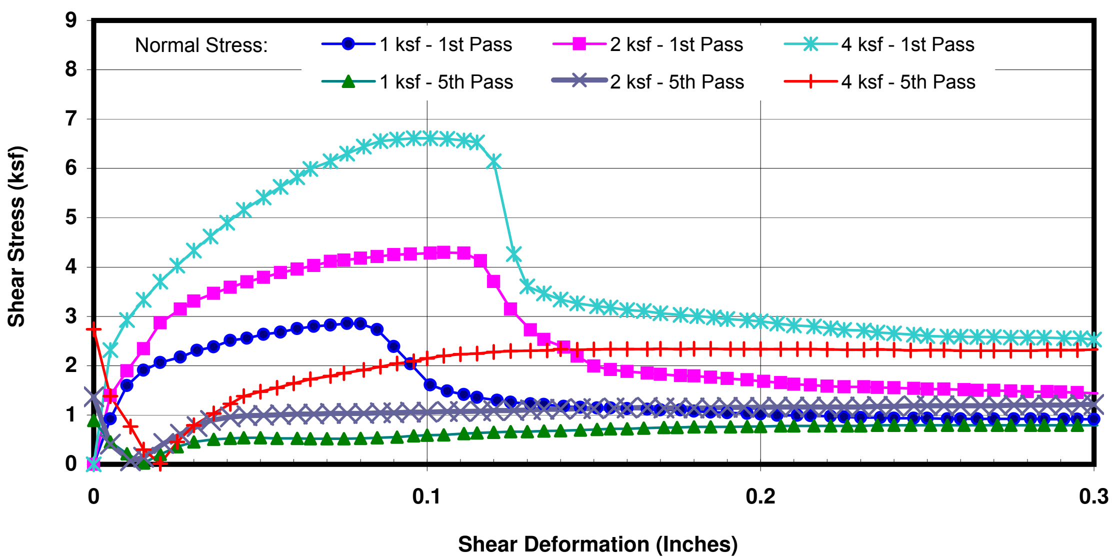
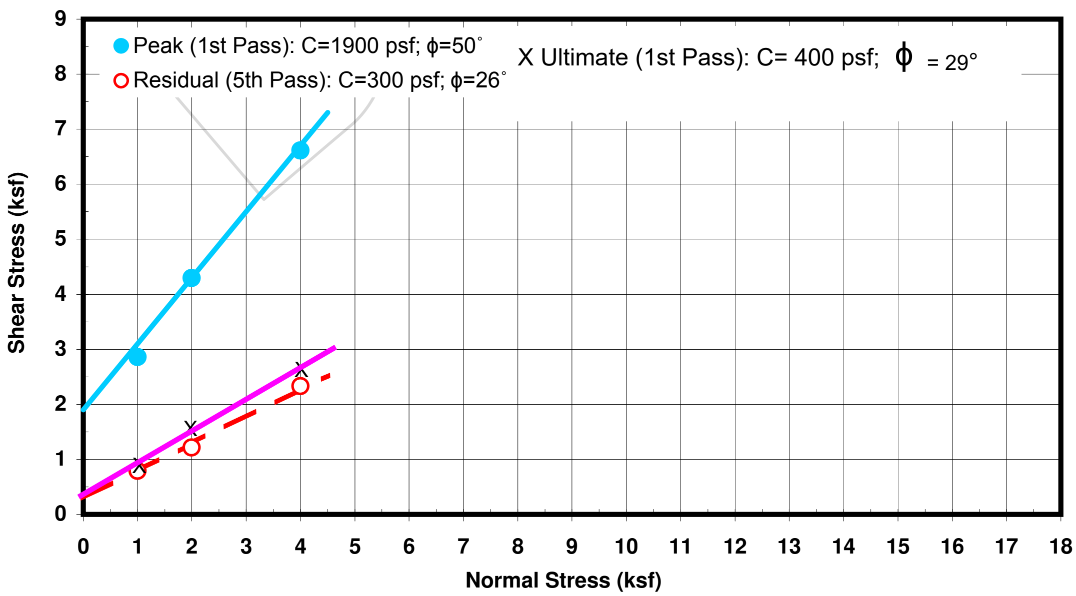
DIRECT SHEAR TEST RESULTS
ASTM D 3080

Project Name:	Cherry Willow Tank	**Tested By:**	LS	**Date:**	06/13/18
Project No.:	04.61180021	**Computed By:**	JP	**Date:**	06/14/18
Boring No.:	BA-2	**Checked by:**	AP	**Date:**	06/14/18

Sample No.: S7 **Depth (ft):** 25
Sample Type: Mod. Cal.
Soil Description: Claystone
Test Condition: Inundated **Shear Type:** 5-Pass Residual

Wet Unit Weight (pcf)	Dry Unit Weight (pcf)	Initial Moisture Content (%)	Final Moisture Content (%)	Initial Degree Saturation (%)	Final Degree Saturation (%)	Normal Stress (ksf)	Peak Shear (1st Pass) (ksf)	Residual Shear (5th Pass) (ksf)
130.8	111.4	17.4	18.9	91	100	1	2.858	0.792
						2	4.296	1.212
						4	6.612	2.328





COOPER TESTING LABORATORY

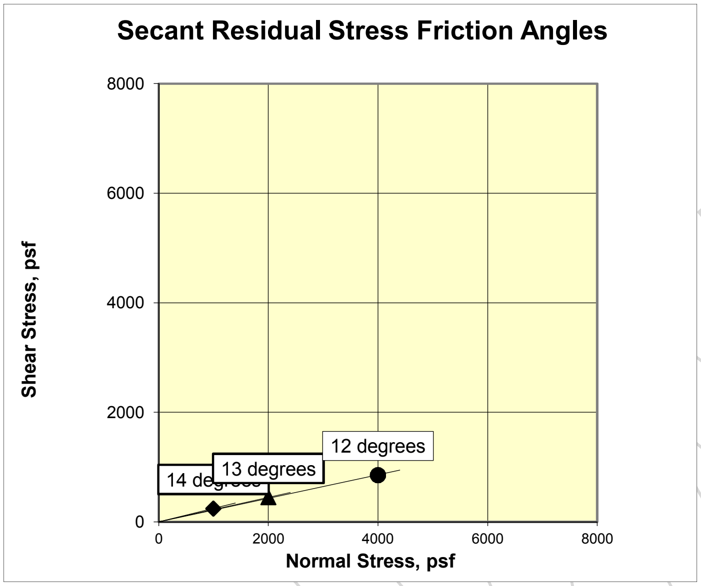
Drained Residual Torsional Shear Strength (ASTM D6467)

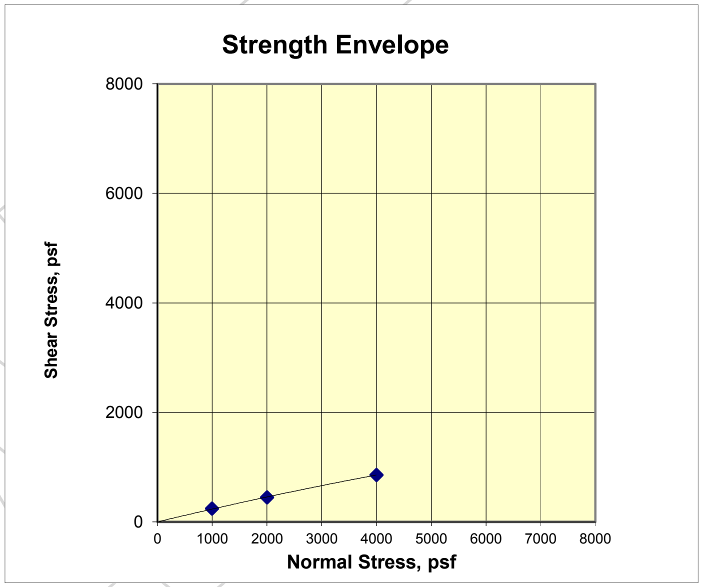
CTL Job No.:	446-299	**Boring:**	BA1	**Date:**	6/21/2018	**Clay, %:**	
Client:	Fugro Consultants	**Sample:**	S13	**By:**	PJ	**LL:**	
Project Name:	Cherry Willow Tank	**Depth (ft):**	18-19	**Checked:**	DC	**PL:**	
Project Number:	04.61180021	**Test Type:**	Fully Softened Residual				

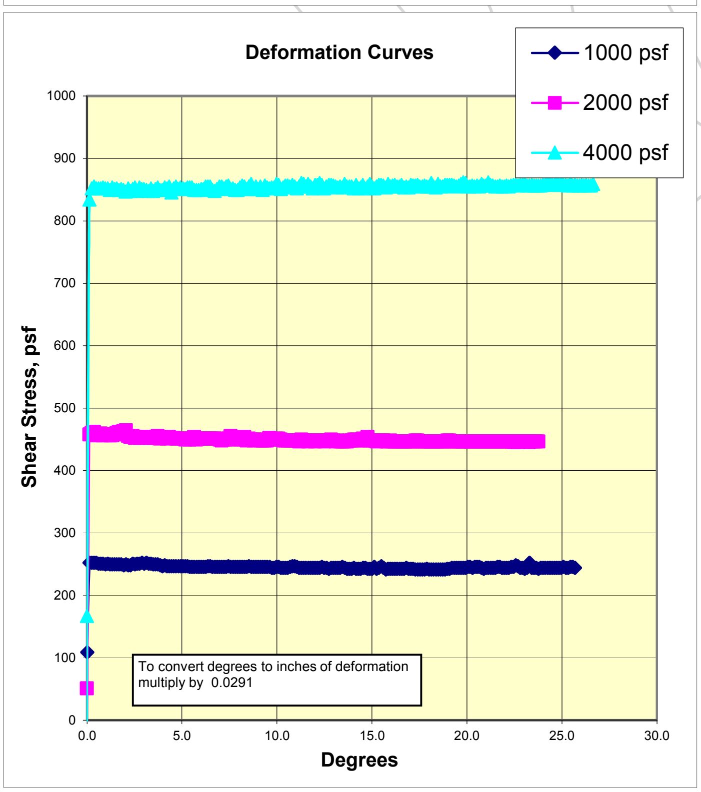
Soil Type: Gray CLAY

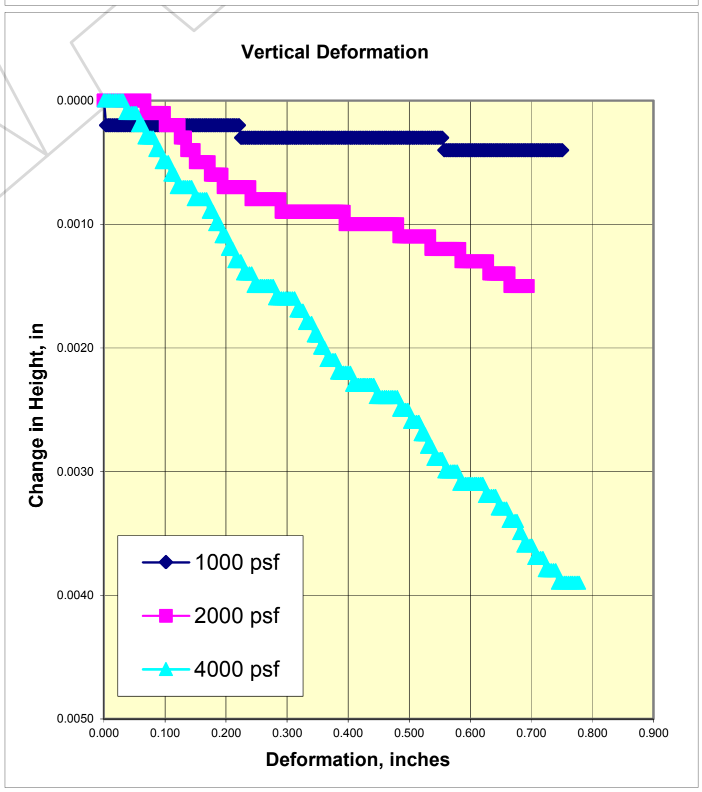
Normal Stress, psf:	1000	2000	4000
Secant Phi, deg.:	14	13	12

Remarks: A small friction correction was applied to each point.









Drained Residual Torsional Shear Strength (ASTM D6467)

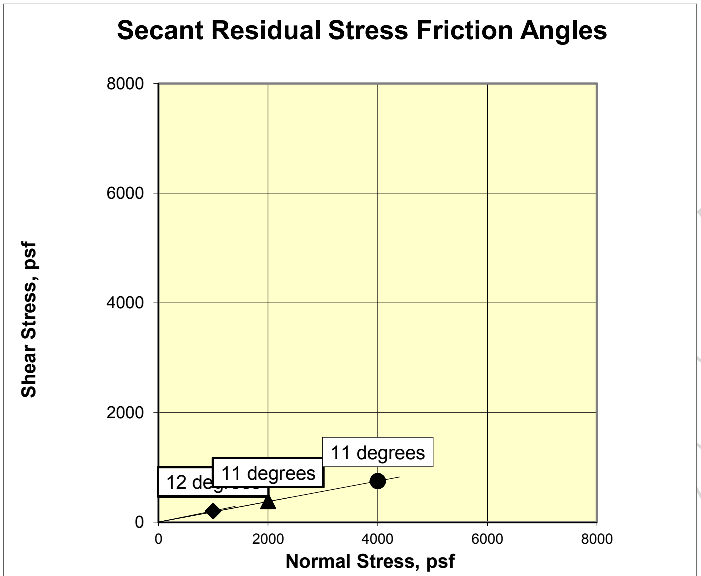
COOPER TESTING LABORATORY

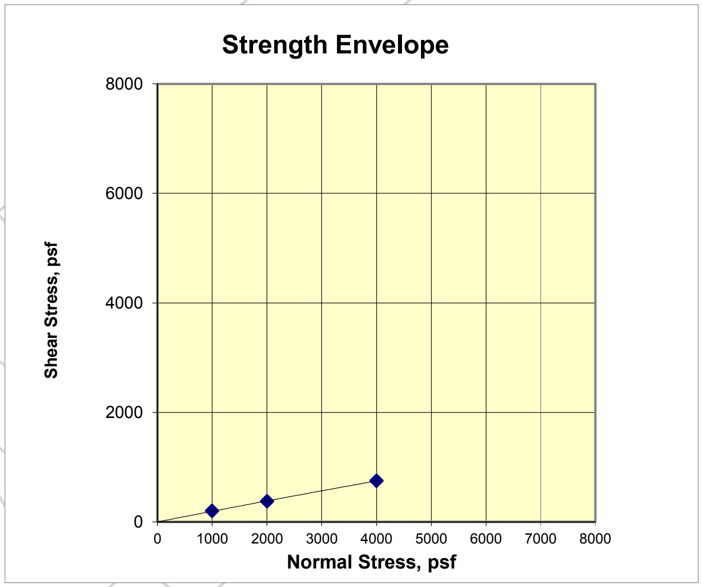
CTL Job No.:	446-299	**Boring:**	BA2	**Date:**	6/20/2018	**Clay, %:**	
Client:	Fugro Consultants	**Sample:**	S13	**By:**	PJ	**LL:**	
Project Name:	Cherry Willow Tank	**Depth (ft):**	17.6	**Checked:**	DC	**PL:**	
Project Number:	04.61180021	**Test Type:**	Fully Softened Residual				

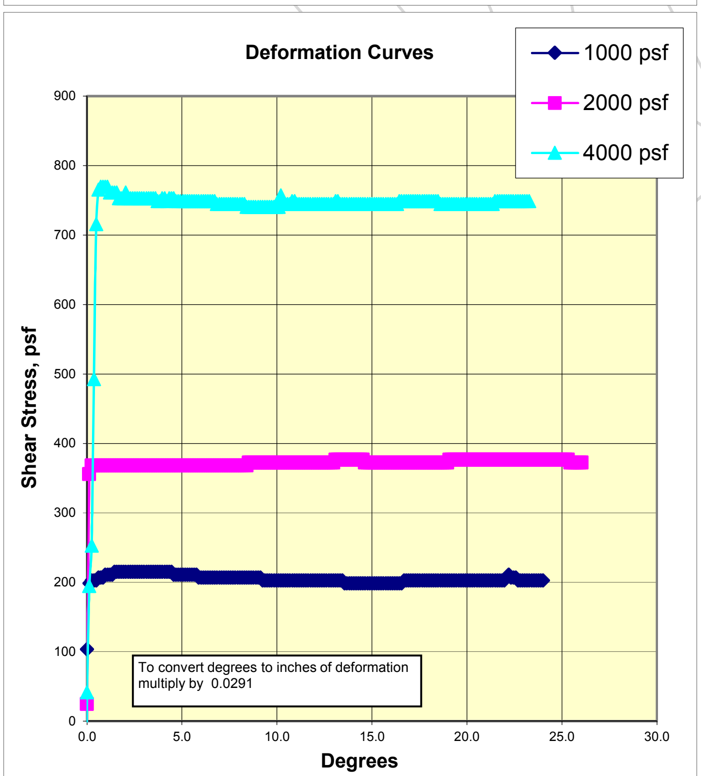
Soil Type: Olive Brown CLAY w/ Sand

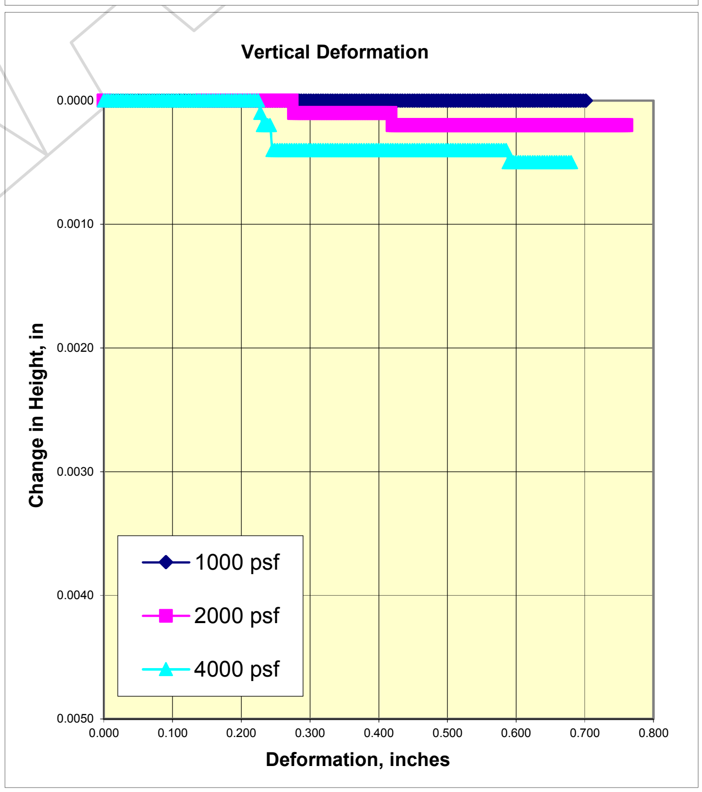
Normal Stress, psf:	1000	2000	4000
Secant Phi, deg.:	12	11	11

Remarks: A small friction correction was applied to each point.









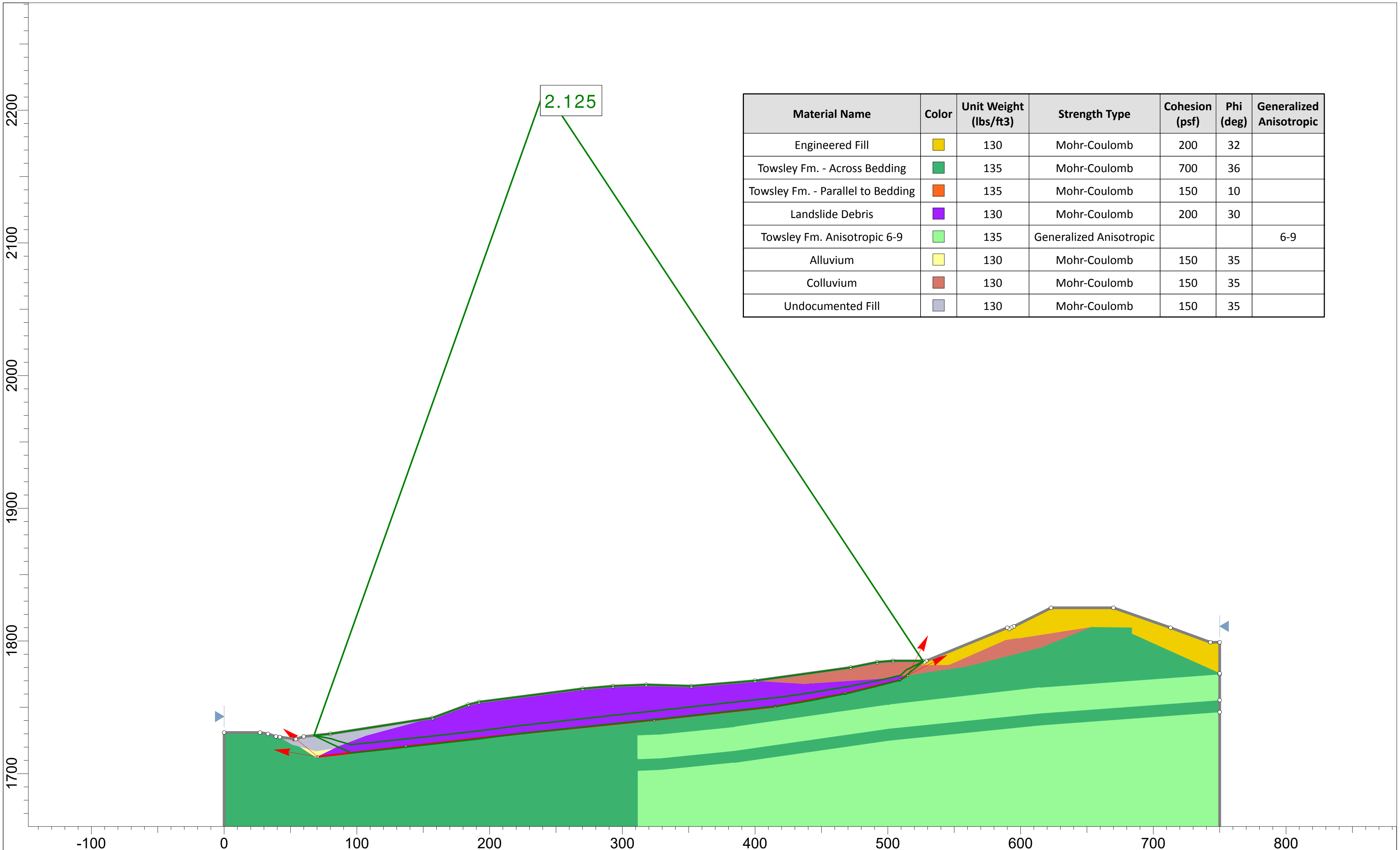
APPENDIX C
Slope Stability Calculations

October 30, 2020
W.O. 8485

CROSS SECTION	STATIC FS	PSEUDO-STATIC FS (for k = 0.15)	TEMPORARY FS	DESCRIPTION	FILE NAME	PLATE NUMBERS
WT13-WT13'	2.12	0.98	N/A	BASE OF SLIDE	WT13.slmd	C.4 - C.23
	2.24	1.28	N/A	DEEP BEDROCK		C.24 - C.43
	2.27	1.59	N/A	FILL SLOPE		C.44 - C.61
WT14-WT14'	1.67	0.82	N/A	BASE OF SLIDE	WT14.slmd	C.62 - C.82
	2.58	1.22	N/A	DEEP BEDROCK		C.83 - C.103
WT15-WT15'	1.30	0.77	N/A	BASE OF SLIDE	WT15.slmd	C.104 - C.123
	2.08	1.25	N/A	DEEP BEDROCK		C.124 - C.143
R1-R1'	N/A	N/A	1.41	3/4:1 BACKCUT	R1.slmd	C.144 - C.151
R3-R3'	N/A	N/A	1.51	1:1 BACKCUT	R3.slmd	C.152 - C.158

Boring	Depth Interval (ft)	Shear Strength	Dip Range (deg)	Rationale
WB1B	0 to 16	Colluvium	all	colluvium exposed
	16 to 20	Landslide Debris	all	postulated landslide exposed
	20 to 21	Towsley Fm. - Parallel to Bedding	all	clay shear at 21 ft
	21 to 36	Towsley Fm. - Across Bedding	all	favorable bedding orientation
	36 to 54	Towsley Fm. - Parallel to Bedding	6 to 9	unfavorable bedding orientation
	54 to 63	Towsley Fm. - Across Bedding	all	coarse-grained
	63 +	Towsley Fm. - Parallel to Bedding	6 to 9	material unexplored
WB2	0 to 17.5	Landslide Debris	all	postulated landslide exposed
	17.5 to 18.5	Towsley Fm. - Parallel to Bedding	all	base of postulated landslide
	18.5 to 43	Towsley Fm. - Across Bedding	all	favorable bedding orientation
	43 to 60	Towsley Fm. - Parallel to Bedding	6 to 9	unfavorable bedding orientation
	60 to 69	Towsley Fm. - Across Bedding	all	projection of coarse-grained material from WB4
	69 +	Towsley Fm. - Parallel to Bedding	6 to 9	material unexplored
WB3	0 to 4	Engineered Fill	all	engineered fill exposed
	4 to 16	Colluvium	all	colluvium exposed
	16 to 46	Towsley Fm. - Across Bedding	all	favorable bedding orientation
	46 to 65	Towsley Fm. - Parallel to Bedding	6 to 9	unfavorable bedding orientation
	65 to 74	Towsley Fm. - Across Bedding	all	coarse-grained
	74 +	Towsley Fm. - Parallel to Bedding	6 to 9	material unexplored
WB4	0 to 4.5	Engineered Fill	all	engineered fill exposed
	4.5 to 19	Landslide Debris	all	postulated landslide exposed
	19 to 20	Towsley Fm. - Parallel to Bedding	all	clay shears at 18.9 ft and 19.3 ft
	20 to 44	Towsley Fm. - Across Bedding	all	favorable bedding orientation in WB1B, WB2, and WB5
	44 to 61	Towsley Fm. - Parallel to Bedding	6 to 9	unfavorable bedding orientation
	61 to 65	Towsley Fm. - Across Bedding	all	coarse-grained
	65 to 70	Towsley Fm. - Across Bedding	all	projection of coarse-grained material from WB1B
	70 +	Towsley Fm. - Parallel to Bedding	6 to 9	material unexplored
WB5	0 to 5	Engineered Fill	all	engineered fill exposed
	5 to 30 +	Towsley Fm. - Across Bedding	all	favorable bedding orientation

Boring	Depth Interval (ft)	Shear Strength	Dip Range (deg)	Rationale
P8	0 to 29	Landslide Debris	all	landslide debris exposed
	29 to 30	Towsley Fm. - Parallel to Bedding	all	base of landslide
	30 to 47 +	Towsley Fm. - Across Bedding	all	favorable bedding orientation
P38	0 to 8	Engineered Fill	all	fill
	8 to 24	Towsley Fm. - Across Bedding	all	coarse-grained
	24 to 41	Towsley Fm. - Across Bedding	all	favorable bedding orientation
	41 to 57	Towsley Fm. - Parallel to Bedding	6 to 9	unfavorable bedding orientation
	57 to 60	Towsley Fm. - Parallel to Bedding	6 to 9	projection from WB3
	60 to 69	Towsley Fm. - Across Bedding	all	projection from WB3
	69 +	Towsley Fm. - Parallel to Bedding	6 to 9	material unexplored

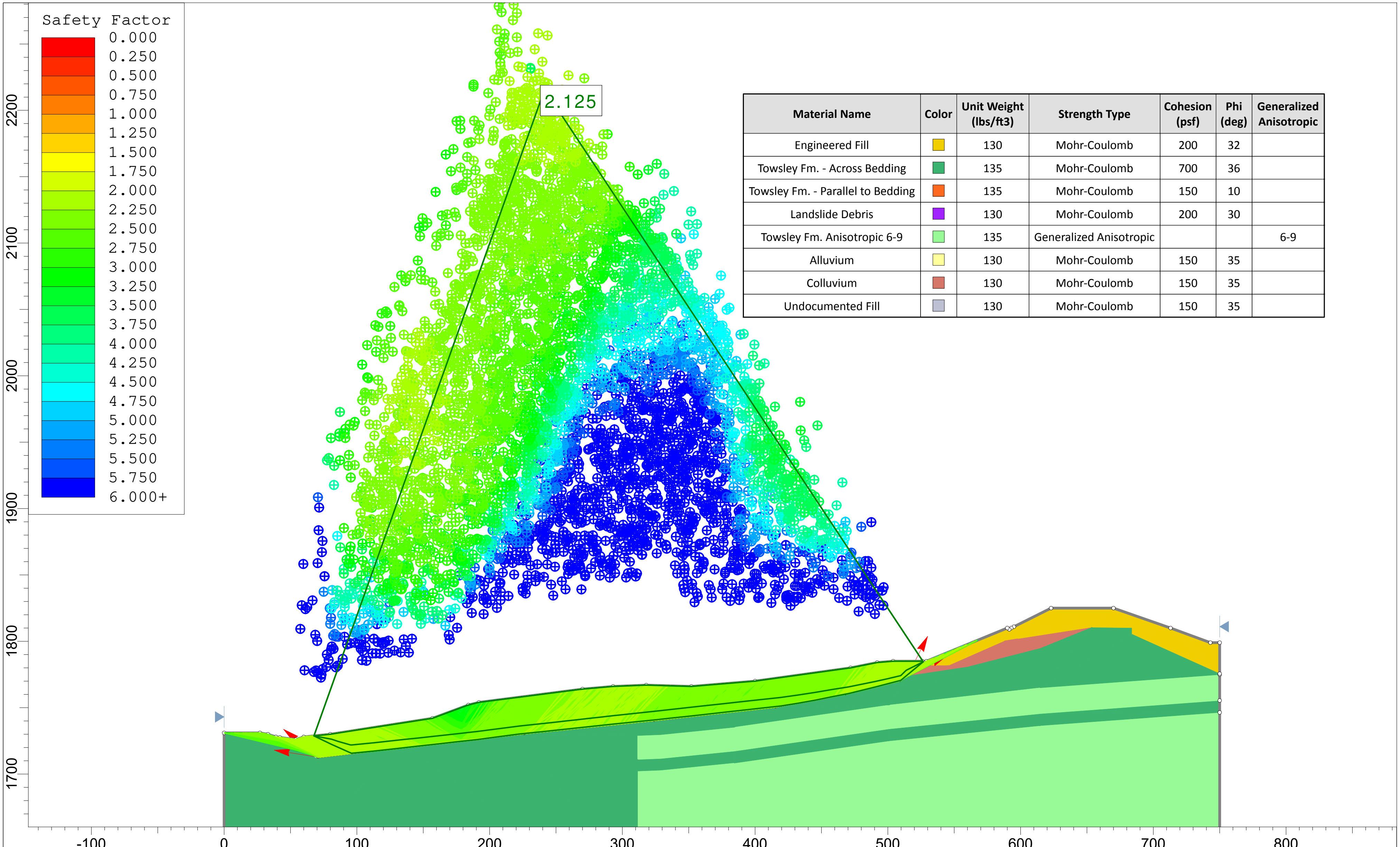


Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Generalized Anisotropic
Engineered Fill		130	Mohr-Coulomb	200	32	
Towsley Fm. - Across Bedding		135	Mohr-Coulomb	700	36	
Towsley Fm. - Parallel to Bedding		135	Mohr-Coulomb	150	10	
Landslide Debris		130	Mohr-Coulomb	200	30	
Towsley Fm. Anisotropic 6-9		135	Generalized Anisotropic			6-9
Alluvium		130	Mohr-Coulomb	150	35	
Colluvium		130	Mohr-Coulomb	150	35	
Undocumented Fill		130	Mohr-Coulomb	150	35	

rocscience

SLIDEINTERPRET 8.032

Project	Cherry Willow Recycled Water Tanks
Analysis Description	WT13-WT13' - Base of slide - Static
Drawn By	RMP
Scale	1:1200
Company	GWV
Date	
File Name	WT13.slmd



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Generalized Anisotropic
Engineered Fill		130	Mohr-Coulomb	200	32	
Towsley Fm. - Across Bedding		135	Mohr-Coulomb	700	36	
Towsley Fm. - Parallel to Bedding		135	Mohr-Coulomb	150	10	
Landslide Debris		130	Mohr-Coulomb	200	30	
Towsley Fm. Anisotropic 6-9		135	Generalized Anisotropic			6-9
Alluvium		130	Mohr-Coulomb	150	35	
Colluvium		130	Mohr-Coulomb	150	35	
Undocumented Fill		130	Mohr-Coulomb	150	35	

rocscience

SLIDEINTERPRET 8.032

Project	Cherry Willow Recycled Water Tanks
Analysis Description	WT13-WT13' - Base of slide - Static
Drawn By	RMP
Scale	1:1200
Company	GWV
Date	
File Name	WT13.slmd

Slide Analysis Information

WT13

Project Summary

File Name:	WT13.slmd
Slide Modeler Version:	8.032
Compute Time:	00h:00m:05.695s
Project Title:	Cherry Willow Recycled Water Tanks
Analysis:	WT13-WT13' - Base of slide - Static
Author:	RMP
Company:	GWV

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	inches/hour
Data Output:	Standard
Failure Direction:	Right to Left

Analysis Options

Analysis Methods Used

Slices Type:	Vertical
	Spencer
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Surface Type:	Non-Circular Block Search
Number of Surfaces:	5000
Multiple Groups:	Disabled
Pseudo-Random Surfaces:	Enabled
Convex Surfaces Only:	Disabled
Left Projection Angle (Start Angle) [°]:	141
Left Projection Angle (End Angle) [°]:	171
Right Projection Angle (Start Angle) [°]:	27

Right Projection Angle (End Angle) [°]:	63
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading

Advanced seismic analysis:	No
Staged pseudostatic analysis:	No

Materials

Property	Engineered Fill	Towsley Fm. - Across Bedding	Towsley Fm. - Parallel to Bedding	Landslide Debris	Towsley Fm. Anisotropic 6-9	Alluvium	Colluvium	Undocumented Fill
Color								
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Generalized Anisotropic	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft3]	130	135	135	130	135	130	130	130
Cohesion [psf]	200	700	150	200		150	150	150
Friction Angle [°]	32	36	10	30		35	35	35
Water Surface	None	None	None	None	None	None	None	None
Ru Value	0	0	0	0	0	0	0	0

Generalized Anisotropic Functions

Name: 6-9

Angle From	Angle To	Material
6	-90	Towsley Fm. - Across Bedding
9	6	Towsley Fm. - Parallel to Bedding
90	9	Towsley Fm. - Across Bedding

Global Minimums

Method: spencer

FS	2.124830
Axis Location:	241.423, 2215.637
Left Slip Surface Endpoint:	67.705, 1728.771
Right Slip Surface Endpoint:	526.685, 1784.543
Resisting Moment:	1.57179e+08 lb-ft
Driving Moment:	7.39726e+07 lb-ft
Resisting Horizontal Force:	314619 lb
Driving Horizontal Force:	148068 lb
Total Slice Area:	9882 ft2
Surface Horizontal Width:	458.98 ft
Surface Average Height:	21.5304 ft

Global Minimum Coordinates

Method: spencer

X	Y
67.7053	1728.77
81.0189	1722.36
95.9612	1715.65
113.033	1717.36
129.638	1719.19
144.84	1720.89
160.056	1722.6
175.324	1724.31
190.745	1726.04
206.165	1728.08

X	Y
223.044	1730.27
240.235	1732.04
257.425	1733.8
274.616	1735.63
291.807	1737.46
308.998	1739.23
326.188	1740.99
338.179	1742.3
350.171	1743.62
362.162	1744.94
373.918	1746.23
396.474	1748.72
419.03	1751.21
432.147	1753.32
445.227	1755.7
457.884	1758.22
470.532	1760.66
490.155	1765.52
509.777	1770.54
526.685	1784.54

Valid/Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 4901
Number of Invalid Surfaces: 108

Error Codes:

Error Code -108 reported for 50 surfaces
Error Code -111 reported for 58 surfaces

Error Codes

The following errors were encountered during the computation:

-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-111 = safety factor equation did not converge

Slice Data

- **Global Minimum Query (spencer) - Safety Factor: 2.12483**

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	13.3136	6706.76	-25.7242	Undocumented Fill	150	35	309.089	656.762	723.734	0	723.734	574.819	574.819
2	4.66452	5586.38	-24.1661	Undocumented Fill	150	35	601.305	1277.67	1610.47	0	1610.47	1340.66	1340.66
3	9.37327	16396.3	-24.1661	Landslide Debris	200	30	705.859	1499.83	2251.38	0	2251.38	1934.65	1934.65
4	0.904587	1948.86	-24.1661	Towsley Fm. - Parallel to Bedding	150	10	271.675	577.264	2423.13	0	2423.13	2301.23	2301.23
5	8.53582	18972.7	5.70032	Towsley Fm. - Parallel to Bedding	150	10	253.247	538.106	2201.06	0	2201.06	2226.34	2226.34
6	8.53582	19509.9	5.70032	Towsley Fm. - Parallel to Bedding	150	10	258.417	549.092	2263.37	0	2263.37	2289.16	2289.16
7	8.30276	19442.3	6.31349	Towsley Fm. - Parallel to Bedding	150	10	262.563	557.902	2313.33	0	2313.33	2342.38	2342.38
8	8.30276	19849.9	6.31349	Towsley Fm. - Parallel to Bedding	150	10	266.588	566.454	2361.83	0	2361.83	2391.33	2391.33
9	7.60061	18523.4	6.38864	Towsley Fm. - Parallel to Bedding	150	10	270.329	574.403	2406.91	0	2406.91	2437.18	2437.18
10	7.60061	18853.7	6.38864	Towsley Fm. - Parallel to Bedding	150	10	273.892	581.974	2449.85	0	2449.85	2480.52	2480.52
11	7.608	19202.2	6.38884	Towsley Fm. - Parallel to Bedding	150	10	277.448	589.53	2492.7	0	2492.7	2523.77	2523.77
12	7.608	19662.6	6.38884	Towsley Fm. - Parallel to Bedding	150	10	282.408	600.07	2552.48	0	2552.48	2584.1	2584.1

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
13	7.63422	21395	6.38773	Towsley Fm. - Parallel to Bedding	150	10	300.282	638.049	2767.87	0	2767.87	2801.48	2801.48
14	7.63422	23353.1	6.38773	Towsley Fm. - Parallel to Bedding	150	10	321.305	682.719	3021.2	0	3021.2	3057.17	3057.17
15	11.6418	39310.6	6.40215	Towsley Fm. - Parallel to Bedding	150	10	347.33	738.018	3334.82	0	3334.82	3373.79	3373.79
16	3.77891	13473.3	6.40215	Towsley Fm. - Parallel to Bedding	150	10	362.797	770.883	3521.2	0	3521.2	3561.91	3561.91
17	7.71034	27873	7.54256	Towsley Fm. - Parallel to Bedding	150	10	365.622	776.885	3555.25	0	3555.25	3603.66	3603.66
18	7.71034	27847	7.54256	Towsley Fm. - Parallel to Bedding	150	10	365.347	776.301	3551.93	0	3551.93	3600.3	3600.3
19	8.43929	30448.9	7.38765	Towsley Fm. - Parallel to Bedding	150	10	365.217	776.024	3550.36	0	3550.36	3597.71	3597.71
20	8.43929	30429.2	7.38765	Towsley Fm. - Parallel to Bedding	150	10	365.027	775.621	3548.07	0	3548.07	3595.39	3595.39
21	8.59536	31104.9	5.86961	Towsley Fm. - Parallel to Bedding	150	10	367.756	781.419	3580.95	0	3580.95	3618.76	3618.76
22	8.59536	31348.8	5.86961	Towsley Fm. - Parallel to Bedding	150	10	370.086	786.37	3609.03	0	3609.03	3647.07	3647.07
23	8.59536	31592.4	5.87119	Towsley Fm. - Parallel to Bedding	150	10	372.41	791.309	3637.05	0	3637.05	3675.34	3675.34
24	8.59536	31835.8	5.87119	Towsley Fm. - Parallel to Bedding	150	10	374.736	796.25	3665.07	0	3665.07	3703.6	3703.6
25	8.59535	32061	6.07809	Towsley Fm. - Parallel to Bedding	150	10	376.655	800.327	3688.19	0	3688.19	3728.3	3728.3
26	8.59535	32210.8	6.07809	Towsley Fm. - Parallel to Bedding	150	10	378.085	803.367	3705.43	0	3705.43	3745.68	3745.68
27	8.59535	32064.1	6.07809	Towsley Fm. - Parallel to Bedding	150	10	376.685	800.391	3688.55	0	3688.55	3728.66	3728.66
28	8.59535	31874.9	6.07809	Towsley Fm. - Parallel to Bedding	150	10	374.879	796.554	3666.79	0	3666.79	3706.7	3706.7
29	8.59536	31538.4	5.85275	Towsley Fm. - Parallel to Bedding	150	10	371.915	790.256	3631.07	0	3631.07	3669.19	3669.19
30	8.59536	30942.2	5.85275	Towsley Fm. - Parallel to Bedding	150	10	366.22	778.155	3562.44	0	3562.44	3599.98	3599.98
31	8.59536	30341.7	5.85275	Towsley Fm. - Parallel to Bedding	150	10	360.483	765.965	3493.31	0	3493.31	3530.26	3530.26
32	8.59536	29438.8	5.85275	Towsley Fm. - Parallel to Bedding	150	10	351.857	747.637	3389.37	0	3389.37	3425.44	3425.44
33	11.9911	38887	6.2612	Towsley Fm. - Parallel to Bedding	150	10	336.511	715.028	3204.43	0	3204.43	3241.35	3241.35
34	11.9911	36286.6	6.2612	Towsley Fm. - Parallel to Bedding	150	10	318.728	677.243	2990.15	0	2990.15	3025.12	3025.12
35	11.9911	34443	6.2612	Towsley Fm. - Parallel to Bedding	150	10	306.12	650.454	2838.21	0	2838.21	2871.8	2871.8
36	11.7561	33263.4	6.27322	Towsley Fm. - Parallel to Bedding	150	10	302.591	642.954	2795.68	0	2795.68	2828.94	2828.94
37	11.278	31457.6	6.30046	Towsley Fm. - Parallel to Bedding	150	10	299.273	635.904	2755.7	0	2755.7	2788.74	2788.74
38	11.278	31009.7	6.30046	Towsley Fm. - Parallel to Bedding	150	10	296.017	628.985	2716.46	0	2716.46	2749.14	2749.14
39	22.5561	61986.2	6.30046	Towsley Fm. - Parallel to Bedding	150	10	295.896	628.728	2715.01	0	2715.01	2747.67	2747.67
40	13.1172	36353.2	9.1378	Towsley Fm. - Parallel to Bedding	150	10	295.376	627.623	2708.73	0	2708.73	2756.24	2756.24
41	13.0798	35535.3	10.3366	Towsley Fm. - Parallel to Bedding	150	10	289.935	616.063	2643.17	0	2643.17	2696.05	2696.05
42	12.6574	33292.9	11.2518	Towsley Fm. - Parallel to Bedding	150	10	282.19	599.606	2549.84	0	2549.84	2605.98	2605.98
43	12.6476	32075.6	10.9181	Towsley Fm. - Parallel to Bedding	150	10	274.857	584.025	2461.48	0	2461.48	2514.5	2514.5
44	9.81134	24047.8	13.9016	Towsley Fm. - Parallel to Bedding	150	10	265.698	564.563	2351.1	0	2351.1	2416.86	2416.86
45	9.81134	23443.1	13.9016	Towsley Fm. - Parallel to Bedding	150	10	260.771	554.095	2291.74	0	2291.74	2356.28	2356.28
46	9.81134	22310	14.3627	Towsley Fm. - Parallel to Bedding	150	10	251.209	533.777	2176.51	0	2176.51	2240.83	2240.83
47	9.81134	19988.2	14.3627	Towsley Fm. - Parallel to Bedding	150	10	232.325	493.652	1948.95	0	1948.95	2008.44	2008.44
48	4.11676	6834.05	39.625	Towsley Fm. - Parallel to Bedding	150	10	186.797	396.911	1400.3	0	1400.3	1554.97	1554.97

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
49	12.1058	9499.18	39.625	Colluvium	150	35	252.872	537.31	553.136	0	553.136	762.516	762.516
50	0.685174	45.6101	39.625	Engineered Fill	200	32	93.857	199.43	-0.911922	0	-0.911922	76.8024	76.8024

Interslice Data

- **Global Minimum Query (spencer) - Safety Factor: 2.12483**

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	67.7053	1728.77	0	0	0
2	81.0189	1722.36	8757.35	946.112	6.16611
3	85.6834	1720.26	14932.9	1613.29	6.16609
4	95.0566	1716.06	31018	3351.08	6.16613
5	95.9612	1715.65	32247.3	3483.88	6.16611
6	104.497	1716.5	32533.6	3514.81	6.16611
7	113.033	1717.36	32811	3544.78	6.16611
8	121.336	1718.27	32865.9	3550.71	6.16611
9	129.638	1719.19	32909.7	3555.45	6.16612
10	137.239	1720.04	32916.1	3556.13	6.1661
11	144.84	1720.89	32913	3555.8	6.16611
12	152.448	1721.75	32900.3	3554.43	6.16611
13	160.056	1722.6	32874.5	3551.64	6.16611
14	167.69	1723.45	32801.3	3543.74	6.16612
15	175.324	1724.31	32672.2	3529.78	6.1661
16	186.966	1725.61	32359.5	3496.01	6.16612
17	190.745	1726.04	32237.5	3482.82	6.16611
18	198.455	1727.06	31427	3395.25	6.1661
19	206.165	1728.08	30617.7	3307.82	6.1661
20	214.605	1729.17	29815	3221.1	6.1661
21	223.044	1730.27	29013.2	3134.48	6.16611
22	231.639	1731.15	29009.9	3134.13	6.16612
23	240.235	1732.04	29001.9	3133.26	6.16611
24	248.83	1732.92	28988.2	3131.78	6.16611
25	257.425	1733.8	28969.7	3129.78	6.16611
26	266.021	1734.72	28831.6	3114.86	6.16611
27	274.616	1735.63	28690	3099.56	6.16611
28	283.212	1736.55	28551.7	3084.62	6.16611
29	291.807	1737.46	28417.9	3070.17	6.16612
30	300.402	1738.35	28415.4	3069.89	6.1661
31	308.998	1739.23	28424.4	3070.87	6.16611
32	317.593	1740.11	28445	3073.09	6.1661
33	326.188	1740.99	28483	3077.2	6.16611
34	338.179	1742.3	28302.4	3057.69	6.16612
35	350.171	1743.62	28190.4	3045.59	6.16612
36	362.162	1744.94	28127.2	3038.76	6.16611
37	373.918	1746.23	28071.5	3032.75	6.16613
38	385.196	1747.47	28015.4	3026.68	6.16611
39	396.474	1748.72	27971.3	3021.92	6.16612
40	419.03	1751.21	27884.1	3012.5	6.16612
41	432.147	1753.32	26043.5	2813.64	6.1661
42	445.227	1755.7	23530.1	2542.11	6.16612
43	457.884	1758.22	20681.1	2234.31	6.16611
44	470.532	1760.66	18152.2	1961.09	6.16609
45	480.343	1763.09	15049.7	1625.92	6.16613
46	490.155	1765.52	12043.1	1301.09	6.1661
47	499.966	1768.03	9039.74	976.621	6.16611
48	509.777	1770.54	6422.8	693.895	6.1661
49	513.894	1773.95	2418.57	261.294	6.16612
50	526	1783.98	-64.6755	-6.9873	6.16611
51	526.685	1784.54	0	0	0

Entity Information

SCV Water

W.O. 8485

Group: Proposed Grades

Shared Entities

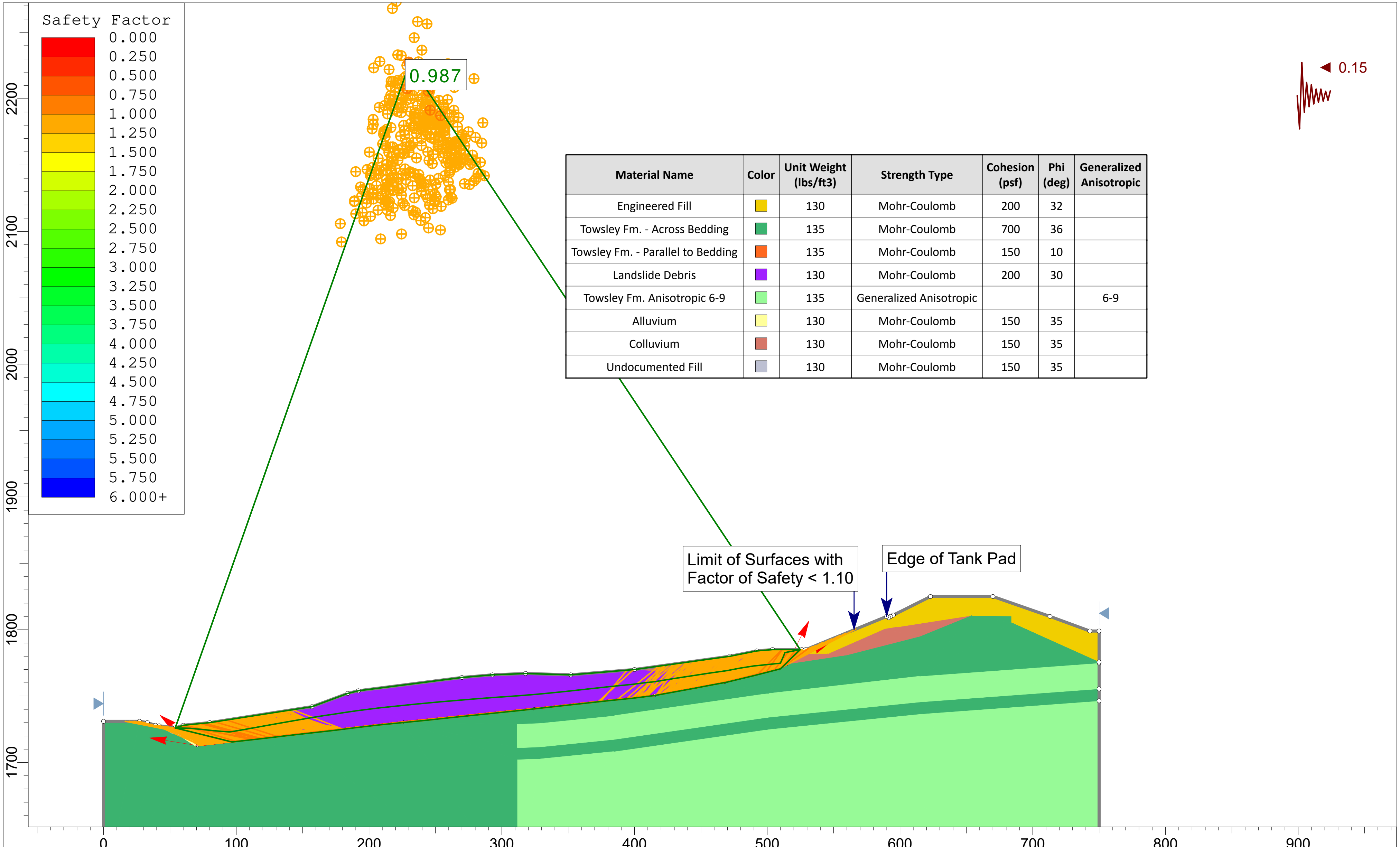
Type	Coordinates X	Coordinates Y
External Boundary	743	1799
	713	1810
	670	1825
	623	1825
	595	1811
	593	1810
	591.5	1809
	590	1810
	529	1785
	527.5	1784
	526	1785
	504	1785
	492	1784
	472	1780
	400	1770
	352	1766
	318	1767
	293	1766
	270	1764
	192	1754
	184	1752
	157	1742
	80	1730
	60	1728
	54	1726
	42	1727.6
	39	1728
	33	1730
	27	1731
	0	1731
	0	1600
	311.567	1600
	750	1600
	750	1746.45
	750	1755.45
	750	1774.95
	750	1775.56
	750	1799
Material Boundary	311.567	1600
	311.567	1701.99
	311.567	1710.99
	311.567	1728.99
	328.966	1729.7
	384.366	1735.29
	501	1752
	615	1765
	750	1774.95
Material Boundary	311.567	1710.99
	328.966	1711.7
	384.366	1717.29
	501	1734
	615	1745.5
	750	1755.45

Type	Coordinates	
	X	Y
Material Boundary	311.567	1701.99
	328.966	1702.7
	384.366	1708.29
	501	1725
	615	1736.5
	750	1746.45
	X	Y
Material Boundary	595	1811
	607	1811
	653.192	1810.56
	654	1810.56
	684	1810.27
	713	1810
	X	Y
Material Boundary	42	1727.6
	51.0038	1722.08
	56	1720.68
	69.1119	1717
	82.2691	1718.96
	85	1720
	106.948	1728.39
	157	1742
	X	Y
Material Boundary	56	1720.68
	69.1119	1712
	71.7039	1713.31
	85	1720
	X	Y
Material Boundary	400	1770
	437.424	1767.68
	441.603	1767.96
	501	1772
	513.929	1773.96
	516.158	1774.29
	560.024	1780.94
	615.003	1795
	654	1810.56
	X	Y
Material Boundary	526	1785
	526	1782
	546	1782
	587.659	1800.3
	598	1802
	653.192	1810.56
	X	Y
Material Boundary	684	1810.27
	684	1805.27
	750	1775.56
	X	Y
Material Boundary	415.192	1750.04
	418.014	1751.57
	424.99	1755.36
	432.321	1760.37
	441.603	1767.96

Type	Coordinates	
	X	Y
Material Boundary	69.1119	1712
	137	1720
	226	1730
	324	1740
	415.192	1750.04
	468	1760
	509	1770
	516.158	1774.29
	X	Y
Material Boundary	71.7039	1713.31
	137	1721
	226	1731
	324	1741
	415.192	1751.04
	418.014	1751.57
	468	1761
	509	1771
	513.929	1773.96

Scenario-based Entities

Type	Coordinates		slide plane static
	X	Y	
Block Search Polyline	70.6533	1712.78	✓
	136.981	1720.44	
	226.047	1730.46	
	324.057	1740.5	
	415.211	1750.55	
	468.004	1760.41	
	508.994	1770.5	
	514.929	1774.11	



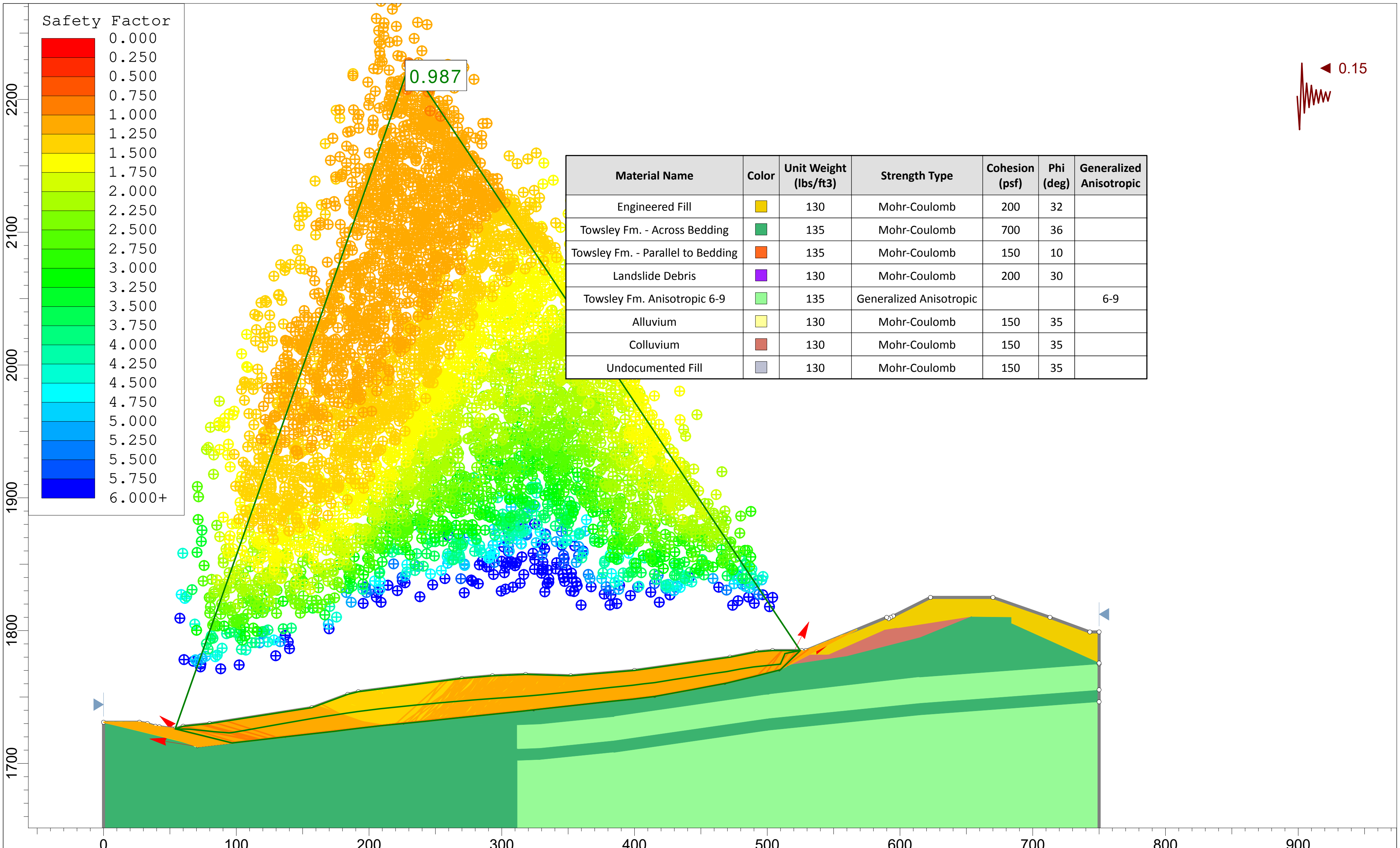
Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Generalized Anisotropic
Engineered Fill		130	Mohr-Coulomb	200	32	
Towsley Fm. - Across Bedding		135	Mohr-Coulomb	700	36	
Towsley Fm. - Parallel to Bedding		135	Mohr-Coulomb	150	10	
Landslide Debris		130	Mohr-Coulomb	200	30	
Towsley Fm. Anisotropic 6-9		135	Generalized Anisotropic			6-9
Alluvium		130	Mohr-Coulomb	150	35	
Colluvium		130	Mohr-Coulomb	150	35	
Undocumented Fill		130	Mohr-Coulomb	150	35	

rocscience

Project	Cherry Willow Recycled Water Tanks
Analysis Description	WT13-WT13' - Base of slide - Pseudo-static
Drawn By	RMP
Scale	1:1200
Company	GWV
Date	
File Name	WT13.slmd

SLIDEINTERPRET 8.032

SCV Water W.O. 8485



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Generalized Anisotropic
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Landslide Debris		130	Mohr-Coulomb	200	30	
Towsley Fm. Anisotropic 6-9		135	Generalized Anisotropic			6-9
Alluvium		130	Mohr-Coulomb	150	35	
Colluvium		130	Mohr-Coulomb	150	35	
Undocumented Fill		130	Mohr-Coulomb	150	35	

rocscience

SLIDEINTERPRET 8.032

Project	Cherry Willow Recycled Water Tanks
Analysis Description	WT13-WT13' - Base of slide - Pseudo-static
Drawn By	RMP
Scale	1:1200
Company	GWV
Date	
File Name	WT13.slmd

Slide Analysis Information

WT13

Project Summary

File Name:	WT13.slmd
Slide Modeler Version:	8.032
Compute Time:	00h:00m:03.550s
Project Title:	Cherry Willow Recycled Water Tanks
Analysis:	WT13-WT13' - Base of slide - Pseudo-static
Author:	RMP
Company:	GWV

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	inches/hour
Data Output:	Standard
Failure Direction:	Right to Left

Analysis Options

Analysis Methods Used	
Slices Type:	Vertical
	Spencer
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Surface Type:	Non-Circular Block Search
Number of Surfaces:	5000
Multiple Groups:	Disabled
Pseudo-Random Surfaces:	Enabled
Convex Surfaces Only:	Disabled
Left Projection Angle (Start Angle) [°]:	141
Left Projection Angle (End Angle) [°]:	171
Right Projection Angle (Start Angle) [°]:	27

Right Projection Angle (End Angle) [°]:	63
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading

Advanced seismic analysis: No
Staged pseudostatic analysis: No

Seismic Load Coefficient (Horizontal): 0.15

Materials

Property	Engineered Fill	Towsley Fm. - Across Bedding	Towsley Fm. - Parallel to Bedding	Landslide Debris	Towsley Fm. Anisotropic 6-9	Alluvium	Colluvium	Undocumented Fill
Color								
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Generalized Anisotropic	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft3]	130	135	135	130	135	130	130	130
Cohesion [psf]	200	700	150	200		150	150	150
Friction Angle [°]	32	36	10	30		35	35	35
Water Surface	None	None	None	None	None	None	None	None
Ru Value	0	0	0	0	0	0	0	0

Generalized Anisotropic Functions

Name: 6-9

Angle From	Angle To	Material
6	-90	Towsley Fm. - Across Bedding
9	6	Towsley Fm. - Parallel to Bedding
90	9	Towsley Fm. - Across Bedding

Global Minimums

Method: spencer

FS	0.986817
Axis Location:	230.416, 2226.332
Left Slip Surface Endpoint:	54.000, 1726.000
Right Slip Surface Endpoint:	524.832, 1785.000
Resisting Moment:	1.70665e+08 lb-ft
Driving Moment:	1.72945e+08 lb-ft
Resisting Horizontal Force:	333971 lb
Driving Horizontal Force:	338432 lb
Total Slice Area:	10092.2 ft2
Surface Horizontal Width:	470.832 ft
Surface Average Height:	21.4347 ft

Global Minimum Coordinates

Method: spencer

X	Y
54	1726
76.0846	1720.62
96.8828	1715.43
115.406	1717.51
136.004	1719.89
156.603	1722.26
173.838	1724.15
191.074	1726.3

X	Y
208.333	1728.29
226.067	1730.06
243.815	1731.86
261.562	1733.72
279.31	1735.57
297.058	1737.43
314.805	1739.29
331.526	1741.13
348.246	1742.97
364.966	1744.82
381.686	1746.69
398.418	1748.36
415.149	1750.44
429.428	1753.03
443.707	1755.62
456.672	1758.07
469.638	1760.51
489.785	1765.37
509.931	1770.53
524.832	1785

Valid/Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 4989
Number of Invalid Surfaces: 18

Error Codes:

Error Code -108 reported for 8 surfaces
Error Code -111 reported for 10 surfaces

Error Codes

The following errors were encountered during the computation:

-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-111 = safety factor equation did not converge

Slice Data

- **Global Minimum Query (spencer) - Safety Factor: 0.986817**

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	11.0423	4185.88	-13.6834	Undocumented Fill	150	35	652.081	643.485	704.769	0	704.769	546.008	546.008
2	11.0423	10176.2	-13.6834	Undocumented Fill	150	35	1252.89	1236.37	1551.49	0	1551.49	1246.46	1246.46
3	6.37601	8393.81	-14.0197	Undocumented Fill	150	35	1705.78	1683.29	2189.76	0	2189.76	1763.84	1763.84
4	0.408991	608.002	-14.0197	Alluvium	150	35	1895.96	1870.97	2457.8	0	2457.8	1984.39	1984.39
5	11.7207	21171.4	-14.0197	Landslide Debris	200	30	1805.99	1782.18	2740.41	0	2740.41	2289.47	2289.47
6	2.29255	4992.77	-14.0197	Towsley Fm. - Parallel to Bedding	150	10	603.36	595.406	2526.02	0	2526.02	2375.37	2375.37
7	9.26138	20992.7	6.40866	Towsley Fm. - Parallel to Bedding	150	10	544.45	537.273	2196.33	0	2196.33	2257.49	2257.49
8	9.26138	21480.3	6.40866	Towsley Fm. - Parallel to Bedding	150	10	553.502	546.205	2246.99	0	2246.99	2309.16	2309.16
9	10.2995	24439.4	6.57678	Towsley Fm. - Parallel to Bedding	150	10	562.144	554.733	2295.35	0	2295.35	2360.17	2360.17
10	10.2995	25000	6.57678	Towsley Fm. - Parallel to Bedding	150	10	571.488	563.954	2347.65	0	2347.65	2413.54	2413.54
11	20.5989	51676.4	6.57678	Towsley Fm. - Parallel to Bedding	150	10	585.459	577.741	2425.84	0	2425.84	2493.34	2493.34
12	8.61754	23252.7	6.24123	Towsley Fm. - Parallel to Bedding	150	10	619.262	611.098	2615.02	0	2615.02	2682.74	2682.74
13	8.61754	25771.4	6.24123	Towsley Fm. - Parallel to Bedding	150	10	669.557	660.73	2896.5	0	2896.5	2969.72	2969.72

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
14	8.61754	28213.4	7.13057	Towsley Fm. - Parallel to Bedding	150	10	714.403	704.985	3147.47	0	3147.47	3236.85	3236.85
15	8.61754	30185.1	7.13057	Towsley Fm. - Parallel to Bedding	150	10	753.532	743.598	3366.46	0	3366.46	3460.72	3460.72
16	8.62987	31029.5	6.58363	Towsley Fm. - Parallel to Bedding	150	10	772.025	761.847	3469.96	0	3469.96	3559.07	3559.07
17	8.62987	31159	6.58363	Towsley Fm. - Parallel to Bedding	150	10	774.601	764.389	3484.38	0	3484.38	3573.78	3573.78
18	8.86684	32225.4	5.69707	Towsley Fm. - Parallel to Bedding	150	10	782.994	772.672	3531.35	0	3531.35	3609.46	3609.46
19	8.86684	32521.1	5.69707	Towsley Fm. - Parallel to Bedding	150	10	788.754	778.356	3563.59	0	3563.59	3642.28	3642.28
20	8.87383	32833.7	5.77226	Towsley Fm. - Parallel to Bedding	150	10	793.966	783.499	3592.75	0	3592.75	3673.01	3673.01
21	8.87383	33111.6	5.77226	Towsley Fm. - Parallel to Bedding	150	10	799.374	788.836	3623.02	0	3623.02	3703.82	3703.82
22	8.87383	33370.2	5.97937	Towsley Fm. - Parallel to Bedding	150	10	803.363	792.772	3645.34	0	3645.34	3729.49	3729.49
23	8.87383	33609.3	5.97937	Towsley Fm. - Parallel to Bedding	150	10	808.009	797.357	3671.34	0	3671.34	3755.97	3755.97
24	17.7477	67703.7	5.97937	Towsley Fm. - Parallel to Bedding	150	10	812.721	802.007	3697.72	0	3697.72	3782.84	3782.84
25	8.87383	33673.4	5.97079	Towsley Fm. - Parallel to Bedding	150	10	809.298	798.629	3678.56	0	3678.56	3763.21	3763.21
26	8.87383	33441.7	5.97079	Towsley Fm. - Parallel to Bedding	150	10	804.796	794.186	3653.36	0	3653.36	3737.53	3737.53
27	8.87383	32850.3	5.97079	Towsley Fm. - Parallel to Bedding	150	10	793.305	782.847	3589.06	0	3589.06	3672.03	3672.03
28	8.87383	32188.1	5.97079	Towsley Fm. - Parallel to Bedding	150	10	780.44	770.151	3517.06	0	3517.06	3598.68	3598.68
29	8.36013	29571.8	6.29266	Towsley Fm. - Parallel to Bedding	150	10	763.384	753.32	3421.6	0	3421.6	3505.78	3505.78
30	8.36013	28346.9	6.29266	Towsley Fm. - Parallel to Bedding	150	10	738.181	728.45	3280.56	0	3280.56	3361.96	3361.96
31	8.36013	27077.7	6.29266	Towsley Fm. - Parallel to Bedding	150	10	712.065	702.678	3134.39	0	3134.39	3212.91	3212.91
32	8.36013	25808.4	6.29266	Towsley Fm. - Parallel to Bedding	150	10	685.949	676.906	2988.23	0	2988.23	3063.87	3063.87
33	8.36013	24694.7	6.29266	Towsley Fm. - Parallel to Bedding	150	10	663.032	654.291	2859.98	0	2859.98	2933.09	2933.09
34	8.36013	24346.6	6.29266	Towsley Fm. - Parallel to Bedding	150	10	655.869	647.223	2819.89	0	2819.89	2892.21	2892.21
35	8.36013	24094	6.38575	Towsley Fm. - Parallel to Bedding	150	10	650.304	641.731	2788.74	0	2788.74	2861.52	2861.52
36	8.36013	23833.6	6.38575	Towsley Fm. - Parallel to Bedding	150	10	644.95	636.448	2758.79	0	2758.79	2830.97	2830.97
37	8.36568	23645.3	5.70881	Towsley Fm. - Parallel to Bedding	150	10	643.392	634.91	2750.06	0	2750.06	2814.38	2814.38
38	8.36568	23497.5	5.70881	Towsley Fm. - Parallel to Bedding	150	10	640.34	631.898	2732.98	0	2732.98	2796.99	2796.99
39	8.36568	23400.2	7.09342	Towsley Fm. - Parallel to Bedding	150	10	633.006	624.661	2691.94	0	2691.94	2770.71	2770.71
40	8.36568	23517.6	7.09342	Towsley Fm. - Parallel to Bedding	150	10	635.406	627.029	2705.37	0	2705.37	2784.44	2784.44
41	14.2789	39689.7	10.2779	Towsley Fm. - Parallel to Bedding	150	10	618.07	609.922	2608.35	0	2608.35	2720.42	2720.42
42	14.2789	38572.2	10.2779	Towsley Fm. - Parallel to Bedding	150	10	604.975	597	2535.06	0	2535.06	2644.76	2644.76
43	12.9656	33976.2	10.6699	Towsley Fm. - Parallel to Bedding	150	10	590.07	582.291	2451.65	0	2451.65	2562.82	2562.82
44	12.9656	32894.6	10.6699	Towsley Fm. - Parallel to Bedding	150	10	576.149	568.554	2373.74	0	2373.74	2482.29	2482.29
45	10.0733	24702.8	13.561	Towsley Fm. - Parallel to Bedding	150	10	552.525	545.241	2241.53	0	2241.53	2374.8	2374.8
46	10.0733	24138.4	13.561	Towsley Fm. - Parallel to Bedding	150	10	543.361	536.198	2190.24	0	2190.24	2321.3	2321.3
47	20.1467	43611.2	14.3705	Towsley Fm. - Parallel to Bedding	150	10	503.12	496.487	1965.03	0	1965.03	2093.93	2093.93
48	2.77403	4739.9	44.1616	Towsley Fm. - Parallel to Bedding	150	10	356.213	351.517	1142.86	0	1142.86	1488.79	1488.79
49	0.669671	996.946	44.1616	Landslide Debris	200	30	658.541	649.859	779.179	0	779.179	1418.72	1418.72
50	11.4569	8285.85	44.1616	Colluvium	150	35	389.768	384.63	335.086	0	335.086	713.612	713.612

Interslice Data

- Global Minimum Query (spencer) - Safety Factor: 0.986817

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	54	1726	0	0	0
2	65.0423	1723.31	8467.33	1843.34	12.2817
3	76.0846	1720.62	24946.7	5430.9	12.2817
4	82.4606	1719.03	38050	8283.47	12.2816
5	82.8696	1718.93	38985.2	8487.07	12.2817
6	94.5903	1716	64996.9	14149.8	12.2816
7	96.8828	1715.43	67077.2	14602.7	12.2817
8	106.144	1716.47	66685.9	14517.5	12.2816
9	115.406	1717.51	66252.6	14423.2	12.2817
10	125.705	1718.7	65650.9	14292.2	12.2817
11	136.004	1719.89	64999.2	14150.3	12.2816
12	156.603	1722.26	63546.4	13834	12.2816
13	165.221	1723.2	62930.5	13700	12.2817
14	173.838	1724.15	62105	13520.2	12.2816
15	182.456	1725.22	60636.3	13200.5	12.2816
16	191.074	1726.3	58972.9	12838.4	12.2817
17	199.703	1727.3	57524.9	12523.2	12.2817
18	208.333	1728.29	56065.3	12205.4	12.2816
19	217.2	1729.18	55050.4	11984.5	12.2817
20	226.067	1730.06	54013.8	11758.8	12.2817
21	234.941	1730.96	52911.4	11518.8	12.2816
22	243.815	1731.86	51788.3	11274.3	12.2816
23	252.688	1732.79	50523.5	10999	12.2817
24	261.562	1733.72	49239.9	10719.5	12.2816
25	279.31	1735.57	46634.6	10152.4	12.2817
26	288.184	1736.5	45351.1	9872.94	12.2817
27	297.058	1737.43	44085.8	9597.48	12.2817
28	305.931	1738.36	42866.9	9332.13	12.2817
29	314.805	1739.29	41700	9078.1	12.2817
30	323.165	1740.21	40492	8815.1	12.2817
31	331.526	1741.13	39386.9	8574.53	12.2817
32	339.886	1742.05	38388.7	8357.22	12.2817
33	348.246	1742.97	37497.3	8163.15	12.2816
34	356.606	1743.9	36699.5	7989.49	12.2817
35	364.966	1744.82	35931.1	7822.2	12.2817
36	373.326	1745.75	35144.4	7650.93	12.2817
37	381.686	1746.69	34380	7484.53	12.2817
38	390.052	1747.53	33915.8	7383.46	12.2816
39	398.418	1748.36	33462.4	7284.77	12.2817
40	406.783	1749.4	32445.6	7063.4	12.2816
41	415.149	1750.44	31417.2	6839.52	12.2817
42	429.428	1753.03	27535.5	5994.48	12.2817
43	443.707	1755.62	23824.2	5186.53	12.2817
44	456.672	1758.07	20389.5	4438.78	12.2816
45	469.638	1760.51	17126.8	3728.5	12.2816
46	479.711	1762.94	13540.8	2947.84	12.2817
47	489.785	1765.37	10071.8	2192.64	12.2817
48	509.931	1770.53	3523.46	767.056	12.2816
49	512.705	1773.22	721.742	157.123	12.2816
50	513.375	1773.87	506.464	110.257	12.2816
51	524.832	1785	0	0	0

Entity Information

Group: Proposed Grades

Shared Entities

Type	Coordinates

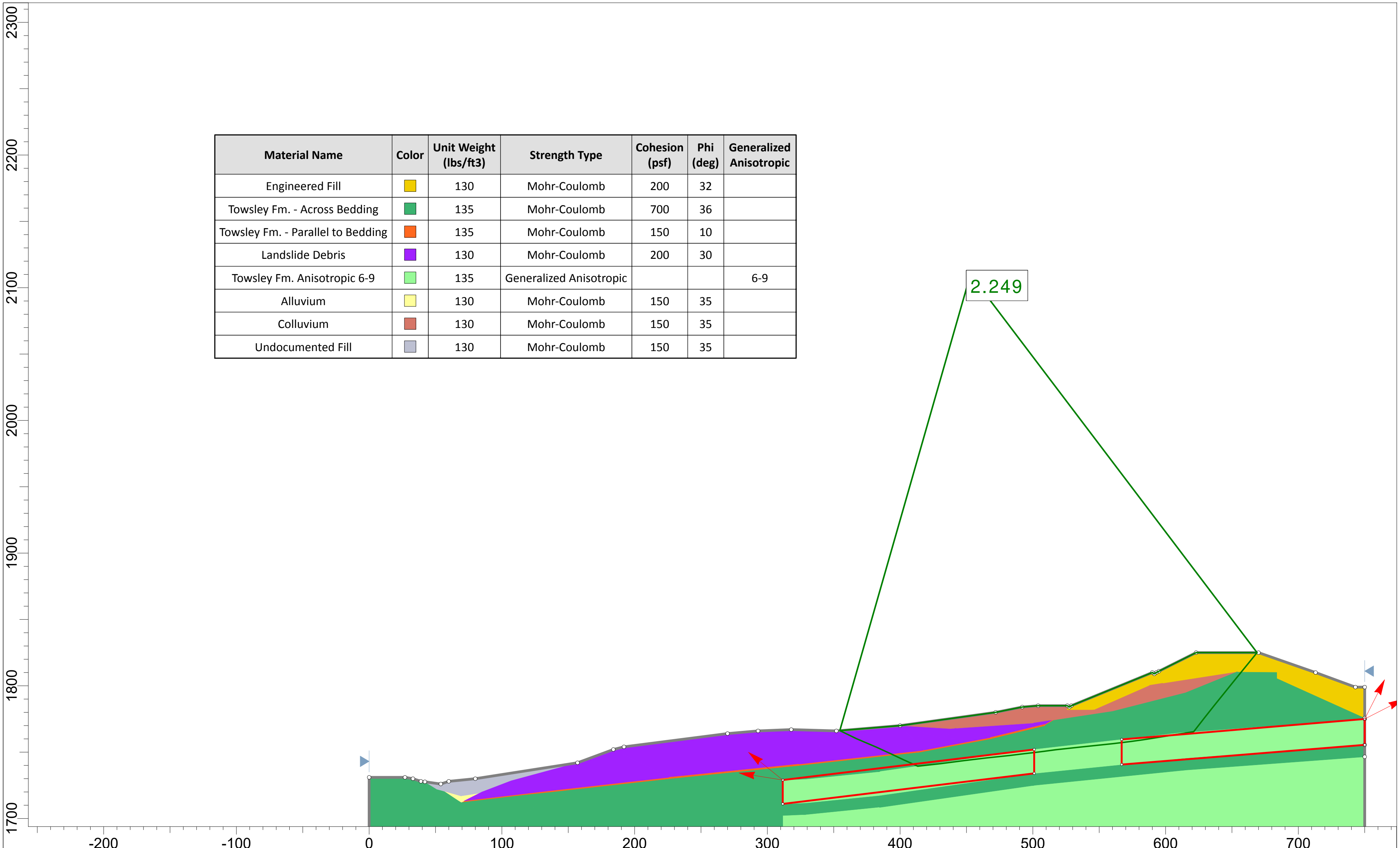
Type	X	Y
External Boundary	743	1799
	713	1810
	670	1825
	623	1825
	595	1811
	593	1810
	591.5	1809
	590	1810
	529	1785
	527.5	1784
	526	1785
	504	1785
	492	1784
	472	1780
	400	1770
	352	1766
	318	1767
	293	1766
	270	1764
	192	1754
	184	1752
	157	1742
	80	1730
	60	1728
	54	1726
	42	1727.6
	39	1728
	33	1730
	27	1731
	0	1731
	0	1600
	311.567	1600
	750	1600
	750	1746.45
	750	1755.45
	750	1774.95
	750	1775.56
	750	1799
Material Boundary	311.567	1600
	311.567	1701.99
	311.567	1710.99
	311.567	1728.99
	328.966	1729.7
	384.366	1735.29
	501	1752
	615	1765
	750	1774.95
Material Boundary	311.567	1710.99
	328.966	1711.7
	384.366	1717.29
	501	1734
	615	1745.5
	750	1755.45

Type	Coordinates X	Coordinates Y
Material Boundary	311.567	1701.99
	328.966	1702.7
	384.366	1708.29
	501	1725
	615	1736.5
	750	1746.45
Material Boundary	595	1811
	607	1811
	653.192	1810.56
	654	1810.56
	684	1810.27
	713	1810
Material Boundary	42	1727.6
	51.0038	1722.08
	56	1720.68
	69.1119	1717
	82.2691	1718.96
	85	1720
	106.948	1728.39
	157	1742
Material Boundary	56	1720.68
	69.1119	1712
	71.7039	1713.31
	85	1720
Material Boundary	400	1770
	437.424	1767.68
	441.603	1767.96
	501	1772
	513.929	1773.96
	516.158	1774.29
	560.024	1780.94
	615.003	1795
	654	1810.56
Material Boundary	526	1785
	526	1782
	546	1782
	587.659	1800.3
	598	1802
	653.192	1810.56
Material Boundary	684	1810.27
	684	1805.27
	750	1775.56
Material Boundary	415.192	1750.04
	418.014	1751.57
	424.99	1755.36
	432.321	1760.37
	441.603	1767.96

Type	Coordinates X	Coordinates Y
Material Boundary	69.1119	1712
	137	1720
	226	1730
	324	1740
	415.192	1750.04
	468	1760
	509	1770
	516.158	1774.29
Material Boundary	71.7039	1713.31
	137	1721
	226	1731
	324	1741
	415.192	1751.04
	418.014	1751.57
	468	1761
	509	1771
	513.929	1773.96

Scenario-based Entities

Type	Coordinates X	Coordinates Y	slide plane pseudo
Block Search Polyline	70.6533	1712.78	✓
	136.981	1720.44	
	226.047	1730.46	
	324.057	1740.5	
	415.211	1750.55	
	468.004	1760.41	
	508.994	1770.5	
	514.929	1774.11	



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Generalized Anisotropic
Engineered Fill		130	Mohr-Coulomb	200	32	
Towsley Fm. - Across Bedding		135	Mohr-Coulomb	700	36	
Towsley Fm. - Parallel to Bedding		135	Mohr-Coulomb	150	10	
Landslide Debris		130	Mohr-Coulomb	200	30	
Towsley Fm. Anisotropic 6-9		135	Generalized Anisotropic			6-9
Alluvium		130	Mohr-Coulomb	150	35	
Colluvium		130	Mohr-Coulomb	150	35	
Undocumented Fill		130	Mohr-Coulomb	150	35	

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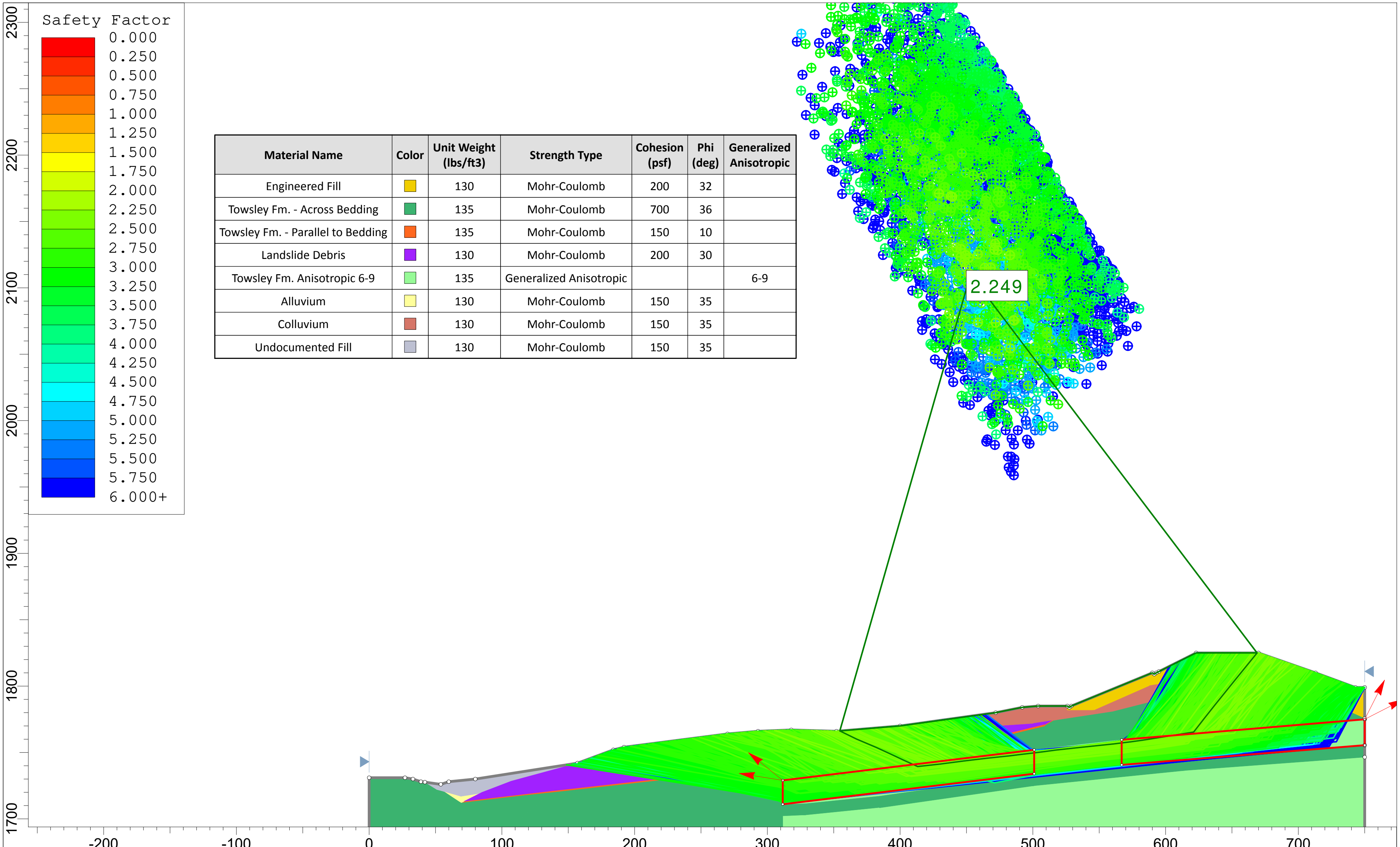
SLIDEINTERPRET 8.032

Project	Cherry Willow Recycled Water Tanks
Analysis Description	WT13-WT13' - Deep Bedrock - Static
Drawn By	RMP
Scale	1:1200
Company	GWV
Date	
File Name	WT13.slmd



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Generalized Anisotropic
Engineered Fill		130	Mohr-Coulomb	200	32	
Towsley Fm. - Across Bedding		135	Mohr-Coulomb	700	36	
Towsley Fm. - Parallel to Bedding		135	Mohr-Coulomb	150	10	
Landslide Debris		130	Mohr-Coulomb	200	30	
Towsley Fm. Anisotropic 6-9		135	Generalized Anisotropic			6-9
Alluvium		130	Mohr-Coulomb	150	35	
Colluvium		130	Mohr-Coulomb	150	35	
Undocumented Fill		130	Mohr-Coulomb	150	35	

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SLIDEINTERPRET 8.032

Project	Cherry Willow Recycled Water Tanks		
Analysis Description	WT13-WT13' - Deep Bedrock - Static		
Drawn By RMP	*Scale* 1:1200	*Company*	GWV
Date		*File Name*	WT13.slmd

Slide Analysis Information

WT13

Project Summary

File Name:	WT13.slmd
Slide Modeler Version:	8.032
Compute Time:	00h:00m:13.131s
Project Title:	Cherry Willow Recycled Water Tanks
Analysis:	WT13-WT13' - Deep Bedrock - Static
Author:	RMP
Company:	GWV

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	inches/hour
Data Output:	Standard
Failure Direction:	Right to Left

Analysis Options

Analysis Methods Used	
Slices Type:	Vertical
	Spencer
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Surface Type:	Non-Circular Block Search
Number of Surfaces:	5000
Multiple Groups:	Disabled
Pseudo-Random Surfaces:	Enabled
Convex Surfaces Only:	Disabled
Left Projection Angle (Start Angle) [°]:	141
Left Projection Angle (End Angle) [°]:	171
Right Projection Angle (Start Angle) [°]:	27

Right Projection Angle (End Angle) [°]:	63
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading

Advanced seismic analysis:	No
Staged pseudostatic analysis:	No

Materials

Property	Engineered Fill	Towsley Fm. - Across Bedding	Towsley Fm. - Parallel to Bedding	Landslide Debris	Towsley Fm. Anisotropic 6-9	Alluvium	Colluvium	Undocumented Fill
Color								
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Generalized Anisotropic	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft3]	130	135	135	130	135	130	130	130
Cohesion [psf]	200	700	150	200		150	150	150
Friction Angle [°]	32	36	10	30		35	35	35
Water Surface	None	None	None	None	None	None	None	None
Ru Value	0	0	0	0	0	0	0	0

Generalized Anisotropic Functions

Name: 6-9

Angle From	Angle To	Material
6	-90	Towsley Fm. - Across Bedding
9	6	Towsley Fm. - Parallel to Bedding
90	9	Towsley Fm. - Across Bedding

Global Minimums

Method: spencer

FS	2.249290
Axis Location:	452.952, 2109.958
Left Slip Surface Endpoint:	354.563, 1766.214
Right Slip Surface Endpoint:	668.914, 1825.000
Resisting Moment:	1.89955e+08 lb-ft
Driving Moment:	8.44512e+07 lb-ft
Resisting Horizontal Force:	453748 lb
Driving Horizontal Force:	201729 lb
Total Slice Area:	10406.6 ft2
Surface Horizontal Width:	314.351 ft
Surface Average Height:	33.1051 ft

Global Minimum Coordinates

Method: spencer

X	Y
354.563	1766.21
367.02	1760.1
382.161	1753.68
392.255	1749.04
402.353	1744.26
413.186	1739.42
430.434	1741.33
447.803	1743.52
465.172	1745.65
473.888	1746.57

X	Y
482.604	1747.5
491.286	1748.53
499.968	1749.57
508.651	1750.67
517.333	1751.77
534.693	1753.64
552.053	1755.56
569.412	1757.4
578.092	1758.6
586.792	1759.92
603.951	1762.64
621.11	1765.35
628.987	1775.46
636.879	1785.45
644.887	1795.38
652.896	1805.28
660.905	1815.11
668.914	1825

Valid/Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 5020
Number of Invalid Surfaces: 10

Error Codes:

Error Code -108 reported for 9 surfaces
Error Code -111 reported for 1 surface

Error Codes

The following errors were encountered during the computation:

-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-111 = safety factor equation did not converge

Slice Data

- **Global Minimum Query (spencer) - Safety Factor: 2.24929**

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	6.22828	1448.4	-26.1557	Landslide Debris	200	30	183.998	413.864	370.423	0	370.423	280.062	280.062
2	6.22828	4345.21	-26.1557	Landslide Debris	200	30	337.674	759.526	969.127	0	969.127	803.296	803.296
3	7.57068	8932.63	-22.98	Landslide Debris	200	30	481.933	1084.01	1531.14	0	1531.14	1326.77	1326.77
4	7.57068	12713.2	-22.98	Landslide Debris	200	30	641.607	1443.16	2153.21	0	2153.21	1881.13	1881.13
5	5.04712	10633.5	-24.6513	Landslide Debris	200	30	791.099	1779.41	2735.62	0	2735.62	2372.57	2372.57
6	5.04712	12429.2	-24.6513	Landslide Debris	200	30	906.802	2039.66	3186.39	0	3186.39	2770.24	2770.24
7	0.909294	2430.96	-25.3541	Landslide Debris	200	30	982.328	2209.54	3480.63	0	3480.63	3015.15	3015.15
8	1.71259	4745.45	-25.3541	Towsley Fm. - Parallel to Bedding	150	10	313.98	706.232	3154.55	0	3154.55	3005.77	3005.77
9	7.47565	23322.4	-25.3541	Towsley Fm. - Across Bedding	700	36	1748.25	3932.31	4448.89	0	4448.89	3620.48	3620.48
10	5.41632	19658.5	-24.0752	Towsley Fm. - Across Bedding	700	36	1939.22	4361.86	5040.11	0	5040.11	4173.66	4173.66
11	5.41632	21973.9	-24.0752	Towsley Fm. - Across Bedding	700	36	2121.93	4772.83	5605.77	0	5605.77	4657.69	4657.69
12	5.74948	24617.1	6.33109	Towsley Fm. - Parallel to Bedding	150	10	398.148	895.551	4228.23	0	4228.23	4272.41	4272.41
13	5.74948	24749.2	6.33109	Towsley Fm. - Parallel to Bedding	150	10	399.927	899.551	4250.91	0	4250.91	4295.28	4295.28
14	5.74948	24882.1	6.33109	Towsley Fm. - Parallel to Bedding	150	10	401.716	903.575	4273.73	0	4273.73	4318.3	4318.3
15	8.68443	37760	7.17212	Towsley Fm. - Parallel to Bedding	150	10	402.183	904.626	4279.69	0	4279.69	4330.3	4330.3

SCV Water W.O. 8485

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
16	8.68443	37911.7	7.17212	Towsley Fm. - Parallel to Bedding	150	10	403.53	907.657	4296.89	0	4296.89	4347.67	4347.67
17	5.78962	25365.2	7.01003	Towsley Fm. - Parallel to Bedding	150	10	404.954	910.859	4315.04	0	4315.04	4364.83	4364.83
18	5.78962	25445.6	7.01003	Towsley Fm. - Parallel to Bedding	150	10	406.026	913.271	4328.72	0	4328.72	4378.65	4378.65
19	5.78962	25526	7.01003	Towsley Fm. - Parallel to Bedding	150	10	407.099	915.683	4342.4	0	4342.4	4392.46	4392.46
20	8.71615	38688	6.03436	Towsley Fm. - Parallel to Bedding	150	10	410.699	923.782	4388.34	0	4388.34	4431.75	4431.75
21	8.71615	39485.4	6.03436	Towsley Fm. - Parallel to Bedding	150	10	417.787	939.724	4478.75	0	4478.75	4522.92	4522.92
22	8.6822	40240.3	6.80505	Towsley Fm. - Parallel to Bedding	150	10	424.821	955.546	4568.48	0	4568.48	4619.18	4619.18
23	8.6822	40596.2	6.80505	Towsley Fm. - Parallel to Bedding	150	10	427.989	962.671	4608.89	0	4608.89	4659.96	4659.96
24	8.6822	40139.3	7.22472	Towsley Fm. - Parallel to Bedding	150	10	423.34	952.214	4549.58	0	4549.58	4603.25	4603.25
25	8.6822	39078	7.22472	Towsley Fm. - Parallel to Bedding	150	10	413.911	931.005	4429.31	0	4429.31	4481.78	4481.78
26	5.78667	25424.8	6.14045	Towsley Fm. - Parallel to Bedding	150	10	407.074	915.628	4342.09	0	4342.09	4385.88	4385.88
27	5.78667	24769.2	6.14045	Towsley Fm. - Parallel to Bedding	150	10	398.3	895.892	4230.16	0	4230.16	4273.01	4273.01
28	5.78667	25365.8	6.14045	Towsley Fm. - Parallel to Bedding	150	10	406.285	913.852	4332.02	0	4332.02	4375.73	4375.73
29	5.78667	26682.3	6.30775	Towsley Fm. - Parallel to Bedding	150	10	423.672	952.962	4553.81	0	4553.81	4600.65	4600.65
30	5.78667	27992	6.30775	Towsley Fm. - Parallel to Bedding	150	10	441.19	992.364	4777.28	0	4777.28	4826.05	4826.05
31	5.78667	29301.8	6.30775	Towsley Fm. - Parallel to Bedding	150	10	458.708	1031.77	5000.75	0	5000.75	5051.45	5051.45
32	5.78647	30620.6	6.05391	Towsley Fm. - Parallel to Bedding	150	10	476.762	1072.38	5231.05	0	5231.05	5281.62	5281.62
33	5.78647	31953.8	6.05391	Towsley Fm. - Parallel to Bedding	150	10	494.613	1112.53	5458.76	0	5458.76	5511.21	5511.21
34	5.78647	33300	6.05391	Towsley Fm. - Parallel to Bedding	150	10	512.633	1153.06	5688.66	0	5688.66	5743.03	5743.03
35	8.67971	52312	7.87753	Towsley Fm. - Parallel to Bedding	150	10	530.465	1193.17	5916.13	0	5916.13	5989.53	5989.53
36	8.70014	55076.4	8.66085	Towsley Fm. - Parallel to Bedding	150	10	552.374	1242.45	6195.56	0	6195.56	6279.7	6279.7
37	5.71968	37244.9	8.98352	Towsley Fm. - Parallel to Bedding	150	10	565.663	1272.34	6365.09	0	6365.09	6454.51	6454.51
38	5.71968	37926.5	8.98352	Towsley Fm. - Parallel to Bedding	150	10	574.795	1292.88	6481.6	0	6481.6	6572.47	6572.47
39	5.71968	39399.2	8.98352	Towsley Fm. - Parallel to Bedding	150	10	594.53	1337.27	6733.35	0	6733.35	6827.34	6827.34
40	5.71968	40868.7	8.99917	Towsley Fm. - Parallel to Bedding	150	10	614.189	1381.49	6984.14	0	6984.14	7081.41	7081.41
41	5.71968	42337.6	8.99917	Towsley Fm. - Parallel to Bedding	150	10	633.876	1425.77	7235.23	0	7235.23	7335.62	7335.62
42	5.71968	43819.7	8.99917	Towsley Fm. - Parallel to Bedding	150	10	653.735	1470.44	7488.58	0	7488.58	7592.11	7592.11
43	0.0802512	624.948	52.059	Towsley Fm. - Across Bedding	700	36	1870.44	4207.16	4827.2	0	4827.2	7226.34	7226.34
44	7.7969	56292.3	52.059	Towsley Fm. - Across Bedding	700	36	1751.31	3939.21	4458.38	0	4458.38	6704.73	6704.73
45	7.8911	46551.6	51.715	Towsley Fm. - Across Bedding	700	36	1480.58	3330.26	3620.24	0	3620.24	5495.99	5495.99
46	8.00888	36605.2	51.0899	Towsley Fm. - Across Bedding	700	36	1209.68	2720.93	2781.57	0	2781.57	4280.21	4280.21
47	8.00888	26013.2	51.0497	Towsley Fm. - Across Bedding	700	36	928.915	2089.4	1912.34	0	1912.34	3061.49	3061.49
48	4.27397	9553.33	50.8132	Towsley Fm. - Across Bedding	700	36	715.381	1609.1	1251.27	0	1251.27	2128.82	2128.82
49	3.7349	5915.06	50.8132	Engineered Fill	200	32	370.939	834.349	1015.17	0	1015.17	1470.2	1470.2
50	8.00888	5149.4	51.0045	Engineered Fill	200	32	192.036	431.944	371.188	0	371.188	608.37	608.37

Interslice Data

- **Global Minimum Query (spencer) - Safety Factor: 2.24929**

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	354.563	1766.21	0	0	0
2	360.792	1763.15	2279.01	295.901	7.39776
3	367.02	1760.1	7346.43	953.843	7.39776
4	374.591	1756.89	15910.7	2065.8	7.39774
5	382.161	1753.68	27680.8	3594.01	7.39776
6	387.208	1751.36	38009.9	4935.11	7.39776
7	392.255	1749.04	49967	6487.59	7.39776
8	393.165	1748.61	52359.9	6798.29	7.39777
9	394.877	1747.8	55457.6	7200.48	7.39776
10	402.353	1744.26	84286.5	10943.6	7.39779
11	407.769	1741.84	106987	13891	7.3978
12	413.186	1739.42	132046	17144.6	7.39779
13	418.935	1740.06	131638	17091.6	7.39778
14	424.685	1740.69	131226	17038.1	7.39778
15	430.434	1741.33	130809	16984	7.39779
16	439.118	1742.42	129625	16830.2	7.39776
17	447.803	1743.52	128434	16675.6	7.39778
18	453.593	1744.23	127707	16581.1	7.39773
19	459.382	1744.94	126976	16486.2	7.39774
20	465.172	1745.65	126241	16390.9	7.39779
21	473.888	1746.57	125778	16330.7	7.39776
22	482.604	1747.5	125293	16267.7	7.39774
23	491.286	1748.53	124248	16132	7.39773
24	499.968	1749.57	123188	15994.5	7.39779
25	508.651	1750.67	121857	15821.6	7.39775
26	517.333	1751.77	120575	15655.2	7.39778
27	523.12	1752.39	120228	15610.1	7.39775
28	528.906	1753.01	119899	15567.4	7.39776
29	534.693	1753.64	119553	15522.5	7.39777
30	540.48	1754.28	119092	15462.6	7.39775
31	546.266	1754.92	118589	15397.3	7.39776
32	552.053	1755.56	118045	15326.7	7.39777
33	557.839	1756.17	117594	15268.1	7.39775
34	563.626	1756.78	117106	15204.7	7.39773
35	569.412	1757.4	116581	15136.6	7.39776
36	578.092	1758.6	114080	14811.9	7.39777
37	586.792	1759.92	110676	14369.8	7.39771
38	592.512	1760.83	108155	14042.6	7.39777
39	598.232	1761.73	105582	13708.6	7.39781
40	603.951	1762.64	102894	13359.6	7.39781
41	609.671	1763.54	100081	12994.3	7.39777
42	615.391	1764.45	97152.7	12614.1	7.39778
43	621.11	1765.35	94108.5	12218.8	7.39775
44	621.191	1765.46	93761.8	12173.8	7.39776
45	628.987	1775.46	62829.2	8157.59	7.39776
46	636.879	1785.45	38320.3	4975.41	7.39775
47	644.887	1795.38	20409.9	2649.97	7.39776
48	652.896	1805.28	8902.53	1155.88	7.39774
49	657.17	1810.53	5399.83	701.101	7.39776
50	660.905	1815.11	2134.16	277.094	7.39776
51	668.914	1825	0	0	0

Entity Information

Group: Proposed Grades

Shared Entities

Type	Coordinates

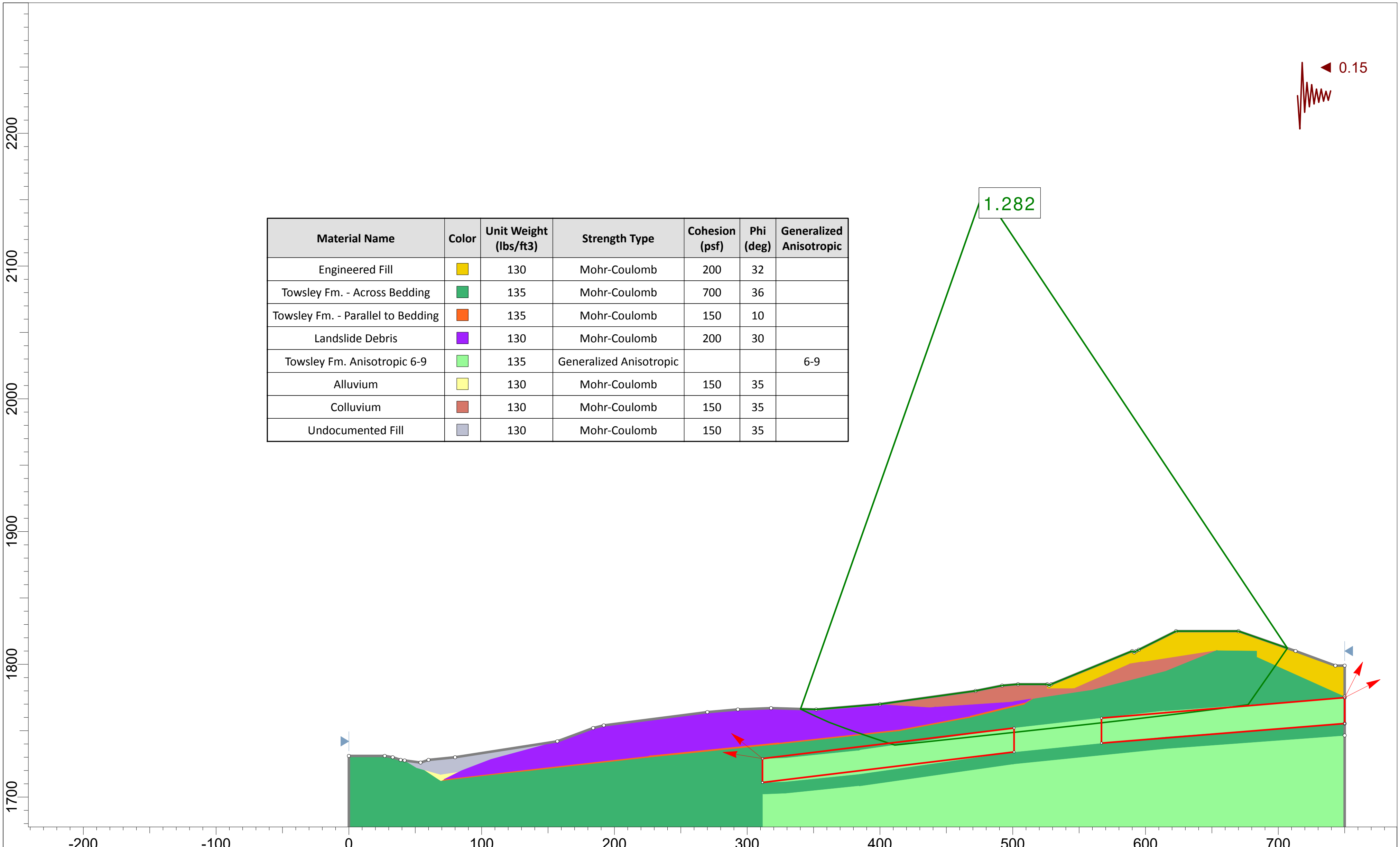
Type	Coordinates	
	X	Y
External Boundary	743	1799
	713	1810
	670	1825
	623	1825
	595	1811
	593	1810
	591.5	1809
	590	1810
	529	1785
	527.5	1784
	526	1785
	504	1785
	492	1784
	472	1780
	400	1770
	352	1766
	318	1767
	293	1766
	270	1764
	192	1754
	184	1752
	157	1742
	80	1730
	60	1728
	54	1726
	42	1727.6
	39	1728
	33	1730
	27	1731
	0	1731
	0	1600
	311.567	1600
	750	1600
	750	1746.45
	750	1755.45
	750	1774.95
	750	1775.56
	750	1799
	X	Y
Material Boundary	311.567	1600
	311.567	1701.99
	311.567	1710.99
	311.567	1728.99
	328.966	1729.7
	384.366	1735.29
	501	1752
	615	1765
	750	1774.95
	X	Y
Material Boundary	311.567	1710.99
	328.966	1711.7
	384.366	1717.29
	501	1734
	615	1745.5
	750	1755.45

Type	Coordinates X	Coordinates Y
Material Boundary	311.567	1701.99
	328.966	1702.7
	384.366	1708.29
	501	1725
	615	1736.5
	750	1746.45
Material Boundary	595	1811
	607	1811
	653.192	1810.56
	654	1810.56
	684	1810.27
	713	1810
Material Boundary	42	1727.6
	51.0038	1722.08
	56	1720.68
	69.1119	1717
	82.2691	1718.96
	85	1720
	106.948	1728.39
	157	1742
Material Boundary	56	1720.68
	69.1119	1712
	71.7039	1713.31
	85	1720
Material Boundary	400	1770
	437.424	1767.68
	441.603	1767.96
	501	1772
	513.929	1773.96
	516.158	1774.29
	560.024	1780.94
	615.003	1795
	654	1810.56
Material Boundary	526	1785
	526	1782
	546	1782
	587.659	1800.3
	598	1802
	653.192	1810.56
Material Boundary	684	1810.27
	684	1805.27
	750	1775.56
Material Boundary	415.192	1750.04
	418.014	1751.57
	424.99	1755.36
	432.321	1760.37
	441.603	1767.96

Type	Coordinates X	Coordinates Y
Material Boundary	69.1119	1712
	137	1720
	226	1730
	324	1740
	415.192	1750.04
	468	1760
	509	1770
	516.158	1774.29
Material Boundary	71.7039	1713.31
	137	1721
	226	1731
	324	1741
	415.192	1751.04
	418.014	1751.57
	468	1761
	509	1771
	513.929	1773.96

Scenario-based Entities

Type	Coordinates X	Coordinates Y	unox static
Block Search Window	311.567	1728.99	✓
	311.567	1710.99	
	501	1734	
	501	1752	
Block Search Window	566.906	1759.52	✓
	566.906	1740.65	
	750	1755.45	
	750	1774.95	



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Generalized Anisotropic
Engineered Fill		130	Mohr-Coulomb	200	32	
Towsley Fm. - Across Bedding		135	Mohr-Coulomb	700	36	
Towsley Fm. - Parallel to Bedding		135	Mohr-Coulomb	150	10	
Landslide Debris		130	Mohr-Coulomb	200	30	
Towsley Fm. Anisotropic 6-9		135	Generalized Anisotropic			6-9
Alluvium		130	Mohr-Coulomb	150	35	
Colluvium		130	Mohr-Coulomb	150	35	
Undocumented Fill		130	Mohr-Coulomb	150	35	

rocscience

SLIDEINTERPRET 8.032

Project	Cherry Willow Recycled Water Tanks
Analysis Description	WT13-WT13' - Deep Bedrock - Pseudo-static
Drawn By	RMP
Scale	1:1200
Company	GWV
Date	
File Name	WT13.slmd

SCV Water

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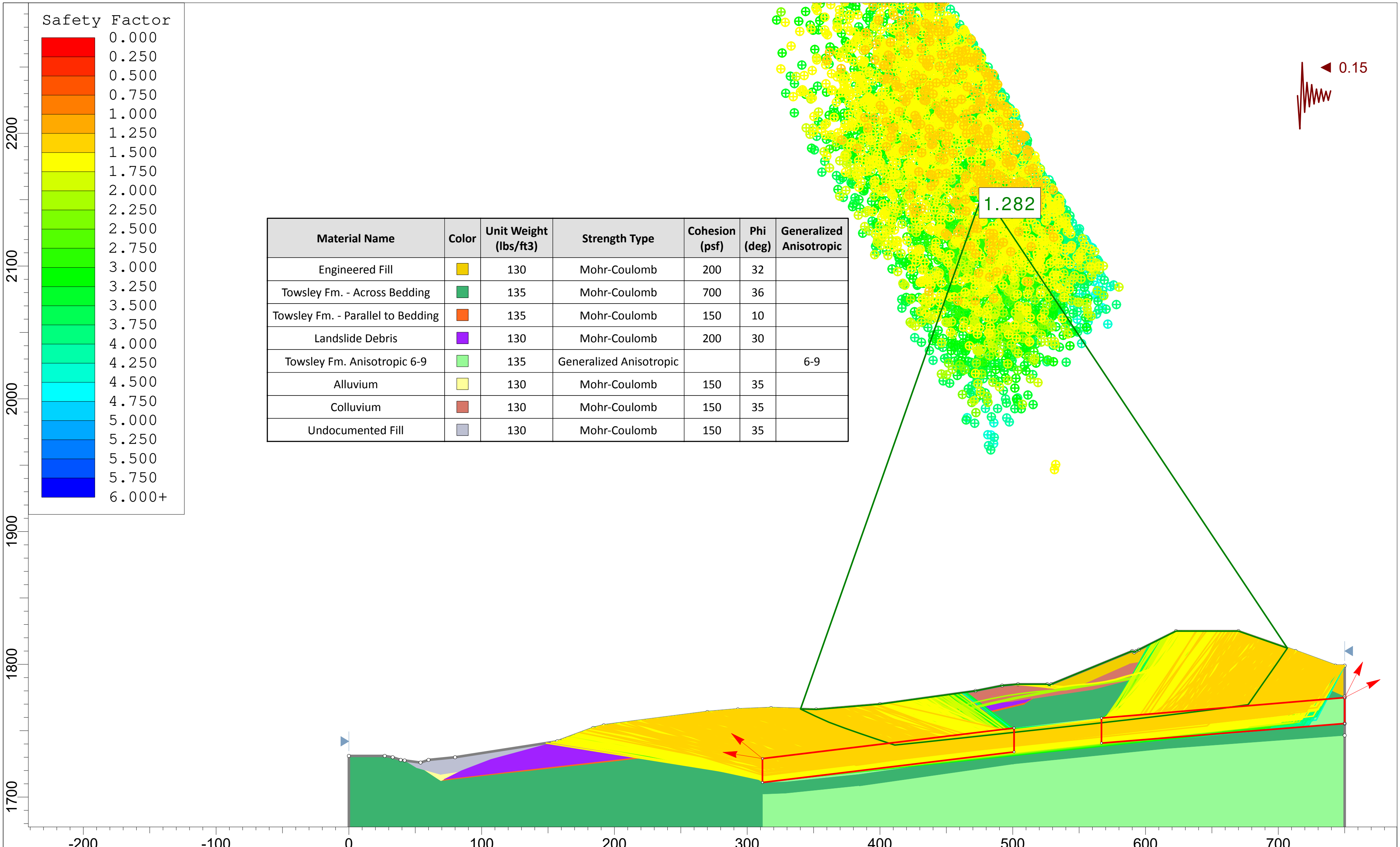

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Generalized Anisotropic
Engineered Fill		130	Mohr-Coulomb	200	32	
Towsley Fm. - Across Bedding		135	Mohr-Coulomb	700	36	
Towsley Fm. - Parallel to Bedding		135	Mohr-Coulomb	150	10	
Landslide Debris		130	Mohr-Coulomb	200	30	
Towsley Fm. Anisotropic 6-9		135	Generalized Anisotropic			6-9
Alluvium		130	Mohr-Coulomb	150	35	
Colluvium		130	Mohr-Coulomb	150	35	
Undocumented Fill		130	Mohr-Coulomb	150	35	

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SLIDEINTERPRET 8.032

Project	Cherry Willow Recycled Water Tanks		
Analysis Description	WT13-WT13' - Deep Bedrock - Pseudo-static		
Drawn By RMP	*Scale* 1:1200	*Company*	GWV
Date		*File Name*	WT13.slmd

Slide Analysis Information

WT13

Project Summary

File Name:	WT13.slmd
Slide Modeler Version:	8.032
Compute Time:	00h:00m:08.429s
Project Title:	Cherry Willow Recycled Water Tanks
Analysis:	WT13-WT13' - Deep Bedrock - Pseudo-static
Author:	RMP
Company:	GWV

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	inches/hour
Data Output:	Standard
Failure Direction:	Right to Left

Analysis Options

Analysis Methods Used	
Slices Type:	Vertical
	Spencer
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Surface Type:	Non-Circular Block Search
Number of Surfaces:	5000
Multiple Groups:	Disabled
Pseudo-Random Surfaces:	Enabled
Convex Surfaces Only:	Disabled
Left Projection Angle (Start Angle) [°]:	141
Left Projection Angle (End Angle) [°]:	171
Right Projection Angle (Start Angle) [°]:	27

Right Projection Angle (End Angle) [°]:	63
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading

Advanced seismic analysis: No
Staged pseudostatic analysis: No

Seismic Load Coefficient (Horizontal): 0.15

Materials

Property	Engineered Fill	Towsley Fm. - Across Bedding	Towsley Fm. - Parallel to Bedding	Landslide Debris	Towsley Fm. Anisotropic 6-9	Alluvium	Colluvium	Undocumented Fill
Color								
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Generalized Anisotropic	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft3]	130	135	135	130	135	130	130	130
Cohesion [psf]	200	700	150	200		150	150	150
Friction Angle [°]	32	36	10	30		35	35	35
Water Surface	None	None	None	None	None	None	None	None
Ru Value	0	0	0	0	0	0	0	0

Generalized Anisotropic Functions

Name: 6-9

Angle From	Angle To	Material
6	-90	Towsley Fm. - Across Bedding
9	6	Towsley Fm. - Parallel to Bedding
90	9	Towsley Fm. - Across Bedding

Global Minimums

Method: spencer

FS	1.281960
Axis Location:	477.791, 2155.899
Left Slip Surface Endpoint:	340.240, 1766.346
Right Slip Surface Endpoint:	706.903, 1812.127
Resisting Moment:	2.38371e+08 lb-ft
Driving Moment:	1.85943e+08 lb-ft
Resisting Horizontal Force:	536573 lb
Driving Horizontal Force:	418557 lb
Total Slice Area:	13624.3 ft2
Surface Horizontal Width:	366.663 ft
Surface Average Height:	37.1576 ft

Global Minimum Coordinates

Method: spencer

X	Y
340.24	1766.35
350.976	1761.19
361.711	1756.37
373.748	1751.8
385.174	1747.86
396.917	1743.83
411.185	1739.13
421.644	1740.25

X	Y
432.102	1741.36
442.401	1742.46
452.701	1743.56
467.495	1745.14
479.14	1746.38
490.784	1747.62
502.429	1748.86
514.074	1750.1
525.719	1751.38
537.363	1752.68
549.008	1753.98
560.653	1755.28
572.57	1756.61
585.165	1758.02
600.531	1759.83
619.633	1762.1
638.689	1764.42
657.739	1766.8
677.263	1769.58
685.93	1781.97
692.921	1791.96
699.912	1801.95
706.903	1812.13

Valid/Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 5007
Number of Invalid Surfaces: 8

Error Codes:

Error Code -111 reported for 8 surfaces

Error Codes

The following errors were encountered during the computation:

-111 = safety factor equation did not converge

Slice Data

- **Global Minimum Query (spencer) - Safety Factor: 1.28196**

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	10.7354	3378.37	-25.6594	Landslide Debris	200	30	469.386	601.734	695.824	0	695.824	470.333	470.333
2	10.7353	10592.1	-24.1872	Landslide Debris	200	30	934.043	1197.41	1727.56	0	1727.56	1308.03	1308.03
3	12.0375	20703.1	-20.7969	Landslide Debris	200	30	1359.11	1742.33	2671.4	0	2671.4	2155.21	2155.21
4	5.71284	12802.7	-18.9966	Landslide Debris	200	30	1648.08	2112.77	3313.01	0	3313.01	2745.65	2745.65
5	5.71284	14616.9	-18.9966	Landslide Debris	200	30	1851.47	2373.51	3764.63	0	3764.63	3127.24	3127.24
6	0.284328	774.871	-18.9674	Landslide Debris	200	30	1957.17	2509.02	3999.34	0	3999.34	3326.67	3326.67
7	2.20387	6163.85	-18.9674	Towsley Fm. - Parallel to Bedding	150	10	564.069	723.114	3250.29	0	3250.29	3056.42	3056.42
8	9.25463	28947.4	-18.9674	Towsley Fm. - Across Bedding	700	36	3601.63	4617.15	5391.5	0	5391.5	4153.65	4153.65
9	7.13391	25700.6	-18.2109	Towsley Fm. - Across Bedding	700	36	3953.63	5068.4	6012.6	0	6012.6	4711.88	4711.88
10	7.13391	28873.5	-18.2109	Towsley Fm. - Across Bedding	700	36	4341.86	5566.09	6697.61	0	6697.61	5269.17	5269.17
11	10.4595	44923.1	6.08744	Towsley Fm. - Parallel to Bedding	150	10	686.386	879.919	4139.57	0	4139.57	4212.78	4212.78
12	10.4573	45413.6	6.08744	Towsley Fm. - Parallel to Bedding	150	10	692.708	888.024	4185.54	0	4185.54	4259.42	4259.42
13	10.2995	45220	6.08744	Towsley Fm. - Parallel to Bedding	150	10	699.022	896.118	4231.44	0	4231.44	4305.99	4305.99

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
14	10.2995	45708.1	6.08744	Towsley Fm. - Parallel to Bedding	150	10	705.287	904.15	4276.99	0	4276.99	4352.21	4352.21
15	7.3972	33129.3	6.08744	Towsley Fm. - Parallel to Bedding	150	10	710.67	911.05	4316.13	0	4316.13	4391.92	4391.92
16	7.3972	33381.1	6.08744	Towsley Fm. - Parallel to Bedding	150	10	715.17	916.819	4348.85	0	4348.85	4425.12	4425.12
17	5.82238	26462.4	6.08744	Towsley Fm. - Parallel to Bedding	150	10	719.436	922.288	4379.86	0	4379.86	4456.58	4456.58
18	5.82238	26816.4	6.08744	Towsley Fm. - Parallel to Bedding	150	10	727.474	932.592	4438.3	0	4438.3	4515.88	4515.88
19	11.6448	54936.8	6.08744	Towsley Fm. - Parallel to Bedding	150	10	742.278	951.571	4545.93	0	4545.93	4625.09	4625.09
20	5.82238	27959.5	6.08744	Towsley Fm. - Parallel to Bedding	150	10	753.428	965.865	4626.99	0	4626.99	4707.35	4707.35
21	5.82238	27891.2	6.08744	Towsley Fm. - Parallel to Bedding	150	10	751.878	963.877	4615.72	0	4615.72	4695.91	4695.91
22	11.6448	55017.1	6.08744	Towsley Fm. - Parallel to Bedding	150	10	743.19	952.74	4552.56	0	4552.56	4631.82	4631.82
23	5.82238	26870.3	6.24208	Towsley Fm. - Parallel to Bedding	150	10	728.087	933.378	4442.76	0	4442.76	4522.39	4522.39
24	5.82238	26395.4	6.24208	Towsley Fm. - Parallel to Bedding	150	10	717.313	919.567	4364.43	0	4364.43	4442.88	4442.88
25	5.82238	25892.6	6.36441	Towsley Fm. - Parallel to Bedding	150	10	705.44	904.346	4278.1	0	4278.1	4356.79	4356.79
26	5.82238	27122.1	6.36441	Towsley Fm. - Parallel to Bedding	150	10	733.311	940.075	4480.73	0	4480.73	4562.52	4562.52
27	5.82238	28443.3	6.36846	Towsley Fm. - Parallel to Bedding	150	10	763.242	978.446	4698.36	0	4698.36	4783.55	4783.55
28	5.82238	29764.3	6.36846	Towsley Fm. - Parallel to Bedding	150	10	793.187	1016.83	4916.06	0	4916.06	5004.59	5004.59
29	5.82238	31085.3	6.36846	Towsley Fm. - Parallel to Bedding	150	10	823.131	1055.22	5133.76	0	5133.76	5225.63	5225.63
30	5.82238	32406.5	6.36846	Towsley Fm. - Parallel to Bedding	150	10	853.077	1093.61	5351.49	0	5351.49	5446.71	5446.71
31	5.95854	34543.1	6.36846	Towsley Fm. - Parallel to Bedding	150	10	883.618	1132.76	5573.53	0	5573.53	5672.15	5672.15
32	5.95854	35945.2	6.36846	Towsley Fm. - Parallel to Bedding	150	10	914.67	1172.57	5799.3	0	5799.3	5901.39	5901.39
33	6.29745	39511.9	6.40678	Towsley Fm. - Parallel to Bedding	150	10	946.371	1213.21	6029.77	0	6029.77	6136.03	6136.03
34	6.29745	41074.4	6.40678	Towsley Fm. - Parallel to Bedding	150	10	979.11	1255.18	6267.78	0	6267.78	6377.72	6377.72
35	7.68309	51796.4	6.7123	Towsley Fm. - Parallel to Bedding	150	10	1006.32	1290.06	6465.6	0	6465.6	6584.03	6584.03
36	7.68309	53593.1	6.7123	Towsley Fm. - Parallel to Bedding	150	10	1037.12	1329.54	6689.52	0	6689.52	6811.58	6811.58
37	9.55077	70761.1	6.77987	Towsley Fm. - Parallel to Bedding	150	10	1093.79	1402.2	7101.58	0	7101.58	7231.62	7231.62
38	9.55077	75350.5	6.77987	Towsley Fm. - Parallel to Bedding	150	10	1157.06	1483.3	7561.52	0	7561.52	7699.08	7699.08
39	9.52795	78540.3	6.9501	Towsley Fm. - Parallel to Bedding	150	10	1202.46	1541.51	7891.64	0	7891.64	8038.22	8038.22
40	9.52795	77595.9	6.9501	Towsley Fm. - Parallel to Bedding	150	10	1189.43	1524.8	7796.86	0	7796.86	7941.85	7941.85
41	9.52531	76244.7	7.11061	Towsley Fm. - Parallel to Bedding	150	10	1170.01	1499.9	7655.68	0	7655.68	7801.63	7801.63
42	9.52531	74883.4	7.11061	Towsley Fm. - Parallel to Bedding	150	10	1151.23	1475.83	7519.15	0	7519.15	7662.76	7662.76
43	6.50789	50253.1	8.11675	Towsley Fm. - Parallel to Bedding	150	10	1126.49	1444.12	7339.3	0	7339.3	7499.96	7499.96
44	6.50789	49422.8	8.11675	Towsley Fm. - Parallel to Bedding	150	10	1109.82	1422.75	7218.15	0	7218.15	7376.43	7376.43
45	6.50789	47435.1	8.11675	Towsley Fm. - Parallel to Bedding	150	10	1069.94	1371.62	6928.15	0	6928.15	7080.74	7080.74
46	8.66678	52344.7	55.0181	Towsley Fm. - Across Bedding	700	36	2024.74	2595.63	2609.11	0	2609.11	5502.67	5502.67
47	6.99121	28964.1	55.0181	Towsley Fm. - Across Bedding	700	36	1500.52	1923.61	1684.16	0	1684.16	3828.56	3828.56
48	4.94668	13391.7	55.0181	Towsley Fm. - Across Bedding	700	36	1103.74	1414.95	984.044	0	984.044	2561.4	2561.4
49	2.04453	3835.6	55.0181	Engineered Fill	200	32	575.609	737.908	860.832	0	860.832	1683.44	1683.44
50	6.99119	5731.91	55.5065	Engineered Fill	200	32	309.173	396.347	314.22	0	314.22	764.178	764.178

Interslice Data

- **Global Minimum Query (spencer) - Safety Factor: 1.28196**

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	340.24	1766.35	0	0	0
2	350.976	1761.19	8120.81	1670.87	11.6264
3	361.711	1756.37	24889.2	5121.01	11.6265
4	373.748	1751.8	50357.5	10361.2	11.6265
5	379.461	1749.83	64368.1	13243.9	11.6265
6	385.174	1747.86	80156.7	16492.4	11.6265
7	385.458	1747.76	80987.8	16663.4	11.6265
8	387.662	1747.01	83768.3	17235.5	11.6265
9	396.917	1743.83	129907	26728.7	11.6265
10	404.051	1741.48	168369	34642.2	11.6264
11	411.185	1739.13	210732	43358.5	11.6265
12	421.644	1740.25	206555	42499.1	11.6265
13	432.102	1741.36	202319	41627.5	11.6265
14	442.401	1742.46	198088	40756.9	11.6264
15	452.701	1743.56	193798	39874.3	11.6265
16	460.098	1744.35	190680	39232.8	11.6265
17	467.495	1745.14	187533	38585.2	11.6264
18	473.317	1745.76	185032	38070.8	11.6265
19	479.14	1746.38	182490	37547.6	11.6264
20	490.784	1747.62	177247	36469	11.6265
21	496.607	1748.24	174567	35917.5	11.6265
22	502.429	1748.86	171895	35367.8	11.6265
23	514.074	1750.1	166643	34287.2	11.6265
24	519.896	1750.74	164022	33747.9	11.6265
25	525.719	1751.38	161460	33220.8	11.6265
26	531.541	1752.03	158905	32695.1	11.6265
27	537.363	1752.68	156197	32137.8	11.6265
28	543.186	1753.33	153321	31546.1	11.6265
29	549.008	1753.98	150280	30920.4	11.6265
30	554.831	1754.63	147074	30260.7	11.6264
31	560.653	1755.28	143702	29567	11.6265
32	566.612	1755.94	140079	28821.6	11.6265
33	572.57	1756.61	136281	28040	11.6264
34	578.868	1757.31	132050	27169.5	11.6264
35	585.165	1758.02	127623	26258.6	11.6264
36	592.848	1758.92	121738	25047.9	11.6265
37	600.531	1759.83	115619	23788.8	11.6264
38	610.082	1760.96	107388	22095.3	11.6265
39	619.633	1762.1	98550.3	20276.9	11.6265
40	629.161	1763.26	89060.4	18324.4	11.6265
41	638.689	1764.42	79698.1	16398.1	11.6265
42	648.214	1765.61	70309.5	14466.3	11.6265
43	657.739	1766.8	61108.3	12573.2	11.6265
44	664.247	1767.73	54089.5	11129	11.6264
45	670.755	1768.66	47199.2	9711.34	11.6265
46	677.263	1769.58	40616.7	8356.97	11.6265
47	685.93	1781.97	17997.2	3702.97	11.6265
48	692.921	1791.96	7316.42	1505.37	11.6265
49	697.868	1799.03	3811	784.121	11.6265
50	699.912	1801.95	1897.3	390.372	11.6264
51	706.903	1812.13	0	0	0

Entity Information

Group: Proposed Grades

Shared Entities

Type	Coordinates

Type	Coordinates	
	X	Y
External Boundary	743	1799
	713	1810
	670	1825
	623	1825
	595	1811
	593	1810
	591.5	1809
	590	1810
	529	1785
	527.5	1784
	526	1785
	504	1785
	492	1784
	472	1780
	400	1770
	352	1766
	318	1767
	293	1766
	270	1764
	192	1754
	184	1752
	157	1742
	80	1730
	60	1728
	54	1726
	42	1727.6
	39	1728
	33	1730
	27	1731
	0	1731
	0	1600
	311.567	1600
	750	1600
	750	1746.45
	750	1755.45
	750	1774.95
	750	1775.56
	750	1799
	X	Y
Material Boundary	311.567	1600
	311.567	1701.99
	311.567	1710.99
	311.567	1728.99
	328.966	1729.7
	384.366	1735.29
	501	1752
	615	1765
	750	1774.95
	X	Y
Material Boundary	311.567	1710.99
	328.966	1711.7
	384.366	1717.29
	501	1734
	615	1745.5
	750	1755.45

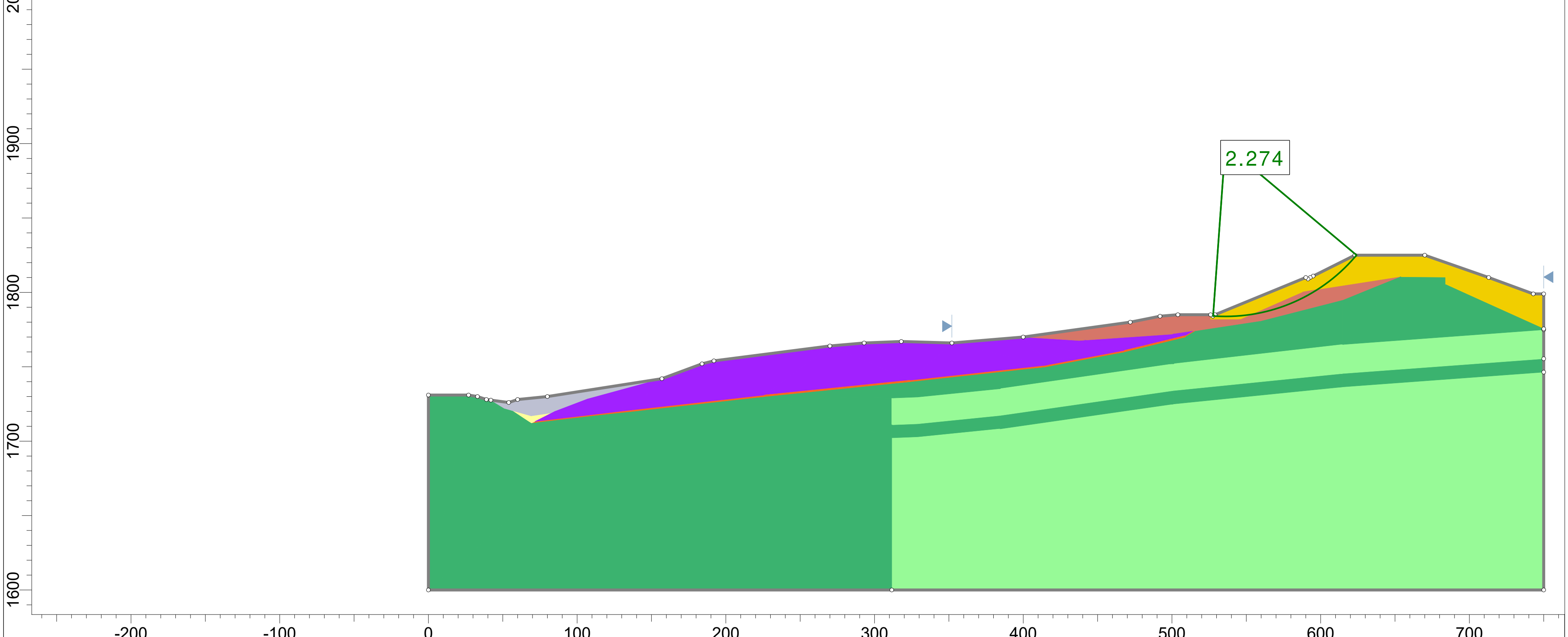
Type	Coordinates	
	X	Y
Material Boundary	311.567	1701.99
	328.966	1702.7
	384.366	1708.29
	501	1725
	615	1736.5
	750	1746.45
	X	Y
Material Boundary	595	1811
	607	1811
	653.192	1810.56
	654	1810.56
	684	1810.27
	713	1810
	X	Y
Material Boundary	42	1727.6
	51.0038	1722.08
	56	1720.68
	69.1119	1717
	82.2691	1718.96
	85	1720
	106.948	1728.39
	157	1742
	X	Y
Material Boundary	56	1720.68
	69.1119	1712
	71.7039	1713.31
	85	1720
	X	Y
Material Boundary	400	1770
	437.424	1767.68
	441.603	1767.96
	501	1772
	513.929	1773.96
	516.158	1774.29
	560.024	1780.94
	615.003	1795
	654	1810.56
	X	Y
Material Boundary	526	1785
	526	1782
	546	1782
	587.659	1800.3
	598	1802
	653.192	1810.56
	X	Y
Material Boundary	684	1810.27
	684	1805.27
	750	1775.56
	X	Y
Material Boundary	415.192	1750.04
	418.014	1751.57
	424.99	1755.36
	432.321	1760.37
	441.603	1767.96

Type	Coordinates	
	X	Y
Material Boundary	69.1119	1712
	137	1720
	226	1730
	324	1740
	415.192	1750.04
	468	1760
	509	1770
	516.158	1774.29
	X	Y
Material Boundary	71.7039	1713.31
	137	1721
	226	1731
	324	1741
	415.192	1751.04
	418.014	1751.57
	468	1761
	509	1771
	513.929	1773.96

Scenario-based Entities

Type	Coordinates		unox pseudo
	X	Y	
Block Search Window	311.567	1728.99	✓
	311.567	1710.99	
	501	1734	
	501	1752	
	X	Y	
Block Search Window	566.906	1759.52	✓
	566.906	1740.65	
	750	1755.45	
	750	1774.95	

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Generalized Anisotropic
Engineered Fill		130	Mohr-Coulomb	200	32	
Towsley Fm. - Across Bedding		135	Mohr-Coulomb	700	36	
Towsley Fm. - Parallel to Bedding		135	Mohr-Coulomb	150	10	
Landslide Debris		130	Mohr-Coulomb	200	30	
Towsley Fm. Anisotropic 6-9		135	Generalized Anisotropic			6-9
Alluvium		130	Mohr-Coulomb	150	35	
Colluvium		130	Mohr-Coulomb	150	35	
Undocumented Fill		130	Mohr-Coulomb	150	35	



Project	Cherry Willow Recycled Water Tanks		
Analysis Description	WT13-WT13' - Fill Slope - Static		
Drawn By RMP	Scale 1:1200	Company	GWV
Date		File Name	WT13.slmd

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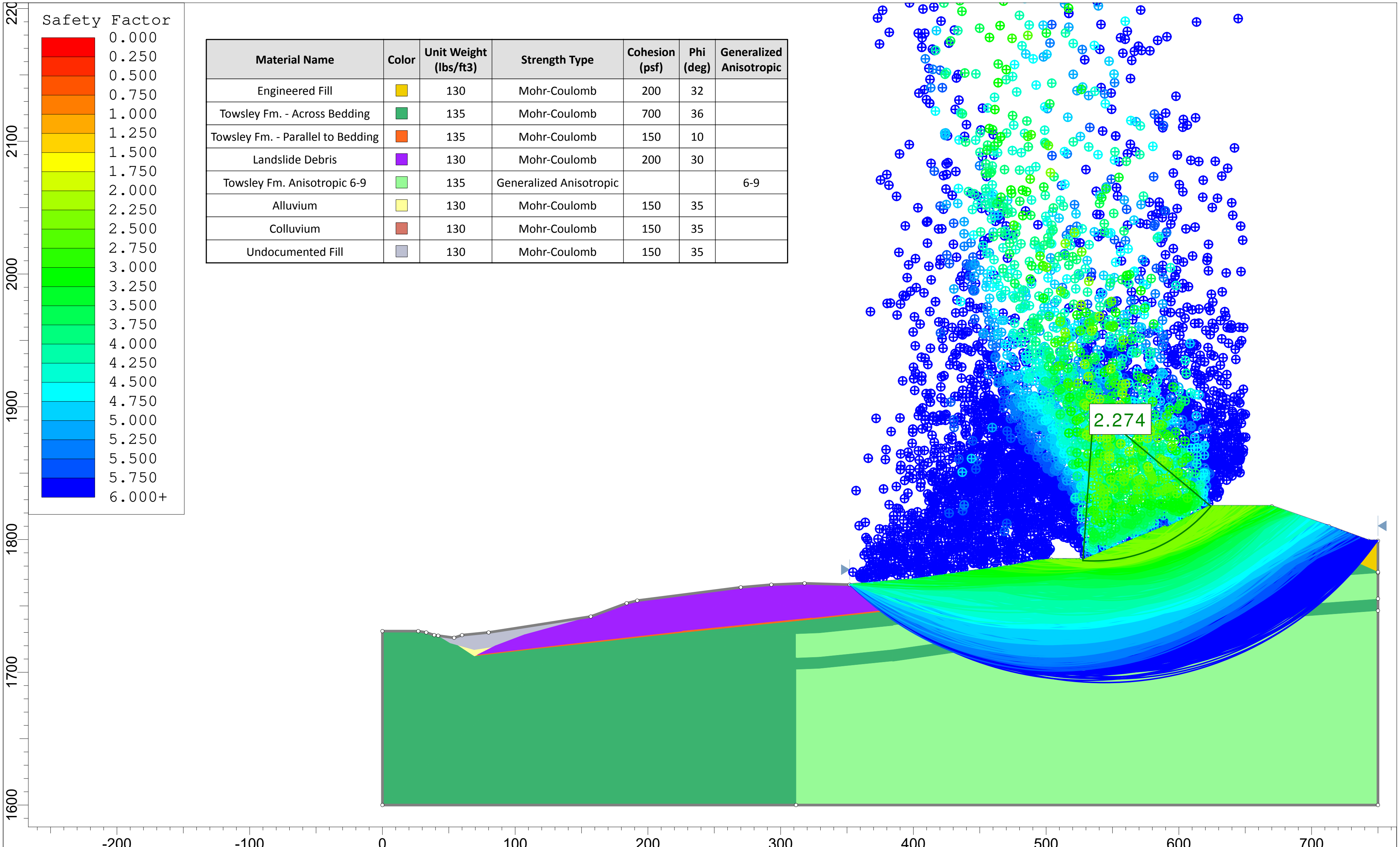
SLIDEINTERPRET 8.032

SCV Water

W.O. 8485



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Generalized Anisotropic
Engineered Fill		130	Mohr-Coulomb	200	32	
Towsley Fm. - Across Bedding		135	Mohr-Coulomb	700	36	
Towsley Fm. - Parallel to Bedding		135	Mohr-Coulomb	150	10	
Landslide Debris		130	Mohr-Coulomb	200	30	
Towsley Fm. Anisotropic 6-9		135	Generalized Anisotropic			6-9
Alluvium		130	Mohr-Coulomb	150	35	
Colluvium		130	Mohr-Coulomb	150	35	
Undocumented Fill		130	Mohr-Coulomb	150	35	

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SLIDEINTERPRET 8.032

Project	Cherry Willow Recycled Water Tanks		
Analysis Description	WT13-WT13' - Fill Slope - Static		
Drawn By RMP	*Scale* 1:1200	*Company*	GWV
Date		*File Name*	WT13.slmd

Slide Analysis Information

WT13

Project Summary

File Name:	WT13.slmd
Slide Modeler Version:	8.032
Compute Time:	00h:00m:01.758s
Project Title:	Cherry Willow Recycled Water Tanks
Analysis:	WT13-WT13' - Fill Slope - Static
Author:	RMP
Company:	GWV

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	inches/hour
Data Output:	Standard
Failure Direction:	Right to Left

Analysis Options

Analysis Methods Used	
Slices Type:	Vertical
	Spencer
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Surface Type:	Circular
Search Method:	Slope Search
Number of Surfaces:	5000
Upper Angle [°]:	Not Defined
Lower Angle [°]:	Not Defined
Composite Surfaces:	Disabled
Reverse Curvature:	Create Tension Crack
Minimum Elevation:	Not Defined

Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading

Advanced seismic analysis:	No
Staged pseudostatic analysis:	No

Materials

Property	Engineered Fill	Towsley Fm. - Across Bedding	Towsley Fm. - Parallel to Bedding	Landslide Debris	Towsley Fm. Anisotropic 6-9	Alluvium	Colluvium	Undocumented Fill
Color								
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Generalized Anisotropic	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft3]	130	135	135	130	135	130	130	130
Cohesion [psf]	200	700	150	200		150	150	150
Friction Angle [°]	32	36	10	30		35	35	35
Water Surface	None	None	None	None	None	None	None	None
Ru Value	0	0	0	0	0	0	0	0

Generalized Anisotropic Functions

Name: 6-9

Angle From	Angle To	Material
6	-90	Towsley Fm. - Across Bedding
9	6	Towsley Fm. - Parallel to Bedding
90	9	Towsley Fm. - Across Bedding

Global Minimums

Method: spencer

FS	2.274140
Center:	535.932, 1899.051
Radius:	115.214
Left Slip Surface Endpoint:	527.697, 1784.131
Right Slip Surface Endpoint:	624.198, 1825.000
Resisting Moment:	1.05008e+07 lb-ft
Driving Moment:	4.61747e+06 lb-ft
Resisting Horizontal Force:	82937.8 lb
Driving Horizontal Force:	36470 lb
Total Slice Area:	860.623 ft2
Surface Horizontal Width:	96.5009 ft
Surface Average Height:	8.91829 ft

Valid/Invalid Surfaces

Method: spencer

Number of Valid Surfaces:	4804
Number of Invalid Surfaces:	196

Error Codes:

Error Code -101 reported for 1 surface
Error Code -105 reported for 2 surfaces
Error Code -106 reported for 96 surfaces
Error Code -107 reported for 14 surfaces
Error Code -108 reported for 23 surfaces
Error Code -111 reported for 59 surfaces
Error Code -112 reported for 1 surface

Error Codes

The following errors were encountered during the computation:

-101 = Only one (or zero) surface / slope intersections.
-105 = More than two surface / slope intersections with no valid slip surface.
-106 = Average slice width is less than 0.0001 * (maximum horizontal extent of soil region). This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
-107 = Total driving moment or total driving force is negative. This will occur if the wrong failure direction is specified, or if high external or anchor loads are applied against the failure direction.
-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-111 = safety factor equation did not converge
-112 = The coefficient M-Alpha = cos(alpha)(1+tan(alpha)tan(phi)/F) < 0.2 for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.

Slice Data

- **Global Minimum Query (spencer) - Safety Factor: 2.27414**

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	1.95492	174.192	-3.61187	Engineered Fill	200	32	128.733	292.757	148.441	0	148.441	140.315	140.315
2	1.95492	433.275	-2.6382	Engineered Fill	200	32	169.705	385.932	297.553	0	297.553	289.733	289.733
3	1.95492	655.558	-1.6653	Engineered Fill	200	32	203.783	463.431	421.578	0	421.578	415.654	415.654
4	1.95492	869.4	-0.692868	Engineered Fill	200	32	235.697	536.008	537.727	0	537.727	534.877	534.877
5	1.95492	1074.81	0.27936	Engineered Fill	200	32	265.523	603.837	646.275	0	646.275	647.57	647.57
6	1.95492	1271.79	1.25167	Engineered Fill	200	32	293.332	667.078	747.48	0	747.48	753.889	753.889
7	1.95492	1460.32	2.22434	Engineered Fill	200	32	319.19	725.883	841.59	0	841.59	853.988	853.988
8	1.95492	1640.41	3.19765	Engineered Fill	200	32	343.157	780.388	928.816	0	928.816	947.987	947.987
9	1.95492	1812.03	4.17188	Engineered Fill	200	32	365.292	830.725	1009.37	0	1009.37	1036.02	1036.02
10	1.95492	1975.15	5.14733	Engineered Fill	200	32	385.646	877.012	1083.44	0	1083.44	1118.18	1118.18
11	1.95492	2129.73	6.12427	Engineered Fill	200	32	404.268	919.361	1151.22	0	1151.22	1194.6	1194.6
12	1.95492	2275.74	7.10301	Engineered Fill	200	32	421.204	957.877	1212.86	0	1212.86	1265.34	1265.34
13	1.95492	2413.12	8.08384	Engineered Fill	200	32	436.497	992.655	1268.51	0	1268.51	1330.51	1330.51
14	1.95312	2539.41	9.0666	Colluvium	150	35	473.309	1076.37	1322.99	0	1322.99	1398.52	1398.52
15	1.95312	2659.13	10.0516	Colluvium	150	35	486.843	1107.15	1366.95	0	1366.95	1453.25	1453.25
16	1.95312	2770.05	11.0396	Colluvium	150	35	498.636	1133.97	1405.25	0	1405.25	1502.54	1502.54
17	1.95312	2872.07	12.031	Colluvium	150	35	508.729	1156.92	1438.03	0	1438.03	1546.45	1546.45
18	1.95312	2965.1	13.026	Colluvium	150	35	517.154	1176.08	1465.39	0	1465.39	1585.03	1585.03
19	1.95312	3049.04	14.025	Colluvium	150	35	523.948	1191.53	1487.46	0	1487.46	1618.34	1618.34
20	1.95312	3123.77	15.0284	Colluvium	150	35	529.141	1203.34	1504.32	0	1504.32	1646.39	1646.39
21	1.95312	3189.17	16.0366	Colluvium	150	35	532.764	1211.58	1516.09	0	1516.09	1669.23	1669.23
22	1.95312	3245.1	17.0499	Colluvium	150	35	534.844	1216.31	1522.85	0	1522.85	1686.88	1686.88
23	1.95312	3291.4	18.0687	Colluvium	150	35	535.407	1217.59	1524.67	0	1524.67	1699.35	1699.35
24	1.95312	3327.92	19.0934	Colluvium	150	35	534.47	1215.46	1521.64	0	1521.64	1706.65	1706.65
25	1.95312	3354.47	20.1246	Colluvium	150	35	532.065	1209.99	1513.82	0	1513.82	1708.78	1708.78
26	1.95312	3370.86	21.1626	Colluvium	150	35	528.204	1201.21	1501.28	0	1501.28	1705.76	1705.76
27	1.95312	3376.89	22.2079	Colluvium	150	35	522.905	1189.16	1484.08	0	1484.08	1697.55	1697.55
28	1.95312	3372.31	23.2611	Colluvium	150	35	516.191	1173.89	1462.27	0	1462.27	1684.16	1684.16
29	1.95312	3356.9	24.3226	Colluvium	150	35	508.069	1155.42	1435.9	0	1435.9	1665.54	1665.54
30	1.95312	3330.36	25.3932	Colluvium	150	35	498.562	1133.8	1405.01	0	1405.01	1641.68	1641.68
31	1.95312	3292.42	26.4733	Colluvium	150	35	487.676	1109.04	1369.66	0	1369.66	1612.52	1612.52
32	1.95312	3239.36	27.5637	Colluvium	150	35	474.993	1080.2	1328.46	0	1328.46	1576.4	1576.4
33	1.95312	2893.2	28.665	Colluvium	150	35	425.744	968.201	1168.51	0	1168.51	1401.26	1401.26
34	1.95312	2790.67	29.778	Colluvium	150	35	407.774	927.336	1110.15	0	1110.15	1343.48	1343.48
35	1.95312	2755.73	30.9035	Colluvium	150	35	398.373	905.957	1079.62	0	1079.62	1318.07	1318.07
36	1.95312	2700.08	32.0424	Colluvium	150	35	386.574	879.123	1041.3	0	1041.3	1283.25	1283.25
37	1.86895	2518.97	33.1706	Engineered Fill	200	32	363.205	825.98	1001.78	0	1001.78	1239.18	1239.18
38	1.86895	2442.8	34.2882	Engineered Fill	200	32	350.63	797.382	956.011	0	956.011	1195.09	1195.09
39	1.86895	2353.55	35.4209	Engineered Fill	200	32	336.826	765.989	905.771	0	905.771	1145.33	1145.33
40	1.86895	2250.69	36.5698	Engineered Fill	200	32	321.79	731.795	851.049	0	851.049	1089.77	1089.77
41	1.86895	2133.59	37.7361	Engineered Fill	200	32	305.52	694.795	791.836	0	791.836	1028.28	1028.28
42	1.86895	2001.59	38.9211	Engineered Fill	200	32	288.011	654.978	728.116	0	728.116	960.687	960.687
43	1.86895	1853.93	40.1262	Engineered Fill	200	32	269.258	612.33	659.867	0	659.867	886.813	886.813
44	1.86895	1689.77	41.353	Engineered Fill	200	32	249.254	566.838	587.063	0	587.063	806.447	806.447
45	1.86895	1508.17	42.6035	Engineered Fill	200	32	227.99	518.482	509.676	0	509.676	719.349	719.349
46	1.86895	1308.08	43.8796	Engineered Fill	200	32	205.458	467.241	427.677	0	427.677	625.253	625.253
47	1.86895	1088.29	45.1836	Engineered Fill	200	32	181.648	413.093	341.02	0	341.02	523.836	523.836
48	1.86895	847.421	46.5183	Engineered Fill	200	32	156.547	356.01	249.668	0	249.668	414.74	414.74
49	1.86895	583.901	47.8867	Engineered Fill	200	32	130.143	295.963	153.573	0	153.573	297.537	297.537
50	1.86895	249.257	49.2922	Engineered Fill	200	32	98.5505	224.118	38.596	0	38.596	153.14	153.14

Interslice Data

- **Global Minimum Query (spencer) - Safety Factor: 2.27414**

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	527.697	1784.13	0	0	0
2	529.652	1784.01	269.493	101.141	20.5712
3	531.607	1783.92	627.413	235.469	20.5712
4	533.562	1783.86	1048.98	393.684	20.5712
5	535.517	1783.84	1521.57	571.047	20.5712
6	537.472	1783.85	2033.49	763.168	20.5711
7	539.427	1783.89	2573.89	965.982	20.5711
8	541.381	1783.97	3132.77	1175.73	20.5711
9	543.336	1784.07	3700.88	1388.94	20.5711
10	545.291	1784.22	4269.68	1602.41	20.5711
11	547.246	1784.39	4831.33	1813.2	20.5711
12	549.201	1784.6	5378.64	2018.61	20.5712
13	551.156	1784.85	5905.01	2216.15	20.5711
14	553.111	1785.12	6404.46	2403.6	20.5712
15	555.064	1785.44	6914.76	2595.11	20.5711
16	557.017	1785.78	7390.54	2773.67	20.5711
17	558.97	1786.16	7827.08	2937.51	20.5712
18	560.923	1786.58	8220.18	3085.04	20.5712
19	562.877	1787.03	8566.16	3214.88	20.5711
20	564.83	1787.52	8861.82	3325.84	20.5711
21	566.783	1788.04	9104.46	3416.91	20.5711
22	568.736	1788.61	9291.87	3487.24	20.5711
23	570.689	1789.2	9422.29	3536.19	20.5711
24	572.642	1789.84	9494.47	3563.28	20.5711
25	574.595	1790.52	9507.59	3568.2	20.5711
26	576.548	1791.23	9461.34	3550.84	20.5711
27	578.501	1791.99	9355.87	3511.26	20.5711
28	580.455	1792.79	9191.84	3449.7	20.5711
29	582.408	1793.63	8970.4	3366.59	20.5711
30	584.361	1794.51	8693.2	3262.56	20.5711
31	586.314	1795.44	8362.45	3138.43	20.5711
32	588.267	1796.41	7980.9	2995.23	20.5711
33	590.22	1797.43	7552.47	2834.44	20.5711
34	592.173	1798.5	7134.71	2677.66	20.5711
35	594.126	1799.61	6688.94	2510.36	20.5711
36	596.08	1800.78	6203.34	2328.12	20.5712
37	598.033	1802.01	5683.97	2133.2	20.5712
38	599.902	1803.23	5137.66	1928.17	20.5712
39	601.771	1804.5	4573.42	1716.41	20.5712
40	603.639	1805.83	3997.74	1500.35	20.5711
41	605.508	1807.22	3418.02	1282.78	20.5711
42	607.377	1808.66	2842.63	1066.84	20.5711
43	609.246	1810.17	2281	856.06	20.5711
44	611.115	1811.75	1743.79	654.447	20.5712
45	612.984	1813.39	1243.03	466.51	20.5711
46	614.853	1815.11	792.276	297.342	20.5712
47	616.722	1816.91	406.886	152.705	20.5712
48	618.591	1818.79	104.273	39.1336	20.5711
49	620.46	1820.76	-95.7419	-35.932	20.5711
50	622.329	1822.83	-170.484	-63.9829	20.5712
51	624.198	1825	0	0	0

Entity Information

Group: Proposed Grades

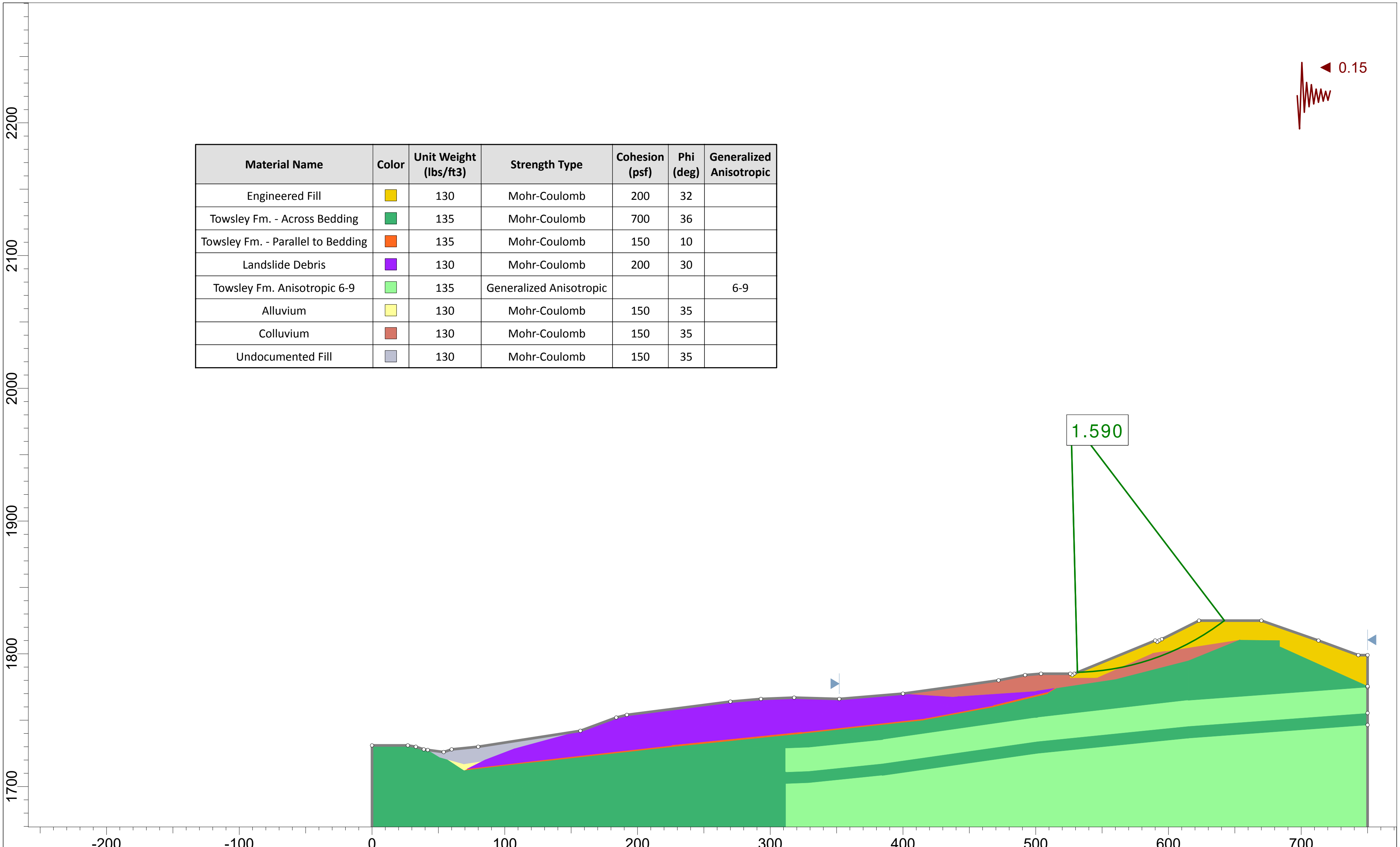
Shared Entities

Type	Coordinates

Type	X	Y
External Boundary	743	1799
	713	1810
	670	1825
	623	1825
	595	1811
	593	1810
	591.5	1809
	590	1810
	529	1785
	527.5	1784
	526	1785
	504	1785
	492	1784
	472	1780
	400	1770
	352	1766
	318	1767
	293	1766
	270	1764
	192	1754
	184	1752
	157	1742
	80	1730
	60	1728
	54	1726
	42	1727.6
	39	1728
	33	1730
	27	1731
	0	1731
	0	1600
	311.567	1600
	750	1600
	750	1746.45
	750	1755.45
	750	1774.95
	750	1775.56
	750	1799
Material Boundary	311.567	1600
	311.567	1701.99
	311.567	1710.99
	311.567	1728.99
	328.966	1729.7
	384.366	1735.29
	501	1752
	615	1765
	750	1774.95
Material Boundary	311.567	1710.99
	328.966	1711.7
	384.366	1717.29
	501	1734
	615	1745.5
	750	1755.45

Type	Coordinates X	Coordinates Y
Material Boundary	311.567	1701.99
	328.966	1702.7
	384.366	1708.29
	501	1725
	615	1736.5
	750	1746.45
Material Boundary	595	1811
	607	1811
	653.192	1810.56
	654	1810.56
	684	1810.27
	713	1810
Material Boundary	42	1727.6
	51.0038	1722.08
	56	1720.68
	69.1119	1717
	82.2691	1718.96
	85	1720
	106.948	1728.39
	157	1742
Material Boundary	56	1720.68
	69.1119	1712
	71.7039	1713.31
	85	1720
Material Boundary	400	1770
	437.424	1767.68
	441.603	1767.96
	501	1772
	513.929	1773.96
	516.158	1774.29
	560.024	1780.94
	615.003	1795
	654	1810.56
Material Boundary	526	1785
	526	1782
	546	1782
	587.659	1800.3
	598	1802
	653.192	1810.56
Material Boundary	684	1810.27
	684	1805.27
	750	1775.56
Material Boundary	415.192	1750.04
	418.014	1751.57
	424.99	1755.36
	432.321	1760.37
	441.603	1767.96

Type	Coordinates	
	X	Y
Material Boundary	69.1119	1712
	137	1720
	226	1730
	324	1740
	415.192	1750.04
	468	1760
	509	1770
	516.158	1774.29
	X	Y
Material Boundary	71.7039	1713.31
	137	1721
	226	1731
	324	1741
	415.192	1751.04
	418.014	1751.57
	468	1761
	509	1771
	513.929	1773.96



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Generalized Anisotropic
Engineered Fill		130	Mohr-Coulomb	200	32	
Towsley Fm. - Across Bedding		135	Mohr-Coulomb	700	36	
Towsley Fm. - Parallel to Bedding		135	Mohr-Coulomb	150	10	
Landslide Debris		130	Mohr-Coulomb	200	30	
Towsley Fm. Anisotropic 6-9		135	Generalized Anisotropic			6-9
Alluvium		130	Mohr-Coulomb	150	35	
Colluvium		130	Mohr-Coulomb	150	35	
Undocumented Fill		130	Mohr-Coulomb	150	35	

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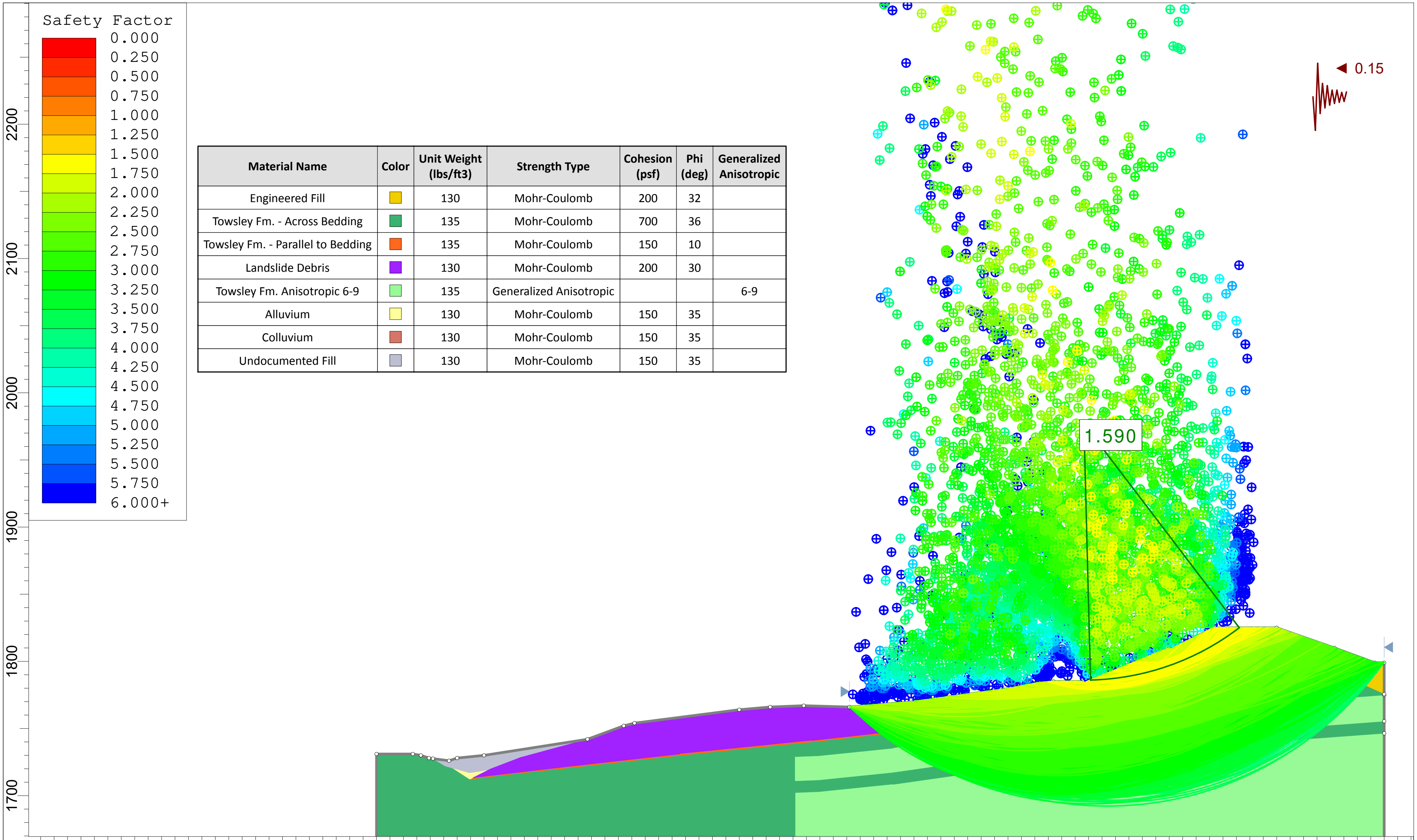
SLIDEINTERPRET 8.032

Project	Cherry Willow Recycled Water Tanks
Analysis Description	WT13-WT13' - Fill Slope - Pseudo-static
Drawn By	RMP
Scale	1:1200
Company	GWV
Date	
File Name	WT13.slmd



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Generalized Anisotropic
Engineered Fill		130	Mohr-Coulomb	200	32	
Towsley Fm. - Across Bedding		135	Mohr-Coulomb	700	36	
Towsley Fm. - Parallel to Bedding		135	Mohr-Coulomb	150	10	
Landslide Debris		130	Mohr-Coulomb	200	30	
Towsley Fm. Anisotropic 6-9		135	Generalized Anisotropic			6-9
Alluvium		130	Mohr-Coulomb	150	35	
Colluvium		130	Mohr-Coulomb	150	35	
Undocumented Fill		130	Mohr-Coulomb	150	35	

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SLIDEINTERPRET 8.032

Project	Cherry Willow Recycled Water Tanks
Analysis Description	WT13-WT13' - Fill Slope - Pseudo-static
Drawn By RMP	*Scale* 1:1200
Company	GWV
Date	
File Name	WT13.slmd

Slide Analysis Information

WT13

Project Summary

File Name:	WT13.slmd
Slide Modeler Version:	8.032
Compute Time:	00h:00m:01.734s
Project Title:	Cherry Willow Recycled Water Tanks
Analysis:	WT13-WT13' - Fill Slope - Pseudo-static
Author:	RMP
Company:	GWV

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	inches/hour
Data Output:	Standard
Failure Direction:	Right to Left

Analysis Options

Analysis Methods Used	
Slices Type:	Vertical
	Spencer
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Surface Type:	Circular
Search Method:	Slope Search
Number of Surfaces:	5000
Upper Angle [°]:	Not Defined
Lower Angle [°]:	Not Defined
Composite Surfaces:	Disabled
Reverse Curvature:	Create Tension Crack
Minimum Elevation:	Not Defined

Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading

Advanced seismic analysis: No
Staged pseudostatic analysis: No

Seismic Load Coefficient (Horizontal): 0.15

Materials

Property	Engineered Fill	Towsley Fm. - Across Bedding	Towsley Fm. - Parallel to Bedding	Landslide Debris	Towsley Fm. Anisotropic 6-9	Alluvium	Colluvium	Undocumented Fill
Color								
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Generalized Anisotropic	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft3]	130	135	135	130	135	130	130	130
Cohesion [psf]	200	700	150	200		150	150	150
Friction Angle [°]	32	36	10	30		35	35	35
Water Surface	None	None	None	None	None	None	None	None
Ru Value	0	0	0	0	0	0	0	0

Generalized Anisotropic Functions

Name: 6-9

Angle From	Angle To	Material
6	-90	Towsley Fm. - Across Bedding
9	6	Towsley Fm. - Parallel to Bedding
90	9	Towsley Fm. - Across Bedding

Global Minimums

Method: spencer

FS	1.590330
Center:	526.443, 1976.869
Radius:	190.944
Left Slip Surface Endpoint:	531.415, 1785.990
Right Slip Surface Endpoint:	642.181, 1825.000
Resisting Moment:	1.95139e+07 lb-ft
Driving Moment:	1.22704e+07 lb-ft
Resisting Horizontal Force:	95301.9 lb
Driving Horizontal Force:	59925.9 lb
Total Slice Area:	1034.57 ft2
Surface Horizontal Width:	110.767 ft
Surface Average Height:	9.34012 ft

Valid/Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 4718
Number of Invalid Surfaces: 282

Error Codes:

Error Code -101 reported for 1 surface
Error Code -105 reported for 2 surfaces
Error Code -106 reported for 96 surfaces
Error Code -108 reported for 5 surfaces
Error Code -111 reported for 178 surfaces

Error Codes

The following errors were encountered during the computation:

-101 = Only one (or zero) surface / slope intersections.
-105 = More than two surface / slope intersections with no valid slip surface.
-106 = Average slice width is less than 0.0001 * (maximum horizontal extent of soil region). This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-111 = safety factor equation did not converge

Slice Data

- **Global Minimum Query (spencer) - Safety Factor: 1.59033**

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	2.25242	124.614	1.83023	Engineered Fill	200	32	178.56	283.97	134.38	0	134.38	140.086	140.086
2	2.25242	369.943	2.5066	Engineered Fill	200	32	224.404	356.877	251.056	0	251.056	260.88	260.88
3	2.25242	607.469	3.18333	Engineered Fill	200	32	267.626	425.613	361.056	0	361.056	375.94	375.94
4	2.25242	837.179	3.86049	Engineered Fill	200	32	308.308	490.312	464.599	0	464.599	485.404	485.404
5	2.25242	1059.05	4.5382	Engineered Fill	200	32	346.534	551.104	561.885	0	561.885	589.391	589.391
6	2.25242	1273.07	5.21655	Engineered Fill	200	32	382.38	608.11	653.113	0	653.113	688.023	688.023
7	2.25242	1479.22	5.89563	Engineered Fill	200	32	415.917	661.446	738.467	0	738.467	781.416	781.416
8	2.25242	1677.45	6.57554	Engineered Fill	200	32	447.216	711.221	818.125	0	818.125	869.676	869.676
9	2.25242	1867.76	7.25638	Engineered Fill	200	32	476.341	757.54	892.252	0	892.252	952.905	952.905
10	2.25242	2050.09	7.93826	Engineered Fill	200	32	503.355	800.501	961.002	0	961.002	1031.19	1031.19
11	2.25242	2224.41	8.62126	Engineered Fill	200	32	528.317	840.199	1024.53	0	1024.53	1104.64	1104.64
12	2.25242	2390.68	9.30551	Engineered Fill	200	32	551.284	876.723	1082.98	0	1082.98	1173.31	1173.31
13	2.25242	2548.85	9.9911	Engineered Fill	200	32	572.308	910.158	1136.49	0	1136.49	1237.31	1237.31
14	2.25242	2698.88	10.6781	Engineered Fill	200	32	591.441	940.587	1185.19	0	1185.19	1296.71	1296.71
15	2.25771	2847.54	11.3675	Colluvium	150	35	639.324	1016.74	1237.83	0	1237.83	1366.36	1366.36
16	2.25771	2981.72	12.0594	Colluvium	150	35	656.817	1044.55	1277.56	0	1277.56	1417.88	1417.88
17	2.25771	3107.52	12.7531	Colluvium	150	35	672.285	1069.15	1312.69	0	1312.69	1464.85	1464.85
18	2.25771	3224.88	13.4487	Colluvium	150	35	685.781	1090.62	1343.34	0	1343.34	1507.33	1507.33
19	2.25771	3333.71	14.1463	Colluvium	150	35	697.355	1109.03	1369.63	0	1369.63	1545.39	1545.39
20	2.25771	3433.96	14.846	Colluvium	150	35	707.056	1124.45	1391.66	0	1391.66	1579.09	1579.09
21	2.25771	3525.53	15.5481	Colluvium	150	35	714.93	1136.97	1409.55	0	1409.55	1608.46	1608.46
22	2.25771	3608.33	16.2525	Colluvium	150	35	721.02	1146.66	1423.38	0	1423.38	1633.57	1633.57
23	2.25771	3682.28	16.9595	Colluvium	150	35	725.371	1153.58	1433.25	0	1433.25	1654.46	1654.46
24	2.25771	3747.27	17.6691	Colluvium	150	35	728.012	1157.78	1439.26	0	1439.26	1671.17	1671.17
25	2.25771	3803.21	18.3816	Colluvium	150	35	729	1159.35	1441.5	0	1441.5	1683.75	1683.75
26	2.25771	3849.86	19.097	Colluvium	150	35	728.339	1158.3	1440	0	1440	1692.16	1692.16
27	2.25771	3573.09	19.8155	Colluvium	150	35	675.52	1074.3	1320.03	0	1320.03	1563.44	1563.44
28	2.25771	3560.66	20.5372	Colluvium	150	35	665.909	1059.01	1298.21	0	1298.21	1547.68	1547.68
29	2.25771	3644.26	21.2624	Colluvium	150	35	671.504	1067.91	1310.92	0	1310.92	1572.22	1572.22
30	2.25771	3712.85	21.9912	Colluvium	150	35	674.52	1072.71	1317.76	0	1317.76	1590.17	1590.17
31	2.25771	3771.61	22.7238	Colluvium	150	35	675.839	1074.81	1320.76	0	1320.76	1603.8	1603.8
32	2.25771	3820.38	23.4603	Colluvium	150	35	675.491	1074.25	1319.97	0	1319.97	1613.12	1613.12
33	2.25771	3859.01	24.2009	Colluvium	150	35	673.507	1071.1	1315.46	0	1315.46	1618.16	1618.16
34	2.13743	3679.76	24.9259	Engineered Fill	200	32	638.94	1016.13	1306.07	0	1306.07	1603.01	1603.01
35	2.13743	3696.2	25.6352	Engineered Fill	200	32	634.819	1009.57	1295.59	0	1295.59	1600.22	1600.22
36	2.13743	3703.58	26.3488	Engineered Fill	200	32	629.454	1001.04	1281.93	0	1281.93	1593.7	1593.7
37	2.13743	3701.71	27.0668	Engineered Fill	200	32	622.861	990.554	1265.15	0	1265.15	1583.43	1583.43
38	2.13743	3690.43	27.7894	Engineered Fill	200	32	615.055	978.141	1245.29	0	1245.29	1569.42	1569.42
39	2.13743	3669.54	28.5169	Engineered Fill	200	32	606.054	963.826	1222.38	0	1222.38	1551.67	1551.67
40	2.13743	3638.85	29.2494	Engineered Fill	200	32	595.873	947.634	1196.47	0	1196.47	1530.16	1530.16
41	2.13743	3598.15	29.9872	Engineered Fill	200	32	584.524	929.586	1167.58	0	1167.58	1504.88	1504.88
42	2.13743	3406.33	30.7305	Engineered Fill	200	32	554.186	881.339	1090.37	0	1090.37	1419.82	1419.82
43	2.13743	3048.06	31.4796	Engineered Fill	200	32	503.616	800.916	961.668	0	961.668	1270.04	1270.04
44	2.13743	2678.97	32.2348	Engineered Fill	200	32	452.792	720.088	832.316	0	832.316	1117.84	1117.84
45	2.13743	2298.89	32.9962	Engineered Fill	200	32	401.734	638.889	702.37	0	702.37	963.222	963.222
46	2.13743	1907.54	33.7644	Engineered Fill	200	32	350.449	557.33	571.846	0	571.846	806.135	806.135
47	2.13743	1504.62	34.5394	Engineered Fill	200	32	298.948	475.426	440.774	0	440.774	646.538	646.538
48	2.13743	1089.79	35.3218	Engineered Fill	200	32	247.239	393.191	309.17	0	309.17	484.365	484.365
49	2.13743	662.725	36.1118	Engineered Fill	200	32	195.329	310.638	177.057	0	177.057	319.555	319.555
50	2.13743	223.043	36.9098	Engineered Fill	200	32	143.117	227.604	44.175	0	44.175	151.669	151.669

SCV Water

W.O. 8485

Interslice Data

- **Global Minimum Query (spencer) - Safety Factor: 1.59033**

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	531.415	1785.99	0	0	0
2	533.667	1786.06	374.336	195.843	27.6174
3	535.92	1786.16	800.181	418.635	27.6175
4	538.172	1786.29	1267.4	663.07	27.6174
5	540.425	1786.44	1766.52	924.199	27.6174
6	542.677	1786.62	2288.73	1197.41	27.6175
7	544.929	1786.82	2825.83	1478.4	27.6174
8	547.182	1787.05	3370.19	1763.2	27.6175
9	549.434	1787.31	3914.74	2048.1	27.6175
10	551.687	1787.6	4452.96	2329.68	27.6175
11	553.939	1787.92	4978.81	2604.79	27.6174
12	556.191	1788.26	5486.76	2870.54	27.6175
13	558.444	1788.63	5971.76	3124.28	27.6175
14	560.696	1789.02	6429.17	3363.58	27.6174
15	562.949	1789.45	6854.83	3586.28	27.6175
16	565.206	1789.9	7311.08	3824.98	27.6175
17	567.464	1790.38	7732.38	4045.39	27.6175
18	569.722	1790.89	8115.21	4245.68	27.6175
19	571.98	1791.43	8456.47	4424.22	27.6175
20	574.237	1792	8753.46	4579.6	27.6175
21	576.495	1792.6	9003.86	4710.6	27.6175
22	578.753	1793.23	9205.76	4816.23	27.6175
23	581.01	1793.89	9357.6	4895.66	27.6174
24	583.268	1794.58	9458.19	4948.29	27.6174
25	585.526	1795.3	9506.72	4973.68	27.6174
26	587.784	1796.05	9502.73	4971.59	27.6174
27	590.041	1796.83	9446.1	4941.97	27.6175
28	592.299	1797.64	9363.32	4898.66	27.6175
29	594.557	1798.49	9236.53	4832.32	27.6174
30	596.814	1799.37	9056.17	4737.97	27.6175
31	599.072	1800.28	8822.54	4615.74	27.6175
32	601.33	1801.22	8535.76	4465.7	27.6175
33	603.587	1802.2	8196.36	4288.14	27.6175
34	605.845	1803.22	7805.22	4083.5	27.6175
35	607.983	1804.21	7323.3	3831.37	27.6175
36	610.12	1805.24	6798.58	3556.85	27.6175
37	612.257	1806.3	6233.04	3260.97	27.6174
38	614.395	1807.39	5628.97	2944.94	27.6175
39	616.532	1808.51	4988.97	2610.1	27.6174
40	618.67	1809.68	4315.97	2258.01	27.6175
41	620.807	1810.87	3613.23	1890.35	27.6174
42	622.945	1812.11	2884.36	1509.03	27.6175
43	625.082	1813.38	2173.96	1137.36	27.6174
44	627.219	1814.68	1535.95	803.573	27.6175
45	629.357	1816.03	981.327	513.406	27.6175
46	631.494	1817.42	521.463	272.816	27.6174
47	633.632	1818.85	168.191	87.9934	27.6175
48	635.769	1820.32	-66.172	-34.6196	27.6175
49	637.907	1821.84	-168.788	-88.3059	27.6175
50	640.044	1823.39	-126.255	-66.0537	27.6175
51	642.181	1825	0	0	0

Entity Information

Group: Proposed Grades

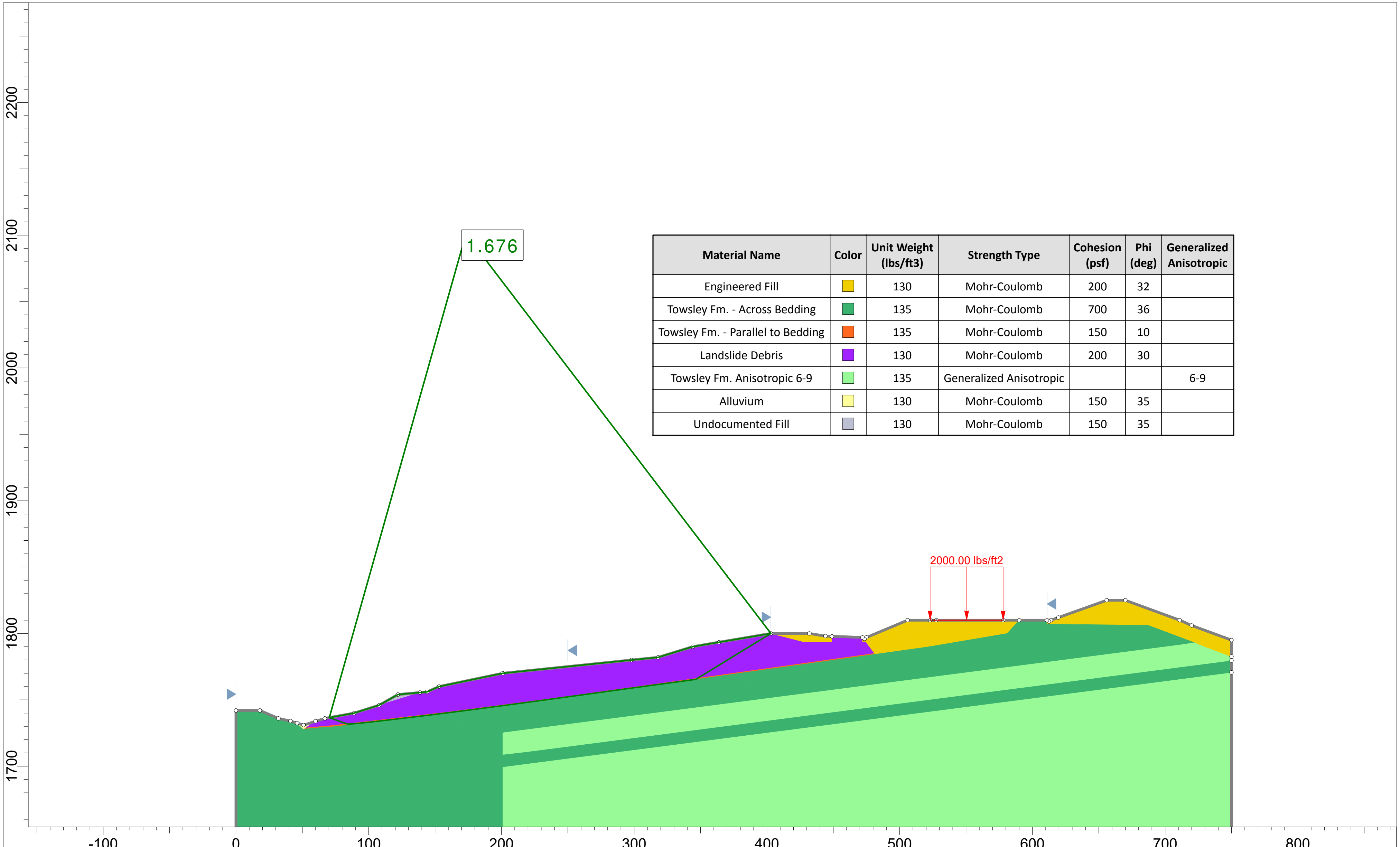
Shared Entities

Type	Coordinates

Type	Coordinates X	Coordinates Y
External Boundary	743	1799
	713	1810
	670	1825
	623	1825
	595	1811
	593	1810
	591.5	1809
	590	1810
	529	1785
	527.5	1784
	526	1785
	504	1785
	492	1784
	472	1780
	400	1770
	352	1766
	318	1767
	293	1766
	270	1764
	192	1754
	184	1752
	157	1742
	80	1730
	60	1728
	54	1726
	42	1727.6
	39	1728
	33	1730
	27	1731
	0	1731
	0	1600
	311.567	1600
	750	1600
	750	1746.45
	750	1755.45
	750	1774.95
	750	1775.56
	750	1799
Material Boundary	311.567	1600
	311.567	1701.99
	311.567	1710.99
	311.567	1728.99
	328.966	1729.7
	384.366	1735.29
	501	1752
	615	1765
	750	1774.95
Material Boundary	311.567	1710.99
	328.966	1711.7
	384.366	1717.29
	501	1734
	615	1745.5
	750	1755.45

Type	Coordinates X	Coordinates Y
Material Boundary	311.567	1701.99
	328.966	1702.7
	384.366	1708.29
	501	1725
	615	1736.5
	750	1746.45
Material Boundary	595	1811
	607	1811
	653.192	1810.56
	654	1810.56
	684	1810.27
	713	1810
Material Boundary	42	1727.6
	51.0038	1722.08
	56	1720.68
	69.1119	1717
	82.2691	1718.96
	85	1720
	106.948	1728.39
	157	1742
Material Boundary	56	1720.68
	69.1119	1712
	71.7039	1713.31
	85	1720
Material Boundary	400	1770
	437.424	1767.68
	441.603	1767.96
	501	1772
	513.929	1773.96
	516.158	1774.29
	560.024	1780.94
	615.003	1795
	654	1810.56
Material Boundary	526	1785
	526	1782
	546	1782
	587.659	1800.3
	598	1802
	653.192	1810.56
Material Boundary	684	1810.27
	684	1805.27
	750	1775.56
Material Boundary	415.192	1750.04
	418.014	1751.57
	424.99	1755.36
	432.321	1760.37
	441.603	1767.96

Type	Coordinates	
	X	Y
Material Boundary	69.1119	1712
	137	1720
	226	1730
	324	1740
	415.192	1750.04
	468	1760
	509	1770
	516.158	1774.29
	X	Y
Material Boundary	71.7039	1713.31
	137	1721
	226	1731
	324	1741
	415.192	1751.04
	418.014	1751.57
	468	1761
	509	1771
	513.929	1773.96

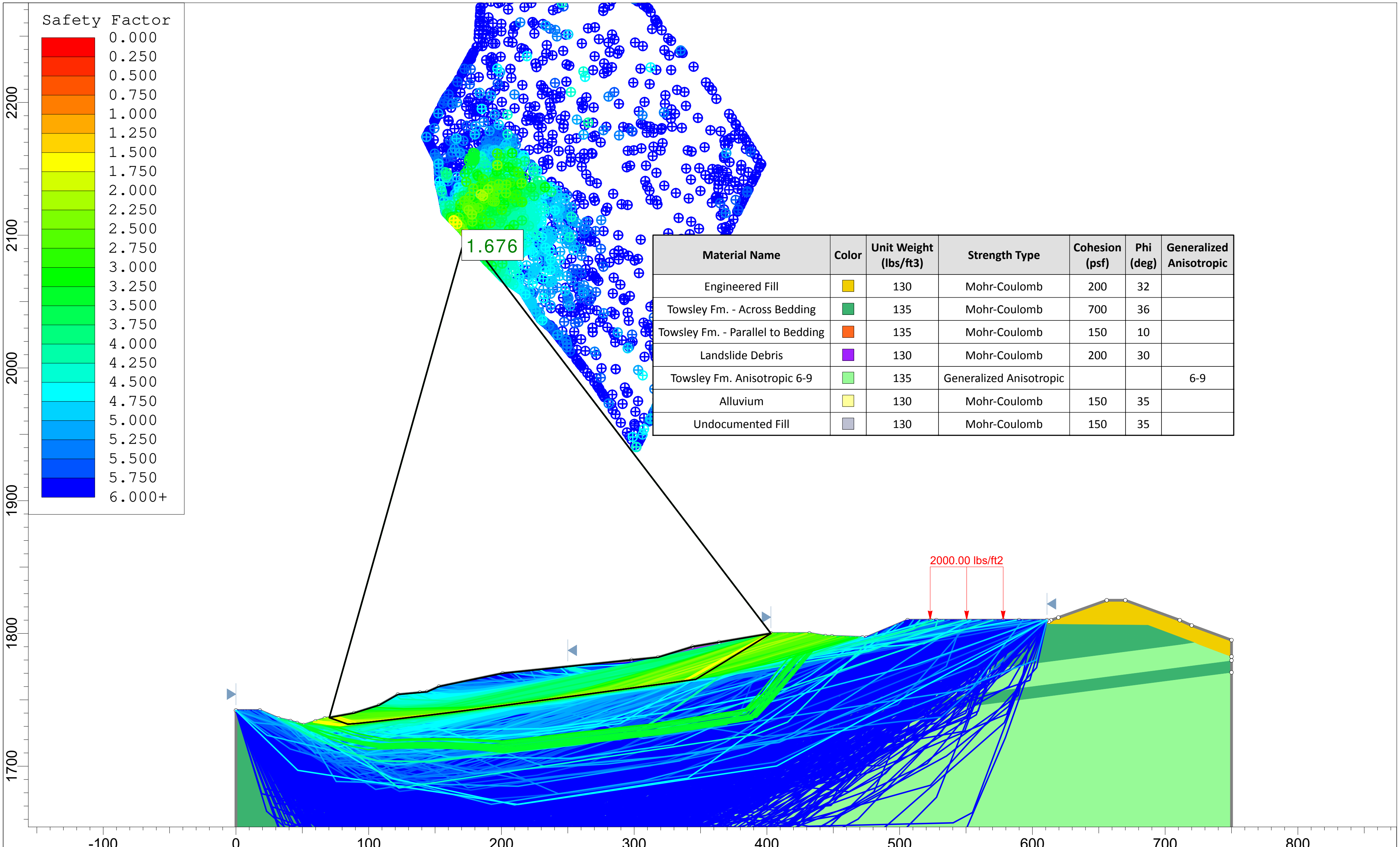


Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Generalized Anisotropic
Engineered Fill		130	Mohr-Coulomb	200	32	
Towsley Fm. - Across Bedding		135	Mohr-Coulomb	700	36	
Towsley Fm. - Parallel to Bedding		135	Mohr-Coulomb	150	10	
Landslide Debris		130	Mohr-Coulomb	200	30	
Towsley Fm. Anisotropic 6-9		135	Generalized Anisotropic			6-9
Alluvium		130	Mohr-Coulomb	150	35	
Undocumented Fill		130	Mohr-Coulomb	150	35	

rocscience

SLIDEINTERPRET 8.032

Project	Cherry Willow Water Tanks
Analysis Description	WT14-WT14' - Base of slide - static
Drawn By	RMP
Scale	1:1200
Company	GWV
Date	
File Name	WT14.slmd



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Generalized Anisotropic
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Landslide Debris		130	Mohr-Coulomb	200	30	
Towsley Fm. Anisotropic 6-9		135	Generalized Anisotropic			6-9
Alluvium		130	Mohr-Coulomb	150	35	
Undocumented Fill		130	Mohr-Coulomb	150	35	

rocscience	*Project* Cherry Willow Water Tanks		
	Analysis Description WT14-WT14' - Base of slide - static		
	Drawn By RMP	*Scale* 1:1200	*Company* GWV
SLIDEINTERPRET 8.032	*Date*		*File Name* WT14.slmd

Slide Analysis Information

WT14

Project Summary

File Name:	WT14.slmd
Slide Modeler Version:	8.032
Compute Time:	00h:00m:18.148s
Project Title:	Cherry Willow Water Tanks
Analysis:	WT14-WT14' - Base of slide - static
Author:	RMP
Company:	GWV

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	inches/hour
Data Output:	Standard
Failure Direction:	Right to Left

Analysis Options

Analysis Methods Used	
Slices Type:	Vertical
	Spencer
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Search Method:	Cuckoo Search
Initial # of Surface Vertices:	8
Maximum Iterations:	500
Number of Nests:	10
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Convex Surfaces Only: Enabled

Seismic Loading

Advanced seismic analysis: No
Staged pseudostatic analysis: No

Loading

- 1 Distributed Load present

Distributed Load 1

Distribution:	Constant
Magnitude [psf]:	2000
Orientation:	Vertical

Materials

Property	Engineered Fill	Towsley Fm. - Across Bedding	Towsley Fm. - Parallel to Bedding	Landslide Debris	Towsley Fm. Anisotropic 6-9	Alluvium	Undocumented Fill
Color							
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Generalized Anisotropic	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft3]	130	135	135	130	135	130	130
Cohesion [psf]	200	700	150	200		150	150
Friction Angle [°]	32	36	10	30		35	35
Water Surface	None	None	None	None	None	None	None
Ru Value	0	0	0	0	0	0	0

Generalized Anisotropic Functions

Name: 6-9

Angle From	Angle To	Material
6	-90	Towsley Fm. - Across Bedding
9	6	Towsley Fm. - Parallel to Bedding
90	9	Towsley Fm. - Across Bedding

Global Minimums

Method: spencer

FS	1.675560
Axis Location:	173.280, 2100.960
Left Slip Surface Endpoint:	70.344, 1736.608
Right Slip Surface Endpoint:	403.000, 1800.000
Resisting Moment:	8.28211e+07 lb-ft
Driving Moment:	4.94333e+07 lb-ft
Resisting Horizontal Force:	218243 lb
Driving Horizontal Force:	130262 lb
Total Slice Area:	6119.55 ft2
Surface Horizontal Width:	332.656 ft
Surface Average Height:	18.3961 ft

Global Minimum Coordinates

Method: spencer

X	Y
70.3442	1736.61
84.2608	1731.68
91.9344	1732.23
102.663	1733.46

X	Y
112.973	1734.65
121.84	1735.69
130.171	1736.68
138.406	1737.65
146.534	1738.61
161.389	1740.37
176.245	1742.37
190.466	1744.29
204.684	1746.2
218.903	1748.12
233.121	1750.04
247.339	1751.95
261.557	1753.87
270.674	1755.1
279.791	1756.33
288.908	1757.57
298.025	1758.81
311.463	1760.65
322.197	1762.11
332.924	1763.58
346.332	1765.43
359.716	1773.54
372.623	1781.43
379.938	1785.9
387.18	1790.32
395.198	1795.22
403	1800

Valid/Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 3613
Number of Invalid Surfaces: 1430

Error Codes:

Error Code -108 reported for 28 surfaces
Error Code -111 reported for 64 surfaces
Error Code -112 reported for 57 surfaces
Error Code -114 reported for 17 surfaces
Error Code -121 reported for 95 surfaces
Error Code -124 reported for 6 surfaces
Error Code -1000 reported for 1163 surfaces

Error Codes

The following errors were encountered during the computation:

-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-111 = safety factor equation did not converge
-112 = The coefficient M-Alpha = cos(alpha)(1+tan(alpha)tan(phi)/F) < 0.2 for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.
-114 = Surface with Reverse Curvature.
-121 = Concave failure surface, only convex surfaces have been defined as being allowed.
-124 = A slice has a width less than the minimum acceptable value.
-1000 = No valid slip surface is generated

Slice Data

- **Global Minimum Query (spencer) - Safety Factor: 1.67556**

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	6.28712	1377.39	-19.5079	Landslide Debris	200	30	242.845	406.901	358.363	0	358.363	272.329	272.329
2	6.28712	4132.16	-19.5079	Landslide Debris	200	30	437.066	732.331	922.025	0	922.025	767.183	767.183
3	1.3424	1241.29	-19.5079	Towsley Fm. - Parallel to Bedding	150	10	203.358	340.738	1081.73	0	1081.73	1009.69	1009.69

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
4	7.67362	7969.84	4.0997	Towsley Fm. - Parallel to Bedding	150	10	199.222	333.808	1042.43	0	1042.43	1056.71	1056.71
5	5.36419	6468.83	6.53351	Towsley Fm. - Parallel to Bedding	150	10	215.036	360.305	1192.7	0	1192.7	1217.33	1217.33
6	5.36419	7221.94	6.53351	Towsley Fm. - Parallel to Bedding	150	10	229.615	384.733	1331.24	0	1331.24	1357.53	1357.53
7	9.33473	14623	6.58845	Towsley Fm. - Parallel to Bedding	150	10	252.431	422.964	1548.06	0	1548.06	1577.22	1577.22
8	0.975884	1777.46	6.58845	Towsley Fm. - Parallel to Bedding	150	10	278.892	467.3	1799.49	0	1799.49	1831.7	1831.7
9	0.415399	773.701	6.736	Towsley Fm. - Parallel to Bedding	150	10	283.015	474.209	1838.68	0	1838.68	1872.11	1872.11
10	8.45132	17948.7	6.736	Towsley Fm. - Parallel to Bedding	150	10	310.118	519.621	2096.22	0	2096.22	2132.85	2132.85
11	8.33048	19725.6	6.736	Towsley Fm. - Parallel to Bedding	150	10	335.444	562.056	2336.89	0	2336.89	2376.51	2376.51
12	8.235	19258.4	6.736	Towsley Fm. - Parallel to Bedding	150	10	332.407	556.968	2308.03	0	2308.03	2347.29	2347.29
13	8.12799	18920	6.736	Towsley Fm. - Parallel to Bedding	150	10	331.281	555.081	2297.32	0	2297.32	2336.45	2336.45
14	14.8555	39424	6.74541	Towsley Fm. - Parallel to Bedding	150	10	365.098	611.743	2618.68	0	2618.68	2661.86	2661.86
15	7.42796	20942.9	7.6761	Towsley Fm. - Parallel to Bedding	150	10	380.941	638.29	2769.23	0	2769.23	2820.57	2820.57
16	7.42796	21469.2	7.6761	Towsley Fm. - Parallel to Bedding	150	10	388.261	650.555	2838.78	0	2838.78	2891.11	2891.11
17	7.11055	21044.7	7.6761	Towsley Fm. - Parallel to Bedding	150	10	395.424	662.557	2906.85	0	2906.85	2960.15	2960.15
18	7.11055	21526.9	7.6761	Towsley Fm. - Parallel to Bedding	150	10	402.431	674.298	2973.44	0	2973.44	3027.68	3027.68
19	7.10912	22004.7	7.6761	Towsley Fm. - Parallel to Bedding	150	10	409.437	686.037	3040.02	0	3040.02	3095.21	3095.21
20	7.10912	22393.8	7.6761	Towsley Fm. - Parallel to Bedding	150	10	415.093	695.514	3093.76	0	3093.76	3149.71	3149.71
21	7.10911	22264.6	7.6761	Towsley Fm. - Parallel to Bedding	150	10	413.216	692.368	3075.92	0	3075.92	3131.62	3131.62
22	7.10911	22055.1	7.6761	Towsley Fm. - Parallel to Bedding	150	10	410.172	687.268	3047	0	3047	3102.28	3102.28
23	7.10912	21845.8	7.6761	Towsley Fm. - Parallel to Bedding	150	10	407.128	682.167	3018.06	0	3018.06	3072.94	3072.94
24	7.10912	21636.3	7.6761	Towsley Fm. - Parallel to Bedding	150	10	404.084	677.067	2989.14	0	2989.14	3043.6	3043.6
25	7.10912	21427.3	7.6761	Towsley Fm. - Parallel to Bedding	150	10	401.047	671.978	2960.28	0	2960.28	3014.34	3014.34
26	7.10912	21220.2	7.6761	Towsley Fm. - Parallel to Bedding	150	10	398.036	666.934	2931.68	0	2931.68	2985.32	2985.32
27	7.10913	21013.3	7.6761	Towsley Fm. - Parallel to Bedding	150	10	395.029	661.895	2903.1	0	2903.1	2956.34	2956.34
28	7.10913	20806.4	7.6761	Towsley Fm. - Parallel to Bedding	150	10	392.022	656.856	2874.52	0	2874.52	2927.36	2927.36
29	9.11697	26380	7.6761	Towsley Fm. - Parallel to Bedding	150	10	388.59	651.106	2841.91	0	2841.91	2894.29	2894.29
30	9.11697	26039.7	7.6761	Towsley Fm. - Parallel to Bedding	150	10	384.733	644.644	2805.27	0	2805.27	2857.12	2857.12
31	9.11697	25690.5	7.76575	Towsley Fm. - Parallel to Bedding	150	10	380.646	637.796	2766.43	0	2766.43	2818.34	2818.34
32	9.11697	25331.8	7.77117	Towsley Fm. - Parallel to Bedding	150	10	376.575	630.974	2727.74	0	2727.74	2779.13	2779.13
33	6.71884	18429.4	7.77117	Towsley Fm. - Parallel to Bedding	150	10	372.9	624.816	2692.82	0	2692.82	2743.7	2743.7
34	6.71884	18216.1	7.77117	Towsley Fm. - Parallel to Bedding	150	10	369.621	619.323	2661.67	0	2661.67	2712.11	2712.11
35	5.36706	14398	7.77117	Towsley Fm. - Parallel to Bedding	150	10	366.673	614.383	2633.64	0	2633.64	2683.68	2683.68
36	5.36706	14499.7	7.77117	Towsley Fm. - Parallel to Bedding	150	10	368.631	617.663	2652.25	0	2652.25	2702.55	2702.55
37	5.36348	15112.6	7.77117	Towsley Fm. - Parallel to Bedding	150	10	380.619	637.75	2766.17	0	2766.17	2818.11	2818.11
38	5.36348	15753.4	7.77117	Towsley Fm. - Parallel to Bedding	150	10	392.958	658.425	2883.42	0	2883.42	2937.05	2937.05
39	6.42852	19720.9	7.8707	Towsley Fm. - Parallel to Bedding	150	10	406.29	680.763	3010.1	0	3010.1	3066.26	3066.26

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
40	6.42852	20603.1	7.8707	Towsley Fm. - Parallel to Bedding	150	10	420.457	704.501	3144.73	0	3144.73	3202.85	3202.85
41	0.551375	1791.61	7.8707	Towsley Fm. - Parallel to Bedding	150	10	425.039	712.179	3188.27	0	3188.27	3247.03	3247.03
42	2.1463	6840.36	31.224	Towsley Fm. - Parallel to Bedding	150	10	380.838	638.117	2768.25	0	2768.25	2999.11	2999.11
43	5.61839	16653.7	31.224	Landslide Debris	200	30	923.172	1546.83	2332.77	0	2332.77	2892.39	2892.39
44	5.61839	14861.6	31.224	Landslide Debris	200	30	835.04	1399.16	2077.01	0	2077.01	2583.2	2583.2
45	6.45383	14846.8	31.4263	Landslide Debris	200	30	738.458	1237.33	1796.71	0	1796.71	2247.93	2247.93
46	6.45383	12456	31.4263	Landslide Debris	200	30	636.291	1066.14	1500.2	0	1500.2	1888.99	1888.99
47	7.31465	11226.9	31.4263	Landslide Debris	200	30	527.311	883.541	1183.93	0	1183.93	1506.13	1506.13
48	7.24264	8090.46	31.4263	Landslide Debris	200	30	412.088	690.478	849.532	0	849.532	1101.33	1101.33
49	8.01787	5444.79	31.4263	Landslide Debris	200	30	291.299	488.089	498.985	0	498.985	676.978	676.978
50	7.80166	1751.34	31.4735	Landslide Debris	200	30	166.16	278.411	135.812	0	135.812	237.53	237.53

Interslice Data

- **Global Minimum Query (spencer) - Safety Factor: 1.67556**

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	70.3442	1736.61	0	0	0
2	76.6313	1734.38	2326.03	338.304	8.27523
3	82.9184	1732.15	7129.45	1036.93	8.27526
4	84.2608	1731.68	7917.07	1151.48	8.27523
5	91.9344	1732.23	8873.51	1290.59	8.27525
6	97.2986	1732.84	9295.04	1351.9	8.27525
7	102.663	1733.46	9709.72	1412.21	8.27524
8	111.998	1734.53	10398.6	1512.41	8.27528
9	112.973	1734.65	10468.2	1522.52	8.27521
10	113.389	1734.7	10495.6	1526.51	8.27524
11	121.84	1735.69	11025.8	1603.63	8.27527
12	130.171	1736.68	11522.8	1675.91	8.27524
13	138.406	1737.65	12017.2	1747.81	8.27521
14	146.534	1738.61	12506.2	1818.94	8.27525
15	161.389	1740.37	13332.4	1939.1	8.27523
16	168.817	1741.37	13391.5	1947.7	8.27525
17	176.245	1742.37	13435.4	1954.09	8.27527
18	183.356	1743.33	13463.2	1958.12	8.27521
19	190.466	1744.29	13477	1960.13	8.27522
20	197.575	1745.25	13476.8	1960.11	8.27526
21	204.684	1746.2	13465.4	1958.45	8.27525
22	211.794	1747.16	13457.7	1957.33	8.27525
23	218.903	1748.12	13456.1	1957.1	8.27526
24	226.012	1749.08	13460.6	1957.74	8.2752
25	233.121	1750.04	13471.1	1959.27	8.27522
26	240.23	1750.99	13487.6	1961.68	8.27526
27	247.339	1751.95	13510.2	1964.96	8.27523
28	254.448	1752.91	13538.7	1969.11	8.27525
29	261.557	1753.87	13573.2	1974.13	8.27526
30	270.674	1755.1	13626.3	1981.84	8.2752
31	279.791	1756.33	13689.2	1990.99	8.27521
32	288.908	1757.57	13722.3	1995.81	8.27523
33	298.025	1758.81	13764	2001.87	8.27521
34	304.744	1759.73	13802	2007.41	8.27527
35	311.463	1760.65	13846.6	2013.89	8.27524
36	316.83	1761.38	13886.9	2019.75	8.27524
37	322.197	1762.11	13924	2025.15	8.27525
38	327.561	1762.84	13942.1	2027.78	8.27524
39	332.924	1763.58	13940.6	2027.57	8.27527
40	339.353	1764.47	13879.2	2018.63	8.27523
41	345.781	1765.35	13789.3	2005.56	8.27526
42	346.332	1765.43	13780.8	2004.32	8.27524
43	348.479	1766.73	10997	1599.44	8.27526
44	354.097	1770.14	8242.23	1198.77	8.27521

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
45	359.716	1773.54	5863.04	852.738	8.27524
46	366.169	1777.49	3546.83	515.861	8.27524
47	372.623	1781.43	1740.06	253.079	8.27523
48	379.938	1785.9	308.208	44.8266	8.27523
49	387.18	1790.32	-464.771	-67.5975	8.27522
50	395.198	1795.22	-572.212	-83.2242	8.27524
51	403	1800	0	0	0

Entity Information

Group: Removals Cuckoo

Shared Entities

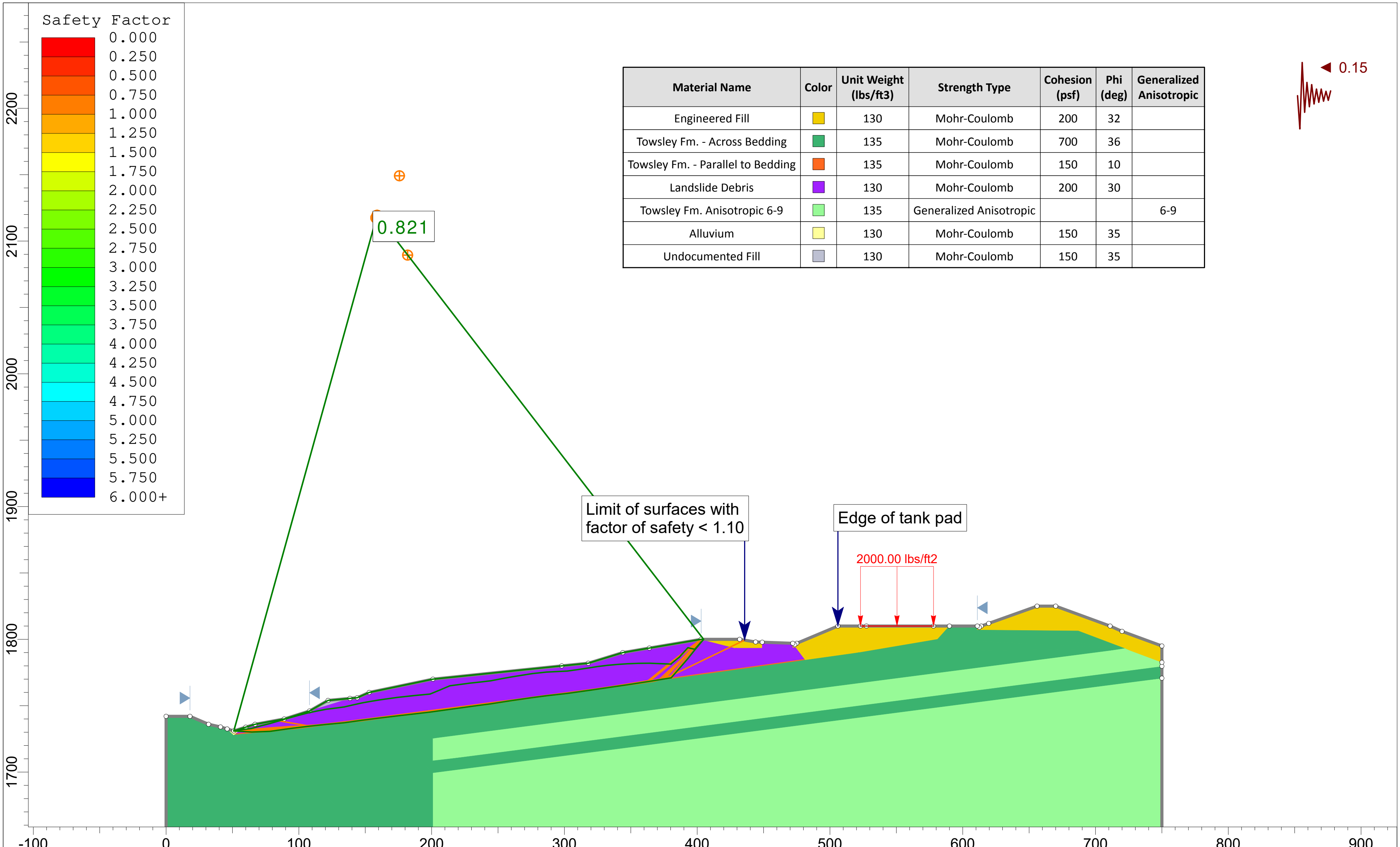
Type	Coordinates X	Coordinates Y
External Boundary	720	1806
	711	1810
	670	1825
	656	1825
	619.6	1812
	614	1810
	612.5	1809
	611	1810
	590	1810
	578	1810
	527.556	1810
	523	1810
	506	1810
	475	1797
	473.5	1796
	472	1797
	449	1797.82
	444	1798
	432	1800
	403	1800
	364	1793.39
	344	1790
	318	1782
	298	1780
	201	1770
	153	1760
	144	1756
	138.55	1755.5
	122	1754
	108	1746
	89	1740
	67	1736
	60	1733.81
	51	1731
	46	1732.5
	41	1734
	32	1736
	18	1742
	0	1742
	0	1600
	201	1600
	750	1600
	750	1770.69
	750	1779.69
	750	1782.62
	750	1795

Type	X	Y
Material Boundary	619.6 638 707 711	1812 1812 1811 1810
Material Boundary	522 581 590	1790 1800 1810
Material Boundary	46 50.8197 52.6617 60	1732.5 1728 1729.17 1733.81
Material Boundary	108 138.55	1746 1755.5
Material Boundary	403 429 449 449	1800 1793.32 1793.32 1797.82
Material Boundary	472 472 474.25 492 527.556	1797 1794 1794 1794 1810
Material Boundary	611 611 687 722.133 750	1810 1807 1806.29 1793.09 1782.62
Material Boundary	581 581	1800 1801
Material Boundary	522 581	1791 1801
Material Boundary	73 159 236 339.832 481.498 522	1730 1740 1750 1764.52 1784.34 1790
Material Boundary	73 159 236 341.831 480.82 522	1731 1741 1751 1765.8 1785.24 1791

Type	Coordinates
Material Boundary	X: 50.8197, 73 Y: 1728, 1730
Material Boundary	X: 52.6617, 73 Y: 1729.17, 1731
Material Boundary	X: 339.832, 341.831, 348.488, 355.176, 360.526, 364 Y: 1764.52, 1765.8, 1770.06, 1777.7, 1784.77, 1793.39
Material Boundary	X: 472, 474.25, 480.82, 481.498 Y: 1797, 1794, 1785.24, 1784.34
Material Boundary	X: 201, 722.133, 722.134 Y: 1725.49, 1793.09, 1793.09
Material Boundary	X: 201, 750 Y: 1708.49, 1779.69
Material Boundary	X: 201, 750 Y: 1699.49, 1770.69
Material Boundary	X: 201, 201, 201, 201 Y: 1600, 1699.49, 1708.49, 1725.49

Scenario-based Entities

Type	Coordinates	slide plane static
Distributed Load	X: 523, 525, 527.556, 578 Y: 1810, 1810, 1810, 1810	Constant Distribution Orientation: Vertical Magnitude: 2000 lbs/ft2 Creates Excess Pore Pressure: No



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Generalized Anisotropic
Engineered Fill		130	Mohr-Coulomb	200	32	
Towsley Fm. - Across Bedding		135	Mohr-Coulomb	700	36	
Towsley Fm. - Parallel to Bedding		135	Mohr-Coulomb	150	10	
Landslide Debris		130	Mohr-Coulomb	200	30	
Towsley Fm. Anisotropic 6-9		135	Generalized Anisotropic			6-9
Alluvium		130	Mohr-Coulomb	150	35	
Undocumented Fill		130	Mohr-Coulomb	150	35	

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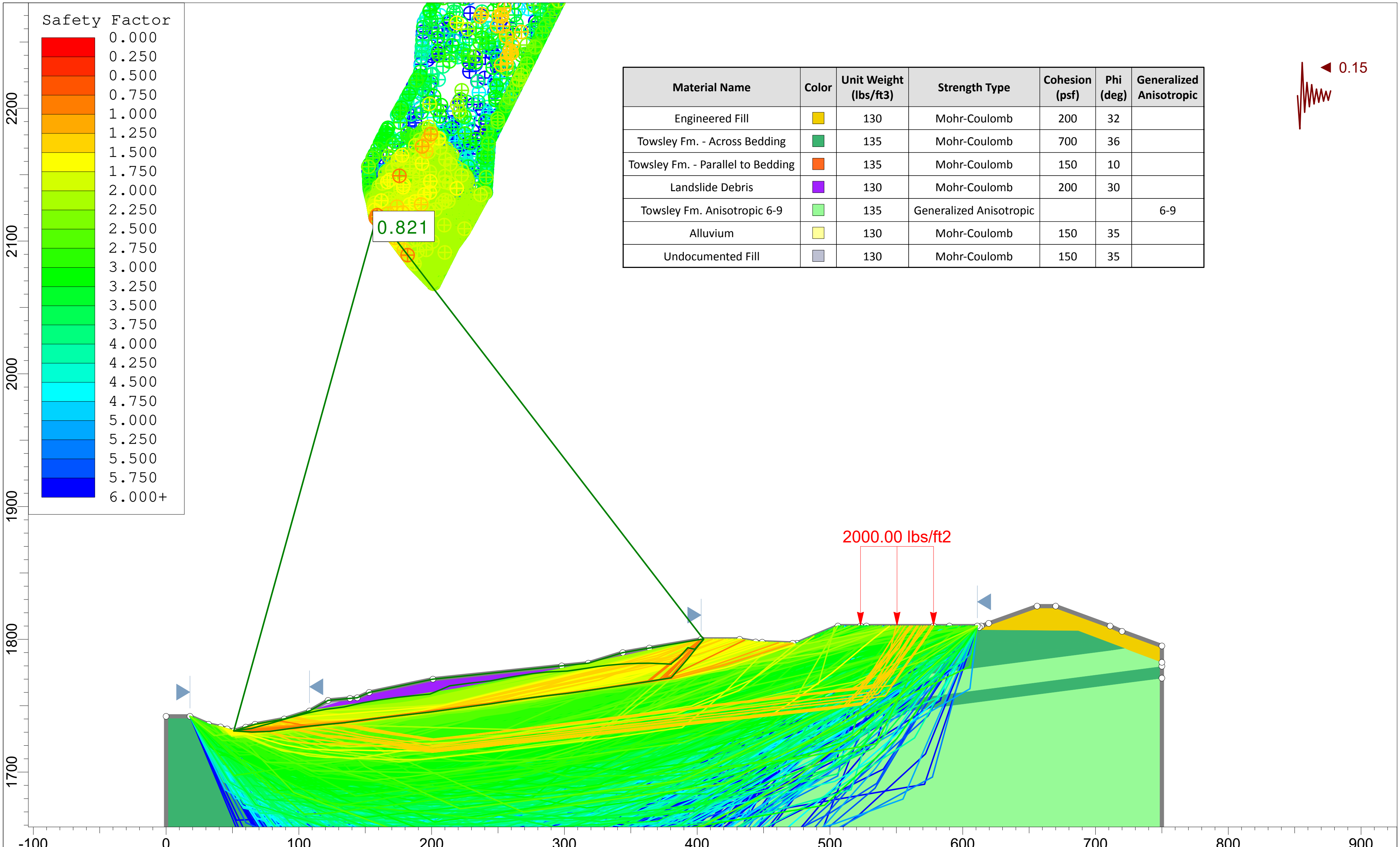
SLIDEINTERPRET 8.032

Project	Cherry Willow Water Tanks
Analysis Description	WT14-WT14' - Base of slide - pseudo-static
Drawn By	RMP
Scale	1:1200
Company	GWV
Date	
File Name	WT14.slmd



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Generalized Anisotropic
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Landslide Debris		130	Mohr-Coulomb	200	30	
Towsley Fm. Anisotropic 6-9		135	Generalized Anisotropic			6-9
Alluvium		130	Mohr-Coulomb	150	35	
Undocumented Fill		130	Mohr-Coulomb	150	35	

Project	Cherry Willow Water Tanks
Analysis Description	WT14-WT14' - Base of slide - pseudo-static
Drawn By	RMP
Scale	1:1200
Company	GWV
Date	
File Name	WT14.slmd

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SLIDEINTERPRET 8.032

Slide Analysis Information

WT14

Project Summary

File Name:	WT14.slmd
Slide Modeler Version:	8.032
Compute Time:	00h:00m:16.436s
Project Title:	Cherry Willow Water Tanks
Analysis:	WT14-WT14' - Base of slide - pseudo-static
Author:	RMP
Company:	GWV

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	inches/hour
Data Output:	Standard
Failure Direction:	Right to Left

Analysis Options

Analysis Methods Used

Slices Type:	Vertical
	Spencer
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Search Method:	Cuckoo Search
Initial # of Surface Vertices:	8
Maximum Iterations:	500
Number of Nests:	10
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Convex Surfaces Only: Enabled

Seismic Loading

Advanced seismic analysis: No
Staged pseudostatic analysis: No

Seismic Load Coefficient (Horizontal): 0.15

Loading

- 1 Distributed Load present

Distributed Load 1

Distribution:	Constant
Magnitude [psf]:	2000
Orientation:	Vertical

Materials

Property	Engineered Fill	Towsley Fm. - Across Bedding	Towsley Fm. - Parallel to Bedding	Landslide Debris	Towsley Fm. Anisotropic 6-9	Alluvium	Undocumented Fill
Color							
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Generalized Anisotropic	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft3]	130	135	135	130	135	130	130
Cohesion [psf]	200	700	150	200		150	150
Friction Angle [°]	32	36	10	30		35	35
Water Surface	None	None	None	None	None	None	None
Ru Value	0	0	0	0	0	0	0

Generalized Anisotropic Functions

Name: 6-9

Angle From	Angle To	Material
6	-90	Towsley Fm. - Across Bedding
9	6	Towsley Fm. - Parallel to Bedding
90	9	Towsley Fm. - Across Bedding

Global Minimums

Method: spencer

FS	0.820580
Axis Location:	158.933, 2119.367
Left Slip Surface Endpoint:	51.000, 1731.000
Right Slip Surface Endpoint:	404.867, 1800.000
Resisting Moment:	8.27608e+07 lb-ft
Driving Moment:	1.01048e+08 lb-ft
Resisting Horizontal Force:	208990 lb
Driving Horizontal Force:	255170 lb
Total Slice Area:	6671.84 ft2
Surface Horizontal Width:	353.867 ft
Surface Average Height:	18.8541 ft

Global Minimum Coordinates

Method: spencer

X	Y
51	1731
64.5728	1730.19

X	Y
78.238	1730.64
92.4122	1732.65
106.586	1734.41
120.76	1735.91
134.289	1737.15
147.952	1739.04
161.111	1740.72
174.27	1742.31
186.461	1743.73
198.652	1745.15
213.765	1747.27
228.877	1749.32
244.494	1751.36
260.11	1753.78
275.727	1756.07
286.582	1757.51
302.095	1759.25
317.58	1761.41
332.48	1763.56
347.367	1765.74
364.117	1768.29
380.414	1771.01
386.696	1778.18
392.977	1785.51
398.209	1791.98
404.867	1800

Valid/Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 3440
Number of Invalid Surfaces: 1602

Error Codes:

Error Code -108 reported for 15 surfaces
Error Code -111 reported for 137 surfaces
Error Code -112 reported for 67 surfaces
Error Code -114 reported for 8 surfaces
Error Code -121 reported for 114 surfaces
Error Code -124 reported for 1 surface
Error Code -1000 reported for 1260 surfaces

Error Codes

The following errors were encountered during the computation:

-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-111 = safety factor equation did not converge
-112 = The coefficient M-Alpha = cos(alpha)(1+tan(alpha)tan(phi)/F) < 0.2 for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.
-114 = Surface with Reverse Curvature.
-121 = Concave failure surface, only convex surfaces have been defined as being allowed.
-124 = A slice has a width less than the minimum acceptable value.
-1000 = No valid slip surface is generated

Slice Data

- **Global Minimum Query (spencer) - Safety Factor: 0.82058**

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	4.16562	419.468	-3.39935	Alluvium	150	35	421.185	345.616	279.37	0	279.37	254.351	254.351
2	9.0927	3829.82	-3.39935	Landslide Debris	200	30	769.632	631.545	747.458	0	747.458	701.742	701.742
3	0.314502	204.024	-3.39935	Towsley Fm. - Parallel to Bedding	150	10	352.512	289.264	789.802	0	789.802	768.863	768.863

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
4	6.8326	5175.82	1.87769	Towsley Fm. - Parallel to Bedding	150	10	362.035	297.079	834.129	0	834.129	845.998	845.998
5	6.8326	6145.52	1.87769	Towsley Fm. - Parallel to Bedding	150	10	392.73	322.266	976.967	0	976.967	989.842	989.842
6	7.08708	6982.08	8.05078	Towsley Fm. - Parallel to Bedding	150	10	391.796	321.5	972.627	0	972.627	1028.04	1028.04
7	7.08708	7340.77	8.05078	Towsley Fm. - Parallel to Bedding	150	10	402.011	329.882	1020.16	0	1020.16	1077.02	1077.02
8	7.08707	8411.98	7.10804	Towsley Fm. - Parallel to Bedding	150	10	435.78	357.592	1177.31	0	1177.31	1231.65	1231.65
9	7.08707	9657.58	7.10804	Towsley Fm. - Parallel to Bedding	150	10	471.621	387.003	1344.11	0	1344.11	1402.92	1402.92
10	7.08707	11502.1	6.03985	Towsley Fm. - Parallel to Bedding	150	10	529.512	434.507	1613.53	0	1613.53	1669.55	1669.55
11	7.08707	14511.7	6.03985	Towsley Fm. - Parallel to Bedding	150	10	617.144	506.416	2021.33	0	2021.33	2086.63	2086.63
12	6.76404	15780.4	5.20695	Towsley Fm. - Parallel to Bedding	150	10	681.208	558.986	2319.47	0	2319.47	2381.55	2381.55
13	6.76404	15832.8	5.20695	Towsley Fm. - Parallel to Bedding	150	10	682.823	560.311	2326.99	0	2326.99	2389.22	2389.22
14	6.83195	15847.2	7.88153	Towsley Fm. - Parallel to Bedding	150	10	662.115	543.318	2230.62	0	2230.62	2322.28	2322.28
15	6.83195	15912.7	7.88153	Towsley Fm. - Parallel to Bedding	150	10	664.052	544.908	2239.64	0	2239.64	2331.56	2331.56
16	6.57944	16887.1	7.26896	Towsley Fm. - Parallel to Bedding	150	10	716.078	587.599	2481.75	0	2481.75	2573.08	2573.08
17	6.57944	17730.4	7.26896	Towsley Fm. - Parallel to Bedding	150	10	742.169	609.009	2603.17	0	2603.17	2697.84	2697.84
18	6.57944	18202.8	6.92144	Towsley Fm. - Parallel to Bedding	150	10	759.232	623.011	2682.59	0	2682.59	2774.75	2774.75
19	6.57944	18693.9	6.92144	Towsley Fm. - Parallel to Bedding	150	10	774.485	635.527	2753.56	0	2753.56	2847.58	2847.58
20	6.09544	17770.9	6.60812	Towsley Fm. - Parallel to Bedding	150	10	791.968	649.873	2834.91	0	2834.91	2926.66	2926.66
21	6.09544	18220.2	6.60812	Towsley Fm. - Parallel to Bedding	150	10	807.083	662.276	2905.27	0	2905.27	2998.76	2998.76
22	6.09544	18667.5	6.65506	Towsley Fm. - Parallel to Bedding	150	10	821.764	674.323	2973.58	0	2973.58	3069.46	3069.46
23	6.09544	19112.6	6.65506	Towsley Fm. - Parallel to Bedding	150	10	836.731	686.605	3043.24	0	3043.24	3140.87	3140.87
24	0.0801759	254.352	8.00668	Towsley Fm. - Parallel to Bedding	150	10	833.579	684.018	3028.56	0	3028.56	3145.81	3145.81
25	7.51626	23906	8.00668	Towsley Fm. - Parallel to Bedding	150	10	835.221	685.366	3036.21	0	3036.21	3153.69	3153.69
26	7.51626	23662.2	8.00668	Towsley Fm. - Parallel to Bedding	150	10	828.674	679.993	3005.74	0	3005.74	3122.3	3122.3
27	7.55635	23526.9	7.72002	Towsley Fm. - Parallel to Bedding	150	10	823.898	676.074	2983.52	0	2983.52	3095.21	3095.21
28	7.55635	23284.2	7.72002	Towsley Fm. - Parallel to Bedding	150	10	817.394	670.737	2953.25	0	2953.25	3064.06	3064.06
29	7.80823	23825.8	7.44309	Towsley Fm. - Parallel to Bedding	150	10	813.417	667.474	2934.73	0	2934.73	3041	3041
30	7.80823	23608.9	7.44309	Towsley Fm. - Parallel to Bedding	150	10	807.775	662.844	2908.48	0	2908.48	3014.01	3014.01
31	7.80824	23293.6	8.80525	Towsley Fm. - Parallel to Bedding	150	10	789.489	647.839	2823.39	0	2823.39	2945.68	2945.68
32	7.80824	22878.4	8.80525	Towsley Fm. - Parallel to Bedding	150	10	778.844	639.104	2773.85	0	2773.85	2894.5	2894.5
33	15.6165	44649	8.33572	Towsley Fm. - Parallel to Bedding	150	10	767.968	630.179	2723.23	0	2723.23	2835.75	2835.75
34	10.8553	30334	7.534	Towsley Fm. - Parallel to Bedding	150	10	760.563	624.103	2688.77	0	2688.77	2789.36	2789.36
35	15.513	42903.2	6.40533	Towsley Fm. - Parallel to Bedding	150	10	762.687	625.846	2698.66	0	2698.66	2784.28	2784.28
36	7.74232	21182.3	7.96608	Towsley Fm. - Parallel to Bedding	150	10	745.716	611.92	2619.68	0	2619.68	2724.03	2724.03
37	7.74232	20871.1	7.96608	Towsley Fm. - Parallel to Bedding	150	10	737.595	605.256	2581.89	0	2581.89	2685.11	2685.11
38	7.45031	20441.1	8.20756	Towsley Fm. - Parallel to Bedding	150	10	745.621	611.842	2619.24	0	2619.24	2726.79	2726.79
39	7.45031	21617	8.20756	Towsley Fm. - Parallel to Bedding	150	10	777.421	637.936	2767.22	0	2767.22	2879.35	2879.35

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
40	7.44308	22766	8.30593	Towsley Fm. - Parallel to Bedding	150	10	808.349	663.315	2911.15	0	2911.15	3029.16	3029.16
41	7.44308	23827.1	8.30593	Towsley Fm. - Parallel to Bedding	150	10	837.04	686.858	3044.68	0	3044.68	3166.88	3166.88
42	8.37499	27147	8.6814	Towsley Fm. - Parallel to Bedding	150	10	842.154	691.055	3068.48	0	3068.48	3197.07	3197.07
43	8.37499	27295.7	8.6814	Towsley Fm. - Parallel to Bedding	150	10	845.713	693.975	3085.04	0	3085.04	3214.17	3214.17
44	16.2976	53295.5	9.45365	Towsley Fm. - Parallel to Bedding	150	10	841.797	690.762	3066.81	0	3066.81	3206.98	3206.98
45	0.18909	616.395	48.7874	Towsley Fm. - Parallel to Bedding	150	10	583.673	478.95	1865.57	0	1865.57	2531.99	2531.99
46	6.09239	17438.4	48.7874	Landslide Debris	200	30	1136.02	932.197	1268.21	0	1268.21	2565.29	2565.29
47	6.28147	13002	49.4145	Landslide Debris	200	30	860.098	705.779	876.034	0	876.034	1880.04	1880.04
48	5.23188	6800.87	51.0184	Landslide Debris	200	30	587.473	482.069	488.557	0	488.557	1214.5	1214.5
49	6.32974	3210.27	50.3096	Landslide Debris	200	30	339.54	278.62	136.173	0	136.173	545.29	545.29
50	0.328032	8.42757	50.3096	Engineered Fill	200	32	314.213	257.837	92.559	0	92.559	471.16	471.16

Interslice Data

- **Global Minimum Query (spencer) - Safety Factor: 0.82058**

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	51	1731	0	0	0
2	55.1656	1730.75	1765.43	706.173	21.8014
3	64.2583	1730.21	8611.56	3444.62	21.8014
4	64.5728	1730.19	8706.87	3482.75	21.8014
5	71.4054	1730.42	10224	4089.59	21.8014
6	78.238	1730.64	11773.9	4709.56	21.8014
7	85.3251	1731.64	12535.8	5014.31	21.8014
8	92.4122	1732.65	13268.8	5307.51	21.8014
9	99.4993	1733.53	14063.2	5625.3	21.8015
10	106.586	1734.41	14778.2	5911.27	21.8014
11	113.673	1735.16	15605.7	6242.29	21.8014
12	120.76	1735.91	16298.8	6519.51	21.8014
13	127.525	1736.53	17122.1	6848.85	21.8014
14	134.289	1737.15	17943.9	7177.57	21.8014
15	141.12	1738.09	17992.9	7197.17	21.8014
16	147.952	1739.04	18036.8	7214.74	21.8015
17	154.532	1739.88	18145.1	7258.05	21.8014
18	161.111	1740.72	18197.1	7278.85	21.8014
19	167.691	1741.52	18332.9	7333.17	21.8014
20	174.27	1742.31	18439	7375.59	21.8014
21	180.366	1743.02	18611.9	7444.75	21.8014
22	186.461	1743.73	18760.1	7504.04	21.8014
23	192.557	1744.44	18867.7	7547.07	21.8014
24	198.652	1745.15	18950.4	7580.16	21.8014
25	198.732	1745.16	18945.1	7578.05	21.8014
26	206.248	1746.22	18443.9	7377.55	21.8014
27	213.765	1747.27	17962.1	7184.84	21.8014
28	221.321	1748.3	17619.3	7047.74	21.8015
29	228.877	1749.32	17294.7	6917.89	21.8014
30	236.686	1750.34	17095.6	6838.25	21.8014
31	244.494	1751.36	16911.7	6764.67	21.8014
32	252.302	1752.57	16183.9	6473.54	21.8013
33	260.11	1753.78	15494.9	6197.96	21.8014
34	275.727	1756.07	14591.7	5836.67	21.8014
35	286.582	1757.51	14459.8	5783.91	21.8014
36	302.095	1759.25	15188	6075.2	21.8014
37	309.837	1760.33	14961.5	5984.61	21.8014
38	317.58	1761.41	14759.6	5903.85	21.8014
39	325.03	1762.49	14448.9	5779.55	21.8014
40	332.48	1763.56	14040.3	5616.11	21.8014
41	339.923	1764.65	13494.9	5397.96	21.8014

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
42	347.367	1765.74	12859.4	5143.75	21.8014
43	355.742	1767.02	11935.5	4774.2	21.8014
44	364.117	1768.29	10998	4399.2	21.8014
45	380.414	1771.01	8437.42	3374.97	21.8014
46	380.603	1771.22	8052.85	3221.14	21.8014
47	386.696	1778.18	3554.98	1421.99	21.8014
48	392.977	1785.51	598.418	239.367	21.8014
49	398.209	1791.98	-498.4	-199.36	21.8014
50	404.539	1799.6	136.483	54.5932	21.8014
51	404.867	1800	0	0	0

Entity Information

Group: Removals Cuckoo

Shared Entities

Type	Coordinates

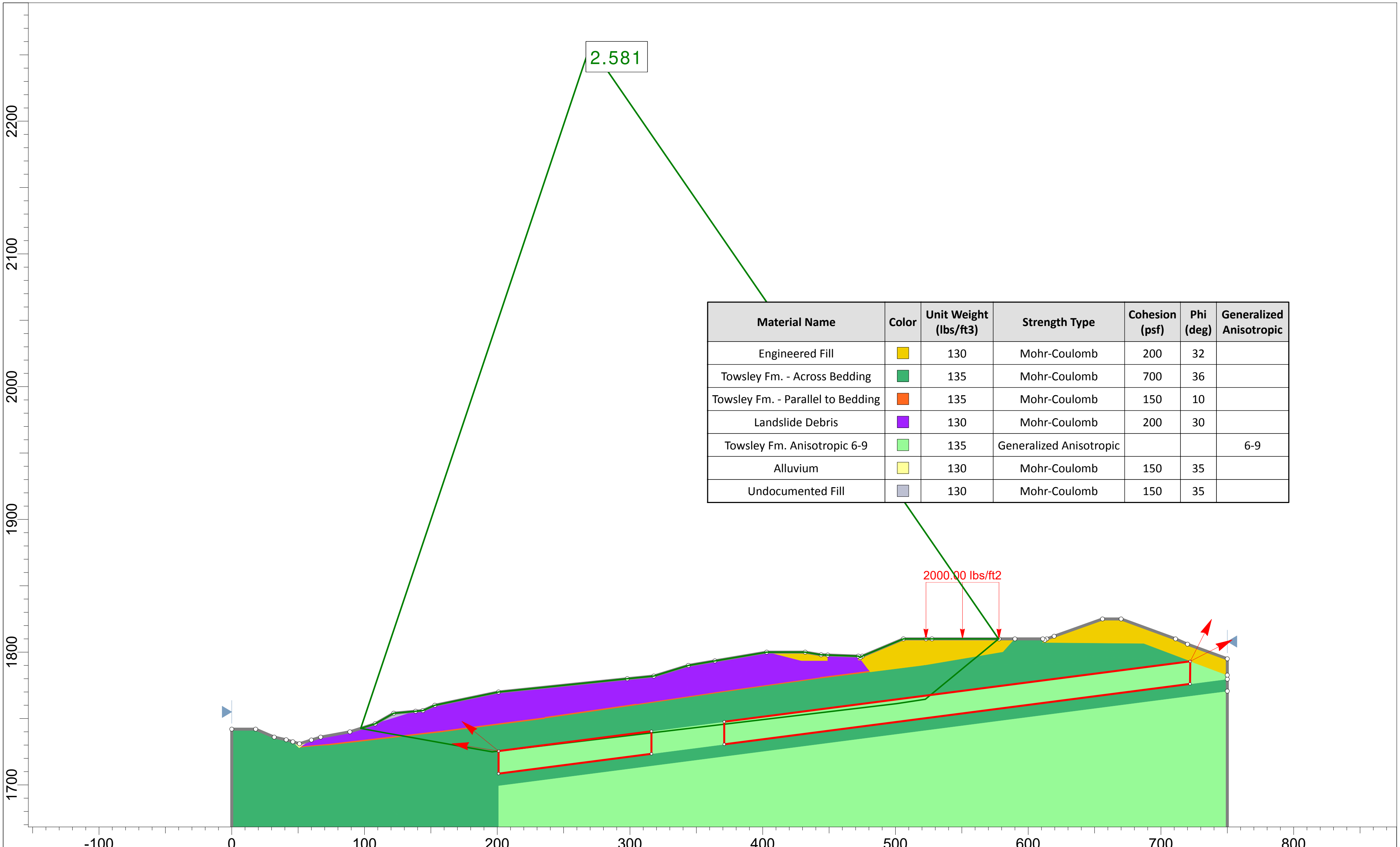
Type	Coordinates	
	X	Y
External Boundary	720	1806
	711	1810
	670	1825
	656	1825
	619.6	1812
	614	1810
	612.5	1809
	611	1810
	590	1810
	578	1810
	527.556	1810
	523	1810
	506	1810
	475	1797
	473.5	1796
	472	1797
	449	1797.82
	444	1798
	432	1800
	403	1800
	364	1793.39
	344	1790
	318	1782
	298	1780
	201	1770
	153	1760
	144	1756
	138.55	1755.5
	122	1754
	108	1746
	89	1740
	67	1736
	60	1733.81
	51	1731
	46	1732.5
	41	1734
	32	1736
	18	1742
	0	1742
	0	1600
	201	1600
	750	1600
	750	1770.69
	750	1779.69
	750	1782.62
	750	1795
	X	Y
Material Boundary	619.6	1812
	638	1812
	707	1811
	711	1810
	X	Y
Material Boundary	522	1790
	581	1800
	590	1810
	X	Y
Material Boundary	46	1732.5
	50.8197	1728
	52.6617	1729.17
	60	1733.81

Type	Coordinates	
	X	Y
Material Boundary	108	1746
	138.55	1755.5
	X	Y
Material Boundary	403	1800
	429	1793.32
	449	1793.32
	449	1797.82
	X	Y
Material Boundary	472	1797
	472	1794
	474.25	1794
	492	1794
	527.556	1810
	X	Y
Material Boundary	611	1810
	611	1807
	687	1806.29
	722.133	1793.09
	750	1782.62
	X	Y
Material Boundary	581	1800
	581	1801
	X	Y
Material Boundary	522	1791
	581	1801
	X	Y
Material Boundary	73	1730
	159	1740
	236	1750
	339.832	1764.52
	481.498	1784.34
	522	1790
	X	Y
Material Boundary	73	1731
	159	1741
	236	1751
	341.831	1765.8
	480.82	1785.24
	522	1791
	X	Y
Material Boundary	50.8197	1728
	73	1730
	X	Y
Material Boundary	52.6617	1729.17
	73	1731
	X	Y
Material Boundary	339.832	1764.52
	341.831	1765.8
	348.488	1770.06
	355.176	1777.7
	360.526	1784.77
	364	1793.39

Type	Coordinates	
	X	Y
Material Boundary	472	1797
	474.25	1794
	480.82	1785.24
	481.498	1784.34
Material Boundary	201	1725.49
	722.133	1793.09
	722.134	1793.09
Material Boundary	201	1708.49
	750	1779.69
Material Boundary	201	1699.49
	750	1770.69
Material Boundary	201	1600
	201	1699.49
	201	1708.49
	201	1725.49

Scenario-based Entities

Type	Coordinates		slide plane pseudo
	X	Y	
Distributed Load	523	1810	Constant Distribution Orientation: Vertical Magnitude: 2000 lbs/ft2 Creates Excess Pore Pressure: No
	527.556	1810	
	578	1810	



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Generalized Anisotropic
Engineered Fill		130	Mohr-Coulomb	200	32	
Towsley Fm. - Across Bedding		135	Mohr-Coulomb	700	36	
Towsley Fm. - Parallel to Bedding		135	Mohr-Coulomb	150	10	
Landslide Debris		130	Mohr-Coulomb	200	30	
Towsley Fm. Anisotropic 6-9		135	Generalized Anisotropic			6-9
Alluvium		130	Mohr-Coulomb	150	35	
Undocumented Fill		130	Mohr-Coulomb	150	35	

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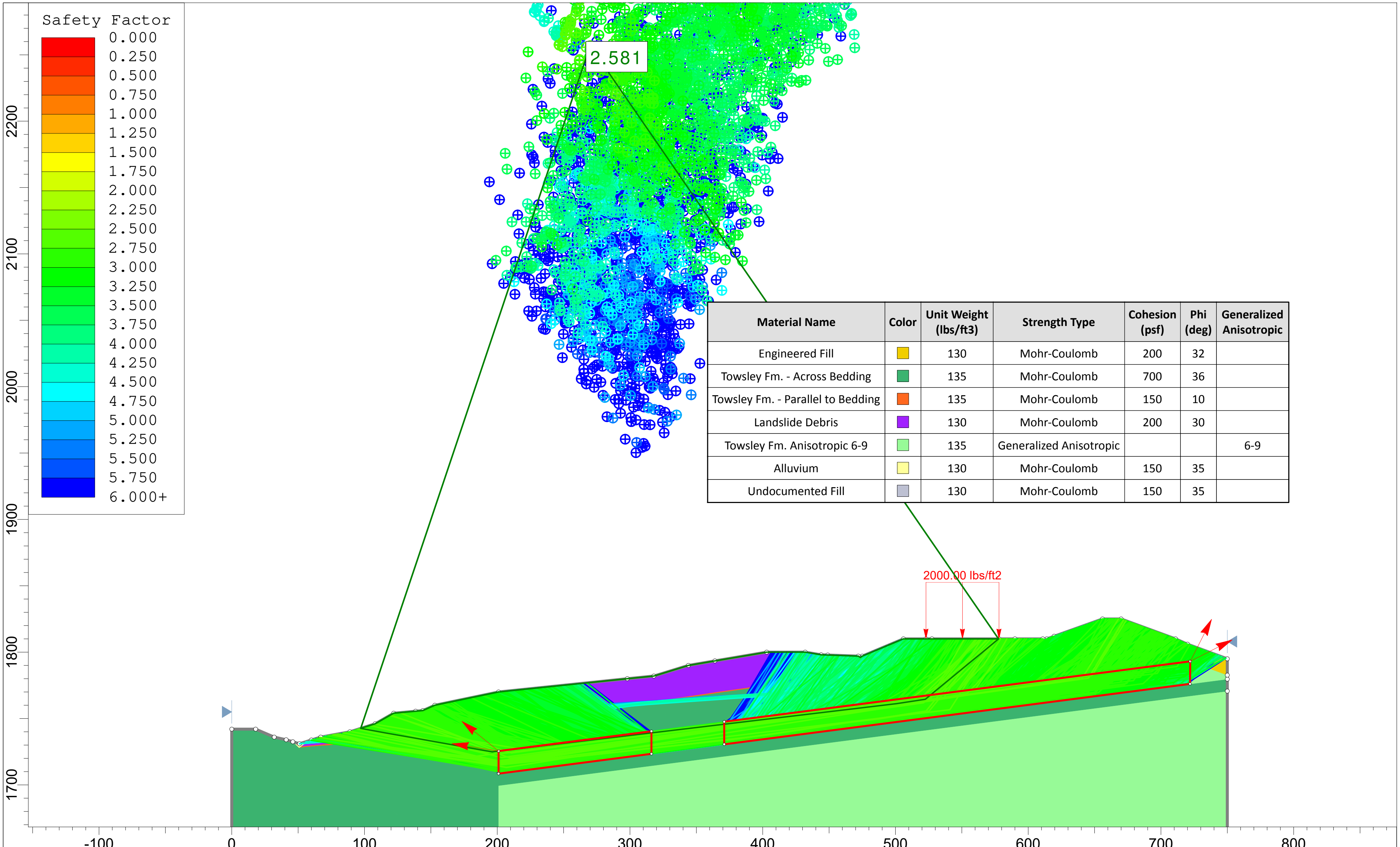
SLIDEINTERPRET 8.032

Project	Cherry Willow Water Tanks		
Analysis Description	WT14-WT14' - Deep bedrock - static		
Drawn By	RMP	*Scale* 1:1200	*Company* GWV
Date			*File Name* WT14.slmd



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Generalized Anisotropic
Engineered Fill		130	Mohr-Coulomb	200	32	
Towsley Fm. - Across Bedding		135	Mohr-Coulomb	700	36	
Towsley Fm. - Parallel to Bedding		135	Mohr-Coulomb	150	10	
Landslide Debris		130	Mohr-Coulomb	200	30	
Towsley Fm. Anisotropic 6-9		135	Generalized Anisotropic			6-9
Alluvium		130	Mohr-Coulomb	150	35	
Undocumented Fill		130	Mohr-Coulomb	150	35	

rocscience

SLIDEINTERPRET 8.032

Project	Cherry Willow Water Tanks		
Analysis Description	WT14-WT14' - Deep bedrock - static		
Drawn By RMP	*Scale* 1:1200	*Company*	GWV
Date		*File Name*	WT14.slmd

Slide Analysis Information

WT14

Project Summary

File Name:	WT14.slmd
Slide Modeler Version:	8.032
Compute Time:	00h:00m:31.331s
Project Title:	Cherry Willow Water Tanks
Analysis:	WT14-WT14' - Deep bedrock - static
Author:	RMP
Company:	GWV

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	inches/hour
Data Output:	Standard
Failure Direction:	Right to Left

Analysis Options

Analysis Methods Used	
Slices Type:	Vertical
	Spencer
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Surface Type:	Non-Circular Block Search
Number of Surfaces:	5000
Multiple Groups:	Disabled
Pseudo-Random Surfaces:	Enabled
Convex Surfaces Only:	Disabled
Left Projection Angle (Start Angle) [°]:	141
Left Projection Angle (End Angle) [°]:	171
Right Projection Angle (Start Angle) [°]:	27

Right Projection Angle (End Angle) [°]:	63
Minimum Elevation:	Not Defined
Minimum Depth [ft]:	35
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading

Advanced seismic analysis:	No
Staged pseudostatic analysis:	No

Loading

- 1 Distributed Load present

Distributed Load 1	
Distribution:	Constant
Magnitude [psf]:	2000
Orientation:	Vertical

Materials

Property	Engineered Fill	Towsley Fm. - Across Bedding	Towsley Fm. - Parallel to Bedding	Landslide Debris	Towsley Fm. Anisotropic 6-9	Alluvium	Undocumented Fill
Color							
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Generalized Anisotropic	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft3]	130	135	135	130	135	130	130
Cohesion [psf]	200	700	150	200		150	150
Friction Angle [°]	32	36	10	30		35	35
Water Surface	None	None	None	None	None	None	None
Ru Value	0	0	0	0	0	0	0

Generalized Anisotropic Functions

Name: 6-9

Angle From	Angle To	Material
6	-90	Towsley Fm. - Across Bedding
9	6	Towsley Fm. - Parallel to Bedding
90	9	Towsley Fm. - Across Bedding

Global Minimums

Method: spencer

FS	2.581260
Axis Location:	270.019, 2256.839
Left Slip Surface Endpoint:	97.165, 1742.578
Right Slip Surface Endpoint:	577.715, 1810.000
Resisting Moment:	4.9968e+08 lb-ft
Driving Moment:	1.9358e+08 lb-ft
Resisting Horizontal Force:	882178 lb
Driving Horizontal Force:	341763 lb
Total Slice Area:	18346.7 ft2
Surface Horizontal Width:	480.55 ft
Surface Average Height:	38.1785 ft

Global Minimum Coordinates

Method: spencer

X	Y

X	Y
97.1652	1742.58
116.317	1739.09
136.317	1735.54
156.318	1731.98
176.318	1728.43
196.203	1724.9
215.827	1727.23
239.545	1730.05
261.154	1732.63
277.819	1734.61
293.674	1736.5
309.528	1738.39
325.383	1740.28
341.237	1742.17
357.092	1744.06
372.947	1745.95
388.801	1747.84
404.656	1749.73
420.51	1751.62
435.997	1753.46
453.706	1755.57
477.284	1758.38
501.074	1761.23
522.493	1764.49
533.197	1773.3
543.901	1782.1
554.964	1791.2
564.781	1799.28
577.715	1810

Valid/Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 5021
Number of Invalid Surfaces: 35

Error Codes:

Error Code -108 reported for 35 surfaces

Error Codes

The following errors were encountered during the computation:

-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).

Slice Data

- **Global Minimum Query (spencer) - Safety Factor: 2.58126**

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	9.57579	2967.94	-10.3243	Landslide Debris	200	30	159.208	410.957	365.388	0	365.388	336.385	336.385
2	9.57579	10053.2	-10.3243	Landslide Debris	200	30	340.727	879.506	1176.94	0	1176.94	1114.87	1114.87
3	10.3865	20309.2	-10.0732	Landslide Debris	200	30	561.966	1450.58	2166.08	0	2166.08	2066.25	2066.25
4	3.40224	7810.47	-10.0732	Towsley Fm. - Parallel to Bedding	150	10	222.845	575.22	2411.54	0	2411.54	2371.95	2371.95
5	6.21175	15346.6	-10.0732	Towsley Fm. - Across Bedding	700	36	1072.19	2767.61	2845.82	0	2845.82	2655.35	2655.35
6	10.0002	27778.5	-10.0707	Towsley Fm. - Across Bedding	700	36	1168.66	3016.61	3188.54	0	3188.54	2980.99	2980.99
7	10.0002	34487.1	-10.0707	Towsley Fm. - Across Bedding	700	36	1379.34	3560.43	3937.05	0	3937.05	3692.08	3692.08
8	10.0002	40338.6	-10.0707	Towsley Fm. - Across Bedding	700	36	1563.1	4034.77	4589.92	0	4589.92	4312.31	4312.31

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
9	10.0002	45509.4	-10.0707	Towsley Fm. - Across Bedding	700	36	1725.49	4453.94	5166.85	0	5166.85	4860.41	4860.41
10	9.94235	50372.3	-10.0707	Towsley Fm. - Across Bedding	700	36	1887.42	4871.91	5742.14	0	5742.14	5406.94	5406.94
11	9.94235	55483.8	-10.0707	Towsley Fm. - Across Bedding	700	36	2048.87	5288.67	6315.77	0	6315.77	5951.89	5951.89
12	4.79715	28138.6	6.7666	Towsley Fm. - Across Bedding	700	36	1898.76	4901.19	5782.44	0	5782.44	6007.73	6007.73
13	14.8266	87169	6.7666	Towsley Fm. - Parallel to Bedding	150	10	454.174	1172.34	5797.95	0	5797.95	5851.84	5851.84
14	11.8592	69409	6.7821	Towsley Fm. - Parallel to Bedding	150	10	452.368	1167.68	5771.55	0	5771.55	5825.35	5825.35
15	11.8592	69127.7	6.7821	Towsley Fm. - Parallel to Bedding	150	10	450.772	1163.56	5748.16	0	5748.16	5801.77	5801.77
16	10.8046	62740	6.79581	Towsley Fm. - Parallel to Bedding	150	10	449.253	1159.64	5725.96	0	5725.96	5779.49	5779.49
17	10.8046	62511.1	6.79581	Towsley Fm. - Parallel to Bedding	150	10	447.828	1155.96	5705.06	0	5705.06	5758.42	5758.42
18	8.33239	48051.5	6.79584	Towsley Fm. - Parallel to Bedding	150	10	446.561	1152.69	5686.55	0	5686.55	5739.76	5739.76
19	8.33239	47915.4	6.79584	Towsley Fm. - Parallel to Bedding	150	10	445.461	1149.85	5670.44	0	5670.44	5723.52	5723.52
20	7.9273	45459.5	6.79584	Towsley Fm. - Parallel to Bedding	150	10	444.387	1147.08	5654.72	0	5654.72	5707.68	5707.68
21	7.9273	45336.2	6.79584	Towsley Fm. - Parallel to Bedding	150	10	443.34	1144.38	5639.39	0	5639.39	5692.22	5692.22
22	15.8546	90276.3	6.79584	Towsley Fm. - Parallel to Bedding	150	10	441.657	1140.03	5614.74	0	5614.74	5667.37	5667.37
23	15.8546	90425.9	6.79584	Towsley Fm. - Parallel to Bedding	150	10	442.292	1141.67	5624.05	0	5624.05	5676.76	5676.76
24	7.9273	47052.9	6.79584	Towsley Fm. - Parallel to Bedding	150	10	457.928	1182.03	5852.92	0	5852.92	5907.49	5907.49
25	7.9273	48602.4	6.79584	Towsley Fm. - Parallel to Bedding	150	10	471.096	1216.02	6045.68	0	6045.68	6101.82	6101.82
26	15.8546	100314	6.79584	Towsley Fm. - Parallel to Bedding	150	10	484.302	1250.11	6239.05	0	6239.05	6296.76	6296.76
27	7.9273	50822.1	6.79584	Towsley Fm. - Parallel to Bedding	150	10	489.955	1264.7	6321.79	0	6321.79	6380.18	6380.18
28	7.9273	51242.6	6.79584	Towsley Fm. - Parallel to Bedding	150	10	493.53	1273.93	6374.1	0	6374.1	6432.91	6432.91
29	15.8546	103741	6.79584	Towsley Fm. - Parallel to Bedding	150	10	498.865	1287.7	6452.21	0	6452.21	6511.66	6511.66
30	7.9273	52497.4	6.79584	Towsley Fm. - Parallel to Bedding	150	10	504.192	1301.45	6530.19	0	6530.19	6590.27	6590.27
31	7.9273	52885.1	6.79584	Towsley Fm. - Parallel to Bedding	150	10	507.485	1309.95	6578.41	0	6578.41	6638.89	6638.89
32	7.9273	52351.7	6.79584	Towsley Fm. - Parallel to Bedding	150	10	502.952	1298.25	6512.06	0	6512.06	6572	6572
33	7.9273	51385	6.79584	Towsley Fm. - Parallel to Bedding	150	10	494.739	1277.05	6391.8	0	6391.8	6450.76	6450.76
34	7.74322	49258.4	6.79584	Towsley Fm. - Parallel to Bedding	150	10	486.619	1256.09	6272.95	0	6272.95	6330.94	6330.94
35	7.74322	48163	6.79584	Towsley Fm. - Parallel to Bedding	150	10	477.089	1231.49	6133.44	0	6133.44	6190.3	6190.3
36	8.85454	52532.9	6.79584	Towsley Fm. - Parallel to Bedding	150	10	457.745	1181.56	5850.28	0	5850.28	5904.83	5904.83
37	8.85454	50413.7	6.79584	Towsley Fm. - Parallel to Bedding	150	10	441.625	1139.95	5614.28	0	5614.28	5666.9	5666.9
38	11.789	64675.5	6.79584	Towsley Fm. - Parallel to Bedding	150	10	427.651	1103.88	5409.71	0	5409.71	5460.67	5460.67
39	11.789	61894.3	6.79584	Towsley Fm. - Parallel to Bedding	150	10	411.759	1062.86	5177.08	0	5177.08	5226.15	5226.15
40	11.8951	65520.8	6.81783	Towsley Fm. - Parallel to Bedding	150	10	429.113	1107.65	5431.12	0	5431.12	5482.42	5482.42
41	11.8951	71022.7	6.81783	Towsley Fm. - Parallel to Bedding	150	10	460.267	1188.07	5887.19	0	5887.19	5942.22	5942.22
42	10.7093	67497.2	8.67196	Towsley Fm. - Parallel to Bedding	150	10	479.952	1238.88	6175.37	0	6175.37	6248.57	6248.57
43	10.7093	65869.7	8.67196	Towsley Fm. - Parallel to Bedding	150	10	469.778	1212.62	6026.43	0	6026.43	6098.08	6098.08
44	3.89543	22707.8	39.437	Towsley Fm. - Across Bedding	700	36	1874.86	4839.49	5697.53	0	5697.53	7239.58	7239.58

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
45	6.80875	35675	39.437	Towsley Fm. - Across Bedding	700	36	1803.29	4654.75	5443.25	0	5443.25	6926.44	6926.44
46	10.7042	45757.4	39.437	Towsley Fm. - Across Bedding	700	36	1593.55	4113.37	4698.11	0	4698.11	6008.79	6008.79
47	11.0626	34023	39.437	Towsley Fm. - Across Bedding	700	36	1332.87	3440.49	3771.97	0	3771.97	4868.25	4868.25
48	6.71152	14066.7	39.4624	Towsley Fm. - Across Bedding	700	36	1119.7	2890.24	3014.61	0	3014.61	3936.38	3936.38
49	3.10576	4843.78	39.4624	Engineered Fill	200	32	746.957	1928.09	2765.52	0	2765.52	3380.44	3380.44
50	12.9345	9011.59	39.6481	Engineered Fill	200	32	581.274	1500.42	2081.11	0	2081.11	2562.8	2562.8

Interslice Data

- **Global Minimum Query (spencer) - Safety Factor: 2.58126**

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	97.1652	1742.58	0	0	0
2	106.741	1740.83	2161.93	253.209	6.68015
3	116.317	1739.09	7477.73	875.807	6.68016
4	126.703	1737.24	17311.2	2027.52	6.68015
5	130.105	1736.64	19526.9	2287.03	6.68016
6	136.317	1735.54	29327.4	3434.89	6.68017
7	146.317	1733.76	46677.3	5466.93	6.68015
8	156.318	1731.98	67463.4	7901.44	6.68016
9	166.318	1730.21	91246.7	10687	6.68016
10	176.318	1728.43	117679	13782.7	6.68011
11	186.26	1726.67	146583	17168.1	6.68016
12	196.203	1724.9	178106	20860.1	6.68015
13	201	1725.47	183923	21541.5	6.68018
14	215.827	1727.23	180457	21135.5	6.68017
15	227.686	1728.64	177682	20810.5	6.68017
16	239.545	1730.05	174921	20487.1	6.68016
17	250.35	1731.34	172402	20192.1	6.68017
18	261.154	1732.63	169895	19898.5	6.68018
19	269.487	1733.62	167970	19672.9	6.68013
20	277.819	1734.61	166051	19448.2	6.68015
21	285.746	1735.56	164232	19235.1	6.68013
22	293.674	1736.5	162419	19022.8	6.68015
23	309.528	1738.39	158813	18600.5	6.68016
24	325.383	1740.28	155199	18177.2	6.68016
25	333.31	1741.22	153300	17954.8	6.68016
26	341.237	1742.17	151323	17723.3	6.68018
27	357.092	1744.06	147214	17242	6.68016
28	365.019	1745	145126	16997.4	6.68014
29	372.947	1745.95	143017	16750.4	6.68015
30	388.801	1747.84	138735	16248.9	6.68015
31	396.728	1748.78	136563	15994.5	6.68015
32	404.656	1749.73	134371	15737.8	6.68016
33	412.583	1750.67	132207	15484.3	6.68014
34	420.51	1751.62	130090	15236.4	6.68016
35	428.254	1752.54	128070	14999.8	6.68016
36	435.997	1753.46	126105	14769.6	6.68013
37	444.851	1754.52	123985	14521.3	6.68013
38	453.706	1755.57	121971	14285.5	6.68017
39	465.495	1756.98	119412	13985.8	6.68018
40	477.284	1758.38	116993	13702.5	6.68018
41	489.179	1759.8	114374	13395.7	6.68016
42	501.074	1761.23	111476	13056.3	6.68017
43	511.783	1762.86	106529	12476.9	6.68017
44	522.493	1764.49	101717	11913.3	6.68016
45	526.388	1767.7	90765.7	10630.7	6.68019
46	533.197	1773.3	72561	8498.48	6.68015
47	543.901	1782.1	48256.1	5651.85	6.68016
48	554.964	1791.2	28680.5	3359.12	6.68017

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
49	561.675	1796.72	19539.2	2288.47	6.68016
50	564.781	1799.28	14788.3	1732.04	6.68018
51	577.715	1810	0	0	0

Entity Information

Group: Deep Rock

Shared Entities

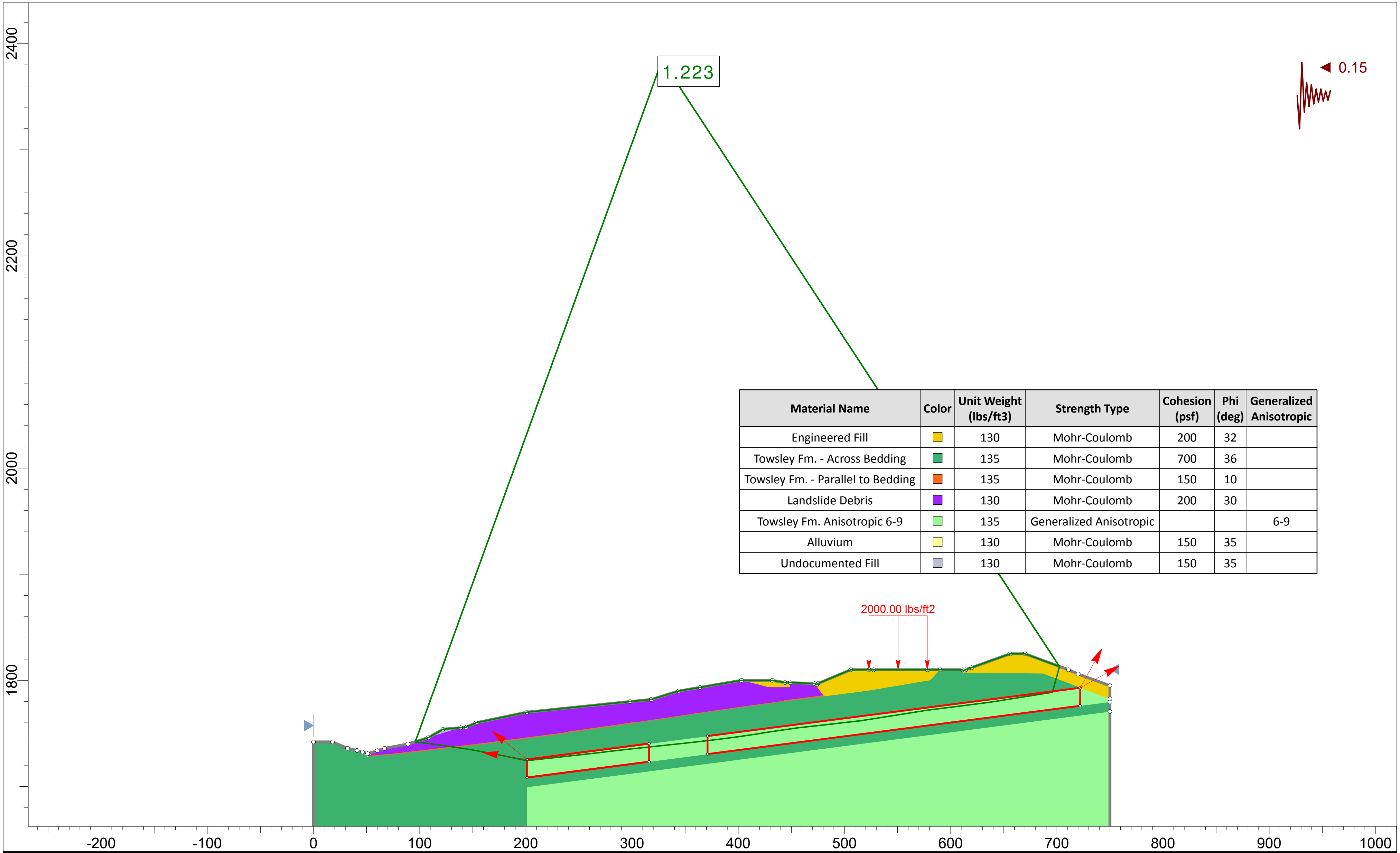
Type	X	Y
External Boundary	720	1806
	711	1810
	670	1825
	656	1825
	619.6	1812
	614	1810
	612.5	1809
	611	1810
	590	1810
	578	1810
	527.556	1810
	523	1810
	506	1810
	475	1797
	473.5	1796
	472	1797
	449	1797.82
	444	1798
	432	1800
	403	1800
	364	1793.39
	344	1790
	318	1782
	298	1780
	201	1770
	153	1760
	144	1756
	138.55	1755.5
	122	1754
	108	1746
	89	1740
	67	1736
	60	1733.81
	51	1731
	46	1732.5
	41	1734
	32	1736
	18	1742
	0	1742
	0	1600
	201	1600
	750	1600
	750	1770.69
	750	1779.69
	750	1782.62
	750	1795
Material Boundary	619.6	1812
	638	1812
	707	1811
	711	1810

Type	Coordinates	
	X	Y
Material Boundary	443	1780
	481.13	1784.83
	522	1790
	581	1800
	590	1810
	X	Y
Material Boundary	46	1732.5
	50.8197	1728
	52.6617	1729.17
	60	1733.81
	X	Y
Material Boundary	108	1746
	138.55	1755.5
	X	Y
Material Boundary	341.448	1765.44
	343.418	1766.73
	348.488	1770.06
	355.176	1777.7
	360.526	1784.77
	364	1793.39
	X	Y
Material Boundary	403	1800
	429	1793.32
	449	1793.32
	449	1797.82
	X	Y
Material Boundary	472	1797
	472	1794
	474.25	1794
	492	1794
	527.556	1810
	X	Y
Material Boundary	611	1810
	611	1807
	687	1806.29
	722.133	1793.09
	750	1782.62
	X	Y
Material Boundary	581	1800
	581	1801
	X	Y
Material Boundary	443	1781
	480.445	1785.74
	522	1791
	581	1801
	X	Y
Material Boundary	73	1730
	159	1740
	236	1750
	305	1760
	341.448	1765.44
	372	1770
	443	1780

Type	Coordinates X	Coordinates Y
Material Boundary	73	1731
	159	1741
	236	1751
	305	1761
	343.418	1766.73
	372	1771
	443	1781
Material Boundary	50.8197	1728
	73	1730
Material Boundary	52.6617	1729.17
	73	1731
Material Boundary	201	1725.49
	722.133	1793.09
	722.134	1793.09
Material Boundary	201	1708.49
	750	1779.69
Material Boundary	201	1699.49
	750	1770.69
Material Boundary	201	1600
	201	1699.49
	201	1708.49
	201	1725.49
Material Boundary	472	1797
	474.25	1794
	480.445	1785.74
	481.13	1784.83

Scenario-based Entities

Type	Coordinates X	Coordinates Y	unox static
Distributed Load	523	1810	Constant Distribution Orientation: Vertical Magnitude: 2000 lbs/ft2 Creates Excess Pore Pressure: No
	525	1810	
	527.556	1810	
	578	1810	
Block Search Window	201	1725.49	✓
	201	1708.49	
	316.156	1723.42	
	316.156	1740.42	
Block Search Window	371.013	1747.54	✓
	371.013	1730.54	
	721.971	1776.06	
	722.134	1793.09	



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Generalized Anisotropic
Engineered Fill		130	Mohr-Coulomb	200	32	
Towsley Fm. - Across Bedding		135	Mohr-Coulomb	700	36	
Towsley Fm. - Parallel to Bedding		135	Mohr-Coulomb	150	10	
Landslide Debris		130	Mohr-Coulomb	200	30	
Towsley Fm. Anisotropic 6-9		135	Generalized Anisotropic			6-9
Alluvium		130	Mohr-Coulomb	150	35	
Undocumented Fill		130	Mohr-Coulomb	150	35	

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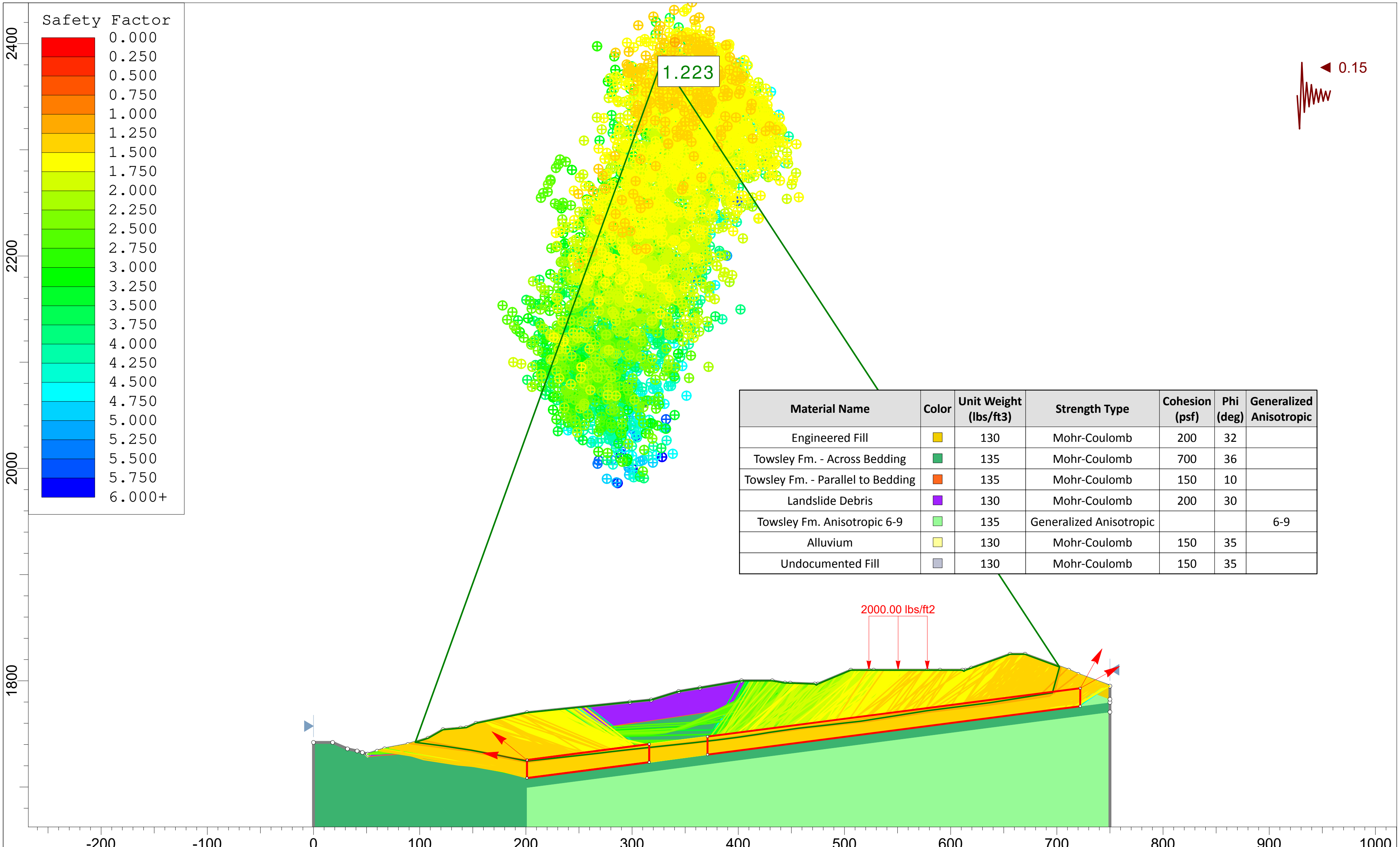
SLIDEINTERPRET 8.032

Project	Cherry Willow Water Tanks
Analysis Description	WT14-WT14' - Deep bedrock - pseudo-static
Drawn By	RMP
Scale	1:1500
Company	GWV
Date	
File Name	WT14.slmd



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Generalized Anisotropic
Engineered Fill		130	Mohr-Coulomb	200	32	
Towsley Fm. - Across Bedding		135	Mohr-Coulomb	700	36	
Towsley Fm. - Parallel to Bedding		135	Mohr-Coulomb	150	10	
Landslide Debris		130	Mohr-Coulomb	200	30	
Towsley Fm. Anisotropic 6-9		135	Generalized Anisotropic			6-9
Alluvium		130	Mohr-Coulomb	150	35	
Undocumented Fill		130	Mohr-Coulomb	150	35	

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SLIDEINTERPRET 8.032

Project	Cherry Willow Water Tanks		
Analysis Description	WT14-WT14' - Deep bedrock - pseudo-static		
Drawn By	RMP	*Scale*	1:1500
Company	GWV		
Date		*File Name*	WT14.slmd

Slide Analysis Information

WT14

Project Summary

File Name:	WT14.slmd
Slide Modeler Version:	8.032
Compute Time:	00h:00m:26.72s
Project Title:	Cherry Willow Water Tanks
Analysis:	WT14-WT14' - Deep bedrock - pseudo-static
Author:	RMP
Company:	GWV

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	inches/hour
Data Output:	Standard
Failure Direction:	Right to Left

Analysis Options

Analysis Methods Used

Slices Type:	Vertical
	Spencer
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Surface Type:	Non-Circular Block Search
Number of Surfaces:	5000
Multiple Groups:	Disabled
Pseudo-Random Surfaces:	Enabled
Convex Surfaces Only:	Disabled
Left Projection Angle (Start Angle) [°]:	141
Left Projection Angle (End Angle) [°]:	171
Right Projection Angle (Start Angle) [°]:	29

Right Projection Angle (End Angle) [°]:	61
Minimum Elevation:	Not Defined
Minimum Depth [ft]:	35
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading

Advanced seismic analysis: No
Staged pseudostatic analysis: No

Seismic Load Coefficient (Horizontal): 0.15

Loading

- 1 Distributed Load present

Distributed Load 1

Distribution:	Constant
Magnitude [psf]:	2000
Orientation:	Vertical

Materials

Property	Engineered Fill	Towsley Fm. - Across Bedding	Towsley Fm. - Parallel to Bedding	Landslide Debris	Towsley Fm. Anisotropic 6-9	Alluvium	Undocumented Fill
Color							
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Generalized Anisotropic	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft3]	130	135	135	130	135	130	130
Cohesion [psf]	200	700	150	200		150	150
Friction Angle [°]	32	36	10	30		35	35
Water Surface	None	None	None	None	None	None	None
Ru Value	0	0	0	0	0	0	0

Generalized Anisotropic Functions

Name: 6-9

Angle From	Angle To	Material
6	-90	Towsley Fm. - Across Bedding
9	6	Towsley Fm. - Parallel to Bedding
90	9	Towsley Fm. - Across Bedding

Global Minimums

Method: spencer

FS	1.222650
Axis Location:	328.193, 2384.344
Left Slip Surface Endpoint:	95.793, 1742.145
Right Slip Surface Endpoint:	702.512, 1813.105
Resisting Moment:	6.34083e+08 lb-ft
Driving Moment:	5.18613e+08 lb-ft
Resisting Horizontal Force:	952266 lb
Driving Horizontal Force:	778853 lb
Total Slice Area:	24307 ft2
Surface Horizontal Width:	606.719 ft
Surface Average Height:	40.063 ft

Global Minimum Coordinates

Method: spencer

X	Y
95.7934	1742.15
122.059	1738.64
148.325	1734.67
174.592	1729.8
200.889	1724.46
223.353	1726.83
245.79	1729.28
268.923	1731.96
292.057	1734.61
319.438	1737.6
346.819	1740.6
374.201	1743.53
401.582	1747.11
428.963	1751.4
456.345	1755.35
483.726	1758.38
499.636	1760.21
515.547	1762.04
531.132	1764.49
546.717	1766.95
577.872	1771.87
607.456	1775.65
637.032	1779.43
666.453	1784.09
695.874	1788.75
702.512	1813.11

Valid/Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 4901
Number of Invalid Surfaces: 149

Error Codes:

Error Code -108 reported for 2 surfaces
Error Code -111 reported for 14 surfaces
Error Code -112 reported for 130 surfaces
Error Code -124 reported for 3 surfaces

Error Codes

The following errors were encountered during the computation:

-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-111 = safety factor equation did not converge
-112 = The coefficient M-Alpha = cos(alpha)(1+tan(alpha)tan(phi)/F) < 0.2 for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.
-124 = A slice has a width less than the minimum acceptable value.

Slice Data

- **Global Minimum Query (spencer) - Safety Factor: 1.22265**

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	13.133	5051.6	-7.60589	Landslide Debris	200	30	409.087	500.17	519.911	0	519.911	465.284	465.284
2	13.133	18382.2	-7.60589	Landslide Debris	200	30	976.215	1193.57	1720.91	0	1720.91	1590.56	1590.56
3	7.23572	15278.3	-8.58173	Landslide Debris	200	30	1392.83	1702.94	2603.17	0	2603.17	2392.98	2392.98
4	3.74267	8557.88	-8.58173	Towsley Fm. - Parallel to Bedding	150	10	476.758	582.908	2455.14	0	2455.14	2383.2	2383.2
5	15.2877	40153.5	-8.58173	Towsley Fm. - Across Bedding	700	36	2699.37	3300.39	3579.13	0	3579.13	3171.77	3171.77
6	13.133	46122.1	-10.5179	Towsley Fm. - Across Bedding	700	36	3484.15	4259.89	4899.76	0	4899.76	4252.89	4252.89

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
7	13.133	55559.8	-10.5179	Towsley Fm. - Across Bedding	700	36	4044.45	4944.95	5842.67	0	5842.67	5091.76	5091.76
8	13.1486	64949	-11.468	Towsley Fm. - Across Bedding	700	36	4680.25	5722.31	6912.62	0	6912.62	5963.13	5963.13
9	13.1486	74478.5	-11.468	Towsley Fm. - Across Bedding	700	36	5255.85	6426.07	7881.23	0	7881.23	6814.96	6814.96
10	11.232	67700.4	6.0042	Towsley Fm. - Parallel to Bedding	150	10	962.033	1176.23	5820.05	0	5820.05	5921.23	5921.23
11	11.232	67681.8	6.0042	Towsley Fm. - Parallel to Bedding	150	10	961.804	1175.95	5818.46	0	5818.46	5919.62	5919.62
12	11.2187	67546.9	6.24551	Towsley Fm. - Parallel to Bedding	150	10	959.866	1173.58	5804.99	0	5804.99	5910.04	5910.04
13	11.2187	67459.5	6.24551	Towsley Fm. - Parallel to Bedding	150	10	958.786	1172.26	5797.5	0	5797.5	5902.42	5902.42
14	11.5666	69406.7	6.61476	Towsley Fm. - Parallel to Bedding	150	10	955.13	1167.79	5772.16	0	5772.16	5882.92	5882.92
15	11.5666	69202.2	6.61476	Towsley Fm. - Parallel to Bedding	150	10	952.677	1164.79	5755.17	0	5755.17	5865.65	5865.65
16	11.5666	69013.2	6.51789	Towsley Fm. - Parallel to Bedding	150	10	950.918	1162.64	5742.95	0	5742.95	5851.6	5851.6
17	11.5666	68839.6	6.51789	Towsley Fm. - Parallel to Bedding	150	10	948.841	1160.1	5728.54	0	5728.54	5836.95	5836.95
18	13.6907	81306.2	6.24422	Towsley Fm. - Parallel to Bedding	150	10	948.473	1159.65	5726.03	0	5726.03	5829.81	5829.81
19	13.6907	81147.3	6.24422	Towsley Fm. - Parallel to Bedding	150	10	946.861	1157.68	5714.86	0	5714.86	5818.46	5818.46
20	13.6907	83989.2	6.24422	Towsley Fm. - Parallel to Bedding	150	10	975.676	1192.91	5914.65	0	5914.65	6021.4	6021.4
21	13.6907	88786.4	6.24422	Towsley Fm. - Parallel to Bedding	150	10	1024.32	1252.38	6251.91	0	6251.91	6363.99	6363.99
22	13.6907	91379.8	6.10785	Towsley Fm. - Parallel to Bedding	150	10	1051.4	1285.49	6439.68	0	6439.68	6552.19	6552.19
23	13.6907	92941.8	6.10785	Towsley Fm. - Parallel to Bedding	150	10	1067.25	1304.87	6549.58	0	6549.58	6663.78	6663.78
24	13.6907	94197.7	7.4524	Towsley Fm. - Parallel to Bedding	150	10	1072.05	1310.74	6582.86	0	6582.86	6723.09	6723.09
25	13.6907	95149.7	7.4524	Towsley Fm. - Parallel to Bedding	150	10	1081.63	1322.45	6649.32	0	6649.32	6790.8	6790.8
26	13.6907	94113.3	8.91215	Towsley Fm. - Parallel to Bedding	150	10	1062.67	1299.27	6517.83	0	6517.83	6684.47	6684.47
27	13.6907	90299.6	8.91215	Towsley Fm. - Parallel to Bedding	150	10	1024.6	1252.73	6253.87	0	6253.87	6414.54	6414.54
28	13.6907	85392.3	8.2111	Towsley Fm. - Parallel to Bedding	150	10	979.348	1197.4	5940.08	0	5940.08	6081.4	6081.4
29	13.6907	79202.6	8.2111	Towsley Fm. - Parallel to Bedding	150	10	917.31	1121.55	5509.93	0	5509.93	5642.3	5642.3
30	13.6907	75211.6	6.30674	Towsley Fm. - Parallel to Bedding	150	10	886.383	1083.74	5295.48	0	5295.48	5393.44	5393.44
31	13.6907	73848.3	6.30674	Towsley Fm. - Parallel to Bedding	150	10	872.566	1066.84	5199.67	0	5199.67	5296.11	5296.11
32	15.9104	94593	6.55476	Towsley Fm. - Parallel to Bedding	150	10	947.777	1158.8	5721.21	0	5721.21	5830.11	5830.11
33	15.9104	102142	6.55476	Towsley Fm. - Parallel to Bedding	150	10	1013.53	1239.19	6177.08	0	6177.08	6293.54	6293.54
34	15.5851	96793.5	8.95287	Towsley Fm. - Parallel to Bedding	150	10	1118.55	1367.59	6905.35	0	6905.35	7081.57	7081.57
35	15.5851	91829	8.95287	Towsley Fm. - Parallel to Bedding	150	10	1209.57	1478.88	7536.44	0	7536.44	7727	7727
36	10.3852	58434.7	8.96907	Towsley Fm. - Parallel to Bedding	150	10	1173.21	1434.43	7284.34	0	7284.34	7469.51	7469.51
37	10.3852	56228.1	8.96907	Towsley Fm. - Parallel to Bedding	150	10	1144.19	1398.94	7083.08	0	7083.08	7263.67	7263.67
38	10.3852	54021.5	8.96907	Towsley Fm. - Parallel to Bedding	150	10	1115.16	1363.45	6881.81	0	6881.81	7057.82	7057.82
39	14.7917	73876.4	7.28734	Towsley Fm. - Parallel to Bedding	150	10	815.275	996.796	4802.42	0	4802.42	4906.67	4906.67
40	14.7917	70484.7	7.28734	Towsley Fm. - Parallel to Bedding	150	10	781.192	955.125	4566.09	0	4566.09	4665.99	4665.99
41	9.85881	44844.6	7.29393	Towsley Fm. - Parallel to Bedding	150	10	751.302	918.58	4358.83	0	4358.83	4455	4455
42	9.85881	46821.2	7.29393	Towsley Fm. - Parallel to Bedding	150	10	778.961	952.397	4550.62	0	4550.62	4650.32	4650.32

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
43	9.85881	49649.9	7.29393	Towsley Fm. - Parallel to Bedding	150	10	818.543	1000.79	4825.08	0	4825.08	4929.85	4929.85
44	14.7104	78898.2	8.999	Towsley Fm. - Parallel to Bedding	150	10	855.809	1046.36	5083.48	0	5083.48	5219.01	5219.01
45	14.7104	81772.1	8.999	Towsley Fm. - Parallel to Bedding	150	10	882.492	1078.98	5268.5	0	5268.5	5408.26	5408.26
46	14.7104	74592.7	8.999	Towsley Fm. - Parallel to Bedding	150	10	815.833	997.478	4806.29	0	4806.29	4935.49	4935.49
47	14.7104	59891.2	8.999	Towsley Fm. - Parallel to Bedding	150	10	679.333	830.587	3859.8	0	3859.8	3967.39	3967.39
48	0.262784	914.76	74.7516	Towsley Fm. - Across Bedding	700	36	791.752	968.036	368.92	0	368.92	3273.34	3273.34
49	3.24925	8203.01	74.7516	Towsley Fm. - Across Bedding	700	36	645.292	788.966	122.452	0	122.452	2489.61	2489.61
50	3.12655	2563.31	74.7516	Engineered Fill	200	32	197.047	240.919	65.4846	0	65.4846	788.321	788.321

Interslice Data

- **Global Minimum Query (spencer) - Safety Factor: 1.22265**

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	95.7934	1742.15	0	0	0
2	108.926	1740.39	5526.6	1058.97	10.8472
3	122.059	1738.64	18607.9	3565.52	10.8472
4	129.295	1737.55	29236.9	5602.16	10.8471
5	133.038	1736.98	31124.2	5963.81	10.8472
6	148.325	1734.67	74625.7	14299.3	10.8472
7	161.459	1732.24	125412	24030.6	10.8472
8	174.592	1729.8	184440	35341.2	10.8472
9	187.74	1727.13	254676	48799.3	10.8472
10	200.889	1724.46	333635	63928.8	10.8471
11	212.121	1725.64	327410	62736	10.8471
12	223.353	1726.83	321187	61543.6	10.8471
13	234.572	1728.05	314696	60299.9	10.8471
14	245.79	1729.28	308216	59058.1	10.8471
15	257.357	1730.62	301110	57696.6	10.8471
16	268.923	1731.96	294029	56339.9	10.8472
17	280.49	1733.28	287087	55009.6	10.8471
18	292.057	1734.61	280165	53683.4	10.8472
19	305.747	1736.1	272377	52191.1	10.8472
20	319.438	1737.6	264608	50702.3	10.8471
21	333.129	1739.1	256507	49150.1	10.8471
22	346.819	1740.6	247848	47490.9	10.8471
23	360.51	1742.06	239101	45814.9	10.8471
24	374.201	1743.53	230176	44104.7	10.8471
25	387.891	1745.32	218934	41950.7	10.8472
26	401.582	1747.11	207562	39771.6	10.8471
27	415.273	1749.26	194001	37173.1	10.8471
28	428.963	1751.4	181057	34692.9	10.8471
29	442.654	1753.38	169921	32559.2	10.8472
30	456.345	1755.35	159714	30603.4	10.8472
31	470.035	1756.87	152555	29231.6	10.8472
32	483.726	1758.38	145557	27890.5	10.8471
33	499.636	1760.21	135988	26057.1	10.8472
34	515.547	1762.04	125499	24047.3	10.8472
35	531.132	1764.49	111459	21356.9	10.8471
36	546.717	1766.95	98031.3	18784.1	10.8472
37	557.102	1768.59	89510.4	17151.4	10.8472
38	567.487	1770.23	81348.9	15587.5	10.8471
39	577.872	1771.87	73546.8	14092.5	10.8471
40	592.664	1773.76	65440.8	12539.3	10.8471
41	607.456	1775.65	57786.3	11072.6	10.8471
42	617.315	1776.91	52966.3	10149	10.8471
43	627.174	1778.17	47880.4	9174.52	10.8472

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
44	637.032	1779.43	42414.2	8127.11	10.8471
45	651.743	1781.76	31326.1	6002.49	10.8471
46	666.453	1784.09	19768.5	3787.9	10.8471
47	681.163	1786.42	9383.94	1798.09	10.8472
48	695.874	1788.75	1401.62	268.569	10.8472
49	696.137	1789.72	1116.84	214	10.8471
50	699.386	1801.64	523.559	100.321	10.8472
51	702.512	1813.11	0	0	0

Entity Information

Group: Deep Rock

Shared Entities

Type	Coordinates X	Coordinates Y
External Boundary	720	1806
	711	1810
	670	1825
	656	1825
	619.6	1812
	614	1810
	612.5	1809
	611	1810
	590	1810
	578	1810
	527.556	1810
	523	1810
	506	1810
	475	1797
	473.5	1796
	472	1797
	449	1797.82
	444	1798
	432	1800
	403	1800
	364	1793.39
	344	1790
	318	1782
	298	1780
	201	1770
	153	1760
	144	1756
	138.55	1755.5
	122	1754
	108	1746
	89	1740
	67	1736
	60	1733.81
	51	1731
	46	1732.5
	41	1734
	32	1736
	18	1742
	0	1742
	0	1600
	201	1600
	750	1600
	750	1770.69
	750	1779.69
	750	1782.62
	750	1795

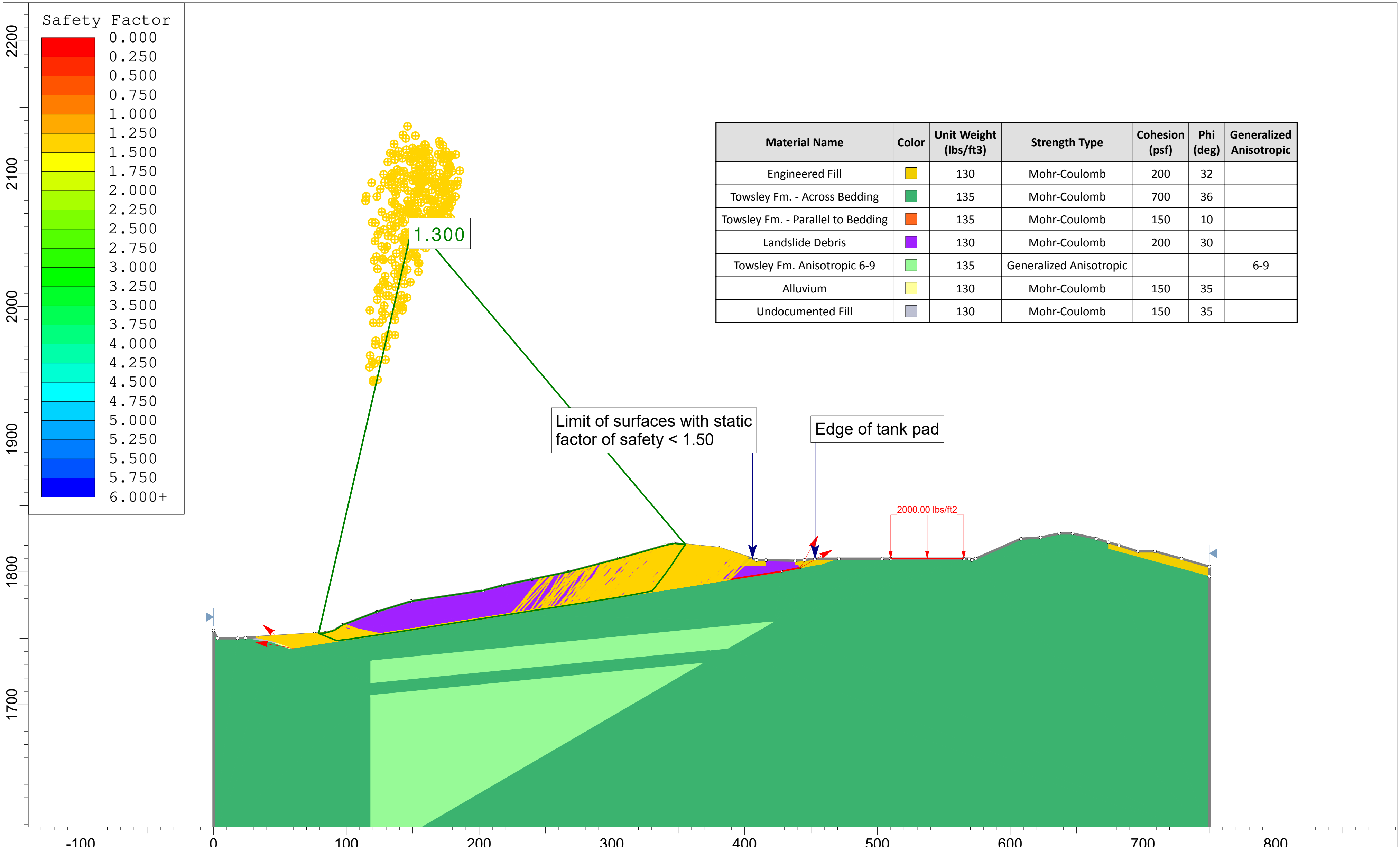
Type	Coordinates
Material Boundary	X, Y: 619.6, 1812; 638, 1812; 707, 1811; 711, 1810
Material Boundary	X, Y: 443, 1780; 481.13, 1784.83; 522, 1790; 581, 1800; 590, 1810
Material Boundary	X, Y: 46, 1732.5; 50.8197, 1728; 52.6617, 1729.17; 60, 1733.81
Material Boundary	X, Y: 108, 1746; 138.55, 1755.5
Material Boundary	X, Y: 341.448, 1765.44; 343.418, 1766.73; 348.488, 1770.06; 355.176, 1777.7; 360.526, 1784.77; 364, 1793.39
Material Boundary	X, Y: 403, 1800; 429, 1793.32; 449, 1793.32; 449, 1797.82
Material Boundary	X, Y: 472, 1797; 472, 1794; 474.25, 1794; 492, 1794; 527.556, 1810
Material Boundary	X, Y: 611, 1810; 611, 1807; 687, 1806.29; 722.133, 1793.09; 750, 1782.62
Material Boundary	X, Y: 581, 1800; 581, 1801
Material Boundary	X, Y: 443, 1781; 480.445, 1785.74; 522, 1791; 581, 1801

Type	Coordinates
Material Boundary	X / Y: 73 1730; 159 1740; 236 1750; 305 1760; 341.448 1765.44; 372 1770; 443 1780
Material Boundary	X / Y: 73 1731; 159 1741; 236 1751; 305 1761; 343.418 1766.73; 372 1771; 443 1781
Material Boundary	X / Y: 50.8197 1728; 73 1730
Material Boundary	X / Y: 52.6617 1729.17; 73 1731
Material Boundary	X / Y: 201 1725.49; 722.133 1793.09; 722.134 1793.09
Material Boundary	X / Y: 201 1708.49; 750 1779.69
Material Boundary	X / Y: 201 1699.49; 750 1770.69
Material Boundary	X / Y: 201 1600; 201 1699.49; 201 1708.49; 201 1725.49
Material Boundary	X / Y: 472 1797; 474.25 1794; 480.445 1785.74; 481.13 1784.83

Scenario-based Entities

Type	Coordinates	unox pseudo
Distributed Load	X / Y: 523 1810; 527.556 1810; 578 1810	Constant Distribution Orientation: Vertical Magnitude: 2000 lbs/ft2 Creates Excess Pore Pressure: No

Type	Coordinates X	Coordinates Y	unox pseudo
Block Search Window	201	1725.49	✓
	201	1708.49	
	316.156	1723.42	
	316.156	1740.42	
Block Search Window	201	1725.49	✓
	201	1708.49	
	316.156	1723.42	
	316.156	1740.42	
Block Search Window	371.013	1747.54	✓
	371.013	1730.54	
	721.971	1776.06	
	722.134	1793.09	



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Generalized Anisotropic
Engineered Fill		130	Mohr-Coulomb	200	32	
Towsley Fm. - Across Bedding		135	Mohr-Coulomb	700	36	
Towsley Fm. - Parallel to Bedding		135	Mohr-Coulomb	150	10	
Landslide Debris		130	Mohr-Coulomb	200	30	
Towsley Fm. Anisotropic 6-9		135	Generalized Anisotropic			6-9
Alluvium		130	Mohr-Coulomb	150	35	
Undocumented Fill		130	Mohr-Coulomb	150	35	

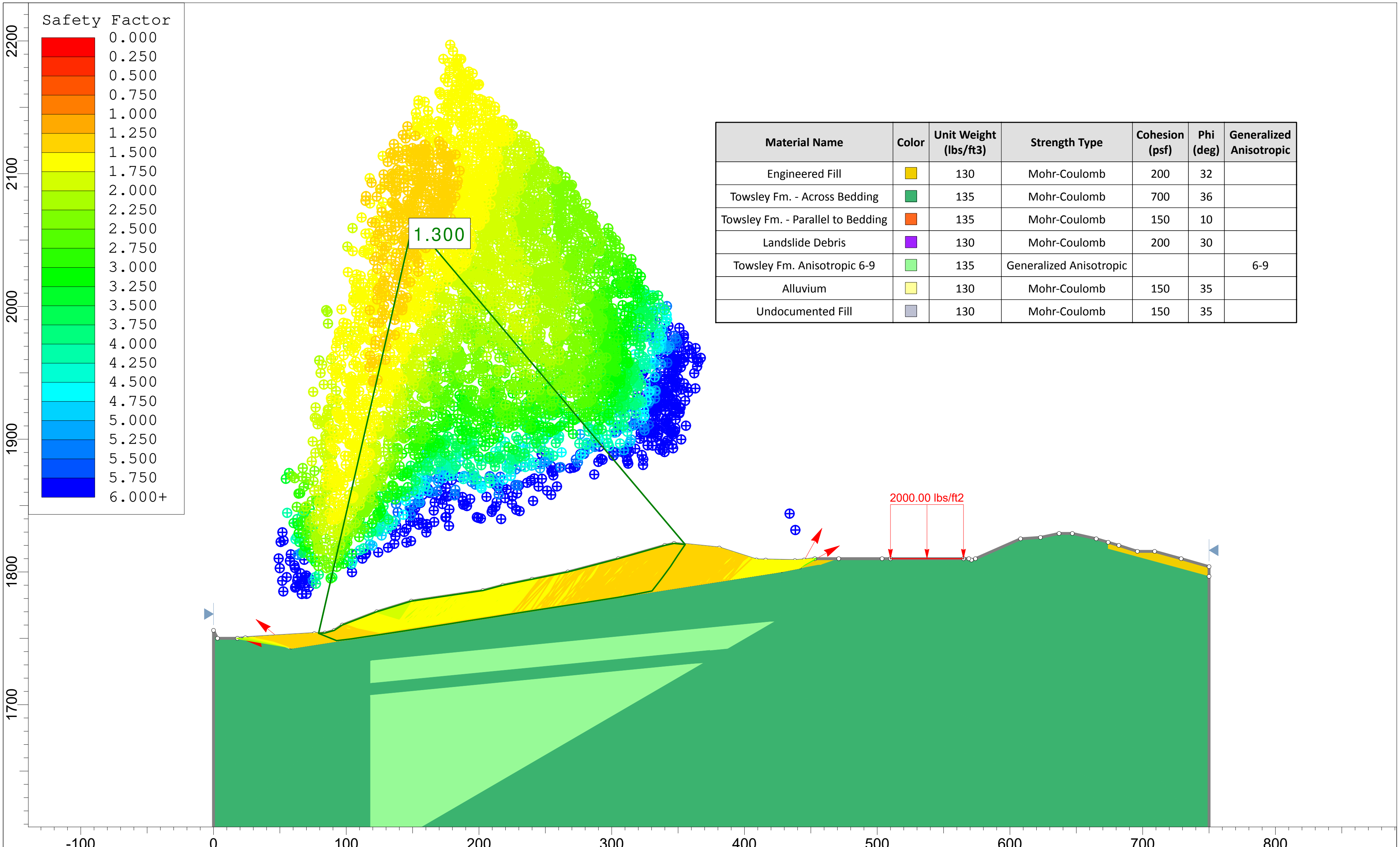
rocscience

SLIDEINTERPRET 8.032

Project	Cherry Willow Recycled Water Tanks		
Analysis Description	WT15-WT15' - Base of slide - static		
Drawn By RMP	*Scale* 1:1200	*Company* GWV	
Date		*File Name* WT15.slmd	

SCV Water

W.O. 8485



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Generalized Anisotropic
Engineered Fill		130	Mohr-Coulomb	200	32	
Towsley Fm. - Across Bedding		135	Mohr-Coulomb	700	36	
Towsley Fm. - Parallel to Bedding		135	Mohr-Coulomb	150	10	
Landslide Debris		130	Mohr-Coulomb	200	30	
Towsley Fm. Anisotropic 6-9		135	Generalized Anisotropic			6-9
Alluvium		130	Mohr-Coulomb	150	35	
Undocumented Fill		130	Mohr-Coulomb	150	35	

rocscience	*Project* Cherry Willow Recycled Water Tanks		
	Analysis Description WT15-WT15' - Base of slide - static		
	Drawn By RMP	*Scale* 1:1200	*Company* GWV
SLIDEINTERPRET 8.032	*Date*		*File Name* WT15.slmd

Slide Analysis Information

WT15

Project Summary

File Name:	WT15.slmd
Slide Modeler Version:	8.032
Compute Time:	00h:00m:04.164s
Project Title:	Cherry Willow Recycled Water Tanks
Analysis:	WT15-WT15' - Base of slide - static
Author:	RMP
Company:	GWV

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	inches/hour
Data Output:	Standard
Failure Direction:	Right to Left

Analysis Options

Analysis Methods Used	
Slices Type:	Vertical
	Spencer
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Surface Type:	Non-Circular Block Search
Number of Surfaces:	5000
Multiple Groups:	Disabled
Pseudo-Random Surfaces:	Enabled
Convex Surfaces Only:	Disabled
Left Projection Angle (Start Angle) [°]:	141
Left Projection Angle (End Angle) [°]:	171
Right Projection Angle (Start Angle) [°]:	29

Right Projection Angle (End Angle) [°]:	61
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading

Advanced seismic analysis:	No
Staged pseudostatic analysis:	No

Loading

- 1 Distributed Load present

Distributed Load 1	
Distribution:	Constant
Magnitude [psf]:	2000
Orientation:	Vertical

Materials

Property	Engineered Fill	Towsley Fm. - Across Bedding	Towsley Fm. - Parallel to Bedding	Landslide Debris	Towsley Fm. Anisotropic 6-9	Alluvium	Undocumented Fill
Color							
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Generalized Anisotropic	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft3]	130	135	135	130	135	130	130
Cohesion [psf]	200	700	150	200		150	150
Friction Angle [°]	32	36	10	30		35	35
Water Surface	None	None	None	None	None	None	None
Ru Value	0	0	0	0	0	0	0

Generalized Anisotropic Functions

Name: 6-9

Angle From	Angle To	Material
6	-90	Towsley Fm. - Across Bedding
9	6	Towsley Fm. - Parallel to Bedding
90	9	Towsley Fm. - Across Bedding

Global Minimums

Method: spencer

FS	1.299550
Axis Location:	150.277, 2063.329
Left Slip Surface Endpoint:	79.141, 1753.705
Right Slip Surface Endpoint:	355.294, 1820.646
Resisting Moment:	6.25726e+07 lb-ft
Driving Moment:	4.81495e+07 lb-ft
Resisting Horizontal Force:	187224 lb
Driving Horizontal Force:	144068 lb
Total Slice Area:	5870.34 ft2
Surface Horizontal Width:	276.153 ft
Surface Average Height:	21.2575 ft

Global Minimum Coordinates

Method: spencer

X	Y

X	Y
79.1407	1753.71
92.757	1748.2
103.713	1749.52
114.669	1751.21
125.625	1752.78
136.271	1754.4
146.419	1755.98
156.373	1757.54
170.342	1759.73
183.603	1761.83
195.505	1763.71
207.407	1765.59
219.31	1767.47
231.212	1769.35
243.114	1771.23
255.016	1773.11
266.918	1774.92
278.82	1776.7
291.639	1778.81
304.459	1780.79
317.345	1783.13
330.288	1785.64
337.239	1794.58
344.189	1804.06
349.742	1812.45
355.294	1820.65

Valid/Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 4651
Number of Invalid Surfaces: 357

Error Codes:

Error Code -108 reported for 23 surfaces
Error Code -111 reported for 334 surfaces

Error Codes

The following errors were encountered during the computation:

-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-111 = safety factor equation did not converge

Slice Data

- **Global Minimum Query (spencer) - Safety Factor: 1.29955**

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	6.44161	1291.24	-22.0261	Landslide Debris	200	30	352.785	458.462	447.67	0	447.67	304.948	304.948
2	6.44161	4695.19	-22.0261	Landslide Debris	200	30	711.682	924.866	1255.5	0	1255.5	967.589	967.589
3	0.7331	818.619	-22.0261	Towsley Fm. - Parallel to Bedding	150	10	307.131	399.132	1412.9	0	1412.9	1288.65	1288.65
4	5.47816	7441.14	6.91105	Towsley Fm. - Parallel to Bedding	150	10	298.403	387.79	1348.57	0	1348.57	1384.74	1384.74
5	5.47816	8804.1	6.91105	Towsley Fm. - Parallel to Bedding	150	10	331.707	431.07	1594.03	0	1594.03	1634.23	1634.23
6	5.47772	9770.55	8.73252	Towsley Fm. - Parallel to Bedding	150	10	352.333	457.874	1746.04	0	1746.04	1800.16	1800.16
7	5.47772	10672.1	8.73252	Towsley Fm. - Parallel to Bedding	150	10	374.133	486.204	1906.71	0	1906.71	1964.18	1964.18
8	5.47791	11593.8	8.18336	Towsley Fm. - Parallel to Bedding	150	10	397.456	516.514	2078.6	0	2078.6	2135.75	2135.75

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
9	5.47791	12500.7	8.18336	Towsley Fm. - Parallel to Bedding	150	10	419.453	545.1	2240.73	0	2240.73	2301.05	2301.05
10	5.32316	12785.5	8.64876	Towsley Fm. - Parallel to Bedding	150	10	434.391	564.513	2350.82	0	2350.82	2416.89	2416.89
11	5.32316	13359.2	8.64876	Towsley Fm. - Parallel to Bedding	150	10	448.675	583.075	2456.08	0	2456.08	2524.33	2524.33
12	5.07394	13261.6	8.8485	Towsley Fm. - Parallel to Bedding	150	10	462.006	600.4	2554.35	0	2554.35	2626.27	2626.27
13	5.07394	13770.5	8.8485	Towsley Fm. - Parallel to Bedding	150	10	475.281	617.651	2652.18	0	2652.18	2726.17	2726.17
14	4.977	13941.2	8.88451	Towsley Fm. - Parallel to Bedding	150	10	486.731	632.531	2736.57	0	2736.57	2812.65	2812.65
15	4.977	13983.9	8.88451	Towsley Fm. - Parallel to Bedding	150	10	487.868	634.009	2744.94	0	2744.94	2821.21	2821.21
16	4.6565	13058.5	8.92483	Towsley Fm. - Parallel to Bedding	150	10	487.063	632.963	2739.03	0	2739.03	2815.52	2815.52
17	4.6565	13033.4	8.92483	Towsley Fm. - Parallel to Bedding	150	10	486.348	632.034	2733.75	0	2733.75	2810.12	2810.12
18	4.6565	13008.2	8.92483	Towsley Fm. - Parallel to Bedding	150	10	485.634	631.106	2728.48	0	2728.48	2804.75	2804.75
19	6.63058	18476.6	8.98087	Towsley Fm. - Parallel to Bedding	150	10	484.574	629.728	2720.68	0	2720.68	2797.26	2797.26
20	6.63058	18419.7	8.98087	Towsley Fm. - Parallel to Bedding	150	10	483.438	628.252	2712.31	0	2712.31	2788.71	2788.71
21	5.95102	16483.6	8.97574	Towsley Fm. - Parallel to Bedding	150	10	482.378	626.874	2704.49	0	2704.49	2780.68	2780.68
22	5.95102	16438.2	8.97574	Towsley Fm. - Parallel to Bedding	150	10	481.368	625.562	2697.05	0	2697.05	2773.08	2773.08
23	5.95102	16392.7	8.97646	Towsley Fm. - Parallel to Bedding	150	10	480.356	624.247	2689.59	0	2689.59	2765.47	2765.47
24	5.95102	16496.9	8.97646	Towsley Fm. - Parallel to Bedding	150	10	482.672	627.256	2706.66	0	2706.66	2782.9	2782.9
25	5.95102	16978.4	8.98255	Towsley Fm. - Parallel to Bedding	150	10	493.359	641.145	2785.42	0	2785.42	2863.4	2863.4
26	5.95102	17471.1	8.98255	Towsley Fm. - Parallel to Bedding	150	10	504.309	655.375	2866.13	0	2866.13	2945.85	2945.85
27	5.95102	17770.3	8.98159	Towsley Fm. - Parallel to Bedding	150	10	510.961	664.02	2915.15	0	2915.15	2995.91	2995.91
28	5.95102	17981.9	8.98159	Towsley Fm. - Parallel to Bedding	150	10	515.665	670.132	2949.81	0	2949.81	3031.31	3031.31
29	5.95103	18193.9	8.97162	Towsley Fm. - Parallel to Bedding	150	10	520.402	676.289	2984.73	0	2984.73	3066.89	3066.89
30	5.95103	18406.3	8.97162	Towsley Fm. - Parallel to Bedding	150	10	525.125	682.426	3019.54	0	3019.54	3102.44	3102.44
31	5.95103	18619.1	8.9646	Towsley Fm. - Parallel to Bedding	150	10	529.872	688.595	3054.52	0	3054.52	3138.11	3138.11
32	5.95103	18832.1	8.9646	Towsley Fm. - Parallel to Bedding	150	10	534.607	694.749	3089.42	0	3089.42	3173.76	3173.76
33	5.9511	19057.5	8.67979	Towsley Fm. - Parallel to Bedding	150	10	540.39	702.264	3132.04	0	3132.04	3214.53	3214.53
34	5.9511	19294.9	8.67979	Towsley Fm. - Parallel to Bedding	150	10	545.676	709.133	3170.99	0	3170.99	3254.29	3254.29
35	5.95111	19672.4	8.49755	Towsley Fm. - Parallel to Bedding	150	10	554.591	720.719	3236.71	0	3236.71	3319.57	3319.57
36	5.95111	20197.3	8.49755	Towsley Fm. - Parallel to Bedding	150	10	566.29	735.922	3322.93	0	3322.93	3407.53	3407.53
37	6.4097	22298.5	9.35105	Towsley Fm. - Parallel to Bedding	150	10	575.058	747.316	3387.55	0	3387.55	3482.24	3482.24
38	6.4097	22822.8	9.35105	Towsley Fm. - Parallel to Bedding	150	10	585.854	761.346	3467.12	0	3467.12	3563.59	3563.59
39	6.40963	23375.4	8.7768	Towsley Fm. - Parallel to Bedding	150	10	598.995	778.424	3563.97	0	3563.97	3656.45	3656.45
40	6.40963	23956.6	8.7768	Towsley Fm. - Parallel to Bedding	150	10	611.005	794.031	3652.49	0	3652.49	3746.82	3746.82
41	6.44321	24643.4	10.2811	Towsley Fm. - Parallel to Bedding	150	10	617.742	802.786	3702.14	0	3702.14	3814.19	3814.19
42	6.44321	25200.8	10.2811	Towsley Fm. - Parallel to Bedding	150	10	629.098	817.544	3785.84	0	3785.84	3899.95	3899.95
43	6.47129	25835.9	10.9904	Towsley Fm. - Parallel to Bedding	150	10	637.414	828.351	3847.12	0	3847.12	3970.91	3970.91
44	6.47129	26326.1	10.9904	Towsley Fm. - Parallel to Bedding	150	10	647.318	841.222	3920.12	0	3920.12	4045.83	4045.83

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
45	0.0760362	311.814	52.1175	Towsley Fm. - Parallel to Bedding	150	10	500.836	650.862	2840.53	0	2840.53	3484.29	3484.29
46	6.87516	25087.3	52.1175	Landslide Debris	200	30	1044.98	1358	2005.72	0	2005.72	3348.9	3348.9
47	6.95051	18788.7	53.7605	Landslide Debris	200	30	781.507	1015.61	1412.67	0	1412.67	2478.92	2478.92
48	5.55218	9398.97	56.5025	Landslide Debris	200	30	506.094	657.694	792.75	0	792.75	1557.45	1557.45
49	4.43254	3035.38	55.8831	Landslide Debris	200	30	270.544	351.585	262.554	0	262.554	661.892	661.892
50	1.1198	128.699	55.8831	Engineered Fill	200	32	133.184	173.079	-43.0817	0	-43.0817	153.506	153.506

Interslice Data

- **Global Minimum Query (spencer) - Safety Factor: 1.29955**

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	79.1407	1753.71	0	0	0
2	85.5823	1751.1	3439.14	673.139	11.0744
3	92.0239	1748.49	11295.4	2210.83	11.0744
4	92.757	1748.2	11939.6	2336.92	11.0744
5	98.2351	1748.86	12678.8	2481.61	11.0744
6	103.713	1749.52	13437.5	2630.11	11.0744
7	109.191	1750.37	13898.4	2720.32	11.0744
8	114.669	1751.21	14343.5	2807.44	11.0744
9	120.147	1752	14883.3	2913.1	11.0745
10	125.625	1752.78	15415.9	3017.34	11.0744
11	130.948	1753.59	15824.9	3097.38	11.0744
12	136.271	1754.4	16224.6	3175.61	11.0744
13	141.345	1755.19	16551.1	3239.53	11.0744
14	146.419	1755.98	16867.8	3301.51	11.0744
15	151.396	1756.76	17161.2	3358.94	11.0744
16	156.373	1757.54	17453.7	3416.2	11.0745
17	161.029	1758.27	17718.8	3468.09	11.0745
18	165.686	1759	17984.4	3520.07	11.0744
19	170.342	1759.73	18250.6	3572.17	11.0744
20	176.973	1760.78	18612.6	3643.02	11.0744
21	183.603	1761.83	18975.8	3714.11	11.0744
22	189.554	1762.77	19304.3	3778.42	11.0745
23	195.505	1763.71	19633.9	3842.91	11.0744
24	201.456	1764.65	19964.1	3907.56	11.0745
25	207.407	1765.59	20292.2	3971.76	11.0744
26	213.359	1766.53	20608	4033.57	11.0744
27	219.31	1767.47	20913	4093.27	11.0744
28	225.261	1768.41	21211.8	4151.76	11.0744
29	231.212	1769.35	21506	4209.33	11.0744
30	237.163	1770.29	21798.7	4266.62	11.0744
31	243.114	1771.23	22086.8	4323.01	11.0744
32	249.065	1772.17	22372.5	4378.95	11.0744
33	255.016	1773.11	22653.7	4433.98	11.0744
34	260.967	1774.02	23024.2	4506.49	11.0744
35	266.918	1774.92	23390.7	4578.23	11.0744
36	272.869	1775.81	23813.3	4660.94	11.0744
37	278.82	1776.7	24228.8	4742.27	11.0744
38	285.23	1777.76	24339.2	4763.88	11.0744
39	291.639	1778.81	24434.8	4782.6	11.0744
40	298.049	1779.8	24747.3	4843.75	11.0744
41	304.459	1780.79	25049.1	4902.83	11.0744
42	310.902	1781.96	24702.5	4834.99	11.0744
43	317.345	1783.13	24331.3	4762.34	11.0744
44	323.816	1784.39	23621.3	4623.36	11.0744
45	330.288	1785.64	22883.6	4478.98	11.0744
46	330.364	1785.74	22644.1	4432.09	11.0744
47	337.239	1794.58	12103.7	2369.05	11.0745
48	344.189	1804.06	4139.33	810.187	11.0744
49	349.742	1812.45	298.711	58.4664	11.0744
50	354.174	1818.99	-219.892	-43.0392	11.0744

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
51	355.294	1820.65	0	0	0

Entity Information

Group: Removals Slots

Shared Entities

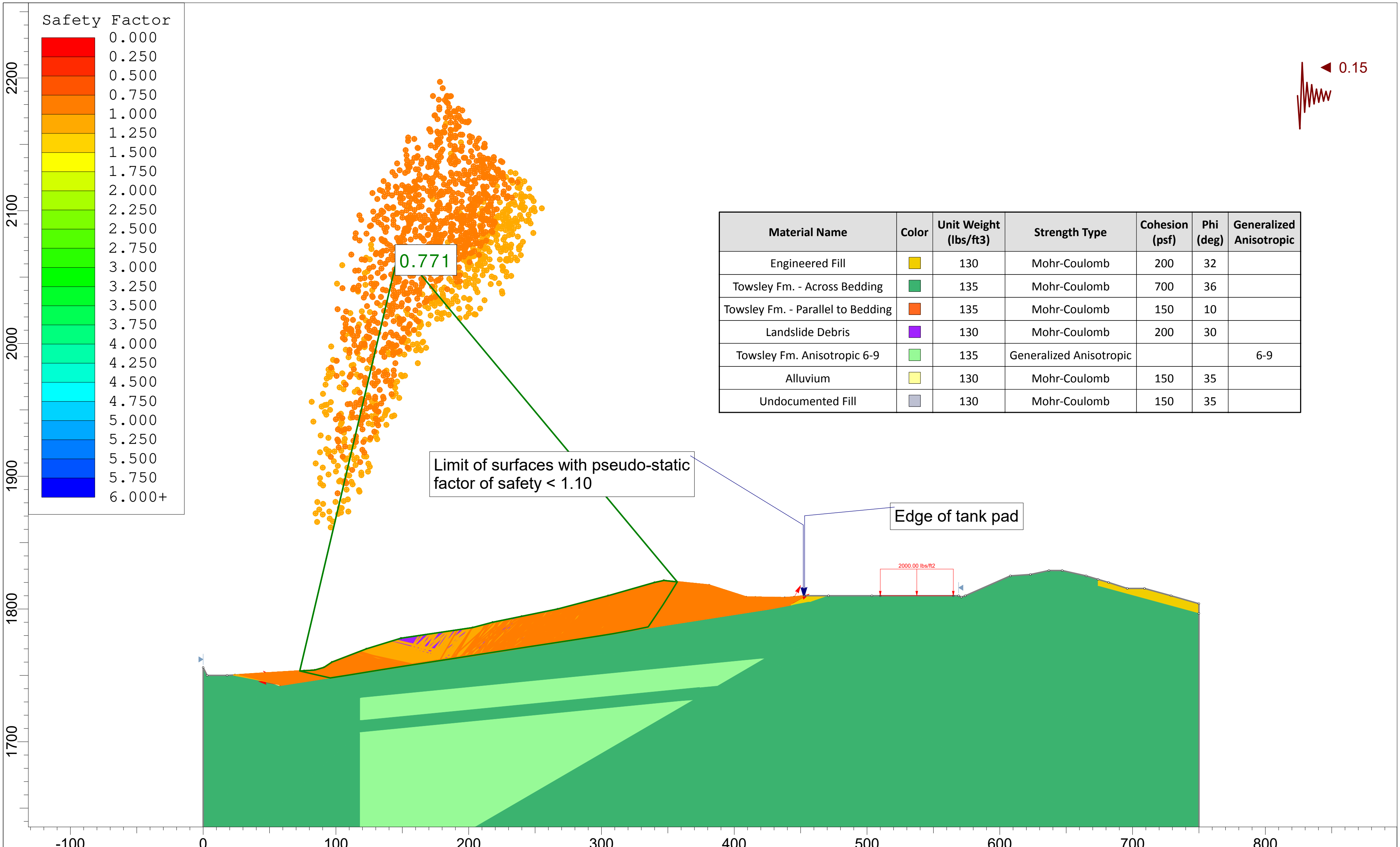
Type	X	Y
External Boundary	0	1600
	118	1600
	142.82	1600
	750	1600
	750	1796.64
	750	1804
	729	1810
	709	1815.5
	696	1815.5
	682	1820
	674	1822.35
	665	1825
	647	1829
	637	1829
	623	1826
	608	1825
	574	1810
	571	1809
	569	1810
	565	1810
	510	1810
	503.637	1810
	471	1810
	453	1810
	445	1809
	438	1808.5
	416	1808.88
	409	1809
	381	1818
	347	1821.5
	340	1820
	305	1810
	267	1800
	240	1794.49
	218	1790
	203	1786
	149	1778
	123	1770
	97	1760
	91	1756
	84	1754
	76	1753.52
	24	1750.36
	18	1750
	3	1750
	0	1756
Material Boundary	118	1600
	118	1707.04
	118	1716.04
	118	1733.04
	422.401	1762.72

Type	Coordinates	
	X	Y
Material Boundary	374.004	1741
	387.309	1742.3
	X	Y
Material Boundary	118	1716.04
	374.004	1741
	X	Y
Material Boundary	118	1707.04
	368.737	1731.49
	X	Y
Material Boundary	142.82	1600
	368.737	1731.49
	387.309	1742.3
	422.401	1762.72
	503.637	1810
	X	Y
Material Boundary	44	1746.7
	57	1742
	221.835	1767.77
	428	1800
	442.345	1802.71
	457.15	1805.5
	X	Y
Material Boundary	24	1750.36
	44	1746.7
	44.1834	1746.67
	57	1745
	68.0457	1748.3
	76	1753.52
	X	Y
Material Boundary	57	1742
	59.4618	1743.4
	68.0457	1748.3
	X	Y
Material Boundary	347	1821.5
	396	1804.38
	416	1804.38
	416	1808.88
	X	Y
Material Boundary	438	1808.5
	438	1805.5
	440.25	1805.5
	451.85	1805.5
	457.15	1805.5
	458	1805.5
	471	1810
	X	Y
Material Boundary	674	1822.35
	674	1817.35
	750	1796.64

Type	Coordinates X	Coordinates Y
Material Boundary	59.4618	1743.4
	223.964	1769.11
	428	1801
	441.688	1803.58
	451.85	1805.5
Material Boundary	438	1808.5
	440.25	1805.5
	441.688	1803.58
	442.345	1802.71
Material Boundary	221.835	1767.77
	223.964	1769.11
	226.819	1770.92
	230.899	1774.6
	235.205	1780.95
	238.691	1788.63
	240	1794.49

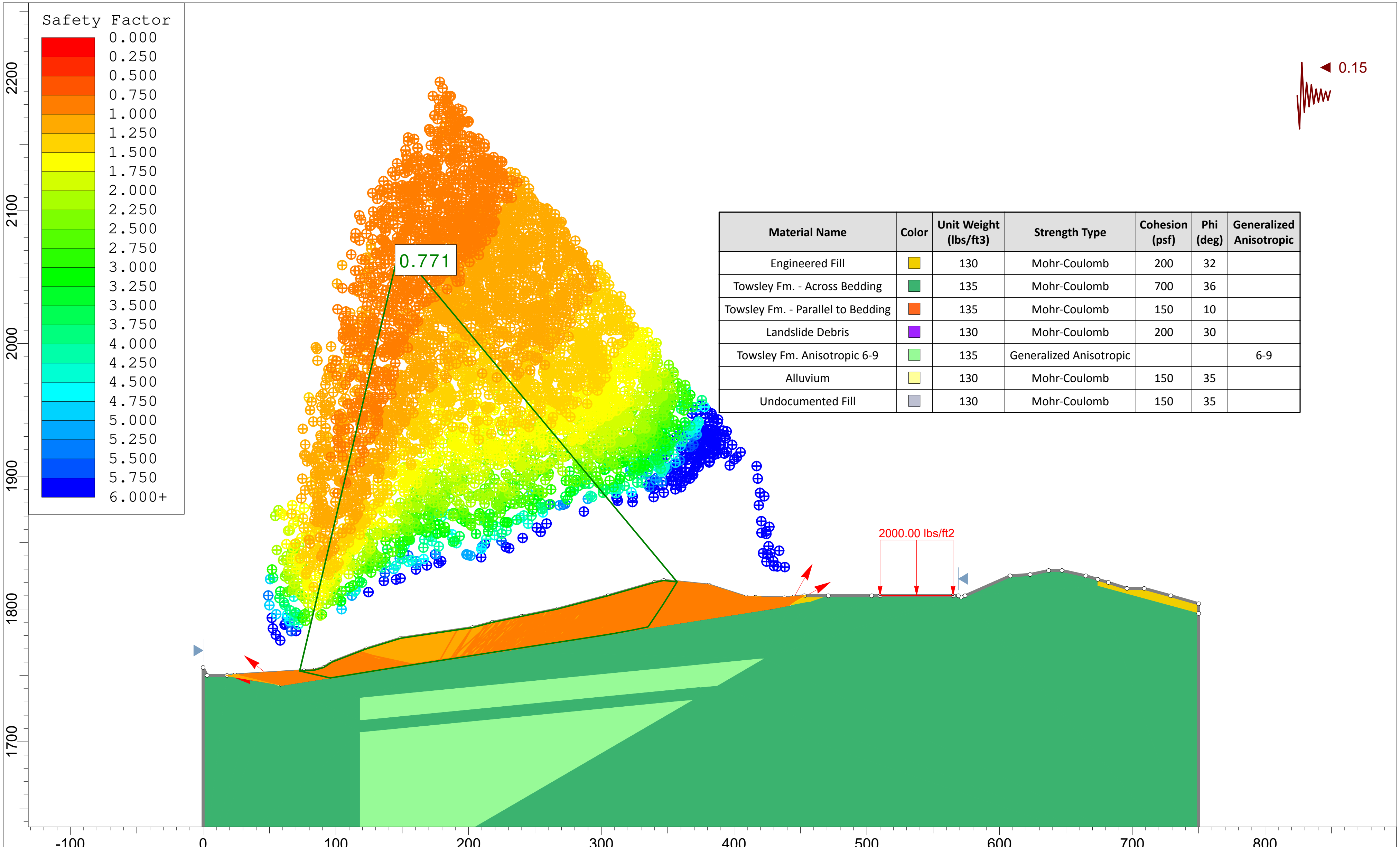
Scenario-based Entities

Type	Coordinates X	Coordinates Y	slide plane static
Distributed Load	510	1810	Constant Distribution Orientation: Vertical Magnitude: 2000 lbs/ft2 Creates Excess Pore Pressure: No
	565	1810	
Block Search Polyline	58.3596	1742.78	✓
	428.02	1800.51	
	441.971	1803.21	



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Generalized Anisotropic
Engineered Fill		130	Mohr-Coulomb	200	32	
Towsley Fm. - Across Bedding		135	Mohr-Coulomb	700	36	
Towsley Fm. - Parallel to Bedding		135	Mohr-Coulomb	150	10	
Landslide Debris		130	Mohr-Coulomb	200	30	
Towsley Fm. Anisotropic 6-9		135	Generalized Anisotropic			6-9
Alluvium		130	Mohr-Coulomb	150	35	
Undocumented Fill		130	Mohr-Coulomb	150	35	

rocscience	*Project*	Cherry Willow Recycled Water Tanks	
	Analysis Description	WT15-WT15' - Base of slide - pseudo-static	
	Drawn By RMP	*Scale* 1:1200	*Company* GWV
SLIDEINTERPRET 8.032	*Date*		*File Name* WT15.slmd



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Generalized Anisotropic
Engineered Fill		130	Mohr-Coulomb	200	32	
Towsley Fm. - Across Bedding		135	Mohr-Coulomb	700	36	
Towsley Fm. - Parallel to Bedding		135	Mohr-Coulomb	150	10	
Landslide Debris		130	Mohr-Coulomb	200	30	
Towsley Fm. Anisotropic 6-9		135	Generalized Anisotropic			6-9
Alluvium		130	Mohr-Coulomb	150	35	
Undocumented Fill		130	Mohr-Coulomb	150	35	

rocscience

SLIDEINTERPRET 8.032

Project	Cherry Willow Recycled Water Tanks		
Analysis Description	WT15-WT15' - Base of slide - pseudo-static		
Drawn By RMP	*Scale* 1:1200	*Company*	GWV
Date		*File Name*	WT15.slmd

Slide Analysis Information

WT15

Project Summary

File Name:	WT15.slmd
Slide Modeler Version:	8.032
Compute Time:	00h:00m:06.222s
Project Title:	Cherry Willow Recycled Water Tanks
Analysis:	WT15-WT15' - Base of slide - pseudo-static
Author:	RMP
Company:	GWV

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	inches/hour
Data Output:	Standard
Failure Direction:	Right to Left

Analysis Options

Analysis Methods Used	
Slices Type:	Vertical
	Spencer
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Surface Type:	Non-Circular Block Search
Number of Surfaces:	5000
Multiple Groups:	Disabled
Pseudo-Random Surfaces:	Enabled
Convex Surfaces Only:	Disabled
Left Projection Angle (Start Angle) [°]:	141
Left Projection Angle (End Angle) [°]:	171
Right Projection Angle (Start Angle) [°]:	29

Right Projection Angle (End Angle) [°]:	61
Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading

Advanced seismic analysis: No
Staged pseudostatic analysis: No

Seismic Load Coefficient (Horizontal): 0.15

Loading

- 1 Distributed Load present

Distributed Load 1

Distribution:	Constant
Magnitude [psf]:	2000
Orientation:	Vertical

Materials

Property	Engineered Fill	Towsley Fm. - Across Bedding	Towsley Fm. - Parallel to Bedding	Landslide Debris	Towsley Fm. Anisotropic 6-9	Alluvium	Undocumented Fill
Color							
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Generalized Anisotropic	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft3]	130	135	135	130	135	130	130
Cohesion [psf]	200	700	150	200		150	150
Friction Angle [°]	32	36	10	30		35	35
Water Surface	None	None	None	None	None	None	None
Ru Value	0	0	0	0	0	0	0

Generalized Anisotropic Functions

Name: 6-9

Angle From	Angle To	Material
6	-90	Towsley Fm. - Across Bedding
9	6	Towsley Fm. - Parallel to Bedding
90	9	Towsley Fm. - Across Bedding

Global Minimums

Method: spencer

FS	0.771208
Axis Location:	147.793, 2071.255
Left Slip Surface Endpoint:	72.750, 1753.318
Right Slip Surface Endpoint:	357.117, 1820.459
Resisting Moment:	6.36255e+07 lb-ft
Driving Moment:	8.2501e+07 lb-ft
Resisting Horizontal Force:	189025 lb
Driving Horizontal Force:	245103 lb
Total Slice Area:	5982.64 ft2
Surface Horizontal Width:	284.367 ft
Surface Average Height:	21.0384 ft

Global Minimum Coordinates

Method: spencer

X	Y
72.7501	1753.32
84.2752	1750.72
95.8003	1748.11
109.583	1750.29
123.365	1752.52
132.626	1753.99
141.777	1755.46
151.05	1756.93
160.319	1758.39
170.959	1760.01
181.598	1761.67
190.164	1762.97
198.73	1764.3
207.296	1765.64
215.861	1766.97
224.427	1768.3
232.993	1769.64
241.558	1770.97
250.124	1772.3
258.69	1773.6
266.878	1774.84
281.73	1777.14
294.746	1779.18
308.773	1781.43
321.976	1783.85
335.178	1786.5
340.852	1794.95
346.525	1803.4
351.821	1811.93
357.117	1820.46

Valid/Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 4865
Number of Invalid Surfaces: 143

Error Codes:

Error Code -108 reported for 12 surfaces
Error Code -111 reported for 131 surfaces

Error Codes

The following errors were encountered during the computation:

-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-111 = safety factor equation did not converge

Slice Data

- **Global Minimum Query (spencer) - Safety Factor: 0.771208**

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	2.19343	89.5798	-12.7264	Undocumented Fill	150	35	551.531	425.345	393.234	0	393.234	268.674	268.674
2	9.33165	2384.67	-12.7264	Landslide Debris	200	30	872.193	672.642	818.64	0	818.64	621.661	621.661
3	4.49174	2634.78	-12.7264	Landslide Debris	200	30	1359.93	1048.79	1470.14	0	1470.14	1163.01	1163.01
4	4.49174	4102.84	-12.7264	Landslide Debris	200	30	1841.47	1420.16	2113.37	0	2113.37	1697.49	1697.49
5	2.54161	3294.9	-12.7264	Towsley Fm. - Parallel to Bedding	150	10	584.867	451.054	1707.36	0	1707.36	1575.27	1575.27
6	6.89118	10943	8.96925	Towsley Fm. - Parallel to Bedding	150	10	543.25	418.959	1525.34	0	1525.34	1611.08	1611.08
7	6.89118	12369.1	8.96925	Towsley Fm. - Parallel to Bedding	150	10	587.542	453.117	1719.06	0	1719.06	1811.79	1811.79

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
8	6.89118	13754.4	9.2195	Towsley Fm. - Parallel to Bedding	150	10	629.238	485.273	1901.43	0	1901.43	2003.57	2003.57
9	6.89118	15124.7	9.2195	Towsley Fm. - Parallel to Bedding	150	10	671.688	518.011	2087.1	0	2087.1	2196.12	2196.12
10	4.63065	10815	9.0158	Towsley Fm. - Parallel to Bedding	150	10	702.97	542.136	2223.92	0	2223.92	2335.45	2335.45
11	4.63065	11230.2	9.0158	Towsley Fm. - Parallel to Bedding	150	10	722.149	556.927	2307.8	0	2307.8	2422.38	2422.38
12	4.57518	11501.7	9.08341	Towsley Fm. - Parallel to Bedding	150	10	740.698	571.232	2388.91	0	2388.91	2507.33	2507.33
13	4.57518	11903.5	9.08341	Towsley Fm. - Parallel to Bedding	150	10	759.475	585.713	2471.06	0	2471.06	2592.48	2592.48
14	4.63651	12474.9	9.01355	Towsley Fm. - Parallel to Bedding	150	10	778.94	600.725	2556.19	0	2556.19	2679.75	2679.75
15	4.63651	12847.7	9.01355	Towsley Fm. - Parallel to Bedding	150	10	796.141	613.99	2631.43	0	2631.43	2757.72	2757.72
16	4.63465	12883.6	8.96458	Towsley Fm. - Parallel to Bedding	150	10	798.385	615.721	2641.24	0	2641.24	2767.19	2767.19
17	4.63465	12856.7	8.96458	Towsley Fm. - Parallel to Bedding	150	10	797.139	614.76	2635.78	0	2635.78	2761.53	2761.53
18	5.31987	14734.4	8.6676	Towsley Fm. - Parallel to Bedding	150	10	798.309	615.662	2640.89	0	2640.89	2762.59	2762.59
19	5.31987	14719.1	8.6676	Towsley Fm. - Parallel to Bedding	150	10	797.693	615.187	2638.21	0	2638.21	2759.82	2759.82
20	5.31987	14697.2	8.86165	Towsley Fm. - Parallel to Bedding	150	10	795.44	613.45	2628.35	0	2628.35	2752.37	2752.37
21	5.31987	14668.7	8.86165	Towsley Fm. - Parallel to Bedding	150	10	794.292	612.564	2623.33	0	2623.33	2747.17	2747.17
22	8.56571	23582.6	8.59135	Towsley Fm. - Parallel to Bedding	150	10	795.294	613.337	2627.72	0	2627.72	2747.87	2747.87
23	4.28285	11775.6	8.86126	Towsley Fm. - Parallel to Bedding	150	10	792.607	611.265	2615.96	0	2615.96	2739.53	2739.53
24	4.28285	11757.1	8.86126	Towsley Fm. - Parallel to Bedding	150	10	791.683	610.552	2611.92	0	2611.92	2735.35	2735.35
25	4.28285	11738.7	8.86126	Towsley Fm. - Parallel to Bedding	150	10	790.759	609.84	2607.88	0	2607.88	2731.16	2731.16
26	4.28285	11862.3	8.86126	Towsley Fm. - Parallel to Bedding	150	10	796.948	614.613	2634.94	0	2634.94	2759.19	2759.19
27	8.56571	24517.2	8.86126	Towsley Fm. - Parallel to Bedding	150	10	816.772	629.901	2721.65	0	2721.65	2848.99	2848.99
28	8.56571	25407.2	8.84512	Towsley Fm. - Parallel to Bedding	150	10	839.158	647.165	2819.56	0	2819.56	2950.15	2950.15
29	4.28285	12886.3	8.84512	Towsley Fm. - Parallel to Bedding	150	10	848.303	654.218	2859.57	0	2859.57	2991.57	2991.57
30	4.28285	13002	8.84512	Towsley Fm. - Parallel to Bedding	150	10	854.089	658.68	2884.87	0	2884.87	3017.78	3017.78
31	8.56571	26350.9	8.84512	Towsley Fm. - Parallel to Bedding	150	10	862.769	665.374	2922.83	0	2922.83	3057.09	3057.09
32	8.56571	26813.4	8.84512	Towsley Fm. - Parallel to Bedding	150	10	874.34	674.298	2973.45	0	2973.45	3109.51	3109.51
33	8.5657	27296.8	8.60916	Towsley Fm. - Parallel to Bedding	150	10	888.325	685.083	3034.61	0	3034.61	3169.1	3169.1
34	8.18856	26568.4	8.58439	Towsley Fm. - Parallel to Bedding	150	10	900.949	694.819	3089.83	0	3089.83	3225.83	3225.83
35	4.95065	16370.9	8.81854	Towsley Fm. - Parallel to Bedding	150	10	912.384	703.638	3139.84	0	3139.84	3281.39	3281.39
36	4.95065	16715.1	8.81854	Towsley Fm. - Parallel to Bedding	150	10	927.291	715.134	3205.03	0	3205.03	3348.89	3348.89
37	4.95065	17059.4	8.81854	Towsley Fm. - Parallel to Bedding	150	10	942.2	726.632	3270.24	0	3270.24	3416.42	3416.42
38	6.50773	22943.9	8.91329	Towsley Fm. - Parallel to Bedding	150	10	958.465	739.176	3341.38	0	3341.38	3491.7	3491.7
39	6.50773	23529.2	8.91329	Towsley Fm. - Parallel to Bedding	150	10	977.725	754.029	3425.62	0	3425.62	3578.96	3578.96
40	7.01351	26001.3	9.11177	Towsley Fm. - Parallel to Bedding	150	10	995.56	767.784	3503.63	0	3503.63	3663.3	3663.3
41	7.01351	26678.4	9.11177	Towsley Fm. - Parallel to Bedding	150	10	1016.19	783.696	3593.87	0	3593.87	3756.85	3756.85
42	6.60145	25759.5	10.4011	Towsley Fm. - Parallel to Bedding	150	10	1024.99	790.484	3632.36	0	3632.36	3820.5	3820.5
43	6.60145	26332.4	10.4011	Towsley Fm. - Parallel to Bedding	150	10	1043.29	804.596	3712.4	0	3712.4	3903.9	3903.9

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
44	6.60136	26856.4	11.3117	Towsley Fm. - Parallel to Bedding	150	10	1051.24	810.721	3747.13	0	3747.13	3957.41	3957.41
45	6.60136	27332.2	11.3117	Towsley Fm. - Parallel to Bedding	150	10	1066.29	822.335	3813	0	3813	4026.29	4026.29
46	5.67309	21170.6	56.134	Landslide Debris	200	30	1276.8	984.677	1359.1	0	1359.1	3261.62	3261.62
47	5.67309	15940.7	56.134	Landslide Debris	200	30	1002.69	773.279	992.95	0	992.95	2487.02	2487.02
48	5.29621	9365.82	58.1582	Landslide Debris	200	30	660.775	509.595	536.234	0	536.234	1600.22	1600.22
49	4.02379	2943.21	58.1582	Landslide Debris	200	30	368.762	284.392	146.171	0	146.171	739.956	739.956
50	1.27242	180.289	58.1582	Engineered Fill	200	32	199.859	154.133	-73.4029	0	-73.4029	248.412	248.412

Interslice Data

- **Global Minimum Query (spencer) - Safety Factor: 0.771208**

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	72.7501	1753.32	0	0	0
2	74.9435	1752.82	1391.11	499.949	19.7679
3	84.2752	1750.72	10897.7	3916.51	19.7679
4	88.7669	1749.7	18102.4	6505.76	19.7678
5	93.2586	1748.69	27902.3	10027.7	19.7677
6	95.8003	1748.11	29874.6	10736.6	19.7679
7	102.691	1749.2	30317.7	10895.8	19.7678
8	109.583	1750.29	30641.5	11012.2	19.7678
9	116.474	1751.41	30787.7	11064.7	19.7678
10	123.365	1752.52	30813.3	11073.9	19.7678
11	127.996	1753.26	30812.3	11073.6	19.7679
12	132.626	1753.99	30776.2	11060.6	19.7678
13	137.201	1754.73	30692.4	11030.5	19.7679
14	141.777	1755.46	30574.1	10987.9	19.7677
15	146.413	1756.19	30434.4	10937.8	19.7679
16	151.05	1756.93	30263.3	10876.2	19.7677
17	155.684	1757.66	30099.9	10817.5	19.7678
18	160.319	1758.39	29938.8	10759.6	19.7678
19	165.639	1759.2	29833.9	10721.9	19.7678
20	170.959	1760.01	29730.2	10684.7	19.7679
21	176.279	1760.84	29577.2	10629.7	19.7678
22	181.598	1761.67	29426.6	10575.6	19.7679
23	190.164	1762.97	29301	10530.4	19.7678
24	194.447	1763.63	29182.6	10487.9	19.7679
25	198.73	1764.3	29065.7	10445.8	19.7677
26	203.013	1764.97	28950.3	10404.4	19.7678
27	207.296	1765.64	28824.8	10359.3	19.7679
28	215.861	1766.97	28508.9	10245.8	19.7679
29	224.427	1768.3	28127.5	10108.7	19.7679
30	228.71	1768.97	27921.9	10034.8	19.7678
31	232.993	1769.64	27706.9	9957.52	19.7678
32	241.558	1770.97	27248.6	9792.79	19.7678
33	250.124	1772.3	26752.5	9614.51	19.7678
34	258.69	1773.6	26331.7	9463.3	19.7678
35	266.878	1774.84	25904.6	9309.79	19.7678
36	271.829	1775.6	25554.4	9183.92	19.7678
37	276.78	1776.37	25176.2	9048.02	19.7678
38	281.73	1777.14	24770.2	8902.09	19.7678
39	288.238	1778.16	24155.7	8681.27	19.7678
40	294.746	1779.18	23492.9	8443.05	19.7678
41	301.759	1780.31	22634	8134.38	19.7678
42	308.773	1781.43	21716.8	7804.74	19.7678
43	315.374	1782.64	20217.9	7266.07	19.7678
44	321.976	1783.85	18657	6705.08	19.7678
45	328.577	1785.18	16620.1	5973.06	19.7678
46	335.178	1786.5	14524.3	5219.85	19.7678
47	340.852	1794.95	7103.29	2552.83	19.7678
48	346.525	1803.4	2006.86	721.242	19.7678

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
49	351.821	1811.93	-471.409	-169.419	19.7679
50	355.845	1818.41	-376.128	-135.176	19.7678
51	357.117	1820.46	0	0	0

Entity Information

Group: Removals Slots

Shared Entities

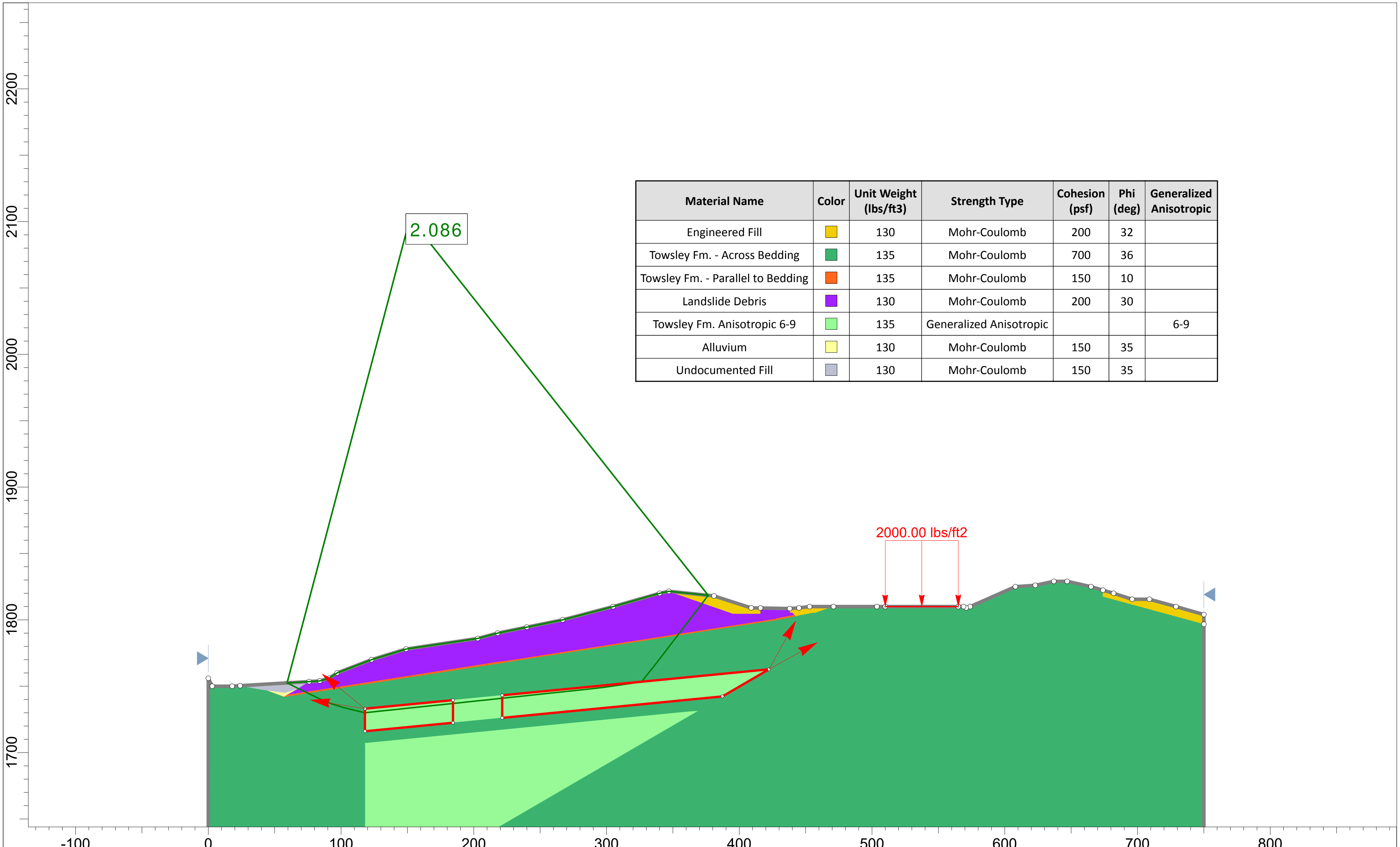
Type	Coordinates X	Coordinates Y
External Boundary	0	1600
	118	1600
	142.82	1600
	750	1600
	750	1796.64
	750	1804
	729	1810
	709	1815.5
	696	1815.5
	682	1820
	674	1822.35
	665	1825
	647	1829
	637	1829
	623	1826
	608	1825
	574	1810
	571	1809
	569	1810
	565	1810
	510	1810
	503.637	1810
	471	1810
	453	1810
	445	1809
	438	1808.5
	416	1808.88
	409	1809
	381	1818
	347	1821.5
	340	1820
	305	1810
	267	1800
	240	1794.49
	218	1790
	203	1786
	149	1778
	123	1770
	97	1760
	91	1756
	84	1754
	76	1753.52
	24	1750.36
	18	1750
	3	1750
	0	1756

Type	X	Y
Material Boundary	118	1600
	118	1707.04
	118	1716.04
	118	1733.04
	422.401	1762.72
Material Boundary	374.004	1741
	387.309	1742.3
Material Boundary	118	1716.04
	374.004	1741
Material Boundary	118	1707.04
	368.737	1731.49
Material Boundary	142.82	1600
	368.737	1731.49
	387.309	1742.3
	422.401	1762.72
	503.637	1810
Material Boundary	44	1746.7
	57	1742
	221.835	1767.77
	428	1800
	442.345	1802.71
	457.15	1805.5
Material Boundary	24	1750.36
	44	1746.7
	44.1834	1746.67
	57	1745
	68.0457	1748.3
	76	1753.52
Material Boundary	57	1742
	59.4618	1743.4
	68.0457	1748.3
Material Boundary	347	1821.5
	396	1804.38
	416	1804.38
	416	1808.88
Material Boundary	438	1808.5
	438	1805.5
	440.25	1805.5
	451.85	1805.5
	457.15	1805.5
	458	1805.5
	471	1810

Type	Coordinates
Material Boundary	X / Y: 674, 1822.35; 674, 1817.35; 750, 1796.64
Material Boundary	X / Y: 59.4618, 1743.4; 223.964, 1769.11; 428, 1801; 441.688, 1803.58; 451.85, 1805.5
Material Boundary	X / Y: 438, 1808.5; 440.25, 1805.5; 441.688, 1803.58; 442.345, 1802.71
Material Boundary	X / Y: 221.835, 1767.77; 223.964, 1769.11; 226.819, 1770.92; 230.899, 1774.6; 235.205, 1780.95; 238.691, 1788.63; 240, 1794.49

Scenario-based Entities

Type	Coordinates	slide plane pseudo
Distributed Load	X / Y: 510, 1810; 565, 1810	Constant Distribution Orientation: Vertical Magnitude: 2000 lbs/ft2 Creates Excess Pore Pressure: No
Block Search Polyline	X / Y: 58.3596, 1742.78; 428.02, 1800.51; 441.994, 1803.18	✓

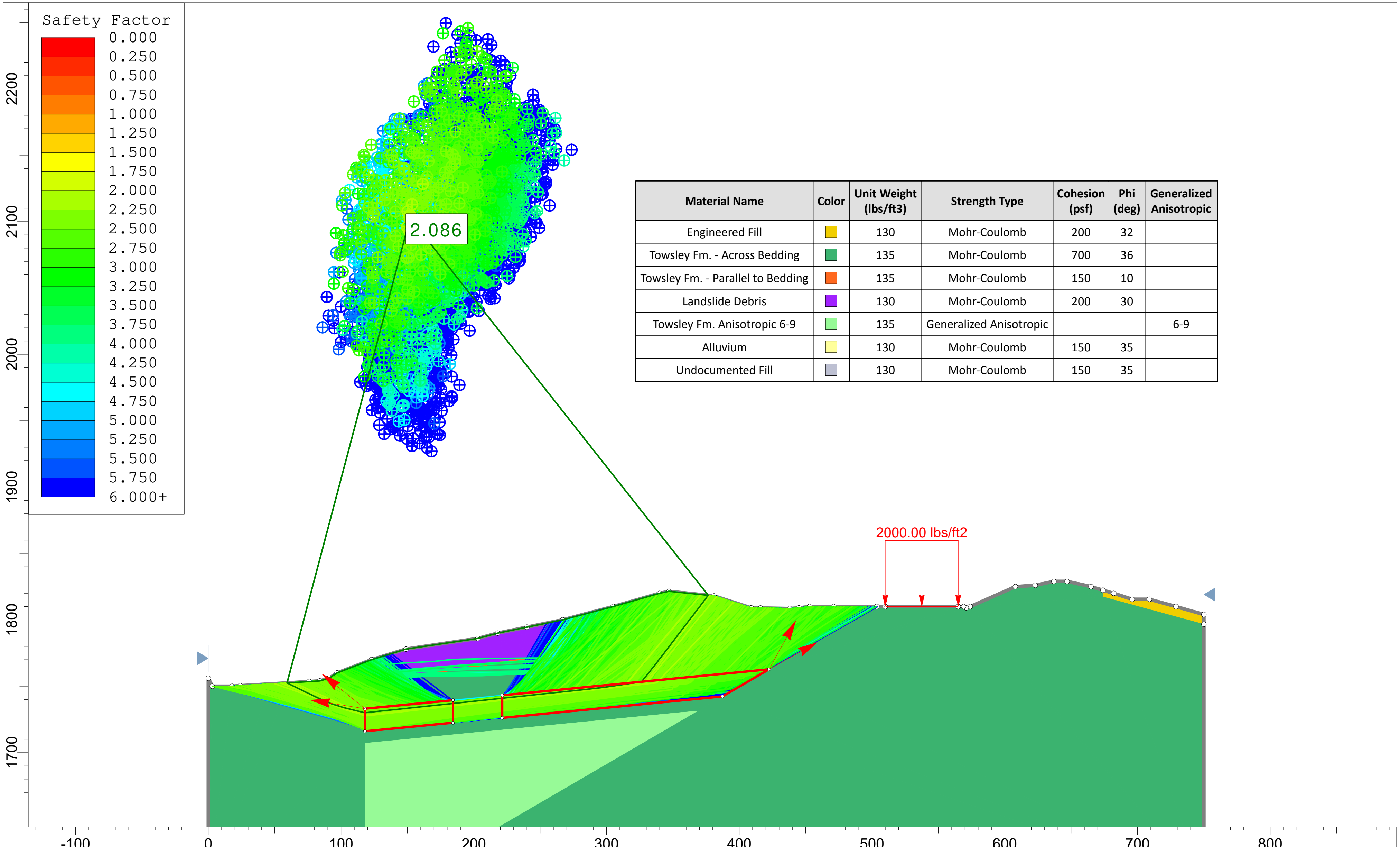


Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Generalized Anisotropic
Engineered Fill		130	Mohr-Coulomb	200	32	
Towsley Fm. - Across Bedding		135	Mohr-Coulomb	700	36	
Towsley Fm. - Parallel to Bedding		135	Mohr-Coulomb	150	10	
Landslide Debris		130	Mohr-Coulomb	200	30	
Towsley Fm. Anisotropic 6-9		135	Generalized Anisotropic			6-9
Alluvium		130	Mohr-Coulomb	150	35	
Undocumented Fill		130	Mohr-Coulomb	150	35	

rocscience

SLIDEINTERPRET 8.032

Project	Cherry Willow Recycled Water Tanks
Analysis Description	WT15-WT15' - Deep bedrock - static
Drawn By	RMP
Scale	1:1200
Company	GWV
Date	
File Name	WT15.slmd



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Generalized Anisotropic
Engineered Fill		130	Mohr-Coulomb	200	32	
Towsley Fm. - Across Bedding		135	Mohr-Coulomb	700	36	
Towsley Fm. - Parallel to Bedding		135	Mohr-Coulomb	150	10	
Landslide Debris		130	Mohr-Coulomb	200	30	
Towsley Fm. Anisotropic 6-9		135	Generalized Anisotropic			6-9
Alluvium		130	Mohr-Coulomb	150	35	
Undocumented Fill		130	Mohr-Coulomb	150	35	

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SLIDEINTERPRET 8.032

Project	Cherry Willow Recycled Water Tanks
Analysis Description	WT15-WT15' - Deep bedrock - static
Drawn By	RMP
Scale	1:1200
Company	GWV
Date	
File Name	WT15.slmd

Slide Analysis Information

WT15

Project Summary

File Name:	WT15.slmd
Slide Modeler Version:	8.032
Compute Time:	00h:00m:13.761s
Project Title:	Cherry Willow Recycled Water Tanks
Analysis:	WT15-WT15' - Deep bedrock - static
Author:	RMP
Company:	GWV

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	inches/hour
Data Output:	Standard
Failure Direction:	Right to Left

Analysis Options

Analysis Methods Used	
Slices Type:	Vertical
	Spencer
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Surface Type:	Non-Circular Block Search
Number of Surfaces:	5000
Multiple Groups:	Disabled
Pseudo-Random Surfaces:	Enabled
Convex Surfaces Only:	Disabled
Left Projection Angle (Start Angle) [°]:	141
Left Projection Angle (End Angle) [°]:	171
Right Projection Angle (Start Angle) [°]:	29

Right Projection Angle (End Angle) [°]:	61
Minimum Elevation:	Not Defined
Minimum Depth [ft]:	35
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading

Advanced seismic analysis:	No
Staged pseudostatic analysis:	No

Loading

- 1 Distributed Load present

Distributed Load 1

Distribution:	Constant
Magnitude [psf]:	2000
Orientation:	Vertical

Materials

Property	Engineered Fill	Towsley Fm. - Across Bedding	Towsley Fm. - Parallel to Bedding	Landslide Debris	Towsley Fm. Anisotropic 6-9	Alluvium	Undocumented Fill
Color							
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Generalized Anisotropic	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft3]	130	135	135	130	135	130	130
Cohesion [psf]	200	700	150	200		150	150
Friction Angle [°]	32	36	10	30		35	35
Water Surface	None	None	None	None	None	None	None
Ru Value	0	0	0	0	0	0	0

Generalized Anisotropic Functions

Name: 6-9

Angle From	Angle To	Material
6	-90	Towsley Fm. - Across Bedding
9	6	Towsley Fm. - Parallel to Bedding
90	9	Towsley Fm. - Across Bedding

Global Minimums

Method: spencer

FS	2.086450
Axis Location:	152.009, 2102.773
Left Slip Surface Endpoint:	59.310, 1752.504
Right Slip Surface Endpoint:	376.605, 1818.452
Resisting Moment:	2.33149e+08 lb-ft
Driving Moment:	1.11744e+08 lb-ft
Resisting Horizontal Force:	558637 lb
Driving Horizontal Force:	267745 lb
Total Slice Area:	13287.1 ft2
Surface Horizontal Width:	317.294 ft
Surface Average Height:	41.8763 ft

Global Minimum Coordinates

Method: spencer

X	Y

X	Y
59.3105	1752.5
67.7979	1748.25
75.6311	1744.47
83.4642	1740.74
92.8646	1736.72
102.265	1733.79
117.937	1730
130.112	1731.29
142.34	1732.58
154.549	1733.87
170.626	1735.57
186.702	1737.26
198.893	1738.55
211.084	1739.84
223.275	1741.13
235.466	1742.41
247.657	1743.7
259.848	1744.99
272.039	1746.27
284.23	1747.56
297.503	1749.06
311.901	1751.18
326.285	1753.35
335.77	1765.05
344.463	1776.4
352.499	1786.88
360.534	1797.36
368.569	1807.84
376.605	1818.45

Valid/Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 5001
Number of Invalid Surfaces: 31

Error Codes:

Error Code -108 reported for 26 surfaces
Error Code -111 reported for 3 surfaces
Error Code -115 reported for 2 surfaces

Error Codes

The following errors were encountered during the computation:

-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-111 = safety factor equation did not converge
-115 = Surface too shallow, below the minimum depth.

Slice Data

- **Global Minimum Query (spencer) - Safety Factor: 2.08645**

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	8.48744	2630.5	-26.6192	Undocumented Fill	150	35	240.694	502.195	502.987	0	502.987	382.355	382.355
2	0.0843257	52.5209	-25.7518	Alluvium	150	35	384.204	801.623	930.613	0	930.613	745.281	745.281
3	5.46238	4471.51	-25.7518	Landslide Debris	200	30	418.013	872.164	1164.22	0	1164.22	962.581	962.581
4	1.5955	1707.58	-25.7518	Towsley Fm. - Parallel to Bedding	150	10	179.519	374.557	1273.53	0	1273.53	1186.93	1186.93
5	0.690934	797.751	-25.7518	Towsley Fm. - Across Bedding	700	36	1005.38	2097.67	1923.72	0	1923.72	1438.75	1438.75
6	7.83314	11481	-25.456	Towsley Fm. - Across Bedding	700	36	1153.3	2406.31	2348.53	0	2348.53	1799.52	1799.52

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
7	9.40039	20637.1	-23.1921	Towsley Fm. - Across Bedding	700	36	1464.5	3055.6	3242.2	0	3242.2	2614.75	2614.75
8	9.4004	30860.6	-17.3094	Towsley Fm. - Across Bedding	700	36	1841.8	3842.83	4325.74	0	4325.74	3751.75	3751.75
9	7.83587	31964.7	-13.5673	Towsley Fm. - Across Bedding	700	36	2103.04	4387.88	5075.93	0	5075.93	4568.42	4568.42
10	7.83587	37083.1	-13.5673	Towsley Fm. - Across Bedding	700	36	2377.31	4960.13	5863.56	0	5863.56	5289.86	5289.86
11	6.08744	31468.4	6.0269	Towsley Fm. - Parallel to Bedding	150	10	503.821	1051.2	5110.95	0	5110.95	5164.14	5164.14
12	6.08744	32579.6	6.0269	Towsley Fm. - Parallel to Bedding	150	10	519.065	1083	5291.32	0	5291.32	5346.12	5346.12
13	6.1143	33713	6.0269	Towsley Fm. - Parallel to Bedding	150	10	532.58	1111.2	5451.24	0	5451.24	5507.47	5507.47
14	6.1143	34704.7	6.0269	Towsley Fm. - Parallel to Bedding	150	10	546.125	1139.46	5611.52	0	5611.52	5669.18	5669.18
15	6.10445	35638.2	6.0269	Towsley Fm. - Parallel to Bedding	150	10	559.659	1167.7	5771.67	0	5771.67	5830.76	5830.76
16	6.10445	36307.4	6.0269	Towsley Fm. - Parallel to Bedding	150	10	568.813	1186.8	5879.99	0	5879.99	5940.04	5940.04
17	16.0767	96659.2	6.02716	Towsley Fm. - Parallel to Bedding	150	10	574.215	1198.07	5943.93	0	5943.93	6004.55	6004.55
18	8.03833	48890.5	6.02717	Towsley Fm. - Parallel to Bedding	150	10	580.043	1210.23	6012.87	0	6012.87	6074.12	6074.12
19	8.03833	49264.4	6.02717	Towsley Fm. - Parallel to Bedding	150	10	583.93	1218.34	6058.83	0	6058.83	6120.49	6120.49
20	6.09547	37606.5	6.02717	Towsley Fm. - Parallel to Bedding	150	10	587.342	1225.46	6099.24	0	6099.24	6161.25	6161.25
21	6.09547	37821.5	6.02717	Towsley Fm. - Parallel to Bedding	150	10	590.29	1231.61	6134.1	0	6134.1	6196.43	6196.43
22	6.09547	38067	6.02717	Towsley Fm. - Parallel to Bedding	150	10	593.65	1238.62	6173.9	0	6173.9	6236.58	6236.58
23	6.09547	38724.6	6.02717	Towsley Fm. - Parallel to Bedding	150	10	602.66	1257.42	6280.48	0	6280.48	6344.11	6344.11
24	6.09547	39512	6.02717	Towsley Fm. - Parallel to Bedding	150	10	613.449	1279.93	6408.15	0	6408.15	6472.92	6472.92
25	6.09547	40186.3	6.02717	Towsley Fm. - Parallel to Bedding	150	10	622.684	1299.2	6517.44	0	6517.44	6583.18	6583.18
26	6.09548	40674.2	6.02717	Towsley Fm. - Parallel to Bedding	150	10	629.37	1313.15	6596.55	0	6596.55	6663	6663
27	6.09548	41159.4	6.02717	Towsley Fm. - Parallel to Bedding	150	10	636.018	1327.02	6675.18	0	6675.18	6742.34	6742.34
28	6.09548	41644.6	6.02717	Towsley Fm. - Parallel to Bedding	150	10	642.661	1340.88	6753.84	0	6753.84	6821.69	6821.69
29	6.09548	42129.8	6.02717	Towsley Fm. - Parallel to Bedding	150	10	649.309	1354.75	6832.49	0	6832.49	6901.05	6901.05
30	6.09548	42614.9	6.02717	Towsley Fm. - Parallel to Bedding	150	10	655.956	1368.62	6911.15	0	6911.15	6980.41	6980.41
31	6.09548	43100.1	6.02717	Towsley Fm. - Parallel to Bedding	150	10	662.604	1382.49	6989.8	0	6989.8	7059.76	7059.76
32	6.09547	43585.3	6.02717	Towsley Fm. - Parallel to Bedding	150	10	669.252	1396.36	7068.44	0	7068.44	7139.11	7139.11
33	6.09547	44168	6.02717	Towsley Fm. - Parallel to Bedding	150	10	677.232	1413.01	7162.91	0	7162.91	7234.41	7234.41
34	6.09547	44934.2	6.02717	Towsley Fm. - Parallel to Bedding	150	10	687.728	1434.91	7287.11	0	7287.11	7359.72	7359.72
35	6.09547	45704.7	6.02717	Towsley Fm. - Parallel to Bedding	150	10	698.287	1456.94	7412.02	0	7412.02	7485.75	7485.75
36	6.6367	50617.4	6.44043	Towsley Fm. - Parallel to Bedding	150	10	707.93	1477.06	7526.16	0	7526.16	7606.07	7606.07
37	6.6367	51487.4	6.44043	Towsley Fm. - Parallel to Bedding	150	10	718.862	1499.87	7655.47	0	7655.47	7736.62	7736.62
38	7.19902	56714.2	8.36293	Towsley Fm. - Parallel to Bedding	150	10	723.588	1509.73	7711.4	0	7711.4	7817.78	7817.78
39	7.19902	57569	8.36293	Towsley Fm. - Parallel to Bedding	150	10	733.408	1530.22	7827.64	0	7827.64	7935.46	7935.46
40	7.19176	58431.8	8.59615	Towsley Fm. - Parallel to Bedding	150	10	743.344	1550.95	7945.19	0	7945.19	8057.56	8057.56
41	7.19176	59337.8	8.59615	Towsley Fm. - Parallel to Bedding	150	10	753.754	1572.67	8068.38	0	8068.38	8182.32	8182.32
42	9.48457	73065.6	50.9794	Towsley Fm. - Across Bedding	700	36	1973.8	4118.23	4704.79	0	4704.79	7140.43	7140.43

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
43	8.69355	56352.9	52.5283	Towsley Fm. - Across Bedding	700	36	1666.03	3476.08	3820.95	0	3820.95	5994.38	5994.38
44	8.03546	41628.1	52.5283	Towsley Fm. - Across Bedding	700	36	1381.83	2883.12	3004.82	0	3004.82	4807.5	4807.5
45	1.14805	4971.66	52.5283	Towsley Fm. - Across Bedding	700	36	1196.24	2495.89	2471.83	0	2471.83	4032.39	4032.39
46	0.874349	3619.53	52.5283	Towsley Fm. - Parallel to Bedding	150	10	337.724	704.645	3145.55	0	3145.55	3586.13	3586.13
47	6.01306	21088.2	52.5283	Landslide Debris	200	30	717.357	1496.73	2246.01	0	2246.01	3181.84	3181.84
48	8.03545	17853.2	52.5283	Landslide Debris	200	30	482.15	1005.98	1396	0	1396	2024.99	2024.99
49	3.66536	4206.32	52.8581	Landslide Debris	200	30	284.461	593.514	681.586	0	681.586	1057.14	1057.14
50	4.37009	1766.66	52.8581	Engineered Fill	200	32	152.413	318.003	188.843	0	188.843	390.064	390.064

Interslice Data

- **Global Minimum Query (spencer) - Safety Factor: 2.08645**

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	59.3105	1752.5	0	0	0
2	67.7979	1748.25	4182.44	614.732	8.36142
3	67.8822	1748.21	4252.69	625.057	8.36142
4	73.3446	1745.57	9603.7	1411.54	8.3614
5	74.9401	1744.8	10870.3	1597.7	8.36138
6	75.6311	1744.47	12206.1	1794.04	8.36141
7	83.4642	1740.74	29997.3	4408.99	8.36144
8	92.8646	1736.72	56822	8351.66	8.36143
9	102.265	1733.79	86808.3	12759	8.36141
10	110.101	1731.89	112886	16591.9	8.36142
11	117.937	1730	142602	20959.5	8.36141
12	124.024	1730.65	142384	20927.5	8.36143
13	130.112	1731.29	142143	20892.1	8.36143
14	136.226	1731.93	141880	20853.4	8.36142
15	142.34	1732.58	141597	20811.8	8.36142
16	148.445	1733.22	141293	20767.2	8.36145
17	154.549	1733.87	140976	20720.6	8.36144
18	170.626	1735.57	140118	20594.5	8.36145
19	178.664	1736.42	139677	20529.7	8.36146
20	186.702	1737.26	139229	20463.8	8.36143
21	192.798	1737.91	138884	20413	8.3614
22	198.893	1738.55	138534	20361.6	8.36141
23	204.989	1739.19	138179	20309.5	8.36145
24	211.084	1739.84	137811	20255.3	8.3614
25	217.18	1740.48	137426	20198.7	8.36139
26	223.275	1741.13	137027	20140.1	8.36141
27	229.371	1741.77	136618	20080	8.36142
28	235.466	1742.41	136198	20018.3	8.36143
29	241.562	1743.06	135769	19955.2	8.36141
30	247.657	1743.7	135330	19890.7	8.36142
31	253.753	1744.34	134880	19824.6	8.36144
32	259.848	1744.99	134421	19757	8.36138
33	265.944	1745.63	133951	19688	8.36142
34	272.039	1746.27	133469	19617.2	8.36143
35	278.135	1746.92	132971	19544	8.36143
36	284.23	1747.56	132457	19468.5	8.36145
37	290.867	1748.31	131517	19330.3	8.36144
38	297.503	1749.06	130553	19188.6	8.36143
39	304.702	1750.12	127601	18754.7	8.36142
40	311.901	1751.18	124597	18313.1	8.36139
41	319.093	1752.26	121305	17829.3	8.36142
42	326.285	1753.35	117954	17336.8	8.36143
43	335.77	1765.05	81610.6	11995.1	8.36145
44	344.463	1776.4	52759.9	7754.6	8.36141
45	352.499	1786.88	32364.8	4756.95	8.36142
46	353.647	1788.38	30036.1	4414.68	8.36142

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
47	354.521	1789.52	26743.4	3930.72	8.36141
48	360.534	1797.36	13438.3	1975.16	8.36146
49	368.569	1807.84	2678.71	393.714	8.36141
50	372.235	1812.68	423.082	62.1843	8.36143
51	376.605	1818.45	0	0	0

Entity Information

Group: Removals Slots

Shared Entities

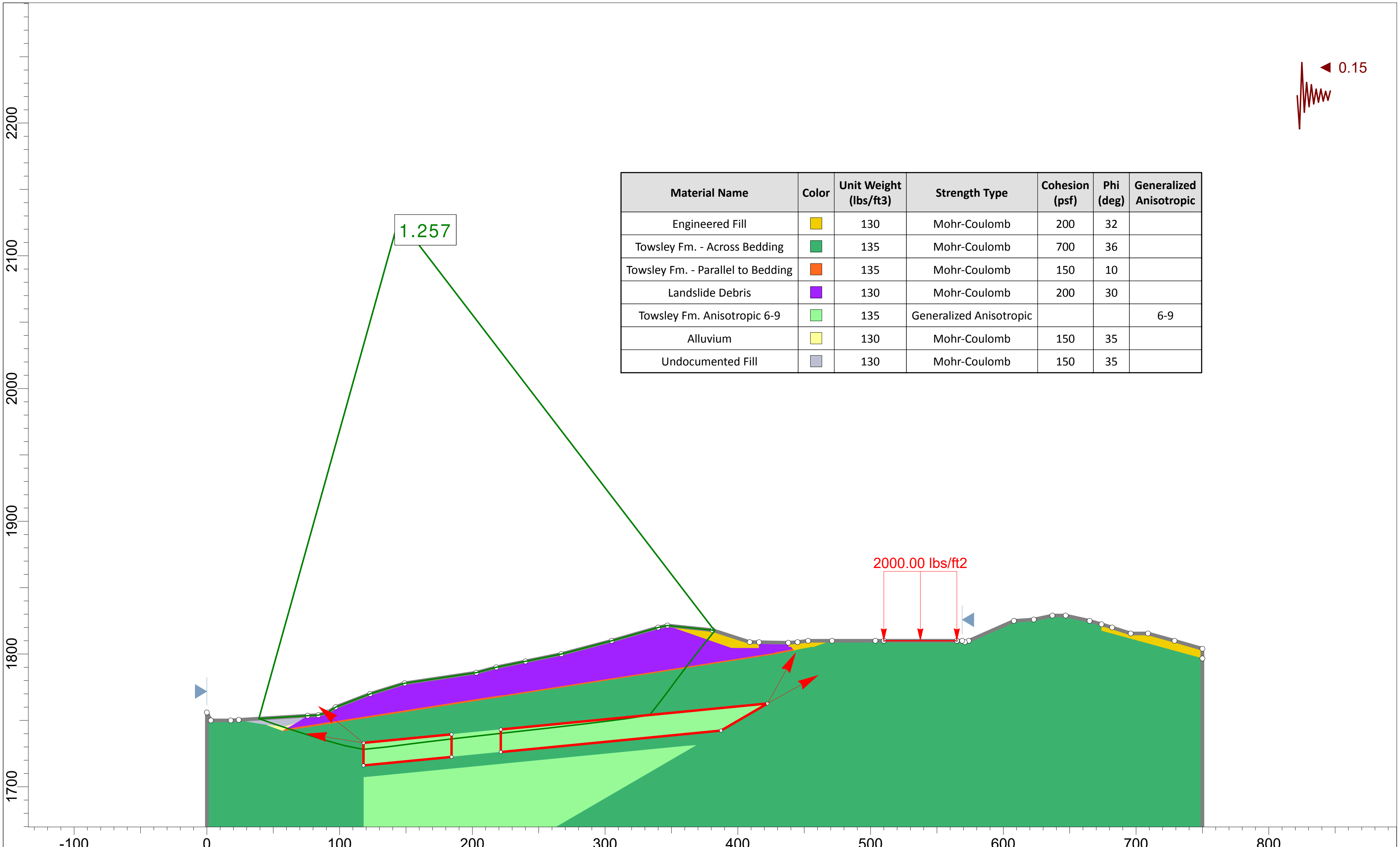
Type	Coordinates X	Coordinates Y
External Boundary	0	1600
	118	1600
	142.82	1600
	750	1600
	750	1796.64
	750	1804
	729	1810
	709	1815.5
	696	1815.5
	682	1820
	674	1822.35
	665	1825
	647	1829
	637	1829
	623	1826
	608	1825
	574	1810
	571	1809
	569	1810
	565	1810
	510	1810
	503.637	1810
	471	1810
	453	1810
	445	1809
	438	1808.5
	416	1808.88
	409	1809
	381	1818
	347	1821.5
	340	1820
	305	1810
	267	1800
	240	1794.49
	218	1790
	203	1786
	149	1778
	123	1770
	97	1760
	91	1756
	84	1754
	76	1753.52
	24	1750.36
	18	1750
	3	1750
	0	1756

Type	Coordinates	
	X	Y
Material Boundary	118	1600
	118	1707.04
	118	1716.04
	118	1733.04
	422.401	1762.72
	X	Y
Material Boundary	374.004	1741
	387.309	1742.3
	X	Y
Material Boundary	118	1716.04
	374.004	1741
	X	Y
Material Boundary	118	1707.04
	368.737	1731.49
	X	Y
Material Boundary	142.82	1600
	368.737	1731.49
	387.309	1742.3
	422.401	1762.72
	503.637	1810
	X	Y
Material Boundary	44	1746.7
	57	1742
	221.835	1767.77
	428	1800
	442.345	1802.71
	457.15	1805.5
	X	Y
Material Boundary	24	1750.36
	44	1746.7
	44.1834	1746.67
	57	1745
	68.0457	1748.3
	76	1753.52
	X	Y
Material Boundary	57	1742
	59.4618	1743.4
	68.0457	1748.3
	X	Y
Material Boundary	347	1821.5
	396	1804.38
	416	1804.38
	416	1808.88
	X	Y
Material Boundary	438	1808.5
	438	1805.5
	440.25	1805.5
	451.85	1805.5
	457.15	1805.5
	458	1805.5
	471	1810

Type	Coordinates	
	X	Y
Material Boundary	674	1822.35
	674	1817.35
	750	1796.64
	X	Y
Material Boundary	59.4618	1743.4
	223.964	1769.11
	428	1801
	441.688	1803.58
	451.85	1805.5
	X	Y
Material Boundary	438	1808.5
	440.25	1805.5
	441.688	1803.58
	442.345	1802.71
	X	Y
Material Boundary	221.835	1767.77
	223.964	1769.11
	226.819	1770.92
	230.899	1774.6
	235.205	1780.95
	238.691	1788.63
	240	1794.49

Scenario-based Entities

Type	Coordinates		unox static
	X	Y	
Distributed Load	510	1810	Constant Distribution Orientation: Vertical Magnitude: 2000 lbs/ft2 Creates Excess Pore Pressure: No
	565	1810	
	X	Y	
Block Search Window	118	1733.04	✓
	118	1716.04	
	184.359	1722.51	
	184.359	1739.51	
	X	Y	
Block Search Window	221.396	1743.12	✓
	221.396	1726.12	
	387.309	1742.3	
	422.401	1762.72	

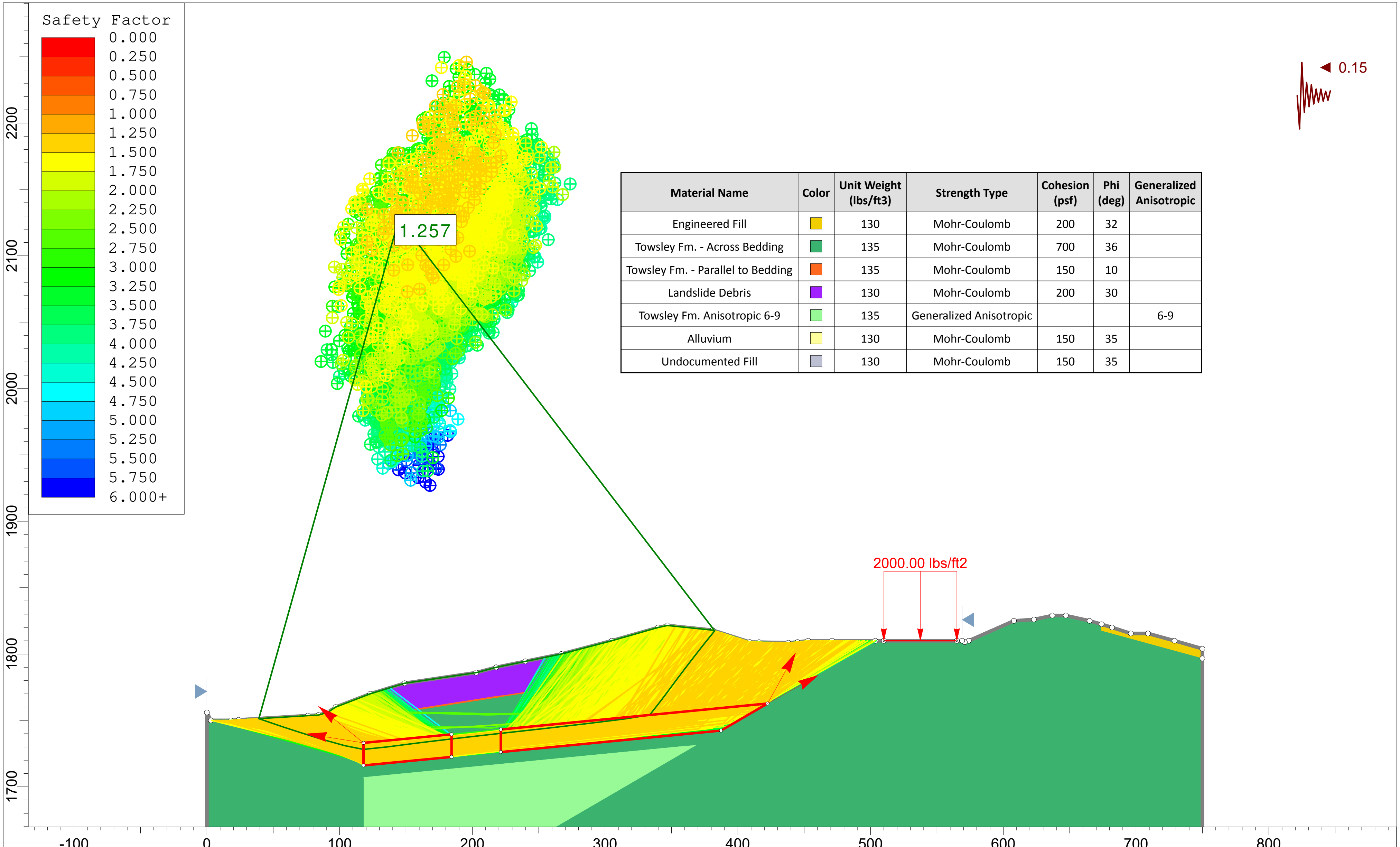


Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Generalized Anisotropic
Engineered Fill		130	Mohr-Coulomb	200	32	
Towsley Fm. - Across Bedding		135	Mohr-Coulomb	700	36	
Towsley Fm. - Parallel to Bedding		135	Mohr-Coulomb	150	10	
Landslide Debris		130	Mohr-Coulomb	200	30	
Towsley Fm. Anisotropic 6-9		135	Generalized Anisotropic			6-9
Alluvium		130	Mohr-Coulomb	150	35	
Undocumented Fill		130	Mohr-Coulomb	150	35	

rocscience

SLIDEINTERPRET 8.032

Project	Cherry Willow Recycled Water Tanks
Analysis Description	WT15-WT15' - Deep bedrock - pseudo-static
Drawn By	RMP
Scale	1:1200
Company	GWV
Date	
File Name	WT15.slmd



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Generalized Anisotropic
Engineered Fill		130	Mohr-Coulomb	200	32	
Towsley Fm. - Across Bedding		135	Mohr-Coulomb	700	36	
Towsley Fm. - Parallel to Bedding		135	Mohr-Coulomb	150	10	
Landslide Debris		130	Mohr-Coulomb	200	30	
Towsley Fm. Anisotropic 6-9		135	Generalized Anisotropic			6-9
Alluvium		130	Mohr-Coulomb	150	35	
Undocumented Fill		130	Mohr-Coulomb	150	35	

rocscience

SLIDEINTERPRET 8.032

Project	Cherry Willow Recycled Water Tanks		
Analysis Description	WT15-WT15' - Deep bedrock - pseudo-static		
Drawn By RMP	*Scale* 1:1200	*Company* GWV	
Date		*File Name* WT15.slmd	

Slide Analysis Information

WT15

Project Summary

File Name:	WT15.slmd
Slide Modeler Version:	8.032
Compute Time:	00h:00m:07.578s
Project Title:	Cherry Willow Recycled Water Tanks
Analysis:	WT15-WT15' - Deep bedrock - pseudo-static
Author:	RMP
Company:	GWV

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	inches/hour
Data Output:	Standard
Failure Direction:	Right to Left

Analysis Options

Analysis Methods Used	
Slices Type:	Vertical
	Spencer
Number of slices:	50
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Surface Type:	Non-Circular Block Search
Number of Surfaces:	5000
Multiple Groups:	Disabled
Pseudo-Random Surfaces:	Enabled
Convex Surfaces Only:	Disabled
Left Projection Angle (Start Angle) [°]:	141
Left Projection Angle (End Angle) [°]:	171
Right Projection Angle (Start Angle) [°]:	29

Right Projection Angle (End Angle) [°]:	61
Minimum Elevation:	Not Defined
Minimum Depth [ft]:	45
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading

Advanced seismic analysis: No
Staged pseudostatic analysis: No

Seismic Load Coefficient (Horizontal): 0.15

Loading

- 1 Distributed Load present

Distributed Load 1

Distribution:	Constant
Magnitude [psf]:	2000
Orientation:	Vertical

Materials

Property	Engineered Fill	Towsley Fm. - Across Bedding	Towsley Fm. - Parallel to Bedding	Landslide Debris	Towsley Fm. Anisotropic 6-9	Alluvium	Undocumented Fill
Color							
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Generalized Anisotropic	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft3]	130	135	135	130	135	130	130
Cohesion [psf]	200	700	150	200		150	150
Friction Angle [°]	32	36	10	30		35	35
Water Surface	None	None	None	None	None	None	None
Ru Value	0	0	0	0	0	0	0

Generalized Anisotropic Functions

Name: 6-9

Angle From	Angle To	Material
6	-90	Towsley Fm. - Across Bedding
9	6	Towsley Fm. - Parallel to Bedding
90	9	Towsley Fm. - Across Bedding

Global Minimums

Method: spencer

FS	1.256930
Axis Location:	144.661, 2127.797
Left Slip Surface Endpoint:	39.167, 1751.283
Right Slip Surface Endpoint:	382.576, 1817.493
Resisting Moment:	2.74353e+08 lb-ft
Driving Moment:	2.18272e+08 lb-ft
Resisting Horizontal Force:	631863 lb
Driving Horizontal Force:	502702 lb
Total Slice Area:	14193.5 ft2
Surface Horizontal Width:	343.409 ft
Surface Average Height:	41.331 ft

Global Minimum Coordinates

Method: spencer

X	Y
39.1666	1751.28
48.3193	1748.16
57.4721	1745.03
69.4919	1741.16
86.6806	1735.75
103.869	1730.94
117.934	1728.09
136.159	1730.08
154.364	1732.41
172.56	1734.59
190.773	1736.77
208.585	1738.68
226.397	1740.8
244.208	1742.7
262.02	1744.85
279.842	1746.73
297.665	1748.82
315.648	1751.22
333.632	1754.07
341.902	1764.62
348.234	1773.07
354.611	1781.62
363.933	1793.9
373.254	1805.86
382.576	1817.49

Valid/Invalid Surfaces

Method: spencer

Number of Valid Surfaces: 4991
Number of Invalid Surfaces: 26

Error Codes:

Error Code -108 reported for 8 surfaces
Error Code -111 reported for 18 surfaces

Error Codes

The following errors were encountered during the computation:

-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-111 = safety factor equation did not converge

Slice Data

- **Global Minimum Query (spencer) - Safety Factor: 1.25693**

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	9.15272	2190.06	-18.8599	Undocumented Fill	150	35	401.699	504.907	506.86	0	506.86	369.643	369.643
2	8.9789	6404.6	-18.8599	Undocumented Fill	150	35	831.325	1044.92	1278.08	0	1278.08	994.103	994.103
3	0.173823	165.579	-18.8599	Alluvium	150	35	1048.2	1317.51	1667.38	0	1667.38	1309.32	1309.32
4	3.0936	3198.78	-17.8341	Alluvium	150	35	1093.66	1374.65	1748.98	0	1748.98	1397.13	1397.13
5	0.956743	1085.57	-17.8341	Landslide Debris	200	30	978.471	1229.87	1783.79	0	1783.79	1469	1469
6	2.13303	2589.47	-17.8341	Towsley Fm. - Parallel to Bedding	150	10	325.195	408.747	1467.43	0	1467.43	1362.8	1362.8
7	5.8365	8296.97	-17.8341	Towsley Fm. - Across Bedding	700	36	2188.91	2751.31	2823.38	0	2823.38	2119.16	2119.16
8	8.59432	15413.4	-17.4761	Towsley Fm. - Across Bedding	700	36	2514.03	3159.96	3385.85	0	3385.85	2594.33	2594.33
9	8.59432	19297.6	-17.4761	Towsley Fm. - Across Bedding	700	36	2932.22	3685.59	4109.3	0	4109.3	3186.12	3186.12
10	8.59432	25004	-15.6281	Towsley Fm. - Across Bedding	700	36	3392.27	4263.84	4905.21	0	4905.21	3956.28	3956.28

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
11	8.59432	32925.4	-15.6281	Towsley Fm. - Across Bedding	700	36	4206.19	5286.89	6313.32	0	6313.32	5136.7	5136.7
12	7.03222	31593	-11.4503	Towsley Fm. - Across Bedding	700	36	4368.64	5491.07	6594.34	0	6594.34	5709.47	5709.47
13	7.03222	35456.4	-11.4503	Towsley Fm. - Across Bedding	700	36	4809.56	6045.28	7357.15	0	7357.15	6382.97	6382.97
14	6.07512	32959.5	6.23285	Towsley Fm. - Parallel to Bedding	150	10	849.331	1067.55	5203.68	0	5203.68	5296.44	5296.44
15	6.07512	34048.8	6.23285	Towsley Fm. - Parallel to Bedding	150	10	873.385	1097.78	5375.15	0	5375.15	5470.54	5470.54
16	6.07512	35009.8	6.23285	Towsley Fm. - Parallel to Bedding	150	10	894.604	1124.45	5526.42	0	5526.42	5624.12	5624.12
17	6.06817	35882.6	7.2881	Towsley Fm. - Parallel to Bedding	150	10	908.883	1142.4	5628.19	0	5628.19	5744.43	5744.43
18	6.06817	36748.6	7.2881	Towsley Fm. - Parallel to Bedding	150	10	927.888	1166.29	5763.68	0	5763.68	5882.35	5882.35
19	6.06817	37316.1	7.2881	Towsley Fm. - Parallel to Bedding	150	10	940.347	1181.95	5852.51	0	5852.51	5972.77	5972.77
20	9.09831	56196.6	6.80785	Towsley Fm. - Parallel to Bedding	150	10	946.751	1190	5898.16	0	5898.16	6011.18	6011.18
21	9.09831	56521.5	6.80785	Towsley Fm. - Parallel to Bedding	150	10	951.525	1196	5932.16	0	5932.16	6045.76	6045.76
22	9.10666	56896.5	6.82998	Towsley Fm. - Parallel to Bedding	150	10	956.139	1201.8	5965.04	0	5965.04	6079.56	6079.56
23	9.10666	57217.5	6.82998	Towsley Fm. - Parallel to Bedding	150	10	960.849	1207.72	5998.61	0	5998.61	6113.69	6113.69
24	8.90583	56333.3	6.12052	Towsley Fm. - Parallel to Bedding	150	10	970.754	1220.17	6069.23	0	6069.23	6173.33	6173.33
25	8.90583	57015	6.12052	Towsley Fm. - Parallel to Bedding	150	10	981.025	1233.08	6142.47	0	6142.47	6247.67	6247.67
26	8.90583	58529.5	6.79558	Towsley Fm. - Parallel to Bedding	150	10	999.674	1256.52	6275.38	0	6275.38	6394.51	6394.51
27	8.90583	59778.3	6.79558	Towsley Fm. - Parallel to Bedding	150	10	1018.41	1280.07	6408.97	0	6408.97	6530.33	6530.33
28	8.90583	60737.5	6.07793	Towsley Fm. - Parallel to Bedding	150	10	1037.42	1303.96	6544.44	0	6544.44	6654.9	6654.9
29	8.90583	61763.6	6.07793	Towsley Fm. - Parallel to Bedding	150	10	1052.89	1323.41	6654.73	0	6654.73	6766.84	6766.84
30	8.90583	62713	6.88844	Towsley Fm. - Parallel to Bedding	150	10	1061.84	1334.66	6718.53	0	6718.53	6846.81	6846.81
31	8.90583	63585.7	6.88844	Towsley Fm. - Parallel to Bedding	150	10	1074.93	1351.11	6811.82	0	6811.82	6941.68	6941.68
32	5.94075	42941	6.01975	Towsley Fm. - Parallel to Bedding	150	10	1092.64	1373.37	6938.05	0	6938.05	7053.27	7053.27
33	5.94075	43578.3	6.01975	Towsley Fm. - Parallel to Bedding	150	10	1107.05	1391.48	7040.77	0	7040.77	7157.51	7157.51
34	5.94075	44310.9	6.01975	Towsley Fm. - Parallel to Bedding	150	10	1123.61	1412.3	7158.85	0	7158.85	7277.34	7277.34
35	8.91113	67776	6.69257	Towsley Fm. - Parallel to Bedding	150	10	1138.56	1431.09	7265.4	0	7265.4	7399	7399
36	8.91113	69296.8	6.69257	Towsley Fm. - Parallel to Bedding	150	10	1161.38	1459.77	7428.09	0	7428.09	7564.37	7564.37
37	8.99182	71380.8	7.61185	Towsley Fm. - Parallel to Bedding	150	10	1176.26	1478.48	7534.16	0	7534.16	7691.35	7691.35
38	8.99182	72909.5	7.61185	Towsley Fm. - Parallel to Bedding	150	10	1198.86	1506.88	7695.24	0	7695.24	7855.46	7855.46
39	5.99455	49439.7	8.99305	Towsley Fm. - Parallel to Bedding	150	10	1206.87	1516.95	7752.36	0	7752.36	7943.36	7943.36
40	5.99455	50034.8	8.99305	Towsley Fm. - Parallel to Bedding	150	10	1219.94	1533.38	7845.54	0	7845.54	8038.61	8038.61
41	5.99455	50629.8	8.99305	Towsley Fm. - Parallel to Bedding	150	10	1233.01	1549.81	7938.73	0	7938.73	8133.87	8133.87
42	8.26966	65647.3	51.9062	Towsley Fm. - Across Bedding	700	36	2702.3	3396.6	3711.56	0	3711.56	7158.69	7158.69
43	6.33256	43584.2	53.163	Towsley Fm. - Across Bedding	700	36	2338.29	2939.07	3081.82	0	3081.82	6203.28	6203.28
44	6.37708	36601.8	53.2728	Towsley Fm. - Across Bedding	700	36	2008.44	2524.47	2511.16	0	2511.16	5203.02	5203.02
45	5.94889	27102.1	52.8082	Towsley Fm. - Across Bedding	700	36	1686.13	2119.35	1953.56	0	1953.56	4175.62	4175.62
46	0.864032	3375.65	52.8082	Towsley Fm. - Parallel to Bedding	150	10	466.475	586.327	2474.53	0	2474.53	3089.28	3089.28

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
47	2.5086	9013.11	52.8082	Landslide Debris	200	30	992.991	1248.12	1815.4	0	1815.4	3124	3124
48	9.32153	23504.4	52.0646	Landslide Debris	200	30	740.667	930.966	1266.07	0	1266.07	2216.29	2216.29
49	4.04813	5369.26	51.2954	Landslide Debris	200	30	450.27	565.958	633.858	0	633.858	1195.8	1195.8
50	5.2734	2642.68	51.2954	Engineered Fill	200	32	248.186	311.953	179.162	0	179.162	488.898	488.898

Interslice Data

- **Global Minimum Query (spencer) - Safety Factor: 1.25693**

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	39.1666	1751.28	0	0	0
2	48.3193	1748.16	4932.85	1193.23	13.5983
3	57.2982	1745.09	15356.6	3714.67	13.5983
4	57.4721	1745.03	15613	3776.69	13.5983
5	60.5657	1744.03	20257.2	4900.11	13.5983
6	61.5224	1743.73	21579.6	5219.98	13.5983
7	63.6554	1743.04	22891.8	5537.4	13.5983
8	69.4919	1741.16	39724.5	9609.12	13.5983
9	78.0863	1738.46	68180.5	16492.5	13.5983
10	86.6806	1735.75	101605	24577.8	13.5984
11	95.2749	1733.35	138802	33575.4	13.5983
12	103.869	1730.94	185191	44796.6	13.5983
13	110.901	1729.52	220566	53353.6	13.5983
14	117.934	1728.09	259549	62783.3	13.5983
15	124.009	1728.76	256312	62000.4	13.5983
16	130.084	1729.42	252944	61185.7	13.5983
17	136.159	1730.08	249461	60343.1	13.5983
18	142.227	1730.86	245226	59318.7	13.5983
19	148.295	1731.64	240871	58265.4	13.5983
20	154.364	1732.41	236438	57193	13.5983
21	163.462	1733.5	230216	55687.9	13.5983
22	172.56	1734.59	223952	54172.6	13.5983
23	181.667	1735.68	217618	52640.6	13.5983
24	190.773	1736.77	211243	51098.4	13.5983
25	199.679	1737.72	205642	49743.7	13.5983
26	208.585	1738.68	199961	48369.4	13.5983
27	217.491	1739.74	193425	46788.3	13.5983
28	226.397	1740.8	186726	45168	13.5983
29	235.303	1741.75	180649	43697.9	13.5983
30	244.208	1742.7	174450	42198.5	13.5983
31	253.114	1743.77	167272	40462	13.5983
32	262.02	1744.85	159978	38697.8	13.5983
33	267.961	1745.47	155681	37658.5	13.5984
34	273.902	1746.1	151311	36601.2	13.5983
35	279.842	1746.73	146854	35523.2	13.5983
36	288.754	1747.77	139237	33680.6	13.5983
37	297.665	1748.82	131424	31790.8	13.5983
38	306.656	1750.02	122240	29569.3	13.5984
39	315.648	1751.22	112837	27294.6	13.5983
40	321.643	1752.17	105301	25471.7	13.5983
41	327.637	1753.12	97665.7	23624.8	13.5983
42	333.632	1754.07	89931.2	21753.8	13.5983
43	341.902	1764.62	63278	15306.6	13.5983
44	348.234	1773.07	45495.5	11005.1	13.5983
45	354.611	1781.62	31350.3	7583.46	13.5983
46	360.56	1789.46	22000.3	5321.74	13.5983
47	361.424	1790.6	19079.3	4615.18	13.5983
48	363.933	1793.9	14216.8	3438.96	13.5983
49	373.254	1805.86	2454.65	593.767	13.5983
50	377.302	1810.91	269.732	65.2466	13.5983
51	382.576	1817.49	0	0	0

Entity Information

Group: Removals Slots

Shared Entities

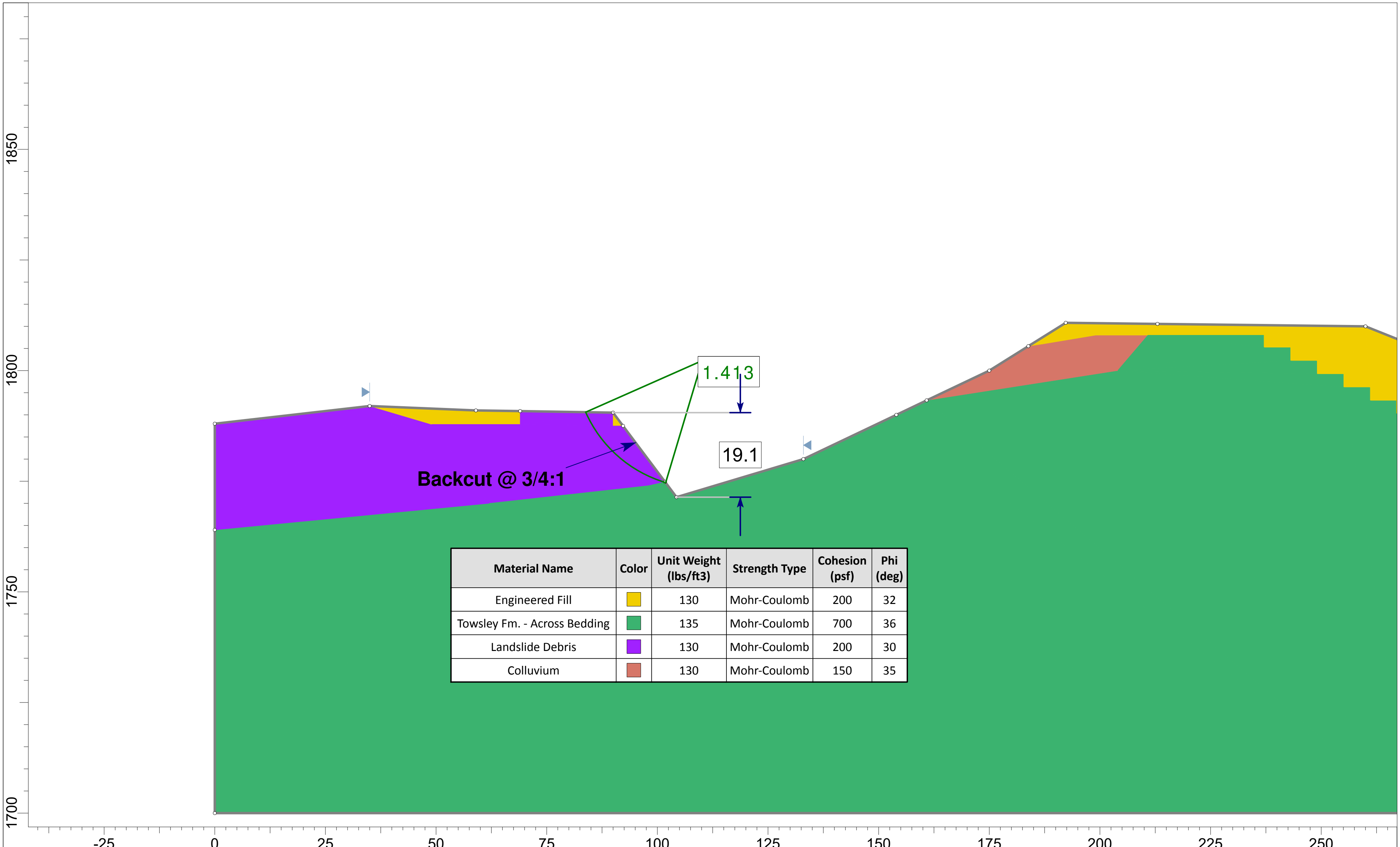
Type	X	Y
External Boundary	0	1600
	118	1600
	142.82	1600
	750	1600
	750	1796.64
	750	1804
	729	1810
	709	1815.5
	696	1815.5
	682	1820
	674	1822.35
	665	1825
	647	1829
	637	1829
	623	1826
	608	1825
	574	1810
	571	1809
	569	1810
	565	1810
	510	1810
	503.637	1810
	471	1810
	453	1810
	445	1809
	438	1808.5
	416	1808.88
	409	1809
	381	1818
	347	1821.5
	340	1820
	305	1810
	267	1800
	240	1794.49
	218	1790
	203	1786
	149	1778
	123	1770
	97	1760
	91	1756
	84	1754
	76	1753.52
	24	1750.36
	18	1750
	3	1750
	0	1756
Material Boundary	118	1600
	118	1707.04
	118	1716.04
	118	1733.04
	422.401	1762.72
Material Boundary	374.004	1741
	387.309	1742.3

Type	Coordinates X	Coordinates Y
Material Boundary	118	1716.04
	374.004	1741
Material Boundary	118	1707.04
	368.737	1731.49
Material Boundary	142.82	1600
	368.737	1731.49
	387.309	1742.3
	422.401	1762.72
	503.637	1810
Material Boundary	44	1746.7
	57	1742
	221.835	1767.77
	428	1800
	442.345	1802.71
	457.15	1805.5
Material Boundary	24	1750.36
	44	1746.7
	44.1834	1746.67
	57	1745
	68.0457	1748.3
	76	1753.52
Material Boundary	57	1742
	59.4618	1743.4
	68.0457	1748.3
Material Boundary	347	1821.5
	396	1804.38
	416	1804.38
	416	1808.88
Material Boundary	438	1808.5
	438	1805.5
	440.25	1805.5
	451.85	1805.5
	457.15	1805.5
	458	1805.5
	471	1810
Material Boundary	674	1822.35
	674	1817.35
	750	1796.64
Material Boundary	59.4618	1743.4
	223.964	1769.11
	428	1801
	441.688	1803.58
	451.85	1805.5

Type	Coordinates	
	X	Y
Material Boundary	438	1808.5
	440.25	1805.5
	441.688	1803.58
	442.345	1802.71
	X	Y
Material Boundary	221.835	1767.77
	223.964	1769.11
	226.819	1770.92
	230.899	1774.6
	235.205	1780.95
	238.691	1788.63
	240	1794.49

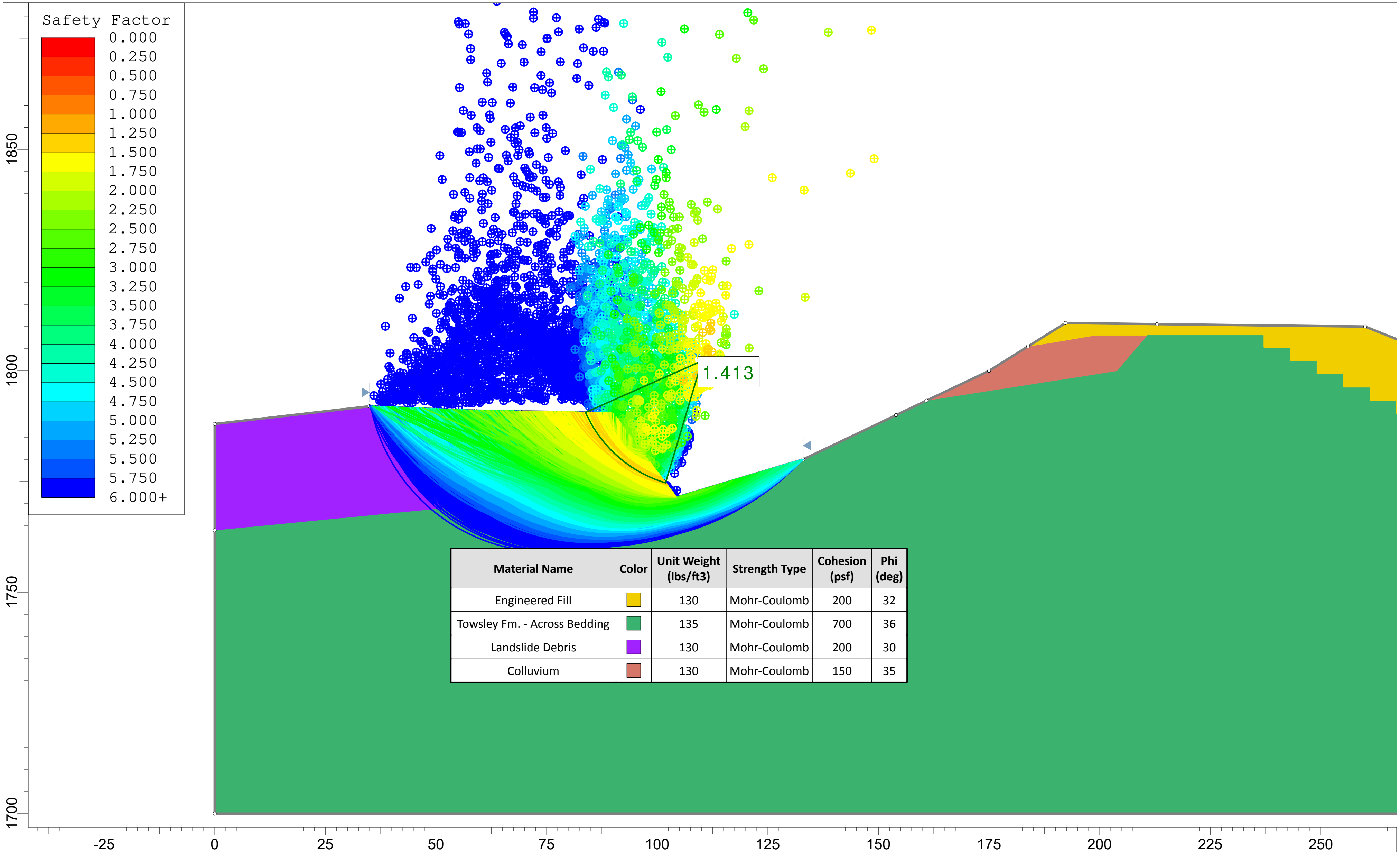
Scenario-based Entities

Type	Coordinates		unox pseudo
	X	Y	
Distributed Load	510	1810	Constant Distribution Orientation: Vertical Magnitude: 2000 lbs/ft2 Creates Excess Pore Pressure: No
	565	1810	
	X	Y	
Block Search Window	118	1733.04	✓
	118	1716.04	
	184.359	1722.51	
	184.359	1739.51	
	X	Y	
Block Search Window	221.396	1743.12	✓
	221.396	1726.12	
	387.309	1742.3	
	422.401	1762.72	



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Engineered Fill		130	Mohr-Coulomb	200	32
Towsley Fm. - Across Bedding		135	Mohr-Coulomb	700	36
Landslide Debris		130	Mohr-Coulomb	200	30
Colluvium		130	Mohr-Coulomb	150	35

rocscience	*Project*	Cherry Willow Recycled Water Tanks	
	Analysis Description	R1-R1' - 3/4:1 Backcut; H=20 ft	
	Drawn By RMP	*Scale* 1:360	*Company* GWV
SLIDEINTERPRET 8.032	*Date*		*File Name* R1.slmd



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Engineered Fill		130	Mohr-Coulomb	200	32
Towsley Fm. - Across Bedding		135	Mohr-Coulomb	700	36
Landslide Debris		130	Mohr-Coulomb	200	30
Colluvium		130	Mohr-Coulomb	150	35

rocscience

SLIDEINTERPRET 8.032

Project	Cherry Willow Recycled Water Tanks		
Analysis Description	R1-R1' - 3/4:1 Backcut; H= 20 ft		
Drawn By RMP	*Scale* 1:360	*Company* GWV	
Date		*File Name* R1.slmd	

Slide Analysis Information

R1

Project Summary

File Name:	R1.slmd
Slide Modeler Version:	8.032
Compute Time:	00h:00m:00.942s
Project Title:	Cherry Willow Recycled Water Tanks
Analysis:	R1-R1' - 3/4:1 Backcut; H=20 ft
Author:	RMP
Company:	GWV

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	inches/hour
Data Output:	Standard
Failure Direction:	Left to Right

Analysis Options

Analysis Methods Used	
Slices Type:	Vertical
	Bishop simplified
	Spencer
Number of slices:	20
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Surface Type:	Circular
Search Method:	Slope Search
Number of Surfaces:	5000
Upper Angle [°]:	Not Defined
Lower Angle [°]:	Not Defined
Composite Surfaces:	Disabled
Reverse Curvature:	Create Tension Crack

Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading

Advanced seismic analysis:	No
Staged pseudostatic analysis:	No

Materials

Property	Engineered Fill	Towsley Fm. - Across Bedding	Landslide Debris	Colluvium
Color				
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft3]	130	135	130	130
Cohesion [psf]	200	700	200	150
Friction Angle [°]	32	36	30	35
Water Surface	None	None	None	None
Ru Value	0	0	0	0

Global Minimums

Method: bishop simplified

FS	1.415470
Center:	110.111, 1802.253
Radius:	28.783
Left Slip Surface Endpoint:	83.793, 1790.600
Right Slip Surface Endpoint:	101.868, 1774.676
Resisting Moment:	303875 lb-ft
Driving Moment:	214682 lb-ft
Total Slice Area:	91.2049 ft2
Surface Horizontal Width:	18.0756 ft
Surface Average Height:	5.04575 ft

Method: spencer

FS	1.412790
Center:	110.111, 1802.253
Radius:	28.783
Left Slip Surface Endpoint:	83.793, 1790.600
Right Slip Surface Endpoint:	101.868, 1774.676
Resisting Moment:	303301 lb-ft
Driving Moment:	214682 lb-ft
Resisting Horizontal Force:	7992.13 lb
Driving Horizontal Force:	5656.98 lb
Total Slice Area:	91.2049 ft2
Surface Horizontal Width:	18.0756 ft
Surface Average Height:	5.04575 ft

Valid/Invalid Surfaces

Method: bishop simplified

Number of Valid Surfaces:	4851
Number of Invalid Surfaces:	149

Error Codes:

Error Code -105 reported for 1 surface
Error Code -106 reported for 68 surfaces
Error Code -108 reported for 30 surfaces
Error Code -112 reported for 49 surfaces
Error Code -123 reported for 1 surface

Method: spencer

Number of Valid Surfaces: 4099
Number of Invalid Surfaces: 901

Error Codes:

Error Code -105 reported for 1 surface
Error Code -106 reported for 68 surfaces
Error Code -108 reported for 106 surfaces
Error Code -111 reported for 676 surfaces
Error Code -112 reported for 49 surfaces
Error Code -123 reported for 1 surface

Error Codes

The following errors were encountered during the computation:

-105 = More than two surface / slope intersections with no valid slip surface.
-106 = Average slice width is less than 0.0001 * (maximum horizontal extent of soil region). This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-111 = safety factor equation did not converge
-112 = The coefficient M-Alpha = cos(alpha)(1+tan(alpha)tan(phi)/F) < 0.2 for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.
-123 = Surface radius equal or less than the internal cutoff of 0.01.

Slice Data

- **Global Minimum Query (bishop simplified) - Safety Factor: 1.41547**

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	0.933011	115.097	-63.9994	Landslide Debris	200	30	104.449	147.844	-90.3373	0	-90.3373	123.808	123.808
2	0.933011	327.372	-60.0217	Landslide Debris	200	30	166.751	236.031	62.4073	0	62.4073	351.481	351.481
3	0.933011	509.064	-56.481	Landslide Debris	200	30	225.358	318.987	206.092	0	206.092	546.324	546.324
4	0.933011	668.43	-53.2469	Landslide Debris	200	30	280.588	397.164	341.497	0	341.497	717.208	717.208
5	0.933011	810.386	-50.2426	Landslide Debris	200	30	332.762	471.014	469.41	0	469.41	869.407	869.407
6	0.933011	938.149	-47.4178	Landslide Debris	200	30	382.161	540.937	590.52	0	590.52	1006.38	1006.38
7	0.933011	1044.99	-44.7378	Landslide Debris	200	30	426.227	603.312	698.557	0	698.557	1120.9	1120.9
8	0.933011	1033.22	-42.1772	Landslide Debris	200	30	433.224	613.216	715.712	0	715.712	1108.22	1108.22
9	0.933011	980.599	-39.7166	Landslide Debris	200	30	425.958	602.931	697.897	0	697.897	1051.74	1051.74
10	0.933011	919.883	-37.3412	Landslide Debris	200	30	414.671	586.955	670.225	0	670.225	986.591	986.591
11	0.933011	851.841	-35.0388	Landslide Debris	200	30	399.633	565.669	633.358	0	633.358	913.588	913.588
12	0.933011	777.094	-32.7996	Landslide Debris	200	30	381.062	539.382	587.827	0	587.827	833.401	833.401
13	0.933011	696.155	-30.6157	Landslide Debris	200	30	359.131	508.339	534.06	0	534.06	746.582	746.582
14	0.933011	609.447	-28.48	Landslide Debris	200	30	333.98	472.739	472.398	0	472.398	653.583	653.583
15	0.933011	517.327	-26.3867	Landslide Debris	200	30	305.72	432.738	403.115	0	403.115	554.787	554.787
16	0.933011	420.095	-24.3308	Landslide Debris	200	30	274.44	388.461	326.425	0	326.425	450.517	450.517
17	0.933011	318.007	-22.3078	Landslide Debris	200	30	240.205	340.003	242.493	0	242.493	341.046	341.046
18	0.933011	211.28	-20.3137	Landslide Debris	200	30	203.064	287.432	151.436	0	151.436	226.607	226.607
19	0.933011	100.101	-18.345	Landslide Debris	200	30	163.05	230.793	53.3347	0	53.3347	107.401	107.401
20	0.348381	8.21198	-17.004	Towsley Fm. - Across Bedding	700	36	438.023	620.009	-110.099	0	-110.099	23.8519	23.8519

- **Global Minimum Query (spencer) - Safety Factor: 1.41279**

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	0.933011	115.097	-63.9994	Landslide Debris	200	30	133.137	188.094	-20.6213	0	-20.6213	252.342	252.342
2	0.933011	327.372	-60.0217	Landslide Debris	200	30	173.298	244.833	77.6533	0	77.6533	378.076	378.076
3	0.933011	509.064	-56.481	Landslide Debris	200	30	216.082	305.279	182.349	0	182.349	508.579	508.579
4	0.933011	668.43	-53.2469	Landslide Debris	200	30	259.878	367.153	289.517	0	289.517	637.497	637.497
5	0.933011	810.386	-50.2426	Landslide Debris	200	30	303.977	429.455	397.427	0	397.427	762.823	762.823
6	0.933011	938.149	-47.4178	Landslide Debris	200	30	348.045	491.715	505.266	0	505.266	883.999	883.999
7	0.933011	1044.99	-44.7378	Landslide Debris	200	30	389.687	550.546	607.163	0	607.163	993.3	993.3
8	0.933011	1033.22	-42.1772	Landslide Debris	200	30	402.365	568.457	638.186	0	638.186	1002.74	1002.74
9	0.933011	980.599	-39.7166	Landslide Debris	200	30	403.049	569.424	639.861	0	639.861	974.677	974.677
10	0.933011	919.883	-37.3412	Landslide Debris	200	30	399.813	564.852	631.943	0	631.943	936.973	936.973

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
11	0.933011	851.841	-35.0388	Landslide Debris	200	30	392.739	554.858	614.632	0	614.632	890.027	890.027
12	0.933011	777.094	-32.7996	Landslide Debris	200	30	381.866	539.496	588.024	0	588.024	834.117	834.117
13	0.933011	696.155	-30.6157	Landslide Debris	200	30	367.194	518.768	552.122	0	552.122	769.416	769.416
14	0.933011	609.447	-28.48	Landslide Debris	200	30	348.691	492.627	506.844	0	506.844	696.01	696.01
15	0.933011	517.327	-26.3867	Landslide Debris	200	30	326.29	460.979	452.029	0	452.029	613.906	613.906
16	0.933011	420.095	-24.3308	Landslide Debris	200	30	299.892	423.685	387.433	0	387.433	523.034	523.034
17	0.933011	318.007	-22.3078	Landslide Debris	200	30	269.366	380.558	312.736	0	312.736	423.254	423.254
18	0.933011	211.28	-20.3137	Landslide Debris	200	30	234.546	331.364	227.53	0	227.53	314.355	314.355
19	0.933011	100.101	-18.345	Landslide Debris	200	30	195.227	275.815	131.315	0	131.315	196.05	196.05
20	0.348381	8.21198	-17.004	Towsley Fm. - Across Bedding	700	36	583.849	824.856	171.849	0	171.849	350.394	350.394

Interslice Data

- **Global Minimum Query (bishop simplified) - Safety Factor: 1.41547**

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	83.7927	1790.6	0	0	0
2	84.7257	1788.69	-270.054	0	0
3	85.6587	1787.07	-324.37	0	0
4	86.5917	1785.66	-243.888	0	0
5	87.5247	1784.41	-78.4951	0	0
6	88.4577	1783.29	138.141	0	0
7	89.3907	1782.28	381.867	0	0
8	90.3237	1781.35	630.848	0	0
9	91.2568	1780.51	832.499	0	0
10	92.1898	1779.73	976.818	0	0
11	93.1228	1779.02	1067.82	0	0
12	94.0558	1778.36	1110.1	0	0
13	94.9888	1777.76	1108.76	0	0
14	95.9218	1777.21	1069.25	0	0
15	96.8548	1776.7	997.406	0	0
16	97.7878	1776.24	899.356	0	0
17	98.7208	1775.82	781.547	0	0
18	99.6539	1775.44	650.728	0	0
19	100.587	1775.09	513.967	0	0
20	101.52	1774.78	378.658	0	0
21	101.868	1774.68	0	0	0

- **Global Minimum Query (spencer) - Safety Factor: 1.41279**

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	83.7927	1790.6	0	0	0
2	84.7257	1788.69	-163.313	-95.9185	30.427
3	85.6587	1787.07	-198.945	-116.846	30.4269
4	86.5917	1785.66	-143.123	-84.0604	30.427
5	87.5247	1784.41	-23.2083	-13.6309	30.4269
6	88.4577	1783.29	139.706	82.0535	30.427
7	89.3907	1782.28	328.879	193.16	30.4269
8	90.3237	1781.35	527.654	309.906	30.4269
9	91.2568	1780.51	692.781	406.89	30.4269
10	92.1898	1779.73	813.725	477.924	30.4269
11	93.1228	1779.02	891.582	523.651	30.4269
12	94.0558	1778.36	928.307	545.221	30.4269
13	94.9888	1777.76	926.595	544.216	30.4269
14	95.9218	1777.21	889.81	522.61	30.4269
15	96.8548	1776.7	821.943	482.75	30.4269
16	97.7878	1776.24	727.608	427.345	30.4269
17	98.7208	1775.82	612.045	359.471	30.4269
18	99.6539	1775.44	481.151	282.594	30.427
19	100.587	1775.09	341.521	200.585	30.4269
20	101.52	1774.78	200.514	117.767	30.4268
21	101.868	1774.68	0	0	0

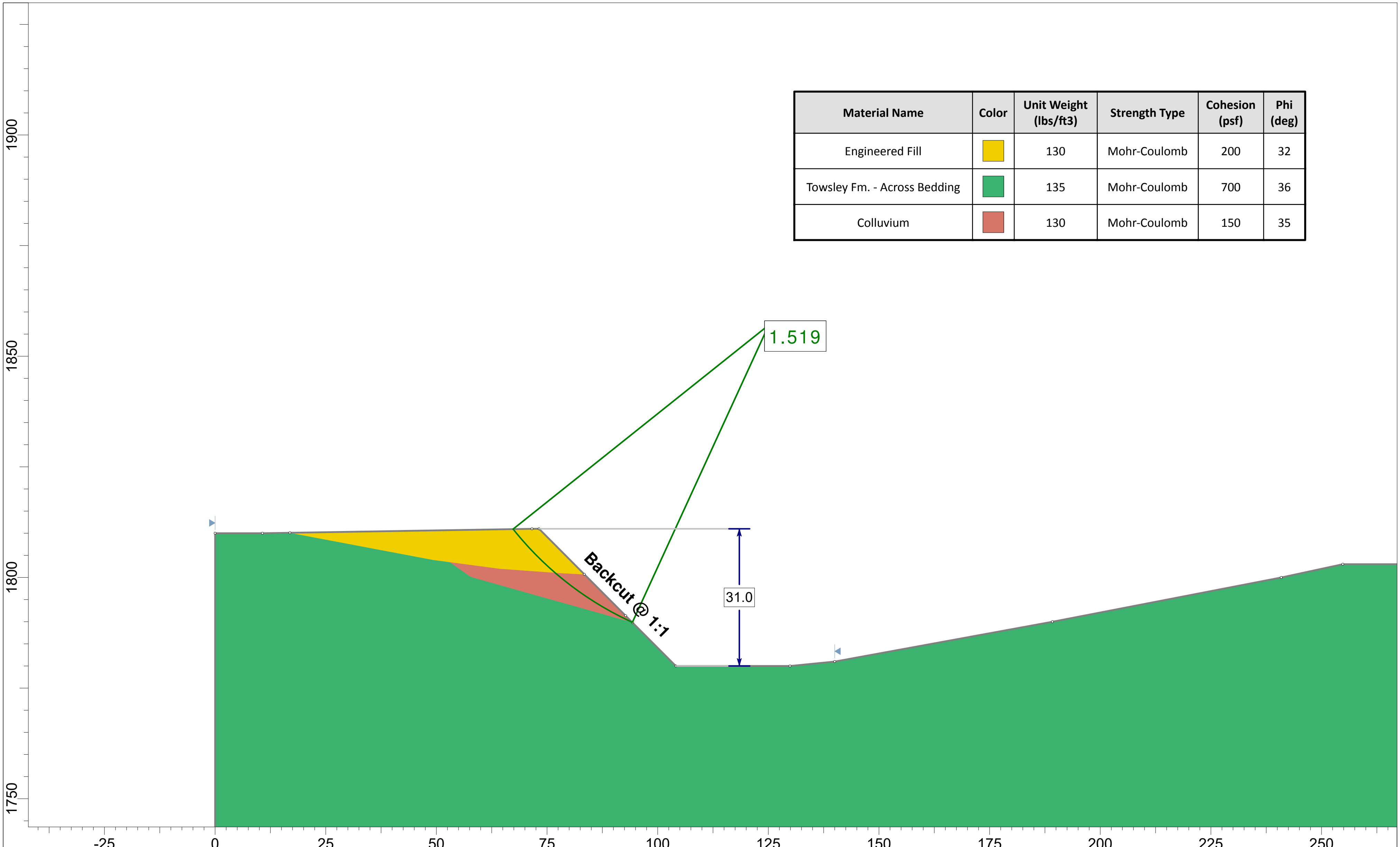
Entity Information

Group: Full Removal

Shared Entities

Type	Coordinates
External Boundary	X, Y: 260, 1810; 213, 1810.55; 192.26, 1810.79; 183.816, 1805.51; 175, 1800; 160.837, 1793.26; 154, 1790; 133, 1780; 104.327, 1771.4; 101.75, 1774.83; 92.25, 1787.5; 90, 1790.5; 69, 1790.84; 59, 1791; 35, 1792; 0, 1788; 0, 1764; 0, 1700; 270, 1700; 270, 1790.27; 270, 1806
Material Boundary	X, Y: 0, 1764; 62, 1770; 98, 1774; 101.75, 1774.83
Material Boundary	X, Y: 160.837, 1793.26; 204, 1800; 210.827, 1808; 213, 1810.55
Material Boundary	X, Y: 90, 1790.5; 90, 1787.5; 92.25, 1787.5
Material Boundary	X, Y: 35, 1792; 49, 1787.84; 69, 1787.84; 69, 1790.84

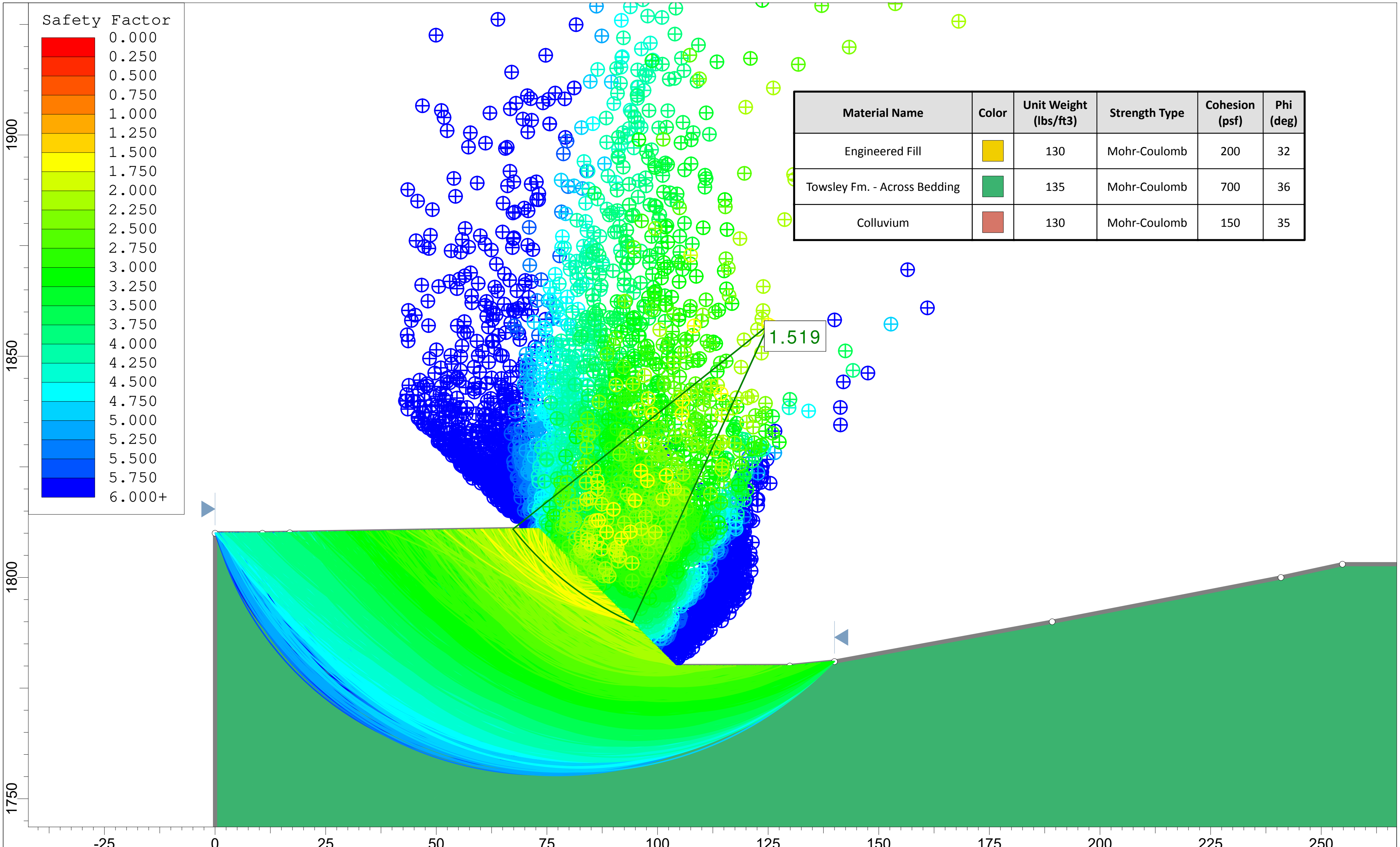
Type	Coordinates X	Coordinates Y
Material Boundary	183.816	1805.51
	187	1806
	199	1808
	210.827	1808
	237	1808
	237	1805.27
	243	1805.27
	243	1802.27
	249	1802.27
	249	1799.27
	255	1799.27
	255	1796.27
	261	1796.27
	261	1793.27
	267	1793.27
	267	1790.27
	270	1790.27



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Engineered Fill		130	Mohr-Coulomb	200	32
Towsley Fm. - Across Bedding		135	Mohr-Coulomb	700	36
Colluvium		130	Mohr-Coulomb	150	35

Project	Cherry Willow Water Tanks		
Analysis Description	R3-R3' - 1:1 Backcut; H=30 ft		
Drawn By RMP	*Scale* 1:360	*Company*	GWV
Date		*File Name*	R3.slmd

SLIDEINTERPRET 8.032



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Engineered Fill		130	Mohr-Coulomb	200	32
Towsley Fm. - Across Bedding		135	Mohr-Coulomb	700	36
Colluvium		130	Mohr-Coulomb	150	35

rocscience	*Project*	Cherry Willow Water Tanks	
	Analysis Description	R3-R3' - 1:1 Backcut; H= 30 ft	
	Drawn By RMP	*Scale* 1:360	*Company* GWV
SLIDEINTERPRET 8.032	*Date*		*File Name* R3.slmd

Slide Analysis Information

R3

Project Summary

File Name:	R3.slmd
Slide Modeler Version:	8.032
Compute Time:	00h:00m:01.255s
Project Title:	Cherry Willow Water Tanks
Analysis:	R3-R3' - 1:1 Backcut; H=30 ft
Author:	RMP
Company:	GWV

General Settings

Units of Measurement:	Imperial Units
Time Units:	days
Permeability Units:	inches/hour
Data Output:	Standard
Failure Direction:	Left to Right

Analysis Options

Analysis Methods Used	
Slices Type:	Vertical
	Bishop simplified
	Spencer
Number of slices:	20
Tolerance:	0.005
Maximum number of iterations:	75
Check malpha < 0.2:	Yes
Create Interslice boundaries at intersections with water tables and piezos:	Yes
Initial trial value of FS:	1
Steffensen Iteration:	Yes

Groundwater Analysis

Groundwater Method:	Water Surfaces
Pore Fluid Unit Weight [lbs/ft3]:	62.4
Use negative pore pressure cutoff:	Yes
Maximum negative pore pressure [psf]:	0
Advanced Groundwater Method:	None

Random Numbers

Pseudo-random Seed:	10116
Random Number Generation Method:	Park and Miller v.3

Surface Options

Surface Type:	Circular
Search Method:	Slope Search
Number of Surfaces:	5000
Upper Angle [°]:	Not Defined
Lower Angle [°]:	Not Defined
Composite Surfaces:	Disabled
Reverse Curvature:	Create Tension Crack

Minimum Elevation:	Not Defined
Minimum Depth:	Not Defined
Minimum Area:	Not Defined
Minimum Weight:	Not Defined

Seismic Loading

Advanced seismic analysis:	No
Staged pseudostatic analysis:	No

Materials

Property	Engineered Fill	Towsley Fm. - Across Bedding	Colluvium
Color			
Strength Type	Mohr-Coulomb	Mohr-Coulomb	Mohr-Coulomb
Unit Weight [lbs/ft3]	130	135	130
Cohesion [psf]	200	700	150
Friction Angle [°]	32	36	35
Water Surface	None	None	None
Ru Value	0	0	0

Global Minimums

Method: bishop simplified

FS	1.518990
Center:	125.101, 1857.061
Radius:	73.934
Left Slip Surface Endpoint:	67.324, 1810.930
Right Slip Surface Endpoint:	94.271, 1789.861
Resisting Moment:	986769 lb-ft
Driving Moment:	649621 lb-ft
Total Slice Area:	108.681 ft2
Surface Horizontal Width:	26.9474 ft
Surface Average Height:	4.03308 ft

Method: spencer

FS	1.516650
Center:	125.101, 1857.061
Radius:	73.934
Left Slip Surface Endpoint:	67.324, 1810.930
Right Slip Surface Endpoint:	94.271, 1789.861
Resisting Moment:	985247 lb-ft
Driving Moment:	649621 lb-ft
Resisting Horizontal Force:	10384 lb
Driving Horizontal Force:	6846.67 lb
Total Slice Area:	108.681 ft2
Surface Horizontal Width:	26.9474 ft
Surface Average Height:	4.03308 ft

Valid/Invalid Surfaces

Method: bishop simplified

Number of Valid Surfaces:	4645
Number of Invalid Surfaces:	355

Error Codes:

Error Code -101 reported for 1 surface
Error Code -105 reported for 2 surfaces
Error Code -106 reported for 61 surfaces
Error Code -107 reported for 55 surfaces
Error Code -108 reported for 79 surfaces

Error Code -109 reported for 1 surface
Error Code -112 reported for 156 surfaces

Method: spencer

Number of Valid Surfaces: 3674
Number of Invalid Surfaces: 1326

Error Codes:

Error Code -101 reported for 1 surface
Error Code -105 reported for 2 surfaces
Error Code -106 reported for 61 surfaces
Error Code -107 reported for 55 surfaces
Error Code -108 reported for 105 surfaces
Error Code -109 reported for 1 surface
Error Code -111 reported for 945 surfaces
Error Code -112 reported for 156 surfaces

Error Codes

The following errors were encountered during the computation:

-101 = Only one (or zero) surface / slope intersections.
-105 = More than two surface / slope intersections with no valid slip surface.
-106 = Average slice width is less than 0.0001 * (maximum horizontal extent of soil region). This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
-107 = Total driving moment or total driving force is negative. This will occur if the wrong failure direction is specified, or if high external or anchor loads are applied against the failure direction.
-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-109 = Soiltype for slice base not located. This error should occur very rarely, if at all. It may occur if a very low number of slices is combined with certain soil geometries, such that the midpoint of a slice base is actually outside the soil region,even though the slip surface is wholly within the soil region.
-111 = safety factor equation did not converge
-112 = The coefficient M-Alpha = cos(alpha)(1+tan(alpha)tan(phi)/F) < 0.2 for the final iteration of the safety factor calculation. This screens out some slip surfaces which may not be valid in the context of the analysis, in particular, deep seated slip surfaces with many high negative base angle slices in the passive zone.

Slice Data

- **Global Minimum Query (bishop simplified) - Safety Factor: 1.51899**

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	1.35212	146.466	-50.5696	Engineered Fill	200	32	117.465	178.428	-34.5232	0	-34.5232	108.326	108.326
2	1.35212	431.332	-48.947	Engineered Fill	200	32	178.557	271.226	113.986	0	113.986	319.008	319.008
3	1.35212	700.803	-47.3755	Engineered Fill	200	32	238.347	362.046	259.327	0	259.327	518.305	518.305
4	1.35212	955.487	-45.8497	Engineered Fill	200	32	296.658	450.62	401.076	0	401.076	706.665	706.665
5	1.35212	1143.52	-44.3646	Engineered Fill	200	32	341.982	519.467	511.255	0	511.255	845.735	845.735
6	1.35212	1145.63	-42.9163	Engineered Fill	200	32	347.357	527.632	524.321	0	524.321	847.29	847.29
7	1.35212	1122.8	-41.5014	Engineered Fill	200	32	346.981	527.061	523.406	0	523.406	830.404	830.404
8	1.34481	1083.83	-40.1203	Colluvium	150	35	338.695	514.475	520.525	0	520.525	805.939	805.939
9	1.34481	1041.41	-38.7705	Colluvium	150	35	332.587	505.196	507.272	0	507.272	774.397	774.397
10	1.34481	989.962	-37.4458	Colluvium	150	35	323.784	491.824	488.175	0	488.175	736.137	736.137
11	1.34481	929.954	-36.1442	Colluvium	150	35	312.352	474.459	463.376	0	463.376	691.515	691.515
12	1.34481	861.817	-34.8638	Colluvium	150	35	298.348	453.188	432.997	0	432.997	640.848	640.848
13	1.34481	785.931	-33.603	Colluvium	150	35	281.825	428.09	397.153	0	397.153	584.419	584.419
14	1.34481	702.636	-32.3605	Colluvium	150	35	262.827	399.232	355.94	0	355.94	522.481	522.481
15	1.34481	612.241	-31.1348	Colluvium	150	35	241.394	366.675	309.445	0	309.445	455.263	455.263
16	1.34481	515.021	-29.9247	Colluvium	150	35	217.561	330.473	257.742	0	257.742	382.97	382.97
17	1.34481	411.227	-28.7292	Colluvium	150	35	191.357	290.67	200.897	0	200.897	305.789	305.789
18	1.34481	301.088	-27.5473	Colluvium	150	35	162.809	247.305	138.966	0	138.966	223.889	223.889
19	1.34481	184.809	-26.3779	Colluvium	150	35	131.937	200.411	71.9943	0	71.9943	137.425	137.425
20	1.34481	62.5798	-25.2202	Colluvium	150	35	98.759	150.014	0.0199123	0	0.0199123	46.535	46.535

- **Global Minimum Query (spencer) - Safety Factor: 1.51665**

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
1	1.35212	146.466	-50.5696	Engineered Fill	200	32	133.865	203.026	4.84201	0	4.84201	167.635	167.635
2	1.35212	431.332	-48.947	Engineered Fill	200	32	183.672	278.566	125.732	0	125.732	336.629	336.629
3	1.35212	700.803	-47.3755	Engineered Fill	200	32	233.47	354.093	246.601	0	246.601	500.281	500.281
4	1.35212	955.487	-45.8497	Engineered Fill	200	32	283.103	429.368	367.066	0	367.066	658.692	658.692
5	1.35212	1143.52	-44.3646	Engineered Fill	200	32	322.949	489.801	463.778	0	463.778	779.643	779.643

Slice Number	Width [ft]	Weight [lbs]	Angle of Slice Base [degrees]	Base Material	Base Cohesion [psf]	Base Friction Angle [degrees]	Shear Stress [psf]	Shear Strength [psf]	Base Normal Stress [psf]	Pore Pressure [psf]	Effective Normal Stress [psf]	Base Vertical Stress [psf]	Effective Vertical Stress [psf]
6	1.35212	1145.63	-42.9163	Engineered Fill	200	32	329.941	500.405	480.749	0	480.749	787.524	787.524
7	1.35212	1122.8	-41.5014	Engineered Fill	200	32	332.129	503.723	486.058	0	486.058	779.914	779.914
8	1.34481	1083.83	-40.1203	Colluvium	150	35	323.991	491.381	487.543	0	487.543	760.566	760.566
9	1.34481	1041.41	-38.7705	Colluvium	150	35	321.305	487.307	481.725	0	481.725	739.789	739.789
10	1.34481	989.962	-37.4458	Colluvium	150	35	316.087	479.394	470.424	0	470.424	712.491	712.491
11	1.34481	929.954	-36.1442	Colluvium	150	35	308.321	467.615	453.601	0	453.601	678.797	678.797
12	1.34481	861.817	-34.8638	Colluvium	150	35	297.982	451.934	431.206	0	431.206	638.801	638.801
13	1.34481	785.931	-33.603	Colluvium	150	35	285.041	432.308	403.178	0	403.178	592.581	592.581
14	1.34481	702.636	-32.3605	Colluvium	150	35	269.468	408.689	369.447	0	369.447	540.196	540.196
15	1.34481	612.241	-31.1348	Colluvium	150	35	251.225	381.02	329.931	0	329.931	481.687	481.687
16	1.34481	515.021	-29.9247	Colluvium	150	35	230.268	349.236	284.538	0	284.538	417.081	417.081
17	1.34481	411.227	-28.7292	Colluvium	150	35	206.551	313.265	233.166	0	233.166	346.386	346.386
18	1.34481	301.088	-27.5473	Colluvium	150	35	180.02	273.028	175.702	0	175.702	269.604	269.604
19	1.34481	184.809	-26.3779	Colluvium	150	35	150.62	228.438	112.021	0	112.021	186.717	186.717
20	1.34481	62.5798	-25.2202	Colluvium	150	35	121.267	183.919	48.4421	0	48.4421	105.558	105.558

Interslice Data

- **Global Minimum Query (bishop simplified) - Safety Factor: 1.51899**

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	67.324	1810.93	0	0	0
2	68.6761	1809.29	-215.59	0	0
3	70.0282	1807.73	-280.05	0	0
4	71.3803	1806.26	-221.324	0	0
5	72.7325	1804.87	-63.8047	0	0
6	74.0846	1803.55	149.915	0	0
7	75.4367	1802.29	339.423	0	0
8	76.7888	1801.1	496.427	0	0
9	78.1336	1799.96	630.84	0	0
10	79.4784	1798.88	731.494	0	0
11	80.8233	1797.85	798.841	0	0
12	82.1681	1796.87	833.941	0	0
13	83.5129	1795.93	838.396	0	0
14	84.8577	1795.04	814.294	0	0
15	86.2025	1794.19	764.159	0	0
16	87.5473	1793.37	690.914	0	0
17	88.8921	1792.6	597.851	0	0
18	90.237	1791.86	488.608	0	0
19	91.5818	1791.16	367.145	0	0
20	92.9266	1790.49	237.732	0	0
21	94.2714	1789.86	0	0	0

- **Global Minimum Query (spencer) - Safety Factor: 1.51665**

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
1	67.324	1810.93	0	0	0
2	68.6761	1809.29	-173.2	-90.2755	27.5295
3	70.0282	1807.73	-226.565	-118.09	27.5294
4	71.3803	1806.26	-180.231	-93.9401	27.5295
5	72.7325	1804.87	-52.1024	-27.1568	27.5294
6	74.0846	1803.55	124.169	64.7193	27.5294
7	75.4367	1802.29	282.041	147.005	27.5294
8	76.7888	1801.1	414.039	215.805	27.5294
9	78.1336	1799.96	530.452	276.483	27.5295
10	79.4784	1798.88	618.292	322.266	27.5294
11	80.8233	1797.85	677.319	353.033	27.5295
12	82.1681	1796.87	707.861	368.952	27.5295
13	83.5129	1795.93	710.767	370.467	27.5295
14	84.8577	1795.04	687.375	358.274	27.5295
15	86.2025	1794.19	639.489	333.315	27.5295
16	87.5473	1793.37	569.359	296.761	27.5294
17	88.8921	1792.6	479.669	250.013	27.5294

Slice Number	X coordinate [ft]	Y coordinate - Bottom [ft]	Interslice Normal Force [lbs]	Interslice Shear Force [lbs]	Interslice Force Angle [degrees]
18	90.237	1791.86	373.529	194.691	27.5295
19	91.5818	1791.16	254.47	132.635	27.5295
20	92.9266	1790.49	126.442	65.9043	27.5295
21	94.2714	1789.86	0	0	0

Entity Information

Group: Full Removal

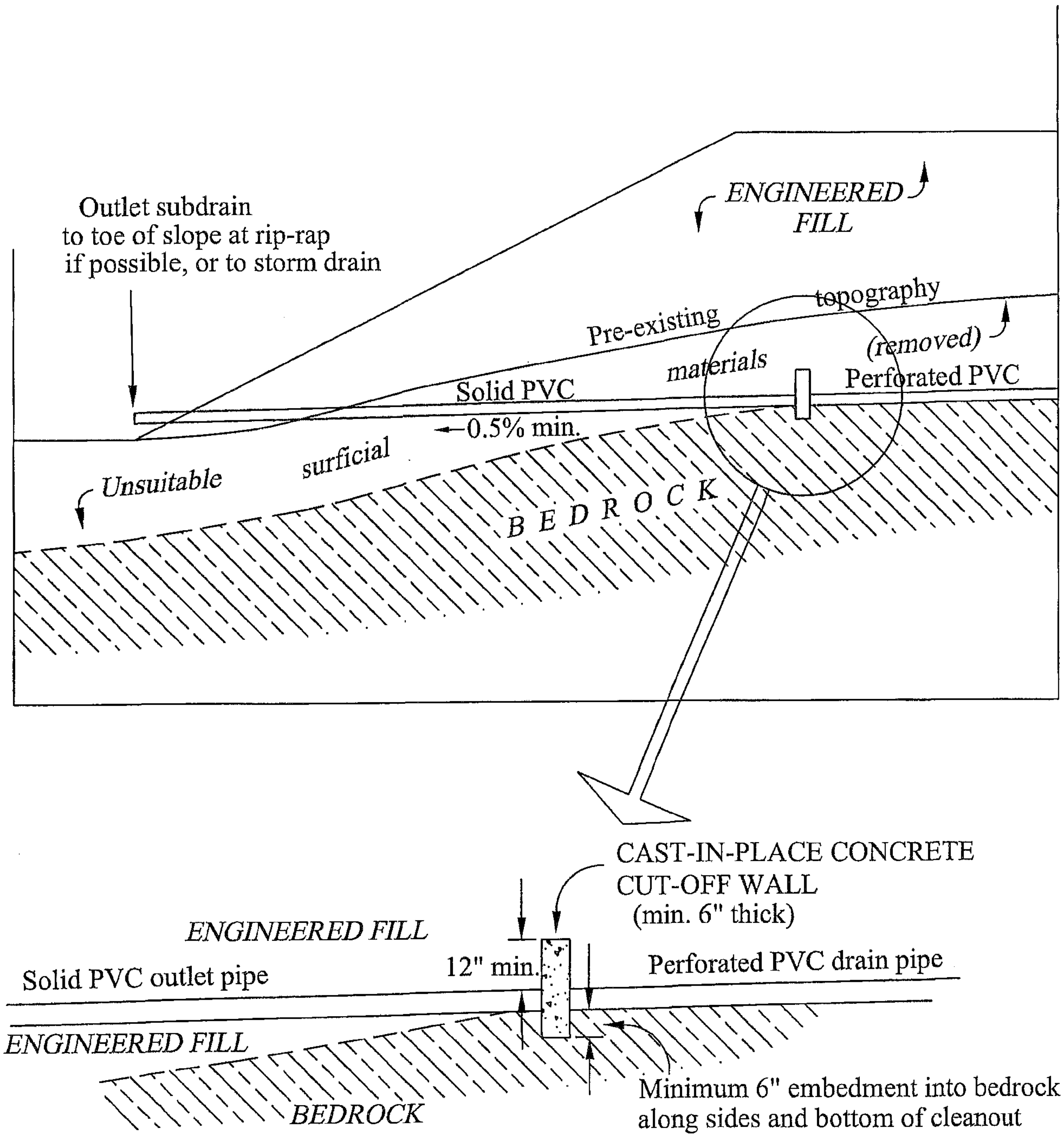
Shared Entities

Type	X	Y
External Boundary	350.1	1826
	340.3	1825
	310	1810
	308.5	1809
	306.9	1810
	304.687	1809.99
	297.2	1803
	254.8	1803
	240.9	1800
	189.2	1790
	140	1781
	129.9	1780
	104.1	1780
	94.3299	1789.8
	92.7476	1791.39
	83.4336	1800.74
	73.1916	1811.01
	71.6	1811
	16.9056	1810.1
	10.7	1810
	3.30679e-06	1810
	3.30679e-06	1700
	408	1700
	408	1842
	382.5	1842
Material Boundary	53	1803.5
	58	1800
	90	1791
	94.3299	1789.8
Material Boundary	16.9056	1810.1
	17.5	1810
	49.2	1804
	53	1803.5
	64.3	1802
	78.1	1801
	83.4336	1800.74
Material Boundary	90	1791
	92.7476	1791.39

APPENDIX D
Typical Grading Details

October 30, 2020
W.O. 8485

TYPICAL SUBDRAIN CUT-OFF WALL DETAIL



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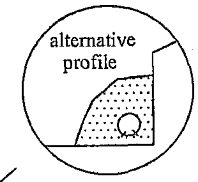
SCALE N.T.S.	W.O. 8485

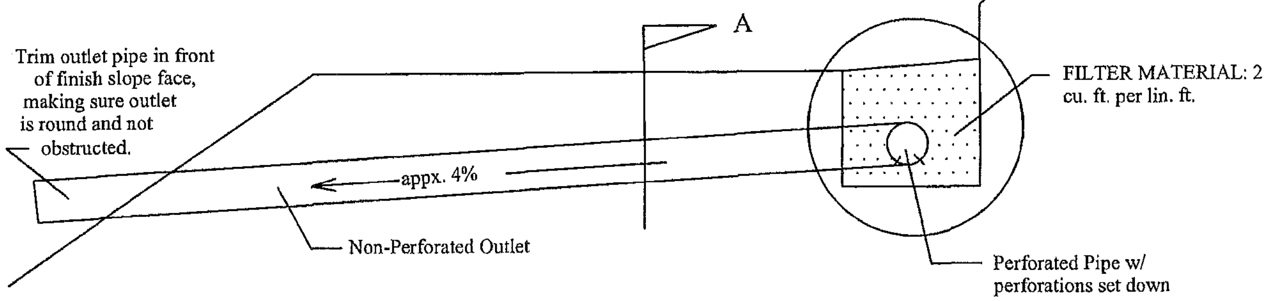
CUT-OFF WALL.DWG

PLATE D.1

TYPICAL BACKDRAIN



SECTION PERPENDICULAR TO SLOPE



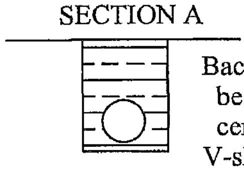
Lowermost drain level should be placed at heel of key, at direction of soil engineer, if gravity flow outlet is practical. Use 6" pipe if over 500'.

Lowermost backdrain to drain one way, following toe, when toe of slope falls one direction (i.e. continuously terraced pads), with outlets at regular intervals (if drain above toe).

Backdrains should be installed at approximately 15 feet vertical intervals.

Outlets should be surveyed and plotted on plans by civil engineer.

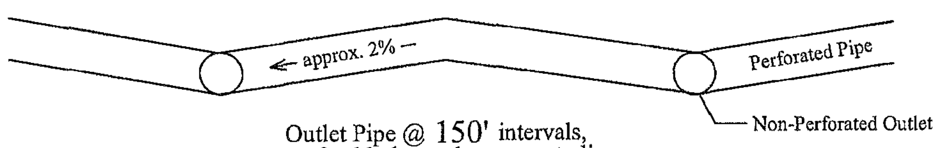
SECTION A



Backfill about outlet pipe should be free of rocks and hard, cemented clods.

V-shaped profile is acceptable alternative.

SECTION PARALLEL TO SLOPE



Outlet Pipe @ 150' intervals, preferably located at property line

Backdrain pipe to consist of 4" diameter Sch. 40 PVC, SDR 35 or other approved material. Use 6" diameter pipe where run to outlet is over 500'.

FILTER MATERIAL

Sieve Size	% Passing
1"	100
3/4"	90-100
3/8"	40-100
#4	24-50
#8	15-35
#30	5-15
#50	0-7
#200	0-2

Alternative Filter Material: Pea Gravel or Crushed Rock. Gravel or Rock Should be Enclosed in Filter Fabric.

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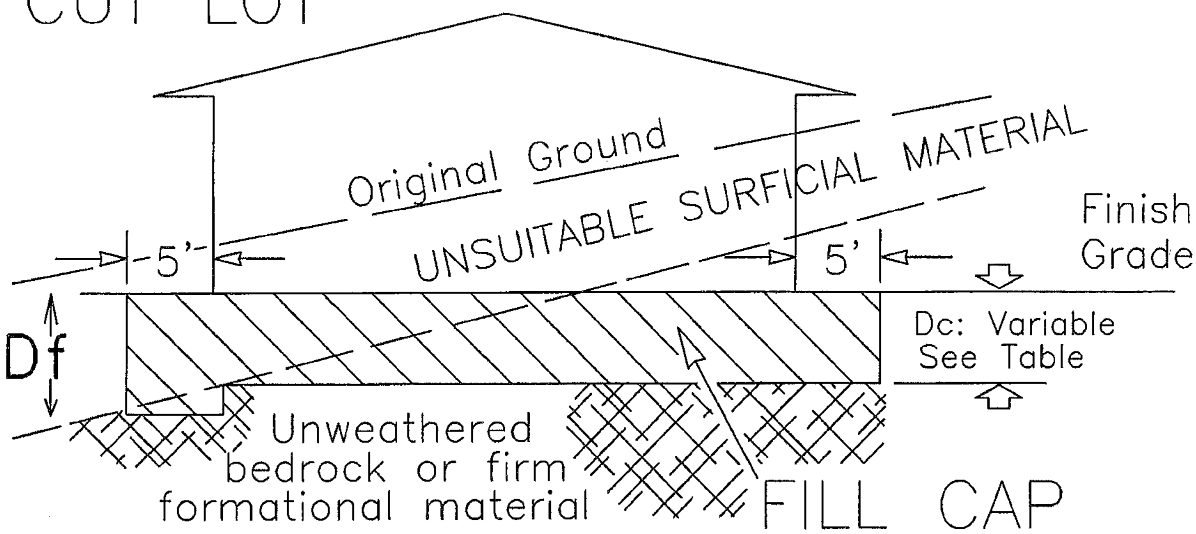
Backdrain.dwg
6/3/2005

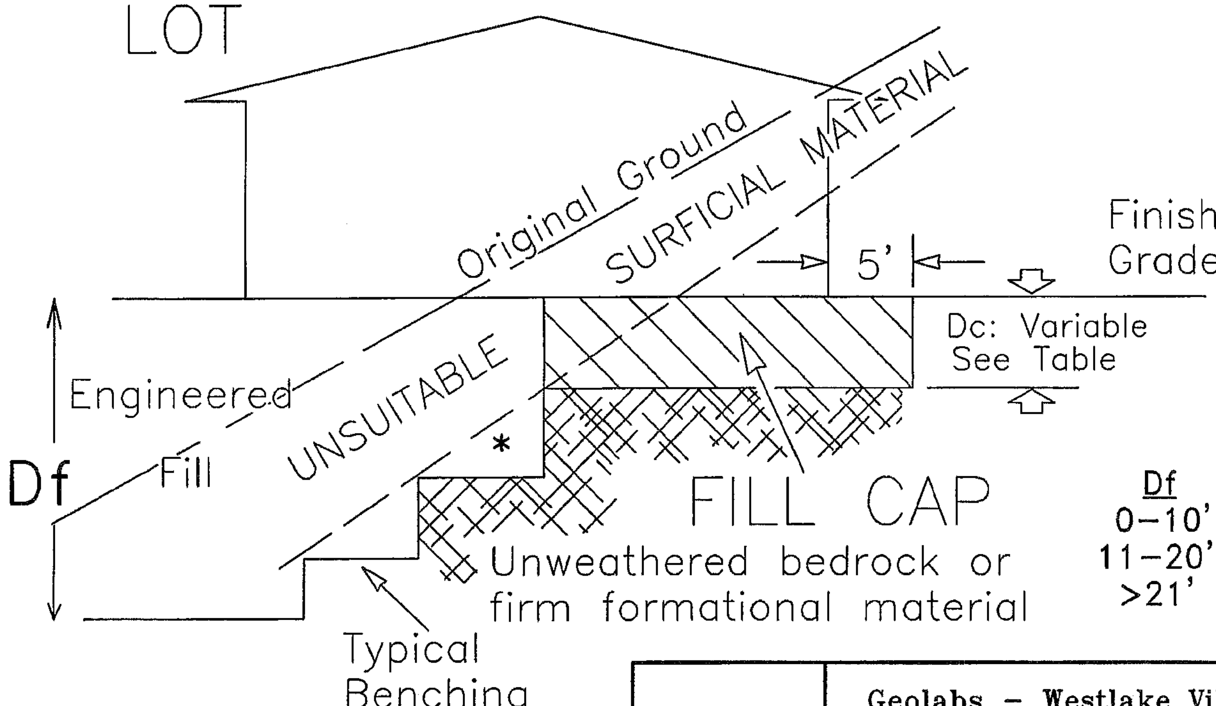
PLATE D.2

FILL CAP DETAIL

CUT LOT



TRANSITION LOT



Df	Dc
0–10'	5'
11–20'	7'
>21'	10'

* For backslopes steeper than 3:1 the uppermost bench is to be 15' wide.

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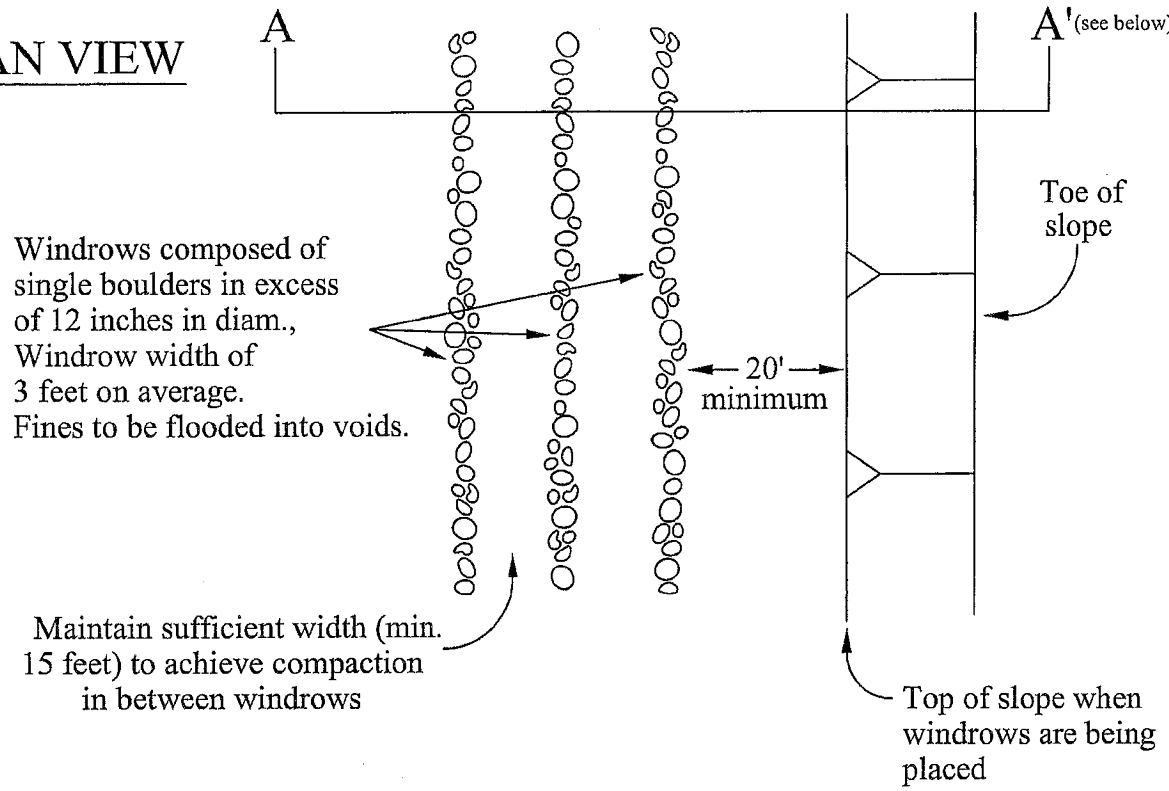
TRANSLOT

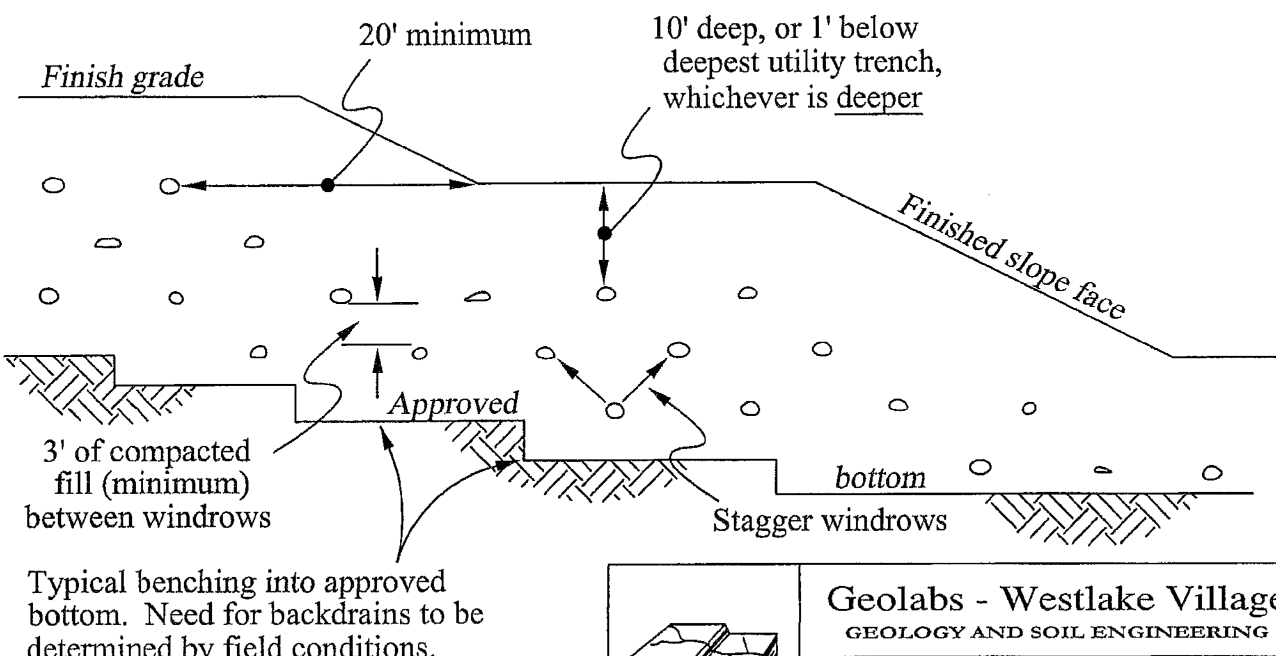
PLATE D.3

ROCK DISPOSAL DETAIL

PLAN VIEW



SECTION A-A'



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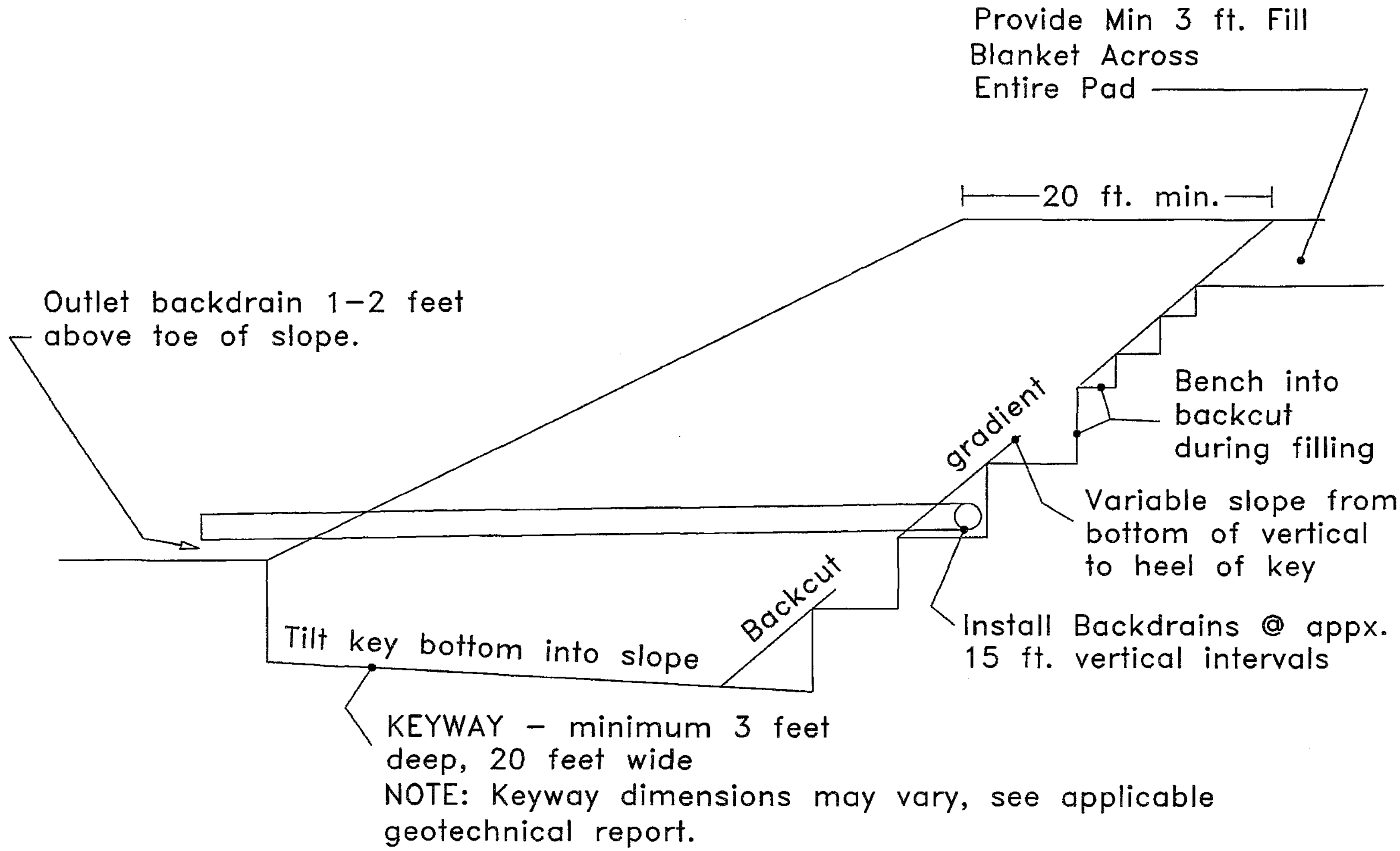
RockDisposal.dwg
10/7/2004

PLATE D.4

TYPICAL STABILITY/BUTTRESS FILL BELOW PAD OR OTHER FLAT GRADED AREA



SF2

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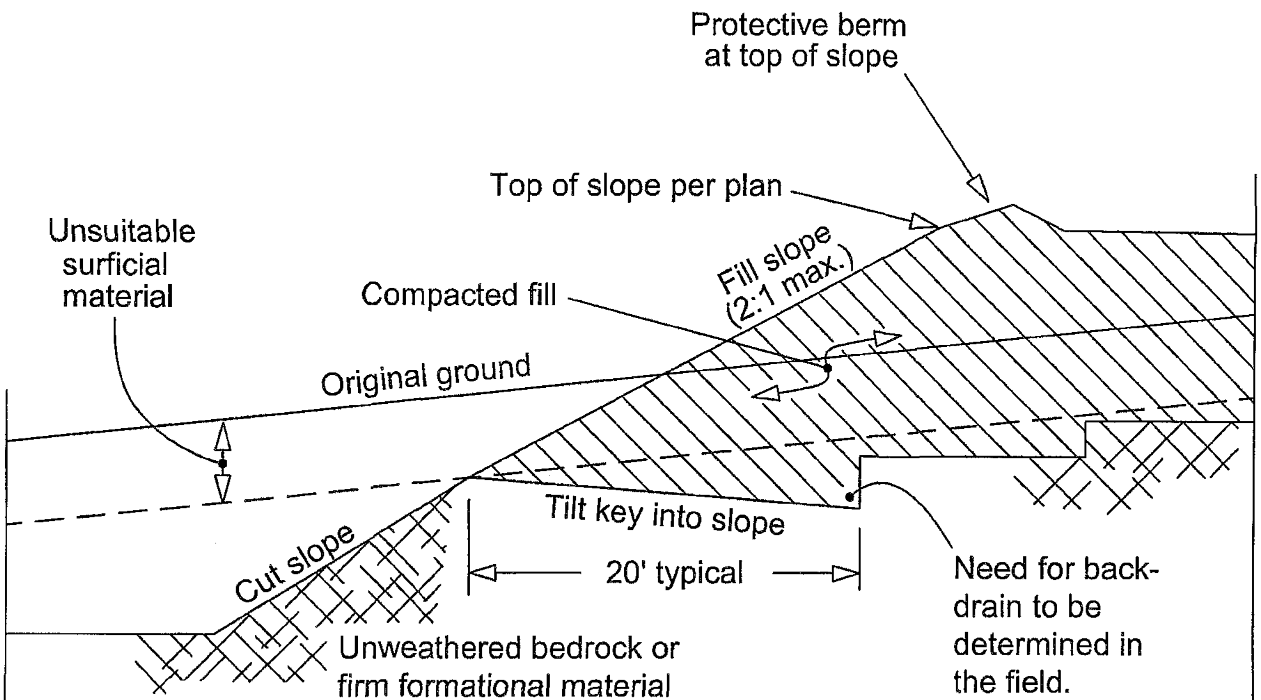
PLATE D.5

TYPICAL FILL OVER CUT SLOPE



Cut portion of the slope should be excavated and observed by the project geologist prior to constructing the fill portion of the slope.

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FILL OVER CUT.DWG

PLATE D.6