Appendix A

Biological Resources



Addendum to the Biological Technical Report

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February 16, 2022 00357.00025.001

Evan Knapp Integral Communities 888 San Clemente Drive, Suite 100 Newport Beach, CA 92660

Subject: Addendum to the Biological Technical Report for the Bouquet Canyon Project (Tentative

Tract No. 82126)

Dear Mr. Knapp:

This letter report is intended to serve as an Addendum to the Biological Technical Report (BTR) for the Bouquet Canyon Project (project) that HELIX Environmental Planning, Inc. (HELIX) prepared in October 2019 (Attachment A, Bouquet Canyon Biological Technical Report). The Bouquet Canyon Project Final Environmental Impact Report (Final EIR) was prepared by Michael Baker International, Inc. and certified by the City of Santa Clarita (California Environmental Quality Act [CEQA] lead agency) on November 10, 2020. Following certification of the Final EIR, some revisions were made to the project design (revised project) and the project study area (revised study area), resulting in minor changes to the original study area evaluated under the attached 2019 BTR for the project.

The purpose of this addendum is to demonstrate that the revised project remains consistent with the findings documented in the "Biological Resources" section of the Final EIR. This letter report describes and existing biological resources within the revised project areas; provides an updated analysis of potential project effects associated with the revised study area; and demonstrates that no new significant impacts to biological resources would result from the implementation of the revised project.

STUDY AREA LOCATION

The revised project is located within an approximately 89.73-acre revised study area (the original study area described in the 2019 BTR is 93.47 acres) in the Saugus Community in the northern portion of the City of Santa Clarita. The study area includes approximately 56.91 acres of on-site areas within the project boundary and approximately 32.82 acres of off-site areas outside of the project boundary, where project disturbance may be required. The study area is generally located 5.5 miles to the northeast of Interstate 5 and 3.8 miles to the northwest of California State Route 14 (Figure 1, Regional Location). The study area is within Section 6 of Township 4 North, Range 15 West of the Mint Canyon U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle (Figure 2, USGS Topography).

Specifically, the study area is located directly south of the intersection of David Way and Bouquet Canyon Road (Figure 3, *Aerial Photograph*).

REVISED PROJECT AREAS

As described in the BTR, the proposed project is a residential development that would consist of a gated community comprising several neighborhoods and common area amenities. The proposed project also includes the construction of a flood control channel adjacent, and parallel to, the proposed Bouquet Canyon Creek low-flow channel and the new proposed alignment of Bouquet Canyon Road along the southerly boundary of the project site. The approximately 7.50 acres of revised project areas summarized below are included within the approximately 89.73-acre revised study area for the project as described below and depicted on Figure 4, *Revised Project Areas*.

Revised Project Areas (7.50 Acres)

- 1. Off-Site Flood Control Channel Outlet Additional temporary impacts to the concrete banks of the off-site concrete flood control channel required for the revisions related to the alignment of the outlet.
- 2. <u>Copper Hill Road Improvements</u> Additional grading/paving for Copper Hill Road.
- 3. <u>Davenport Trailhead</u> Addition of the Davenport parcel (APN 2812-008-008) for the construction of a city-required trailhead.
- 4. <u>Bouquet Canyon Road Improvements North</u> Additional off-site repaving and improvements to existing Bouquet Canyon Road near the northeast corner of the project.
- 5. <u>Flood Control Channel Inlet & Diversion Structure</u> Construction of a slightly larger concrete flow diversion structure intended to convey low flows into the low-flow channel and divert high flows into the proposed concrete-lined flood control channel.
- 6. Sewer Line Installation of a sewer line in the northeast portion of the site.
- 7. <u>Slope Grading</u> Additional slope grading for the new alignment of Bouquet Canyon Road along the southerly border of the study area.
- 8. <u>Bouquet Canyon Road Improvements South</u> Minor additional off-site road repaying and improvements to Bouquet Canyon Road located in the southwesterly portion of the project site.
- 9. Residential Addition Addition of the "donut hole" parcel (APN 2812-008-002) in the easterly portion of the project site. Note that this area was evaluated for impacts to biological resources in the 2019 BTR yet was not evaluated as part of the project in the Final EIR. Additional residential uses have been proposed in the donut hole area since the Final EIR was certified. As such, the donut hole parcel has been included in this addendum.
- 10. <u>Residential Reduction</u> Removal of Planning Area 1a, which was previously proposed to be constructed within the southern portion of the study area per the project BTR and Final EIR.



This planning area presented in the Final EIR for the project will not be constructed as part of the revised project.

UPDATED GENERAL BIOLOGICAL SURVEY AND JURISDICTIONAL DELINEATION

On December 10 and December 21, 2021, HELIX biologist and ISA-certified arborist Daniel Torres performed a general biological survey, jurisdictional assessment, burrowing habitat assessment, and oak tree assessment over Revised Project Areas 1-8 described above. Mr. Torres performed an initial oak tree survey within Project Area 3 on February 26, 2021. Carlsberg and Associates performed a follow-up oak tree health assessment on Project Area 3 (Davenport Trailhead) on August 12, 2021. Area 9 (the donut hole parcel) was previously assessed as part of the 2019 BTR although that area had not been included as part of the project in the Final EIR for the original project. An oak tree assessment was performed in Area 9 on August 16, 2021. Area 10 is a reduction in the project footprint, and is, therefore, not included in the December 2021 field assessments. The oak tree survey report addendum including addenda covering all surveys mentioned above is included as Attachment B, *Oak Tree Survey Report Addendum*.

SUMMARY OF EXISTING CONDITIONS

The revised approximately 85.86-acre study area is located in the foothills of the Sierra Pelona Mountains, and portions were historically used as a school, ranch, and hog farm from the early 1900s through the 1970s (Historic Aerials 1948). The topography in the southern and western portions of the revised study area is predominantly steep hillsides, while the northern portion is primarily flat. The steep hills throughout the southern and western portions of the site are predominated by Riversidean upland sage scrub, while the flatter portions of the study area are dominated by non-native grassland due to historic disturbance from ranching activities (Figure 5, Vegetation and Land Uses). Bouquet Canyon Creek flows from east to west in the northern portion of the revised study area and supports U.S. Army Corps of Engineers (USACE)/Regional Water Quality Control Board (RWQCB) waters of the U.S. and California Department of Fish and Wildlife (CDFW) jurisdictional streambed and associated vegetation (Figure 6, Jurisdictional Features). Elevations associated with the revised study area range from approximately 1,365 feet above mean sea level (AMSL) near the western boundary of the study area to approximately 1,600 feet above AMSL near the southeastern corner. Eight soil types are mapped on the revised study area, including Castaic-Balcom silty clay loams (CmF2), Hanford sandy loam (HcC), Metz loam sandy (MfA), Mocho loam (MpA), Ojai loam (3f), Saugus loam (ScF2), Sorrento loam (SsA), and Yolo loam (YoC; NRCS 2017).

Immediate surrounding land uses include existing residential development to the north and west, a mixture of undeveloped land and residential development to the south, and a juvenile camp (Los Angeles County Camp Joseph Scott) to the east. The revised study area is located approximately 0.20 mile to the southeast of Haskell Canyon Open Space and 1.40 miles to the south of Angeles National Forest.



REVISED PROJECT EFFECTS TO BIOLOGICAL RESOURCES

The following provides a summary of revised project effects to biological resources:

Vegetation Communities

The revised project falls within, and adjacent to, the original study area and consists of approximately 80.83 acres of permanent impacts and 0.53 acre of temporary impacts to vegetation and land uses. Additional impacts to vegetation and land uses occur on the edges of the prior study area and would mostly affect existing disturbed/developed areas and non-native vegetation (See Areas 2, 3, 4, 7, 8, and 9 on Figure 4). The removal of Planning Area 1a (Revised Project Area 10 on Figure 4) alone results in the reduction of 6.95 acres of impacts to vegetation and land uses as compared to the previous study area evaluated in the project BTR.

Jurisdictional Waters

In summary, the project has reduced permanent impacts to California Department of Fish and Wildlife (CDFW) jurisdictional streambeds and U.S. Army Corps of Engineers (USACE) waters of the U.S. evaluated in the Final EIR. However, due to State-level procedural changes implemented in May 2020 during the processing of the Los Angeles Regional Water Quality Control Board (RWQCB) Section 401 Water Quality Certification for the project issued the Los Angeles RWQCB on March 8, 2021 (File No. 20-089), the limits of RWQCB waters of the State were expanded on the site based on hydrologic modeling of the 25-year flood event within Bouquet Canyon Creek, rather than being based on jurisdictional field indicators associated with the ordinary high water mark (OHWM), as had been the long-standing method. Consequently, the extent of permanent impacts to RWQCB jurisdictional waters of the U.S. have increased compared to the Final EIR. It should be noted that areas of expanded jurisdiction by the Los Angeles RWQCB are located within the limits of areas previously evaluated in the project BTR and the Final EIR as supporting CDFW jurisdictional resources. Given that project impacts to expanded RWQCB jurisdictional areas (and compensatory mitigation for RWQCB impacts) were evaluated as waters of the State regulated by CDFW in the Final EIR for the project, impacts to expanded RWQCB waters regulated under the project Section 401 Water Quality Certification are considered less than significant.

Although jurisdictional resources were identified within areas added to the project (See Revised Project Areas #5 and #6 on Figure 4), no additional impacts to jurisdictional streambeds will occur within the Revised Project Areas depicted on Figure 4. The sewer line proposed within Area 6 will be installed with directional drilling and will not result in additional impacts to jurisdictional streambeds regulated by the CDFW, USACE, or RWQCB. Therefore, no new significant impacts to biological resources will result from the implementation of the revised project plan when compared to the findings of the Final EIR for the project. A more detailed discussion of revised project effects on biological resources is provided below.

Sensitive Species

Rare Plants

Rare plant surveys were conducted within the prior study area in 2018 and 2019. A total of 496 slender mariposa lilies (*Calochortus clavatus* var. *gracilis*) were observed throughout the north-facing slopes in



the eastern and southern portions of the original study area. Of those 496 individuals, 462 individual lilies were determined to be permanently impacted by the original project as part of the project BTR and the Final EIR. The new impact areas associated with New Bouquet Canyon Road improvement slope grading revisions (Area 7 on Figure 4) in the southern portion of the revised study area are located within the vicinity of these individuals. Area 7 was surveyed as part of the 2018 and 2019 rare plant surveys. However, with the removal of Area 10 from the revised study area and the minor slope revisions proposed within Revised Project Area 7 (slope grading), impacts to slender mariposa lilies will be reduced by nine (9) individuals, reducing the total impacts to this species from 462 individual lilies within the original project study area, to 453 individual lilies within the revised study area. Area 3 supports a suitable vegetation community (non-native vegetation/Riversidean upland sage scrub) for slender mariposa lily; however, the vegetation is located on a steep and highly disturbed south-facing slope, which is not suitable geomorphology for this species. Revised Project Areas 5 and 6 were not surveyed during the rare plant surveys; however, these areas support riverwash and non-native vegetation, which are not suitable habitat for the rare plant species analyzed in the BTR. The additional areas do not support habitat for slender mariposa lilies or other rare plants described in the BTR (Figure 7, Impacts to Vegetation and Land Uses). Therefore, the implementation of the revised project would not result in increased impacts to rare plant species.

Based on HELIX's assessment, the revised project results in a minor reduction of impacts to rare plants and therefore remains consistent with the findings described in the BTR and Final EIR. Compliance with Mitigation Measure [MM] 3.3-1 of the original project EIR provides appropriate mitigation for impacts to rare plants for the revised project.

Sensitive Wildlife Species

The revised project plan proposes additional permanent impacts to vegetation communities within mapped non-native grassland/Riversidean upland sage scrub, non-native vegetation/Riversidean upland sage scrub, riverwash, non-native vegetation, mulefat scrub, riverwash, developed areas, and ornamental vegetation (Figure 7). These vegetation communities and land uses do not provide suitable habitat for sensitive wildlife species previously identified in the BTR to have a potential to occur on the previous study area. The Revised Project Areas were included as part of the 2018 burrowing owl (*Athene cunicularia*), and the 2018 coastal California gnatcatcher (*Polioptila californica californica*) focused surveys. These species were not detected during the surveys. No suitable habitat for burrowing owl was detected during the 2021 general biological survey performed in the Revised Project Areas. Therefore, the implementation of the revised project plan would not result in additional direct impacts to sensitive animal species.

As described in the BTR, potential significant indirect impacts were identified for burrowing owl. Mitigation Measure 3.3-2 in the Final EIR includes measures to avoid and/or minimize potential indirect impacts to this sensitive animal species, which the revised project would also comply with. No additional measures to avoid or minimize significant impacts to sensitive wildlife species are warranted and the revised project is consistent with the findings described in the BTR and Final EIR.



Sensitive Vegetation Communities

California Department of Fish and Wildlife Sensitive Vegetation Communities/Habitats

The revised project would result in 80.83 acres of permanent impacts and 0.53 acre of temporary impacts to vegetation and land uses (Figure 7; Table 1, *Revised Permanent Impacts to Vegetation and Land Uses*). The revised project plan proposes the reduction of permanent impacts to 5.62 acres of vegetation and land uses, including the reduction of permanent impacts to: 0.24 acres of chamise chaparral/non-native grassland, 0.02 acres of giant reed stand, 1.37 acres of non-native grassland, 0.08 acre of non-native grassland/Riversidean upland sage scrub, 0.16 acre of non-native vegetation, 0.53 acre of Riversidean upland sage scrub, 1.17 acres of Riversidean upland sage scrub/non-native grassland, 0.05 acre of southern north slope chaparral, and 0.01 acre of southern willow scrub/giant reed stand). The Revised Project includes new permanent impacts to developed areas (1.3 acres), disturbed areas (0.42 acre), mulefat scrub (0.09 acre), ornamental vegetation (0.30 acre), and riverwash (0.02 acre). The revised project area also includes new temporary impacts to 0.53 acre (0.08 acre of disturbed areas, 0.02 acre of non-native grassland, 0.18 acre of non-native vegetation, 0.24 acre of ornamental vegetation, and 0.01 acre of riverwash). None of these communities are considered sensitive by CDFW.

With the removal of Planning Area 1a, the revised study area no longer includes the following vegetation and land uses: disturbed-Riversidean upland sage scrub, scrub oak chaparral, and scrub oak chaparral/non-native grassland. The revised study area includes two vegetation communities (non-native vegetation/upland Riversidean sage scrub and Tucker oak chaparral) not described in the BTR. These vegetation communities were recorded within Revised Project Area 3 (Davenport Parcel) and are described below. Neither vegetation community is considered sensitive by CDFW.

Based on the above analysis, impacts to CDFW Sensitive Vegetation Communities from the revised project remain consistent with the findings described in the BTR and Final EIR. Therefore, impacts to CDFW Sensitive Vegetation Communities remain less than significant consistent with the Final EIR.

Non-native Vegetation/Riversidean Upland Sage Scrub

This plant community is dominated by non-native vegetation with a subdominant component of Riversidean upland sage scrub. Non-native vegetation community is typically associated with land that has been heavily influenced by human activities, including areas adjacent to roads, manufactured slopes, and abandoned lots. Non-native vegetation areas are dominated by ornamental and non-native species that take advantage of previously cleared or abandoned landscaping or land showing signs of past or present animal usage that removes any capability of providing viable habitat. Riversidean sage scrub is the most xeric expression of coastal sage scrub south of Point Conception, California. This community occupies xeric sites, such as steep slopes, severely drained soils, or clays that slowly release stored soil moisture. This community is dominated by subshrubs, with leaves that are deciduous during drought, an adaptation that allows the habitat to withstand the prolonged drought period in the summer and fall. Sage scrub species have relatively shallow root systems and open canopies that allow for the occurrence of a substantial herbaceous (annual plant) component. Typical stands are fairly open and dominated by species such as California sagebrush, brittlebush (*Encelia farinosa*), and California buckwheat.



Non-native vegetation/Riversidean upland sage scrub was mapped in one area totaling 0.67 acre within the southern portion of Revised Project Area 3 (Davenport parcel). This vegetation community was dominated by shortpod mustard (*Hirschfeldia incana*). Component species of Riversidean upland sage scrub were observed in scattered amounts. These species included California sagebrush (*Artemisia californica*), purple sage (*Salvia leucophylla*), fourwing saltbush (*Atriplex canescens*), and California buckwheat (*Eriogonum fasciculatum*). The revised project plan includes impacts to 0.53 acre of this vegetation community.

Tucker Oak Chaparral

Tucker oak chaparral is dominated by an open to a continuous canopy of Tucker oak (*Quercus johntuckeri*). This vegetation community is found on upper slopes and ridges, from approximately 980 to 4,920 feet in elevation. Other shrubs present may include chamise (*Adenostoma fasciculatum*), bigberry manzanita (*Arctostaphylos glauca*), California buckwheat, California juniper (*Juniperus californica*), and interior live oak (*Quercus wislizeni*).

One small area of Tucker oak chaparral totaling 0.24 acre was mapped in the northern portion of Revised Project Area 3 (Davenport Parcel). This vegetation community was dominated by Tucker oak with an understory of red brome (Bromus madritensis) and leaf litter. Other shrub species observed included California juniper, hollyleaf cherry (*Prunus ilicifolia*), purple sage, and chaparral yucca (*Hesperoyucca whipplei*). There were also two large interior live oaks within this vegetation community. The revised project plan does not propose impacts to Tucker oak chaparral.



Table 1
REVISED PERMANENT IMPACTS TO VEGETATION COMMUNITIES AND LAND USES

| Habitat Type (Holland/Oberbauer) | Revised Study Area Existing (acres) | Prior Permanent Impacts (acres) | Revised Study Area Permanent Impacts (acres) | Revised Study Area Temporary Impacts (acres) |
|--|--|--|--|--|
| Big Sagebrush Scrub | 1.91 | 1.91 | 1.91 | 0.00 |
| Chamise Chaparral/Non-native Grassland | 2.99 | 2.77 | 2.53 | 0.00 |
| Developed | 6.61 | 4.70 | 6.00 | 0.08 |
| Disturbed | 5.30 | 3.83 | 4.25 | 0.00 |
| Disturbed-Riversidean Upland Sage Scrub | 0.58 | 0.54 | - | _ |
| Elderberry Savanna ¹ | 0.56 | 0.56 | 0.56 | 0.00 |
| Giant Reed Stand | 7.06 | 7.08 | 7.06 | 0.00 |
| Mule Fat Scrub | 0.42 | 0.27 | 0.36 | 0.00 |
| Non-native Grassland | 21.77 | 21.75 | 20.38 | 0.02 |
| Non-native Grassland/Riversidean Upland Sage Scrub | 7.49 | 7.41 | 7.33 | 0.00 |
| Non-native Vegetation | 8.08 | 7.16 | 7.00 | 0.18 |
| Non-native Vegetation/Elderberry Savanna | 0.97 | 0.97 | 0.97 | 0.00 |
| Non-native Vegetation/Riversidean Upland Sage Scrub ² | 0.67 | - | 0.53 | 0.00 |
| Ornamental | 2.95 | 2.13 | 2.43 | 0.24 |
| Riversidean Upland Sage Scrub | 7.01 | 6.90 | 6.37 | 0.00 |
| Riversidean Upland Sage Scrub/Non-native Grassland | 13.01 | 12.96 | 11.79 | 0.00 |
| River Wash | 0.42 | 0.36 | 0.38 | 0.01 |
| Scrub Oak Chaparral | - | 0.26 | ı | - |
| Scrub Oak Chaparral/Non-native Grassland | 0.67 | 2.01 | - | - |
| Southern North Slope Chaparral | 0.34 | 0.34 | 0.29 | 0.00 |
| Southern Willow Scrub/Giant Reed Stand ¹ | 0.70 | 0.70 | 0.69 | 0.00 |
| Tucker Oak Chaparral ² | 0.24 | - | 0.00 | 0.00 |
| | 89.75 | 84.61 | 80.83 | 0.53 |

 $^{^{1}}$ Sensitive habitats pursuant to the California Department of Fish and Wildlife (CDFW) Natural Communities List (2018b).

California Department of Fish and Wildlife Riparian Habitat and Streambed

The revised project plan includes a reduction of permanent impacts to CDFW jurisdictional areas within Bouquet Canyon Creek associated with Revised Project Areas 1, 5, and 6 compared to the Final EIR for the project. Permanent impacts to CDFW jurisdictional streambeds from the revised project were decreased from 9.33 acres to 8.36 acres, and temporary impacts increased by 1.27 acres (Table 2, Revised Impacts to California Department of Fish and Wildlife Jurisdiction; Figure 8, Impacts to Jurisdictional Features). The decrease in permanent impacts and the corresponding decrease in temporary impacts to CDFW jurisdiction is due primarily to the recharacterization of the on-site low flow channel invert as a temporary impact. No new CDFW jurisdictional areas will be impacted by the revised project. The Final EIR for the project assumed all permanent impacts to CDFW jurisdiction within the low-flow channel, in order to avoid using the channel as compensatory mitigation for impacts to CDFW jurisdictional waters.



² Indicates a plant community added during the 2021 survey.

Table 2
REVISED IMPACTS TO CDFW JURISDICTION

| Drainage | Permanent Impacts (acres) | Temporary Impacts (acres) |
|----------------------|---------------------------------|---------------------------------|
| Bouquet Canyon Creek | 8.32 | 1.74 |
| Drainage A | 0.01 | 0.00 |
| Drainage B | 0.01 | 0.00 |
| Drainage C | 0.01 | 0.00 |
| Drainage D | 0.01 | 0.00 |
| TOTAL | 8.36 | 1.74 |

The revised project is consistent with the findings described in the BTR and Final EIR and does not result in any new significant impacts to CDFW jurisdictional areas. Therefore, impacts to CDFW jurisdictional waters from the revised project are considered less than significant pursuant to CEQA.

U.S. Army Corps of Engineers Jurisdictional Waters of the U.S.

The revised project plan includes a total reduction of 0.01 acre of permanent impacts to USACE jurisdictional waters of the U.S. compared to the original project. Permanent impacts to USACE jurisdiction associated with the revised project have decreased from 0.19 acre to 0.18 acre (Table 3, Revised Impacts to USACE Jurisdiction; Figure 8).

Table 3
REVISED IMPACTS TO USACE JURISDICTION

| Drainage | Permanent Impacts (acres) | Temporary Impacts (acres) |
|----------------------|---------------------------------|---------------------------------|
| Bouquet Canyon Creek | 0.18 | 0.46 |

The revised project results in a reduction of impacts to USACE jurisdictional areas compared to the BTR and Final EIR for the project. Therefore, impacts to USACE jurisdictional waters from the revised project are considered less than significant pursuant to CEQA.

The Final EIR for the project estimated the same limits of jurisdiction for both the USACE and the RWQCB within the study area. Use of the OHWM was the standard for determining the limits of RWQCB waters of the State prior to the procedural changes to the Section 401 Water Quality Certification program implemented by the State Water Resources Control Board in May 2020. As such, the Los Angeles RWQCB expanded their jurisdiction on the site compared to areas previously delineated by HELIX in the project BTR, resulting in an increase from 0.19 acre to 1.32 acres of permanent impacts to RWQCB jurisdictional waters of the State compared to the BTR and Final EIR for the project (Table 4, Revised Impacts to RWQCB Jurisdiction; Figure 8). This larger extent of RWQCB jurisdiction is documented in the project Section 401 Water Quality Certification (File No. 20-089) issued on March 8, 2021, for the project). Consequently, the extent of permanent impacts to RWQCB jurisdictional waters of the U.S. have increased compared to the Final EIR. It should be noted that areas of expanded jurisdiction by the Los Angeles RWQCB are located within the limits of areas previously evaluated in the



project BTR and Final EIR as supporting CDFW jurisdictional resources. Given that project impacts to, and mitigation for, expanded RWQCB jurisdictional areas were already evaluated as waters of the State regulated by CDFW in the Final EIR for the project. Therefore, the increase in RWQCB jurisdiction as regulated under the project Section 401 Water Quality Certification is considered less than significant.

Table 4
REVISED IMPACTS TO RWQCB JURISDICTION

| Drainage | Permanent Impacts (acres) | Temporary Impacts (acres) |
|----------------------|---------------------------------|---------------------------------|
| Bouquet Canyon Creek | 1.32 | 1.39 |

The revised project does not result in any new significant impacts to RWQCB jurisdictional areas compared to the BTR and Final EIR for the project. Therefore, impacts to RWQCB jurisdictional waters from the revised project are considered less than significant pursuant to CEQA.

Wildlife Movement and Migratory Species

Wildlife Movement

Impacts associated with the Revised Project Areas are proposed within mapped developed areas, non-native vegetation, non-native grassland/Riversidean upland sage scrub, and riverwash. With the removal of Planning Area 1a from the project plan, the total revised permanent impacts to vegetation were reduced from 3.78 acres (Figure 7). As discussed in the BTR, the study area provides suitable habitat for some local wildlife movement but is not considered a regional wildlife movement corridor. Although the implementation of the project may result in some temporary disturbance to local wildlife movement from construction noise, the project would have a less than significant impact to wildlife movement, and no mitigation measures are recommended.

The revised project includes a reduction of impacts to vegetation and land uses. No additional impacts to wildlife movement are proposed; therefore, the revised project is consistent with the (1) vegetation and land use impact and (2) wildlife movement findings described in the BTR and Final EIR.

Migratory Species

The revised project plan proposes permanent impacts to 80.83 acres and temporary impacts to 0.53 acre of vegetation communities and land uses. Some impacted areas may support vegetation suitable for nesting birds (Figure 7). In addition, adjacent areas may support suitable habitat for nesting birds. Construction activities could disturb or destroy active migratory bird nests, including eggs and young. The Final EIR includes Mitigation Measure 3.3-5 to avoid potential impacts to nesting bird species, which the revised project would also comply with these measures. No additional measures to avoid or minimize significant impacts to nesting birds are warranted.

The revised project plan includes a reduction of permanent impacts by 3.78 acres. Additionally, the revised project plan includes compliance with the MM 3.3-5 of the Final EIR. The findings described in the BTR and Final EIR are consistent with the revised project.



Local Policies and Ordinances

The oak tree survey described in the BTR detected 64 City-protected oak trees (*Quercus* sp.) within the survey area. The project originally proposed to remove 26 oak trees, including four scrub oaks, two blue oaks, and 20 Tucker oaks. In addition, one Tucker oak would have been subjected to major encroachment, and two Tucker oaks would have been subjected to minor encroachment. The remaining 35 oak trees would have been completely avoided by the original proposed project. Impacts to oak trees within the revised study area have been evaluated by HELIX, resulting in a significant decrease in impacts to oak trees as further described below.

An oak tree survey was performed by Carlsberg and Associates within Revised Project Area 3 (Davenport Trailhead). This survey detected 20 City-protected oak trees, including 17 Tucker oak, one blue oak, two interior live oak on the Davenport Trailhead property. All the trees within Revised Project Area 3 will be avoided. No oak trees were detected during the December 2021 oak tree survey performed within Revised Project Areas 1, 2, and 4-10. The revised project includes a reduction of tree removals, from 26 removals proposed as part of the original project, to 12 removals proposed as part of the revised project. The revised impacts to oak trees are detailed in Table 5, below. The project oak tree survey report, including addenda addressing Revised Project Areas and including a revised tree appraisal, is included as Attachment B.

Table 5
REVISED IMPACTS TO OAK TREES

| | Common Name | Number of Trees | | | |
|------------------------|-------------------|-----------------|-----------------------|-----------------------|---------|
| Species Name | | Removed | Major Encroachment | Minor Encroachment | Avoided |
| Quercus agrifolia | coast live oak | 1 | 0 | 0 | 2 |
| Quercus berberidifolia | scrub oak | 0 | 1 | 1 | 4 |
| Quercus douglasii | blue oak | 1 | 0 | 0 | 2 |
| Quercus john-tuckeri | Tucker oak | 10 | 0 | 0 | 60 |
| Quercus lobata | valley oak | 0 | 0 | 0 | 1 |
| Quercus wislizeni | interior live oak | 0 | 0 | 0 | 2 |
| | TOTAL | 12 | 1 | 1 | 69 |

The revised project would not conflict with the City's Oak Tree Preservation ordinance. Furthermore, the revised project includes a reduction of impacts to oaks compared to oak impacts proposed in the Final EIR. As described in BIO-6 of the BTR, an oak tree removal permit will be obtained from the City prior to construction. Impacts to oak trees by the revised project therefore remain less than significant with the mitigation proposed in the Final EIR.

Adopted Habitat Conservation Plans

The Revised Project Areas are not located within any adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan. As such, the implementation of the project would not conflict with any adopted habitat conservation plans.

The findings related to adopted Habitat Conservation Plan described in the BTR and Final EIR are therefore consistent with the revised project.



MITIGATION MEASURES

Permanent impacts analyzed in this addendum are consistent with impacts evaluated under the BTR and Final EIR, and no additional significant impacts were identified. Implementation of the revised project would not trigger any additional avoidance/minimization measures. The revised project will still be required to comply with the avoidance/minimization measures 3.3-1 through 3.3-5 listed in Section Four of the Final EIR, which are provided below.

- **3.3-1** Mitigation for project impacts to the slender mariposa-lily (*Calochortus clavatus* var. *gracilis*) shall include one or more of the following, implemented in consultation with the City and CDFW prior to construction:
 - Prior to construction, a mitigation plan shall be developed that describes methods to mitigate for impacts to slender mariposa lily at a 1:1 ratio. The mitigation plan shall include a description of the mitigation site, bulb collection and planting methods, maintenance and monitoring requirements, and performance standards to measure the success of the mitigation. Slender mariposa lily bulbs shall be collected at the end of the growing season and prior to ground disturbance, or bulbs shall be obtained from a native plant nursery if available. The bulbs shall be planted within an appropriate on-site or off-site mitigation area, which will be conserved as open space in perpetuity.
 - Payment into a mitigation bank and/or in-lieu fee program that has mitigation available for slender mariposa lily at a 1:1 ratio; and/or
 - Preservation of land that contains slender mariposa lily at a 1:1 ratio.
- In compliance with the CDFW *Staff Report on Burrowing Owl Mitigation* (2012), a take avoidance survey shall be conducted on the study area within 14 days prior to ground disturbance to determine the presence of BUOW. If the take avoidance survey is negative and BUOW is confirmed absent, then ground-disturbing activities shall be allowed to commence, and no further mitigation would be required.

If BUOW are observed during the take avoidance survey, active burrows shall be avoided by the project in accordance with the CDFW's Staff Report (2012). The CDFW shall be immediately informed of any BUOW observations. A Burrowing Owl Protection and Relocation Plan (plan) shall be prepared by a qualified biologist, which must be sent for approval by CDFW prior to initiating ground disturbance. The plan shall detail avoidance measures that shall be implemented during construction and passive or active relocation methodology. Relocation shall only occur outside of the nesting season (September 1 through January 31).

3.3-3 Prior to the City's issuance of a grading permit, the Project Applicant shall demonstrate that a Streambed Alteration Agreement has been issued by CDFW. Temporary impacts to CDFW jurisdiction shall be returned to pre-project topographic contours once the project has been completed. Permanent impacts to CDFW jurisdiction for southern willow scrub/giant reed stand (0.70 acre) shall be mitigated through on-site or off-site



enhancement, restoration, and/or creation of CDFW jurisdictional streambed at a ratio of no less than 1:1. Given that the remaining portion of Bouquet Canyon Creek is dominated by invasive giant reed stands, which is of extremely low biological function and value, and contributes to downstream infestation of giant reed, the remaining permanent impacts to CDFW jurisdiction (8.63 acres) shall be mitigated through on-site or off-site enhancement, restoration, and/or creation of CDFW jurisdictional streambed at a ratio of no less than 0.5:1. Best Management Practices (BMPs) to minimize and avoid impacts to CDFW jurisdiction during and after construction will be addressed as part of the Streambed Alteration Agreement. Minimization and avoidance measures may include, but are not limited to, the following:

- Construction-related equipment will be stored in developed areas, outside of drainages. No equipment maintenance will be done within or adjacent to the drainage.
- Mud, silt, spoil sites, raw cement, asphalt, or other pollutants from construction activities will not be placed within or adjacent to the drainage.
- Open trenches or other excavated areas will be properly secured at the end of the day to avoid entrapment of animals, or an escape ramp will be provided.
- To avoid attracting predators during construction, the project will be kept clean of debris to the extent possible. All food-related trash items will be enclosed in sealed containers and regularly removed from the site.
- Construction personnel will strictly limit their activities, vehicles, equipment, and construction material to the proposed project footprint, staging areas, and designated routes of travel.
- Exclusion fencing will be installed to demarcate the limits of disturbance. The
 exclusion fencing should be maintained until the completion of construction
 activities.
- To the extent feasible, construction will be conducted outside of the nesting bird season (see MM 3.3-5 below).
- 3.3-4 USACE and RWQCB Jurisdiction: Prior to the City's issuance of a grading permit, the Project Applicant shall demonstrate that the appropriate regulatory permits have been issued by USACE and RWQCB. Temporary impacts to waters of the U.S. shall be returned to pre-project topographic contours once the project has been completed. Compensatory mitigation for permanent impacts to waters of the U.S. shall be required as part of subsequent permitting requirements. Permanent impacts to WUS shall be mitigated through on-site or off-site enhancement, restoration, and/or creation of jurisdictional streambed at a ratio of no less than 1:1. BMPs to minimize and avoid impacts to waters of the U.S. during and after construction will be addressed as part of the USACE and RWQCB permitting process. Minimization and avoidance measures may include, but are not limited to, the following:



- Construction-related equipment will be stored in developed areas, outside of the drainage. No equipment maintenance will be done within or adjacent to the drainage.
- Source control and treatment control BMPs will be implemented to minimize the
 potential contaminants that are generated during and after construction. Water
 quality BMPs will be implemented throughout the project to capture and treat
 potential contaminants.
- Substances harmful to aquatic life will not be discharged into the drainage. All hazardous substances will be properly handled and stored.
- A Storm Water Pollution Prevention Plan will be prepared to prevent sediment from entering the drainage during construction.
- To avoid attracting predators during construction, the project will be kept clean of debris to the extent possible. All food-related trash items will be enclosed in sealed containers and regularly removed from the site.
- Construction personnel will strictly limit their activities, vehicles, equipment, and construction material to the proposed project footprint, staging areas, and designated routes of travel.
- Exclusion fencing will be installed to demarcate the limits of disturbance. The
 exclusion fencing should be maintained until the completion of construction
 activities.
- 3.3-5 Construction activities (i.e., earthwork, clearing, and grubbing) shall occur outside of the general bird nesting season for migratory birds, which is February 15 through August 31 for songbirds and January 15 to August 31 for raptors.

If construction activities (i.e., earthwork, clearing, and grubbing) must occur during the general bird nesting season for migratory birds and raptors, a qualified biologist shall perform a pre-construction survey of potential nesting habitat to confirm the absence of active nests belonging to migratory birds and raptors afforded protection under the MBTA and CFG Code. The pre-construction survey shall be performed no more than seven days prior to the commencement of construction activities. The results of the pre-construction survey shall be documented by the qualified biologist. If construction is inactive for more than seven days, an additional survey shall be conducted.

If the qualified biologist determines that no active migratory bird or raptor nests occur, the activities shall be allowed to proceed without any further requirements. If the qualified biologist determines that an active migratory bird or raptor nest is present, no impacts within 300 feet (500 feet for raptors) of the active nest shall occur until the young have fledged the nest and the nest is confirmed to no longer be active, or as determined by the qualified biologist. The biological monitor may modify the buffer or propose other recommendations in order to minimize disturbance to nesting birds.



CONCLUSIONS

The analysis provided above is intended to serve as an addendum to the BTR to document revisions to the proposed project comprised of ten revised areas. The revised project areas total 7.50 acres located adjacent to the project site (see Figure 4).

The revised project would result in a total of 80.83 acres of permanent impacts and 0.53 acre of temporary impacts to the same vegetation/land uses analyzed in the project BTR and Final EIR. The revised project includes a reduction of impacts to USACE and CDFW jurisdiction, slender mariposa lilies, and oak trees The project would still be required to comply with mitigation measures disclosed in the Final EIR to avoid potential indirect impacts to sensitive wildlife species (burrowing owl), CDFW, and USACE/RWQCB jurisdiction, oak trees, slender mariposa lilies, and nesting birds. Therefore, no new significant impacts to biological resources would result from implementation of the revised project, and the revised project remains consistent with the findings of the Final EIR.

If you have any questions regarding the information presented in this letter report, please contact Daniel Torres (<u>DanielT@helixepi.com</u>) or Ezekiel Cooley (<u>EzekielC@helixepi.com</u>).

Sincerely,

Daniel Torres

Biologist

Ezekiel Cooley

Senior Biology Project Manager

Attachments:

Figure 1: Regional Location

Figure 2: USGS Topography

Figure 3: Aerial Vicinity

Figure 4: Revised Project Areas

Figure 5: Vegetation and Land Uses

Figure 6: Jurisdictional Features

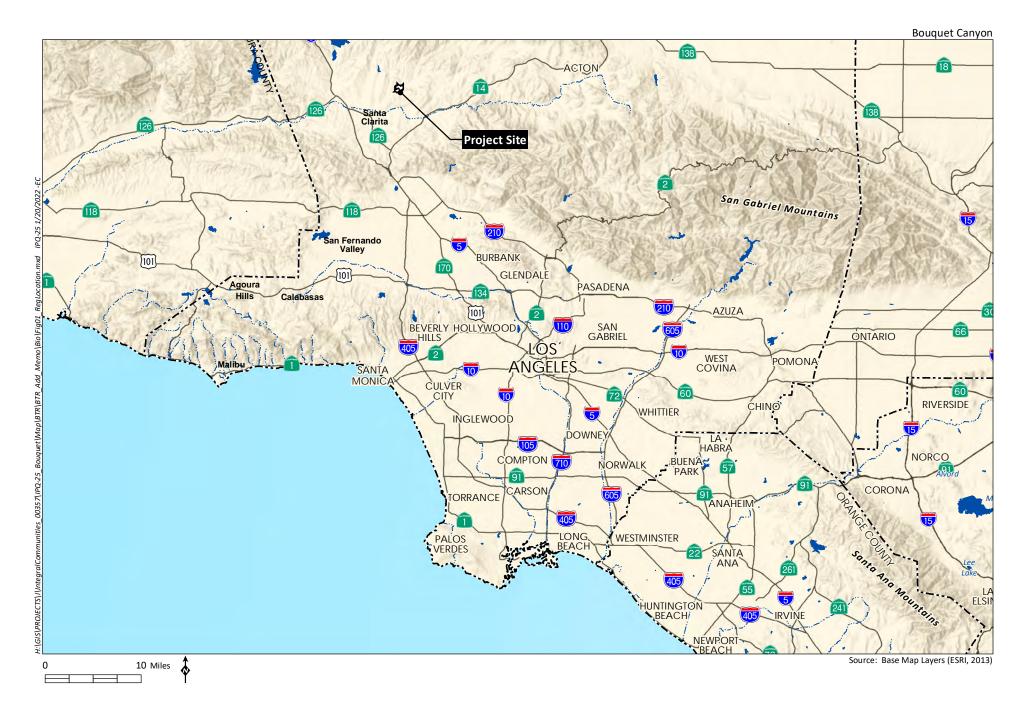
Figure 7: Impacts to Vegetation and Land Uses

Figure 8: Impacts to Jurisdictional Features

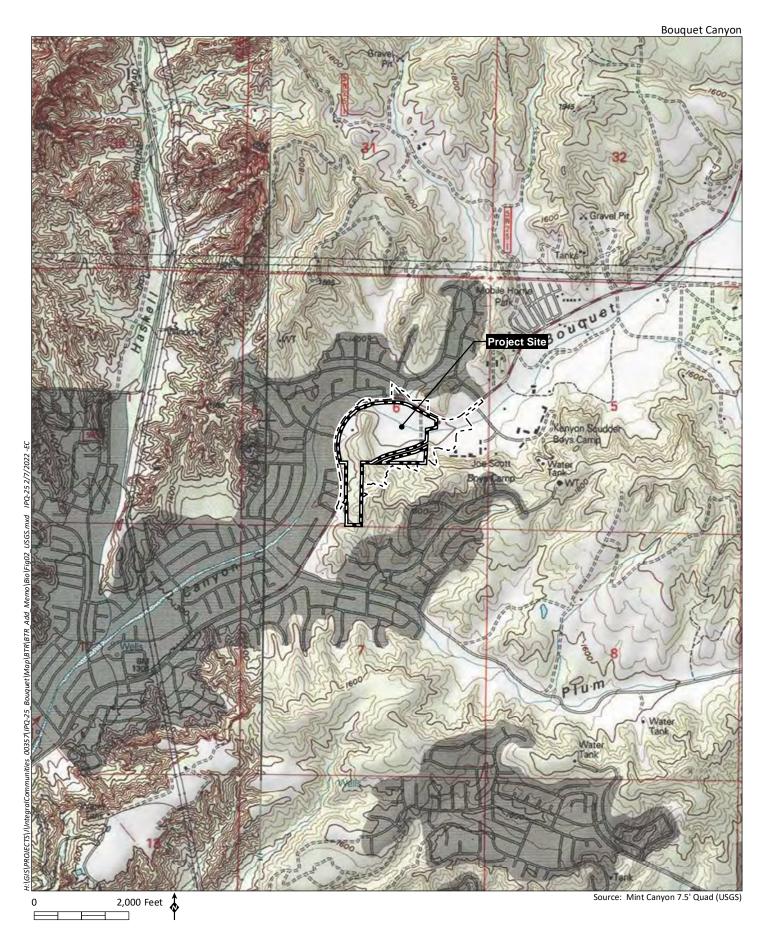
Attachment A: Biological Technical Report

Attachment B: Oak Tree Survey Report Addendum

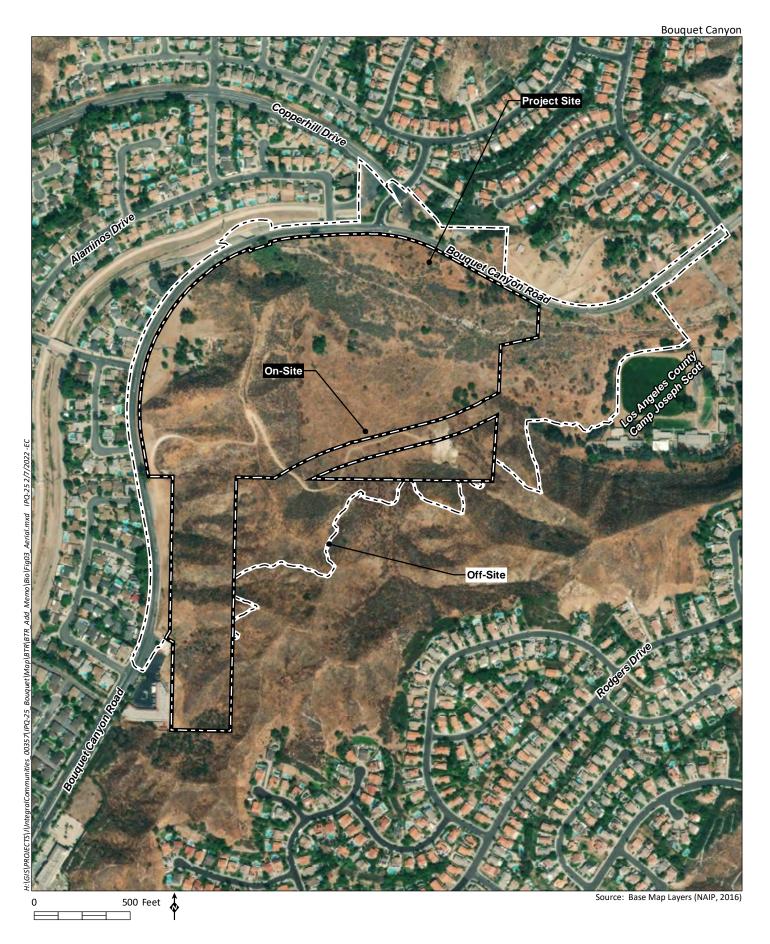




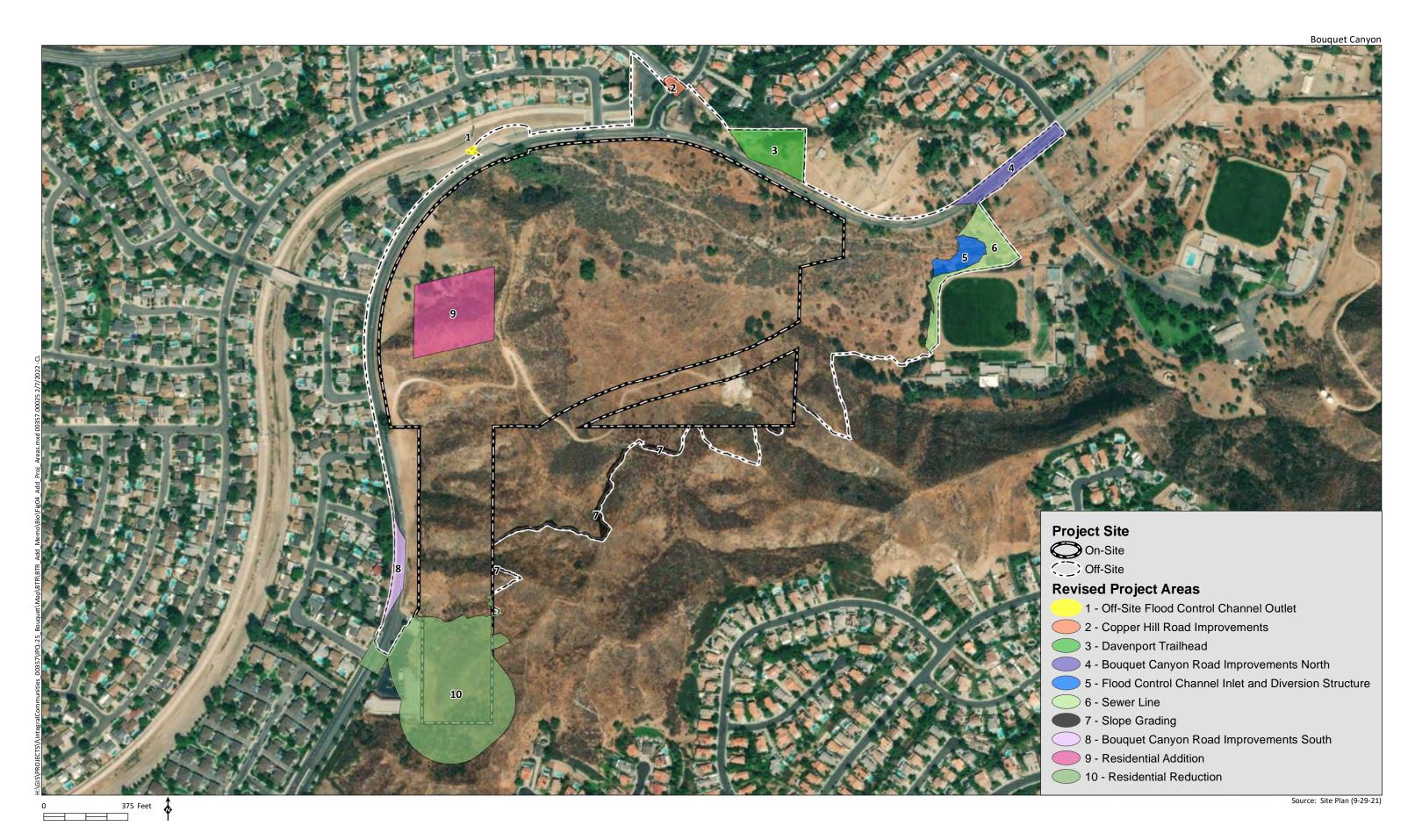




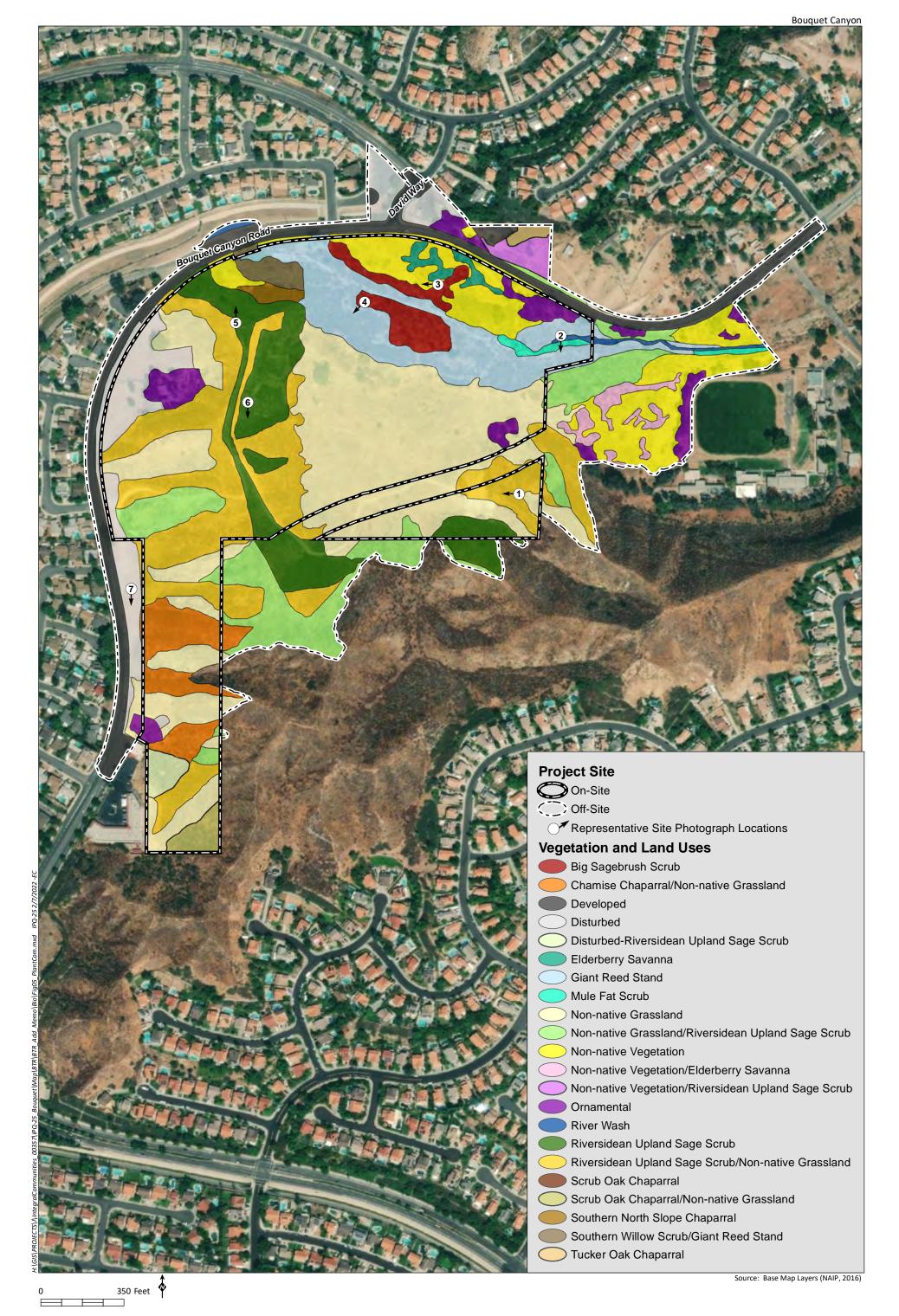








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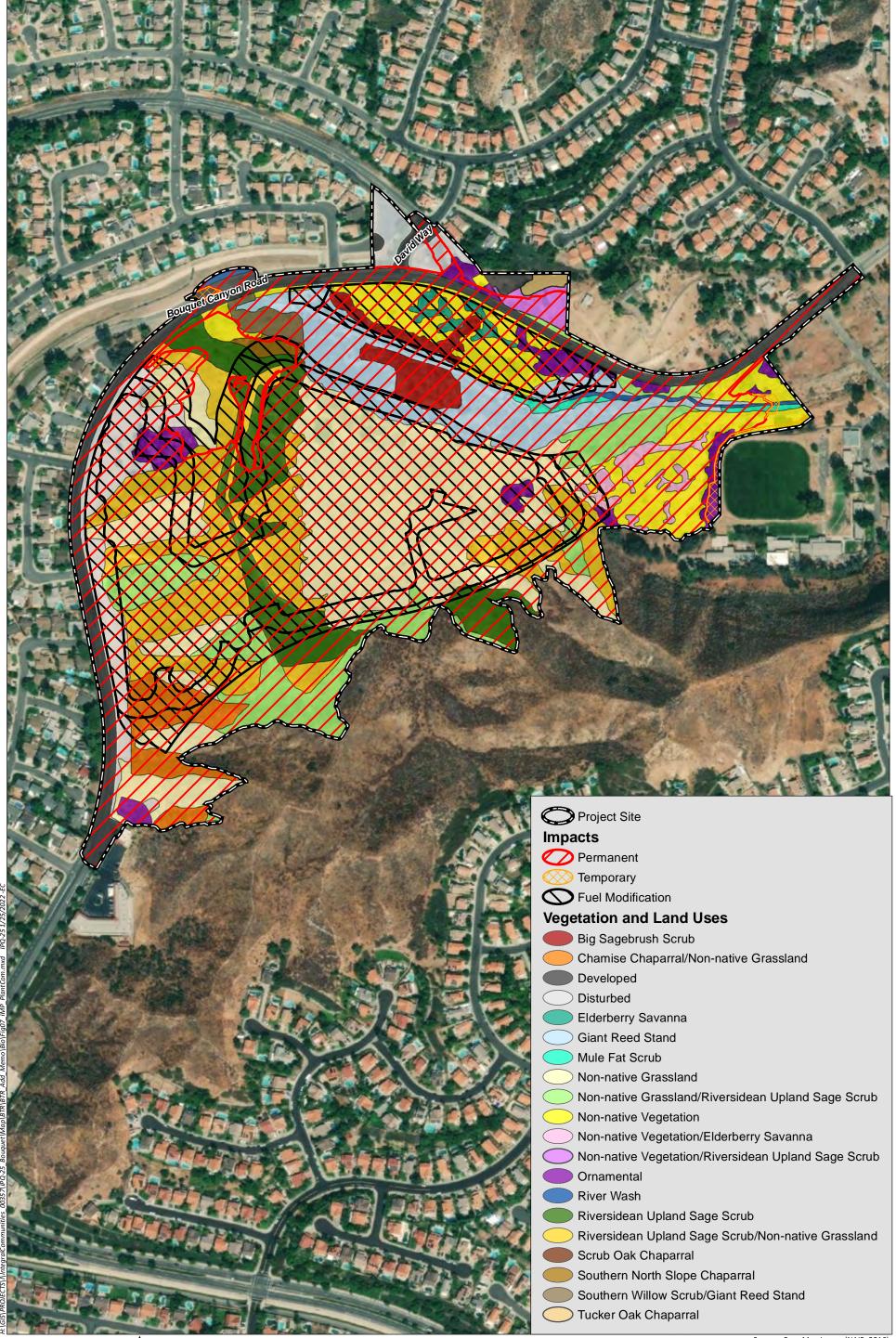


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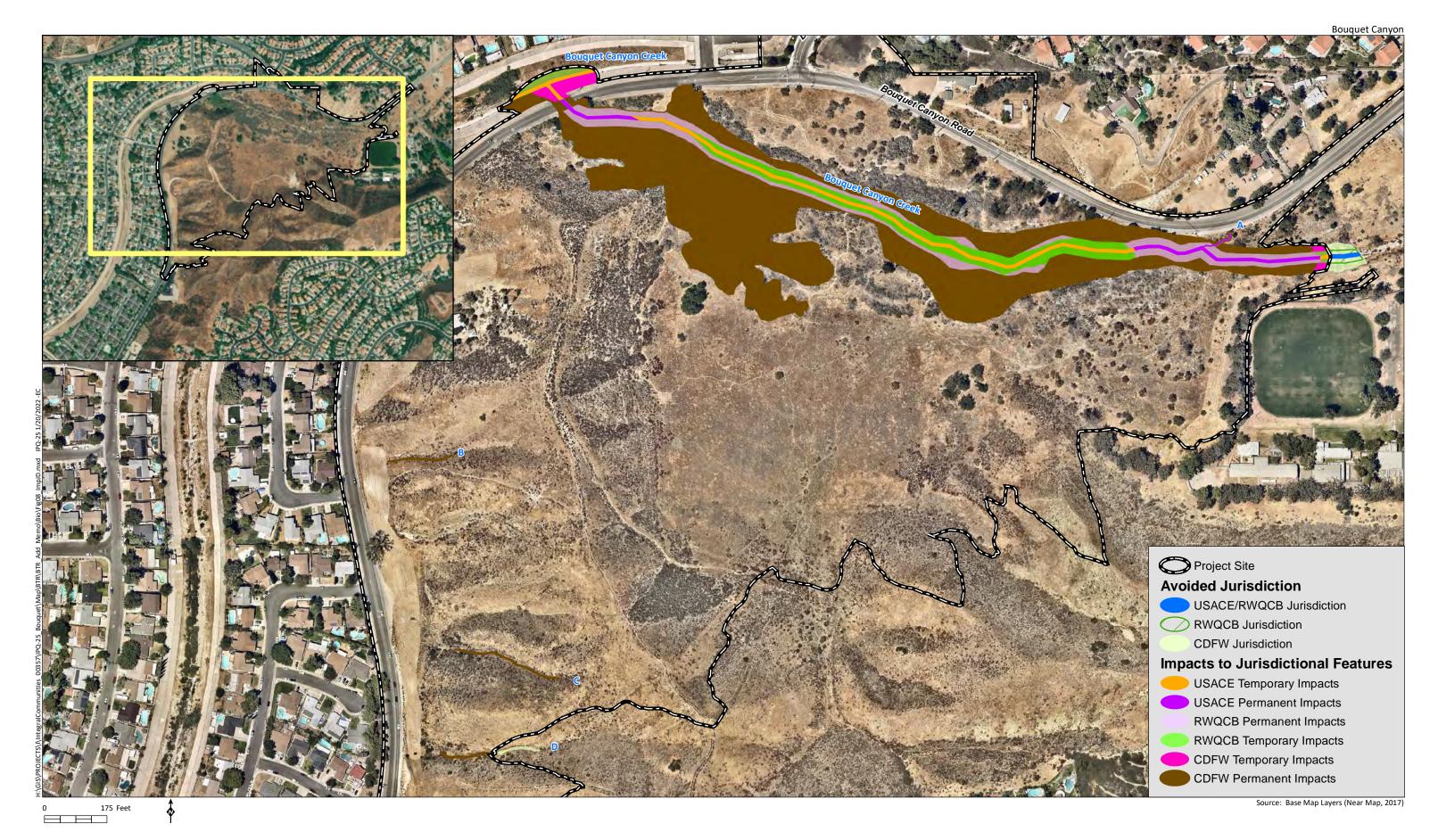
Jurisdictional Features



Source: Base Map Layers (NAIP, 2016)

350 Feet 💠

Bouquet Canyon



HELIX
Environmental Plannin

Attachment A

Biological Technical Report



Bouquet Canyon Project (Tentative Tract No. 82126)

Biological Technical Report

October 17, 2019 | IPQ-25

Prepared for:

Integral Communities

888 San Clemente Drive, Suite 100 Newport Beach, CA 92660

Prepared by:

HELIX Environmental Planning, Inc.

16485 Laguna Canyon Road, Suite 150 Irvine, CA 92618

Bouquet Canyon Project (Tentative Tract No. 82126)

Biological Technical Report

Prepared for:

Integral Communities

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October 17, 2019 | IPQ-25

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ACRONYMS AND ABBREVIATIONS

AMSL Above Mean Sea Level

BMPs Best Management Practices

BUOW Burrowing Owl

CAGN Coastal California Gnatcatcher

CDFW California Department of Fish and Wildlife
CEQA California Environmental Quality Act
CESA California Endangered Species Act

CFG California Fish and Game
City City of Santa Clarita

CNDDB California Natural Diversity Database
CNPS California Native Plant Society

County County of Los Angeles

CRPR California Rare Plant Rank

CWA Clean Water Act

EPA Environmental Protection Agency

FESA Federal Endangered Species Act

G Global

GPS Global Positioning System

HELIX Environmental Planning, Inc.

ISA International Society of Arboriculture

MBTA Migratory Bird Treaty Act

MCV A Manual of California Vegetation

NPPA Native Plant Protection Act

NRCS Natural Resources Conservation Service

OHWM Ordinary High Water Mark

Project Bouquet Canyon

RPW Relatively Permanent Water Body
RWQCB Regional Water Quality Control Board

S State

SFP State Fully Protected

SMEA San Marino Environmental Associates

SSC Species of Special Concern
TNW Traditional Navigable Waters

USACE U.S. Army Corps of Engineers USFWS U.S. Fish and Wildlife Service

USGS U.S. Geological Survey

UTS Unarmored Threespine Stickleback

WUS Waters of the U.S.

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EXECUTIVE SUMMARY

HELIX Environmental Planning, Inc. (HELIX) completed this biological technical report for the Bouquet Canyon Project (project), which is proposed by Integral Communities in the City of Santa Clarita (City), Los Angeles County, California. Integral Communities is proposing a residential development and road improvements to Bouquet Canyon Road on an approximately 94-acre study area. The study area is generally located 5.5 miles to the northeast of Interstate 5 and 3.8 miles to the northwest of California State Route 14.

The study area is located in the foothills of the Sierra Pelona Mountains. The topography in the southern and western portions of the study area is predominantly steep hillsides, while the northern portion is primarily flat. Bouquet Canyon Creek flows from east to west in the northern portion of the study area. The steep hills throughout the southern and western portions of the site are predominated by Riversidean upland sage scrub while the flatter portions of the study area are dominated by non-native grassland. HELIX conducted a general biological survey (including vegetation mapping and a general habitat assessment) and a jurisdictional assessment in 2017. Focused surveys for rare plant species, burrowing owl (*Athene cunicularia*; BUOW), and coastal California gnatcatcher (*Polioptila californica californica*; CAGN) surveys and an oak tree survey were conducted in 2018.

A total of 20 vegetation communities were mapped on the study area. Native communities totaled 29.19 acres, which included big sagebrush scrub, chamise chaparral/non-native grassland, elderberry savanna, Riversidean upland sage scrub, Riversidean upland sage scrub/non-native grassland, scrub oak chaparral, scrub oak chaparral/non-native grassland, southern north slope chaparral, and southern willow scrub/giant reed stand. Elderberry savanna and southern riparian scrub/giant reed stand are considered sensitive communities pursuant to the California Department of Fish and Wildlife (CDFW). A total of 496 slender mariposa lilies (Calochortus clavatus var. gracilis) were observed throughout the north-facing slopes in the eastern and southern portions of the study area during the rare plant surveys. Eight sensitive animal species were determined to have a potential occur on the study area, including three species with a low potential (California glossy snake [Arizona elegans occidentalis], Townsend's big-eared bat [Corynorhinus townsendii; foraging only], and southern grasshopper mouse [Onychomys torridus ramona]), one species with a moderate potential (California legless lizard [Anniella sp.]), four species with a high potential (coastal whiptail [Aspidoscelis tigris stejnegeri], coast horned lizard [Phrynosoma blainvillii], loggerhead shrike [Lanius ludovicianus], and San Diego black-tailed jackrabbit [Lepus californicus bennettii]). Two sensitive animal species are presumed absent due to negative focused surveys (BUOW and CAGN). Bouquet Canyon Creek is an ephemeral stream that runs east to west through the northern portion of the study area and is dominated by the invasive grass species giant reed (Arundo donax). The study are supports a total of 0.65 acre of U.S. Army Corps of Engineers (USACE)/Regional Water Quality Control Board (RWQCB) waters of the U.S. (WUS) and 9.80 acres of CDFW jurisdictional streambed and associated vegetation. A total of 64 oak trees meet the City's definition of a protected tree, including two coast live oaks (Quercus agrifolia), six scrub oaks (Quercus berberidifolia), two blue oaks (Quercus douglasii), and 54 Tucker oaks (Quercus john-tuckeri). The study area is not considered a regional wildlife corridor.

Potential significant impacts were identified for rare plants, BUOW (if present during the take avoidance survey), jurisdictional resources, nesting bird species, and City-protected oak trees. Permanent impacts are proposed to approximately 462 slender mariposa lilies and 28.68 acres of native-dominated vegetation. The project would permanently impact 0.19 acre and temporarily impact 0.46 acre of non-



wetland USACE/RWQCB WUS. The project would also permanently impact 9.33 acres and temporarily impact 0.47 acre of CDFW jurisdictional streambed and associated vegetation (mostly invasive giant reed). Following construction, the majority of the central channel within CDFW jurisdiction will be returned to pre-project topographic contours. The project would permanently remove 26 City-protected oak trees. The proposed project would not impact wildlife corridors or conflict with regional conservation plans.

Measures related to the following topics are proposed herein to fully mitigate potential impacts of the project: rare plants, BUOW, jurisdictional resources, nesting birds, and City-protected oak trees. Successful implementation of these measures would mitigate potential impacts to below a level of significance.



1.0 INTRODUCTION

1.1 PURPOSE OF THE REPORT

This report provides the City of Santa Clarita (City; California Environmental Quality Act [CEQA] lead agency), resource agencies, and the public with current biological data to satisfy review of the proposed Bouquet Canyon Project (Tentative Tract No. 82126; project) located in the City of Santa Clarita, Los Angeles County, California. The purpose of this report is to document the existing biological conditions on and in the immediate vicinity of the project and provide an analysis of potential impacts to sensitive biological resources with respect to local, state, and federal policy. This report provides the biological resources technical documentation necessary for project review under CEQA by the lead agency.

1.2 PROJECT LOCATION

The proposed project is located within an approximately 93.47-acre study area in the Saugus Community in the northern portion of the City. The study area is generally located 5.5 miles to the northeast of Interstate 5 and 3.8 miles to the northwest of California State Route 14 (Figure 1, *Regional Location*). The study area is within Section 6 of Township 4 North, Range 15 West of the Mint Canyon U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle (Figure 2, *USGS Topography*). Specifically, the study area is located directly south of the intersection of David Way and Bouquet Canyon Road (Figure 3, *Aerial Photograph*).

1.3 PROJECT DESCRIPTION

The proposed project is a residential development that would consist of a gated community comprising several neighborhoods and common area amenities (Figure 4, *Proposed Project*). The development would consist of private residences and would include a combination of detached single-family lots, auto court detached bungalow units, attached row townhomes, and attached motor court condominiums. The project would also require some slope stabilization in addition to implementing fuel modification zones in accordance with the County of Los Angeles (County) Fire Department regulations (County of Los Angeles 2017). A flood control channel would be constructed to south of existing Bouquet Canyon Creek. Downstream flows within Bouquet Canyon Creek would feed into the flood control channel, which would ultimately tie into the existing concrete-lined portion of Bouquet Canyon Creek to the northwest of the proposed project.

The project would construct a new alignment of Bouquet Canyon Road, which would improve a heavily-traveled route that connects to Copper Hill Drive and the northern portion of the City. The new road alignment would be constructed approximately 1,500 feet north of Plum Canyon Road on the south end to a connection point at the existing Bouquet Canyon Road approximately 700 feet south of Shadow Valley Lane. Construction of the new Bouquet Canyon alignment would implement a portion of the City's General Plan Circulation Element (City of Santa Clarita [City] 2011). The new alignment would include widened lane and shoulder areas, a full-width bridge over Bouquet Canyon Creek, pedestrian walkways, and a multi-use trail accessible to both existing neighborhoods and the proposed development.



2.0 METHODS

Project evaluation included a review of project plans; a literature review of biological resources occurring on the study area and surrounding vicinity; a general biological survey, including vegetation mapping and a general habitat assessment; focused surveys for rare plant species, burrowing owl (Athene cunicularia; BUOW), and coastal California gnatcatcher (Polioptila californica californica; CAGN); an oak tree (Quercus spp.) survey; and a jurisdictional assessment. The methods used to evaluate the biological resources present on the study area are discussed in this section.

2.1 NOMENCLATURE

Nomenclature for this report follows Baldwin et al. (2012) for plants. Plant communities were classified in accordance with Holland (1986) and Oberbauer (1996), with additional vegetation community information taken from Manual of California Vegetation, Second Edition (MCV; Sawyer et al. 2009). Animal nomenclature follows Emmel and Emmel (1973) for butterflies, Center for North American Herpetology (Taggart 2016) for reptiles and amphibians, American Ornithologists' Union (2018) for birds, and Baker et al. (2003) for mammals. Rare plant and sensitive animal statuses are from the Inventory of Rare and Endangered Plants of California (California Native Plant Society [CNPS] 2017, 2018) and the California Natural Diversity Database (CNDDB; California Department of Fish and Wildlife [CDFW] 2017, 2018a). Rare plant species' habitats and flowering periods are from the Jepson Manual (Baldwin et al. 2012), the Inventory of Rare and Endangered Plants of California (CNPS 2018), and California Natural Diversity Database (CDFW 2018a). Soil classifications were obtained from the Web Soil Survey (Natural Resources Conservation Service [NRCS] 2017).

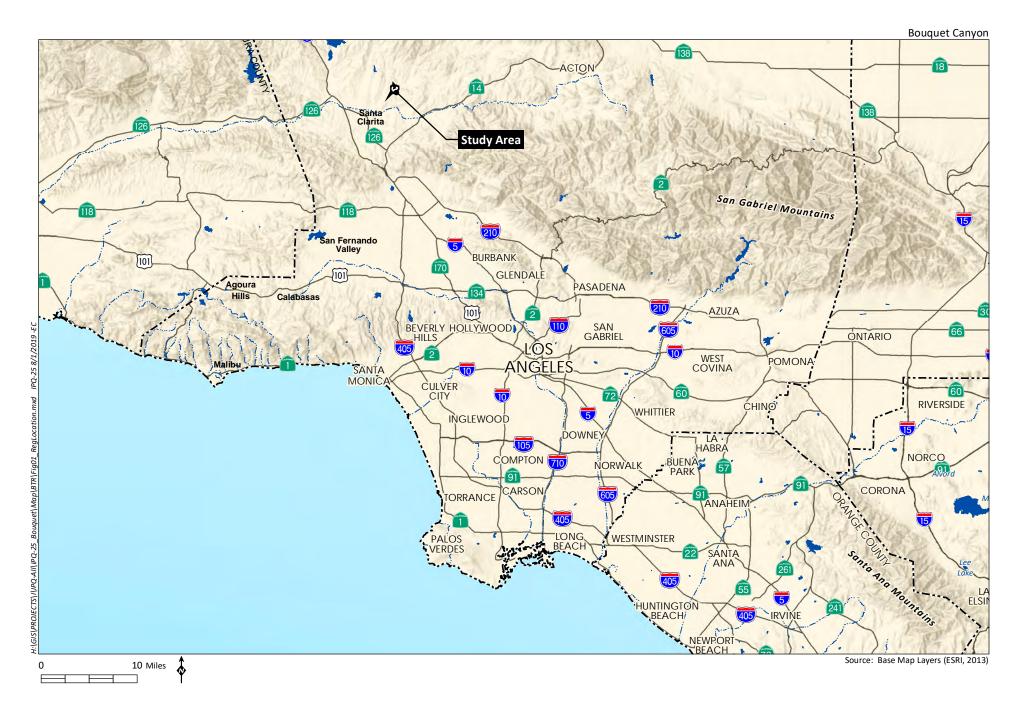
2.2 LITERATURE REVIEW

Prior to conducting the site visit, HELIX Environmental Planning, Inc. (HELIX) reviewed regional planning documents, Google Earth aerials (2017), Web Soil Survey (NRCS 2017), and sensitive species database records, including the Inventory of Rare and Endangered Plants of California (CNPS 2017, 2018), CNDDB (CDFW 2017, 2018a), and critical habitat maps for endangered and threatened species (U.S. Fish and Wildlife Service [USFWS] 2017a). A nine-quadrangle database search was conducted on CNDDB and CNPS, which included the following quadrangles: Agua Dulce, Green Valley, Mint Canyon, Newhall, Oat Mountain, San Fernando, Sleepy Valley, Sunland, and Warm Springs Mountain.

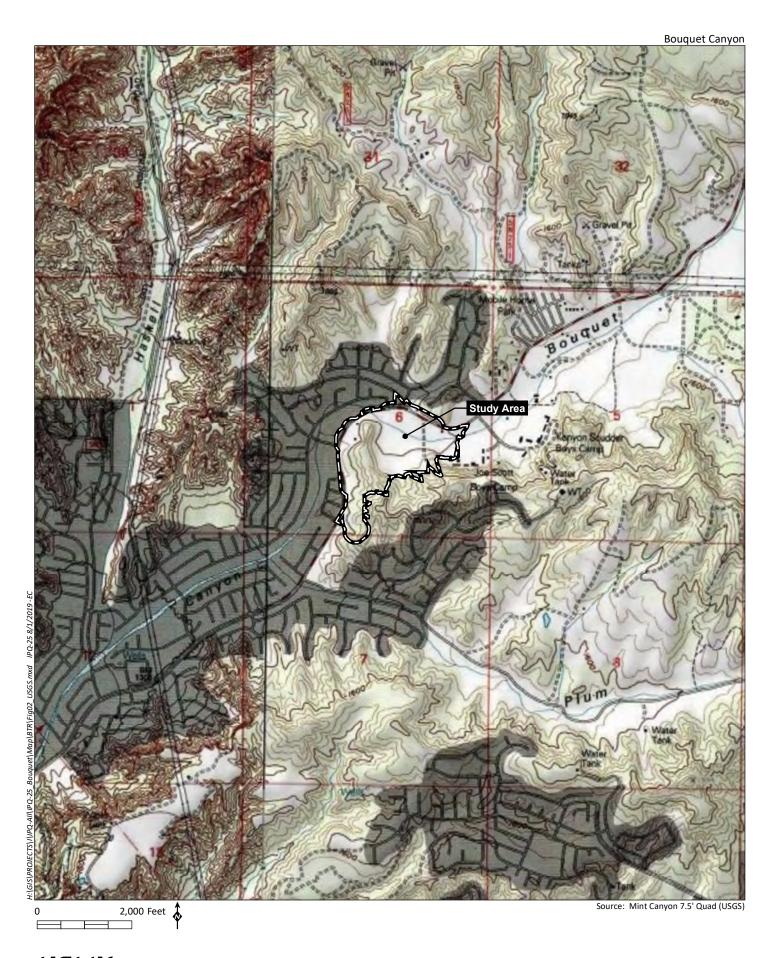
2.3 FIELD SURVEYS

Field surveys were conducted to document the existing condition of the study area and surrounding lands. A general biological survey and habitat assessment were conducted on the study area to map existing vegetation communities and to determine habitat suitability for sensitive plant and animal species. A list of plant and animal species observed and/or detected during the field surveys are provided as Appendix A, *Plant Species Observed* and Appendix B, *Animal Species Observed and/or Detected*. Noted animal species were identified by direct observation, vocalizations, or the observance of scat, tracks, or other signs. However, the list of animal species identified is not necessarily a comprehensive account of all species that use the study area as species that are nocturnal, secretive, or seasonally restricted may not have been observed. Focused surveys for rare plant species, oak trees, BUOW, and CAGN were conducted. A jurisdictional assessment was also conducted to determine the











500 Feet





existing jurisdictional limits regulated by the U.S. Army Corps of Engineers (USACE), Regional Water Quality Control Board (RWQCB), and CDFW.

2.3.1 General Biological Survey

HELIX Biologist and Regulatory Specialist Ezekiel Cooley and Biologist Lauren Singleton conducted a general biological survey of the study area on June 13, 2017. Vegetation communities were classified and mapped in accordance with Holland (1986) and Oberbauer (1996). Vegetation was mapped on a 125-foot (1 inch = 125 feet) aerial photograph of the site. Vegetation communities were mapped by HELIX to one-hundredth of an acre (0.01 acre). The entire site was surveyed on foot with the aid of binoculars. Representative photographs of the site were taken, with select photographs included in this report as Appendix C, Representative Site Photographs. Plant and animal species observed or otherwise detected were recorded in field notebooks. Animal identifications were made in the field by direct, visual observation or indirectly by detection of calls, burrows, tracks, or scat. Plant identifications were made in the field or in the lab through comparison with voucher specimens or photographs.

2.3.2 Rare Plant Species Surveys

Rare plants investigated include those that are listed as threatened or endangered by USFWS or CDFW and those afforded a California Rare Plant Rank (CRPR) of 1 through 3 by CNPS.

Mr. Cooley, Ms. Singleton, and HELIX Biologist Daniel Torres conducted spring rare plant surveys on May 15, 2018 and May 9, 2019, and a summer rare plant survey on August 8, 2018. The surveys were conducted in accordance with published agency guidelines (CDFW 2009, 2000; USFWS 2000) and during the appropriate flowering period to maximize the detection of those rare plant species with the potential occur on the study area. Survey methods incorporated a combination of meandering transects and focused searches in areas with the greatest potential to support rare plant species with the potential to occur on the study area. If observed, individual rare plants were mapped using a handheld Global Positioning System (GPS) unit. HELIX also recorded any rare plant species incidentally encountered during other field surveys.

2.3.3 Burrowing Owl

A habitat assessment was conducted on the study area by Ms. Singleton and Mr. Torres on March 27, 2018, to identify areas with potential BUOW habitat and eliminate those that did not contain habitat suitable to support the species. A focused burrow survey was conducted concurrently with the habitat assessment. All suitable burrows (i.e., greater than approximately four inches [11 cm] in height and width and greater than approximately 59 inches [50 cm] in depth) and burrow surrogates were recorded using a handheld GPS unit. The assessment was conducted on the study area and included an approximately 500-foot (150-m) buffer zone around the periphery of the study area. The study area was determined to support suitable BUOW habitat and burrows; therefore, a focused survey was conducted as described below.

A focused survey for BUOW was conducted between April 13 and June 26, 2018, by Mr. Cooley. The survey consisted of four breeding season (February 1 through August 31) surveys that were performed in accordance with the current CDFW survey guidelines (California Department of Fish and Game [CDFG] 2012). The surveys were spaced at least three weeks apart, with at least one survey conducted between February 15 and April 15 and one survey conducted between June 15 and July 15. Biologists visually



searching for BUOW sign and individuals with the aid of binoculars by slowly walking meandering transects spaced no more than 65 feet (20 meters) apart through areas of potential habitat. Fence posts, rocks, and other possible perching locations as well as mammal burrows (especially those of California ground squirrel [Otospermophilus beecheyi]) potentially suitable for use by BUOW were inspected. Burrows were searched for sign of recent BUOW occupation, including pellets with regurgitated fur, bones, and insect parts; white wash (excrement); tracks; and feathers. If observed, BUOW sign and/or individuals were recorded with a handheld GPS unit. The findings for the BUOW survey are included as Appendix D, Burrowing Owl Focused Survey Report.

2.3.4 Coastal California Gnatcatcher

A focused survey for CAGN was conducted between March 15 and June 30 by HELIX Biologist Tara Baxter (TE 87004B-0) in accordance with the current USFWS protocols (USFWS 1997). The survey consisted of six breeding season (February 15 through August 30) surveys conducted at least one week apart between March 15 and June 30. The CAGN survey area encompassed suitable habitat and a 100-foot buffer area. The CAGN survey area totaled approximately 33 acres of potential CAGN habitat within the survey area, which comprised big sagebrush scrub, Riversidean upland sage scrub, Riversidean upland sage scrub/non-native grassland, and adjacent habitat.

The surveys were conducted by walking within and along the perimeter of suitable CAGN habitat. The survey route was arranged to ensure complete survey coverage of habitat with potential for occupancy by CAGN. Surveys were conducted with binoculars to aid in bird detection. Recorded CAGN vocalizations were played sparingly and only if other means of detection had failed. If a CAGN was detected before playing recorded vocalizations, the recordings were not played. Once CAGNs were initially detected in an area, use of playback was discontinued. The CAGN survey findings are documented in a separate letter report included as Appendix E, *Coastal California Gnatcatcher Focused Survey Report*.

2.3.5 Jurisdictional Assessment

Prior to beginning fieldwork, aerial photographs (1 inch = 75 feet), topographic maps (1 inch = 75 feet), USGS quadrangle maps, and National Wetlands Inventory maps (USFWS 2017b) were reviewed to assist in determining the location of potential jurisdictional waters on the study area. Mr. Cooley and HELIX Principal Regulatory Specialist Amir Morales conducted the jurisdictional assessment field work on July 6, 2017. The assessment was conducted to identify and jurisdictional waters potentially subject to USACE jurisdiction pursuant to Section 404 of the Clean Water Act (CWA), RWQCB jurisdiction pursuant to Section 401 of the CWA, and streambed habitats potentially subject to CDFW jurisdiction pursuant to Sections 1600 et seq. of the California Fish and Game (CFG) Code. Data collection was targeted in areas that were deemed to have the potential to support jurisdictional resources, such as the presence of an ordinary high water mark (OHWM), the presence of a bed/bank and streambed associated vegetation and/or other surface indications of streambed hydrology. Representative photographs were taken of the drainage features and are included as Appendix F, Representative Drainage Photographs. The findings of the jurisdictional assessment are included as Appendix G, Jurisdictional Delineation Report).

2.3.5.1 U.S. Army Corps of Engineers and Regional Water Quality Control Board Jurisdiction

The USACE waters of the U.S. (WUS) were determined using current USACE guidelines (Environmental Laboratory 1987, USACE 2008a). Areas were determined to be WUS if there was evidence of regular



surface flow (e.g., bed and bank). Jurisdictional limits for these areas were measured according to the presence of a discernible OHWM, which is defined in 33 Code of Federal Regulations Section 329.11 as "that line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank; shelving; changes in the character of the soil; destruction of terrestrial vegetation; the presence of litter or debris; or other appropriate means that consider the characteristics of the surrounding areas." The USACE has issued further guidance on the OHWM (Riley 2005; USACE 2008b), which also was considered in this jurisdictional assessment.

The jurisdictional delineation was conducted in accordance with court decisions (i.e., Rapanos v. United States, Carabell v. United States, and Solid Waste Agency of Northern Cook County v. USACE), as outlined and applied by the USACE (USACE 2007; Grumbles and Woodley 2007); the USACE and U.S. Environmental Protection Agency (EPA; 2007), and the 2015 Clean Water Rule (USACE 2015). These publications explain that the EPA and USACE will assert jurisdiction over traditional navigable waters (TNW) and tributaries to TNWs that are a relatively permanent water body (RPW), which has year-round or continuous seasonal flow. For water bodies that are not RPWs, a significant nexus evaluation is used to determine if the non-RPW is jurisdictional. As an alternative to the significant nexus evaluation process, a preliminary jurisdictional delineation may be submitted to the USACE. The preliminary jurisdictional delineation treats all waters and wetlands on a site as if they are jurisdictional WUS (USACE 2008a). A significant nexus evaluation or preliminary jurisdictional delineation are typically only required for projects that propose impacts to potentially jurisdictional features and, therefore, require a Section 404 permit from the USACE.

The RWQCB asserts regulatory jurisdiction over activities affecting wetland and non-wetland waters of the State pursuant to Section 401 of the CWA and the State Porter-Cologne Water Quality Control Act. Potential RWQCB jurisdiction found within the study area follows the boundaries of potential USACE jurisdiction for WUS. There are no areas supporting isolated waters of the State subject to exclusive RWQCB jurisdiction pursuant to the State Porter-Cologne Water Quality Control Act.

2.3.5.2 California Department of Fish and Wildlife Jurisdiction

The CDFW jurisdictional boundaries were determined based on the presence of riparian vegetation or regular surface flow, if present. Streambeds within CDFW jurisdiction were delineated based on the definition of streambed as "a body of water that flows at least periodically or intermittently through a bed or channel having banks and supporting fish or other aquatic life. This includes watercourses with surface or subsurface flow that supports riparian vegetation" (Title 14, Section 1.72). This definition for CDFW jurisdictional habitat allows for a wide variety of habitat types to be jurisdictional, including some that do not include wetland species (e.g., oak woodland and alluvial fan sage scrub). Jurisdictional limits for CDFW streambeds were defined by the top of bank. Vegetated CDFW habitats were mapped at the limits of streambed-associated vegetation, if present.

2.3.6 Oak Tree Survey

An oak tree survey was conducted by Mr. Cooley and Mr. Torres (International Society of Arboriculture [ISA] WE-12249) on December 19 and 20, 2018 to identify oak trees that are protected under the City's Oak Tree Preservation ordinance (Title 17, Chapter 51, Section 40; City of Santa Clarita [City] 1990). Under these guidelines, all oak trees in the genus *Quercus* at least six inches in circumference measured at 4.5 feet above the natural grade are protected by the City. Heritage oak trees are given special consideration and may be fully protected or subject to requirements stricter than those of a standard



protected oak tree. A heritage oak tree is defined as any oak tree measuring 108 inches in circumference measured at 4.5 feet above the tree's natural grade. In the case of trees with multiple trunks, two or more trunks must measure 72 inches each or greater in circumference when measured at 4.5 feet above the tree's natural grade.

All oak trees within the survey area that satisfied the previously mentioned criteria were identified to species. An aluminum tag with a unique number was affixed to the north side of each tree at approximately three feet above natural grade, with the exception of those trees located outside of the study area where the Applicant does not own the property. The location of each individual tree and the canopy extent were recorded with a GPS with sub-meter accuracy. Physical and horticultural evaluations were performed for each tree according to the City's Oak Tree Preservation and Protection Guidelines (City 1990). The rating system is outlined below in Table 1, *Oak Tree Rating System*. The findings of the oak tree survey are included as Appendix H, *Oak Tree Survey Report*.

Table 1
OAK TREE RATING SYSTEM

| Rating | Description | |
|------------------------|---|--|
| A – Outstanding | A healthy and vigorous tree characteristic of its species and reasonably free of any visible signs of stress, disease, or pest infestation. | |
| B – Above Average | A healthy and vigorous tree with minor visible signs of stress, disease, or pest infestation. | |
| C – Average | Although healthy in overall appearance there is an abnormal amount of stress or disease and/or pest infestation. | |
| D – Below Average/Poor | This tree is characterized by exhibiting a greater degree of stress, disease, and/or pest infestation than normal and appears to be in a state of rapid decline. The degree of decline may vary greatly in signs of dieback, disease, and pest infestation and appears to be in an advanced state of decline. | |
| F – Dead | This tree exhibits no signs of life whatsoever. | |

Source: City of Santa Clarita (1990)

3.0 RESULTS

3.1 ENVIRONMENTAL SETTING

The study area is located in the foothills of the Sierra Pelona Mountains and portions were historically used as school, ranch, and hog farm from the early 1900s through the 1970s (Historic Aerials 1948). The



topography in the southern and western portions of the study area is predominantly steep hillsides, while the northern portion is primarily flat. The steep hills throughout the southern and western portions of the site are predominated by Riversidean upland sage scrub while the flatter portions of the study area are dominated by non-native grassland due to historic disturbance from ranching activities. Bouquet Canyon Creek flows from east to west in the northern portion of the study area. Elevations on the study area range from approximately 1,365 feet above mean sea level (AMSL) near the western boundary of the study area to approximately 1,600 feet above AMSL near the southeastern corner. Seven soil types are mapped on the study area, including Hanford sandy loam (HcC), Metz loam sandy (MfA), Mocho loam (MpA), Ojai loam (OgF), Saugus loam (ScF2), Sorrento loam (SsA), and Yolo loam (YoC; NRCS 2017).

Immediate surrounding land uses include existing residential development to the north and west, a mixture of undeveloped land and residential development to the south, and a juvenile camp (Los Angeles County Camp Joseph Scott) to the east. The study area is located approximately 0.20 mile to the southeast of Haskell Canyon Open Space and 1.40 miles to the south of Angeles National Forest.

3.2 VEGETATION COMMUNITIES

A total of 20 vegetation communities were mapped on the study area (Table 2, *Vegetation Communities*, Figure 5, *Vegetation*). The Holland/Oberbauer Element Codes and CDFW CaCodes are provided in parentheses next to each MCV community name in Table 2. Sensitive habitats pursuant to CDFW's Natural Communities List (2018b) are also identified in Table 2. A brief description of each vegetation community and land uses mapped on the study area is provided below.

Table 2
VEGETATION COMMUNITIES

| Habitat Type (Holland/Oberbauer) | Habitat Type (Manual of California Vegetation) | Acres | |
|--|---|-------|--|
| Big Sagebrush Scrub (H ¹ 35210) | Big Sagebrush (35.110.02) | 1.91 | |
| Chamise Chaparral (H 37200)/Non-native | Chamise Chaparral (37.101.16)/Red Brome | 2.98 | |
| Grassland (H 42200) | Grasslands (42.024.02) | | |
| Developed (O ² 12000) | Developed (N/A) | 9.37 | |
| Disturbed (O 11300) | Disturbed (N/A) | 5.32 | |
| Disturbed-Riversidean Upland Sage Scrub | Disturbed-California Buckwheat Scrub | 0.62 | |
| Elderberry Savanna (H 63430) | Blue Elderberry Stands (63.410.00) ³ | 0.56 | |
| Giant Reed Stand (O 65100) | Giant Reed Breaks (42.080.01) | 7.08 | |
| Mule Fat Scrub (H 63310) | Mule Fat Thickets (63.510.01) | 0.27 | |
| Non-native Grassland (H 42200) | Red Brome Grasslands (42.024.02) | 22.06 | |
| Non-native Grassland (H 42200)/ Riversidean | Red Brome Grasslands (42.024.02)/California | 7.75 | |
| Upland Sage Scrub (H 32710) | Sagebrush Scrub (32.010.01) | | |
| Non-native Vegetation (O 42210) | Upland Mustards (42.011.05) | 8.06 | |
| Non-native Vegetation (O 42210)/ Elderberry | Red Brome Grasslands (42.024.02)/Blue Elderberry | 0.97 | |
| Savanna (H 63430) | Stands (63.410.00) | 0.97 | |
| Ornamental (N/A) | Ornamental (N/A) | 2.69 | |
| Riversidean Upland Sage Scrub (H 32710) | California Sagebrush Scrub (32.010.01) | 7.06 | |
| Riversidean Upland Sage Scrub (H 32710)/Non- | California Sagebrush Scrub (32.010.01)/Non-native | 13.10 | |
| native Grassland (H 42200) | Grassland | 13.10 | |
| River Wash (O 64140) | River Wash (N/A) | 0.36 | |
| Scrub Oak Chaparral (H 37900) | Scrub Oak Chaparral (37.407.02) | 0.26 | |



Table 2 (cont.) VEGETATION COMMUNITIES

| Habitat Type (Holland/Oberbauer) | Habitat Type (Manual of California Vegetation) | Acres | |
|--|--|-------|--|
| Scrub Oak Chaparral (H 37900)/Non-native | Scrub Oak Chaparral (37.407.02)/Red Brome | 2.01 | |
| Grassland (H 42200) | Grasslands (42.024.02) | | |
| Southern North Slope Chaparral (H 37E20) | Tucker Oak Chaparral (37.418.04) | 0.34 | |
| Southern Willow Scrub (H 63320)/Giant Reed | Red Willow Thickets (61.205.01) ³ | 0.70 | |
| Stand (O 65100) | | 0.70 | |
| | TOTAL | 93.47 | |

- ¹ Holland Element Code
- ² Oberbauer Element Code
- ³ Sensitive habitats pursuant to the California Department of Fish and Wildlife (CDFW) Natural Communities List (2018b).

3.2.1 Big Sagebrush Scrub

Big sagebrush scrub comprises mostly soft-woody shrubs usually with bare ground underneath and between the shrubs. This vegetation community occurs on a wide variety of soils and terrain, from rocky, well-drained slopes to fine-textured valley soils with high water tables. Big sagebrush scrub usually occurs between 4,000 feet and 9,000 feet in scattered localities within and along the margins of the Mojave and Sonoran deserts, on desert mountain ranges. Great Basin sagebrush (*Artemisia tridentata*) is the dominant plant species.

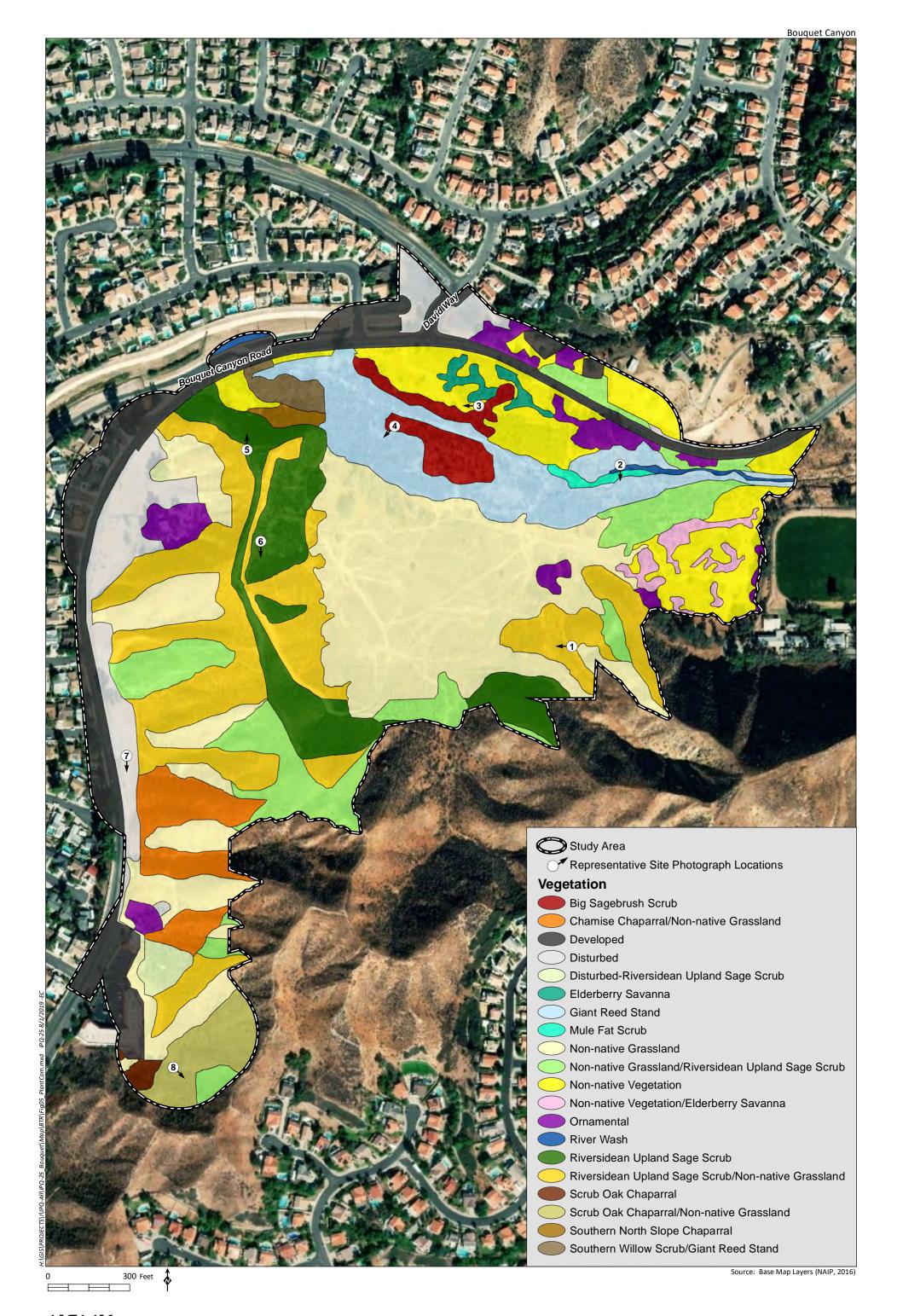
Big sagebrush scrub totaled 1.91 acres and was observed adjacent to portions of Bouquet Canyon Creek. This plant community was dominated by big sagebrush with scattered non-native species in the understory, including giant reed (*Arundo donax*), Mediterranean grass (*Schismus barbatus*), and shortpod mustard (*Hirschfeldia incana*).

3.2.2 Chamise Chaparral/Non-native Grassland

Chamise chaparral is the most widely distributed chaparral shrub and is dominated by the species chamise (*Adenostoma fasciculatum*). This vegetation community is found from Baja to northern California in pure or mixed stands. Chamise chaparral's ubiquitous distribution may be the result of chamise being the only chaparral species that regenerates from fire from both an underground root crown and the production of seeds. This community can be found on variable landforms, but soils are usually fairly shallow over bedrock. Chamise chaparral often dominates at low elevations and on xeric south facing slopes with 60 to 90 percent canopy cover. Along its lower elevation limit, chamise chaparral intergrades with coastal sage scrub. Mission manzanita (*Xylococcus bicolor*) and black sage (*Salvia mellifera*) are minor plant species associated within this vegetation community.

Chamise chaparral/non-native grassland was observed on some of the steep north-facing slopes in the southwestern portion of the study area, totaling 2.98 acres. Chamise was the dominant shrub observed in this community. The shrubs were fairly well-spaced with understory comprising many non-native grassland species (see Section 3.2.10 below). A few other native shrubs were observed in this community, including California buckwheat (*Eriogonum fasciculatum*), chaparral mallow (*Malacothamnus fasciculatus*), and Tucker oak (*Quercus john-tuckeri*).





HELIX
Environmental Planning

3.2.3 Developed

Developed land is where permanent structures and/or pavement have been placed, which prevents the growth of vegetation, or where landscaping is clearly tended and maintained.

Developed areas were observed near the northern and western study area boundaries, totaling 9.37 acres. The developed areas consisted of the existing Bouquet Canyon Road right-of-way.

3.2.4 Disturbed

Disturbed habitat includes land cleared of vegetation (e.g., dirt roads) or actively maintained or heavily disturbed areas that are mostly unvegetated but may support scattered non-native plant species, such as ornamentals or ruderal exotic species that take advantage of disturbance. Disturbed habitat is similar to the non-native vegetation community described below (see Section 3.2.11), although disturbed areas generally support little to no vegetative cover.

Disturbed habitat was observed adjacent to Bouquet Canyon Road along the northern and western study area boundary, totaling 5.32 acre. The disturbed habitat mainly consisted of fuel modification areas for existing adjacent residential homes and were mostly void of vegetation.

3.2.5 Disturbed/Riversidean Upland Sage Scrub

This community is dominated by disturbed habitat described in Section 3.2.4 above and is intermixed with species associated with Riversidean upland sage scrub described in Section 3.2.14 below.

Disturbed/Riversidean upland sage scrub was observed in the southern portion of the study area, totaling 0.62 acre. This community consisted of widely-spaced California buckwheat shrubs. The interstitial spaces between the shrubs were mostly unvegetated due to fuel modification that was implemented for the adjacent shopping center.

3.2.6 Elderberry Savanna

Elderberry savanna is dominated by widely-spaced blue elderberry (*Sambucus nigra* ssp. *caerulea*) with a grassy understory. This plant community is associated with stream terraces and bottomlands, which may be intermittently flooded.

One small patch of elderberry savanna was observed adjacent to the northern study area boundary, totaling 0.56 acre. This plant community was dominated by blue elderberry trees in the overstory and California buckwheat and short-pod mustard (*Hirschfeldia incana*) in the understory.

3.2.7 Giant Reed Stand

Giant reed stand occurs within sandy or gravelly soils that are deposited near stream channels during flood events and are densely vegetated by giant reed. These dense stands generally exclude most other plant life. This community typically associated with riparian areas along low-gradient streams and in ditches.

The giant reed stands on the study area were densely vegetated by giant reed, and the community totaled 7.08 acres on the study area. Native species, such as thick-leaved yerba santa (*Eriodictyon*



crassifolium), fourwing saltbush (Atriplex canescens), and caterpillar phacelia (Phacelia cicutaria), were observed within the openings of this plant community. One Fremont cottonwood (Populus fremontii ssp. fremontii) was also observed in this community. Non-native species observed within these openings included prickly lettuce (Lactuca serriola), red brome (Bromus madritensis ssp. rubens), short-pod mustard, and tree tobacco (Nicotiana glauca).

3.2.8 Mule Fat Scrub

Mule fat scrub is a shrubby riparian scrub community dominated by mule fat (*Baccharis salicifolia*) interspersed with small willows. This early seral community is dominated by frequent flooding, the absence of which would lead to a cottonwood or sycamore dominated woodland or forest. In some environments, limited hydrology may favor the persistence of mule fat.

The study area supports one patch of mule fat scrub along Bouquet Canyon Creek in the northeastern corner of the study area, which totaled 0.27 acre. In addition to mule fat, other species observed included California sagebrush (*Artemisia californica*) with and understory of non-native species such as Jersey cudweed (*Pseudognaphalium luteo-album*), red brome (*Bromus madritensis* ssp. *rubens*), common ripgut grass (*Bromus diandrus*), and short-podded mustard.

3.2.9 Non-native Grassland

Non-native grassland is a dense to sparse cover of annual grasses, often associated with numerous species of showy-flowered native annual forbs. Characteristic species include oats (*Avena* spp.), brome grasses (*Bromus* spp.), and mustards (*Brassica* spp., *Hirschfeldia incana*). Most of the annual introduced species within the non-native grassland originated from the Mediterranean region, an area with a long history of agriculture and a climate similar to California. Intensive grazing and agricultural practices combined with severe droughts in California contributed to the successful invasion and establishment of these species and the replacement of native grasslands with annual-dominated non-native grasslands (Jackson 1985).

Non-native grassland is the predominant plant community observed on the study area, totaling 22.06 acres. This community was observed in the flatter portions of the study area, including the valleys in the center and western parts of the study area. This plant community consisted most of red brome. Other non-native grass species included common ripgut grass, Mediterranean grass, and oats. A few annual native species were also observed within these areas, including common sandaster (*Corethrogyne filaginifolia*), fascicled tarplant (*Deinandra fasciculata*), and Menzies' fiddleneck (*Amsinckia menziesii*) and.

3.2.10 Non-native Grassland/Riversidean Upland Sage Scrub

This community is dominated by non-native grassland described in Section 3.2.9 above and is intermixed with some species associated with Riversidean upland sage scrub described in Section 3.2.14 below.

Non-native grassland/Riversidean upland sage scrub was observed on some of the south- and southwest-facing slopes in the southern portion of the study area, totaling 7.75 acres. This community was dominated by non-native grasses with widely-spaced California buckwheat shrubs.



3.2.11 Non-native Vegetation

Non-native vegetation community is typically associated with land that has been heavily influenced by human activities, including areas adjacent to roads, manufactured slopes, and abandoned lots. Non-native vegetation areas are dominated by ornamental and non-native species that take advantage of previously cleared or abandoned landscaping or land showing signs of past or present animal usage that removes any capability of providing viable habitat.

Non-native vegetation was observed in several patches within the study area, totaling 8.06 acres. These areas were dominated by short-podded mustard with other scattered non-native species such as annual yellow sweetclover (*Melilotus indicus*), foxtail barely (*Hordeum murinum*), red brome, and redstem filaree (*Erodium cicutarium*).

3.2.12 Non-native Vegetation/Elderberry Savanna

This community is dominated by non-native herbaceous species described in Section 3.2.11 above and is intermixed with some species associated with elderberry savanna described in Section 3.2.6 above.

Non-native vegetation/elderberry savanna was observed as scattered patches in the eastern portion of the study area, totaling 0.97 acre. This community was dominated by mustard with widely-spaced blue elderberry shrubs.

3.2.13 Ornamental

Ornamental vegetation is characterized as stands of naturalized trees and shrubs, many of which are also used in landscaping.

Ornamental vegetation was observed in small patches throughout the study area, totaling 2.69 acres. Most of the ornamental vegetation was associated with existing development adjacent to the study area, such as Bouquet Canyon Road, residences, and commercial businesses. Ornamental species observed included black locust (*Robinia pseudoacacia*), chinaberry (*Melia azedarach*), blue gum (*Eucalyptus globulus*), Italian cypress (*Cupressus sempervirens*), river red gum (*Eucalyptus camaldulensis*), silver dollar gum (*Eucalyptus polyanthemos*), and tree of heaven (*Ailanthus altissima*).

3.2.14 Riversidean Upland Sage Scrub

Riversidean sage scrub is the most xeric expression of coastal sage scrub south of Point Conception, California. This community occupies xeric sites, such as steep slopes, severely drained soils, or clays that slowly release stored soil moisture. This community is dominated by subshrubs with leaves that are deciduous during drought, an adaptation that allows the habitat to withstand the prolonged drought period in the summer and fall. Sage scrub species have relatively shallow root systems and open canopies that allow for the occurrence of a substantial herbaceous (annual plant) component. Typical stands are fairly open and dominated by species such as California sagebrush, brittlebush (*Encelia farinosa*), and California buckwheat.

Several patches of Riversidean upland sage scrub were observed on the east- and north-facing hillsides in the western portion of the study area, totaling 7.06 acres. In addition to California sagebrush and California buckwheat, other native shrubs included black sage, basket-brush (*Rhus aromatica*), purple sage (*Salvia leucophylla*), chaparral mallow, and Our Lord's candle (*Hesperoyucca whipplei*). Native



annuals included common goldenstar (*Bloomeria crocea*), elegant clarkia (*Clarkia unguiculata*), gilia (*Gilia angelensis*), and Menzies' fiddleneck.

3.2.15 Riversidean Upland Sage Scrub/Non-native Grassland

This community is dominated by species associated with the Riversidean upland sage scrub community described above in Section 3.2.7 above with a significant component of species associated with non-native grassland described in Section 3.2.9 above.

Riversidean upland sage scrub/non-native grassland was observed on the north-facing hillsides in the western portion of the study area, totaling 13.10 acres. This community mostly consisted of California sagebrush and California buckwheat shrubs, but contributed less cover than those observed in the Riversidean upland sage scrub community. The understory was made up mostly of non-native brome grasses, such as red brome and common ripgut grass.

3.2.16 River Wash

River wash is mostly unvegetated streambed that typically consists of coarse-textured substrate, which ranges from sand to gravel. The coarse-textured substrate is transported and deposited by stream flows.

River wash was observed in the upstream portion of Bouquet Canyon, totaling 0.36 acre. The river wash consisted of mostly unvegetated sandy streambed. Some thick-leaved yerba santa and non-native grasses were scattered throughout this area.

3.2.17 Scrub Oak Chaparral

Scrub oak chaparral is a dense, evergreen chaparral with shrubs up to 20 feet tall and is dominated by scrub oak (*Quercus berberidifolia*) with considerable mountain mahogany (*Cercocarpus betuloides*). Scrub oak chaparral occurs in somewhat more mesic areas than other chaparrals, such as north facing slopes, and recovers more rapidly from fires than other chaparrals due to resprouting capabilities of scrub oak (Holland 1986). This vegetation community often occurs at slightly higher elevations (to 5,000 feet) and substantial leaf litter accumulates.

Two small areas of scrub oak chaparral were observed on a steep north-facing slope in the southwestern corner of the study area, totaling 0.26 acre. Scrub oak was the dominant shrub species while the understory consisted of non-native brome grasses.

3.2.18 Scrub Oak Chaparral/Non-native Grassland

This community is dominated by species associated with the scrub oak chaparral community described above in Section 3.2.17 above with a significant component of species associated with non-native grassland described in Section 3.2.9 above.

Scrub oak chaparral/non-native grassland was observed on the north-facing hillsides in the western portion of the study area, totaling 13.10 acres. This community mostly consisted of scrub oak, but contributed less cover than those observed in the scrub oak chaparral. The understory was made up mostly of non-native brome species, such as red brome and common ripgut grass. The study area supports one patch of scrub oak chaparral/non-native grassland totaling 2.01 acres adjacent to the southern corner of the study area.



3.2.19 Southern North Slope Chaparral

Southern north slope chaparral is generally a mixed chaparral community on more mesic, shady slopes with well-drained soil. Codominant species or minor components of this plant community may include chamise, manzanita (*Arcostaphylos* spp.), California lilac (*Ceanothus* spp.), and basket-bush.

One patch of southern north slope chaparral was observed on the upper portion of a north-facing slope near the northwestern corner of the study area, totaling 0.34 acre. Tucker oak was the dominant shrub in this plant community. Other species observed included basket-bush, California bee plant (*Scrophularia californica*), and chamise. The understory of this plant community comprised non-native grasses.

3.2.20 Southern Willow Scrub/Giant Reed Stand

Southern willow scrub consists of dense, broad-leaved, winter-deciduous stands of trees dominated by shrubby willows (*Salix* spp.) in association with mule fat and with scattered emergent Fremont cottonwood and western sycamores (*Platanus racemosa*). This vegetation community occurs on loose, sandy or fine gravelly alluvium deposited near stream channels during flood flows. Frequent flooding maintains this early seral community, preventing succession to a riparian woodland or forest (Holland 1986). In the absence of periodic flooding, this early seral type would be succeeded by southern cottonwood or western sycamore riparian forest.

The study area supports one patch of southern riparian scrub/giant reed stand located along in the downstream (western) portion of Bouquet Canyon Creek, totaling 0.70 acre. Red willow (*Salix laevigata*) dominated the canopy in this community with a strong presence of giant reed in the understory. The canopy also included a few dying Fremont cottonwoods and scattered patches of mule fat were observed in the shrub layer.

3.3 PLANTS

HELIX identified a total of 151 plant species within the study area during surveys to date, of which 53 (35 percent) are non-native species (Appendix A).

3.4 ANIMALS

A total of 45 animal species were identified on the study area during biological surveys, including one reptile species, 40 bird species, and four mammal species (Appendix B).

3.5 SENSITIVE BIOLOGICAL RESOURCES

3.5.1 Rare Plant Species

Rare plant species are uncommon or limited in that they: (1) are only found in the Santa Clarita region; (2) are a local representative of a species or association of species not otherwise found in the region; or (3) are severely depleted within their ranges or within the region. Rare plant species include those species listed by CNPS with a CRPR of 1, 2, or 3 or federally and state listed endangered and threatened species. Species with CRPR of 4 may be considered rare if a population is locally uncommon, at the periphery of the species' range, sustained heavy losses, shows unusual morphology, or occurs on



unusual substrates (CNPS 2019). Focused surveys concentrated on the identification of CRPR 1, 2, and 3 species.

A total of eight rare plant species were recorded within the Mint Canyon quadrangle database search conducted on CNDDB (CDFW 2018a) and CNPS (2018). These species are included in Appendix I, Rare Plant Species Potential to Occur. Of the eight rare plant species recorded within the vicinity of the study area, four species were considered to have no potential to occur on the study area based on elevation range and/or lack of suitable habitat on the study area. The remaining four species were considered to have a potential to occur on the study area, primarily based on the presence of chaparral and coastal scrub habitats (see Appendix I). These species include Nevin's barberry (Berberis nevinii), slender mariposa lily (Calochortus clavatus var. gracilis), slender-horned spineflower (Dodecahema leptoceras), and Piute Mountains navarretia (Navarretia setiloba).

Spring rare plant surveys were conducted on May 15, 2018 and May 9, 2019, and a summer rare plant survey was conducted on August 8, 2018. Nevin's barberry, slender-horned spineflower, and Piute Mountains navarretia were not observed during the rare plant surveys and are therefore presumed absent from the study area. A total of 496 slender mariposa lilies were observed throughout the north-facing slopes in the eastern and southern portions of the study area during the spring rare plant survey (Figure 6, *Rare Plant Locations*).

3.5.2 Sensitive Animal Species

Sensitive animal species include federally and state listed endangered and threatened species, candidate species for listing by USFWS or CDFW, and/or are species of special concern (SSC) pursuant to CDFW.

A total of 15 sensitive animal species were recorded within the Mint Canyon database search conducted on CNDDB (CDFW 2018a). These species are included in Appendix J, Sensitive Animal Species Potential to Occur. An evaluation of each sensitive animal species' potential to occur on the study area is also provided in Appendix J and discussed in further detail below.

No Potential to Occur

Of the 15 sensitive animal species recorded within the vicinity of the study area, five species (Quino checkerspot butterfly [Euphydryas editha quino], two-striped gartersnake [Thamnophis hammondii], unarmored threespine stickleback [Gasterosteus aculeatus williamsoni], vernal pool fairy shrimp [Branchinecta lynchi], and western spadefoot [Spea hammondii]) were considered to have no potential to occur on the study area due to lack of suitable habitat and/or the study area is located outside of the species' known geographical range. Due to historical documentation of unarmored threespine stickleback (UTS) in Bouquet Canyon Creek, this species is discussed in further detail below.

Unarmored Threespine Stickleback

Currently, there are three recognized subspecies of threespine stickleback (*Gasterosteus aculeatus*), which are differentiated by the number of plates on the sides of their bodies. The subspecies include: (1) fully plated threespine stickleback (*Gasterosteus aculeatus aculeatus*), which have up to 36 plates; (2) low-plated threespine stickleback (*Gasterosteus aculeatus microcephalus*), which have 3 to 7 plates; and (3) UTS, which lack plates (Richmond et al. 2015). The UTS adults prefer slow-moving streams with a constant flow of water, but will occupy faster moving water if algal mats or other forms of protection





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are available (USFWS 2009). The UTS require sheltered pools at least 15 inches in depth with dense aquatic vegetation for breeding.

The UTS has been historically documented in Bouquet Canyon Creek. Although there is no written record, low-plated threespine stickleback were believed to have been introduced from the Fillmore State Fish Hatchery on the lower Santa Clara River into Bouquet Canyon Creek during rainbow trout (Oncorhynchus mykiss) stocking in the 1970s. This resulted in intergrades between the low-plated threespine stickleback and the UTS (San Marino Environmental Associates [SMEA] 2008; Richmond et al. 2015). San Marino Environmental Associates (SMEA) conducted multiple surveys for stickleback in Bouquet Canyon Creek. They identified an intergrade zone just upstream of the U.S. Forest Service Texas Canyon Station near the end of Bouquet Canyon. SMEA also conducted a number of surveys downstream of this intergrade zone where Bouquet Canyon Creek crosses Vasquez Canyon Road, which is approximately 1.70 miles upstream of the study area. SMEA collected 27 UTS in 1998 and only 3 UTS in 2001. In 2005, three sticklebacks were captured and plates were counted on two of the individuals. One of the individuals was unarmored while the other individual had one plate. This reach of Bouquet Canyon Creek was also surveyed in 2000, but was entirely dry. SMEA notes that this stretch of UTS habitat has clearly become more ephemeral since the 1998 survey, which is reflected in the drop in stickleback individuals collected between 1998 and 2005. SMEA concluded that the population located near Vasquez Canyon Road has likely been extirpated and only the intergrade zone remains upstream at the U.S. Forest Service Texas Canyon Station.

Richmond et al. (2015) also conducted a genetic study of sticklebacks in Bouquet Canyon Creek. They determined that the genotype and phenotype of sticklebacks in Bouquet Canyon Creek resemble a low-plated threespine stickleback population as opposed to the unarmored populations they observed in adjacent streams (e.g., San Francisquito Canyon, Santa Ana River near Valencia, and Soledad Canyon). They also discovered that although sticklebacks sampled near the juncture of Bouquet Canyon Creek and Texas Canyon Creek were the most similar to the unarmored populations, plates have steadily increased since at least the 1980s. This is the near the same location SMEA (2008) identified an intergrade zone between UTS and the low-plated threespine stickleback.

Although UTS have historically been documented upstream of the study area, findings by SMEA (2008) and Richmond et al. (2015) indicate that many stickleback in Bouquet Canyon Creek have a low plate count due to introduction of partially armored stickleback upstream. Richmond et al. (2015) indicates that downstream movement of stickleback through Bouquet Canyon Creek into the Santa Clara River is not likely due to channel alteration at the base of Bouquet Canyon (i.e., approximately 3.2 miles upstream of the study area). Upstream movement of stickleback from the Santa Clara River to Bouquet Canyon Creek and into the study area is restricted as a result of the channelization of Bouquet Canyon Creek just downstream of the study area. Existing drop structures would prohibit stickleback movement upstream into the study area.

The reach of Bouquet Canyon Creek that occurs within the study area does not support suitable live-in habitat for stickleback. Bouquet Canyon Creek within the study area is characterized as an ephemeral drainage comprising somewhat excessively drained sandy loam soil of the Metz series. Due to its ephemeral nature, the drainage only supports flowing water for a brief period following rainfall. The drainage does not support dense vegetation or algal mats. No ponding or surface water was documented during any of the site visits conducted between 2017 and 2019. Since this portion of Bouquet Canyon Creek only supports water for a short period following rainfall, the study area does not support suitable live-in habitat for UTS.



Potential to Occur

Of the 15 sensitive animal species recorded within the vicinity of the study area, eight species were considered to have potential occur. Three species were determined to have a low potential to occur on the study area based on the presence of low quality habitat, limited acreage of habitat, and lack of recent observations within the immediate vicinity of the study area, including California glossy snake (*Arizona elegans occidentalis*), Townsend's big-eared bat (*Corynorhinus townsendii*; foraging only), and southern grasshopper mouse (*Onychomys torridus ramona*). California glossy snake and southern grasshopper mouse are SSC. Townsend's big-eared bat is an SSC and state candidate threatened species; no suitable roosting habitat is present for this species, although this species may use the site as foraging habitat.

One species (California legless lizard [Anniella sp.]) was determined to have a moderate potential to occur on the study area based on the presence of low-quality habitat and recent observations within the immediate vicinity.

Four species were determined to have a high potential to occur on the study area based on the presence of suitable habitat and recent observations within the immediate vicinity of the study area, including coastal whiptail (*Aspidoscelis tigris stejnegeri*), coast horned lizard (*Phrynosoma blainvillii*), loggerhead shrike (*Lanius ludovicianus*), and San Diego black-tailed jackrabbit (*Lepus californicus bennettii*). All four species are SSC and were recorded within the last 15 years less than five miles from the study area.

Presumed Absent

Focused surveys were conducted for two sensitive bird species with the potential to occur on the study area, including BUOW and CAGN. Focused surveys for both species were negative. Survey results are discussed further below.

Burrowing Owl

The BUOW is an SSC. A focused survey for BUOW was conducted between March and June 2018. No BUOWs were observed during the surveys; therefore, this species is presumed absent from the study area. The detailed report findings for the BUOW surveys are included as Appendix D.

Coastal California Gnatcatcher

The CAGN is a federally threatened species and a SSC. A focused survey for CAGN was conducted between March and May 2018. No CAGN were observed during the surveys; therefore, this species is presumed absent from the study area. The detailed report findings for the CAGN surveys are included as Appendix E.

3.5.3 Sensitive Vegetation Communities/Habitats

Sensitive vegetation communities/habitats are considered either rare within the region or sensitive by CDFW (2018b). Communities are given a Global (G) and State (S) ranking on a scale of 1 to 5. Communities afforded a rank of 5 are most common while communities with a rank of 1 are considered highly periled. The CDFW considers sensitive communities as those with a rank between S1 and S3.



The study area supports two sensitive plant communities. Elderberry savanna and southern willow scrub/giant reed stand are considered sensitive habitats pursuant to CDFW. Approximately 0.56 acre of elderberry savanna and 0.70 acre of southern riparian scrub/giant reed stand were mapped on the study area (Figure 5). Both communities are small, isolated habitat patches with a non-native understory.

3.5.4 Jurisdictional Waters and Wetlands

One major drainage feature, Bouquet Canyon Creek, occurs within the study area. The drainage features are described in detail below. The study area supports approximately 0.65 acre of USACE/RWQCB jurisdictional WUS and 9.80 acres of CDFW jurisdictional streambed and riparian vegetation (Figure 7, *Jurisdictional Features*).

3.5.4.1 Bouquet Canyon Creek

Bouquet Canyon Creek, which is mapped by USGS as a blueline stream, is an ephemeral drainage that runs from east to west near the northern study area boundary. The headwaters of the Bouquet Canyon drainage feature originate approximately 10 miles to the northeast of the study area in the Sierra Pelona Mountains, and non-storm related flows through the wash are often controlled via regulated releases from Bouquet Reservoir. The Bouquet Canyon streambed enters the study area at the northeastern boundary and exits at the northwestern boundary. The drainage continues under Bouquet Canyon Road at the northwestern corner of the study area boundary where the drainage has been channelized. The Bouquet Canyon drainage is a tributary to the Santa Clara River, which ultimately drains into the Pacific Ocean approximately 35 miles to the southwest of the study area. The on-site floodplain of Bouquet Canyon Creek is infested with invasive giant reed. Historical imagery and evidence of grinded material observed on the study area suggest that giant reed removal has previously occurred on the study area. Bouquet Canyon Creek supports somewhat excessively drained sandy loam of the Metz soil series. Aside from Bouquet Canyon Creek, no other surface water features were observed and the study area is predominantly upland habitat. The jurisdictional delineation report is included as Appendix G, *Jurisdictional Delineation Report*.

Within the study area, Bouquet Canyon Creek supports approximately 0.65 acre of USACE/RWQCB non-wetland WUS ephemeral streams. In addition, Bouquet Canyon Creek supports approximately 9.80 acres of CDFW jurisdictional streambed and riparian vegetation.

3.5.5 Oak Tree Survey

A total of 64 oak trees meet the City's definition of a protected tree (Figure 8, *Oak Tree Locations*). Of the 64 trees, two were coast live oaks (*Quercus agrifolia*), six were scrub oaks, two were blue oaks (*Quercus douglasii*), 53 were Tucker oaks, and one was a valley oak (*Quercus lobata*). Six trees (9 percent) were assigned an A rating, 22 trees (34 percent) were assigned a B rating, 25 trees (40 percent) were assigned a C rating, and 11 trees (17 percent) were assigned a D rating. No dead trees or heritage oak trees were observed during the survey. The detailed report findings are included as Appendix H.

¹ The study area evaluated in the Jurisdictional Delineation Report increased slightly following report completion. The jurisdictional resources were extended based on previous delineation results and confirmed in the field during subsequent site visits.



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3.5.6 Habitat and Wildlife Corridor Evaluation

Wildlife corridors connect otherwise isolated pieces of habitat and allow movement or dispersal of plants and animals. Corridors can be local or regional in scale; their functions may vary temporally and spatially based on conditions and species presence. Local wildlife corridors allow access to resources such as food, water, and shelter within the framework of their daily routine. Animals use these corridors, which are often hillsides or tributary drainages, to move between different habitats. Regional corridors provide these functions over a larger scale and link two or more large habitat areas, allowing the dispersal of organisms and the consequent mixing of genes between populations.

Regionally, the study area is situated in the foothills of the Sierra Pelona Mountains and supports the lower portion of Bouquet Canyon Creek just upstream of where the creek becomes channelized. The study area is located approximately 0.20 mile to the southeast of Haskell Canyon Open Space and 1.40 miles to the south of Angeles National Forest, although existing development separates the study area from these open space areas. The study area is mostly surrounded by development with the exception of the eastern portion of the study area, which connects to undeveloped land located to the east. Bouquet Canyon Creek supports limited native habitat for wildlife, including small patches of mule fat and red willows. The majority of Bouquet Canyon Creek on the study area is vegetated with giant reed, which provides limited resources for wildlife. The remainder of the study area supports a number of native upland habitats that provide live-in resources for wildlife, such as big sagebrush scrub, elderberry savanna, Riversidean upland sage scrub, scrub oak chaparral, and southern north slope chaparral. The dominant habitat on the study area is non-native grassland, which also provides low-value foraging habitat for some bird species.

As previously described, corridors can be local or regional in scale. The study area is not considered a regional corridor since it does not directly connect two or more large blocks of habitat that would otherwise be fragmented or isolated from one another. The areas immediately adjacent to the study area are highly urbanized and support limited cover for wildlife moving through the area. Wildlife may access the study area via undeveloped land to the east. Access to the study area from the east is quite constrained, but could occur along Bouquet Canyon Creek or along the ridgeline to the south of the Camp Joseph Scott facility. Development of the project would not impede wildlife access to other undeveloped land in the region since the study area is located at the edge of existing development. Although wildlife likely use Bouquet Canyon Creek for local movement through the area, the lower portion of Bouquet Canyon would not be considered a regional corridor for wildlife since the creek becomes channelized and unvegetated just downstream of the study area. The study area is essentially a "dead end" for wildlife moving through the area since it does not directly connect two or more large blocks of habitat and the northern, southern, and western portions of the study area are confined by existing development. The study area is not within any wildlife corridors or linkages identified by the South Coast Missing Linkages Project (South Coast Wildlands 2008). The nearest wildlife movement corridor to the study area identified by the South Coast Missing Linkages Project is the San Gabriel – Castaic Connection located approximately 4.3 miles to the northeast of the study area.

While the study area is not considered a regional wildlife movement corridor, the study area does support habitat suitable for local wildlife movement. Common mammals that are adapted to human disturbance (e.g., raccoon [Procyon lotor], skunk [Mephitis sp.], cottontail rabbits [Sylvilagus spp.], and coyote [Canis latrans]) may use the study area for local movement within the area. Birds species may fly over surrounding development to nest and/or forage within study area. Mountain lions (Puma concolor) are known to occur within the vicinity of the study area and one bobcat (Lynx rufus) was observed on





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the study area during field surveys. These larger mammals require large expanses of undeveloped land for their territories, such as land to the east. Although the study area is not large enough to solely support live-in habitat for these larger mammals, the study area could be on the edge of their territories and they may occasionally wander onto the study area. As discussed above, the study area supports opportunities for local wildlife movement but does not function as a wildlife corridor since it does not directly connect to two or more blocks of large habitat.

4.0 REGIONAL AND REGULATORY CONTEXT

Biological resources located within the study area are subject to regulatory review by federal, state, and local agencies. Biological resources-related laws and regulations that apply to the project include the Federal Endangered Species Act (FESA), Migratory Bird Treaty Act (MBTA), CWA, California Endangered Species Act (CESA), and CFG Code.

4.1 FEDERAL REGULATIONS

4.1.1 Federal Endangered Species Act

Administered by the USFWS, the FESA provides the legal framework for the listing and protection of species (and their habitats) identified as being endangered or threatened with extinction. Actions that jeopardize endangered or threatened species and the habitats upon which they rely are considered a "take" under the FESA. Section 9(a) of the FESA defines take as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." "Harm" and "harass" are further defined in federal regulations and case law to include actions that adversely impair or disrupt a listed species' behavioral patterns.

Sections 4(d), 7, and 10(a) of the FESA regulate actions that could jeopardize endangered or threatened species. Section 7 describes a process of federal interagency consultation for use when federal actions may adversely affect listed species. A biological assessment is required for any major construction activity if it may affect listed species. In this case, take can be authorized via a letter of biological opinion issued by the USFWS for non-marine related listed species issues. A Section 7 consultation is required when there is a nexus between federally listed species' use of the site and impacts to USACE jurisdictional areas. Section 10(a) allows issuance of permits for "incidental" take of endangered or threatened species. The term "incidental" applies if the taking of a listed species is incidental to and not the purpose of an otherwise lawful activity.

4.1.2 Federal Clean Water Act

Federal wetland regulation (non-marine issues) is guided by the Rivers and Harbors Act of 1899 and the CWA. The Rivers and Harbors Act deals primarily with discharges into navigable waters, while the purpose of the CWA is to restore and maintain the chemical, physical, and biological integrity of all WUS. Permitting for projects filling WUS, including wetlands and vernal pools, is overseen by USACE under Section 404 of the CWA. Projects may be permitted on an individual basis or may be covered under one of several approved Nationwide Permits. Individual Permits are assessed individually based on the type of action, amount of fill, etc. Individual Permits typically require substantial time (often longer than six months) to review and approve, while Nationwide Permits are pre-approved if a project meets the



appropriate conditions. A CWA Section 401 Water Quality Certification, which is administered by the State Water Resources Control Board, must be issued prior to any 404 Permit.

4.1.3 Migratory Bird Treaty Act

All migratory bird species that are native to the United States or its territories are protected under the federal MBTA, as amended under the Migratory Bird Treaty Reform Act of 2004 (FR Doc. 05-5127). The MBTA is generally protective of migratory birds but does not actually stipulate the type of protection required. In common practice, the MBTA is used to place restrictions on disturbance of active bird nests during the nesting season, which is generally defined as February 15 to August 31 for songbirds. In addition, the USFWS commonly places restrictions on disturbances allowed near active raptor nests, which the nesting season is generally defined as January 15 to August 31.

4.1.4 Critical Habitat

As described by the FESA, critical habitat is the geographic area occupied by a threatened or endangered species essential to species conservation that may require special management considerations or protection. Critical habitat also may include specific areas not occupied by the species but that have been determined to be essential for species conservation.

Critical habitat does not occur on the study area. The nearest critical habitat to the study area is spreading navarretia (*Navarretia fossalis*) critical habitat, which is approximately 2.25 miles to the east (USFWS 2017a).

4.2 STATE REGULATIONS

4.2.1 California Environmental Quality Act

Primary environmental legislation in California is found in CEQA and its implementing guidelines (State CEQA Guidelines), which require that projects with potential adverse effects (i.e., impacts) on the environment undergo environmental review. Adverse environmental impacts are typically mitigated as a result of the environmental review process in accordance with existing laws and regulations.

4.2.2 California Endangered Species Act

The CESA is similar to the FESA in that it contains a process for listing of species and regulating potential impacts to listed species. Section 2081 of the CESA authorizes the CDFW to enter into a memorandum of agreement for take of listed species for scientific, educational, or management purposes. The golden eagle (*Aquila chrysaetos*) and white-tailed kite (*Elanus leucurus*) are considered State Fully Protected (SFP) species. A SFP species may not be taken or possessed at any time, and no state licenses or permits may be issued for their take except for collecting the species necessary for scientific research and relocation of the bird species for the protection of livestock (Fish and Game Code Sections 3511, 4700, 5050, and 5515).

The Native Plant Protection Act (NPPA) enacted a process by which plants are listed as rare or endangered. The NPPA regulates the collection, transport, and commerce of plants that are listed. The CESA followed the NPPA and covers both plants and animals that are determined to be endangered or



threatened with extinction. Plants listed as rare under NPPA were designated threatened under the CESA.

4.2.3 California Fish and Game Code

4.2.3.1 Protection of Raptor Species

Raptors (birds of prey) and owls and their active nests are protected by CFG Code Section 3503.5, which states that it is unlawful to take, possess, or destroy any birds of prey or to take, possess, or destroy the nest or eggs of any such bird unless authorized by the CDFW.

4.2.3.2 Streambed Alteration Agreement

The CFG Code (Section 1600 et seq.) requires an agreement with the CDFW for projects affecting riparian and wetland habitats through the issuance of a Streambed Alteration Agreement.

4.3 LOCAL REGULATIONS

4.3.1 Oak Tree Protection

The City has implemented regulatory measures to protect and preserve oak trees that occur within the City's jurisdiction. The City's Oak Tree Preservation ordinance states, "No person shall cut, prune, remove, relocate, endanger, damage, or encroach into the protected zone of any oak tree on any public or private property within the City" (City 2013). The protected zone of the oak tree includes the area within five feet of the dripline (canopy extent), but no less than 15 feet from the trunk. Encroachment is defined as intrusion into the protected zone of an oak tree, which includes but is not limited to, intrusion by trenching, paving, pruning, dumping, parking of commercial vehicles. Major encroachment is defined by the City as "an area between the outer edge of the trunk and fifty percent of the diameter of the protected zone" and minor encroachment is defined as an area between the outermost edge of the protected zone and fifty percent of the diameter of the protected zone and fifty percent of the diameter of the protected zone" (2013).

To remove any oak tree or to subject its protected zone to major encroachment, an Oak Tree Permit must be obtained. Trees subject to the permit include all oak trees in the genus *Quercus* that exceed six inches in circumference when measured at 4.5 feet above the tree's natural grade. Heritage oak trees are given special consideration and may be fully protected or subject to requirements stricter than those of a standard protected oak tree. A heritage oak tree is defined as any oak tree measuring 108 inches in circumference measured at 4.5 feet above the tree's natural grade. In the case of trees with multiple trunks, two or more trunks must measure 72 inches each or greater in circumference when measured at 4.5 feet above the tree's natural grade.

To obtain an Oak Tree Permit, an application must be submitted to the City Manager or designated representative ("Director") and a filing fee as established by the City Council must be paid. The conditions of the Oak Tree Permit will require native oak trees at a minimum of 24-inch box size to be planted for each protected oak tree removed and for each tree whose protected zone will be subject to major encroachment. Minor encroachment does not require mitigation, but a number of protection measures are required during construction as outlined in Section VII. Standards for Performance of Permitted Work of the Oak Tree Preservation Guidelines (City 1990). The number of replacement trees required is dependent upon the circumference of the tree to be impacted, which are described in



Subsection B of the Oak Tree Preservation Ordinance. For those trees with multiple stems, the average circumference was used to determine the number of replacement trees.

4.3.2 Fuel Modification Zones

The County Fire Department requires fuel modification zones to create a defensible space in the event a wildlife breaks out (County of Los Angeles N.D.). There are three difference zones, which are outlined below:

- 1. **Zone A (Setback Zone)** This zone extends 20 feet beyond the edge of any structures. The only allowed vegetation within this zone is green lawns, ground cover not exceeding six inches in height, and well-spaced shrubs. The landscape must be irrigated to promote healthy vegetation and fire resistance.
- 2. **Zone B (Irrigated Zone)** This zone extends from the outermost edge of Zone A to 100 feet from structures. Green lawn, ground cover not exceeding six inches in height, and well-spaced shrubs and trees are allowed in this zone. The landscape must be irrigated to promote healthy vegetation and fire resistance.
- 3. **Zone C (Native Brush Thinning Zone)** This zone extends from the outermost edge of Zone B to 200 feet from the structures. Well-spaced native vegetation and ornamental shrubs and trees are allowed. Vegetation must be thinned and species that constitute a fire risk are not allowed (e.g., chamise, sages [*Salvia* spp.], California sagebrush, and California buckwheat). This zone does not require irrigation.

5.0 PROJECT EFFECTS

This section describes potential direct and indirect impacts associated with the proposed project. Direct impacts immediately alter the affected biological resources such that those resources are eliminated temporarily or permanently. Indirect impacts consist of secondary effects of a project, including noise, decreased water quality (e.g., through sedimentation, urban contaminants, or fuel release), fugitive dust, colonization of non-native plant species, animal behavioral changes, and night lighting. The magnitude of an indirect impact can be the same as a direct impact; however, the effect usually takes a longer time to become apparent.

The significance of impacts to biological resources present or those with potential to occur was determined based upon the sensitivity of the resource and the extent of the anticipated impacts. For certain highly sensitive resources (e.g., a federally listed species), any impact would be significant. Conversely, other resources that are of low sensitivity (e.g., species with a large, locally stable population in the region but declining elsewhere) could sustain some impact with a less than significant effect.



5.1 SENSITIVE SPECIES

5.1.1 Rare Plant Species

Less than Significant Impacts with Mitigation Incorporated

A total of four of the eight rare plant species recorded within the Mint Canyon quadrangle were not considered to have a potential to occur based on geographic range, elevation range, and/or lack of suitable habitat (see Appendix I). The remaining four species were considered to have a potential to occur on the study area primarily based on the presence of chaparral and coastal scrub habitats. Rare plant surveys were conducted in May and August 2018 and May 2019.

Nevin's barberry, Piute Mountains navarretia, and slender-horned spineflower were not observed on the study area during any of the rare plant surveys. Therefore, these species are presumed absent from the study area. Project grading and fuel modification associated with the residential development would impact approximately 142 slender mariposa lilies (Figure 9, *Impacts to Rare Plants*). Construction of the new alignment of Bouquet Canyon Road would impact approximately 320 slender mariposa lilies. The remaining 34 individuals would be avoided by the project.

Slender mariposa lily is a CRPR 1B.2 species, which are species considered rare throughout their range and have declined significant over the last century. This species is not federally or state listed as endangered or threatened. Project impacts to this species would be significant and mitigation would be required to reduce impacts to less than significant. Required mitigation for potential impacts to slender mariposa lily is described in mitigation measure BIO-1 in Section 6.0 below.

5.1.2 Sensitive Animal Species

Less than Significant Impacts with Mitigation Incorporated

Of the 15 sensitive animal species recorded within the vicinity of the study area, five species (Quino checkerspot butterfly, two-striped gartersnake, UTS, vernal pool fairy shrimp, and western spadefoot) were considered to have no potential to occur on the study area due to lack of suitable habitat and/or the study area is located outside of the species' known geographical range (Appendix J). Although UTS was determined to have no potential to occur on the study area (see discussion in Section 3.5.2 above), populations of UTS do occur downstream in portions of the Santa Margarita River. The project would not indirectly affect downstream water quality or surface water flows. The project would prevent sedimentation and potential impacts to water quality downstream during construction and postconstruction by preparing and implementing a project-specific Stormwater Pollution Prevention Plan (SWPPP) and Water Quality Management Plan (WQMP), respectively. Potential impacts to water quality due to pollutants from residential uses will be addressed through the use of infiltration basins where feasible and biofiltration basins where infiltration is not feasible due to low percolation rates in the underlying soil. The SWPPP and WQMP will also be provided to the resource agencies (USACE, RWQCB, and CDFW) during the regulatory permitting process. Most of the flow within the Bouquet Creek is from upstream waters. Per the project engineer, the water surface flows within the project reach will only contribute an additional 100 cubic feet per second, which represents approximately 0.5 percent of the overall flow within this reach of Bouquet Canyon Creek. Potential increases to surface flow rates due to project construction of impervious surfaces (e.g., roads, roofs, sidewalks, etc.) would be offset by the construction of desilting basins upstream of the realigned Bouquet Canyon Road. Since the project



would not indirectly affect downstream water quality or surface water flows, the project would not indirectly impact any UTS downstream of the study area.

As discussed above, the project would not impact Quino checkerspot butterfly, two-striped gartersnake, UTS, vernal pool fairy shrimp, or western spadefoot. Of the remaining 10 species, three species have a low potential to occur, one species has a moderate potential to occur, four species have a high potential to occur, and two species are presumed absent from the study area. These species are discussed in further detail below.

Low Potential Species

Three species were determined to have a low potential to occur on the study area based on the presence of low quality habitat, limited acreage of habitat, and lack of recent observations within the immediate vicinity. These species include California glossy snake, Townsend's big-eared bat, and southern grasshopper mouse. California glossy snake and southern grasshopper mouse are SSC. Although suitable habitat is present on the study area, these species have not been recorded within the vicinity of the study area (five- to 10-mile radius) in over 50 years, indicating that regionally significant populations of these species are not present. Therefore, the study area is not expected to support large populations of California glossy snake or southern grasshopper mouse and a loss of a few individuals, if present, would not be expected to reduce regional population numbers. Townsend's big-eared bat is a State Candidate Threatened species and an SSC. There is no suitable roosting habitat on the study area. This species could use the study area for foraging habitat since it uses a variety habitats, although it is a low potential since this species prefers mesic habitats. Impacts to these species would be less than significant and no mitigation measures are considered required.

Moderate Potential Species

California legless lizard, which is an SSC, was determined to have a moderate potential to occur on the study area based on the presence of low quality habitat on the study area and recent observations within the immediate vicinity. Although the study area supports suitable sandy wash habitat within Bouquet Canyon Creek, the habitat is considered low quality since the banks are infested with giant reed, leaving little open areas for the lizard to burrow and no leaf litter for protection. Since the study area supports low quality habitat, the study area is not expected to support large populations of this species and a loss of a few individuals, if present, would not be expected to reduce regional population numbers. Impacts to these species would be less than significant and no mitigation measures are considered required.

High Potential Species

Four species were determined to have a high potential to occur on the study area based on the presence of suitable habitat and recent observations within the immediate vicinity. These species include coastal whiptail, coast horned lizard, loggerhead shrike, and San Diego black-tailed jackrabbit, which are all SSC. None of these species were observed during any of the field surveys conducted on the study area. Coastal whiptail, coast horned lizard, loggerhead shrike, and San Diego black-tailed jackrabbit are highly mobile and the majority are expected to disperse to undeveloped land to the east of the proposed project. These species are not afforded a state or federal listing. Displacement or loss of a few individuals, if present, would not be expected to reduce regional population numbers. Impacts to these





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species would be less than significant and no mitigation measures are proposed. Loggerhead shrike eggs and young are protected under MBTA, which is discussed in Section 5.4.2 below.

Presumed Absent Species

Focused surveys for BUOW (SSC) and CAGN (federally threatened and SSC) were conducted in 2018. Survey results were negative, and these species are presumed absent from the study area. Therefore, no direct or indirect impacts are anticipated to these species.

Since the study area supports suitable BUOW habitat, a take avoidance survey is required prior to ground disturbance in accordance with CDFW's *Staff Report on Burrowing Owl Mitigation* (CDFG 2012). An avoidance and minimization measure is included as BIO-2 in Section 6.0 below, which requires a take avoidance survey and avoidance of active nests and/or relocation of BUOW (if BUOWs are observed).

5.2 SENSITIVE VEGETATION COMMUNITIES

5.2.1 California Department of Fish and Wildlife Sensitive Vegetation Communities/Habitats

Less than Significant Impacts with Mitigation Incorporated

The study area supports native-dominated habitat totaling 29.19 acres, including big sagebrush scrub (1.91 acres), chamise chaparral/non-native grassland (2.98 acres), elderberry savanna (0.56 acre), mule fat scrub (0.27 acre), Riversidean upland sage scrub (7.06 acres), Riversidean upland sage scrub/non-native grassland (13.10 acres), scrub oak chaparral (0.26 acre), scrub oak chaparral/non-native grassland (2.01 acres), southern north slope chaparral (0.34 acre), and southern willow scrub/giant reed stand (0.70 acre). The remainder of the study area (64.28 acres) supports habitat dominated by non-native species and sparsely vegetated developed, disturbed, and river wash.

Permanent impacts to vegetation total 84.61 acres, which are proposed for project development and to implement County-required fuel modification (Figure 10, *Impacts to Vegetation*). Permanent impacts are proposed to 28.68 acres of native-dominated habitat and 55.93 acres of habitat dominated by nonnative species, developed, disturbed, and river wash (Table 3, *Impacts to Vegetation Communities*). Although some native vegetation will be avoided in Zones B and C, such as protected oak trees, all fuel modification impacts were assessed as permanent impacts.



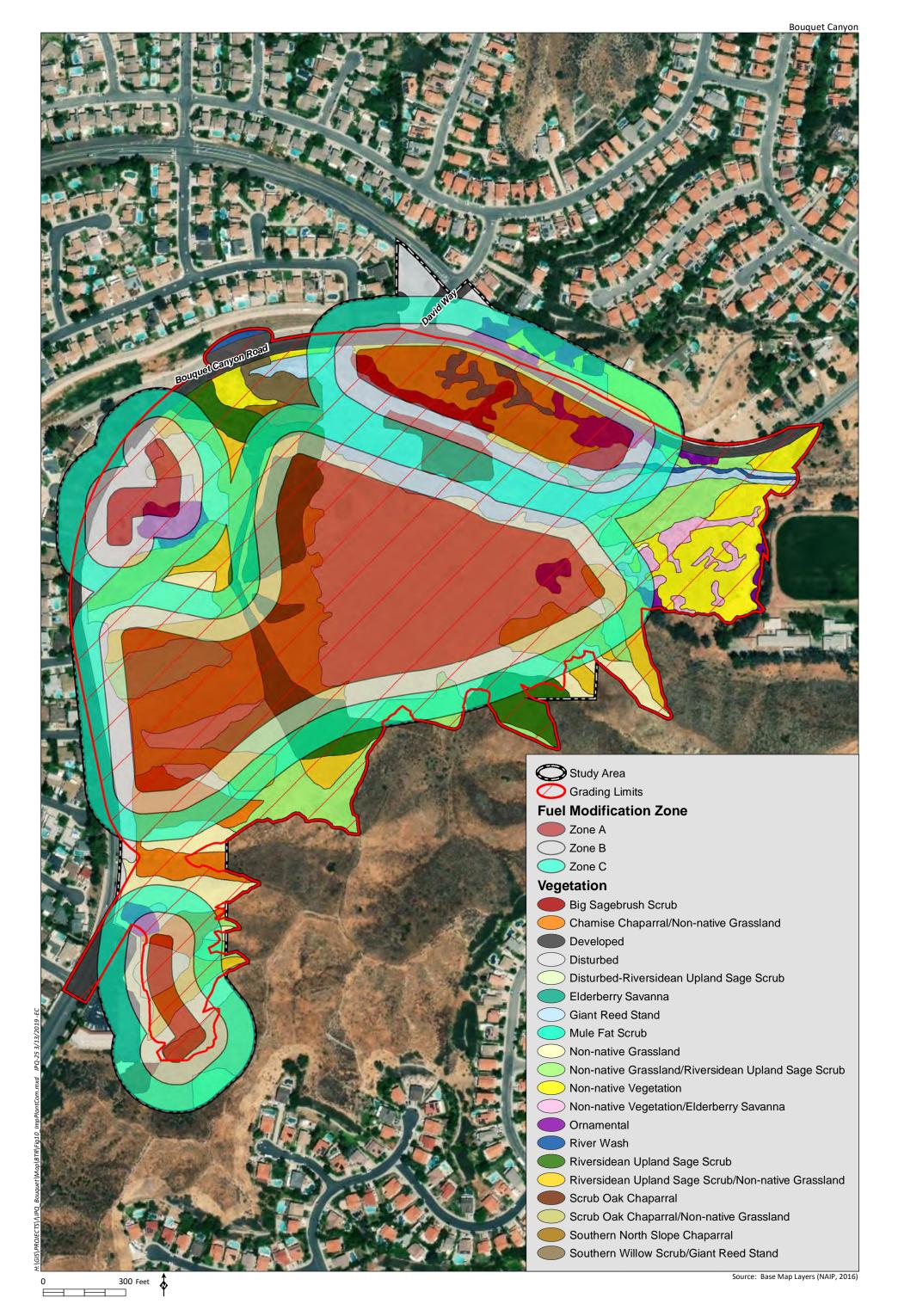
Table 3
IMPACTS TO VEGETATION COMMUNITIES

| Habitat Type (Holland/Oberbauer) | Existing (acres) | Permanent Impacts (acres) |
|---|------------------|---------------------------------|
| Big Sagebrush Scrub | 1.91 | 1.91 |
| Chamise Chaparral/Non-native Grassland | 2.98 | 2.77 |
| Developed | 9.37 | 4.70 |
| Disturbed | 5.32 | 3.83 |
| Disturbed-Riversidean Upland Sage Scrub | 0.62 | 0.54 |
| Elderberry Savanna ¹ | 0.56 | 0.56 |
| Giant Reed Stand | 7.08 | 7.08 |
| Mule Fat Scrub | 0.27 | 0.27 |
| Non-native Grassland | 22.06 | 21.75 |
| Non-native Grassland/Riversidean Upland Sage Scrub | 7.75 | 7.41 |
| Non-native Vegetation | 8.06 | 7.16 |
| Non-native Vegetation/Elderberry Savanna | 0.97 | 0.97 |
| Ornamental | 2.69 | 2.13 |
| Riversidean Upland Sage Scrub | 7.06 | 6.90 |
| Riversidean Upland Sage Scrub/Non-native Grassland | 13.10 | 12.96 |
| River Wash | 0.36 | 0.36 |
| Scrub Oak Chaparral | 0.26 | 0.26 |
| Scrub Oak Chaparral/Non-native Grassland | 2.01 | 2.01 |
| Southern North Slope Chaparral | 0.34 | 0.34 |
| Southern Willow Scrub/Giant Reed Stand ¹ | 0.70 | 0.70 |
| | 93.47 | 84.61 |

Sensitive habitats pursuant to the California Department of Fish and Wildlife (CDFW) Natural Communities List (2018b).

Two of the vegetation communities described above are considered sensitive pursuant to CDFW (2018b): elderberry savanna (0.56 acre) and southern willow scrub/giant reed stand (0.70 acre; Table 3; Figure 10). Both communities will be permanently impacted. The sensitive natural community designation is generally reserved for high-quality habitats, such as those that lack invasive species, do not show signs of human-caused disturbance, and show signs of reproduction (i.e., sprouts and seedlings present). Mitigation for impacts to elderberry savanna is not proposed since the habitat is considered low quality. The elderberry savanna is small and isolated from other native habitat, with the exception of a small patch of big sagebrush scrub. The understory is dominated by non-native short-pod mustard, which is likely due to historic disturbance from ranching activities, fuel modification over the years, and its proximity to Bouquet Canyon Road. No sprouts or seedlings were noted during field surveys. Based on the low-quality characteristics of the elderberry scrub, impacts to these species would be less than significant and no mitigation is proposed. The southern willow scrub/giant reed stand on the project appears to be associated with relict floodplain conditions that no longer exist on the site. However, for the purpose of this biological technical report, this habitat is presumed to be regulated as CDFW jurisdiction. Although southern willow scrub/giant reed stand is considered low-quality habitat due to the prevalence of giant reed, the project will provide mitigation for permanent impacts to 0.70 acre through compensatory mitigation for impacts to CDFW jurisdiction as outlined in BIO-3 included in Section 6.0 below.





5.2.2 California Department of Fish and Wildlife Riparian Habitat and Streambed

Less than Significant Impacts with Mitigation Incorporated

Bouquet Canyon Creek flows through the northern portion of the study area, which is considered a jurisdictional streambed pursuant to Section 1602 of the CFG Code as regulated by CDFW. The project would result in permanent impacts to 9.33 acres and temporary impacts to 0.47 acre of CDFW jurisdictional streambed and associated vegetation (Table 4, Impacts to California Department of Fish and Wildlife Jurisdiction; Figure 11, Impacts to Jurisdictional Features). The streambed is characterized as an ephemeral floodplain with a central channel that conveys the majority of flows through the site. Permanent impacts are necessary to construct the development, complete slope grading, implement County-required fuel modification, and construct a new flood control channel to the south of Bouquet Canyon Creek. The majority of the central channel within CDFW jurisdiction will be returned to preproject topographic contours following completion of construction. Most of the permanent impacts to streambed-associated vegetation would be to giant reed, which is rated highly invasive by the California Invasive Plant Council (2006, 2007). Only small areas of native-dominated habitat would be permanently impacted, including southern willow scrub/giant reed stand and mule fat scrub. The remaining permanent impacts would be to mostly invasive giant reed stands and unvegetated river wash. The project would remove approximately 7.08 acres of giant reed stand, eliminating it as possible seed source to downstream habitats. Temporary impacts include those proposed to existing concrete within Bouquet Canyon Creek at the downstream (west) end and disturbance for bridge installation at the upstream (east) end.

Table 4
IMPACTS TO CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE JURISDICTION

| Drainage | Existing (acres) | Permanent Impacts (acres) | Temporary Impacts (acres) |
|----------------------|------------------|---------------------------------|---------------------------------|
| Bouquet Canyon Creek | 9.80 | 9.33 | 0.47 |

Impacts to CDFW jurisdiction will require a Section 1602 Stream Alteration Agreement from the CDFW, as described in BIO-3 included in Section 6.0 below. Compensatory streambed mitigation for permanent impacts to CDFW jurisdiction will be required as part of subsequent Section 1602 permitting requirements.

5.3 U.S. ARMY CORPS OF ENGINEERS/REGIONAL WATER QUALITY CONTROL BOARD JURISDICTION

Less than Significant Impacts with Mitigation Incorporated

Bouquet Canyon Creek is considered a jurisdictional streambed pursuant to Sections 404/401 of the CWA as regulated by USACE and RWQCB, respectively. The project would result in permanent impacts to 0.19 acre and temporary impacts to 0.46 acre of non-wetland WUS (Table 5, *Impacts to U.S. Army Corps of Engineers/Regional Water Quality Control Board Jurisdiction*; Figure 11). Permanent impacts are proposed within Bouquet Canyon Creek at the downstream (west) end for improvements to the outlet



for the proposed flood control channel and construction of a park as well as at the upstream (east) end to install a culvert associated within the new Bouquet Canyon Road alignment. The remainder of the Bouquet Canyon Creek central channel will be temporarily impacted to construct a new flood control channel to the south of Bouquet Canyon Creek. Temporary impact areas within Bouquet Canyon Creek will be returned to pre-project topographic contours following completion of construction.

Table 5
IMPACTS TO U.S. ARMY CORPS OF ENGINEERS/
REGIONAL WATER QUALITY CONTROL BOARD JURISDICTION

| Drainage | Existing (acres) | Permanent Impacts (acres) | Temporary Impacts (acres) |
|----------------------|------------------|---------------------------------|---------------------------------|
| Bouquet Canyon Creek | 0.65 | 0.19 | 0.46 |

Impacts to USACE/RWQCB jurisdiction will require a Section 404 permit from USACE and a Section 401 permit from RWQCB, as described in BIO-4 included in Section 6.0 below. Compensatory streambed mitigation for permanent impacts to USACE/RWQCB jurisdiction will be required as part of subsequent Section 404/401 permitting requirements.

5.4 WILDLIFE MOVEMENT AND MIGRATORY SPECIES

5.4.1 Wildlife Movement

Less than Significant

The study area is not part of a regional corridor and does not serve as a nursery site. The study area is not identified as being part of a local or regional corridor or linkage by the South Coast Missing Linkages (South Coast Wildlands 2008). The study area currently has no direct connectivity to two or more large blocks of habitat and is constrained by existing development. The study area does support native upland vegetation and small patches of native riparian vegetation, which provide habitat for local wildlife movement and migratory birds passing through the study area. Some reptiles, small mammals, and occasionally larger mammals may access the study area from undeveloped land to the east via Bouquet Canyon Creek or the ridgeline to the south of the Camp Joseph Scott facility. Birds may fly over existing development to access the study area for foraging and/or nesting. Therefore, the study area provides habitat for local wildlife movement, but does not serve as a regional wildlife corridor.

The study area is confined by existing development to the north, south, and west. Wildlife movement through Bouquet Canyon Creek downstream of the study area is limited since the stream becomes channelized to the north of Bouquet Canyon Road, just downstream (west) of the study area. Although vegetation will be removed from Bouquet Canyon Creek due to fuel modification requirements, the majority of the stream will be recontoured to pre-project topographic contours following construction. Although implementation of the project may result in some temporary disturbance to local wildlife movement from construction noise, the project would have a less than significant impact to wildlife movement and no mitigation measures would be required.





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Impact to Jurisdictional Features

5.4.2 Migratory Species

Less than Significant Impacts with Mitigation Incorporated

The study area has the potential to support songbird and raptor nests due to the presence of shrubs, ground cover, and trees on the study area. Project activities could disturb or destroy active migratory bird nests including eggs and young. Disturbance to or destruction of migratory bird eggs, young, or adults is in violation of the MBTA and is considered a potentially significant impact. The nesting season is generally defined as February 15 through August 31 for songbirds and January 15 to August 31 for raptors. An avoidance and minimization measure is provided as BIO-5 in Section 6.0 below, which would ensure the project is in compliance with MBTA regulations.

5.5 LOCAL POLICIES AND ORDINANCES

Less than Significant with Mitigation Incorporated

The project would remove 26 oak trees, including four scrub oaks, two blue oaks, and 20 Tucker oaks (Table 6, *Impacts to Oak Trees*; Figure 12, *Impacts to Oak Trees*). In addition, one Tucker oak would be subjected to major encroachment and two Tucker oaks would be subjected to minor encroachment. The remaining 35 oak trees would be completely avoided by the project.

Table 6
IMPACTS TO OAK TREES

| | Common | Number of Trees | | | |
|------------------------|----------------|-----------------|-----------------------|-----------------------|---------|
| Species Name | Name | Removed | Major Encroachment | Minor Encroachment | Avoided |
| Quercus agrifolia | coast live oak | 0 | 0 | 0 | 2 |
| Quercus berberidifolia | scrub oak | 4 | 0 | 0 | 2 |
| Quercus douglasii | blue oak | 2 | 0 | 0 | 0 |
| Quercus john-tuckeri | Tucker oak | 20 | 1 | 2 | 30 |
| Quercus lobata | valley oak | 0 | 0 | 0 | 1 |
| | TOTAL | 26 | 1 | 2 | 35 |

Impacts to City-protected oak trees will require an Oak Tree Permit prior to project construction to mitigate for proposed impacts. The conditions of the Oak Tree Permit will require native oak trees at a minimum of 24-inch box size to be planted for each protected oak tree removed and for each tree whose protected zone will be subject to major encroachment. The number of replacement trees required is dependent upon the circumference of the tree to be impacted. These guidelines are described in Subsection B of the Oak Tree Preservation Ordinance, reproduced in Table 7, *Number of Replacement Trees*. Replacement trees must be placed on the same property. If there is no appropriate location on site, the replacement trees may be donated to the City or the monetary value of the required replacement trees may be paid to the City at the discretion of the Director.



Table 7
NUMBER OF REPLACEMENT TREES

| Circumference of Tree Destroyed (4 feet above ground level) | Number of Replacement Trees Required for Each Tree Destroyed |
|---|--|
| Under 12 inches | 2 |
| 12 to 18 inches | 3 |
| 18 to 24 inches | 4 |
| 24 to 30 inches | 5 |
| 30 to 36 inches | 6 |
| Over 36 inches | 1 additional replacement tree per incremental increase of 6 inches |

Source: City of Santa Clarita (2013)

For the purpose of this assessment, oak trees located within the grading footprint and/or Fuel Modification Zone A were considered impacted while oak trees located within Zones B or C were considered avoided. Based on the impacts to oak trees as quantified by the impact assessment, 27 oak trees will be removed or subjected to major encroachment and would require replacement trees (Table 8, *Oak Tree Mitigation*). In order to receive an Oak Tree Removal Permit for these impacts, it is anticipated the City will require 91 replacement trees to be planted or the equivalent monetary value of the replacement trees to be paid, as described in mitigation measure BIO-6 included in Section 6.0 below. Replacement trees must be approved by the City and consist of the following tree species: coast live oak, valley oak, canyon live oak (*Quercus chrysolepis*), or interior live oak (*Quercus wislizenii*).

Table 8
OAK TREE MITIGATION

| | Common | Number | of Trees | |
|------------------------|------------|-------------------------------|----------------------------|--|
| Species Name | Name | Removed/Major Encroachment | Replacement Trees Required | |
| Quercus berberidifolia | scrub oak | 4 | 9 | |
| Quercus douglasii | blue oak | 2 | 19 | |
| Quercus john-tuckeri | Tucker oak | 21 | 63 | |
| | TOTAL | 27 | 91 | |

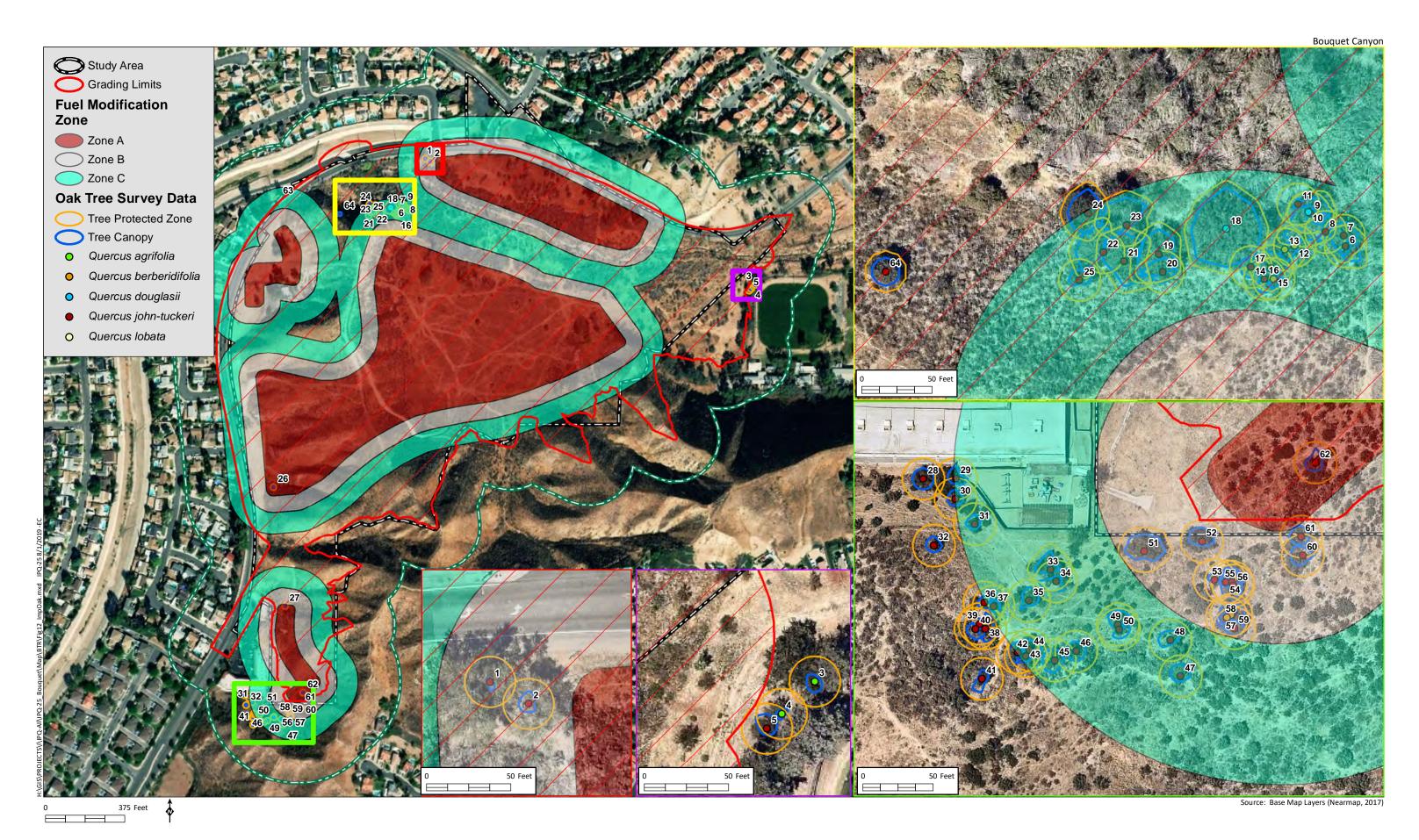
Thirty-seven oak trees will be completely avoided or subject to minor encroachment and would not require replacement trees. During construction, avoided trees and trees subject to encroachment will require protection measures, including but not limited to those outlined within Section VII. Standards for Performance of Permitted Work of the Oak Tree Preservation Guidelines (City 1990).

5.6 ADOPTED HABITAT CONSERVATION PLANS

No Impacts

The study area is not located within any adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan. As such, implementation of the project would not conflict with any adopted habitat conservation plans.







6.0 MITIGATION MEASURES

The following provides recommended measures intended to minimize or avoid impacts to biological resources:

- **BIO-1** Mitigation for project impacts to slender mariposa lily shall include one or more of the following:
 - Prior to construction, a mitigation plan shall be developed that describes methods to mitigate for impacts to slender mariposa lily at a 1:1 ratio. The mitigation plan shall include a description of the mitigation site, bulb collection and planting methods, maintenance and monitoring requirements, and performance standards to measure the success of the mitigation. Slender mariposa lily bulbs shall be collected at the end of the growing season and prior to ground disturbance, or bulbs shall be obtained from a native plant nursery if available. The bulbs shall be planted within an appropriate on-site or off-site mitigation area, which will be conserved as open space in perpetuity.
 - Payment into a mitigation bank and/or in-lieu fee program that has mitigation available for slender mariposa lily at a 1:1 ratio; and/or
 - Preservation of land that contains slender mariposa lily at a 1:1 ratio.

Mitigation for significant impacts to slender mariposa lily shall be implemented in consultation with the City and CDFW prior to construction.

BIO-2 Burrowing Owl: In compliance with the CDFW *Staff Report on Burrowing Owl Mitigation* (2012), a take avoidance survey shall be conducted on the study area within 14 days prior to ground disturbance to determine presence of BUOW. If the take avoidance survey is negative and BUOW is confirmed absent, then ground-disturbing activities shall be allowed to commence, and no further mitigation would be required.

If BUOW are observed during the take avoidance survey, active burrows shall be avoided by the project in accordance with the CDFW's Staff Report (2012). The CDFW shall be immediately informed of any BUOW observations. A Burrowing Owl Protection and Relocation Plan (plan) shall be prepared by a qualified biologist, which must be sent for approval by CDFW prior to initiating ground disturbance. The plan shall detail avoidance measures that shall be implemented during construction and passive or active relocation methodology. Relocation shall only occur outside of the nesting season (September 1 through January 31).

Southern Willow Scrub/Giant Reed Stand and CDFW Jurisdiction: Prior to the City's issuance of a grading permit, the Project Applicant shall demonstrate that a Streambed Alteration Agreement has been issued by CDFW. Temporary impacts to CDFW jurisdiction shall be returned to pre-project topographic contours once the project has been completed. Permanent impacts to CDFW jurisdiction for southern willow scrub/giant reed stand (0.70 acre) shall be mitigated through on-site or off-site enhancement, restoration, and/or creation of CDFW jurisdictional streambed at ratio of



no less than 1:1. Given that the remaining portion of Bouquet Canyon Creek is dominated by invasive giant reed stands, which is of extremely low biological function and value and contributes to downstream infestation of giant reed, the remaining permanent impacts to CDFW jurisdiction (8.63 acres) shall be mitigated through on-site or off-site enhancement, restoration, and/or creation of CDFW jurisdictional streambed at a ratio of no less than 0.5:1. Best Management Practices (BMPs) to minimize and avoid impacts to CDFW jurisdiction during and after construction will be addressed as part in the Streambed Alteration Agreement. Minimization and avoidance measures may include, but are not limited to, the following:

- Construction-related equipment will be stored in developed areas, outside of drainages. No equipment maintenance will be done within or adjacent to the drainage.
- Mud, silt, spoil sites, raw cement, asphalt, or other pollutants from construction activities will not be placed within or adjacent to the drainage.
- Open trenches or other excavated areas will be properly secured at the end of the day to avoid entrapment of animals, or an escape ramp will be provided.
- To avoid attracting predators during construction, the project will be kept clean of debris to the extent possible. All food-related trash items will be enclosed in sealed containers and regularly removed from site.
- Construction personnel will strictly limit their activities, vehicles, equipment and construction material to the proposed project footprint, staging areas, and designated routes of travel.
- Exclusion fencing will be installed to demarcate the limits of disturbance. The
 exclusion fencing should be maintained until the completion of construction
 activities.
- To the extent feasible, construction will be conducted outside of the nesting bird season (see MM BIO-5 below).
- BIO-4

 USACE and RWQCB Jurisdiction: Prior to the City's issuance of a grading permit, the Project Applicant shall demonstrate that the appropriate regulatory permits have been issued by USACE and RWQCB. Temporary impacts to WUS shall be returned to preproject topographic contours once the project has been completed. Compensatory mitigation for permanent impacts to WUS shall be required as part of subsequent permitting requirements. Permanent impacts to WUS shall be mitigated through on-site or off-site enhancement, restoration, and/or creation of jurisdictional streambed at a ratio of no less than 1:1. BMPs to minimize and avoid impacts to WUS during and after construction will be addressed as part of the USACE and RWQCB permitting process. Minimization and avoidance measures may include, but are not limited to, the following:



- Construction-related equipment will be stored in developed areas, outside of the drainage. No equipment maintenance will be done within or adjacent to the drainage.
- Source control and treatment control BMPs will be implemented to minimize the
 potential contaminants that are generated during and after construction. Water
 quality BMPs will be implemented throughout the project to capture and treat
 potential contaminants.
- Substances harmful to aquatic life will not be discharged into the drainage. All
 hazardous substances will be properly handled and stored.
- A Storm Water Pollution Prevention Plan will be prepared to prevent sediment from entering the drainage during construction.
- To avoid attracting predators during construction, the project will be kept clean of debris to the extent possible. All food-related trash items will be enclosed in sealed containers and regularly removed from site.
- Construction personnel will strictly limit their activities, vehicles, equipment and construction material to the proposed project footprint, staging areas, and designated routes of travel.
- Exclusion fencing will be installed to demarcate the limits of disturbance. The
 exclusion fencing should be maintained until the completion of construction
 activities.
- **Nesting Birds:** Construction activities (i.e., earthwork, clearing, and grubbing) shall occur outside of the general bird nesting season for migratory birds, which is February 15 through August 31 for songbirds and January 15 to August 31 for raptors.

If construction activities (i.e., earthwork, clearing, and grubbing) must occur during the general bird nesting season for migratory birds and raptors, a qualified biologist shall perform a pre-construction survey of potential nesting habitat to confirm the absence of active nests belonging to migratory birds and raptors afforded protection under the MBTA and CFG Code. The pre-construction survey shall be performed no more than seven days prior to the commencement of construction activities. The results of the pre-construction survey shall be documented by the qualified biologist. If construction is inactive for more than seven days, an additional survey shall be conducted.

If the qualified biologist determines that no active migratory bird or raptor nests occur, the activities shall be allowed to proceed without any further requirements. If the qualified biologist determines that an active migratory bird or raptor nest is present, no impacts within 300 feet (500 feet for raptors) of the active nest shall occur until the young have fledged the nest and the nest is confirmed to no longer be active, or as determined by the qualified biologist. The biological monitor may modify the buffer or propose other recommendations in order to minimize disturbance to nesting birds.



- **BIO-6 Protected Oak Trees:** Prior to construction, the Applicant shall obtain an Oak Tree Permit in accordance with the City's Oak Tree Preservation ordinance (City 2013) to impact protected oak trees. The following measures shall be required:
 - Impacted Trees: All tree removals shall be conducted in the presence of a qualified arborist approved by the City. The Applicant shall replace impacted City-protected oak trees proposed for removal by planting replacement trees on-site, donating trees to the City, or to pay the City an equivalent monetary value of the replacement trees. Replacement ratios shall be determined based requirements described in Subsection B of the Oak Tree Preservation Ordinance (City 2013). Unless otherwise approved by the City, replacement trees shall be at a minimum of 24-inch box size and consist of the following tree species: coast live oak, valley oak, canyon live oak, or interior live oak. All replacement trees shall be approved by the City.
 - Encroached Trees: The Applicant shall notify the City and qualified arborist 48 hours prior to beginning work within the protected zone of an oak tree. All work conducted within the protected zone shall be monitored by a qualified arborist and verified by the City. Work shall be done with hand tools only. Once work within the protected zones is complete, the qualified arborist shall submit a certification letter to the City within 10 working days demonstrating the work was conducted in accordance with project's permit. Other protection measures may be required by the City.
 - Encroached/Avoided Trees: A minimum five-foot chain link fence in concrete footings with posts installed every eight feet and two feet deep shall be installed at the outermost edge of the protected zone of each oak or oak grove. Trees on steep slopes that will not be impacted by vegetation removal or graded may be exempt from fencing requirement. Fencing shall be inspected and approved by the City prior to construction initiation. Signs shall be placed on the fence in four locations around each tree or every 50 feet around oak groves. Signs shall be a minimum of two feet by two with the following language: "Warning: This fence is for the protection of this tree and shall not be removed or relocated without written authorization for the City of Santa Clarity Community Development Department." The fence shall remain in place for the duration of construction and shall not be removed until receiving written authorization from the City. Planting within the protected zone is discouraged. If planting within the protected zone, only drought tolerant species shall be permitted and no spraytype irrigation shall be used. A maintenance and care program shall be implemented to ensure continued health and care of oak trees on the proposed development. Other protection measures may be required by the City.



7.0 CERTIFICATION/QUALIFICATION

The following individuals contributed to the fieldwork and/or preparation of this report:

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Appendix A

Plant Species Observed

Appendix A Plant Species Observed

| Family | Scientific Name | Common Name |
|------------------------|--|------------------------|
| GYMNOSPERMS | | |
| Cupressaceae | Cupressus sempervirens* | Italian cypress |
| ANGIOSPERMS – EUDICOTS | | |
| Adoxaceae | Sambucus nigra ssp. caerulea | blue elderberry |
| Aizoaceae | Carpobrotus edulis* | hottentot-fig |
| | Malosma laurina | laurel sumac |
| | Rhus aromatica | basket-brush |
| Anacardiaceae | Rhus ovata | sugar bush |
| | Schinus molle* | Peruvian pepper tree |
| | Toxicodendron diversilobum | poison oak |
| Apocynaceae | Nerium oleander* | oleander |
| | Acourtia microcephala | sacapellote |
| | Ambrosia acanthicarpa | annual bur-sage |
| | Artemisia californica | California sagebrush |
| | Artemisia douglasiana | mugwort |
| | Artemisia tridentata | Great Basin sagebrush |
| | Baccharis pilularis | coyote brush |
| | Baccharis salicifolia | mule fat |
| | Centaurea benedicta* | blessed thistle |
| | Centaurea melitensis* | tocalote |
| | Corethrogyne filaginifolia | common sand aster |
| | Deinandra fasciculata | fascicled tarplant |
| | Encelia farinosa | brittlebush |
| | Ericameria pinifolia | pine goldenbush |
| | Erigeron canadensis | horseweed |
| | Eriophyllum confertiflorum | golden-yarrow |
| | Gutierrezia californica | California matchweed |
| Asteraceae | Hazardia squarrosa | saw-toothed goldenbush |
| | Helianthus annuus | western sunflower |
| | Heterotheca grandiflora | telegraph weed |
| | Isocoma menziesii | goldenbush |
| | Iva axillaris | povertyweed |
| | Lactuca serriola* | wild lettuce |
| | Lepidospartum squamatum | scale-broom |
| | Malacothrix saxatilis | cliff aster |
| | Osteospermum sp.* | African daisy |
| | Pseudognaphalium californicum | California everlasting |
| | Pseudognaphalium luteoalbum* | everlasting cudweed |
| | Silybum marianum* | milk thistle |
| | Sonchus asper* | prickly sow thistle |
| | Stephanomeria virgata | virgate wreath-plant |
| | Taraxacum officinale* | dandelion |
| | Uropappus lindleyi | silver puffs |
| | Amsinckia intermedia | rancher's fiddleneck |
| | | |
| | Emmenanthe penduliflora | whispering bells |
| Boraginaceae | Eucrypta chrysanthemifolia | common eucrypta |
| | Eriodictyon crassifolium | felt-leaf yerba santa |
| | Heliotropium curassavicum var. occulatum | salt heliotrope |

Appendix A (cont.) Plant Species Observed

| Family | Scientific Name | Common Name |
|------------------------|-----------------------------------|-------------------------|
| ANGIOSPERMS – EUDICOTS | (cont.) | |
| Boraginaceae (contin.) | Phacelia cicutaria | caterpillar phacelia |
| Boraginaceae (contin.) | Phacelia distans | wild heliotrope |
| | Hirschfeldia incana* | short-pod mustard |
| Brassicaceae | Sisymbrium irio* | London rocket |
| | Sisymbrium orientale * | hare's ear cabbage |
| Cactaceae | Opuntia basilaris | beavertail cactus |
| | Atriplex canescens | fourwing saltbush |
| | Atriplex semibaccata* | Australian saltbush |
| Chenopodiaceae | Chenopodium californicum | California pigweed |
| | Chenopodium murale* | nettle-leaf goosefoot |
| | Salsola tragus* | Russian thistle |
| Convolvulaces | Calystegia peirsonii¹ | Peirson's morning-glory |
| Convolvulaceae | Cuscuta sp. | dodder |
| Crassulaceae | Dudleya lanceolata | coastal dudleya |
| Cucurhitacasa | Cucurbita foetidissima | calabazilla |
| Cucurbitaceae | Marah macrocarpa | wild cucumber |
| | Euphorbia albomarginata | rattlesnake weed |
| Euphorbiaceae | Croton setigerus | dove weed |
| | Euphorbia serpens* | matted sandmat |
| | Stillingia linearifolia | linear leaf stillingia |
| | Acmispon glaber | deerweed |
| | Astragalus pomonensis | Pomona locoweed |
| - 1 | Lupinus bicolor | miniature lupine |
| Fabaceae | Lupinus succulentus | arroyo lupine |
| | Melilotus indicus* | Indian sweet clover |
| | Robinia pseudoacacia* | black locust |
| | Quercus berberidifolia | scrub oak |
| _ | Quercus douglasii | blue oak |
| Fagaceae | Quercus john-tuckeri | Tucker oak |
| | Quercus lobata | valley oak |
| Geraniaceae | Erodium cicutarium* | redstem filaree |
| | Marrubium vulgare* | horehound |
| | Salvia apiana | white sage |
| | Salvia columbariae | chia |
| Lamiaceae | Salvia leucophylla | purple sage |
| | Salvia mellifera | black sage |
| | Trichostema lanatum | woolly blue-curls |
| | Malacothamnus fasciculatus | chaparral mallow |
| Malvaceae | Malva parviflora* | cheeseweed |
| | Malvella leprosa | alkali-mallow |
| Meliaceae | Melia azaderach* | chinaberry |
| | Eucalyptus camaldulensis* | river red gum |
| Mytaceae | Eucalyptus globulus* | blue gum |
| | Eucalyptus polyanthemos* | silver dollar gum |
| Nyctaginaceae | Mirabilis laevis ssp. crassifolia | wishbone bush |
| _, | Clarkia purpurea | purple clarkia |
| Onagraceae | Clarkia unguiculata | elegant clarkia |
| | | U-:::= =::::::::: |

Appendix A (cont.) Plant Species Observed

| Family | Scientific Name | Common Name |
|----------------------|---|---------------------------|
| ANGIOSPERMS – EUDICO | TS (cont.) | |
| Orobanchaceae | Castilleja exserta | purple owl's clover |
| Papaveraceae | Eschscholzia californica | California poppy |
| Plantaginaceae | Penstemon centranthifolius | scarlet bugler |
| | Allophyllum divaricatum | purple fasle gilia |
| Polemoniaceae | Eriastrum densifolium | giant eriastrum |
| | Gilia angelensis | gilia |
| | Chorizanthe staticoides | Turkish rugging |
| Dolugonacoao | Eriogonum fasciculatum | buckwheat |
| Polygonaceae | Polygonum aviculare* | common knotweed |
| | Rumex crispus* | curly dock |
| Portulacaceae | Portulaca oleracea* | common purslane |
| Ranunculaceae | Delphinium parryi | San Bernardino larkspur |
| Rhamnaceae | Rhamnus crocea | spiny redberry |
| | Adenostoma fasciculatum | chamise |
| Rosaceae | Heteromeles arbutifolia | toyon |
| | Prunus ilicifolia | holly-leafed cherry |
| Rubiaceae | Galium angustifolium | narrow-leaved bedstraw |
| Salicaceae | Populus fremontii ssp. fremontii | Fremont cottonwood |
| | Salix gooddingii | Goodding's black willow |
| | Salix laevigata | red willow |
| Santalaceae | Phoradendron sp. | mistletoe |
| Sapindaceae | Koelreuteria paniculata* | goldenrain tree |
| Canadaniana | Scrophularia californica | California figwort |
| Scrophulariaceae | Verbascum virgatum* | wand mullein |
| Simaroubaceae | Ailanthus altissima* | tree-of-heaven |
| | Datura wrightii | jimson weed |
| C-1 | Nicotiana glauca* | tree tobacco |
| Solanaceae | Nicotiana quadrivalvis | Indian tobacco |
| | Solanum xanti | purple nightshade |
| Tamaricaceae | Tamarix ramosissima* | saltcedar |
| Ulmaceae | Ulmus pumila* | Siberian elm |
| Urticaceae | Urtica dioica | stinging nettle |
| Verbenaceae | Verbena lasiostachys | verbena |
| Vitaceae | Vitis vinifera* | cultivated grape |
| Zygophyllaceae | Tribulus terrestris* | puncture vine |
| ANGIOSPERMS – MONOC | OTS | 1 |
| Agavaceae | Hesperoyucca whipplei | Our Lord's candle |
| Arecaceae | Washingtonia robusta* | Mexican fan palm |
| | Calochortus clavatus var. clavatus ² | club-haired mariposa lily |
| | Calochortus clavatus var. gracilis ³ | slender mariposa lily |
| Liliaceae | Calochortus splendens | lilac mariposa lily |
| | Calochortus venustus | butterfly mariposa lily |

Appendix A (cont.) Plant Species Observed

| Family | Scientific Name | Common Name | | | |
|--------------------------------|----------------------------------|---------------------|--|--|--|
| ANGIOSPERMS – MONOCOTS (cont.) | | | | | |
| | Arundo donax* | giant reed | | | |
| | Avena barbata* | slender oat | | | |
| | Avena fatua* | wild oats | | | |
| | Bromus diandrus* | common ripgut grass | | | |
| | Bromus hordeaceus* | soft brome | | | |
| | Bromus madritensis ssp. rubens * | red brome | | | |
| | Bromus tectorum* | cheatgrass | | | |
| Poaceae | Cynodon dactylon* | Bermuda grass | | | |
| | Distichlis spicata | saltgrass | | | |
| | Elymus condensatus | giant wild rye | | | |
| | Festuca myuros* | fescue | | | |
| | Hordeum murinum* | hare barley | | | |
| | Polypogon monspeliensis* | annual beardgrass | | | |
| | Schismus barbatus* | Mediterranean grass | | | |
| Thereidenes | Bloomeria crocea | common goldenstar | | | |
| Themidaceae | Dichelostemma capitatum | blue dicks | | | |

^{*} Non-native species

1 California Rare Plant Rank (CRPR) 4.2

2 CRPR 4.3

3 CRPR 1B.2

Appendix B

Animal Species Observed or Detected

Appendix B Animal Species Observed or Detected

| Order | Family | Scientific Name | Common Name |
|------------------|-------------------|----------------------------|-------------------------------|
| Insects | • | | |
| | Pieridae | Anthocharis sara sara | Sara orangetip |
| Lepidoptera | Riodinidae | Apodemia mormo virgulti | Behr's metalmark |
| Reptiles | - | , , | |
| Squamata | Phrynosomatidae | Sceloporus occidentalis | western fence lizard |
| Birds | , | | |
| <u> </u> | | Accipiter cooperii | Cooper's hawk |
| Accipitriformes | Accipitridae | Buteo jamaicensis | red-tailed hawk |
| Accipititionines | Cathartidae | Cathartes aura | turkey vulture |
| | Apodidae | Aeronautes saxatalis | white-throated swift |
| | ripodiduc | Calypte anna | Anna's hummingbird |
| Apodiformes | Trochilidae | Calypte costae | Costa's hummingbird |
| | Trocimidae | Selasphorus sp. | hummingbird sp. |
| Charadriiformes | Charadriidae | Charadrius vociferus | killdeer |
| | | Columba livia | rock pigeon |
| Columbiformes | Columbidae | Streptopelia decaocto | Eurasian collared-dove |
| | | Zenaida macroura | mourning dove |
| Cuculiformes | Cuculidae | Geococcyx californianus | greater roadrunner |
| Falconiformes | Falconidae | Falco sparverius | American kestrel |
| Galliformes | Odontophoridae | Callipepla californica | California quail |
| | Aegithalidae | Psaltriparus minimus | bushtit |
| | Alaudidae | Eremophila alpestris | horned lark |
| | | Passerina caerulea | blue grosbeak |
| | Cardinalidae | Pheucticus melanocephalus | black-headed grosbeak |
| | | Piranga ludoviciana | western tanager |
| | | Aphelocoma californica | California scrub-jay |
| | Corvidae | Corvus brachyrhynchos | American crow |
| | | Corvus corax | common raven |
| | | Aimophila ruficeps | rufous-crowned sparrow |
| | | Chondestes grammacus | lark sparrow |
| | Emborizidas | Melospiza melodia | song sparrow |
| | Emberizidae | Pipilo crissalis | California towhee |
| | | Pipilo maculatus | spotted towhee |
| Passeriformes | | Zonotrichia leucophrys | white-crowned sparrow |
| Passeriioriiles | | Haemorhous mexicanus | house finch |
| | Fringillidae | Spinus psaltria | lesser goldfinch |
| | | Spinus tristis | American goldfinch |
| | | Hirundo rustica | barn swallow |
| | Hirundinidae | Petrochelidon pyrrhonota | cliff swallow |
| | | Stelgidopteryx serripennis | northern rough-winged swallow |
| | | Agelaius phoeniceus | red-winged blackbird |
| | Icteridae | Icterus cucullatus | hooded oriole |
| | icteriuae | Molothrus ater | brown-headed cowbird |
| | | Sturnella neglecta | western meadowlark |
| | Mimidae | Mimus polyglottos | northern mockingbird |
| | IVIIIIIIIIII | Toxostoma redivivum | California thrasher |
| | Paradoxornithidae | Chamaea fasciata | wrentit |
| | Paridae | Baeolophus inornatus | oak titmouse |

Appendix B (cont.) Animal Species Observed or Detected

| Order | Family | Scientific Name | Common Name |
|---------------|----------------|--------------------------|----------------------------|
| Birds (cont.) | | | |
| | | Cardellina pusilla | Wilson's warbler |
| | 5 11 | Geothlypis trichas | common yellowthroat |
| | Parulidae | Oreothlypis celata | orange-crowned warbler |
| | | Setophaga coronate | yellow-rumped warbler |
| | | Aimophila ruficeps | rufous-crowned sparrow |
| | | Melospiza melodia | song sparrow |
| | Passerellidae | Melozone crissalis | California towhee |
| | | Pipilo maculatus | spotted towhee |
| | | Zonotrichia leucophrys | white-crowned sparrow |
| | Polioptilidae | Polioptila caerulea | blue-gray gnatcatcher |
| Passeriformes | Ptilogonatidae | Phainopepla nitens | Phainopepla |
| (cont.) | Sturnidae | Sturnus vulgaris | European starling |
| | Troglodytidae | Thryomanes bewickii | Bewick's wren |
| | Turdidae | Sialia mexicana | western bluebird |
| | | Turdus migratorius | American robin |
| | | Contopus sordidulus | western wood-pewee |
| | | Empidonax difficilis | pacific-slope flycatcher |
| | | Myiarchus cinerascens | ash-throated flycatcher |
| | Tyrannidae | Sayornis nigricans | black phoebe |
| | | Sayornis saya | Say's phoebe |
| | | Tyrannus verticalis | western kingbird |
| | | Tyrannus vociferans | Cassin's kingbird |
| | | Colaptes auratus | northern flicker |
| Piciformes | Picidae | Melanerpes formicivorus | acorn woodpecker |
| Picifornies | Piciuae | Picoides nuttallii | Nuttall's woodpecker |
| | | Picoides pubescens | Downy woodpecker |
| Mammals | | | |
| | Canidae | Canis latrans | coyote |
| Carnivora | Felidae | Lynx rufus | bobcat |
| | Procyonidae | Procyon lotor | raccoon |
| Lagomorpha | Leporidae | Sylvilagus audubonii | desert cottontail |
| Rodentia | Sciuridae | Otospermophilus beecheyi | California ground squirrel |

Appendix C

Representative Site Photographs

Photograph 1: Overview of the study area, facing west. Note the flatter portions of the study area support mostly non-native grass species due to historical ranching activities and the steeper hillsides support native Riversidean upland sage scrub.



Photograph 3: View of the non-native vegetation community (left) and elderberry savanna community (right), facing west.



Photograph 2: View of the mule fat scrub community, facing south.



Photograph 4: View of the big sagebrush scrub community (foreground) and giant reed stand community (background), facing southwest.

Note: See Figure 5 for photograph locations.

Source: HELIX 2017





Photograph 5: View of the non-native vegetation community (left) and the southwestern willow scrub/giant reed stand community (right), facing north.



Photograph 7: View of the Riversidean upland sage scrub/non-native grassland community (left) and disturbed habitat (right), facing south.



Photograph 6: View of non-native grassland community (left) and Riversidean upland sage scrub community (right), facing south. The non-native grassland/Riversidean upland sage scrub can be seen on the hillsides in the background.



Photograph 8: View of the scrub oak chaparral community, facing southeast.

Note: See Figure 5 for photograph locations.

Source: HELIX 2017



Appendix D

Burrowing Owl Focused Survey Report **HELIX Environmental Planning, Inc.**

16485 Laguna Canyon Road Suite 150 Irvine, CA 92618 949.234.8792 tel. 619.462.0552 fax www.helixepi.com



September 7, 2018 IPQ-25

Mr. Scott Covington Integral Communities 888 San Clemente Drive, Suite 100 Newport Beach, CA 92660

Subject: 2018 Burrowing Owl (Athene cunicularia) Survey Report for the Bouquet Canyon Road

Project

Dear Mr. Covington:

This letter report presents the results of the 2018 focused burrowing owl (*Athene cunicularia*; BUOW) survey conducted by HELIX Environmental Planning, Inc. (HELIX) for the Bouquet Canyon Road Project (project) located in the City of Santa Clarita, Los Angeles County, California. The survey was conducted in accordance with the California Department of Fish and Wildlife (CDFW; previously California Department of Fish and Game [CDFG]) Staff Report on Burrowing Owl Mitigation (CDFG 2012). This letter report describes the methods used to perform the survey and the survey results.

PROJECT SITE LOCATION

The 78.10-acre project site is generally located 6.9 miles to the east of Interstate 5 and 3.8 miles to the northwest of California State Route 14 in the City of Santa Clarita (Figure 1, *Regional Location*). The project site is within Section 6 of Township 4 North, Range 15 West of the Mint Canyon, California U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle (Figure 2, *Vicinity Map*). Specifically, the project site is located directly south of the intersection of David Way and Bouquet Canyon Road (Figure 3, *Aerial Photograph*).

PROJECT SITE DESCRIPTION

The project site is located in the foothills of the Sierra Pelona Mountains. The topography in the southern and western portions of the project site is predominantly steep hillsides, while the northern portion is primarily flat. Elevations on the project site range from approximately 1,365 feet above mean sea level (AMSL) near the northwest corner of the project to approximately 1,520 feet above AMSL near the southeastern corner. The steep hills throughout the southern and western portions of the site are predominated by Riversidean upland sage scrub while the flatter portions of the project site are dominated by non-native grassland. Seven soil types are mapped on the project site, including Hanford

sandy loam (HcC), Metz loam sandy (MfA), Mocho loam (MpA), Ojai loam (OgF), Saugus loam (ScF2), Sorrento loam (SsA), and Yolo loam (YoC).

Immediate surrounding land uses include existing residential development to the north and west, a mixture of undeveloped land and residential development to the south, and undeveloped land and juvenile detention schools to the east (Figure 3). The project site is located approximately 0.20 mile to the southeast of Haskell Canyon Open Space and 1.40 miles to the south of Angeles National Forest.

Representative photographs of the project site are shown on Attachment A, Site Photographs.

METHODS

The focused BUOW survey was conducted according to the CDFW BUOW survey guidelines (CDFG 2012), which includes Part I Habitat Assessment and Focused Burrow Survey and Part II Focused BUOW Surveys. The CDFW BUOW survey guidelines are described in further detail below.

Part I: Habitat Assessment and Focused Burrow Survey

Prior to conducting the habitat assessment, HELIX consulted the California Natural Diversity Database (CNDDB) to determine the nearest BUOW occurrence(s). A habitat assessment was conducted by HELIX biologists Lauren Singleton and Daniel Torres on March 27, 2018, to determine whether the project site supports suitable BUOW habitat. A focused burrow survey was conducted concurrently with the habitat assessment. All suitable burrows (i.e., greater than 11 centimeters [cm] in height and width and greater than 150 cm in depth) and burrow surrogates were recorded using a handheld Global Positioning System (GPS) unit (Figure 4, Suitable Burrow and Transect Locations). The habitat assessment and focused burrow survey were conducted prior to commencement of the BUOW focused surveys. The assessment was conducted on the project site and within a 150-meter (approximately 500-foot) buffer zone around the periphery of the project site (survey area). The survey area was slowly walked and assessed for suitable BUOW habitat, including:

- disturbed low-growing vegetation within grassland and shrublands (less than 30 percent canopy cover);
- gently rolling or level terrain;
- areas with abundant small mammal burrows, especially California ground squirrel (Otospermophilus beecheyi) burrows;
- fence posts, rocks, or other low perching locations; and
- man-made structures, such as earthen berms, debris piles, and cement culverts.

All potential burrows were checked for signs of recent owl occupation. Signs of occupation include:

- pellets/casting (regurgitate fur, bones, and/or insect parts);
- white wash (excrement); and/or
- feathers.



Part II: Locating Burrowing Owls

Since suitable habitat and burrows were observed within the survey area, focused BUOW surveys were conducted to determine whether the survey area supports BUOW. The focused surveys consisted of four breeding season surveys that were performed by HELIX biologist Ezekiel Cooley between April 13 and June 26, 2018. The surveys were spaced at least three weeks apart, with at least one survey conducted between February 15 and April 15 and three surveys conducted between April 15 and July 15 (Table 1, *Survey Information*)

The biologist walked transects spaced no greater than 20 meters apart (approximately 65 feet) to allow for 100 percent visual coverage of all suitable habitat within the survey area (Figure 4). The biologist walked slowly and methodically, closely checking suitable habitat within the survey area for BUOW diagnostic sign (e.g., molted feathers, pellets/castings, or whitewash at or near a burrow entrance) and individual BUOW. If observed, BUOW sign and BUOW observations were recorded with a GPS unit. Inaccessible areas of the survey area were visually assessed using binoculars.

Table 1
SURVEY INFORMATION

| Site Visit | Survey Date | Biologist | Start/Stop Time | Start/Stop Weather Conditions | Survey Results |
|-----------------|----------------|-----------------------------------|--------------------|--|---------------------------------------|
| HA ¹ | 03/27/18 | Lauren Singleton Daniel Torres | 0800-1300 | 54°F, wind 6-7 mph, 0% clouds 66°F, wind 6-7 mph, 0% clouds | Suitable habitat and burrows present. |
| 1 | 04/13/18 | Ezekiel Cooley | 0630-1000 | 48°F, wind 2-3 mph, 100% clouds 63°F, wind 2-4 mph, 5% clouds | No BUOW detected. |
| 2 | 05/11/18 | Ezekiel Cooley | 0625-1000 | 58°F, wind 2-3 mph, 100% clouds 61°F, wind 1-2 mph, 100% clouds | No BUOW detected. |
| 3 | 06/08/18 | Ezekiel Cooley | 0600-1000 | 56°F, wind 2-3 mph, 0% clouds 73°F, wind 1-2 mph, 0% clouds | No BUOW detected. |
| 4 | 06/26/18 | Ezekiel Cooley | 0630-0950 | 61°F, wind 0-1 mph, 0% clouds 70°F, wind 0-1 mph, 5% clouds | No BUOW detected. |

¹ Part I Habitat Assessment and focused burrowing survey.

RESULTS

No BUOW have been previously recorded on the project site. The nearest BUOW observation record in CNDDB was observed in 2005, approximately three miles to the southeast of the survey area (California Department of Fish and Wildlife 2018).

Suitable BUOW habitat was observed within the survey area, including low-growing vegetation within disturbed areas and non-native grasslands (Attachment A). Several burrows that could potentially be used by BUOW were observed within the survey area and suitable foraging habitat was observed within and adjacent to the survey area. No BUOW or sign of BUOW occupation were observed within the survey area during the four focused surveys. Therefore, BUOW do not currently occupy the survey area. Observed burrow locations and transects walked are show on Figure 4.



CONCLUSION

No BUOW were observed or detected within the survey area during the focused surveys. Burrows with potential to support BUOW were noted on the project site, but no sign of BUOW occupation was observed. A take avoidance (pre-construction) survey is required to be conducted within 14 days prior to ground disturbance in accordance with CDFW Staff Report on Burrowing Owl Mitigation (2012). If ground-disturbing activities are delayed more than 14 days after the pre-construction survey has been completed, the project site must be resurveyed.

If you have any questions regarding the information presented in this letter report, please contact Ezekiel Cooley (EzekielC@helixepi.com) at (949) 234-8770.

Sincerely,

Enclosures:

Biologist

Figure 1: Regional Location Figure 2: Vicinity Map

Figure 3: Aerial Photograph

Figure 4: Suitable Burrow and Transect Locations

Attachment A: Site Photographs

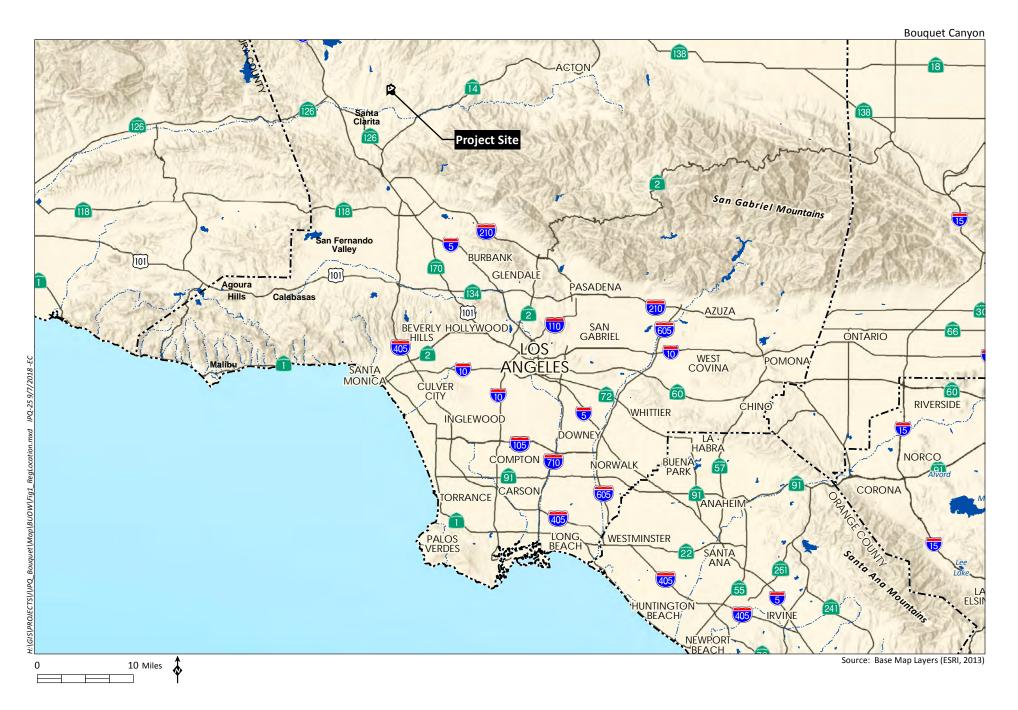


REFERENCES

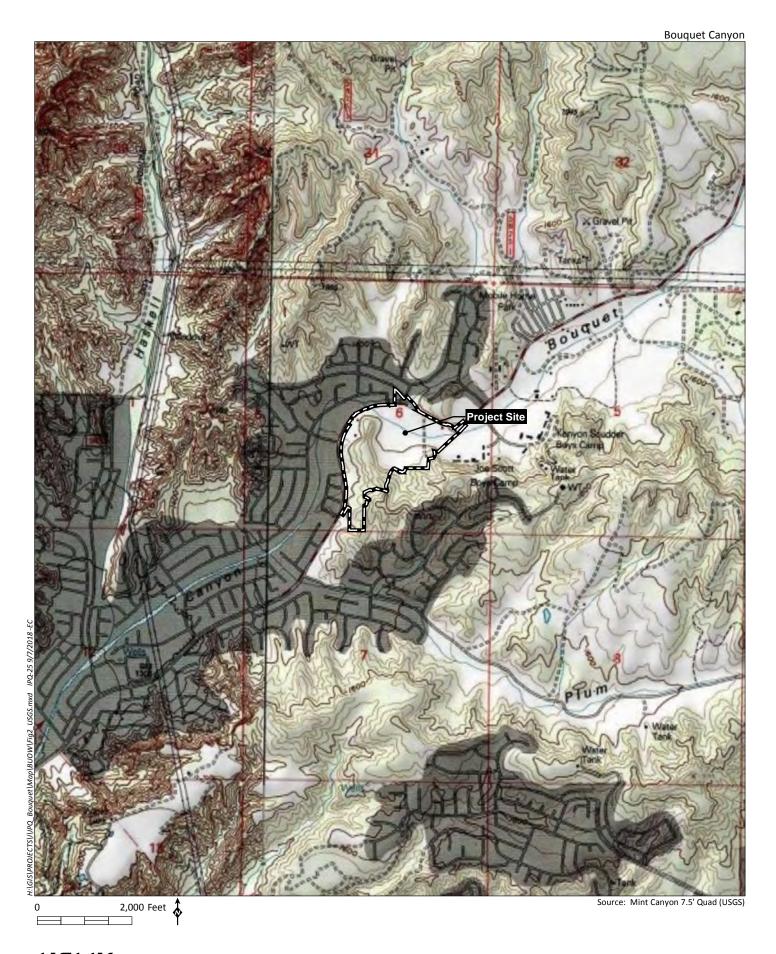
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https://www.wildlife.ca.gov/Data/CNDDB/Maps-and-Data. Accessed August 22, 2018.

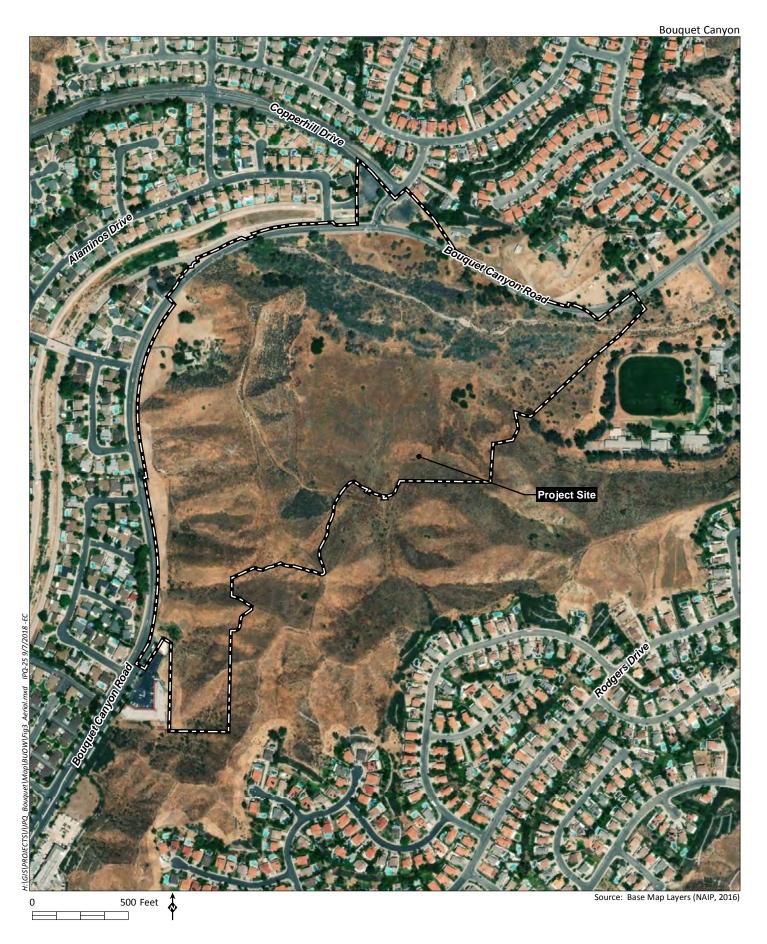
















HELIX Environmental Plan



Photograph 3: View of disturbed-riversidean upland sage scrub in foreground, chamise chaparral/non-native grassland, non-native grassland, and disturbed area in the background, facing southwest.



Photograph 2: View of the non-native grassland located in the center of the study area, facing south.



Photograph 4: View of disturbed areas located adjacent to Bouquet Canyon Road, facing south.

Note: See Figure 4 for photograph locations.

Source: HELIX 2018



Appendix E

Coastal California Gnatcatcher Focused Survey Report **HELIX Environmental Planning, Inc.**

7578 El Cajon Boulevard La Mesa, CA 91942 619.462.1515 tel 619.462.0552 fax www.helixepi.com



June 22, 2018 IPQ-25

Mr. Chris Kofron US Fish & Wildlife Service 2493 Portola Road, Suite B Ventura, California 93003

Subject: 2018 Coastal California Gnatcatcher (*Polioptila californica californica*) Survey Report for the Bouquet Canyon Project

Dear Mr. Kofron:

This letter presents the results of a US Fish and Wildlife Service (USFWS) protocol presence/absence survey of the federally listed threatened coastal California gnatcatcher (*Polioptila californica californica*; CAGN) conducted by HELIX Environmental Planning, Inc. (HELIX) for the Bouquet Canyon Project (project). The project site is comprised of four parcels with Assessor Parcel Numbers (APNs) 2812-008-03, -013, -022, and -031 located in the City of Santa Clarita, Los Angeles County, California. The project site also includes the northwest corner of the parcel with APN 2812-038-022, which may be considered for slope stabilization associated with the proposed development, and a road easement that extends through the southern portion of the parcel with APN 2812-008-022. In addition, a 100-foot buffer around the project site was evaluated. This report describes the methods used to perform the survey and the results, which is being submitted to the USFWS as a condition of HELIX's Threatened and Endangered Species Permit TE-778195-13.

PROJECT LOCATION

The approximately 78-acre project site and 24-acre buffer is generally located 6.9 miles to the east of Interstate 5 and 3.8 miles to the northwest of California State Route 14 in the City of Santa Clarita (Figure 1). Specifically, the project site is located directly south of the intersection of David Way and Bouquet Canyon Road (Figure 2). The project site is within Section 6 of Township 4 North, Range 15 West of the Mint Canyon, California US Geological Survey (USGS) 7.5-minute topographic quadrangle (Figure 3).

Immediate surrounding land uses include existing residential development to the north and west, a mixture of undeveloped land and residential development to the south, and undeveloped land and juvenile detention schools to the east. The project site is located approximately 0.20 mile to the southeast of Haskell Canyon Open Space and 1.40 miles to the south of Angeles National Forest.



METHODS

The survey consisted of six visits that were performed by HELIX biologist Tara Baxter (TE 87004B-0) in accordance with the current (1997) USFWS protocol. Approximately 32.83 acres of potential CAGN habitat occurs within the survey area, which consists of big sagebrush scrub, Riversidean upland sage scrub, disturbed-Riversidean upland sage scrub, Riversidean upland sage scrub/non-native grassland, and non-native grassland/Riversidean upland sage scrub mapped within the project site and 100-foot buffer (Figure 4). Table 1 details the survey dates, times, and conditions.

The surveys were conducted by walking within and along the perimeter of suitable CAGN habitat within the project site. Suitable habitat in areas adjacent to the project site were surveyed from the project site boundary. The survey route was arranged to ensure complete survey coverage of habitat with potential for occupancy by CAGN. Surveys were conducted with binoculars to aid in bird detection. Recorded CAGN vocalizations were played sparingly and only if other means of detection had failed. If a CAGN was detected before playing recorded vocalizations, the recordings were not played. Once CAGNs were initially detected in an area, use of playback was discontinued. The approximate survey route followed is depicted on Figure 4.



Table 1
GNATCATCHER SURVEY INFORMATION

| Site Visit | Survey Date | Biologist(s) | Start/Stop Time | Approx. Acres Surveyed/ Acres per Hour | Start/Stop Weather Conditions | Survey Results |
|---------------|----------------|-----------------|--------------------|--|--------------------------------------|------------------|
| 1 | 03/24/18 | Tara Baxter | 0715/1045 | 32.83 ac/ | 46°F, wind 2-4 mph, 20% cloud cover | No CAGN detected |
| 1 | 03/24/18 | | | 9.38 ac/hr | 64°F, wind 3-5 mph, 40% cloud cover | |
| 2 | 04/07/19 | /18 Tara Baxter | 0630/0930 | 32.83 ac/ | 56°F, wind 0-2 mph, 15% cloud cover | No CAGN detected |
| 2 | 04/07/18 | | | 9.38 ac/hr | 70°F, wind 1-3 mph, 20% cloud cover | NO CAGN detected |
| 3 | 04/14/10 | Tara Daytar | 0920/1120 | 32.83 ac/ | 67°F, wind 0-2mph, 0% cloud cover | No CAGN detected |
| 3 | 04/14/18 | Tara Baxter | 0830/1130 | 9.38 /hr | 77°F, wind 0-2 mph, 0% cloud cover | |
| 4 | 04/21/18 | Tara Baxter | 0700/1000 | 32.83 ac/ | 50°F, wind 0-2mph, 0% cloud cover | No CAGN detected |
| 4 | | | | 9.38 ac/hr | 68°F, wind 1-3 mph, 0% cloud cover | |
| 5 | 05/05/18 | Tara Baxter | r 0600/0900 | 32.83 ac/ | 57°F, wind 0-2 mph, 5% cloud cover | No CAGN detected |
| | | | | 9.38 ac/hr | 74°F, wind 1-3 mph, 10% cloud cover | |
| | 05/12/18 | Tara Baxter | 0645/0945 | 32.83 ac/ | 59°F, wind 1-4 mph, 95% cloud cover | No CACN detected |
| 6 | | | | 9.38 ac/hr | 63°F, wind 1-4 mph, 100% cloud cover | No CAGN detected |



COASTAL CALIFORNIA GNATCATCHER HABITAT

Big Sagebrush Scrub

Big sagebrush scrub comprises mostly soft-woody shrubs up to two meters tall, and usually has bare ground underneath and between the shrubs. This vegetation community is dominated by big sagebrush (*Artemisia tridentata*) and occurs on a wide variety of soils and terrain, from rocky, well-drained slopes to fine-textured valley soils with high water tables. Other species observed in this community included mostly non-native species, such as giant reed (*Arundo donax*), short-pod mustard (*Hirschfeldia incana*), and tree tobacco (*Nicotiana glauca*).

Riversidean Upland Sage Scrub

Riversidean upland sage scrub (including disturbed-Riversidean sage scrub, Riversidean sage scrub/non-native grassland, and non-native grassland/Riversidean sage scrub) occupies xeric sites such as steep slopes, severely drained soils, or clays that slowly release stored soil moisture. This vegetation community is dominated by California sagebrush (*Artemisia californica*) and California buckwheat (*Eriogonum fasciculatum*). Other species observed in this community included basket-brush (*Rhus aromatica*), purple sage (*Salvia leucophylla*), and rancher's fiddleneck (*Amsinckia intermedia*).

Disturbed-Riversidean sage scrub has been subjected to human disturbance and has a lower percent cover of Riversidean sage scrub species and a higher percent cover of bare ground. Riversidean sage scrub/non-native grassland is dominated by California sagebrush and California buckwheat with several non-native grass species interspersed between shrubs, including red brome (*Bromus madritensis* ssp. *rubens*), ripgut (*Bromus diandrus*), and soft chess (*Bromus hordeaceus*). Non-native grassland/Riversidean sage scrub is dominated by non-native grass species with interspersed California sagebrush and California buckwheat shrubs.

RESULTS

No coastal California gnatcatchers were detected during the survey (Figure 4). CAGN is assumed to be absent from the survey area.

CERTIFICATION

I certify that the information in this survey report and enclosed exhibit fully and accurately represent our work.

Sincerely,

Tara Baxter

Enclosures:

Figure 1 Regional Location

Figure 2 Project Vicinity (Aerial Photograph)

Figure 3 Project Vicinity (USGS Topography)

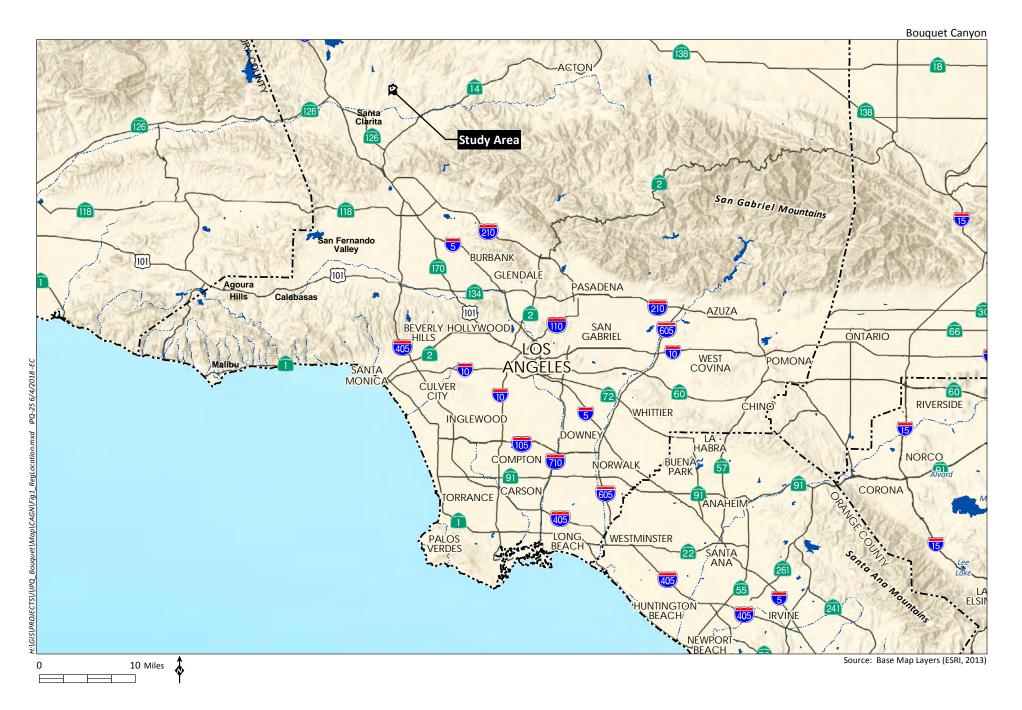
Figure 4 2018 Coastal California Gnatcatcher Survey Results



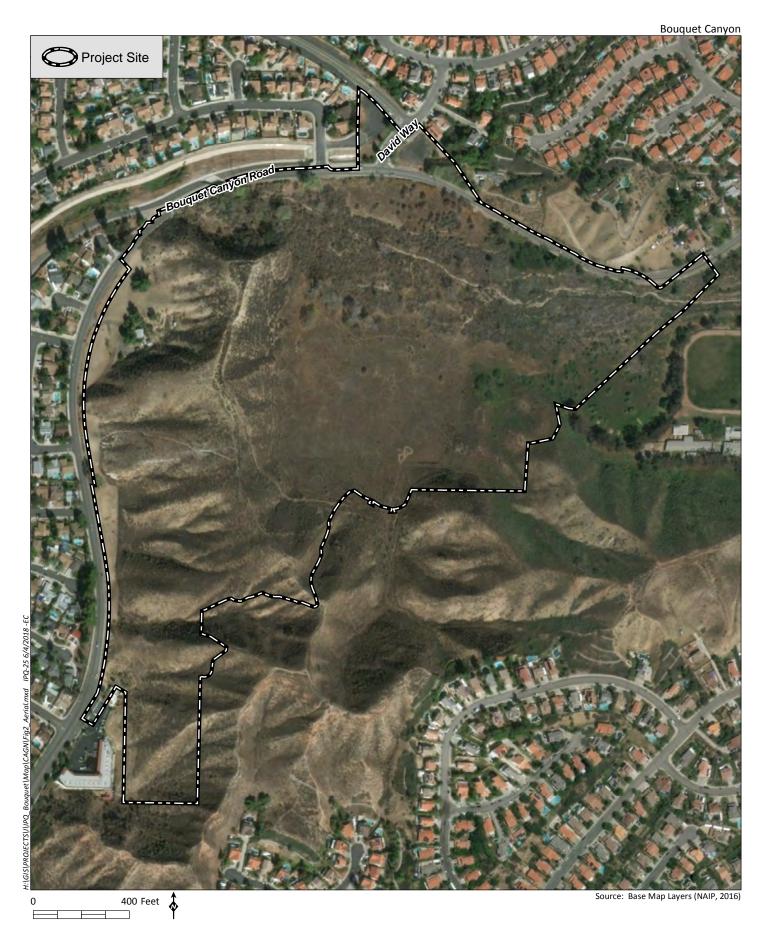
REFERENCES

US Fish and Wildlife Service (USFWS). 1997. Coastal California Gnatcatcher (*Polioptila californica californica*) Presence/Absence Survey Protocol. 5pp.

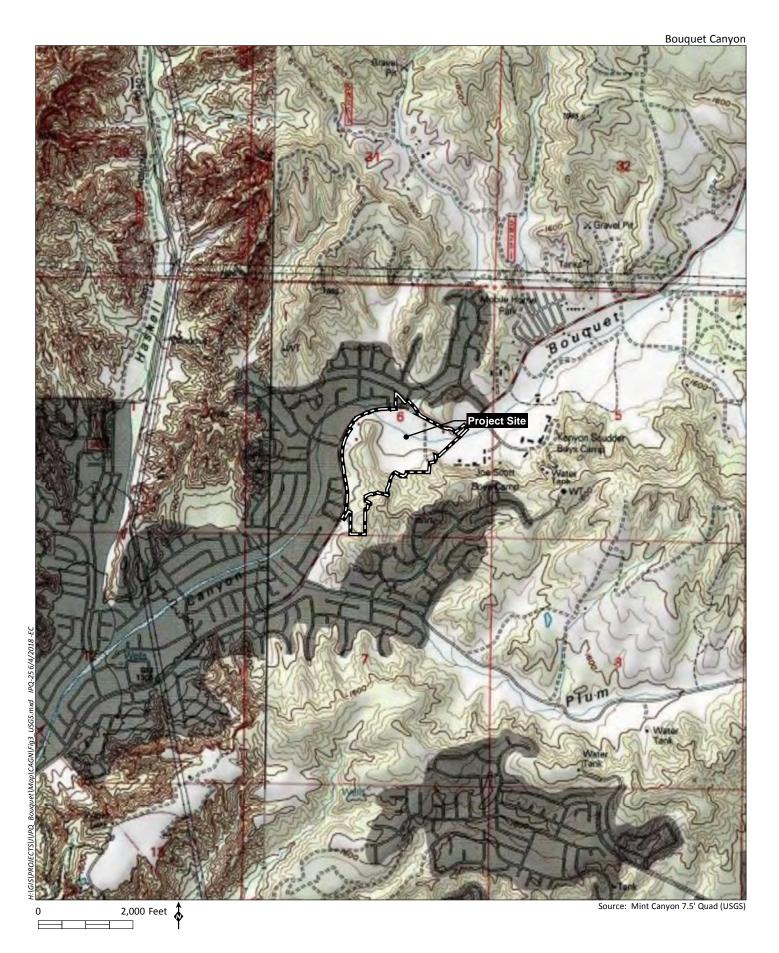




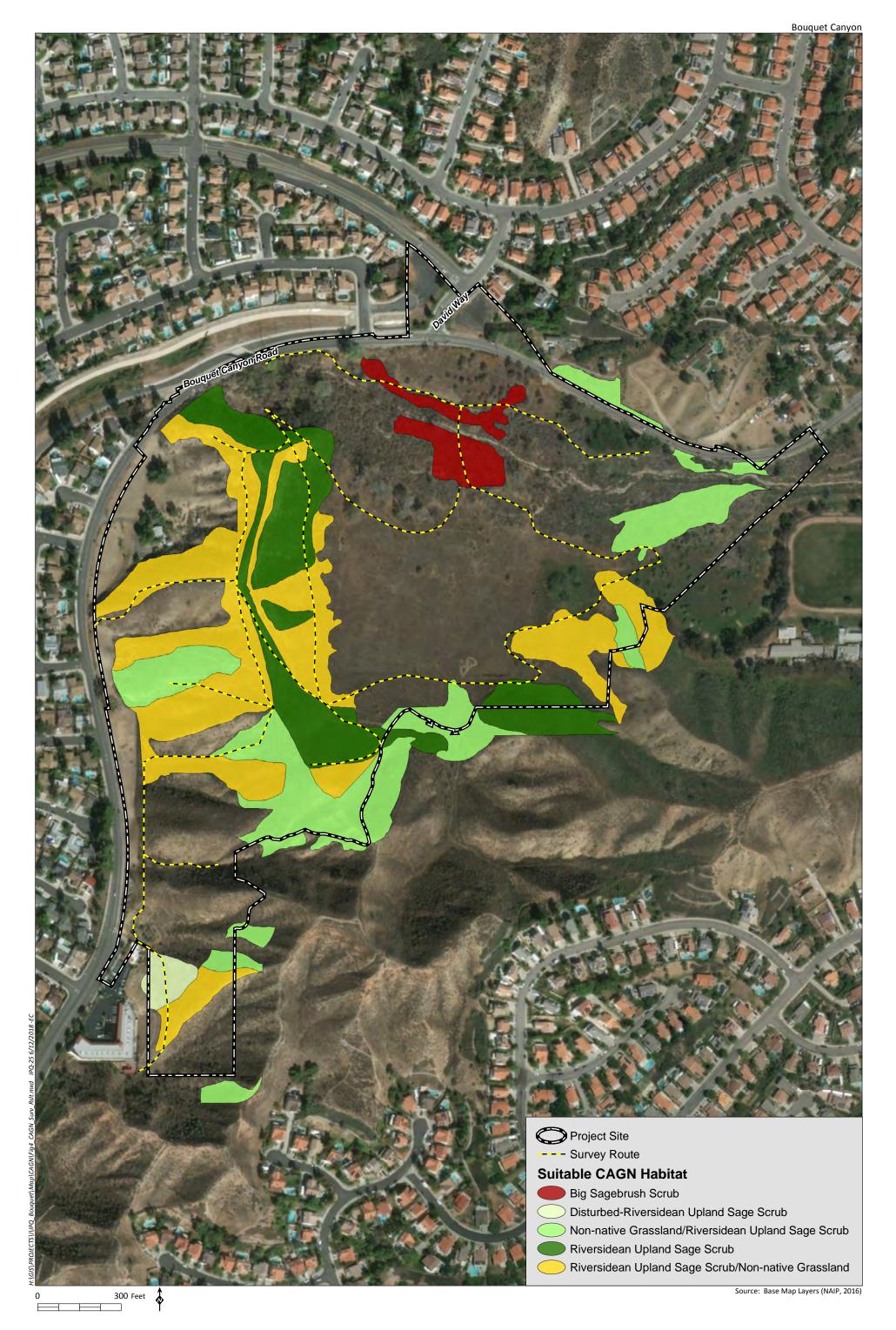












Appendix F

Representative Drainage Photographs

Photograph 1: View of the eastern portion of Bouquet Canyon Creek, facing downstream. The unvegetated river wash can be seen in the foreground and the mule fat scrub community can be seen in the distance.



Photograph 3: View of the western portion of Bouquet Canyon Creek within the study area, facing upstream. The giant reed stand vegetation community can be seen along the banks.



Photograph 2: View of the central portion of Bouquet Canyon Creek within the study area, facing upstream. The unvegetated river wash can be seen in the foreground and the giant reed stand vegetation community can be seen along the banks.



Photograph 4: View of the western most portion of Bouquet Canyon Creek within the study area, facing upstream. The giant reed stand vegetation community can be seen along the banks.

Note: See Figure 7 for photograph locations.

Source: HELIX 2017



Appendix G

Jurisdictional Delineation Report



Bouquet Canyon Project

Jurisdictional Delineation Report

September 20. 2017 | IPQ-25

Ezekiel Cooley
Project Manager

Prepared for:

Integral Communities

888 San Clemente Drive, Suite 100 Newport Beach, CA 92660

Prepared by:

HELIX Environmental Planning, Inc. 7578 El Cajon Boulevard La Mesa, CA 91942

Bouquet Canyon Project

Jurisdictional Delineation Report

Prepared for:

Integral Communities 888 San Clemente Drive, Suite 100 Newport Beach, CA 92660

Prepared by:

HELIX Environmental Planning, Inc. 16485 Laguna Canyon Road, Suite 150 Irvine, CA 92618

September 20, 2017 | IPQ-25

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ACRONYMS AND ABBREVIATIONS

AMSL Above mean sea level

CDFW California Department of Fish and Wildlife CEQA California Environmental Quality Act

CFR Code of Federal Regulations

CWA Clean Water Act

EPA Environmental Protection Agency

HELIX Environmental Planning, Inc.

IP Individual Permit

MCV A Manual of California Vegetation

NWP Nationwide Permit

OHWM Ordinary high water mark

Project Bouquet Canyon Residential Development Project

RPW Relatively Permanent Waterbody

RWQCB California Regional Water Quality Control Board

SAA Stream Alteration Agreement

TNW Traditional Navigable Waters

U.S.United StatesU.S.C.United States CodeUSGSU.S. Geological Survey

USACE U.S. Army Corps of Engineers

WUS Waters of the U.S.

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1.0 INTRODUCTION

This report presents the results of a jurisdictional delineation for the proposed Bouquet Canyon Residential Development (Project), which is proposed on an approximately 56.77-acre undeveloped property located in the City of Santa Clarita, Los Angeles County, California (study area). The Project proposes a residential development, along with associated infrastructure improvements.

This delineation was conducted to identify and map existing areas within the study area that are Waters of the U.S. (WUS) under U.S. Army Corps of Engineers (USACE) jurisdiction pursuant to Section 404 of the Clean Water Act ([CWA] 33 United States Code [U.S.C.] 1344); and wetland and streambed habitats under California Department of Fish and Wildlife (CDFW) jurisdiction pursuant to Section 1600 of the California Fish and Game Code. This information is necessary to evaluate effects on jurisdictional areas and determine permit requirements for the proposed Project. This report presents HELIX Environmental Planning, Inc.'s (HELIX's) best efforts to quantify the amount of WUS and state jurisdictional habitats in the study area using the current regulations, written policies, and guidance from the agencies. The results presented here are subject to confirmation by the USACE and CDFW.

1.1 STUDY AREA LOCATION

The 56.77-acre study area is generally located 6.9 miles to the east of Interstate 5 and 3.8 miles to the northwest of California State Route 14 in the City of Santa Clarita (Figure 1, *Regional Location*). Specifically, the study area is located directly south of the intersection of David Way and Bouquet Canyon Road. The study area is within Section 6 of Township 4 North, Range 15 West of the Mint Canyon, California U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle (Figure 2, *Vicinity Map*).

Immediate surrounding land uses include existing residential development to the north and west, a mixture of undeveloped land and residential development to the south, and undeveloped land and juvenile detention schools to the east (Figure 3, *Aerial Photograph*). The study area is located approximately 0.20 mile to the southeast of Haskell Canyon Open Space and 1.40 miles to the south of Angeles National Forest.



2.0 METHODS

Prior to beginning fieldwork, aerial photographs (1"=75' scale), topographic maps (1"=125' scale), USGS quadrangle maps, and National Wetlands Inventory maps (U.S. Fish and Wildlife Service 2017) were reviewed to assist in determining the location of potential jurisdictional waters and wetlands in the study area. HELIX regulatory specialists Amir Morales and Ezekiel Cooley conducted the jurisdictional delineation field work on July 6, 2017. Data were collected in areas that were judged likely to support potential jurisdictional resources. Mapping of drainage features was performed in the field based on ordinary high water mark (OHWM) and other surface indications, as defined below.

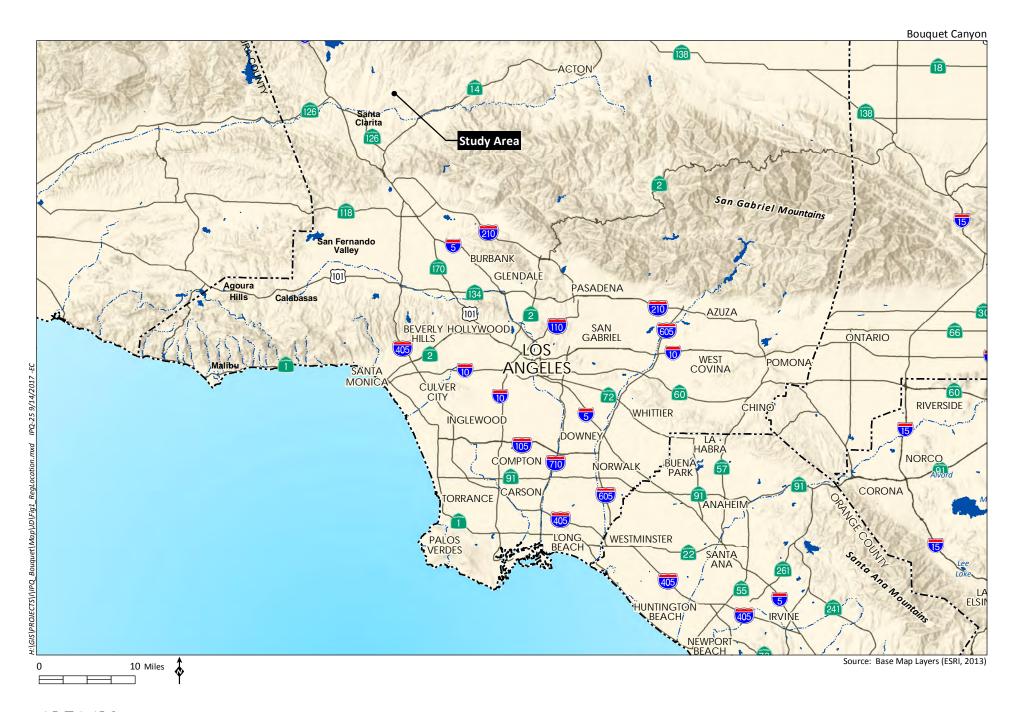
2.1 U.S. ARMY CORPS OF ENGINEERS AND REGIONAL WATER QUALITY CONTROL BOARD JURISDICTION

Areas were determined to be potential USACE WUS wetland if the three criteria (vegetation, soils, and hydrology) established for wetland delineations, as described within the Wetlands Delineation Manual (Environmental Laboratory 1987) and Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (U.S. Army Corps of Engineers [USACE] 2008a) were met. Plants were identified according to Baldwin et al. (2012), and Calflora (2017) was used to augment common names. Wetland affiliations of plant species follow the National Wetland Plant List (Lichvar et al. 2016). Soils information was taken from the Natural Resource Conservation Services' Web Soil Survey (2017). Areas were determined to be potential non-wetland WUS if there was evidence of regular surface flow (e.g., bed and bank) but either the vegetation or soils criterion was not met. Jurisdictional limits for these areas were measured according to the presence of a discernible OHWM, which is defined in 33 Code of Federal Regulations (CFR) Section 329.11 as "that line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank; shelving; changes in the character of the soil; destruction of terrestrial vegetation; the presence of litter or debris; or other appropriate means that consider the characteristics of the surrounding areas." The USACE has issued further guidance on the OHWM (Riley 2005; USACE 2008b), which also was used for this delineation.

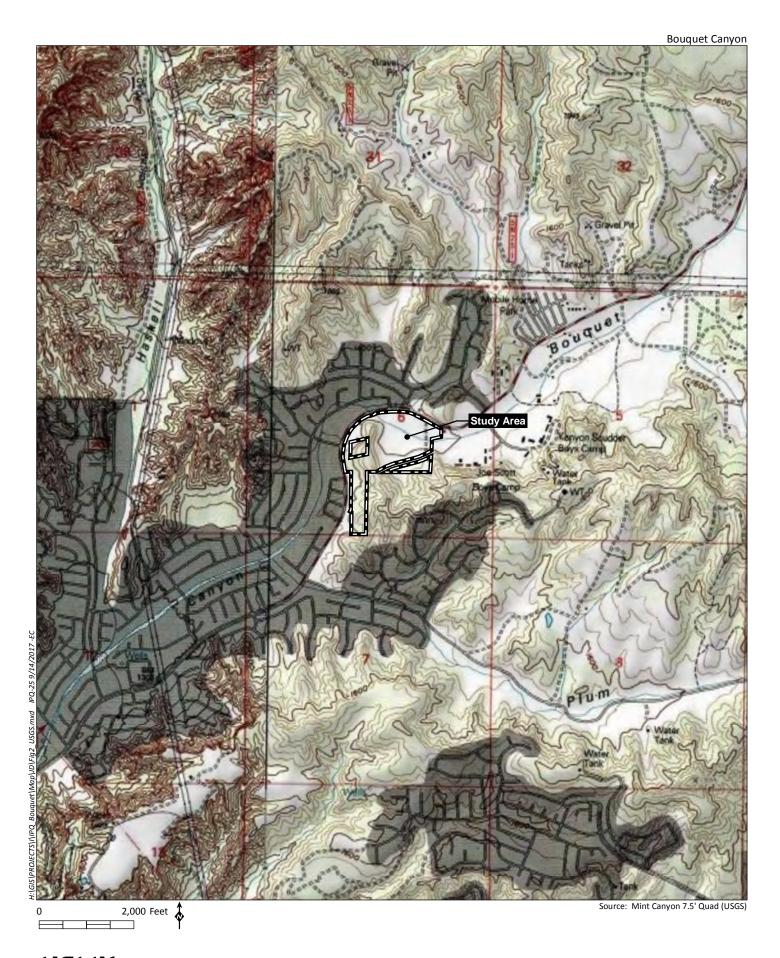
The results presented here are also discussed in light of court decisions (i.e., Rapanos v. United States, Carabell v. United States, and Solid Waste Agency of Northern Cook County [SWANCC] v. USACE), as outlined and applied by the USACE (USACE 2007; Grumbles and Woodley 2007), USACE and Environmental Protection Agency (EPA; 2007), and EPA and USACE (2007). These publications explain that the EPA and USACE will assert jurisdiction over traditional navigable waters (TNW) and tributaries to TNW that are relatively permanent water bodies (RPWs), which have year-round or continuous seasonal flow. For water bodies that are not RPWs, a significant nexus evaluation must be conducted to determine whether the non-RPW is jurisdictional. An overview of USACE wetlands and jurisdictional WUS definitions is presented in Appendix A, Federal Jurisdictional Information.

The California Regional Water Quality Control Board (RWQCB) asserts regulatory jurisdiction over activities affecting wetland and non-wetland Waters of the State pursuant to Section 401 of the CWA and the State Porter-Cologne Water Quality Control Act. Potential RWQCB jurisdiction found within the study area follows the boundaries of potential USACE jurisdiction for WUS. There are no areas supporting isolated Waters of the State subject to exclusive RWQCB jurisdiction pursuant to the State Porter Cologne Water Quality Control Act.

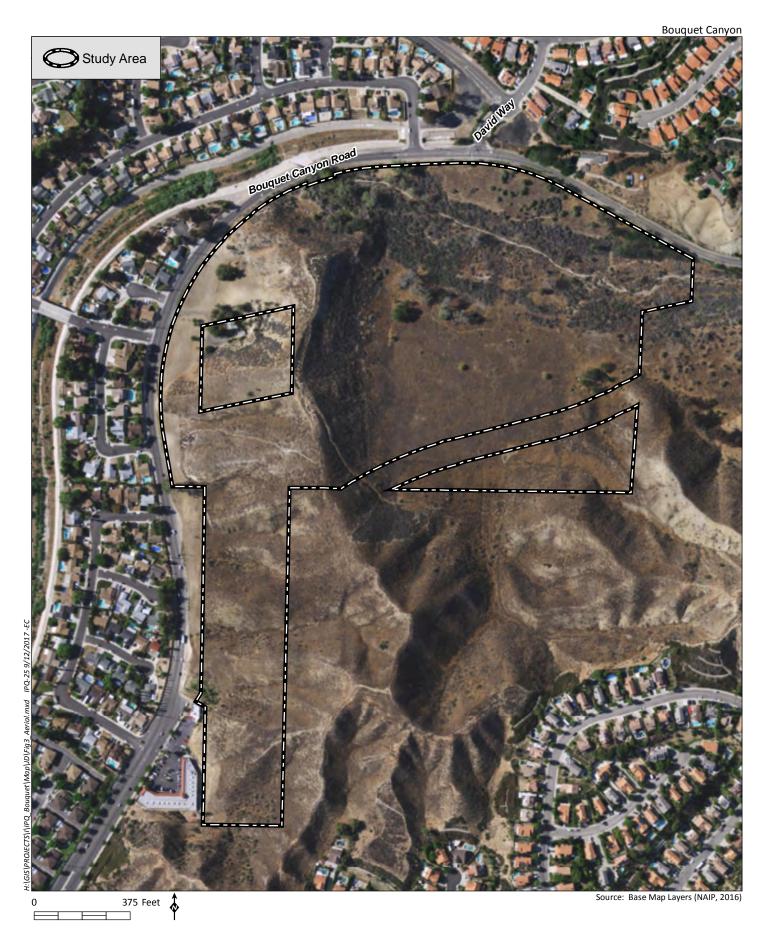














2.2 CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE JURISDICTION

The CDFW jurisdictional boundaries were determined based on the presence of riparian vegetation or regular surface flow. Streambeds within CDFW jurisdiction were delineated based on the definition of streambed as "a body of water that flows at least periodically or intermittently through a bed or channel having banks and supporting fish or other aquatic life. This includes watercourses having a surface or subsurface flow that supports riparian vegetation" (Title 14, Section 1.72). This definition for CDFW jurisdictional habitat allows for a wide variety of habitat types to be jurisdictional, including some that do not include wetland species (e.g., oak woodland and alluvial fan sage scrub). Streambed widths were measured to the nearest foot at various locations along the channel. The CDFW guidance on dryland watersheds (Vyverberg 2010) was also used to understand fluvial actions and map jurisdictional areas in the study area. Definitions of CDFW jurisdictional areas are presented in Appendix B, *State Jurisdictional Information*.



3.0 RESULTS

3.1 STUDY AREA DESCRIPTION

The study area is located in the foothills of the Sierra Pelona Mountains. The topography in the southern and western portions of the study area is predominantly steep hillsides, while the northern portion is primarily flat. Elevations on the study area range from approximately 1,365 feet above mean sea level (AMSL) near the northwest corner of the study area to approximately 1,520 feet above AMSL near the southeastern corner. The steep hills throughout the southern and western portions of the site are predominated by Riversidean upland sage scrub while the flatter portions of the study area are dominated by non-native grassland.

Seven soil types are mapped on the study area, including Hanford sandy loam (HcC), Metz loam sandy (MfA), Mocho loam (MpA), Ojai loam (OgF), Saugus loam (ScF2), Sorrento loam (SsA), and Yolo loam (YoC; Figure 4, *Soils*).

3.2 DRAINAGE FEATURE DESCRIPTION

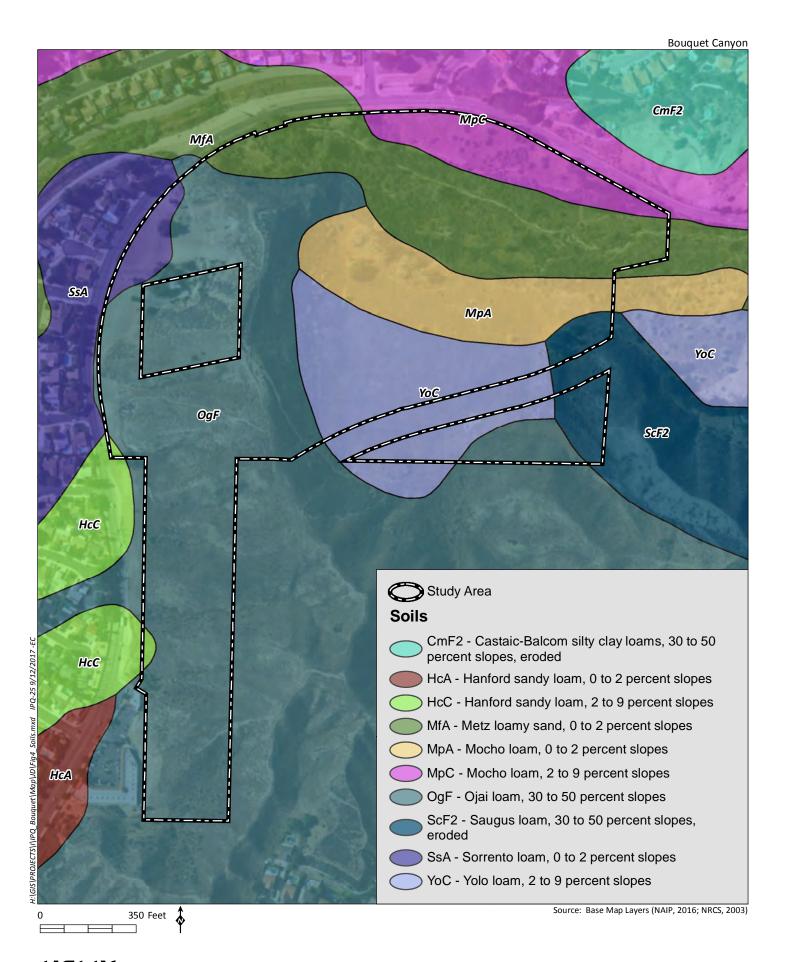
Bouquet Canyon Creek, which is a blueline stream mapped by USGS, is an ephemeral drainage that runs from east to west near the northern study area boundary. The headwaters of the Bouquet Canyon drainage feature originate approximately 10 miles to the northeast of the study area in the Sierra Pelona Mountains, and non-storm related flows through the wash are often controlled via regulated releases from Bouquet Reservoir. The Bouquet Canyon streambed enters the study area at the northeastern boundary and exits at the northwestern boundary. The drainage continues under Bouquet Canyon Road at the northwestern corner of the study area boundary where the drainage has been channelized. The Bouquet Canyon drainage is a tributary to the Santa Clara River, which ultimately drains into the Pacific Ocean approximately 35 miles to the southwest of the study area. The on-site floodplain of the Bouquet Canyon drainage is infested with invasive giant reed (*Arundo donax*). Historical imagery and evidence of grinded material observed on the study area suggest giant reed removal has occurred on the study area. Bouquet Canyon supports somewhat excessively drained sandy loam of the Metz soil series. Aside from Bouquet Canyon, no other surface water feature was observed and the study area is predominantly made up of upland habitat.

Representative photographs were taken of the drainage and are included as Appendix C, *Representative Drainage Photographs*.

3.3 VEGETATION COMMUNITIES

The study area supports 18 vegetation communities, which are shown on Figure 5, *Vegetation* and listed in Table 1, *Vegetation Communities*. Plant communities are classified in accordance with Holland (1986) and Oberbauer (1996). Community names consistent with A Manual of California Vegetation, Second Edition (MCV; Sawyer et al. 2009) are also provided. Sensitive habitats pursuant to CDFW's Natural Communities List (California Department of Fish and Wildlife 2010) are also identified in Table 1.







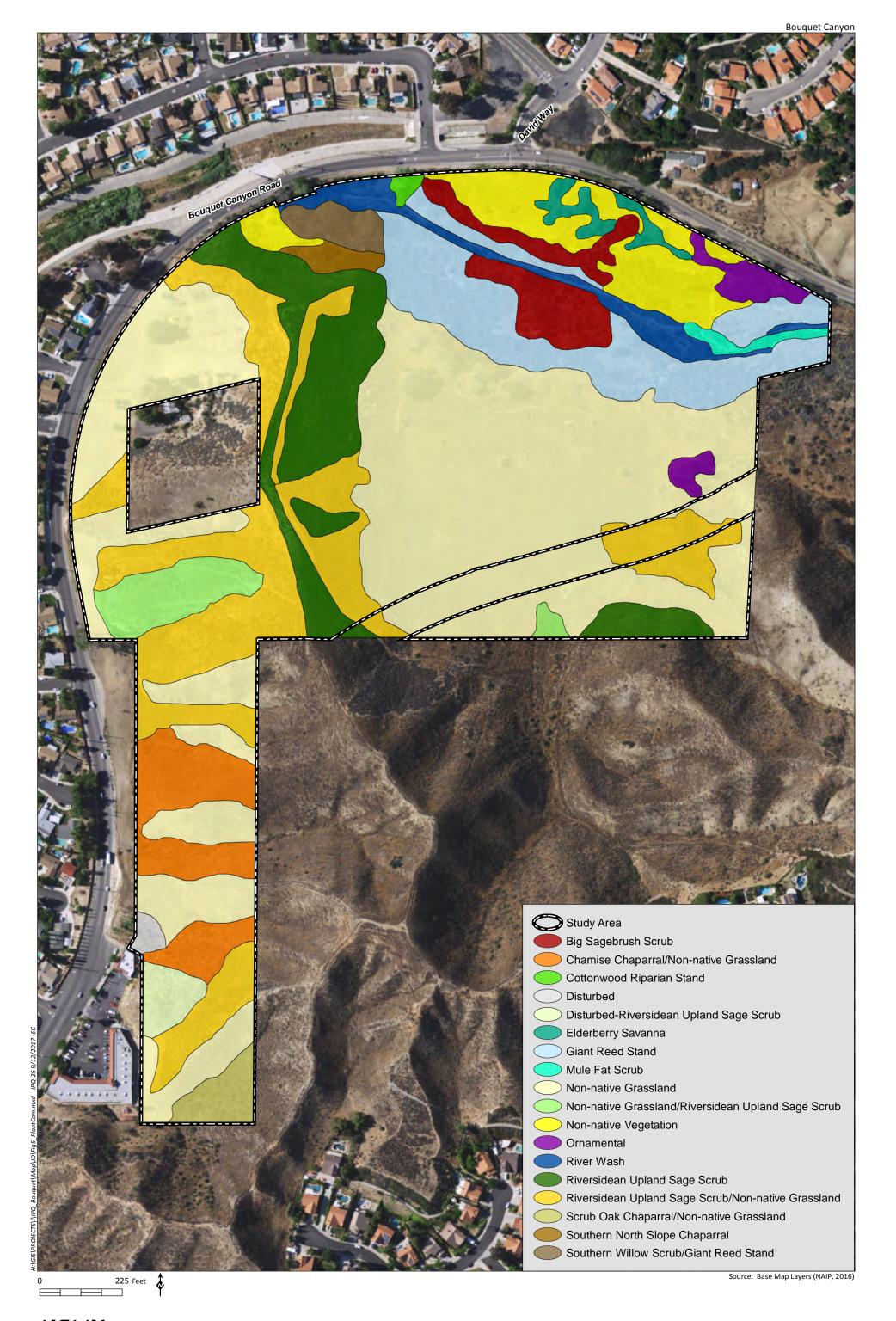


Table 1 VEGETATION COMMUNITIES

| Habitat Type (Holland/Oberbauer) | Habitat Type (MCV) | Acres |
|--|---|-------|
| Big Sagebrush Scrub | Big Sagebrush | 1.91 |
| Chamise Chaparral/Non-native Grassland | Chamise Chaparral/Non-native Grassland | 2.70 |
| Cottonwood Riparian Stand | Fremont Cottonwood Forest | 0.13 |
| Elderberry Savannah | Blue Elderberry Stands ¹ | 0.56 |
| Mule Fat Scrub | Mule Fat Thickets | 0.29 |
| Riversidean Upland Sage Scrub | California Sagebrush Scrub | 4.87 |
| Riversidean Upland Sage Scrub/Non-native Grassland | California Sagebrush Scrub/Non-native Grassland | 8.86 |
| Scrub Oak Chaparral/Non-native Grassland | Scrub Oak Chaparral/Non-native Grassland | 0.67 |
| Southern North Slope Chaparral | Tucker Oak Chaparral | 0.34 |
| Southern Willow Scrub/Giant Reed Stand | Red Willow Thickets ¹ /Giant Reed Breaks | 0.61 |
| Disturbed | Disturbed | 0.18 |
| Disturbed-Riversidean Upland Sage Scrub | Disturbed-California Buckwheat Scrub | 0.58 |
| Giant Reed Stand | Giant Reed Breaks | 5.12 |
| Non-native Grassland | Non-native Grassland | 23.02 |
| Non-native Grassland/Riversidean Upland Sage Scrub | Non-native Grassland/California Sagebrush Scrub | 1.49 |
| Non-native Vegetation | Upland Mustards | 3.30 |
| Ornamental | Ornamental | 0.78 |
| River Wash | River Wash | 1.36 |
| | TOTAL | 56.77 |

Source: HELIX (2017)

3.3.1 Description of Jurisdictional Habitats

Potential jurisdictional habitats observed on the study area include big sagebrush scrub, cottonwood riparian stand, giant reed stand, mule fat scrub, river wash, and southern willow scrub/giant reed stand.

3.3.1.1 Big Sagebrush Scrub

Big sagebrush scrub is dominated by big sagebrush (*Artemisia tridentata*). Big sagebrush scrub is typically associated with plains, alluvial fans, lower slopes, and dry washes in well-drained sandy and loamy soils. Associated species observed within this community include shadscale (*Atriplex canescens*), giant reed, Mediterranean grass (*Schismus barbatus*). Big sagebrush scrub/non-native grassland was observed along the eastern boundary of the study area.

3.3.1.2 Cottonwood Riparian Stand

Cottonwood riparian stand consists of tall, open, broad-leaved, winter-deciduous cottonwood (*Populus fremontii* ssp. *fremontii*), with non-native herbaceous species and giant reed comprising the understory. Most of the understory of this community is heavily disturbed due to the community's proximity to Bouquet Canyon Road and the roads associated weed abatement activities. A small cottonwood riparian stand was observed in the northeastern portion of the study area.



¹ These communities are considered sensitive habitats pursuant to CDFW's Natural Communities List.

3.3.1.3 Giant Reed Stand

Giant reed stand is completely dominated by dense stands of giant reed. Giant reed stand is associated with low-gradient streams, ditches, and coastal marshes. Giant reed is an invasive species that outcompetes native riparian species. Other scattered species observed in this community included native big sagebrush and red willow (*Salix laevigata*) and non-native foxtail chess (*Bromus madritensis* ssp. *rubens*) and short podded mustard (*Hirschfeldia incana*). Giant reed stand extends the length of the drainage atop the banks on both sides.

3.3.1.4 Mule Fat Scrub

Mule fat scrub is a shrubby riparian scrub community dominated by mule fat (*Baccharis salicifolia*) and interspersed with small willows (*Salix* spp.). This vegetation community occurs along stream channels with a fairly coarse substrate and moderate depth to the water table. Mule fat scrub is present in the downstream most portion of the drainage near the eastern boundary of the study area.

3.3.1.5 River Wash

River wash is predominately unvegetated; however, some sparse upland species and giant reed do persist in the wash. River wash is present in the most upstream portion of the drainage near the northern boundary of the study area.

3.3.1.6 Southern Willow Scrub/Giant Reed Stand

Southern willow scrub/giant reed stand consists of dense, broad-leaved, winter-deciduous stands of trees dominated by shrubby willows in association with mule fat, and also contains scattered stands of giant reed. This vegetation community occurs on loose, sandy or fine gravelly alluvium deposited near stream channels during flood flows (Holland 1986). Southern willow scrub/giant reed stand is present in the most upstream portion of the drainage near the northern boundary of the study area.

3.3.1.7 Riversidean Upland Sage Scrub

Riversidian sage scrub is the most xeric expression of coastal sage scrub south of Point Conception, California. Typical stands are fairly open and dominated by California sagebrush (*Artemisia californica*), California buckwheat (*Eriogonum fasciculatum* ssp. *fasciculatum*), and foxtail chess, each attaining at least 20 percent cover. Riversidian sage scrub is typically found on xeric sites such as steep slopes, severely drained soils, or clays that release stored soil moisture only slowly. Intergrades at slightly higher elevations with several southern Californian chaparrals. Characteristic species of Riversidean upland sage scrub in the study area include California buckwheat, California sagebrush, and black sage (*Salvia melifera*), with a sparse understory of non-native grasses.

3.3.1.8 Southern North Slope Chaparral

Southern north slope chaparral is a dense, evergreen chaparral up to 20 feet tall, dominated by scrub oak (*Quercus berberidifolia*). Southern north slope chaparral occurs in somewhat more mesic areas than many other chaparrals, such as north facing slopes, and recovers more rapidly from fires than other chaparrals due to resprouting capabilities of scrub oak (Holland 1986; Keeley and Keeley 1988).



Characteristic species of southern north slope chaparral in the study area include scrub oak, with an understory of non-native grasses.

3.3.1.9 Non-native Vegetation

Non-native vegetation includes land containing a preponderance of non-native plant species such as ornamentals or ruderal exotic species that take advantage of disturbance (previously cleared or abandoned landscaping), or land showing signs of past or present animal usage. Characteristic species of non-native vegetation in the study area include short podded mustard, foxtail chess, and Mediterranean grass.

3.3.1.10 Non-native Grassland

Non-native grassland is a dense to sparse cover of annual grasses, sometimes associated with native annual forbs. Most of the species that occur in non-native grassland originated from the Mediterranean region, an area with a long history of agriculture and a climate similar to California. Characteristic species of non-native grassland in the study area include oats (*Avena* sp.), bromes (*Bromus* spp.), and mustards (*Brassica* spp.).

3.4 JURISDICTIONAL SUMMARY

3.4.1 Federal Jurisdiction

Areas under USACE jurisdiction within the study area consist of a total of 0.35 acre of non-wetland WUS ephemeral streams (Figure 6, USACE Waters of the U.S.; Table 2, Jurisdictional Habitats Occurring on the Study Area).

3.4.2 State Jurisdiction

Areas under CDFW jurisdiction within the study area total 8.14 acres, including 0.57 acre of big sagebrush scrub, 0.11 acre of cottonwood riparian stand, 4.09 acres of giant reed stand, 0.29 acre of mule fat scrub, 0.68 acre of non-native grassland, 0.35 acre of non-native vegetation, 0.01 acre of Riverisdean upland sage scrub, 1.20 acre of river wash, 0.26 acre of southern north slope chaparral, and 0.58 acre of southern willow scrub/giant reed stand (Figure 7, CDFW Waters of the State; Table 2).



Table 2 JURISDICTIONAL HABITATS OCCURRING ON THE STUDY AREA

| Habitat | CDFW (Acres) ¹ | USACE/RWQCB (Acres) ¹ |
|--|---------------------------|-------------------------------------|
| Big Sagebrush Scrub | 0.57 | <0.01 |
| Cottonwood Riparian Stand | 0.11 | <0.01 |
| Giant Reed Stand | 4.09 | 0.00 |
| Mule Fat Scrub | 0.29 | 0.07 |
| Non-native Grassland | 0.68 | 0.00 |
| Non-native Vegetation | 0.35 | 0.00 |
| Riversidean Upland Sage Scrub | 0.01 | 0.00 |
| River Wash | 1.20 | 0.27 |
| Southern North Slope Chaparral | 0.26 | 0.00 |
| Southern Willow Scrub/Giant Reed Stand | 0.58 | 0.00 |
| TOTAL | 8.14 | 0.35 |



Source: HELIX (2017)

Acres are rounded to the nearest hundredth.



USACE Waters of the U.S.

HELIX
Environmental Planning

CDFW Waters of the State

4.0 CONCLUSION

4.1 FEDERAL PERMITTING

Federal jurisdictional areas occurring within the study area total 0.35 acre. Impacts to WUS are regulated by the USACE under Section 404 of the CWA (33 U.S.C. 401 et seq.; 33 U.S.C. 1344; U.S.C. 1413; and U.S. Department of Defense, Department of the Army, USACE 33 CFR Part 323). A federal CWA Section 404 Permit would be required for the proposed Project. A CWA Section 401 Water Quality Certification administered by the RWQCB must be issued prior to any 404 Permit.

Projects may be permitted on an individual basis or may be covered under one of several approved Nationwide Permits (NWPs), which is based on the type of action, amount of fill, and size and length of impact. Individual Permits (IPs) typically require substantial time (often longer than 12 months) to review and approve, while NWPs are pre-approved if a project meets appropriate conditions.

4.1.1 404 Permit

A CWA Section 404 Permit is required by the USACE for impacts to WUS. The type of 404 Permit required from the USACE would depend primarily on the quantity of jurisdictional areas to be impacted. If the Project affects less than 0.5 acre of jurisdictional areas, it may qualify for a NWP 29 for residential developments under current regulations. The NWP's are pre-issued permits for certain activities resulting in no more than minimal adverse effects to USACE jurisdictional streambeds. If implementation of the Project on the study area would impact less than 0.5 acre of jurisdictional areas but exceed the 300-foot threshold for linear streambed impacts under NWP 29, an IP could be required if USACE does not grant a waiver of the 300-foot limit for the Project. Based on the preliminary site plan, our sense is that a NWP may be obtainable if unavoidable impacts to USACE waters are required. An IP application generally takes significantly longer to process than a NWP and requires preparation of a biological assessment, a detailed Section 404(b)(1) on- and off-site alternatives analysis, an environmental assessment, and issuance of a public notice.

4.1.2 401 Certification

A 401 Water Quality Certification (Certification) is required by the RWQCB for impacts to Waters of the State. The 401 Certification is tied to the 404 Permit, and the 404 Permit cannot be issued until the 401 Certification is issued. The 401 Certification cannot be issued until the adopted or certified California Environmental Quality Act (CEQA) document is completed by the lead CEQA agency. In HELIX's experience, RWQCB is one of the most challenging regulatory agencies to obtain a regulatory permit from, as the 401 Certification evaluates impacts to jurisdictional WUS and Waters of the State, and also ensures that adequate pre- and post-construction water quality measures are implemented by a proposed project. Early planning and coordination between the design engineer and regulatory consultant is highly recommended to minimize impacts to RWQCB jurisdiction, ensure adequate water quality measures, and determine potential mitigation obligations.



4.2 STATE PERMITTING

The CDFW jurisdictional areas occurring within the study area total 8.14 acres, including 0.57 acre of big sagebrush scrub, 0.11 acre of cottonwood riparian stand, 4.09 acres of giant reed stand, 0.29 acre of mule fat scrub, 0.68 acre of non-native grassland, 0.35 acre of non-native vegetation, 0.01 acre of Riverisdean upland sage scrub, 1.20 acre of river wash, 0.26 acre of southern north slope chaparral, and 0.58 acre of southern willow scrub/giant reed stand. The CDFW regulates alterations or impacts to streambeds or lakes under California Fish and Game Code 1602 and requires a Streambed Alteration Agreement (SAA) for projects that will divert or obstruct the natural flow of water; change the bed, channel, or bank of any stream; or use any material from a streambed. The SAA is a contract between the applicant and CDFW that includes reasonable measures necessary to protect the resource (California Association of Resource Conservation Districts 2002). Any impacts to CDFW habitat would be regulated under California Fish and Game Code 1602 (Appendix B) and require an SAA.

4.2.1 1602 Agreement

Notification of Lake or Streambed Alteration is required to CDFW for impacts to jurisdictional streambed and riparian habitat. For projects with minor minimal streambed impacts, CDFW may waive their right to issue a formal SAA and issue an Operation of Law authorization, which requires compliance with the terms proposed as part of the SAA notification. For projects in which CDFW takes action and requires a SAA, the SAA cannot be issued until the certified CEQA document or determination is completed by the lead CEQA agency.



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Appendix A

Federal Jurisdictional Information

WETLANDS AND "WATERS OF THE U.S." DEFINITIONS

WETLANDS

The U.S. Army Corps of Engineers (USACE; 33 CFR 328.3) and the Environmental Protection Agency (EPA; 40 CFR 230.3) jointly define wetlands as "[t]hose areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (Environmental Laboratory 1987).

WATERS OF THE U.S.

The official definition of "Waters of the U.S." and their limits of jurisdiction (as they may apply) are defined by the USACE' Regulatory Program Regulations (33 CFR 328.3, paragraphs [a] 1-3 and [e], and Section 328.4, paragraphs [c] 1 and 2) as follows:

- 1. All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;
- 2. All interstate waters including interstate wetlands;
- All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce including any such waters,
 - i. which are or could be used by interstate or foreign travelers for recreation or other purposes; or
 - ii. from which fish or shellfish are or could be taken and sold in interstate commerce; or
 - iii. which are used or could be used for industrial purpose by industries in interstate commerce;
- 4. All impoundments of waters otherwise defined as waters of the United States under the definition;
- 5. Tributaries of waters;
- 6. The territorial seas;
- 7. Wetlands adjacent to waters (other than waters that are themselves wetlands)...

NON-TIDAL WATERS OF THE U.S.

The limits of jurisdiction in non-tidal waters: In the absence of adjacent wetlands, the jurisdiction extends to the OHWM, or when adjacent wetlands are present, the jurisdiction extends to the limit of the adjacent wetlands.

The term OHWM refers to that line on the shore established by the fluctuation of water and indicated by physical characteristics such as clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation (scouring), the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.

Waters of the U.S. must exhibit an OHWM or other evidence of surface flow created by hydrologic physical changes. These physical changes include (Riley 2005):

| • | Natural | line | impressed | on the | hank |
|---|---------|-------|-------------|--------|-------|
| • | maturar | IIIIe | IIIIbresseu | on me | Dalik |

• Changes in the character of soil

• Destruction of terrestrial vegetation

• Presence of litter and debris

Wracking

Shelving

• Vegetation matted down, bent, or absent

• Sediment sorting

• Leaf litter disturbed or washed away

Scour

• Deposition

• Multiple observed flow events

Bed and banks

Water staining

Change in plant community

Further guidance on identifying the OHWM in the Arid Southwest (Lichvar and McColley 2008). This publication provided geomorphic and vegetation OHWM indicators specific to the Arid Southwest.

Jurisdictional areas also must be connected to Waters of the U.S. (Guzy and Anderson 2001; U.S. Supreme Court 2001).

As a consequence of the U.S. Supreme Court decision in Rapanos v. United States, a memorandum was developed regarding Clean Water Act jurisdiction (Grumbles and Woodley 2007). The memorandum states that the EPA and the USACE will assert jurisdiction over traditional navigable waters (TNW), wetlands adjacent to TNW, tributaries to TNWs that are a relatively permanent water body (RPW), and wetlands adjacent to TNW. An RPW has year-round flow or a continuous seasonal flow (i.e., typically for three months or longer). Jurisdiction over other waters (i.e., non TNW and RPW) will be based on a fact-specific analysis to determine if they have a significant nexus to a TNW.

Pursuant to the USACE Instructional Guidebook (USACE and EPA 2007), the significant nexus evaluation will cover the subject reach of the stream (upstream and downstream) as well as its adjacent wetlands (Illustrations 2 through 6, USACE and EPA 2007). The evaluation will include the flow characteristics,

annual precipitation, ability to provide habitat for aquatic species, ability to retain floodwaters and filter pollutants, and proximity of the subject reach to a TNW, drainage area, and the watershed.

WETLAND CRITERIA

Wetland boundaries are determined using three mandatory criteria (hydrophytic vegetation, wetland hydrology, and hydric soil) established for wetland delineations and described within the Wetlands Delineation Manual (Environmental Laboratory 1987) and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (USACE 2008). Following is a brief discussion of the three criteria and how they are evaluated.

Vegetation

"Hydrophytic vegetation is defined herein as the sum total of macrophytic plant life that occurs in areas where the frequency and duration of inundation or soil saturation produce permanently or periodically saturated soils of sufficient duration to exert a controlling influence on the plant species present" (Environmental Laboratory 1987).

The wetland indicator status (obligate upland, facultative upland, facultative, facultative wetland, obligate wetland, or no indicator status) of the dominant plant species of all vegetative layers is determined. Species considered to be hydrophytic include the classifications of facultative, facultative wetland, and obligate wetland as defined in the current list of wetland plants of the Arid Southwest (Lichvar, et al. 2016; Table A-1). The percent of dominant wetland plant species is calculated. The hydrophytic vegetation criterion is considered to be met if it meets the "Dominance Test," "Prevalence Index," or the vegetation has morphological adaptations for prolonged inundation.

Table A-1
DEFINITIONS OF PLANT INDICATOR CATEGORIES

| Indicator Categories | Abbreviation | Qualitative Description |
|----------------------|--------------|---|
| Obligate | OBL | Almost always occur in wetlands |
| Facultative Wetland | FACW | Usually occur in wetlands but may occur in non-wetlands |
| Facultative | FAC | Occur in wetlands and non-wetlands |
| Facultative Upland | FACU | Usually occur in non-wetlands but may occur in wetlands |
| Upland | UPL | Almost never occur in wetlands |

Hydrology

"The term 'wetland hydrology' encompasses all hydrologic characteristics of areas that are periodically inundated or have soils saturated to the surface at some time during the growing season. Areas with evident characteristics of wetland hydrology are those where the presence of water has an overriding influence on characteristics of vegetation and soils due to anaerobic reducing conditions, respectively" (Environmental Laboratory 1987).

Hydrologic characteristics must indicate that the ground is saturated to within 12 inches of the surface for at least five percent of the growing season during a normal rainfall year (approximately 18 days for most of low-lying southern California). Hydrology criteria are evaluated based on the characteristics

listed below (USACE 2008). Where positive indicators of wetland hydrology are present, the limit of the OHWM (or the limit of adjacent wetlands) is noted and mapped. Evidence of wetland hydrology is met by the presence of a single primary indicator or two secondary indicators.

Primary

- surface water (A1)
- high water table (A2)
- saturation (A3)
- water marks (B1; non-riverine)
- sediment deposits (B2; non-riverine)
- drift deposits (B3; non-riverine
- surface soil cracks (B6)
- inundation visible on aerial imagery (B7)
- water-stained leaves (B9)

Secondary

- watermarks (B1; riverine)
- sediment deposits (B2; riverine)
- drift deposits (B3; riverine)
- drainage patterns (B10)
- dry-season water table (C2)

- salt crust (B11)
- biotic crust (B12)
- aquatic invertebrates (B13)
- hydrogen sulfide odor (C1)
- oxidized rhizospheres along living roots (C3)
- presence of reduced iron (C4)
- recent iron reduction in tilled soils (C6)
- thin muck surface (C7)
- crayfish burrows (C8)
- saturation visible on aerial imagery (C9)
- shallow aquitard (D3)
- FAC-neutral test (D5)

In the absence of all other hydrologic indicators and in the absence of significant modifications of an area's hydrologic function, positive hydric soil characteristics are assumed to indicate positive wetland hydrology. This assumption applies unless the site visit was done during the wet season of a normal or wetter-than-normal year. Under those circumstances, wetland hydrology would not be present.

Soils

The USACE and EPA, in their administration of Section 404 of the Clean Water Act, rely on the National Technical Committee for Hydric Soils (NTCHS) for a definition of hydric soils. According to the NTCHS, "A hydric soil is a soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part." (Federal Register 1994)

Soils must exhibit physical and/or chemical characteristics indicative of permanent or periodic saturation. Soil matrix and mottle colors are identified at each sampling plot using a Munsell soil color chart (Kollmorgen 1994). Generally, an 18-inch or deeper pit is excavated with a shovel at each sampling plot unless refusal occurs above 18 inches.

Soils in each area are closely examined for hydric soil indicators, including the characteristics listed below. Hydric soil indicators are presented in three groups. Indicators for "All Soils" (A) are used in any soil regardless of texture, indicators for "Sandy Soils" (S) area used in soil layers with USDA textures of loamy fine sand or coarser, and indicators for "Loamy and Clayey Soils" (F) are used with soil layers of loamy very fine sand and finer (USACE 2008 and Vasilias et al. 2017).

| histosol | S | (A1) |
|----------------------------|---|------|
|----------------------------|---|------|

- histic epipedons (A2)
- black histic (A3)
- hydrogen sulfide (A4)
- stratified layers (A5)
- 1 cm muck (A9)
- depleted below dark surface (A11)
- thick dark surface (A12)
- sandy mucky mineral (S1)
- sandy gleyed matrix (S4)
- sandy redox (S5)

- stripped matrix (S6)
- loamy mucky mineral (F1)
- loamy gleyed matrix (F2)
- depleted matrix (F3)
- redox dark surface (F6)
- depleted dark surface (F7)
- redox depressions (F8)
- vernal pools (F9)
- 2 cm muck (A10)
- reduced vertic (F18)
- red parent material (TF2)

Hydric soils may be assumed to be present in plant communities that have complete dominance of obligate or facultative wetland species. In some cases, there is only inundation during the growing season and determination must be made by direct observation during that season, recorded hydrologic data, testimony of reliable persons, and/or indication on aerial photographs.

NON-WETLAND WATERS OF THE U.S.

The non-wetland Waters of the U.S. designation is met when an area has periodic surface flows but lacks sufficient indicators to meet the hydrophytic vegetation and/or hydric soils criteria. For purposes of delineation and jurisdictional designation, the non-wetland Waters of the U.S. boundary in non-tidal areas is the OHWM as described in the Section 404 regulations (33 CFR Part 328).

U.S. Geological Survey Mapping

The U.S. Geological Survey (USGS) quad maps are one of the resources used to aid in the identification and mapping of jurisdictional areas. Their primary uses include understanding the subregional landscape position of a site, major topographical features, and a project's position in the watershed.

In our experience, the designation of watercourse as a blue-line stream (intermittent or perennial) on USGS maps has been unreliable and typically overstates the hydrology of most streams. This has also been the experience of others, including the late Dr. Luna Leopold. Dr. Leopold was a hydrologist with USGS from 1952 to 1972, professor in the Department of Geology and Geophysics and Department of Landscape Architecture, University of California, Berkeley from 1972 to 1986, and Professor Emeritus from 1987 until his death in 2006. In regard to USGS maps, Dr. Leopold wrote, "I tried to devise a way of defining hydrologic criteria for the channels shown on topographic maps and developed some promising procedures. None were acceptable to the topographers, however. I learned that the blue lines on a map are drawn by non-professional, low-salaried personnel. In actual fact, they are drawn to fit a rather personalized aesthetic" (Leopold 1994).

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Appendix B

State Jurisdictional Information

Appendix B State Jurisdictional Information

CALIFORNIA FISH AND WILDLIFE REGULATIONS

The California Department of Fish and Wildlife (CDFW) regulates alterations or impacts to streambeds or lakes (wetlands) under Fish and Game Code Sections 1600 through 1616 for any private, state, or local government or public utility-initiated projects. The Fish and Game Code Section 1602 requires any entity to notify the CDFW before beginning any activity that will do one or more of the following: (1) substantially obstruct or divert the natural flow of a river, stream, or lake; (2) substantially change or use any material from the bed, channel, or bank of a river, stream, or lake; or (3) deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it can pass into a river, stream, or lake. Fish and Game Code Section 1602 applies to all perennial, intermittent, and ephemeral rivers and streams as well as lakes in the state.

In order to notify the CDFW, a person, state, or local governmental agency or public utility must submit a complete notification package and fee to the CDFW regional office that serves the county where the activity will take place (CDFW 2016). A fee schedule is included in the notification package materials. Under the Permit Streamlining Act (Government Code Sections 65920 et seq.), the CDFW has 30 days to determine whether the package is complete. If the requestor is not notified within 30 days, the application is automatically deemed to be complete.

Once the notification package is deemed to be complete, the CDFW will determine whether the applicant will need a Lake or Streambed Alteration Agreement (SAA) for the activity, which will be required if the activity could substantially adversely affect an existing fish and wildlife resource. If an SAA is required, the CDFW will conduct an on-site inspection, if necessary, and submit a draft SAA that will include measures to protect fish and wildlife resources while conducting the project. If the applicant is applying for a regular SAA (less than five years), the CDFW will submit a draft SAA within 60 calendar days after notification is deemed complete. The 60-day time period does not apply to notifications for long-term SAAs (greater than five years).

After the applicant receives the SAA, the applicant has 30 calendar days to notify the CDFW whether the measures in the draft SAA are acceptable. If the applicant agrees with the measures included in the draft SAA, the applicant will need to sign the SAA and submit it to the CDFW. If the applicant disagrees with any measures in the draft SAA, the applicant must notify the CDFW in writing and specify the measures that are not acceptable. Upon written request, the CDFW will meet with the applicant within 14 calendar days of receiving the request to resolve the disagreement. If the applicant fails to respond in writing within 90 calendar days of receiving the draft SAA, the CDFW may withdraw that SAA. The time periods described above may be extended at any time by mutual agreement.

After the CDFW receives the signed draft SAA, the CDFW will make it final by signing the SAA; however, the CDFW will not sign the SAA until it both receives the notification fee and ensures that the SAA complies with the California Environmental Quality Act (Public Resources Code Section 21000 et seq.). After the applicant receives the final agreement, the applicant may begin the project, provided that the applicant has obtained any other necessary federal, state, and/or local authorizations.

Appendix B (cont.) State Jurisdictional Information

WATER RESOURCE CONTROL BOARD REGULATIONS

SECTION 401 WATER QUALITY CERTIFICATION

Whenever a project requires a federal Clean Water Act (CWA) Section 404 permit or a Rivers and Harbors Act Section 10 permit, it must first obtain a CWA Section 401 Water Quality Certification. The Regional Water Quality Control Board (RWQCB) administers the 401 Certification program. Federal CWA Section 401 requires that every applicant for a Section 404 permit must request a Water Quality Certification that the proposed activity will not violate state and federal water quality standards.

PORTER-COLOGNE WATER QUALITY CONTROL ACT

The State Water Resource Control Board (SWRCB) and the RWQCB regulate the discharge of waste to waters of the State via the 1969 Porter-Cologne Water Quality Control Act (Porter-Cologne) as described in the California Water Code (SWRCB 2017). The California Water Code is the State's version of the federal CWA. Waste, according to the California Water Code, includes sewage and any and all other waste substances, liquid, solid, gaseous, or radioactive, associated with human habitation, or of human or animal origin, or from any producing, manufacturing, or processing operation, including waste placed within containers of whatever nature prior to, and for purposes of, disposal. State waters that are not federal waters may be regulated under Porter-Cologne. A Report of Waste Discharge must be filed with the RWQCB for projects that result in discharge of waste into waters of the State. The RWQCB will issue Waste Discharge Requirements (WDRs) or a waiver. The WDRs are the Porter-Cologne version of a CWA 401 Water Quality Certification.

Appendix B (cont.) State Jurisdictional Information

REFERENCES

California Department of Fish and Wildlife (CDFW). 2016. Notification of Lake or Streambed Alteration, Notification Instructions and Process.

Available from: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=3773&inline

State Water Resources Control Board. 2017. Laws and Regulations. Sacramento, CA: State Water Resources Control Board, California Environmental Protection Agency. Available from: http://www.waterboards.ca.gov/laws regulations/

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Appendix C

Representative Drainage Photographs

Photograph 1: View of the eastern portion of Bouquet Canyon Creek, facing downstream. The unvegetated river wash can be seen in the foreground and the mule fat scrub community can be seen in the distance.



Photograph 3: View of the western portion of Bouquet Canyon Creek within the project site, facing upstream. The giant reed stand vegetation community can be seen along the banks.



Photograph 2: View of the central portion of Bouquet Canyon Creek within the project site, facing upstream. The unvegetated river wash can be seen in the foreground and the giant reed stand vegetation community can be seen along the banks.



Photograph 4: View of the western most portion of Bouquet Canyon Creek within the project site, facing upstream. The giant reed stand vegetation community can be seen along the banks.

Source: HELIX 2017



Appendix H

Oak Tree Survey Report

HELIX Environmental Planning, Inc.

16485 Laguna Canyon Road, Suite 150 Irvine, CA 91942 949.234.8770 tel 619.462.1515 fax www.helixepi.com



March 21, 2019 IPQ-25

Mr. Scott Covington Integral Communities 888 San Clemente Drive Newport Beach, CA 92660

Subject: Oak Tree Survey Report for the Bouquet Canyon Road Project

Dear Mr. Covington:

HELIX Environmental Planning, Inc. (HELIX) prepared this report to document the results of an oak tree survey conducted for the proposed Bouquet Canyon Road Project (project) located the City of Santa Clarita (City), Los Angeles County, California. The purpose of this report is to provide an inventory of all species of oak tree (*Quercus* spp.) within 200-feet of the project footprint with at least one trunk over 6 inches in circumference at a point 4.5 feet above natural grade and to determine the presence of Heritage Trees as defined under the City's Oak Tree Preservation Ordinance (17.51.040; ordinance). This report was also prepared to provide supporting information for obtaining an Oak Tree Permit if sought in the future.

STUDY AREA LOCATION

The approximately 94-acre study area is generally located 6.9 miles to the east of Interstate 5 and 3.8 miles to the northwest of California State Route 14 in the City of Santa Clarita (Figure 1, *Regional Location*). Specifically, the study area is located directly south of the intersection of David Way and Bouquet Canyon Road. The study area is within Section 6 of Township 4 North, Range 15 West of the Mint Canyon, USGS 7.5-minute topographic quadrangle (Figure 2, *USGS Topography*).

Immediate surrounding land uses include existing residential developments to the north and west, a mixture of undeveloped land and residential development to the south, and undeveloped land and juvenile detention schools to the east (Figure 3, *Aerial Photograph*). The study area is located approximately 0.20 mile to the southeast of Haskell Canyon Open Space and 1.40 miles to the south of Angeles National Forest.

REGULATORY FRAMEWORK

The City's Oak Tree Preservation ordinance states, "No person shall cut, prune, remove, relocate, endanger, damage, or encroach into the protected zone of any oak tree on any public or private property within the City" (City of Santa Clarita [City] 2013). The protected zone of the oak tree includes

the area within five feet of the dripline (canopy extent), but no less than 15 feet from the trunk. To remove any oak tree or to subject its protected zone to major encroachment, an Oak Tree Permit must be obtained. Trees subject to the permit include all trees of the oak species (*Quercus* sp.) exceeding 6 inches in circumference when measured at a point 4.5 feet above the tree's natural grade. Encroachment is defined as intrusion into the protected zone of an oak tree, which includes but is not limited to, intrusion by trenching, paving, pruning, dumping, parking of commercial vehicles. Major encroachment is defined by the City's ordinance as "an area between the outer edge of the trunk and fifty percent of the diameter of the protected zone" and minor encroachment is defined as an area between the outermost edge of the protected zone and fifty percent of the diameter of the protected zone" (City 2013).

To obtain an Oak Tree Permit, an application must be submitted to the City Manager or designated representative ("Director") and a filing fee as established by the City Council must be paid. The conditions of the Oak Tree Permit will require native oak trees at a minimum of 24-inch box size to be planted for protected trees that are removed or subjected to major encroachment. The number of replacement trees required is dependent upon the circumference of the tree to be impacted. These guidelines are described in Subsection B of the Oak Tree Preservation Ordinance (City 2013), and reproduced below in Table 1, *Number of Replacement Trees*.

Table 1
NUMBER OF REPLACEMENT TREES

| Circumference of Tree Destroyed (4 feet above ground level) | Number of Replacement Trees Required for Each Tree Destroyed |
|---|--|
| Under 12 inches | 2 |
| 12 to 18 inches | 3 |
| 18 to 24 inches | 4 |
| 24 to 30 inches | 5 |
| 30 to 36 inches | 6 |
| Over 36 inches | 1 additional replacement tree per incremental increase of 6 inches |

Source: City of Santa Clarita (2013)

Replacement trees must be placed on the same property. If there is no appropriate location on-site, the replacement trees may be donated to the City or the monetary value of the required replacement trees may be paid to the City at the discretion of the Director.

Heritage Oak Trees are given special consideration and may be fully protected or subject to requirements stricter than those of a standard protected oak tree. A Heritage Oak Tree is defined as any oak tree measuring 108 inches in circumference when measured 4.5 feet above the tree's natural grade. In the case of trees with multiple trunks, two or more trunks each must measure 72 inches or greater in circumference when measured 4.5 feet above the tree's natural grade.

METHODS

HELIX International Society of Arboriculture (ISA) Certified Arborist Daniel Torres (WE-12249) and HELIX Biologist/Regulatory Specialist Ezekiel Cooley completed an oak tree survey on the study area and within a 200-foot buffer of the study area (survey area) on December 19 and 20, 2018. The purpose of the



survey was to document the presence of: (1) oak trees with at least one trunk over 6 inches in circumference at a point 4.5 feet above natural grade and (2) Heritage Oak Trees.

All oak trees within the survey area that satisfied the previously mentioned criteria were identified to species. The circumference at a point 4.5 feet above natural grade was measured. For trees with codominant stems at 4.5 feet above natural grade, the circumference of each stem was measured at this height. The average circumference of all the stems was calculated in order to determine the number of replacement trees required if the tree was to be removed or subject to major encroachment, as outlined in Table 1 above. Next, the height of each tree was estimated and an aluminum tag with a unique number was affixed to the north side of the tree at approximately three feet above natural grade. Trees located outside of the study area but located within the buffer area were not tagged since Integral Communities does not own this property. Finally, the location of each individual tree and the canopy extent were recorded with a global positioning system device with sub-meter accuracy. The collected data are not considered survey-grade accuracy and should not be used for construction purposes.

Physical and horticultural evaluations were performed for each protected tree according to the City's Oak Tree Preservation and Protection Guidelines (City 1990). The physical evaluation included the assessment of structure, terrain, and general appearance. The horticultural evaluation included the detection of any disease or pathogens and an assessment of the tree's overall vigor. The physical and horticultural evaluations were used to rate each tree on a scale ranging from A to F as outlined in the City's Preservation and Protection Guidelines. The rating system is reproduced below in Table 2, *Oak Tree Rating System*.

Table 2
OAK TREE RATING SYSTEM

| Rating | Description |
|------------------------|---|
| A – Outstanding | A healthy ad vigorous tree characteristic of its species and reasonably free of any visible signs of stress, disease or pest infestation. |
| B – Above Average | A healthy and vigorous tree with minor visible signs of stress, disease or pest infestation. |
| C – Average | Although healthy in overall appearance there is an abnormal amount of stress or disease and/or pest infestation. |
| D – Below Average/Poor | This tree is characterized by exhibiting a greater degree of stress, disease and/or pest infestation than normal and appears to be in a state of rapid decline. The degree of decline may vary greatly in signs of dieback, disease and pest infestation and appears to be in an advanced state of decline. |



| F - Dean | This tree exhibits no signs of life whatsoever. |
|--------------------------------------|---|
| Source: City of Santa Clarita (1990) | · |

Source: City of Santa Clarita (1990)

Following the oak tree survey, an impact assessment was conducted using the most recent project grading plans. The impact assessment was used to determine the number of oak trees that would be required to be removed or whose protected zone would be subject to major encroachment to complete project activities.

RESULTS

A total of 64 oak trees subject to an Oak Tree Permit were located within the survey area (Figure 4, *Oak Tree Locations*). Of these trees, 2 were coast live oak (*Quercus agrifolia*), 6 were scrub oak (*Quercus berberidifolia*), 2 were blue oak (*Quercus douglasii*), 53 were Tucker oak (*Quercus john-tuckeri*), and one was a valley oak (*Quercus lobata*). Six trees (approximately 9 percent) were assigned a rating of A — Outstanding, 22 trees (approximately 34 percent) were B — Above Average, 25 trees (approximately 40 percent) were C — Average, and 11 trees (approximately 17 percent) were D — Below Average. No dead trees were observed during the survey. Overall, there was very little disease noted on the oak trees within the survey area. The majority of trees (37 trees, approximately 58 percent) showed evidence of stress-related growth such as epicormic sprouting and suckers. No Heritage Oak Trees were found during the survey. The locations of all oak tree surveyed are shown in Figure 4. The data collected during the survey is included as Attachment A, *Oak Tree Survey Data*. Representative site and tree photographs are included as Attachment B, *Representative Photographs*.

IMPACT ASSESSMENT

All oak trees within the project footprint will be removed. In addition, the project will be required to implement fuel medication. The County Fire Department requires fuel modification zones to create a defensible space in the event a wildlife breaks out (County of Los Angeles N.D.). There are three different zones, which are outlined below:

Zone A (Setback Zone) – This zone extends 20 feet beyond the edge of any structures. The only allowed vegetation within this zone is green lawns, ground cover not exceeding six inches in height, and well-spaced shrubs. The landscape must be irrigated to promote healthy vegetation and fire resistance.

Zone B (Irrigated Zone) – This zone extends from the outermost edge of Zone A to 100 feet from structures. Green lawn, ground cover not exceeding six inches in height, and well-spaced shrubs and trees are allowed in this zone. The landscape must be irrigated to promote healthy vegetation and fire resistance.

Zone C (Native Brush Thinning Zone) – This zone extends from the outermost edge of Zone B to 200 feet from the structures. Well-spaced native vegetation and ornamental shrubs and trees are allowed. Vegetation must be thinned and species that constitute a fire risk are not allowed (e.g., chamise [Adenostoma fasciculatum], sages [Salvia spp.], California sagebrush, and California buckwheat). This zone does not require irrigation.



For the purpose of this assessment, oak trees located within Fuel Modification Zone A were considered impacted while oak trees located within Zones B and C were considered avoided.

Based on analyzing each surveyed oak's location in respect to the project grading plans and fuel modification zones, the project would require the removal of 26 oak trees, including 4 scrub oaks (*Quercus berberidifolia*), 2 blue oaks (*Quercus douglasii*), and 20 Tucker oaks (*Quercus john-tuckeri*). In addition, one Tucker oak would be subjected to major encroachment and two Tucker oaks would be subjected to minor encroachment. The remaining 35 oak trees would be completely avoided by the project (Table 3, *Impacts to Oak Trees*). A map with the location and protected zone of the oak trees assessed during this survey is included as Figure 5, *Impacts to Oak Trees*.

Table 3
IMPACTS TO OAK TREES

| | Common | Number of Trees | | | | | | | | | |
|------------------------|----------------|-----------------|-----------------------|-----------------------|---------|--|--|--|--|--|--|
| Species Name | Name | Removed | Major Encroachment | Minor Encroachment | Avoided | | | | | | |
| Quercus agrifolia | coast live oak | 0 | 0 | 0 | 2 | | | | | | |
| Quercus berberidifolia | scrub oak | 4 | 0 | 0 | 2 | | | | | | |
| Quercus douglasii | blue oak | 2 | 0 | 0 | 0 | | | | | | |
| Quercus john-tuckeri | Tucker oak | 20 | 1 | 2 | 30 | | | | | | |
| Quercus lobata | valley oak | 0 | 0 | 0 | 1 | | | | | | |
| | TOTAL | 26 | 1 | 2 | 35 | | | | | | |

MITIGATION

Based on the impacts to oak trees as quantified by the impact assessment, 27 oak trees will be removed or subjected to major encroachment. In order to receive an Oak Tree Removal Permit for these impacts, it is anticipated that the City will require 91 replacement trees to be planted or the equivalent monetary value of the replacement trees to be paid (Table 4, Oak Tree Mitigation). Trees that will be completely avoided or subject to minor encroachment will not require replacement trees.

Table 4
OAK TREE MITIGATION

| | Common | Number of Trees | | | | | |
|------------------------|------------|-------------------------------|----------------------------|--|--|--|--|
| Species Name | Name | Removed/Major Encroachment | Replacement Trees Required | | | | |
| Quercus berberidifolia | scrub oak | 4 | 9 | | | | |
| Quercus douglasii | blue oak | 2 | 19 | | | | |
| Quercus john-tuckeri | Tucker oak | 21 | 63 | | | | |
| | TOTAL | 27 | 91 | | | | |



CONCLUSION

Sixty-four (64) oak trees on the survey area were considered City-protected trees. Construction of the project will require 27 of these trees to be removed or to be subjected to major encroachment. It is anticipated that the City will require mitigation for these impacts through the purchase of 91 replacement trees or payment to the City of their equivalent monetary value. Thirty-seven (37) of these trees will be completely avoided or subjected to minor encroachment during project activities and will not require replacement trees.

During construction, trees subject to minor or major encroachment will require protection measures, including but not limited to those outlined within Section VII. Standards for Performance of Permitted Work of the Oak Tree Preservation Guidelines. Other general guidelines to protect trees during for project construction are included as Attachment C, *Tree Protection Recommendations*.

Should you have any questions or require additional information, please do not hesitate to contact me at (949) 234-1515 or DanielT@helixepi.com.

Sincerely,

Daniel Torres

ISA Certified Arborist (WE-12249A)

Enclosures:

Figure 1: Regional Location
Figure 2: USGS Topography
Figure 3: Aerial Vicinity
Figure 4: Oak Tree Locations
Figure 5: Impacts to Oak Trees

Attachment A: Oak Tree Survey Data Attachment B: Representative Photos

Attachment C: Tree Protection Recommendations

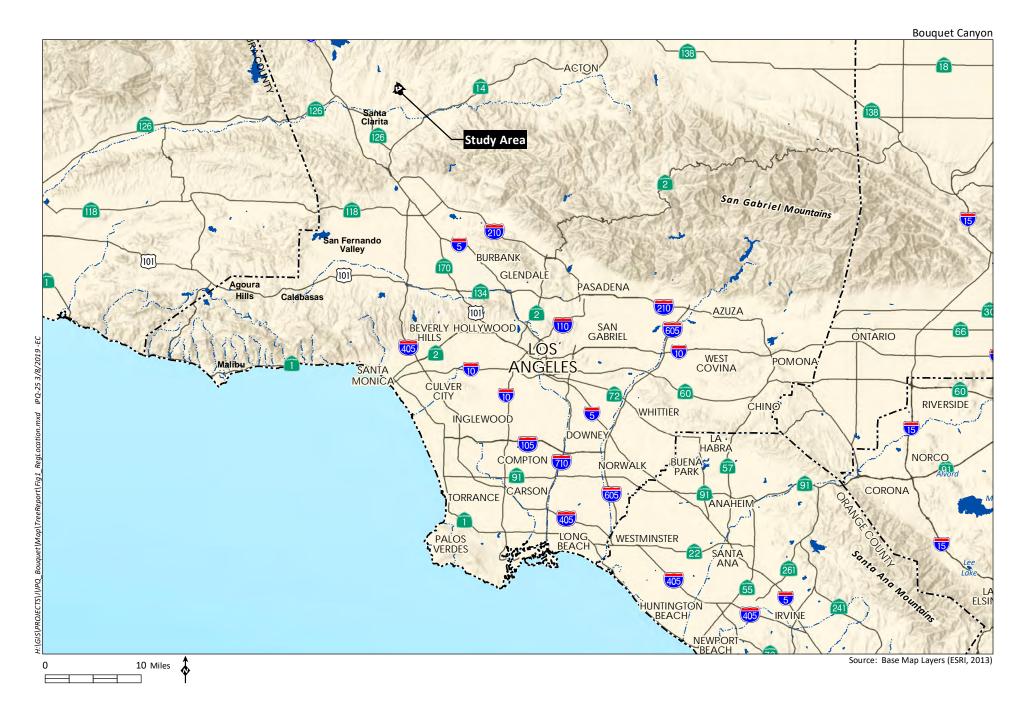


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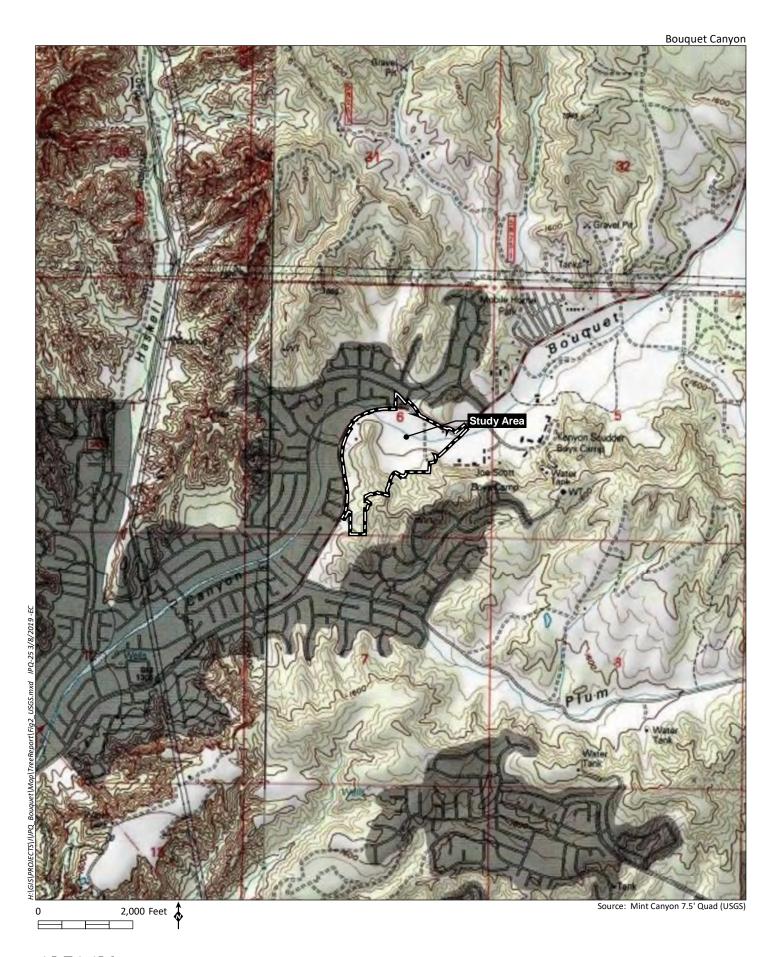
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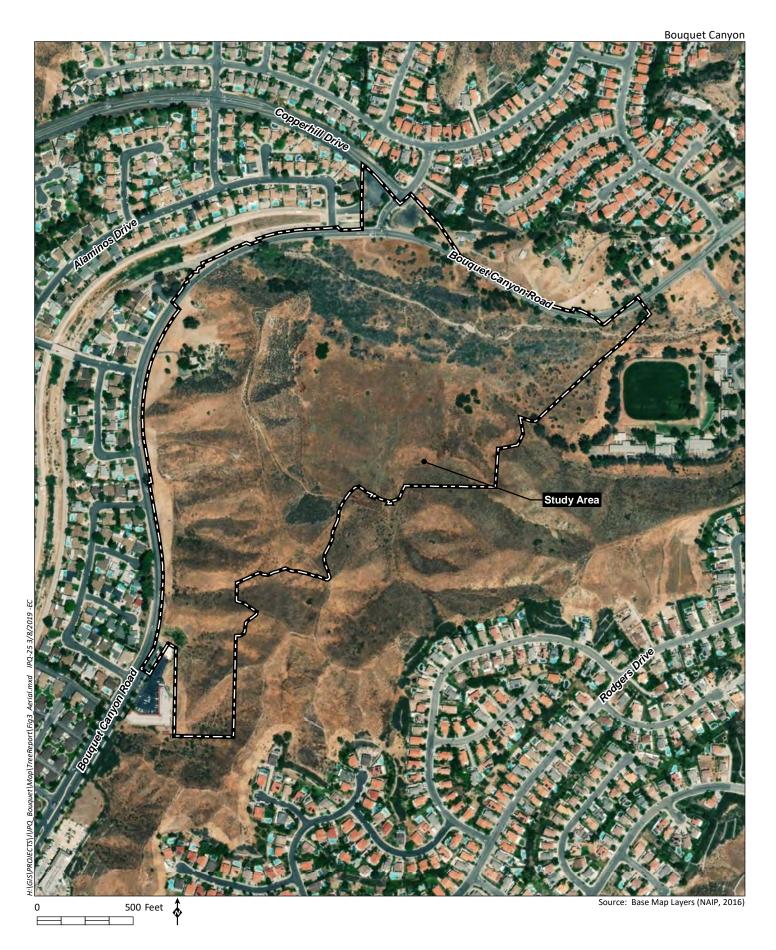
 https://www.codepublishing.com/CA/SantaClarita. Accessed November 19, 2018.



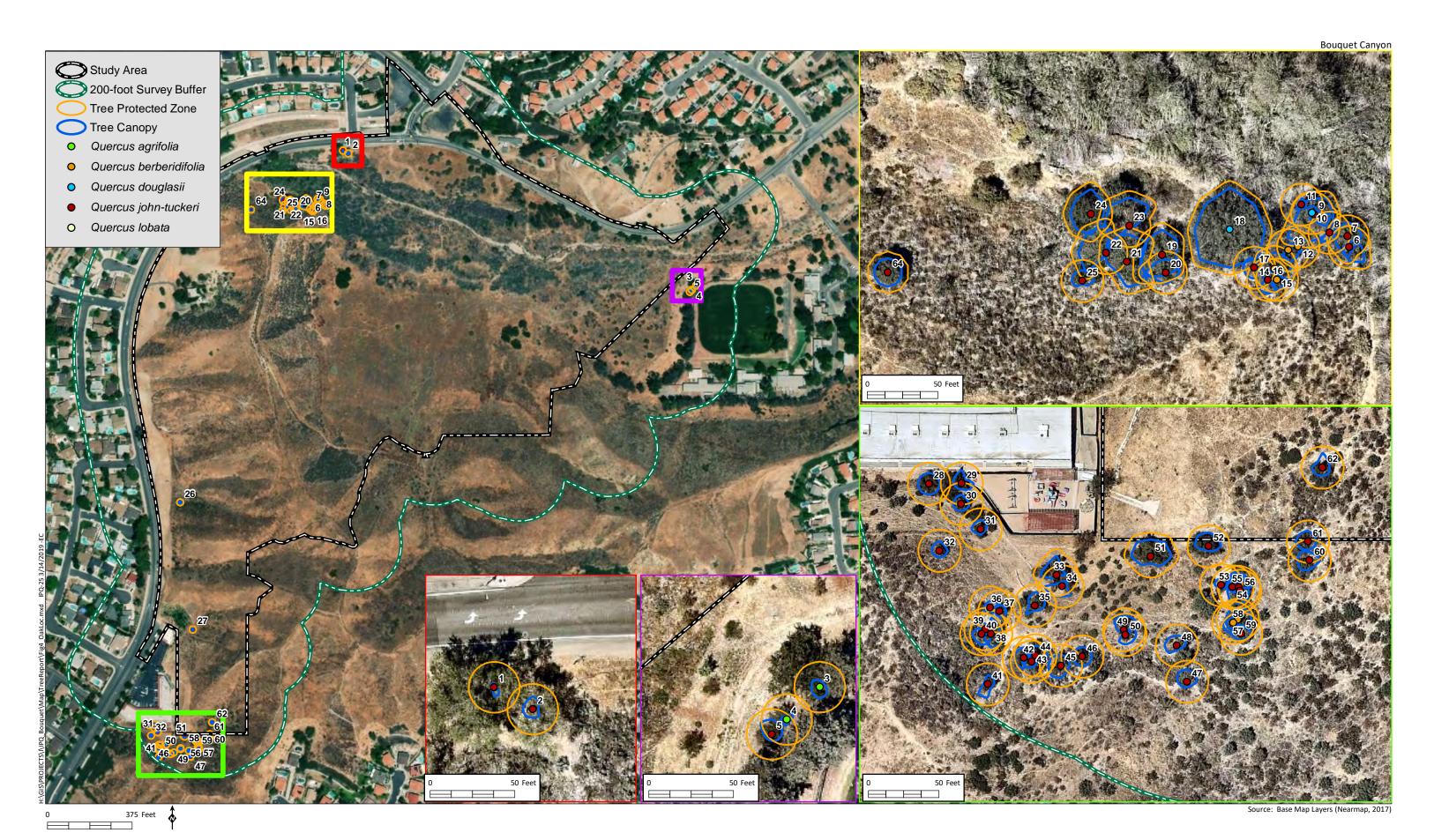




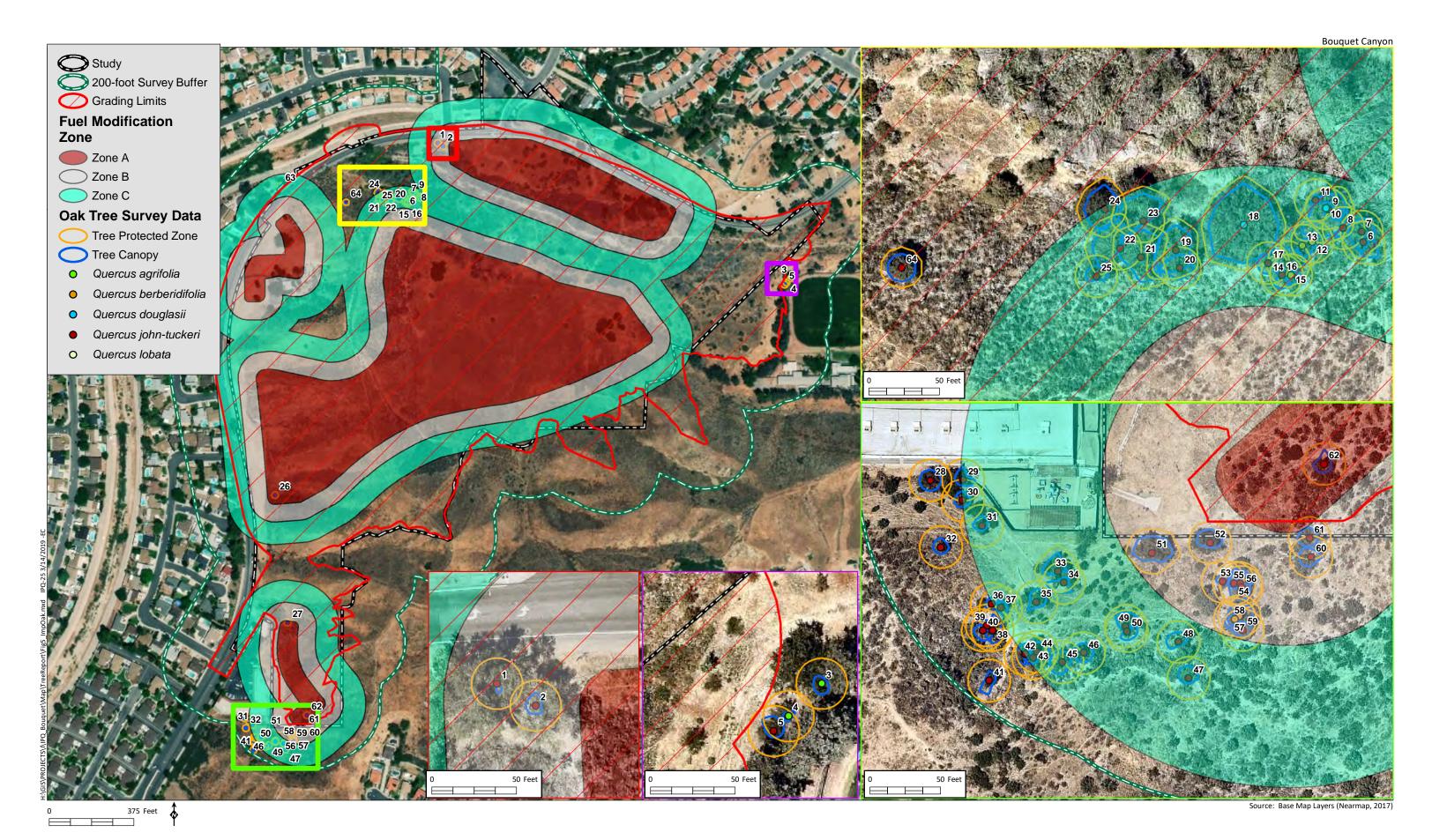














| Tree | | Circum- | II allahat | Canopy Extent (feet) | | | | Physical | Hanking Itania | Oak | | Duanasad | | | | |
|------------|-------------------------------------|-------------------|----------------|----------------------|----|----|----|----------|----------------|-----|--------|--|--|----------------|-----------------------|----------------------------|
| Tag No. | Species | ference (in) | Height (ft) | N | NE | E | SE | S | S W | w | N W | Evaluation | Horticultural Evaluation | Tree Rating | Comments | Proposed Impacts |
| 1 | Tucker oak Quercus john-tuckeri | 6 | 10 | 3 | 1 | 1 | 5 | 6 | 1 | 1 | 3 | Deep v- crotch at 7", canopy is N-S oriented, does not extend E-W. | Appears vigorous, some small galls present, some old, healed trunk injuries. | В | | Removal |
| 2 | Tucker oak Quercus john-tuckeri | 7.5 | 9 | 8 | 6 | 3 | 6 | 5 | 6 | 6 | 6 | Trunk leaning northeast, canopy overall well-distributed. | Galls, insect damage. | В | | Removal |
| 3 | coast live oak Quercus agrifolia | 12.75 | 16 | 4 | 3 | 4 | 6 | 7 | 6 | 5 | 6 | Tree leaning south. | Has stress- related suckers, sapsucker holes. | В | No tag; off- site. | Avoided |
| 4 | coast live oak Quercus agrifolia | 10, 9, 7 | 9 | 2 | 6 | 3 | 1 | 4 | 3 | 4 | 3 | Tree has been topped. | All epicormic growth, tree in severe decline. | D | No tag; off- site. | Avoided |
| 5 | Tucker oak Quercus john-tuckeri | 11.75, 12, 8.5 | 15 | 9 | 8 | 6 | 5 | 4 | 4 | 5 | 10 | Tree leaning north, away from adjacent eucalyptus. | Some galls present, bark damage present (chainsaw cut)-healing. | В | No tag; offsite. | Minor Encroach- ment |
| 6 | Tucker oak Quercus john-tuckeri | 9, 13, 13 | 16 | 4 | 6 | 9 | 15 | 10 | 5 | 5 | 2 | Large failure at v-crotch with decay (old main stem), exposed roots. | Declining, significant amount of epicormic sprouting. | D | | Removal |
| 7 | Tucker oak Quercus john-tuckeri | 18, 19, 24 | 22 | 10 | 10 | 10 | 8 | 15 | 10 | 10 | 9 | Exposed roots, wide angle crotch at base. | Declining, epicormic sprouting, canopy dieback. | D | | Removal |



Oak Tree Survey Data

| Tree | Tree Circum- Height Canopy Extent (feet) | | | | Physical | Horticultural | Oak | | Droposod | | | | | | | |
|------------|--|-----------------|------|----|----------|---------------|-----|----|----------|----|--------|--|--|----------------|---|---------------------|
| Tag No. | Species | ference (in) | (ft) | N | NE | E | SE | S | S W | w | N W | Evaluation | Evaluation | Tree Rating | Comments | Proposed Impacts |
| 8 | Tucker oak Quercus john-tuckeri | 9.75, 6 | 5 | 2 | 8 | 2 | 2 | 5 | 10 | 2 | 4 | Severe lean to south, on steep slope. | Tree is being shaded, very sparse canopy, canopy dieback. | D | Stump shoots from old dead tree. | Removal |
| 9 | Tucker oak Quercus john-tuckeri | 20 | 15 | 6 | 3 | 12 | 12 | 5 | 5 | 2 | 7 | Exposed roots, on steep slope. | Large split with internal decay in trunk, internal decay throughout. | D | | Removal |
| 10 | blue oak Quercus douglasii | 85, 36 | 45 | 10 | 15 | 15 | 20 | 20 | 25 | 10 | 10 | Main trunk split long ago, large trunk leaning north, southern- most trunk with severe lean south, on steep slope. | Lots of mistletoe, canopy very sparse. | D | | Removal |
| 11 | Tucker oak Quercus john-tuckeri | 9 | 16 | 5 | 3 | 3 | 4 | 2 | 6 | 2 | 2 | On steep slope. | Most of canopy is dead, mistletoe present, epicormic sprouting. | D | Tree is almost completely dead. | Removal |
| 12 | scrub oak Quercus berberidifolia | 10 | 15 | 2 | 8 | 8 | 8 | 2 | 2 | 2 | 2 | Trunk leaning to north, multi-stem, one stem is dead, on steep slope. | Epicormic growth, very sparse canopy. | D | | Removal |



| Tree | | Circum- | Uniaht | | | Cano | ру Ех | tent (| feet) | | | Physical | Horticultural | Oak | | Droposed |
|------------|--|-----------------------------|----------------|----|----|------|-------|--------|--------|----|--------|--|---|----------------|----------|---------------------|
| Tag No. | Species | ference (in) | Height (ft) | N | NE | E | SE | S | S W | w | N W | Evaluation | Evaluation | Tree Rating | Comments | Proposed Impacts |
| 13 | scrub oak Quercus berberidifolia | 12, 9.5, 10, 10 | 15 | 5 | 6 | 8 | 8 | 9 | 5 | 2 | 2 | One dead stem, on steep slope. | Epicormic sprouting, severe decline, some galls present. | D | | Removal |
| 14 | scrub oak Quercus berberidifolia | 22.5. 22, 17, 10, 7.5 | 20 | 12 | 12 | 12 | 5 | 12 | 10 | 10 | 12 | Some stems have internal decay, on steep slope. | Epicormic sprouting, mistletoe present, tree in decline. | D | | Removal |
| 15 | scrub oak Quercus berberidifolia | 7.5. 7.5, 8, 5.5 | 14 | 5 | 3 | 8 | 6 | 8 | 5 | 5 | 9 | Good balance, on steep slope. | Some mistletoe present, significant amount of epicormic sprouting, some canopy dieback. | С | | Removal |
| 16 | Tucker oak Quercus john-tuckeri | 9.5 | 10 | 1 | 1 | 1 | 10 | 10 | 10 | 2 | 1 | Most of canopy is in the south, shaded in the north, on steep slope. | Some dieback present, significant amount of epicormic sprouting. | С | | Removal |
| 17 | Tucker oak Quercus john-tuckeri | 5.5, 6.5, 7, 9 | 12 | 7 | 3 | 3 | 4 | 8 | 8 | 8 | 8 | Some included bark at v-crotch about 5" above ground, tree on steep slope. | Small amounts of dieback and epicormic sprouting present. | В | | Removal |



| Tree | | Circum- | lla:abt | | | Cano | ру Ех | tent (| feet) | | | Dhysical | Horticultural | Oak | | Duamasad |
|------------|------------------------------------|--------------------------------|----------------|----|----|------|-------|--------|--------|----|--------|--|--|----------------|--|---------------------|
| Tag No. | Species | ference (in) | Height (ft) | N | NE | E | SE | S | S W | w | N W | Physical Evaluation | Evaluation | Tree Rating | Comments | Proposed Impacts |
| 18 | blue oak Quercus douglasii | 40.5, 24, 47, 52.5, 48 | 35 | 30 | 25 | 25 | 28 | 27 | 30 | 25 | 25 | Large multi- stem tree with big split and decay, all stems leaning towards the south, tree on steep slope. | Tree is experiencing some dieback, epicormic sprouting, sap sucker and borer holes present. | С | Tree tagged 61 in old survey, probably burned. | Removal |
| 19 | Tucker oak Quercus john-tuckeri | 22, 16.5, 17, 13, 10, 11 | 30 | 18 | 15 | 10 | 15 | 15 | 22 | 15 | 15 | Included bark in all crotches, tree on a steep slope. | Appears vigorous, some cankers, canopy is somewhat sparse. | В | | Removal |
| 20 | Tucker oak Quercus john-tuckeri | 17.5, 17, 14, 14 | 15 | 10 | 10 | 10 | 7 | 8 | 8 | 15 | 10 | Tree on steep slope, nexus of stems is 1' above ground. | Some canopy dieback present. | В | | Removal |
| 21 | Tucker oak Quercus john-tuckeri | 21, 25, 20.5, 9 | 20 | 20 | 20 | 10 | 20 | 18 | 10 | 15 | 20 | Multiple trunks all leaning in different directions, tree on a steep slope. | Most of canopy is epicormic sprouting, borer and sapsucker holes are present. | С | | Removal |
| 22 | Tucker oak Quercus john-tuckeri | 15, 19, 18.5, 19, 20 | 25 | 20 | 3 | 2 | 1 | 1 | 20 | 20 | 20 | Tree is on a steep slope, included bark present. | Tree appears healthy but is being shaded, canopy is somewhat sparse, significant dieback is present. | С | | Removal |



| Tree | | Circum- | llaiaht. | | | Cano | ру Ех | tent (| feet) | | | Dhysical | Hentie dtunel | Oak | | Duamasad |
|------------|------------------------------------|---------------------------|----------------|----|----|------|-------|--------|--------|----|--------|---|---|----------------|---|---------------------|
| Tag No. | Species | ference (in) | Height (ft) | N | NE | E | SE | S | S W | w | N W | Physical Evaluation | Horticultural Evaluation | Tree Rating | Comments | Proposed Impacts |
| 23 | Tucker oak Quercus john-tuckeri | 44.5 | 35 | 20 | 20 | 5 | 1 | 1 | 10 | 18 | 20 | Strong lean to the north. | Significant amount of dieback in the lower canopy. | В | | Removal |
| 24 | Tucker oak Quercus john-tuckeri | 18, 12.5, 42, 22.5 | 30 | 18 | 12 | 9 | 9 | 15 | 15 | 15 | 15 | V-crotch with included bark at 7", 1.5', and 2' above ground. | Some galls are present. | В | Tree tagged 60 in old survey. | Removal |
| 25 | Tucker oak Quercus john-tuckeri | 9, 9, 10, 6 | 9 | 8 | 8 | 8 | 5 | 2 | 6 | 8 | 8 | Tree is on a steep slope. | Some epicormic sprouting is present, fairly even canopy. | В | | Removal |
| 26 | Tucker oak Quercus john-tuckeri | 6.5 | 10 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | Even canopy spread, tree growing in the open. | Some galls are present, canopy is dense and healthy. | А | Shrub form, more than 25 stems, all 1-3 inches in circum- ference. | Removal |
| 27 | Tucker oak Quercus john-tuckeri | 6 | 9 | 6 | 4 | 4 | 4 | 6 | 6 | 4 | 5 | Structurally good, open, even canopy. | Significant amount of epicormic growth, most leaves are affected by aphids. | D | Some mechanical damage on the east side of the trunk. | Removal |
| 28 | Tucker oak Quercus john-tuckeri | 6.5 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | Tree is on a steep slope. | Some galls are present. | В | No tag; off- site. | Avoided |
| 29 | Tucker oak Quercus john-tuckeri | 10, 6, 6.5, 5.5, 11 | 9 | 10 | 4 | 9 | 7 | 4 | 5 | 6 | 7 | | Dense canopy, tree appears vigorous. | А | No tag; offsite. | Avoided |
| 30 | Tucker oak Quercus john-tuckeri | 9, 11 | 12 | 7 | 5 | 6 | 5 | 5 | 6 | 6 | 6 | | Dense canopy, tree appears vigorous. | А | No tag; offsite. | Avoided |



| Tree | | Circum- | lla:abt | | | Cano | ру Ех | tent (| feet) | | | Dhusiaal | Horticultural | Oak | | Duanasad |
|------------|------------------------------------|-------------------|----------------|----|----|------|-------|--------|--------|----|--------|---|--|----------------|-----------------------|---------------------|
| Tag No. | Species | ference (in) | Height (ft) | N | NE | E | SE | S | S W | w | N W | Physical Evaluation | Evaluation | Tree Rating | Comments | Proposed Impacts |
| 31 | Tucker oak Quercus john-tuckeri | 6.5, 8, 6.5 | 8 | 7 | 6 | 4 | 3 | 4 | 4 | 7 | 6 | | Dense canopy, tree appears vigorous. | А | No tag; off- site. | Avoided |
| 32 | Tucker oak Quercus john-tuckeri | 6 | 9 | 7 | 5 | 6 | 5 | 5 | 5 | 6 | 6 | | Dense canopy, tree appears vigorous. | А | No tag; offsite. | Avoided |
| 33 | Tucker oak Quercus john-tuckeri | 12, 9.5, 14.5 | 13 | 14 | 5 | 7 | 1 | 1 | 4 | 12 | 10 | Strong lean downhill. | Tree is vigorous, some minor boring insect damage, significant amount of stress-related sprouting at base. | С | No tag; offsite. | Avoided |
| 34 | Tucker oak Quercus john-tuckeri | 14.5, 11 | 14 | 4 | 5 | 3 | 9 | 7 | 10 | 13 | 3 | Good structure. | Tree appears vigorous, lots of stress-related sprouting at base, epicormic sprouting present. | С | No tag; offsite. | Avoided |
| 35 | Tucker oak Quercus john-tuckeri | 8, 13, 16, 9.5 | 15 | 10 | 10 | 7 | 5 | 3 | 9 | 4 | 7 | Internal decay present in one main trunk. | Significant amount of stress-related sprouting at base. | С | No tag; off- site. | Avoided |
| 36 | Tucker oak Quercus john-tuckeri | 6 | 12 | 5 | 6 | 6 | 4 | 5 | 5 | 5 | 4 | | Significant amount of epicormic sprouting, some galls present. | С | No tag; offsite. | Avoided |



| Tree | | Circum- | Haiabt | | | Cano | ру Ех | tent (| feet) | | | Dhusiaal | Hoution literard | Oak | | Duamasad |
|------------|------------------------------------|-----------------|----------------|----|----|------|-------|--------|--------|---|--------|--|--|----------------|-----------------------|---------------------|
| Tag No. | Species | ference (in) | Height (ft) | N | NE | E | SE | S | S W | w | N W | Physical Evaluation | Horticultural Evaluation | Tree Rating | Comments | Proposed Impacts |
| 37 | Tucker oak Quercus john-tuckeri | 8 | 12 | 5 | 5 | 5 | 5 | 4 | 3 | 3 | 5 | | Significant amount of epicormic sprouting, some galls present. | С | No tag; offsite. | Avoided |
| 38 | Tucker oak Quercus john-tuckeri | 9.5, 10, 8.5 | 12 | 12 | 10 | 5 | 10 | 10 | 6 | 5 | 2 | Lean is causing bark to split. | Some internal decay and stress-related sprouting at the base is present. | С | No tag; offsite. | Avoided |
| 39 | Tucker oak Quercus john-tuckeri | 7 | 10 | 4 | 3 | 3 | 3 | 4 | 4 | 5 | 5 | | Stress-related sprouting at the base and epicormic sprouting is present. | С | No tag; offsite. | Avoided |
| 40 | Tucker oak Quercus john-tuckeri | 6, 5 | 12 | 5 | 4 | 7 | 8 | 8 | 6 | 7 | 5 | | Some galls are present, tree is in good health overall. | В | No tag; off- site. | Avoided |
| 41 | Tucker oak Quercus john-tuckeri | 8, 6 | 15 | 7 | 6 | 5 | 3 | 10 | 10 | 3 | 3 | Bark has a healing fissure down the middle of the trunk. | Some epicormic sprouting is present. | В | No tag; offsite. | Avoided |
| 42 | Tucker oak Quercus john-tuckeri | 6.5, 6 | 12 | 8 | 8 | 2 | 2 | 8 | 7 | 7 | 7 | Several branches are rubbing against each other. | Some galls are present. | В | No tag; offsite. | Avoided |
| 43 | Tucker oak Quercus john-tuckeri | 6, 4 | 12 | 5 | 5 | 3 | 4 | 4 | 6 | 7 | 7 | | Some epicormic sprouting is present. | В | No tag; off- site. | Avoided |



| Tree | | Circum- | Height | | | Cano | ру Ех | tent (| feet) | | | Dhusiaal | Horticultural | Oak | | Duonasad |
|------------|------------------------------------|-----------------------|--------|----|----|------|-------|--------|--------|---|--------|--|--|----------------|-----------------------|---------------------|
| Tag No. | Species | ference (in) | (ft) | N | NE | E | SE | S | S W | w | N W | Physical Evaluation | Evaluation | Tree Rating | Comments | Proposed Impacts |
| 44 | Tucker oak Quercus john-tuckeri | 6, 6 | 12 | 7 | 8 | 9 | 5 | 3 | 3 | 7 | 7 | | Some canopy dieback is present. | С | No tag; off- site. | Avoided |
| 45 | Tucker oak Quercus john-tuckeri | 7, 6, 6, 6, 5 | 13 | 8 | 8 | 6 | 6 | 9 | 10 | 9 | 9 | Tree is in shrub form, several widely-spaced branches. | Some epicormic sprouting and galls are present. | В | No tag; off- site. | Avoided |
| 46 | Tucker oak Quercus john-tuckeri | 6, 6, 6, 6, 8, 8.5 | 9 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | Tree is in shrub form, several widely-spaced branches. | Some epicormic sprouting is present, tree exhibiting vigorous growth. | В | No tag; offsite. | Avoided |
| 47 | Tucker oak Quercus john-tuckeri | 6.5, 4 | 9 | 9 | 8 | 7 | 4 | 4 | 5 | 7 | 9 | Tree is leaning downslope causing fissures in some stems. | Main stem has a large fissure with internal decay. | С | No tag; offsite. | Avoided |
| 48 | Tucker oak Quercus john-tuckeri | 6, 5, 5 | 9 | 7 | 9 | 6 | 3 | 3 | 8 | 9 | 8 | Some healing cracks are present at the base of main stems. | Some galls are present, some canopy dieback. | В | No tag; off- site. | Avoided |
| 49 | Tucker oak Quercus john-tuckeri | 10, 6.5, 9.5 | 13 | 11 | 11 | 5 | 5 | 5 | 2 | 5 | 10 | Good structure. | Some dieback and significant amounts of epicormic sprouting are present. | С | No tag; offsite. | Avoided |



| Tree | | Circum- | Height | | | Cano | ру Ех | tent (| feet) | | | Physical | Horticultural | Oak | | Proposed |
|------------|------------------------------------|------------------------------------|--------|----|----|------|-------|--------|--------|----|--------|--|--|----------------|-----------------------|----------------------------|
| Tag No. | Species | ference (in) | (ft) | N | NE | E | SE | S | S W | w | N W | Evaluation | Evaluation | Tree Rating | Comments | Impacts |
| 50 | Tucker oak Quercus john-tuckeri | 9, 7, 6, 6 | 13 | 2 | 8 | 8 | 7 | 7 | 7 | 2 | 2 | Good structure. | Significant amount of epicormic sprouting is present. | С | No tag; offsite. | Avoided |
| 51 | Tucker oak Quercus john-tuckeri | 15, 16, 16, 17 | 18 | 12 | 14 | 15 | 10 | 5 | 9 | 14 | 14 | V-crotches are 1' above ground, some chainsaw wounds are present. | Significant amount of epicormic sprouting is present. | С | No tag; offsite. | Avoided |
| 52 | Tucker oak Quercus john-tuckeri | 16.5, 10, 9.5, 17, 6, 9, 8.5 | 17 | 10 | 9 | 9 | 5 | 3 | 4 | 10 | 11 | Many stems, but good structure. | Significant amount of epicormic sprouting and some canopy dieback are present. | С | | Minor Encroach- ment |
| 53 | Tucker oak Quercus john-tuckeri | 13 | 19 | 5 | 8 | 6 | 3 | 2 | 2 | 5 | 5 | V-crotch at 6" and 4' above ground, tree has a slight lean. | Most of canopy is epicormic sprouting. | С | No tag; offsite. | Avoided |
| 54 | Tucker oak Quercus john-tuckeri | 10, 8, 10 | 17 | 11 | 11 | 5 | 5 | 3 | 3 | 5 | 5 | | Most of canopy is epicormic sprouting, significant canopy dieback is present. | С | No tag; off- site. | Avoided |
| 55 | Tucker oak Quercus john-tuckeri | 12 | 17 | 11 | 9 | 9 | 1 | 1 | 6 | 8 | 9 | Tree is leaning northeast. | Borer holes and internal decay are present. | С | No tag; off- site. | Avoided |



| Tree | | Circum- | Height | | | Cano | ру Ех | tent (| feet) | | | Physical | Horticultural | Oak | | Proposed |
|------------|--|----------------------------------|--------|---|----|------|-------|--------|--------|---|--------|---|--|----------------|---|----------|
| Tag No. | Species | ference (in) | (ft) | N | NE | E | SE | S | S W | w | N W | Evaluation | Evaluation | Tree Rating | Comments | Impacts |
| 56 | Tucker oak Quercus john-tuckeri | 12, 11, 7, 7, 8, 10.5 | 15 | 8 | 8 | 6 | 8 | 9 | 10 | 9 | 7 | | Borer holes, some epicormic sprouting, internal decay, and canopy dieback are present. | С | No tag; offsite. | Avoided |
| 57 | scrub oak Quercus berberidifolia | 9.5, 9.5, 7, 10, 8, 6.5, 6 | 12 | 9 | 10 | 10 | 7 | 5 | 9 | 9 | 9 | Tree is in shrub form, mostly shaded by surrounding trees. | Some galls and epicormic sprouting are present. | В | No tag; offsite. | Avoided |
| 58 | scrub oak Quercus berberidifolia | 7, 6 | 11 | 5 | 1 | 3 | 8 | 8 | 8 | 8 | 3 | Tree is in shrub form. | Canopy is dying back, significant amount of epicormic sprouting is present. | С | No tag; offsite. | Avoided |
| 59 | Tucker oak Quercus john-tuckeri | 8, 8, 8, 8, 8, 12.5 | 11 | 6 | 6 | 8 | 5 | 5 | 5 | 7 | 7 | Tree is in shrub form. | A healing fissure and internal decay are present in one of the main stems. | С | No tag; offsite. | Avoided |
| 60 | Tucker oak Quercus john-tuckeri | 6, 6, 6, 9, 4 | 8 | 6 | 6 | 8 | 5 | 7 | 9 | 9 | 9 | Stems are all widely-spaced, spread out, tree is in shrubby form. | Some canopy dieback is present. | В | No tag; off- site, there is a packrat midden in the middle of the trunks. | Avoided |



Oak Tree Survey Report for the Bouquet Canyon Road Project, Santa Clarita, CA

| Tree | | Circum- | Hoight | | | Cano | ру Ех | tent (| feet) | | | Dhysical | Horticultural | Oak | | Droposed |
|------------|------------------------------------|---|----------------|----|----|------|-------|--------|--------|---|--------|--|--|----------------|---|----------------------------|
| Tag No. | Species | ference (in) | Height (ft) | N | NE | E | SE | S | S W | W | N W | Physical Evaluation | Evaluation | Tree Rating | Comments | Proposed Impacts |
| 61 | Tucker oak Quercus john-tuckeri | 6, 6, 4, 5, 8, 6, 4, 4 | 9 | 8 | 6 | 6 | 6 | 6 | 7 | 9 | 8 | Tree is in shrub form, stems are spread out. | Some canopy dieback, epicormic sprouting, and galls are present. | В | | Major Encroach- ment |
| 62 | Tucker oak Quercus john-tuckeri | 9, 7.5, 5.5, 6.5, 5.5, 8.5, 8, 6.5, 4, 5, 6 | 9 | 11 | 6 | 5 | 6 | 6 | 7 | 8 | 5 | | Cankers, galls, epicormic sprouting, and canopy dieback are present. | С | | Removal |
| 63 | valley oak Quercus lobata | 12, 22 | 20 | 5 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | V-crotch at 1.5' and 5' with included bark, tree is growing straight. | Vigorous growth, healthy specimen, no obvious signs of disease. | А | Circumfer- ence and canopy were estimated- tree is on private property. | Avoided |
| 64 | Tucker oak Quercus john-tuckeri | 17, 32.5 | 19 | 10 | 10 | 10 | 10 | 10 | 8 | 8 | 10 | Included bark, exposed roots, tree is growing on a steep slope. | Vigorous growth, some canopy dieback is present. | В | | Removal |





Photo 1: Tree 10 (blue oak, Quercus douglasii) adjacent to the northwestern corner of the study area.



Photo 2: Tucker oak (Quercus john-tuckeri) scrub adjacent to the southwestern corner of the study area.





Photo 3: Tree 51 (Tucker oak, Quercus john-tuckeri) assigned an oak tree rating of C for displaying significant amounts of epicormic growth.



Photo 4: Tree 62 (Tucker oak, Quercus john-tuckeri) assigned an oak tree rating of C for displaying canopy dieback and significant amounts of epicormic growth.



Attachment C

Tree Protection Recommendations

Oak Tree Survey Report for the Bouquet Canyon Road Project, Santa Clarita County, CA

General Construction Site Recommendations

- A minimum 4-foot tall, brightly colored, synthetic fence should be installed around the
 outermost edge of the protected zone of trees that are designated for retention onsite. Encroachment into the fenced areas should be restricted to the minimum amount
 feasible and fencing should remain in place until all construction activities have ceased
- The fenced area should be kept clear of building materials, waste, and excess soil.
- No digging, trenching, compaction, or other soil disturbance should be allowed in the fenced area.
- The storage of construction equipment or hazardous materials such as gasoline, oil, or other toxic chemicals should not be allowed in or adjacent to the fenced area.
- Storage areas for equipment, soil, and construction materials as well as burn sites (if permitted), cement washout pits, and construction work zones should be kept away from protected trees and outside the fenced in area.
- Cable, chain, rope or signage should not be attached to retained trees.
- Designated roads and parking areas should be established. All construction personnel should be restricted to driving and parking in designated areas. Discharge of exhaust from construction vehicles and equipment should not be allowed near the protected zone of trees.
- Grade changes should be avoided near fenced areas to the maximum extent possible.

Recommendations for Construction Activities in the Vicinity of Retained Trees

- All necessary clearance pruning should be conducted by a Certified Tree Worker or Certified Arborist.
- Trenching within the dripline of retained trees should be avoided to the maximum extent practicable and kept a minimum distance of 10 times the diameter of the tree away from its trunk. If necessary, this trenching should be conducted using hand excavation or compressed air to reduce impacts to tree roots. Machine trenching should not be allowed within the dripline of retained trees. If pipes must be installed closer to the tree than a distance of 10 times the diameter of the tree away from its trunk, they should be bored beneath the tree a minimum of 3 feet below the ground surface to reduce impacts to roots.
- Excavation should also be minimized within the dripline of retained trees. Construction
 within the dripline of retained trees should be conducted in a manner that minimizes
 excavation and provides for the best preservation of roots as determined by the Project
 Arborist.
- If tree roots are severed outside of the fenced area, they should be severed cleanly and kept moist. All exposed roots outside of fenced areas should be covered with protective material during construction such as mulch or plywood sheets to reduce soil



Attachment C

Tree Protection Recommendations

Oak Tree Survey Report for the Bouquet Canyon Road Project, Santa Clarita County, CA

- compaction. Protective material should be removed upon completion of construction activities.
- Trenching and excavation should be avoided during hot, dry, weather and trees shall be watered before, during, and after trenching and excavation within the dripline of retained trees to offset water loss due to cut roots.
- Grading within the driplines of retained trees should be avoided wherever feasible.
- To prevent soil compaction, several inches of wood chips should be spread in the root zone area and covered with steel plates.

Recommendations for Protection of Trees Post-Construction

- Post-construction inspections of the trees should be conducted by a Certified Arborist or Certified Tree Worker to determine if retained trees are stressed (e.g., water stress, nutrient stress) or damaged (e.g., broken branches, trunk damage). Appropriate corrective actions should be implemented as necessary. Such corrective actions may include application of root stimulant to encourage new root growth in trees that have a significant portion of their roots lost due to cutting or soil compaction.
- Aeration of soil by vertical mulching or similar technique should be implemented around retained trees to offset the impacts of soil compaction that has already occurred due to construction activities and other site uses.
- Long term maintenance should also be conducted by a Certified Arborist or tree care specialist to assist the trees with recovering from construction related stress and may include watering, fertilization, pruning, and/or pest/disease control.



Appendix I

Rare Plant Species Potential to Occur

Appendix I Rare Plant Species Potential to Occur¹

| Species Name | Common Name | Status ² | Habitat, Ecology, and Life History | Potential to Occur ³ |
|---------------------------------------|------------------------|---------------------|--|--|
| Berberis nevinii | Nevin's barberry | FE/SE CRPR 1B.1 | Shrub. Occurs on steep, north-facing slopes or washes within chaparral, cismontane woodland, coastal scrub, and riparian scrub. Elevation range 70-825 m. Flowering period Mar-May. | Presumed absent. The study area supports suitable habitat for this species. The nearest observation of this species was recorded in 1987 within the Santa Clara river, approximately 4.25 miles to the southwest of the study area. This species was not observed during the rare plant surveys. |
| Calochortus clavatus var. gracilis | slender mariposa-lily | CRPR 1B.2 | Medium perennial herb. Occurs in shaded foothills and canyons within chaparral, coastal scrub, and valley grassland. Elevation range below 1000 m. Flowering period May-Jun. | Observed. A total of 496 individuals were observed on the study area during the rare plant surveys. |
| Calochortus palmeri var. palmeri | Palmer's mariposa-lily | CRPR 1B.2 | Medium perennial herb. Occurs in mesic and vernally moist areas within chaparral, lower montane coniferous forest, and meadows. Also occurs within seeps. Elevation range 1200-2200 m. Flowering period May-Jul. | None. The study area does not support mesic or vernally moist areas. There are no records of this species in the Santa Clarita area; Los Angeles County records are confined to the San Gabriel Mountains. This study area is below the elevation range for this species. |

Appendix I (cont.) Rare Plant Species Potential to Occur¹

| Species Name | Common Name | Status ² | Habitat, Ecology, and Life History | Potential to Occur ³ |
|---------------------------------------|-------------------------------|---------------------|--|--|
| Dodecahema leptoceras | slender-horned spineflower | FE/SE CRPR 1B.1 | Small annual herb. Occurs in sandy or gravelly places within chaparral, cismontane woodland, and coastal scrub associated with alluvial fans. Elevation range 200-700 m. Flowering period May-Jun. | Presumed absent. The study area supports suitable habitat for this species. The nearest observation of this species was recorded in 1979, approximately 3.75 miles to the east of the study area within a non-specific area of Mint Canyon. This species was not observed during the rare plant surveys. |
| Navarretia fossalis | spreading navarretia | FT CRPR 1B.1 | Small annual herb. Occurs in vernal pools, vernal swales, or roadside depressions. Population size is strongly correlated with rainfall. Depth of pool appears to be a significant factor as this species is rarely found in shallow pools. Elevation range 30-1300 m. Flowering period Apr-Jun. | None. The study area does not support vernally moist areas. |
| Navarretia setiloba | Piute Mountains navarretia | CRPR 1B.1 | Small annual herb. Occurs on depressions in clay or gravelly loam within valley grassland, foothill woodland, and pinyon-juniper woodland. Elevation range 500-2100 m. Flowering period Apr-Jul. | Presumed absent. The study area contains suitable habitat for the species. The nearest observation of this species was recorded in 2001, approximately 2.25 miles the to the east of the study area within Plum Canyon. This species was not observed during the rare plant surveys. |
| Opuntia basilaris var. brachyclada | short-joint beavertail | CRPR 1B.2 | Medium succulent. Occurs on sandy or coarse granitic soil within chaparral, Joshua tree woodland, and oak/pine woodland. Elevation range 1200-1800 m. Flowering period Apr-Jun. | None. The study area is below the elevation range for this species. |

Appendix I (cont.) Rare Plant Species Potential to Occur¹

| Species Name | Common Name | Status ² | Habitat, Ecology, and Life History | Potential to Occur ³ |
|----------------------|-------------------------|---------------------|---|---|
| Orcuttia californica | California Orcutt grass | FE/SE CRPR 1B.1 | Small annual herb. Occurs in or near vernal pools. This species tends to grow in wetter portions of the vernal pool basin but does not show much growth until the basins become somewhat desiccated. Elevation range 0-700 m. Flowering period Apr-Aug. | None. The study area does support vernal pools. |

Source: HELIX (2018)

¹ Sensitive species reported within the Mint Canyon quadrangle on CNDDB and CNPS databases.

Listing is as follows: F = Federal; S = State of California; E = Endangered; T = Threatened.
CRPR = California Rare Plant Rank: 1A - presumed extinct; 1B - rare, threatened, or endangered in California and elsewhere; 2A - rare, threatened, or endangered in California and elsewhere; 3 - more information on distribution, endangerment, ecology, and/or taxonomic validity is needed. Extension codes: .1 - seriously endangered; .2 - moderately endangered; .3 - not very endangered.

Potential to Occur is assessed as follows: **None**: Habitat suitable for species survival does not occur on the study area, the study area is not within geographic range of the species, and/or the study area is not within the elevation range of the species; **Low**: Suitable habitat is present on the study area but of low quality and/or small extent. The species has not been recorded recently on or near the study area. Although the species was not observed during surveys for the current project, the species cannot be excluded with certainty; **Moderate**: Suitable habitat is present on the study area and the species was recorded recently near the study area; however, the habitat is of moderate quality and/or small extent. Although the species was not observed during surveys for the current project, the species cannot be excluded with certainty; **High**: Suitable habitat of sufficient extent is present on the study area and the species has been recorded recently on or near the study area, but was not observed during surveys for the current project. However, focused/protocol surveys are not required or have not been completed; **Presumed Present**: The species was observed during focused surveys for the current project and is assumed to occupy the study area; **Presumed Absent**: Suitable habitat is present on the study area but focused surveys for the species were negative.

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Appendix J

Sensitive Animal Species Potential to Occur

| Species Name | Common Name | Status ² | Habitat, Ecology, and Life History | Potential to Occur ³ |
|---------------------------------------|----------------------------------|---------------------|---|--|
| Invertebrates | | | | |
| Branchinecta lynchi | vernal pool fairy shrimp | FT | Most commonly found in swale, earth slump, or basal-flow depression pools in unplowed grasslands. Requires cool-water pools. | None. The study area does not support vernal pools or other depressional pool habitat. |
| Euphydryas editha quino | Quino checkerspot butterfly | FE | Primary larval host plants in San Diego are dwarf plantain (<i>Plantago erecta</i>) at lower elevations, woolly plantain (<i>P. patagonica</i>) and white snapdragon (<i>Antirrhinum coulterianum</i>) at higher elevations. Owl's clover (<i>Castilleja exserta</i>) is considered a secondary host plant if primary host plants have senesced. Potential habitat includes vegetation communities with areas of lowgrowing and sparse vegetation. These habitats include open stands of sage scrub and chaparral, adjacent open meadows, old foot trails and dirt roads. | None. The study area is located outside of this species' current range. A historical record of this species was documented on CNDDB in 1920, approximately 2.25 miles to the east of the study area within non-specific area in Mint Canyon. The study area does not support this species' primary larval host plant, although a few scattered owl's clover individuals were observed. |
| Fish | | | | |
| Gasterosteus aculeatus williamsoni | unarmored threespine stickleback | FE/SE | Occurs in weedy ponds, backwaters, and among emergent vegetation in small, south coast-flowing streams. | None. The study area does not support suitable perennial water for this species. |
| Amphibians | | | | |
| Spea hammondii western spadefoot SSC | | SSC | Occurs in open coastal sage scrub, chaparral, and grassland, along sandy or gravelly washes, floodplains, alluvial fans, or playas; require temporary pools for breeding and friable soils for burrowing; generally excluded from areas with bullfrogs (Rana catesbiana) or crayfish (Procambarus spp.) | None. The study area does not support suitable temporary pools required for breeding. |

| Species Name | Common Name | Status ² | Habitat, Ecology, and Life History | Potential to Occur ³ | | | |
|-----------------------------------|---------------------------|---------------------|--|---|--|--|--|
| Reptiles | | | | | | | |
| Anniella sp. | California legless lizard | SSC | Occurs in a variety of habitats, such as coastal dunes, sandy washes, and alluvial fans within chaparral, pineoak woodlands, stream terraces with cottonwoods, sycamores or oaks. Prefers areas with leaf litter under trees and bushes with generally moist and loose soil. | Moderate. The study area supports suitable habitat for this species, particularly within and adjacent to Bouquet Canyon Creek. However, the site is relatively free of leaf litter due to presence of giant reed (Arundo donax) along the banks of Bouquet Canyon Creek. The nearest CNDDB occurrence was recorded in 2010, approximately 1.5 miles to the northwest of the study area along Pettinger Canyon Road. | | | |
| Arizona elegans occidentalis | California glossy snake | SSC | Most common in desert habitats but also occur in chaparral, sagebrush, valley-foothill hardwood, pine-juniper, and annual grass. Prefers open sandy areas with scattered brush, but also found in rocky areas. | Low. The study area supports suitable chaparral habitat, although there has not been a CNDDB occurrence record in the area in over 50 years. | | | |
| Aspidoscelis tigris stejnegeri | coastal whiptail | SSC | Open coastal sage scrub, chaparral, and woodlands. Frequently found along the edges of dirt roads traversing its habitats. Important habitat components include open, sunny areas, shrub cover with accumulated leaf litter, and an abundance of insects, spiders, or scorpions. | High. The study area supports suitable sage scrub, chaparral, and woodland habitat for this species. The nearest CNDDB occurrence was recorded in 2008, approximately 1.25 miles to the east of the study area along Hayfork Road. | | | |

| Species Name | Common Name | Status ² | Habitat, Ecology, and Life History | Potential to Occur ³ | | |
|------------------------|-------------------------|---------------------|---|--|--|--|
| Reptiles (cont.) | | | | | | |
| Phrynosoma blainvillii | coast horned lizard | SSC | Coastal sage scrub and open areas in chaparral, oak (Quercus sp.) woodlands, and coniferous forests with sufficient basking sites, adequate scrub cover, and areas of loose soil; require native ants, especially harvester ants (Pogonomyrmex spp.), and are generally excluded from areas invaded by Argentine ants (Linepithema humile). | High. The study area supports suitable sage scrub, chaparral, and oak woodland habitats. The nearest CNDDB occurrence was recorded in 2005, approximately 4.5 miles to the southwest of the study area within the Santa Clara River. | | |
| Thamnophis hammondii | two-striped gartersnake | SSC | Occurs along perennial and intermittent streams bordered by dense riparian vegetation, but occasionally associated with vernal pools or stock ponds. | None. The study area does not support perennial or intermittent streams or other aquatic habitats. | | |
| Birds | | | | | | |
| Athene cunicularia | burrowing owl | SSC | Typical habitat is grasslands, open scrublands, agricultural fields, and other areas where there are ground squirrel burrows or other areas in which to burrow. | Presumed Absent. Although the study area supports suitable habitat and burrows, no burrowing owls were observed during the focused survey. | | |

| Species Name | Common Name | Status ² | Habitat, Ecology, and Life History | Potential to Occur ³ |
|---------------------------------------|---|---------------------|--|---|
| Birds (cont.) | | | | |
| Lanius ludovicianus | loggerhead shrike | SSC | Nests in dense, often thorny shrubs or trees. Will nest within brush piles or tumbleweeds when trees or shrubs are not present. Feeds on a wide variety of animals, including arthropods, amphibians, reptiles, small mammals, and small songbirds within open habitats such as grasslands, agricultural fields, pastures, shrublands, and ruderal areas with adequate perching locations. | High. Some portions of the study area support dense shrubs and trees suitable for nesting. The majority of the site supports suitable foraging habitat. The nearest CNDDB occurrence was recorded in 2005, approximately 1.25 miles to the northeast of the study area. |
| Polioptila californica californica | coastal California gnatcatcher | FT/SSC | Occurs in coastal sage scrub and very open chaparral. | Presumed Absent. The study area supports coastal scrub and chaparral habitat. This species was not observed during focused surveys. |
| Mammals | | | | |
| Corynorhinus townsendii | Townsend's big-eared bat | SCT/SSC | Occurs in a wide variety of habitats, although more common in mesic habitats. Usually roosts in caves, abandoned mines, and occasionally buildings. Forages for small moths along the edge of vegetation, such as riparian and woodland habitats. | Low. The study area does not contain suitable roosting habitat but may be used by foraging individuals. |
| Lepus californicus bennettii | San Diego black-tailed jackrabbit San Diego black-tailed jackrabbit SSC SSC Occurs primarily in open ha including coastal sage scrub chaparral, grasslands, crople open, disturbed areas if the | | Occurs primarily in open habitats including coastal sage scrub, chaparral, grasslands, croplands, and open, disturbed areas if there is at least some shrub cover present. | High. The study area contains suitable habitat for this species. The nearest CNDDB occurrence was recorded in 2015, approximately 5.5 miles to the southeast of the study area. |

| Species Name | Common Name | Status ² | Habitat, Ecology, and Life History | Potential to Occur ³ | |
|------------------------------|-------------------------------|---------------------|---|--|--|
| Mammals (cont.) | | | | | |
| Onychomys torridus ramona | southern grasshopper mouse | SSC | Sandy valley floors within desert scrub habitat with low to moderate shrub cover and friable soils, but also found in coastal scrub and chaparral habitats. | Low. The study area contains suitable habitat for this species. However, the nearest CNDDB occurrence was recorded in 1930, approximately 7 miles to the northeast of the study area within the Angeles National Forest. | |

¹ Sensitive species reported within the Mint Canyon quadrangle on CNDDB.

² Listing is as follows: F = Federal; S = State of California; E = Endangered; T = Threatened; CE = Candidate Endangered; CT = Candidate Threated; FP = Fully Protected; SSC = State Species of Special Concern.

Potential to Occur is assessed as follows. **None**: Species is so limited to a particular habitat that it cannot disperse across unsuitable habitat (*e.g.* aquatic organisms), and habitat suitable for its survival does not occur on the study area; **Not Expected**: Species moves freely and might disperse through or across the study area, but suitable habitat for residence or breeding does not occur on the study area (includes species recorded during surveys but only as transients); **Low**: Suitable habitat is present on the study area but of low quality and/or small extent. The species has not been recorded recently on or near the study area. Although the species was not observed during surveys for the current project, the species cannot be excluded with certainty; **Moderate**: Suitable habitat is present on the study area and the species was recorded recently near the study area; however, the habitat is of moderate quality and/or small extent. Although the species was not observed during surveys for the current project, the species cannot be excluded with certainty; **High**: Suitable habitat of sufficient extent for residence or breeding is present on the study area and the species has been recorded recently on or near the study area, but was not observed during surveys for the current project. However, focused/protocol surveys are not required or have not been completed; **Presumed Present**: The species was observed during biological surveys for the current project and is assumed to occupy the study area; **Presumed Absent**: Suitable habitat is present on the study area but focused/protocol surveys for the species were negative.

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Attachment B

Oak Tree Survey Report Addendum

HELIX Environmental Planning, Inc.

16485 Laguna Canyon Road Suite 150 Irvine, CA 92618 949.234.8770 tel 619.462.0552 fax www.helixepi.com



February 16, 2022

Evan Knapp Integral Communities 888 San Clemente Drive, Suite 100 Newport Beach, CA 92660

Subject: Addendum to the Oak Tree Report for the Bouquet Canyon Project (Tentative Tract No.

82126)

Dear Mr. Knapp:

HELIX Environmental Planning, Inc. (HELIX) completed an oak tree survey report in August 2021 for the proposed Bouquet Canyon Road Project (Project) located in the City of Santa Clarita (City), Los Angeles County, California. This letter report is an addendum to the oak tree survey report to provide updates to the findings of that report based on revised project plans. The revised study area total 89.73 acres (56.91 acres on-site and 32.82 acres off-site). The revised project is shown on Figure 1, *Regional Location*, Figure 2, *USGS Topography*, and Figure 3, *Aerial Photograph*.

REVISED PROJECT AREAS

The Revised Project Areas and changes made to the project since the BTR are summarized below and depicted on Figure 4, *Revised Project Areas*.:

- Off-Site Flood Control Outlet- Additional temporary impacts to the concrete banks of the
 off-site concrete flood control channel required for the revisions related to the alignment of
 the outlet.
- 2. Copper Hill Road Improvements Additional grading/paving for Copper Hill Road.
- 3. <u>Davenport Trailhead</u> The addition of the Davenport parcel (APN 2812-008-008) for the construction of a city-required trailhead.
- 4. <u>Bouquet Canyon Road Improvements North</u> Additional off-site repaving and improvements to existing Bouquet Canyon Road near the northeast corner of the project.

- 5. <u>Flood Control Channel Inlet & Diversion Structure</u> Construction of a slightly larger concrete flow diversion structure intended to convey low flows into the low-flow channel and divert high flows into the proposed concrete-lined flood control channel.
- 6. <u>Sewer Line</u> Installation of a sewer line in the northeast portion of the site.
- 7. <u>Slope Grading</u> Additional slope grading for the new alignment of Bouquet Canyon Road along the southerly border of the study area.
- 8. <u>Bouquet Canyon Road Improvements South</u> Minor additional off-site road repaving and improvements to Bouquet Canyon Road located in the southwesterly portion of the project site.
- 9. Residential Addition Addition of the "donut hole" parcel (APN 2812-008-002) in the easterly portion of the project site. Note that this area was evaluated for impacts to biological resources in the 2019 BTR yet was not evaluated as part of the project in the EIR. Additional residential uses have been proposed in the donut hole area since the EIR was certified. As such, the donut hole parcel has been included in this addendum.
- 10. <u>Residential Reduction</u> Removal of Planning Area 1a, which was previously proposed to be constructed within the southern portion of the study area per the project BTR and EIR. This planning area presented in the Final EIR for the project will not be constructed as part of the revised project.

UPDATED OAK TREE SURVEY

On February 26, 2021, HELIX biologist and ISA-certified arborist Daniel Torres performed a preliminary oak tree survey on Revised Project Area 3 (Davenport Trailhead). On October 19, 2021, Mr. Torres performed an oak tree survey in Revised Project Area 9 (see *Attachment A*, Oak Tree Survey Report). On August 12, 2021, Carlsberg and Associates performed a follow-up oak tree survey on the Davenport Parcel. The Carlsberg report is included as Attachment B, *Davenport Oak Tree Survey Report*. On December 10, 2021, Mr. Torres performed an oak tree survey on Additional Project Areas 1, 2, 4-8, and 10. Of the Revised Project Areas, City-protected oak trees were detected on the Revised Project Area 3 only.

UPDATED RESULTS

A total of 20 new trees subject to an Oak Tree Permit were identified on Revised Project Area 3 (Attachment B). The total number of trees within the revised study area is 84. Of the 20 new trees, one was a blue oak (*Quercus douglasii*), two were interior live oak (*Quercus wislizeni* var. *wislizeni*), and 17 were Tucker oak (*Quercus john-tuckeri*). The locations of all oak trees are depicted on Figure 5, *Oak Tree Locations*).

REVISED PROJECT EFFECTS

The revised project includes avoidance for all oaks within Revised Project Area 3. Tree 27 (Tucker oak) located in the southwestern portion of the study area was avoided in the original project plan. This tree



will be subject to minor encroachment in the revised project plan. The updated oak tree impacts table is included as Attachment C, *Updated Oak Tree Survey Data*. According to the City's Oak Tree Preservation Ordinance, no mitigation is warranted for minor encroachments. With the removal of Planning Area 1a, 69 oaks are now being avoided. A summary of the revised impacts to oak trees is provided in Table 1, *Revised Impacts to Oak Trees*. A map within the location, canopy, and protected zone of the oak trees assessed during this survey is included as Figure 6, *Impacts to Oak Trees*.

Table 1
REVISED IMPACTS TO OAK TREES

| Species Name | Common Name | Removed | Major Encroachment | Minor Encroachment | Avoided |
|-------------------------------------|----------------------|---------|-----------------------|-----------------------|---------|
| Quercus agrifolia | coast live oak | 1 | 0 | 0 | 0 |
| Quercus berberidifolia | scrub oak | 0 | 1 | 1 | 4 |
| Quercus douglasii | blue oak | 1 | 0 | 0 | 2 |
| Quercus john-tuckeri | Tucker oak | 10 | 0 | 1 | 60 |
| Quercus lobata | valley oak | 0 | 0 | 0 | 1 |
| Quercus wislizeni var. wislizeni | interior live oak | 0 | 0 | 0 | 2 |
| | 12 | 1 | 1 | 69 | |

OAK TREE APPRAISED VALUES

Since the oak trees within Revised Project Area 3 will be avoided, no oak tree appraisal is warranted for these trees. Additionally, no appraisal is warranted for minor encroachment to Tree 27. Therefore, the total appraised value of the oak trees (\$80,300) remains the same as presented in the Oak Tree Survey Report (Attachment A). The oak tree appraisals are detailed in Attachment C of Oak Tree Survey Report and summarized in Table 2, Summary of Tree Appraisals, below.

To mitigate for the full value of the appraised oak trees, an Oak Tree Mitigation Plan will be prepared detailing the installation of \$39,600 worth of oak trees. Additionally, blue oak #10 will be transplanted. If the blue oak tree does not survive after a 5-year monitoring period, the full appraised value of the tree (\$40,700) will be paid to the City.



Table 2
SUMMARY OF TREE APPRAISALS

| Tree Number | Species | DBH* | Appraised Value |
|-----------------------|----------------|-------|-----------------|
| 1 | Tucker oak | 1.9 | \$2,300 |
| 2 | Tucker oak | 2.4 | \$2,500 |
| 3 | coast live oak | 4.1 | \$3,100 |
| 4 | Tucker oak | 4.8* | \$3,700 |
| 5 | Tucker oak | 6.0* | \$5,200 |
| 6 | Tucker oak | 6.5* | \$3,700 |
| 7 | Tucker oak | 11.3* | \$7,000 |
| 8 | Tucker oak | 3.6* | \$2,100 |
| 9 | Tucker oak | 6.4 | \$3,100 |
| 10 | blue oak | 29.4* | \$40,700 |
| 11 | Tucker oak | 2.9 | \$2,200 |
| 12 | scrub oak | 3.2 | \$2,300 |
| 26 | Tucker oak | 2.1 | \$2,400 |
| TOTAL APPRAISED VALUE | | | \$80,300 |

Source: HELIX (2021)

CONCLUSIONS

The analysis provided above is intended to serve as an addendum to the Oak Tree Survey Report to document revisions to the original proposed project, including nine Revised Project Areas and the removal of Planning Area 1a. The revised study area includes 84 City-protected oak trees. All 20 new oak trees detected within Revised Project Area 3 will be completely avoided. The revised project plan includes minor encroachment to Tree 27. No appraisal or mitigation is warranted for minor encroachment according to the City's Oak Tree Preservation Ordinance. The total appraised value required to mitigate for impacted oak trees is \$80,300. This will occur through the planting of \$39,600 worth of mitigation oak trees on site and the transplantation of blue oak #10. If the blue oak does not survive the 5-year monitoring period following transplantation, the appraised value of the blue oak (\$40,700) will be paid to the City.

If you have any questions regarding the information presented in this letter report, please contact me at (619) 462-1515 or DanielT@helixepi.com.

Sincerely,

Daniel Torres Biologist

ISA-Certified Arborist (WE-12249)



^{*}Indicates a tree with multiple trunks at DBH where the aggregate diameter was calculated

Attachments:

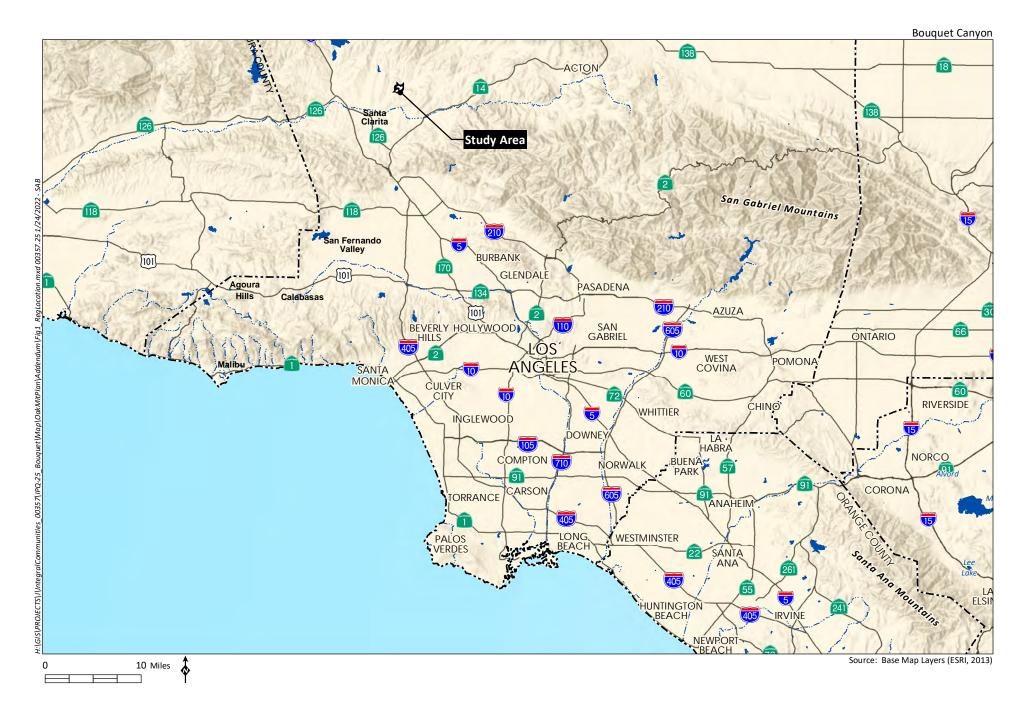
Figure 1: Regional Location Figure 2: USGS Topography Figure 3: Aerial Vicinity

Figure 4: Revised Project Areas Figure 5: Oak Tree Locations Figure 6: Impacts to Oak Trees

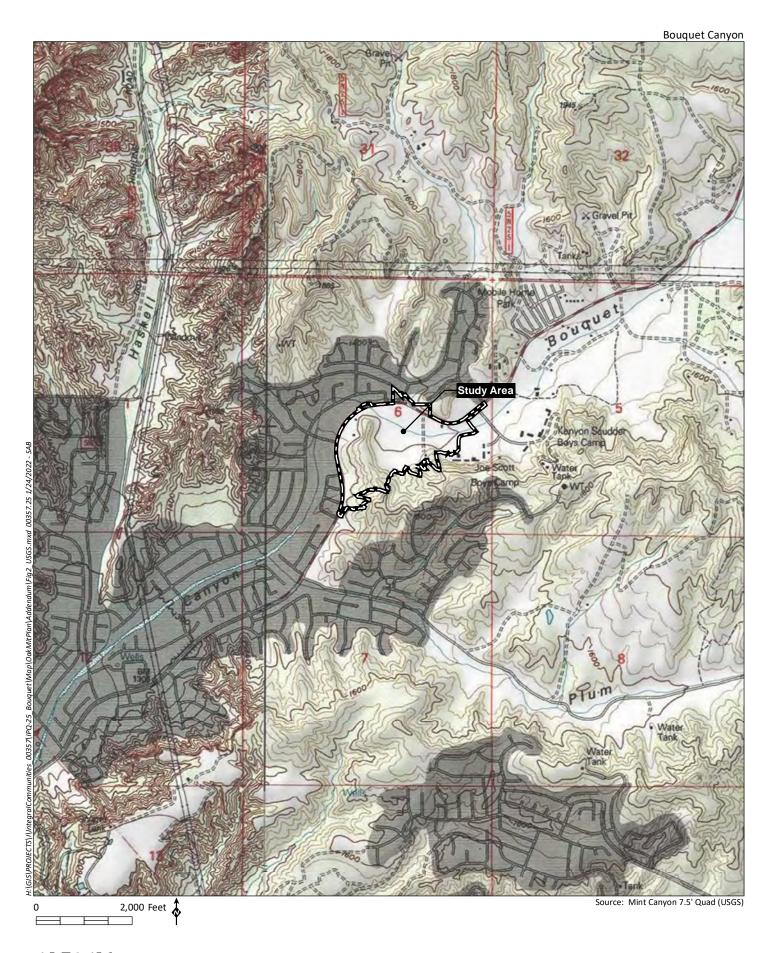
Attachment A: Oak Tree Survey Report

Attachment B: Davenport Oak Tree Survey Report Attachment C: Updated Oak Tree Survey Data







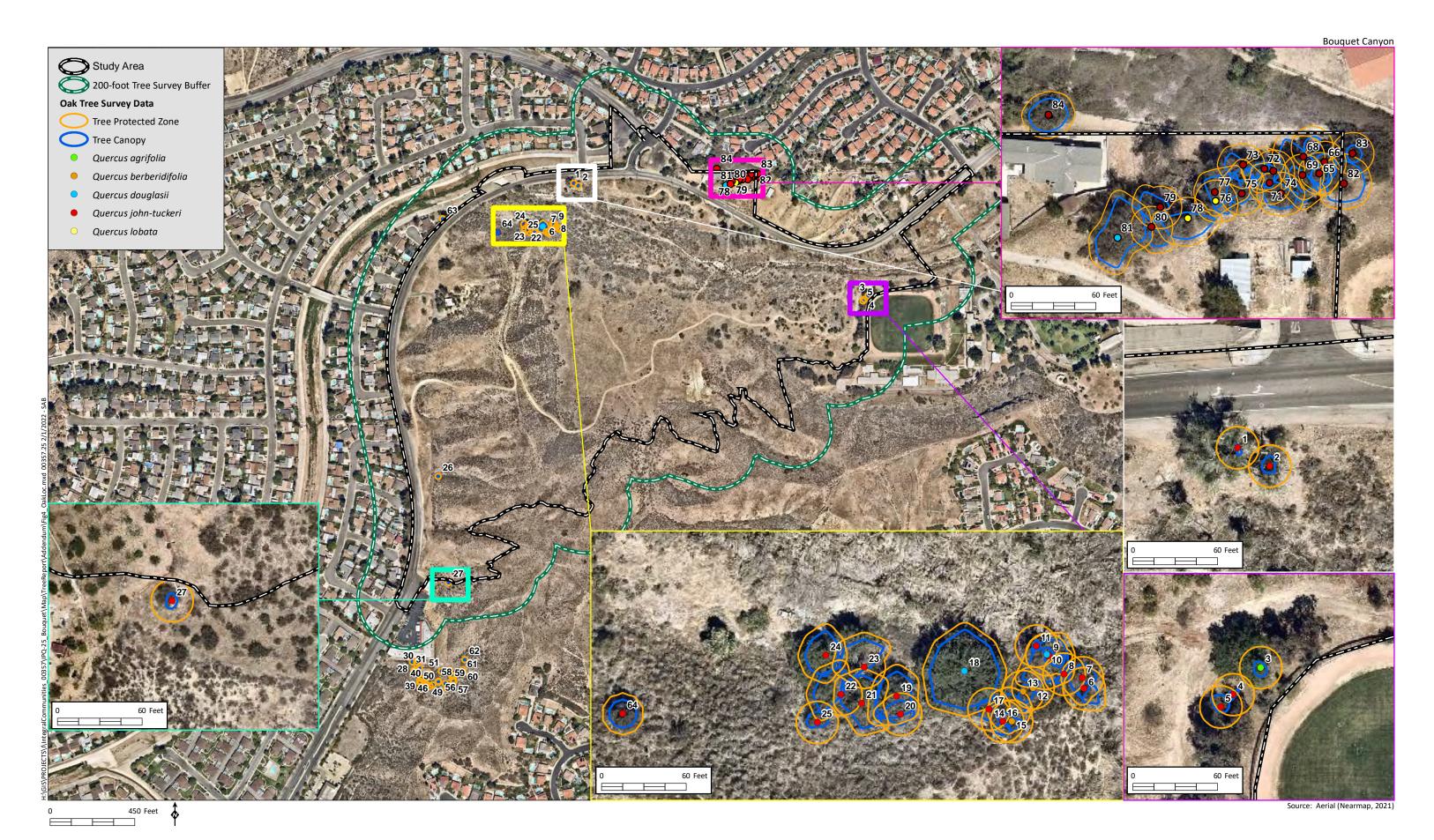




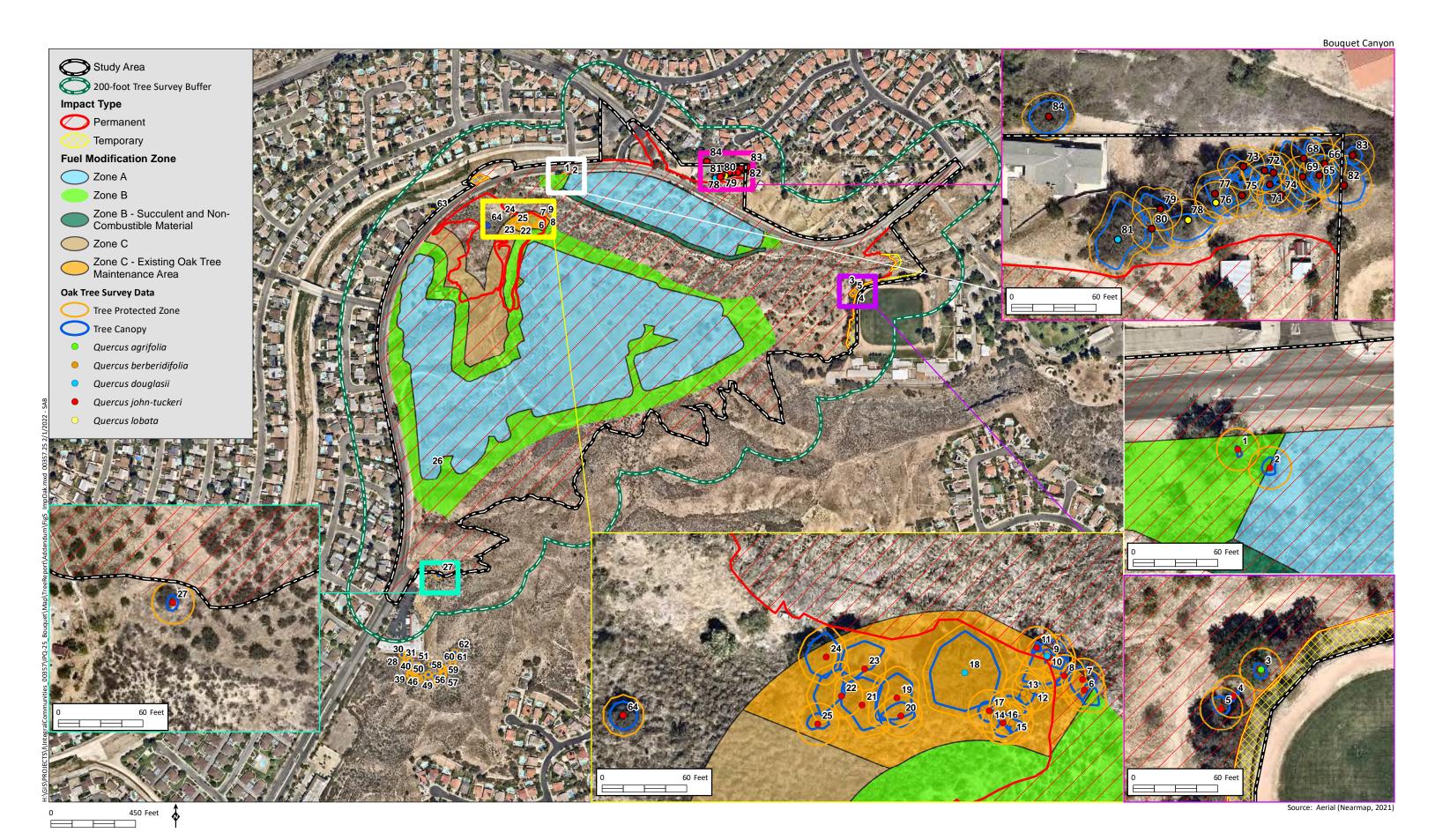




HELIX
Environmental Plannin









Attachment A

Oak Tree Survey Report

HELIX Environmental Planning, Inc. 16485 Laguna Canyon Road, Suite 150

Irvine, CA 91942 949.234.8770 tel 619.462.1515 fax www.helixepi.com



August 16, 2021 IPQ-25

Mr. Peter Vanek Integral Communities 888 San Clemente Drive Newport Beach, CA 92660

Subject: Oak Tree Survey Report for the Bouquet Canyon Road Project

Dear Mr. Covington:

HELIX Environmental Planning, Inc. (HELIX) prepared this report to document the results of an oak tree survey conducted for the proposed Bouquet Canyon Road Project (project) located the City of Santa Clarita (City), Los Angeles County, California. The purpose of this report is to provide an inventory of all species of oak tree (*Quercus* spp.) within 200-feet of the project footprint with at least one trunk over 6 inches in circumference at a point 4.5 feet above natural grade and to determine the presence of Heritage Trees as defined under the City's Oak Tree Preservation Ordinance (17.51.040; ordinance). This report was also prepared to provide supporting information for obtaining an Oak Tree Permit if sought in the future.

STUDY AREA LOCATION

The approximately 94-acre study area is generally located 6.9 miles to the east of Interstate 5 and 3.8 miles to the northwest of California State Route 14 in the City of Santa Clarita (Figure 1, *Regional Location*). Specifically, the study area is located directly south of the intersection of David Way and Bouquet Canyon Road. The study area is within Section 6 of Township 4 North, Range 15 West of the Mint Canyon, USGS 7.5-minute topographic quadrangle (Figure 2, *USGS Topography*).

Immediate surrounding land uses include existing residential developments to the north and west, a mixture of undeveloped land and residential development to the south, and undeveloped land and juvenile detention schools to the east (Figure 3, *Aerial Photograph*). The study area is located approximately 0.20 mile to the southeast of Haskell Canyon Open Space and 1.40 miles to the south of Angeles National Forest.

REGULATORY FRAMEWORK

The City's Oak Tree Preservation ordinance states, "No person shall cut, prune, remove, relocate, endanger, damage, or encroach into the protected zone of any oak tree on any public or private property within the City" (City of Santa Clarita [City] 2013). The protected zone of the oak tree includes

the area within five feet of the dripline (canopy extent), but no less than 15 feet from the trunk. To remove any oak tree or to subject its protected zone to major encroachment, an Oak Tree Permit must be obtained. Trees subject to the permit include all trees of the oak species (*Quercus* sp.) exceeding 6 inches in circumference when measured at a point 4.5 feet above the tree's natural grade. Encroachment is defined as intrusion into the protected zone of an oak tree, which includes but is not limited to, intrusion by trenching, paving, pruning, dumping, parking of commercial vehicles. Major encroachment is defined by the City's ordinance as "an area between the outer edge of the trunk and fifty percent of the diameter of the protected zone" and minor encroachment is defined as an area between the outermost edge of the protected zone and fifty percent of the diameter of the protected zone" (City 2013).

To obtain an Oak Tree Permit, an application must be submitted to the City Manager or designated representative ("Director") and a filing fee as established by the City Council must be paid. The conditions of the Oak Tree Permit may include replacement or relocation of trees, or payment of a fee based on the ISA's "Guide for Plant Appraisal."

Heritage Oak Trees are given special consideration and may be fully protected or subject to requirements stricter than those of a standard protected oak tree. A Heritage Oak Tree is defined as any oak tree measuring 108 inches in circumference when measured 4.5 feet above the tree's natural grade. In the case of trees with multiple trunks, two or more trunks each must measure 72 inches or greater in circumference when measured 4.5 feet above the tree's natural grade.

METHODS

HELIX International Society of Arboriculture (ISA) Certified Arborist Daniel Torres (WE-12249) and HELIX Biologist/Regulatory Specialist Ezekiel Cooley completed an oak tree survey on the study area and within a 200-foot buffer of the study area (survey area) on December 19 and 20, 2018. The purpose of the survey was to document the presence of: (1) oak trees with at least one trunk over 6 inches in circumference at a point 4.5 feet above natural grade and (2) Heritage Oak Trees.

All oak trees within the survey area that satisfied the previously mentioned criteria were identified to species. The circumference at a point 4.5 feet above natural grade was measured. For trees with codominant stems at 4.5 feet above natural grade, the circumference of each stem was measured at this height. Next, the height of each tree was estimated and an aluminum tag with a unique number was affixed to the north side of the tree at approximately three feet above natural grade. Trees located outside of the study area but located within the buffer area were not tagged since Integral Communities does not own this property. Additionally, trees located on the detention school property to the east were not surveyed since permission to access this property was not provided. Finally, the location of each individual tree and the canopy extent were recorded with a global positioning system device with sub-meter accuracy. The collected data are not considered survey-grade accuracy and should not be used for construction purposes.

Physical and horticultural evaluations were performed for each protected tree according to the City's Oak Tree Preservation and Protection Guidelines (City 1990). The physical evaluation included the assessment of structure, terrain, and general appearance. The horticultural evaluation included the detection of any disease or pathogens and an assessment of the tree's overall vigor. The physical and horticultural evaluations were used to rate each tree on a scale ranging from A to F as outlined in the



City's Preservation and Protection Guidelines. The rating system is reproduced below in Table 2, *Oak Tree Rating System*.

Table 2
OAK TREE RATING SYSTEM

| Rating | Description |
|-------------------------|--------------------------------------|
| | A healthy and vigorous tree |
| A. Outstanding | characteristic of its species and |
| A – Outstanding | reasonably free of any visible signs |
| | of stress, disease or pest |
| | infestation. |
| D. Al A | A healthy and vigorous tree with |
| B – Above Average | minor visible signs of stress, |
| | disease or pest infestation. |
| | Although healthy in overall |
| C – Average | appearance there is an abnormal |
| S | amount of stress or disease and/or |
| | pest infestation. |
| | This tree is characterized by |
| | exhibiting a greater degree of |
| | stress, disease and/or pest |
| | infestation than normal and |
| D – Below Average/Poor | appears to be in a state of rapid |
| D - Below Average/ Foor | decline. The degree of decline may |
| | vary greatly in signs of dieback, |
| | disease and pest infestation and |
| | appears to be in an advanced state |
| | of decline. |
| _ Dood | This tree exhibits no signs of life |
| F – Dead | whatsoever. |

Source: City of Santa Clarita (1990)

Following the oak tree survey, an impact assessment was conducted using the most recent project grading plans. The impact assessment was used to determine the number of oak trees that would be required to be removed or whose protected zone would be subject to major encroachment to complete project activities.

RESULTS

A total of 64 oak trees subject to an Oak Tree Permit were located within the survey area (Figure 4, *Oak Tree Locations*). Of these trees, one was coast live oak (*Quercus agrifolia*), six were scrub oak (*Quercus berberidifolia*), two were blue oak (*Quercus douglasii*), 54 were Tucker oak (*Quercus john-tuckeri*), and one was a valley oak (*Quercus lobata*). Six trees (approximately 9 percent) were assigned a rating of A – Outstanding, 22 trees (approximately 34 percent) were B – Above Average, 25 trees (approximately 40 percent) were C – Average, and 11 trees (approximately 17 percent) were D – Below Average. No dead trees were observed during the survey. Overall, there was very little disease noted on the oak trees within the survey area. The majority of trees (37 trees, approximately 58 percent) showed evidence of



stress-related growth such as epicormic sprouting and suckers. No Heritage Oak Trees were found during the survey. The locations of all oak tree surveyed are shown in Figure 4. The data collected during the survey is included as Attachment A, *Oak Tree Survey Data*. Representative site and tree photographs are included as Attachment B, *Representative Photographs*.

IMPACT ASSESSMENT

All oak trees within the project footprint will be removed. In addition, the project will be required to implement fuel modification. The County Fire Department requires fuel modification zones to create a defensible space in the event a wildlife breaks out (County of Los Angeles N.D.). There are five different zones, which are outlined below:

Zone A (Setback Zone) – This zone extends 30 feet beyond the edge of any structures. The only allowed vegetation within this zone is green lawns, ground cover not exceeding six inches in height, and well-spaced shrubs. The landscape must be irrigated to promote healthy vegetation and fire resistance.

Zone B (Irrigated Zone) – This zone extends from the outermost edge of Zone A to 100 feet from structures. Green lawn, ground cover not exceeding six inches in height, and well-spaced shrubs and trees are allowed in this zone. The landscape must be irrigated to promote healthy vegetation and fire resistance.

Zone B (Succulent and Non-Combustible Material) – This zone is in included within Zone B and will be comprised of a minimum of 50% succulent plant material and non-combustible material (including rock, decomposed granite [DG], or concrete), comprising a minimum 25% succulents and 25% non-combustible material.

Zone C (Native Brush Thinning Zone) – This zone extends from the outermost edge of Zone B to 200 feet from the structures. Well-spaced native vegetation and ornamental shrubs and trees are allowed. Vegetation must be thinned and species that constitute a fire risk are not allowed (e.g., chamise [Adenostoma fasciculatum], sages [Salvia spp.], California sagebrush, and California buckwheat). This zone does not require irrigation.

Zone C (Existing Oak Tree Maintenance Area) – This zone is included within Zone C and shall comply with the following requirements: (1) any plant material and tree litter under the oak canopies shall be cleared twice yearly, once by May 15th and August 15th of each calendar year; (2) in lieu of plant material where topography allows, DG may be placed, but is not required to be placed, within the drip line area of the oak trees beginning approximately 3-feet from the trunk of the tree with an approximately thickness of 2-inches, DG shall not be compacted, rather shall be loosely placed; and (3) use of soil sterilizers shall be prohibited under and around existing oak trees, use of pre-emergent weed killer shall be prohibited within 100 feet of any individual oak tree or within a natural drainage that seasonally irrigates oak trees.

According to County Fire Department guidelines, all vegetation within Zone A must be irrigated, and the only vegetation allowed is green lawns, ground cover not exceeding six inches in height, and well-spaced shrubs. It was determined that requirements of Zone A are incompatible with the retainment of native oak trees. For the purpose of this assessment, oak trees located within Fuel Modification Zone A were



considered removed, while oak trees located within Zones B and C were considered retained. In order to retain oaks within Zones A, authorization from the County Fire Department would be required. No tree pruning will be performed in any of the zones. The fuel modification zone plans were prepared by FireSafe Planning Solutions and were submitted to the County Fire Department on July 20, 2021.

Based on analyzing each surveyed oak's location in respect to the project grading plans and fuel modification zones, the project would require the removal of 12 oak trees, including one coast live oak (*Quercus agrifolia*, Tree 3), one blue oak (*Quercus douglasii*, Tree 10), and 10 Tucker oaks (*Quercus johntuckeri*, Trees 1,2, 4-9, 11, and 26). Finally, one scrub oak (Tree 12) would be subjected to major encroachment.

One scrub oak (Tree 13) would be subjected to minor encroachment. Additionally, a retaining wall will be built outside of the protected zone of one blue oak (Tree 18), therefore this tree will be avoided. A total of 50 oak trees would be completely avoided by the project (Table 3, *Impacts to Oak Trees*). A map with the location, canopy, and protected zone of the oak trees assessed during this survey is included as Figure 5, *Impacts to Oak Trees*.

Common Minor Major Removed Avoided **Species Name** Name **Encroachment Encroachment** Quercus agrifolia coast live oak 1 0 0 0 0 Quercus berberidifolia scrub oak 1 1 4 Quercus douglasii 1 0 0 blue oak 1 0 44 Quercus john-tuckeri Tucker oak 10 0 valley oak Quercus lobata 0 0 0 1 **TOTAL** 12 1 1 50

Table 3
IMPACTS TO OAK TREES

MITIGATION

Based on the impacts to oak trees as quantified by the impact assessment, 12 oak trees will be removed, and one will be subjected to major encroachment. In order to receive an Oak Tree Removal Permit for these impacts, the City may determine whether the project proponent shall replace or relocate, pay a fee, or donate boxed trees to the City of an equivalent value to all oak trees removed or subject to major encroachment. In order to determine the value of impacted trees, the appraised value of each tree subject to impacts was calculated using the 10th Edition of the Guide for Plant Appraisal (CTLA 2019). The total appraised value of trees subject to removal or major encroachment is \$80,300 (Attachment C). Trees that will be completely avoided or subject to minor encroachment will not require mitigation.

CONCLUSION

Sixty-four (64) oak trees on the survey area were considered City-protected trees. Construction of the project will require 12 of these trees to be removed and one to be subjected to major encroachment. It is anticipated that the City will require mitigation for the value of these trees, which totals \$80,300. Fifty



(50) of these trees will be completely avoided or subjected to minor encroachment during project activities and therefore will not require mitigation.

During construction, trees subject to minor or major encroachment will require protection measures, including but not limited to those outlined within Section VII. Standards for Performance of Permitted Work of the Oak Tree Preservation Guidelines. Other general guidelines to protect trees during for project construction are included as Attachment D, *Tree Protection Recommendations*.

Should you have any questions or require additional information, please do not hesitate to contact me at (949) 234-1515 or DanielT@helixepi.com.

Sincerely,

Daniel Torres

ISA Certified Arborist (WE-12249A)

Enclosures:

Figure 1: Regional Location
Figure 2: USGS Topography
Figure 3: Aerial Vicinity
Figure 4: Oak Tree Locations
Figure 5: Impacts to Oak Trees

Attachment A: Oak Tree Survey Data Attachment B: Representative Photos

Attachment C Oak Tree Appraisal Addendum
Attachment D: Tree Protection Recommendations

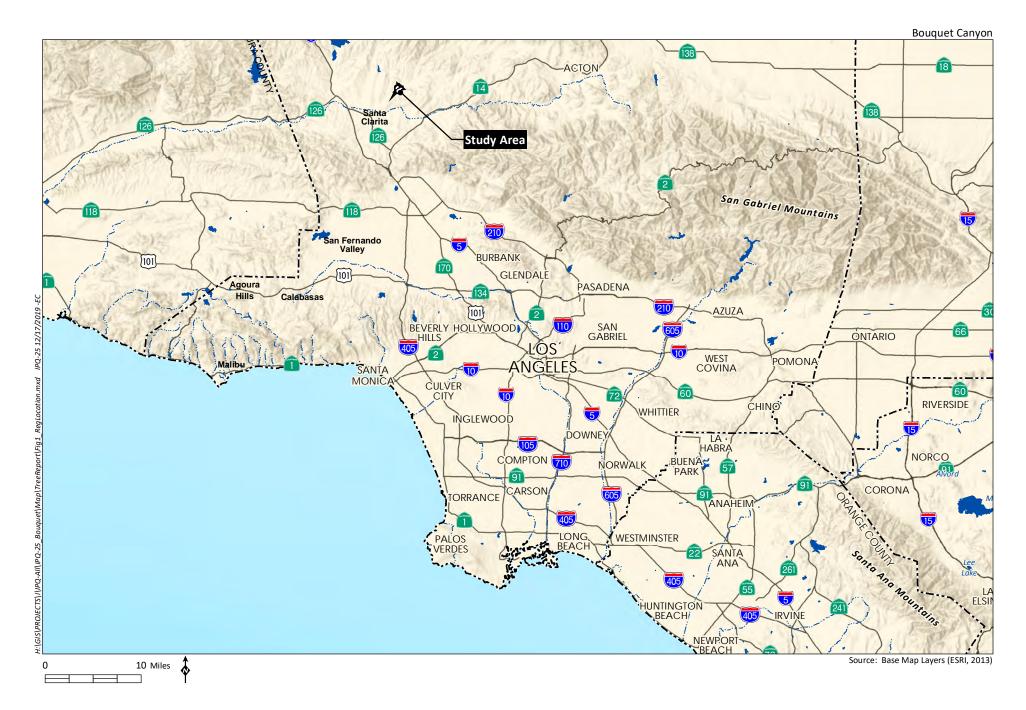


REFERENCES

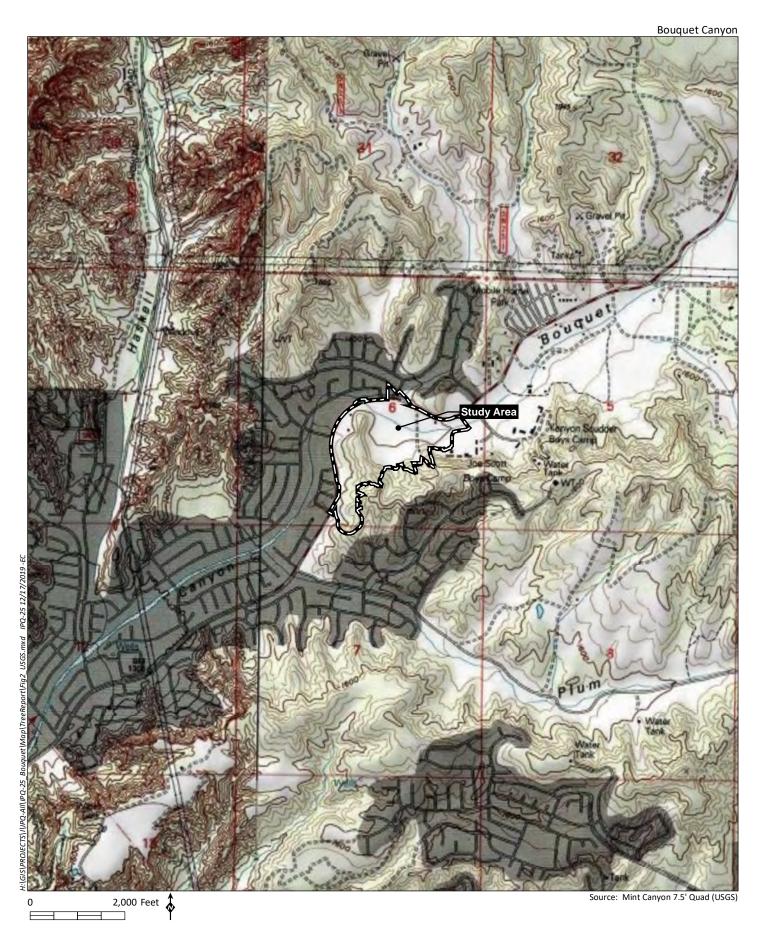
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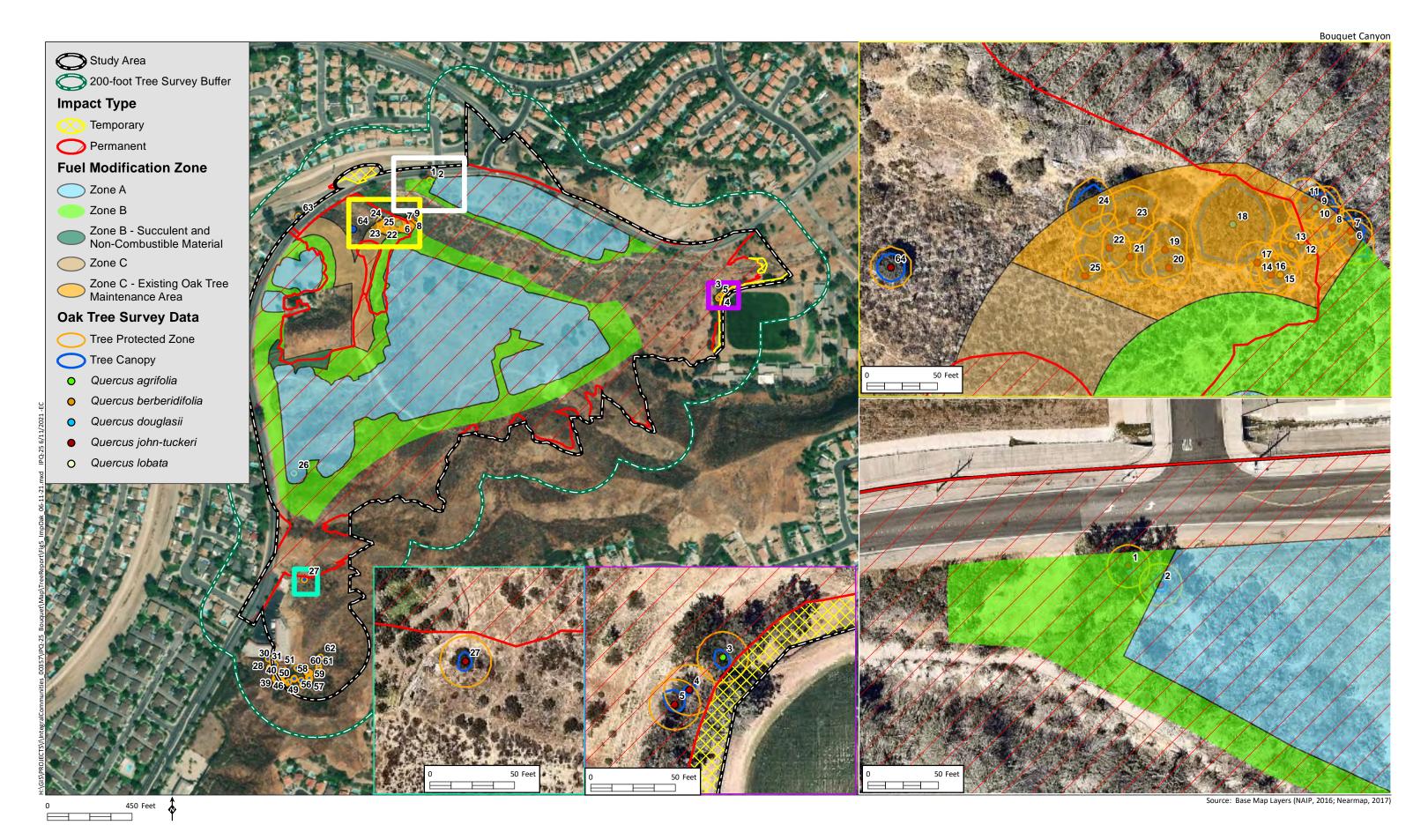




500 Feet 💠



0 375 Feet





Attachment A

| Tree | | Circum- | Height | | | Can | ору | Exten | t (feet | t) | | Physical | Horticultural | Oak | | Proposed |
|------------|-------------------------------------|-------------------|--------|----|----|-----|-----|-------|---------|----|----|---|--|----------------|-------------------|----------|
| Tag No. | Species | ference (in) | (ft) | N | NE | E | SE | S | sw | W | NW | Evaluation | Evaluation | Tree Rating | Comments | Impacts |
| 1 | Tucker oak Quercus john-tuckeri | 6 | 10 | 3 | 1 | 1 | 5 | 6 | 1 | 1 | 3 | Deep v-crotch at 7", canopy is N-S oriented, does not extend E- W. | Appears vigorous, some small galls present, some old, healed trunk injuries. | В | | Removal |
| 2 | Tucker oak Quercus john-tuckeri | 7.5 | 9 | 8 | 6 | 3 | 6 | 5 | 6 | 6 | 6 | Trunk leaning northeast, canopy overall well-distributed. | Galls, insect damage. | В | | Removal |
| 3 | coast live oak Quercus agrifolia | 12.75 | 16 | 4 | 3 | 4 | 6 | 7 | 6 | 5 | 6 | Tree leaning south. | Has stress- related suckers, sapsucker holes. | В | No tag; off-site. | Removal |
| 4 | Tucker oak Quercus john-tuckeri | 10, 9, 7 | 9 | 2 | 6 | 3 | 1 | 4 | 3 | 4 | 3 | Tree has been topped. | All epicormic growth, tree in severe decline. | D | No tag; off-site. | Removal |
| 5 | Tucker oak Quercus john-tuckeri | 11.75, 12, 8.5 | 15 | 9 | 8 | 6 | 5 | 4 | 4 | 5 | 10 | Tree leaning north, away from adjacent eucalyptus. | Some galls present, bark damage present (chainsaw cut)-healing. | В | No tag; off-site. | Removal |
| 6 | Tucker oak Quercus john-tuckeri | 9, 13, 13 | 16 | 4 | 6 | 9 | 15 | 10 | 5 | 5 | 2 | Large failure at v-crotch with decay (old main stem), exposed roots. | Declining, significant amount of epicormic sprouting. | D | | Removal |
| 7 | Tucker oak Quercus john-tuckeri | 18, 19, 24 | 22 | 10 | 10 | 10 | 8 | 15 | 10 | 10 | 9 | Exposed roots, wide angle crotch at base. | Declining, epicormic sprouting, canopy dieback. | D | | Removal |



| Tree | | Circum- | Height | | | Can | ору І | Exten | t (feet | t) | | Physical | Horticultural | Oak | | Proposed |
|------------|--|-----------------|--------|----|----|-----|-------|-------|---------|----|----|---|--|----------------|----------------------------------|-----------------------|
| Tag No. | Species | ference (in) | (ft) | N | NE | E | SE | S | sw | w | NW | Evaluation | Evaluation | Tree Rating | Comments | Impacts |
| 8 | Tucker oak Quercus john-tuckeri | 9.75, 6 | 5 | 2 | 8 | 2 | 2 | 5 | 10 | 2 | 4 | Severe lean to south, on steep slope. | Tree is being shaded, very sparse canopy, canopy dieback. | D | Stump shoots from old dead tree. | Removal |
| 9 | Tucker oak Quercus john-tuckeri | 20 | 15 | 6 | 3 | 12 | 12 | 5 | 5 | 2 | 7 | Exposed roots, on steep slope. | Large split with internal decay in trunk, internal decay throughout. | D | | Removal |
| 10 | blue oak Quercus douglasii | 85, 36 | 45 | 10 | 15 | 15 | 20 | 20 | 25 | 10 | 10 | Main trunk split long ago, large trunk leaning north, southern-most trunk with severe lean south, on steep slope. | Lots of mistletoe, canopy very sparse. | D | | Removal |
| 11 | Tucker oak Quercus john-tuckeri | 9 | 16 | 5 | 3 | 3 | 4 | 2 | 6 | 2 | 2 | On steep slope. | Most of canopy is dead, mistletoe present, epicormic sprouting. | D | Tree is almost completely dead. | Removal |
| 12 | scrub oak Quercus berberidifolia | 10 | 15 | 2 | 8 | 8 | 8 | 2 | 2 | 2 | 2 | Trunk leaning to north, multi-stem, one stem is dead, on steep slope. | Epicormic growth, very sparse canopy. | D | | Major Encroachment |



| Tree | | Circum- | Height | | | Can | ору | Exten | t (feet | t) | | Physical | Horticultural | Oak | | Proposed |
|------------|--|-----------------------------|--------|----|----|-----|-----|-------|---------|----|----|--|---|----------------|----------|-----------------------|
| Tag No. | Species | ference (in) | (ft) | N | NE | E | SE | S | sw | w | NW | Evaluation | Evaluation | Tree Rating | Comments | Impacts |
| 13 | scrub oak Quercus berberidifolia | 12, 9.5, 10, 10 | 15 | 5 | 6 | 8 | 8 | 9 | 5 | 2 | 2 | One dead stem, on steep slope. | Epicormic sprouting, severe decline, some galls present. | D | | Minor Encroachment |
| 14 | scrub oak Quercus berberidifolia | 22.5. 22, 17, 10, 7.5 | 20 | 12 | 12 | 12 | 5 | 12 | 10 | 10 | 12 | Some stems have internal decay, on steep slope. | Epicormic sprouting, mistletoe present, tree in decline. | D | | Avoided |
| 15 | scrub oak Quercus berberidifolia | 7.5. 7.5, 8, 5.5 | 14 | 5 | 3 | 8 | 6 | 8 | 5 | 5 | 9 | Good balance, on steep slope. | Some mistletoe present, significant amount of epicormic sprouting, some canopy dieback. | С | | Avoided |
| 16 | Tucker oak Quercus john-tuckeri | 9.5 | 10 | 1 | 1 | 1 | 10 | 10 | 10 | 2 | 1 | Most of canopy is in the south, shaded in the north, on steep slope. | Some dieback present, significant amount of epicormic sprouting. | С | | Avoided |
| 17 | Tucker oak Quercus john-tuckeri | 5.5, 6.5, 7, 9 | 12 | 7 | 3 | 3 | 4 | 8 | 8 | 8 | 8 | Some included bark at v-crotch about 5" above ground, tree on steep slope. | Small amounts of dieback and epicormic sprouting present. | В | | Avoided |



| Tree | | Circum- | Height | | | Can | пору | Exten | t (feet | t) | | Physical | Horticultural | Oak | | Proposed |
|------------|------------------------------------|--------------------------------|--------|----|----|-----|------|-------|---------|----|----|---|--|----------------|--|----------|
| Tag No. | Species | ference (in) | (ft) | N | NE | E | SE | S | sw | W | NW | Evaluation | Evaluation | Tree Rating | Comments | Impacts |
| 18 | blue oak Quercus douglasii | 40.5, 24, 47, 52.5, 48 | 35 | 30 | 25 | 25 | 28 | 27 | 30 | 25 | 25 | Large multi- stem tree with big split and decay, all stems leaning towards the south, tree on steep slope. | Tree is experiencing some dieback, epicormic sprouting, sap sucker and borer holes present. | С | Tree tagged 61 in old survey, probably burned. | Avoided |
| 19 | Tucker oak Quercus john-tuckeri | 22, 16.5, 17, 13, 10, 11 | 30 | 18 | 15 | 10 | 15 | 15 | 22 | 15 | 15 | Included bark in all crotches, tree on a steep slope. | Appears vigorous, some cankers, canopy is somewhat sparse. | В | | Avoided |
| 20 | Tucker oak Quercus john-tuckeri | 17.5, 17, 14, 14 | 15 | 10 | 10 | 10 | 7 | 8 | 8 | 15 | 10 | Tree on steep slope, nexus of stems is 1' above ground. | Some canopy dieback present. | В | | Avoided |
| 21 | Tucker oak Quercus john-tuckeri | 21, 25, 20.5, 9 | 20 | 20 | 20 | 10 | 20 | 18 | 10 | 15 | 20 | Multiple trunks all leaning in different directions, tree on a steep slope. | Most of canopy is epicormic sprouting, borer and sapsucker holes are present. | С | | Avoided |
| 22 | Tucker oak Quercus john-tuckeri | 15, 19, 18.5, 19, 20 | 25 | 20 | 3 | 2 | 1 | 1 | 20 | 20 | 20 | Tree is on a steep slope, included bark present. | Tree appears healthy but is being shaded, canopy is somewhat sparse, significant dieback is present. | С | | Avoided |



| Tree | | Circum- | Height | | | Can | ору I | Exten | t (feet | t) | | Physical | Horticultural | Oak | | Proposed |
|------------|------------------------------------|---------------------------|--------|----|----|-----|-------|-------|---------|----|----|---|---|----------------|---|----------|
| Tag No. | Species | ference (in) | (ft) | N | NE | E | SE | S | sw | W | NW | Evaluation | Evaluation | Tree Rating | Comments | Impacts |
| 23 | Tucker oak Quercus john-tuckeri | 44.5 | 35 | 20 | 20 | 5 | 1 | 1 | 10 | 18 | 20 | Strong lean to the north. | Significant amount of dieback in the lower canopy. | В | | Avoided |
| 24 | Tucker oak Quercus john-tuckeri | 18, 12.5, 42, 22.5 | 30 | 18 | 12 | 9 | 9 | 15 | 15 | 15 | 15 | V-crotch with included bark at 7", 1.5', and 2' above ground. | Some galls are present. | В | Tree tagged 60 in old survey. | Avoided |
| 25 | Tucker oak Quercus john-tuckeri | 9, 9, 10, 6 | 9 | 8 | 8 | 8 | 5 | 2 | 6 | 8 | 8 | Tree is on a steep slope. | Some epicormic sprouting is present, fairly even canopy. | В | | Avoided |
| 26 | Tucker oak Quercus john-tuckeri | 6.5 | 10 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | Even canopy spread, tree growing in the open. | Some galls are present, canopy is dense and healthy. | А | Shrub form, more than 25 stems, all 1-3 inches in circum-ference. | Removal |
| 27 | Tucker oak Quercus john-tuckeri | 6 | 9 | 6 | 4 | 4 | 4 | 6 | 6 | 4 | 5 | Structurally good, open, even canopy. | Significant amount of epicormic growth, most leaves are affected by aphids. | D | Some mechanical damage on the east side of the trunk. | Avoided |
| 28 | Tucker oak Quercus john-tuckeri | 6.5 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | Tree is on a steep slope. | Some galls are present. | В | No tag; off-site. | Avoided |
| 29 | Tucker oak Quercus john-tuckeri | 10, 6, 6.5, 5.5, 11 | 9 | 10 | 4 | 9 | 7 | 4 | 5 | 6 | 7 | | Dense canopy, tree appears vigorous. | А | No tag; off-site. | Avoided |
| 30 | Tucker oak Quercus john-tuckeri | 9, 11 | 12 | 7 | 5 | 6 | 5 | 5 | 6 | 6 | 6 | | Dense canopy, tree appears vigorous. | А | No tag; off-site. | Avoided |



| Tree | | Circum- | Height | | | Can | ору I | Exten | t (feet | t) | | Dhysical | Horticultural | Oak | | Droposed |
|------------|------------------------------------|-------------------|--------|----|----|-----|-------|-------|---------|----|----|---|--|----------------|-------------------|---------------------|
| Tag No. | Species | ference (in) | (ft) | N | NE | E | SE | S | sw | W | NW | Physical Evaluation | Evaluation | Tree Rating | Comments | Proposed Impacts |
| 31 | Tucker oak Quercus john-tuckeri | 6.5, 8, 6.5 | 8 | 7 | 6 | 4 | 3 | 4 | 4 | 7 | 6 | | Dense canopy, tree appears vigorous. | А | No tag; off-site. | Avoided |
| 32 | Tucker oak Quercus john-tuckeri | 6 | 9 | 7 | 5 | 6 | 5 | 5 | 5 | 6 | 6 | | Dense canopy, tree appears vigorous. | А | No tag; off-site. | Avoided |
| 33 | Tucker oak Quercus john-tuckeri | 12, 9.5, 14.5 | 13 | 14 | 5 | 7 | 1 | 1 | 4 | 12 | 10 | Strong lean downhill. | Tree is vigorous, some minor boring insect damage, significant amount of stress-related sprouting at base. | С | No tag; off-site. | Avoided |
| 34 | Tucker oak Quercus john-tuckeri | 14.5, 11 | 14 | 4 | 5 | 3 | 9 | 7 | 10 | 13 | 3 | Good structure. | Tree appears vigorous, lots of stress-related sprouting at base, epicormic sprouting present. | С | No tag; off-site. | Avoided |
| 35 | Tucker oak Quercus john-tuckeri | 8, 13, 16, 9.5 | 15 | 10 | 10 | 7 | 5 | 3 | 9 | 4 | 7 | Internal decay present in one main trunk. | Significant amount of stress-related sprouting at base. | С | No tag; off-site. | Avoided |
| 36 | Tucker oak Quercus john-tuckeri | 6 | 12 | 5 | 6 | 6 | 4 | 5 | 5 | 5 | 4 | | Significant amount of epicormic sprouting, some galls present. | С | No tag; off-site. | Avoided |



| Tree | | Circum- | Height | | | Can | ору | Exten | t (feet | t) | | Physical | Horticultural | Oak | | Proposed |
|------------|------------------------------------|-----------------|--------|----|----|-----|-----|-------|---------|----|----|--|--|----------------|-------------------|----------|
| Tag No. | Species | ference (in) | (ft) | N | NE | E | SE | S | sw | W | NW | Evaluation | Evaluation | Tree Rating | Comments | Impacts |
| 37 | Tucker oak Quercus john-tuckeri | 8 | 12 | 5 | 5 | 5 | 5 | 4 | 3 | 3 | 5 | | Significant amount of epicormic sprouting, some galls present. | С | No tag; off-site. | Avoided |
| 38 | Tucker oak Quercus john-tuckeri | 9.5, 10, 8.5 | 12 | 12 | 10 | 5 | 10 | 10 | 6 | 5 | 2 | Lean is causing bark to split. | Some internal decay and stress-related sprouting at the base is present. | С | No tag; off-site. | Avoided |
| 39 | Tucker oak Quercus john-tuckeri | 7 | 10 | 4 | 3 | 3 | 3 | 4 | 4 | 5 | 5 | | Stress-related sprouting at the base and epicormic sprouting is present. | С | No tag; off-site. | Avoided |
| 40 | Tucker oak Quercus john-tuckeri | 6, 5 | 12 | 5 | 4 | 7 | 8 | 8 | 6 | 7 | 5 | | Some galls are present, tree is in good health overall. | В | No tag; off-site. | Avoided |
| 41 | Tucker oak Quercus john-tuckeri | 8, 6 | 15 | 7 | 6 | 5 | 3 | 10 | 10 | 3 | 3 | Bark has a healing fissure down the middle of the trunk. | Some epicormic sprouting is present. | В | No tag; off-site. | Avoided |
| 42 | Tucker oak Quercus john-tuckeri | 6.5, 6 | 12 | 8 | 8 | 2 | 2 | 8 | 7 | 7 | 7 | Several branches are rubbing against each other. | Some galls are present. | В | No tag; off-site. | Avoided |
| 43 | Tucker oak Quercus john-tuckeri | 6, 4 | 12 | 5 | 5 | 3 | 4 | 4 | 6 | 7 | 7 | | Some epicormic sprouting is present. | В | No tag; off-site. | Avoided |



| Tree | | Circum- | Height | | | Can | ору І | Exten | t (feet | t) | | Physical | Horticultural | Oak | | Proposed |
|------------|------------------------------------|-----------------------|--------|----|----|-----|-------|-------|---------|----|----|--|--|----------------|-------------------|----------|
| Tag No. | Species | ference (in) | (ft) | N | NE | E | SE | S | sw | W | NW | Evaluation | Evaluation | Tree Rating | Comments | Impacts |
| 44 | Tucker oak Quercus john-tuckeri | 6, 6 | 12 | 7 | 8 | 9 | 5 | 3 | 3 | 7 | 7 | | Some canopy dieback is present. | С | No tag; off-site. | Avoided |
| 45 | Tucker oak Quercus john-tuckeri | 7, 6, 6, 6, 5 | 13 | 8 | 8 | 6 | 6 | 9 | 10 | 9 | 9 | Tree is in shrub form, several widely-spaced branches. | Some epicormic sprouting and galls are present. | В | No tag; off-site. | Avoided |
| 46 | Tucker oak Quercus john-tuckeri | 6, 6, 6, 6, 8, 8.5 | 9 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | Tree is in shrub form, several widely-spaced branches. | Some epicormic sprouting is present, tree exhibiting vigorous growth. | В | No tag; off-site. | Avoided |
| 47 | Tucker oak Quercus john-tuckeri | 6.5, 4 | 9 | 9 | 8 | 7 | 4 | 4 | 5 | 7 | 9 | Tree is leaning downslope causing fissures in some stems. | Main stem has a large fissure with internal decay. | С | No tag; off-site. | Avoided |
| 48 | Tucker oak Quercus john-tuckeri | 6, 5, 5 | 9 | 7 | 9 | 6 | 3 | 3 | 8 | 9 | 8 | Some healing cracks are present at the base of main stems. | Some galls are present, some canopy dieback. | В | No tag; off-site. | Avoided |
| 49 | Tucker oak Quercus john-tuckeri | 10, 6.5, 9.5 | 13 | 11 | 11 | 5 | 5 | 5 | 2 | 5 | 10 | Good structure. | Some dieback and significant amounts of epicormic sprouting are present. | С | No tag; off-site. | Avoided |
| 50 | Tucker oak Quercus john-tuckeri | 9, 7, 6, 6 | 13 | 2 | 8 | 8 | 7 | 7 | 7 | 2 | 2 | Good structure. | Significant amount of epicormic sprouting is present. | С | No tag; off-site. | Avoided |



| Tree | | Circum- | Height | | | Can | ору | Exten | t (feet | t) | | Dhysical | Horticultural | Oak | | Proposed |
|------------|------------------------------------|------------------------------------|--------|----|----|-----|-----|-------|---------|----|----|---|--|----------------|-------------------|----------|
| Tag No. | Species | ference (in) | (ft) | N | NE | E | SE | S | sw | w | NW | Physical Evaluation | Evaluation | Tree Rating | Comments | Impacts |
| 51 | Tucker oak Quercus john-tuckeri | 15, 16, 16, 17 | 18 | 12 | 14 | 15 | 10 | 5 | 9 | 14 | 14 | V-crotches are 1' above ground, some chainsaw wounds are present. | Significant amount of epicormic sprouting is present. | С | No tag; off-site. | Avoided |
| 52 | Tucker oak Quercus john-tuckeri | 16.5, 10, 9.5, 17, 6, 9, 8.5 | 17 | 10 | 9 | 9 | 5 | 3 | 4 | 10 | 11 | Many stems, but good structure. | Significant amount of epicormic sprouting and some canopy dieback are present. | С | | Avoided |
| 53 | Tucker oak Quercus john-tuckeri | 13 | 19 | 5 | 8 | 6 | 3 | 2 | 2 | 5 | 5 | V-crotch at 6" and 4' above ground, tree has a slight lean. | Most of canopy is epicormic sprouting. | С | No tag; off-site. | Avoided |
| 54 | Tucker oak Quercus john-tuckeri | 10, 8, 10 | 17 | 11 | 11 | 5 | 5 | 3 | 3 | 5 | 5 | | Most of canopy is epicormic sprouting, significant canopy dieback is present. | С | No tag; off-site. | Avoided |
| 55 | Tucker oak Quercus john-tuckeri | 12 | 17 | 11 | 9 | 9 | 1 | 1 | 6 | 8 | 9 | Tree is leaning northeast. | Borer holes and internal decay are present. | С | No tag; off-site. | Avoided |
| 56 | Tucker oak Quercus john-tuckeri | 12, 11, 7, 7, 8, 10.5 | 15 | 8 | 8 | 6 | 8 | 9 | 10 | 9 | 7 | | Borer holes, some epicormic sprouting, internal decay, and canopy dieback are present. | С | No tag; off-site. | Avoided |



| Tree | | Circum- | Height | | | Can | ору | Exten | t (feet | t) | | Physical | Horticultural | Oak | | Proposed |
|------------|--|---|--------|----|----|-----|-----|-------|---------|----|----|---|--|----------------|--|----------|
| Tag No. | Species | ference (in) | (ft) | N | NE | E | SE | S | sw | W | NW | Evaluation | Evaluation | Tree Rating | Comments | Impacts |
| 57 | scrub oak Quercus berberidifolia | 9.5, 9.5, 7, 10, 8, 6.5, 6 | 12 | 9 | 10 | 10 | 7 | 5 | 9 | 9 | 9 | Tree is in shrub form, mostly shaded by surrounding trees. | Some galls and epicormic sprouting are present. | В | No tag; off-site. | Avoided |
| 58 | scrub oak Quercus berberidifolia | 7, 6 | 11 | 5 | 1 | 3 | 8 | 8 | 8 | 8 | 3 | Tree is in shrub form. | Canopy is dying back, significant amount of epicormic sprouting is present. | С | No tag; off-site. | Avoided |
| 59 | Tucker oak Quercus john-tuckeri | 8, 8, 8, 8, 8, 12.5 | 11 | 6 | 6 | 8 | 5 | 5 | 5 | 7 | 7 | Tree is in shrub form. | A healing fissure and internal decay are present in one of the main stems. | С | No tag; off-site. | Avoided |
| 60 | Tucker oak Quercus john-tuckeri | 6, 6, 6, 9, 4 | 8 | 6 | 6 | 8 | 5 | 7 | 9 | 9 | 9 | Stems are all widely-spaced, spread out, tree is in shrubby form. | Some canopy dieback is present. | В | No tag; off-site, there is a packrat midden in the middle of the trunks. | Avoided |
| 61 | Tucker oak Quercus john-tuckeri | 6, 6, 4, 5, 8, 6, 4, 4 | 9 | 8 | 6 | 6 | 6 | 6 | 7 | 9 | 8 | Tree is in shrub form, stems are spread out. | Some canopy dieback, epicormic sprouting, and galls are present. | В | | Avoided |
| 62 | Tucker oak Quercus john-tuckeri | 9, 7.5, 5.5, 6.5, 5.5, 8.5, 8, 6.5, 4, 5, 6 | 9 | 11 | 6 | 5 | 6 | 6 | 7 | 8 | 5 | | Cankers, galls, epicormic sprouting, and canopy dieback are present. | С | | Avoided |



| Tree | | Circum- | Height | | | Can | ору | Exten | t (fee | t) | | Physical | Horticultural | Oak | | Proposed |
|------------|------------------------------------|-----------------|--------|----|----|-----|-----|-------|--------|----|----|---|---|----------------|--|----------|
| Tag No. | Species | ference (in) | (ft) | N | NE | E | SE | S | sw | W | NW | Evaluation | Evaluation | Tree Rating | Comments | Impacts |
| 63 | valley oak Quercus lobata | 12, 22 | 20 | 5 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | V-crotch at 1.5' and 5' with included bark, tree is growing straight. | Vigorous growth, healthy specimen, no obvious signs of disease. | А | Circumference and canopy were estimated- tree is on private property. | Avoided |
| 64 | Tucker oak Quercus john-tuckeri | 17, 32.5 | 19 | 10 | 10 | 10 | 10 | 10 | 8 | 8 | 10 | Included bark, exposed roots, tree is growing on a steep slope. | Vigorous growth, some canopy dieback is present. | В | | Avoided |



Attachment B

Representative Photos

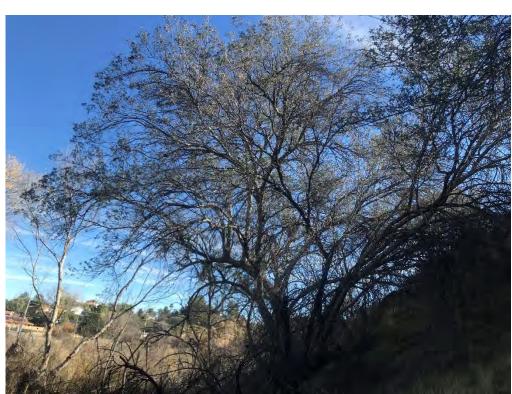


Photo 1: Tree 10 (blue oak, Quercus douglasii) adjacent to the northwestern corner of the study area.



Photo 2: Tucker oak (Quercus john-tuckeri) scrub adjacent to the southwestern corner of the study area.





Photo 3: Tree 51 (Tucker oak, Quercus john-tuckeri) assigned an oak tree rating of C for displaying significant amounts of epicormic growth.



Photo 4: Tree 62 (Tucker oak, Quercus john-tuckeri) assigned an oak tree rating of C for displaying canopy dieback and significant amounts of epicormic growth.



Attachment C

Oak Tree Appraisal Addendum

HELIX Environmental Planning, Inc.

16485 Laguna Canyon Road, Suite 150 Irvine, CA 92618 619.462.1515 tel 619.462.0552 fax www.helixepi.com



July 7, 2021 IPQ-25

Mr. Peter Vanek Integral Communities 888 San Clemente Drive Newport Beach, CA 92660

Subject: Addendum to the Oak Tree Survey Report for the Bouquet Canyon Road Project

Dear Mr. Vanek:

HELIX Environmental Planning, Inc. (HELIX) completed an oak tree survey report for the proposed Bouquet Canyon Road Project (Project) located in the City of Santa Clarita (City), Los Angeles County, California. This letter report is an addendum to the oak tree survey report to provide the appraised value and a photograph of each tree to be removed or subjected to major encroachment by the proposed project. The appraised values and photographs were requested by the City in order to process the Oak Tree Permit, as defined under the City's Oak Tree Preservation Ordinance (17.51.040; ordinance).

METHODS

Photographs

HELIX International Society of Arboriculture (ISA) Certified Arborist Daniel Torres (WE-12249) performed a field visits on June 5, 2020 and October 20, 2020 in order to collect photographs of each oak tree that has been proposed for major encroachment or removal by the proposed project. During the field visits, Mr. Torres located each tree, verified the tree tag number, and collected photographs.

Oak Tree Appraised Values

In order to determine the appraised value of each tree subject to major encroachment or removal, the Trunk Formula Method as described in the 10th Edition of the Council of Tree and Landscape Appraisers (CTLA) Guide for Plant Appraisal was used (CTLA 2019). The Trunk Formula Method is used to extrapolate the costs to purchase the largest commonly available nursey plant to the size of the plant being appraised. Data collected during the oak tree survey was used to assess the condition, functional limitations, and external limitations of each tree. The condition ratings were intuitively designated based on each tree's ratings for health, structure, and form. For trees with multiple trunks at breast height, the aggregate diameter was calculated using the following formula:

Aggregate diameter = $\sqrt{(d1^2 + d2^2 + d3^2 + d4^2)}$

Where d1, d2, etc. are each trunk's diameter at breast height (DBH).

Replacement Tree

As discussed above, the cost of a replacement tree is extrapolated from the largest commonly available nursery stock. On June 12, 2020, several Southern California nurseries were contacted to determine the largest commonly available nursery stock and the cost of this stock., The nurseries contacted included Matilija Nursery in Moorpark, Boething Treeland Farms in Woodland Hills, and Tree of Life Nursey in San Juan Capistrano. The arborist determined that the largest commonly available nursery stock to replace coast live oaks (*Quercus agrifolia*) was a 36"-box sized coast live oak at a cost of \$870 per tree from Boething Treeland Farms. The largest commonly available replacement for scrub oaks (*Quercus berberidifolia*), Tucker oaks (*Quercus john-tuckeri*), and blue oaks (*Quercus douglasii*), was a 15-gallon scrub oak at a cost of \$63 per tree from Tree of Life Nursery.

Based on coordination with the nurseries mentioned it above, the following assumptions about trunk diameter were applied when calculation the cost of as replacement tree: 15-gallon scrub oaks were assumed to have a diameter of 0.75 inch, 24-inch box sized trees were assumed to have a diameter of 2 inches, and 36-inch box sized trees were assumed to have a diameter of 3 inches.

Blue oaks and Tucker oaks were not available at any of the nurseries mentioned above and are not commonly available. Scrub oaks were used as a replacement for Tucker oak, as this species is commonly available and has similar form, functional value, and growth rate.

On October 6, 2020, the City prepared a Draft Conditions of Approval (COA) for the project. According to OT6 of the draft COA, a scrub oak should be used as a replacement for blue oaks because this species closely matches the growth rate of the blue oak.

Additional Costs

Additional costs include the costs to plant and maintain a replacement tree. For the purposes of this appraisal, HELIX has assumed a maintenance and establishment period of one year. Additional costs include labor, installation of irrigation, equipment to plant a replacement tree, tree stakes, and pruning. Through consultation with HELIX Senior Construction Project Manager Peter Tomsovic, it was determined that the cost to plant and maintain a 36" box sized tree is \$2,000. This additional cost was applied to the appraised value of each oak tree to be impacted.

RESULTS AND CONCLUSION

As determined in the oak tree report, the project proposes to subject a total of 12 trees to removal and one tree to major encroachment. This includes one coast live oak (removal), one blue oak (removal), one scrub oak (major encroachment), and ten Tucker oaks (ten removals).

The total appraised value for the trees proposed for impacts is \$80,300. Table 1 below provides a summary of the tree appraisals. Attachment A provides a photograph of each tree and the detailed tree appraisal calculations.



Table 1
SUMMARY OF TREE APPRAISALS

| Tree Number | Species | DBH* | Appraised Value |
|-----------------------|----------------|-------|-----------------|
| 1 | Tucker oak | 1.9 | \$2,300 |
| 2 | Tucker oak | 2.4 | \$2,500 |
| 3 | coast live oak | 4.1 | \$3,100 |
| 4 | Tucker oak | 4.8* | \$3,700 |
| 5 | Tucker oak | 6.0* | \$5,200 |
| 6 | Tucker oak | 6.5* | \$3,700 |
| 7 | Tucker oak | 11.3* | \$7,000 |
| 8 | Tucker oak | 3.6* | \$2,100 |
| 9 | Tucker oak | 6.4 | \$3,100 |
| 10 | blue oak | 29.4* | \$40,700 |
| 11 | Tucker oak | 2.9 | \$2,200 |
| 12 | scrub oak | 3.2 | \$2,300 |
| 26 | Tucker oak | 2.1 | \$2,400 |
| TOTAL APPRAISED VALUE | | | \$80,300 |

Source: HELIX (2021)

Should you have any questions or require additional information, please do not hesitate to contact me at (949) 234-1515 or DanielT@helixepi.com.

Daniel Torres

ISA Certified Arborist (WE-12249A)

Attachments:

Attachment A: Appraised Values and Photographs

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^{*}Indicates a tree with multiple trunks at DBH where the aggregate diameter was calculated

REFERENCES

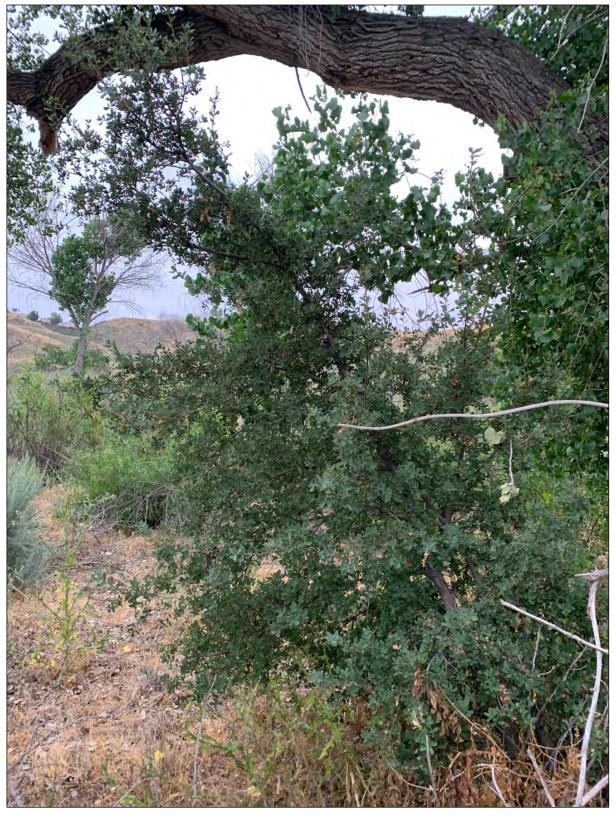
Council of Tree and Landscape Appraisers (CTLA). 2019. *Guide for Plant Appraisal, 10th Edition.*



Attachment A

Tree Appraisals and Photographs

Tree #1 - Tucker oak (Quercus john-tuckeri)





Appraised Values and Photographs

Tree #1 - Tucker oak (Quercus john-tuckeri)

| Subject Tree | Tree #1 |
|--------------|---------|
|--------------|---------|

| Species | Quercus john-tuckeri | | |
|--------------------------------------|---|-----|------|
| Trunk diameter, inches (inches) | | | 1.9 |
| Cross-sectional Area (square inches) | | | 2.8 |
| Condition Rating | | | 70% |
| Health | Health appears normal for this species | 80% | |
| Structure | There is a deep v-crotch at 7" above grade | 55% | |
| Form | The canopy in not symmetric due to shading by adjacent tree | 75% | |
| Functional Limitations | None | | 100% |
| External Limitations | None | | 100% |

Replacement Tree

| Species | Quercus berberidifolia | |
|--------------------------------------|------------------------|----------|
| Size (trunk diameter, inches) | 15-gallon | 0.75 |
| Cross-sectional Area (square inches) | | 0.4 |
| Cost | | \$ 63 |

Calculations

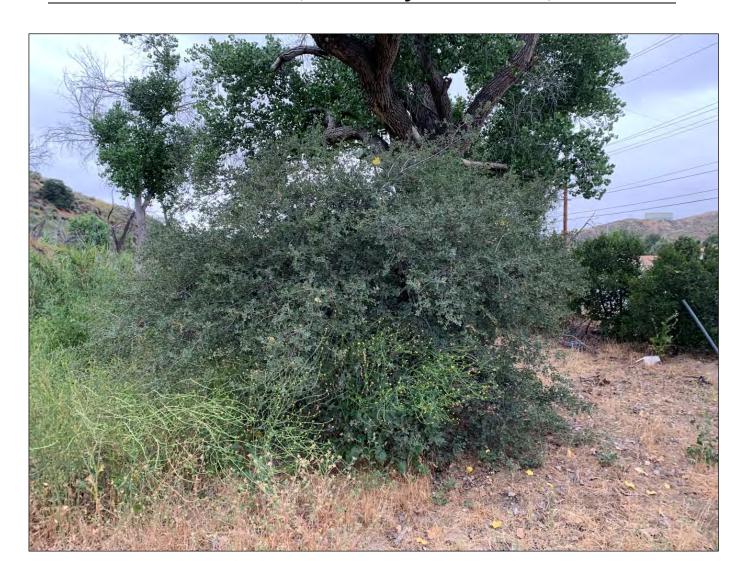
| Unit Tree Cost (\$/sq.in.) | \$ | 142.60 |
|------------------------------------|----|--------|
| Basic Replacement Cost | \$ | 404.32 |
| Depreciated Functional Replacement | | |
| Cost | \$ | 283.02 |

| Installation of Replacement Tree | |
|----------------------------------|-------------|
| Maintenance during establishment | |
| Total Additional Costs | \$ 2,000.00 |

| Total Functional Replacement Cost | \$ 2,283.02 |
|-----------------------------------|-------------|
| Rounded Estimate | \$ 2,300.00 |



Tree #2 - Tucker oak (Quercus john-tuckeri)



Tree #2 - Tucker oak (Quercus john-tuckeri)

| Cubinet Tree | Troc #2 |
|--------------|---------|
| Subject Tree | Tree #2 |

| Species | Quercus john-tuckeri | | |
|----------------------------------|--|-----|------|
| Trunk diameter, inches (inches) | | | 2.4 |
| Cross-sectional Area (square inc | hes) | | 4.5 |
| Condition Rating | | | 75% |
| Health | Health appears normal for this species | 80% | |
| Structure | Structure appears normal for this species | 80% | |
| Form | The tree canopy is fairly symmetric; however, the trunk has a lean | 75% | |
| Functional Limitations | None | | 100% |
| External Limitations | None | | 100% |

Replacement Tree

| Species | Quercus berberidifolia | |
|--------------------------------------|------------------------|----------|
| Size (trunk diameter, inches) | 15-gallon | 0.75 |
| Cross-sectional Area (square inches) | | 0.4 |
| Cost | | \$ 63 |

Calculations

| Unit Tree Cost (\$/sq.in.) | \$ 142.60 |
|------------------------------------|--------------|
| Basic Replacement Cost | \$ 645.12 |
| Depreciated Functional Replacement | |
| Cost | \$ 483.84 |

| Installation of Replacement Tree | |
|----------------------------------|-------------|
| Maintenance during establishment | |
| Total Additional Costs | \$ 2,000.00 |

| Total Functional Replacement Cost | \$ 2,483.84 |
|-----------------------------------|-------------|
| Rounded Estimate | \$ 2,500.00 |



Tree #3 - coast live oak (Quercus agrifolia)





Appraised Values and Photographs

Tree #3 - coast live oak (Quercus agrifolia)

| Cubinet Tree | Tron #2 |
|--------------|---------|
| Subject Tree | Tree #3 |

| Species | Quercus agrifolia | | |
|----------------------------------|---|-----|------|
| Trunk diameter, inches (inches) | | | 4.1 |
| Cross-sectional Area (square ind | ches) | | 13.2 |
| Condition Rating | | | 65% |
| Health | Tree health appears good | 75% | |
| Structure | Structure appears normal for this species | 85% | |
| Form | Canopy is not symmetric due to shading by adjacent tree, trunk is leaning | 65% | |
| Functional Limitations | None | | 100% |
| External Limitations | None | | 100% |

Replacement Tree

| Species | Quercus agrifolia | |
|---------------------------------------|-------------------|-----------|
| Size (trunk diameter, inches, inches) | 36" box | 3 |
| Cross-sectional Area (square inches) | | 7.1 |
| Cost | | \$ 870 |

Calculations

| Unit Tree Cost (\$/sq.in.) | \$ 123.08 |
|------------------------------------|----------------|
| Basic Replacement Cost | \$ 1,624.97 |
| Depreciated Functional Replacement | |
| Cost | \$ 1,056.23 |

| Installation of Replacement Tree | |
|----------------------------------|----------------|
| Maintenance during establishment | |
| Total Additional Costs | \$ 2,000.00 |

| - | Total Functional Replacement Cost | \$ | 3,056.23 |
|---|-----------------------------------|----|----------|
| | Rounded Estimate | 5 | 3.100.00 |



Tree #4 - Tucker oak (Quercus john-tuckeri)





Appraised Values and Photographs

Tree #4 - Tucker oak (Quercus john-tuckeri)

| Codelant Torre | T 44 |
|----------------|---------|
| Subject Tree | Tree #4 |

| Species | Quercus john-tuckeri | | |
|--------------------------------------|--|-----|------|
| Trunk diameter, inches (inches) | 3.2, 2.9, 2.2 | | 4.8 |
| Cross-sectional Area (square inches) | | | 18.1 |
| Condition Rating | | | 65% |
| Health | Tree health appears fair, significant amounts of epicormic sprouting | 70% | |
| Structure | Structure appears normal for this species | 80% | |
| Form | Canopy is not symmetric; tree has been topped | 65% | |
| Functional Limitations | None | | 100% |
| External Limitations | None | | 100% |

Replacement Tree

| Species | Quercus berberidifolia | |
|---------------------------------------|------------------------|----------|
| Size (trunk diameter, inches, inches) | 15-gallon | 0.75 |
| Cross-sectional Area (square inches) | | 0.4 |
| Cost | | \$ 63 |

Calculations

| Unit Tree Cost (\$/sq.in.) | \$ 142.60 |
|------------------------------------|----------------|
| Basic Replacement Cost | \$ 2,580.48 |
| Depreciated Functional Replacement | |
| Cost | \$ 1,677.31 |

| Installation of Replacement Tree | |
|----------------------------------|----------------|
| Maintenance during establishment | |
| Total Additional Costs | \$ 2,000.00 |

| Rounded Estimate | , | 3.700.00 |
|-----------------------------------|--------------|----------|
| Total Functional Replacement Cost | Ś | 3.677.31 |



Tree #5 - Tucker oak (Quercus john-tuckeri)





Appraised Values and Photographs

Tree #5 - Tucker oak (Quercus john-tuckeri)

| Subject Tree | Tree #5 |
|--------------|---------|
| Subject free | 1166 #3 |

| Species | Quercus john-tuckeri | | |
|-------------------------------------|---|-----|------|
| Trunk diameter, inches (inches) | 3.7, 3.8, 2.7 | | 6.0 |
| Cross-sectional Area (square inches |) | | 28.3 |
| Condition Rating | | | 78% |
| Health | Health appears normal for this species | 80% | |
| Structure | Structure appears normal for this species | 80% | |
| Form | The tree canopy is fairly symmetric; however, the trunk has a lean due to shading by adjacent tree, some branches were pruned in the past | 75% | |
| Functional Limitations | None | | 100% |
| External Limitations | None | | 100% |

Replacement Tree

| Species | Quercus berberidifolia | |
|--------------------------------------|------------------------|----------|
| Size (trunk diameter, inches) | 15-gallon | 0.75 |
| Cross-sectional Area (square inches) | | 0.4 |
| Cost | | \$ 63 |

Calculations

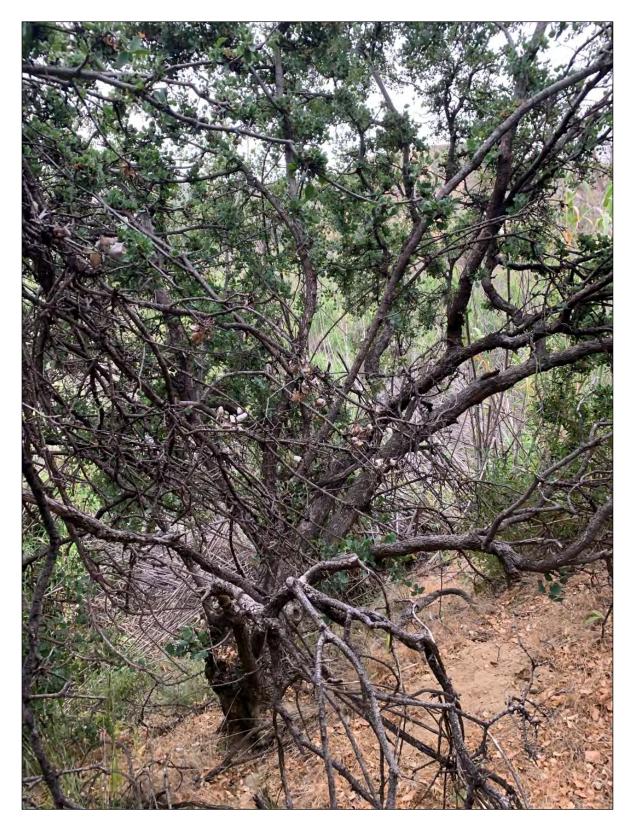
| Unit Tree Cost (\$/sq.in.) | \$ 142.60 |
|------------------------------------|----------------|
| Basic Replacement Cost | \$ 4,032.00 |
| Depreciated Functional Replacement | |
| Cost | \$ 3,158.40 |

| Installation of Replacement Tree | |
|----------------------------------|-------------|
| Maintenance during establishment | |
| Total Additional Costs | \$ 2,000.00 |

| Total Functional Replacement Cost | \$ 5,158.40 |
|-----------------------------------|-------------|
| Rounded Estimate | \$ 5,200.00 |



Tree #6 - Tucker oak (Quercus john-tuckeri)





Appraised Values and Photographs

Tree #6 - Tucker oak (Quercus john-tuckeri)

| Culpinat Tuna | Tuo 0 40 |
|---------------|----------|
| Subject Tree | Tree #6 |

| Species | Quercus john-tuckeri | | |
|-------------------------------------|--|-----|------|
| Trunk diameter, inches (inches) | 2.9, 4.1, 4.1 | | 6.5 |
| Cross-sectional Area (square inches | 5) | | 33.2 |
| Condition Rating | | | 35% |
| Health | Tree is in decline | 35% | |
| Structure | There was a large branch failure at the v-crotch | 35% | |
| Form | Tree canopy is not symmetric due to shading by adjacent tree | 35% | |
| Functional Limitations | None | | 100% |
| External Limitations | None | | 100% |

Replacement Tree

| Species | Quercus berberidifolia | |
|--------------------------------------|------------------------|----------|
| Size (trunk diameter, inches) | 15-gallon | 0.75 |
| Cross-sectional Area (square inches) | | 0.4 |
| Cost | | \$ 63 |

Calculations

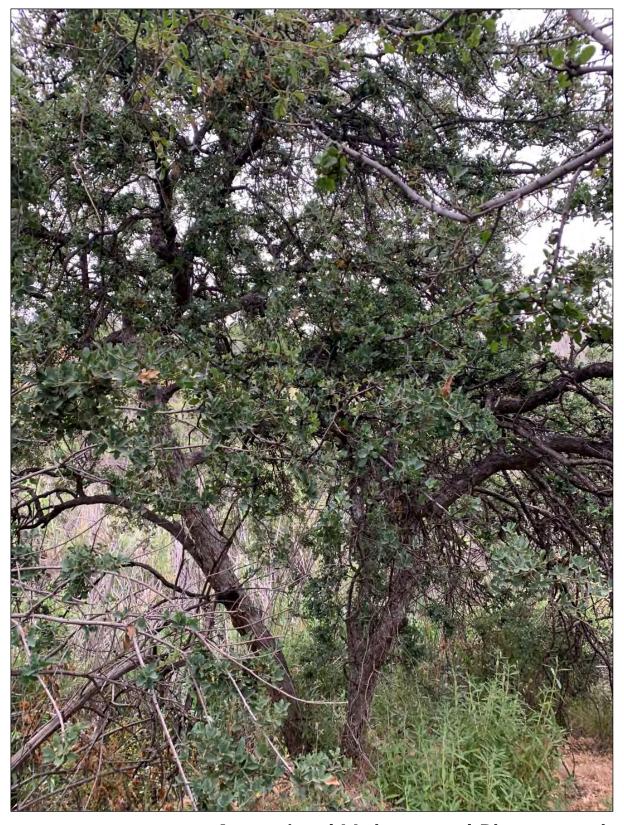
| Unit Tree Cost (\$/sq.in.) | \$ 142.60 |
|------------------------------------|----------------|
| Basic Replacement Cost | \$ 4,732.00 |
| Depreciated Functional Replacement | |
| Cost | \$ 1,656.20 |

| Installation of Replacement Tree | |
|----------------------------------|-------------|
| Maintenance during establishment | |
| Total Additional Costs | \$ 2,000.00 |

| Total Functional Replacement Cost | \$ 3,656.20 |
|-----------------------------------|-------------|
| Rounded Estimate | \$ 3,700.00 |



Tree #7 - Tucker oak (Quercus john-tuckeri)





Appraised Values and Photographs

Tree #7 - Tucker oak (Quercus john-tuckeri)

| Subject Tree | Tree #7 |
|--------------|---------|
| Subject free | 1166 #/ |

| Species | Quercus john-tuckeri | | |
|-------------------------------------|--|-----|-------|
| Trunk diameter, inches (inches) | 5.7, 6.1, 7.6 | | 11.3 |
| Cross-sectional Area (square inches |) | | 100.3 |
| Condition Rating | | | 35% |
| Health | Tree is in decline | 35% | |
| Structure | There was a large branch failure at the v-crotch | 35% | |
| Form | Tree canopy is not symmetric | 35% | |
| Functional Limitations | None | | 100% |
| External Limitations | None | | 100% |

Replacement Tree

| Species | Quercus berberidifolia | |
|--------------------------------------|------------------------|----------|
| Size (trunk diameter, inches) | 15-gallon | 0.75 |
| Cross-sectional Area (square inches) | | 0.4 |
| Cost | | \$ 63 |

Calculations

| Unit Tree Cost (\$/sq.in.) | \$ 142.60 |
|------------------------------------|-----------------|
| Basic Replacement Cost | \$ 14,301.28 |
| Depreciated Functional Replacement | |
| Cost | \$ 5,005.45 |

| Installation of Replacement Tree | |
|----------------------------------|----------------|
| Maintenance during establishment | |
| Total Additional Costs | \$ 2,000.00 |

| Total Functional Replacement Cost | \$ 7,005.45 |
|-----------------------------------|----------------|
| Rounded Estimate | \$ 7,000.00 |



Tree #8 - Tucker oak (Quercus john-tuckeri)





Appraised Values and Photographs

Tree #8 - Tucker oak (Quercus john-tuckeri)

| Culpinat Tuna | Tuo o 40 |
|---------------|----------|
| Subject Tree | Tree #8 |

| Species | Quercus john-tuckeri | | |
|--------------------------------------|---|-----|------|
| Trunk diameter, inches (inches) | 3.1, 1.9 | | 3.6 |
| Cross-sectional Area (square inches) | | | 10.2 |
| Condition Rating | | | 10% |
| Health | Tree is almost dead; canopy is extremely sparse | 10% | |
| Structure | Tree has a severe lean to the south | 20% | |
| Form | Tree has very poor form- strong lean | 20% | |
| Functional Limitations | None | | 100% |
| External Limitations | None | | 100% |

Replacement Tree

| Species | Quercus berberidifolia | |
|--------------------------------------|------------------------|----------|
| Size (trunk diameter, inches) | 15-gallon | 0.75 |
| Cross-sectional Area (square inches) | | 0.4 |
| Cost | | \$ 63 |

Calculations

| Unit Tree Cost (\$/sq.in.) | \$ 142.60 |
|------------------------------------|----------------|
| Basic Replacement Cost | \$ 1,451.52 |
| Depreciated Functional Replacement | |
| Cost | \$ 145.15 |

| Installation of Replacement Tree | |
|----------------------------------|----------------|
| Maintenance during establishment | |
| Total Additional Costs | \$ 2,000.00 |

| Total Functional Replacement Cost | \$ 2,145.15 |
|-----------------------------------|----------------|
| Rounded Estimate | \$ 2,100.00 |



Tree #9 - Tucker oak (Quercus john-tuckeri)



HELIX Environmental Planning

Appraised Values and Photographs

Tree #9 - Tucker oak (Quercus john-tuckeri)

| Subject Tree | Tree #9 |
|--------------|---------|
|--------------|---------|

| Species | Quercus john-tuckeri | | |
|---------------------------------|---|-----|------|
| Trunk diameter, inches (inches) | | | 6.4 |
| Cross-sectional Area (square in | ches) | | 32.2 |
| Condition Rating | | | 25% |
| Health | Tree appears to be in decline, exhibiting internal decay throughout | 20% | |
| Structure | Large split in main trunk | 20% | |
| Form | Form is fair | 45% | |
| Functional Limitations | None | | 100% |
| External Limitations | None | | 100% |

Replacement Tree

| Species | Quercus berberidifolia | | |
|--------------------------------------|------------------------|----|------|
| Size (trunk diameter, inches) | 15-gallon | | 0.75 |
| Cross-sectional Area (square inches) | | | 0.4 |
| Cost | | \$ | 63 |

Calculations

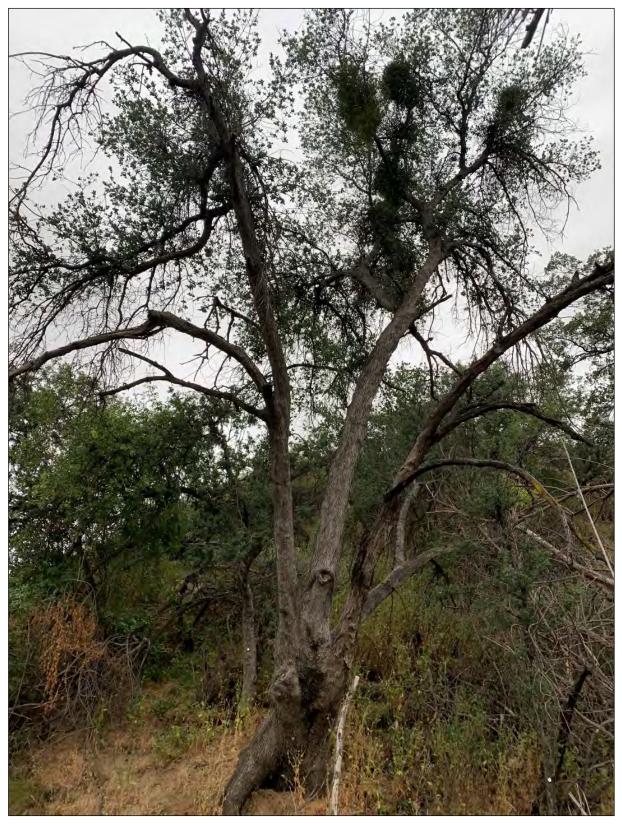
| Unit Tree Cost (\$/sq.in.) | \$ 142.60 |
|------------------------------------|----------------|
| Basic Replacement Cost | \$ 4,587.52 |
| Depreciated Functional Replacement | |
| Cost | \$ 1,146.88 |

| Installation of Replacement Tree | |
|----------------------------------|----------------|
| Maintenance during establishment | |
| Total Additional Costs | \$ 2,000.00 |

| Total Functional Replacement Cost | \$ 3,146.88 |
|-----------------------------------|----------------|
| Rounded Estimate | \$ 3,100.00 |



Tree #10 - blue oak (Quercus douglasii)





Appraised Values and Photographs

Tree #10 - blue oak (Quercus douglasii)

Subject Tree #10

| • | | | |
|--------------------------------------|---|-----|-------|
| Species | Quercus douglasii | | |
| Trunk diameter, inches (inches) | 27.1, 11.5 | | 29.4 |
| Cross-sectional Area (square inches) | | | 678.9 |
| Condition Rating | | | 40% |
| Health | Tree appears to be in decline | 40% | |
| Structure | Main trunk has split, trunks are widely divergent | 60% | |
| Form | Canopy is not symmetric | 60% | |
| Functional Limitations | None | | 100% |
| External Limitations | None | | 100% |

Replacement Tree

| Species | Quercus berberidifolia | |
|---------------------------------------|------------------------|----------|
| Size (trunk diameter, inches, inches) | 15-gallon | 0.75 |
| Cross-sectional Area (square inches) | | .4 |
| Cost | | \$ 63 |

Calculations

| Unit Tree Cost (\$/sq.in.) | \$ 142.60 |
|------------------------------------|-----------------|
| Basic Replacement Cost | \$ 96,808.32 |
| Depreciated Functional Replacement | |
| Cost | \$ 38,723.33 |

| Installation of Replacement Tree | |
|----------------------------------|----------------|
| Maintenance during establishment | |
| Total Additional Costs | \$ 2,000.00 |

| Total Functional Replacement Cost | \$ 40,723.33 |
|-----------------------------------|--------------|
| Rounded Estimate | \$ 40,700.00 |



Tree #11 - Tucker oak (Quercus john-tuckeri)





Appraised Values and Photographs

Tree #11 - Tucker oak (Quercus john-tuckeri)

| Subject Tree | Tree #11 |
|--------------|----------|
|--------------|----------|

| Species | Quercus john-tuckeri | | |
|----------------------------------|---|-----|------|
| Trunk diameter, inches (inches) | | | 2.9 |
| Cross-sectional Area (square inc | hes) | | 6.6 |
| Condition Rating | | | 25% |
| Health | Tree appears to be in decline, canopy is extremely sparse | 20% | |
| Structure | Structure appears normal | 80% | |
| Form | Form is fair | 45% | |
| Functional Limitations | None | | 100% |
| External Limitations | None | | 100% |

Replacement Tree

| Species | Quercus berberidifolia | |
|--------------------------------------|------------------------|----------|
| Size (trunk diameter, inches) | 15-gallon | 0.75 |
| Cross-sectional Area (square inches) | | 0.4 |
| Cost | | \$ 63 |

Calculations

| Unit Tree Cost (\$/sq.in.) | \$ 142.60 |
|------------------------------------|--------------|
| Basic Replacement Cost | \$ 941.92 |
| Depreciated Functional Replacement | |
| Cost | \$ 235.48 |

| Installation of Replacement Tree | |
|----------------------------------|----------------|
| Maintenance during establishment | |
| Total Additional Costs | \$ 2,000.00 |

| Total Functional Replacement Cost | \$ 2,235.48 |
|-----------------------------------|----------------|
| Rounded Estimate | \$ 2,200.00 |



Tree #12 - scrub oak (Quercus berberidifolia)





Appraised Values and Photographs

Tree #12 - scrub oak (Quercus berberidifolia)

| Subject Tree | Tree #12 |
|--------------|----------|
| Judiect Hee | 1166 #12 |

| Species | Quercus berberidifolia | | |
|----------------------------------|---|-----|------|
| Trunk diameter, inches (inches) | | | 3.2 |
| Cross-sectional Area (square inc | hes) | | 8.0 |
| Condition Rating | | | 25% |
| Health | Tree appears to be in decline, canopy is extremely sparse | 20% | |
| Structure | Structure is poor | 35% | |
| Form | Form is poor- not symmetrical and trunk is leaning | 25% | |
| Functional Limitations | None | | 100% |
| External Limitations | None | | 100% |

Replacement Tree

| Species | Quercus berberidifolia | |
|--------------------------------------|------------------------|----------|
| Size (trunk diameter, inches) | 15-gallon | 0.75 |
| Cross-sectional Area (square inches) | | 0.4 |
| Cost | | \$ 63 |

Calculations

| Unit Tree Cost (\$/sq.in.) | \$ 142.60 |
|------------------------------------|----------------|
| Basic Replacement Cost | \$ 1,146.88 |
| Depreciated Functional Replacement | |
| Cost | \$ 286.72 |

| Installation of Replacement Tree | |
|----------------------------------|----------------|
| Maintenance during establishment | |
| Total Additional Costs | \$ 2,000.00 |

| Total Functional Replacement Cost | \$ 2,286.72 |
|-----------------------------------|----------------|
| Rounded Estimate | \$ 2,300.00 |



Tree #26 - Tucker oak (Quercus john-tuckeri)



Tree #26 - Tucker oak (Quercus john-tuckeri)

| Subject Tree | Tree #26 |
|--------------|----------|
|--------------|----------|

| Species | Quercus john-tuckeri | | |
|--------------------------------------|---|-----|------|
| Trunk diameter, inches (inches) | | | 2.1 |
| Cross-sectional Area (square inches) | | | 3.5 |
| Condition Rating | | | 90% |
| Health | Tree health appears good | 90% | |
| Structure | Structure appears normal for this species | 90% | |
| Form | Canopy is symmetric | 90% | |
| Functional Limitations | None | | 100% |
| External Limitations | None | | 100% |

Replacement Tree

| Species | Quercus berberidifolia | |
|--------------------------------------|------------------------|----------|
| Size (trunk diameter, inches) | 15-gallon | 0.75 |
| Cross-sectional Area (square inches) | | 0.4 |
| Cost | | \$ 63 |

Calculations

| Unit Tree Cost (\$/sq.in.) | \$ 142.60 |
|------------------------------------|--------------|
| Basic Replacement Cost | \$ 493.92 |
| Depreciated Functional Replacement | |
| Cost | \$ 444.53 |

| Installation of Replacement Tree | |
|----------------------------------|----------------|
| Maintenance during establishment | |
| Total Additional Costs | \$ 2,000.00 |

| Total Functional Replacement Cost | \$ 2,444.53 |
|-----------------------------------|----------------|
| Rounded Estimate | \$ 2,400.00 |



Attachment D

Tree Protection Recommendations

Attachment D

Tree Protection Recommendations

Oak Tree Survey Report for the Bouquet Canyon Road Project, Santa Clarita County, CA

General Construction Site Recommendations

- A minimum 4-foot tall, brightly colored, synthetic fence should be installed around the
 outermost edge of the protected zone of trees that are designated for retention onsite. Encroachment into the fenced areas should be restricted to the minimum amount
 feasible and fencing should remain in place until all construction activities have ceased
- The fenced area should be kept clear of building materials, waste, and excess soil.
- No digging, trenching, compaction, or other soil disturbance should be allowed in the fenced area.
- The storage of construction equipment or hazardous materials such as gasoline, oil, or other toxic chemicals should not be allowed in or adjacent to the fenced area.
- Storage areas for equipment, soil, and construction materials as well as burn sites (if permitted), cement washout pits, and construction work zones should be kept away from protected trees and outside the fenced in area.
- Cable, chain, rope or signage should not be attached to retained trees.
- Designated roads and parking areas should be established. All construction personnel should be restricted to driving and parking in designated areas. Discharge of exhaust from construction vehicles and equipment should not be allowed near the protected zone of trees.
- Grade changes should be avoided near fenced areas to the maximum extent possible.

Recommendations for Construction Activities in the Vicinity of Retained Trees

- All necessary clearance pruning should be conducted by a Certified Tree Worker or Certified Arborist.
- Trenching within the dripline of retained trees should be avoided to the maximum extent practicable and kept a minimum distance of 10 times the diameter of the tree away from its trunk. If necessary, this trenching should be conducted using hand excavation or compressed air to reduce impacts to tree roots. Machine trenching should not be allowed within the dripline of retained trees. If pipes must be installed closer to the tree than a distance of 10 times the diameter of the tree away from its trunk, they should be bored beneath the tree a minimum of 3 feet below the ground surface to reduce impacts to roots.
- Excavation should also be minimized within the dripline of retained trees. Construction
 within the dripline of retained trees should be conducted in a manner that minimizes
 excavation and provides for the best preservation of roots as determined by the Project
 Arborist.
- If tree roots are severed outside of the fenced area, they should be severed cleanly and kept moist. All exposed roots outside of fenced areas should be covered with protective material during construction such as mulch or plywood sheets to reduce soil



Attachment D

Tree Protection Recommendations

Oak Tree Survey Report for the Bouquet Canyon Road Project, Santa Clarita County, CA

- compaction. Protective material should be removed upon completion of construction activities.
- Trenching and excavation should be avoided during hot, dry, weather and trees shall be watered before, during, and after trenching and excavation within the dripline of retained trees to offset water loss due to cut roots.
- Grading within the driplines of retained trees should be avoided wherever feasible.
- To prevent soil compaction, several inches of wood chips should be spread in the root zone area and covered with steel plates.

Recommendations for Protection of Trees Post-Construction

- Post-construction inspections of the trees should be conducted by a Certified Arborist or Certified Tree Worker to determine if retained trees are stressed (e.g., water stress, nutrient stress) or damaged (e.g., broken branches, trunk damage). Appropriate corrective actions should be implemented as necessary. Such corrective actions may include application of root stimulant to encourage new root growth in trees that have a significant portion of their roots lost due to cutting or soil compaction.
- Aeration of soil by vertical mulching or similar technique should be implemented around retained trees to offset the impacts of soil compaction that has already occurred due to construction activities and other site uses.
- Long term maintenance should also be conducted by a Certified Arborist or tree care specialist to assist the trees with recovering from construction related stress and may include watering, fertilization, pruning, and/or pest/disease control.



"Donut Hole" Parcel Addendum

Memorandum

HELIX Environmental Planning, Inc. 16485 Laguna Canyon Road, Suite 150 Irvine, CA 92618 949.234.8770 tel 619.462.0552 fax www.helixepi.com



Date: October 27, 2021

To: Mr. Peter Vanek

Integral Communities 888 San Clemente Drive Newport Beach, CA 92660

From: Daniel Torres, HELIX Environmental Planning, Inc.

Subject: Oak Tree Survey Addendum, Additional Survey Area

HELIX Project: 00357.00025.001

Message:

The oak tree survey report¹ and tree appraisal addendum² were both dated August 16, 2021. Since submittal of these reports, an additional property along Bouquet Canyon Road was added to the project site (Additional Survey Area; see Figure 5, *Impacts to Oak Trees*). The additional survey area was analyzed as part of the Project's EIR. However, this property was not owned by the project proponent during the time of the oak tree survey, and therefore, an oak tree survey was not performed within this area.

On October 19, 2021, HELIX International Society of Arboriculture (ISA) Certified Arborist Daniel Torres (WE-12249) performed an oak tree survey within the additional survey area. The purpose of the survey was to document the presence of (1) oak trees with at least one trunk over 6 inches in circumference at a point 4.5 feet above natural grade, and (2) Heritage Oak Trees within the additional survey area.

No oak trees, including Heritage trees, were found within the additional survey area.

If you have any questions regarding the information presented in this memorandum, please contact me at DanielT@helixepi.com or at (949) 234-8770.

Enclosures:

Figure 5: Impacts to Oak Trees

¹ HELIX Environmental Planning. 2021. Oak Tree Survey Report for the Bouquet Canyon Road Project. August.

² HELIX Environmental Planning. 2021. Addendum to the Oak Tree Survey Report for the Bouquet Canyon Road Project. August.



Attachment B

Davenport Oak Tree Survey Report



Horticulturists and Registered Consulting

ARBORISTS

August 15, 2021

Peter Vanek Vice President of Forward Planning Integral Communities 888 San Clemente, Suite 100 Newport Beach, California 92660

Re: Oak Tree Health Assessment
Davenport Trailhead Site – 28601 and 28635 Bouquet Canyon Road, Santa Clarita, California

Dear Mr. Vanek,

This letter is presented in response to your request for arboricultural consulting services. You requested a health assessment of 20 oak trees located on and immediately adjacent to 28601 and 28635 Bouquet Canyon Road, Santa Clarita, California. These properties are held by Integral Communities and are the proposed site of the project known as the 'Davenport Trailhead'.

On August 12, 2021, I conducted a site visit to perform a health evaluation of the 20 oak trees identified in the enclosed tree location exhibit (by Helix Environmental Planning) provided to us by you. The trees were assessed for health and structural integrity, and photographs were recorded to support my opinions. No other information was gathered or recorded regarding mapped tree trunk and canopy locations, genera or species identification, impact analysis, etc. I used Helix's exhibit to locate the trees and to fill in the tree number and species listings in the enclosed table.

Table 1 on page 5 summarizes my opinions on the trees' health ratings. Based on the health and structure rating, each tree was assigned an overall grade. In our opinion, both health and structure must be addressed when evaluating the condition of a tree. Definitions for the grading structure are enclosed before the table. Enclosed exhibits and representative photographs illustrate the setting, the oak trees, and their condition at the time of the site visit. Additional photographs are available upon request.

With the exception of one tree, Tree #84, the subject oaks appear to be in fair-to-poor condition. Severe drought stress is evident and most of the trees exhibit sparse foliage, cavities, poor form due to close growing conditions, and two trees were found to have active bee hives.

Please feel free to call or email me with any questions. Thank you.

Very truly yours,

Christy Cuba, Senior Arborist

Registered Consulting Arborist, #504

International Society of Arboriculture (ISA) Certified Arborist, #WE1982A

ISA Tree Risk Qualified

AMERICAN SOCIETY OF SO

Santa Monica Office

828 Fifth Street, Suite 3 Santa Monica, California 90403

Office: 310.451.4804

Sierra Madre Office

80 West Sierra Madre Boulevard, #241 Sierra Madre, California 91024 Office: 626.428.5072



HEALTH AND STRUCTURE GRADE DEFINITIONS

Health and structure ratings are based on an archetypal tree of the same species, determined by a subjective evaluation of physiological health, aesthetic quality, and structural integrity. Overall physiological condition (health) and structural condition are rated A-D and F:

Health

- A) Outstanding Exceptional trees comprising above-average foliage production and vigor for their age class; exhibiting very good to excellent health as evidenced by normal to exceptional shoot growth during the current growing season, good bud development and leaf color, lack of leaf, twig or branch dieback throughout the crown, and the absence of decay, bleeding, or cankers. Common leaf and/or twig pests may be noted at very minor levels.
- B) Above average Good to very good trees that exhibit minor necrotic (dead) or physiological symptoms of stress and/or disease; shoot growth is less than reasonably expected, leaf color is less than optimal in some areas, the crown may be thinning, minor levels of leaf, twig, and branch dieback may be present, and minor areas of decay, bleeding, or cankers may be manifesting. Minor amounts of epicormic growth may be present. Minor amounts of fire damage or mechanical damage may be present. Still healthy, but with moderately diminished vigor and vitality. No significant decline noted.
- C) Average Average, moderately good trees whose growth habit and physiological or fire-induced symptoms indicate an equal chance to either decline or continue with good health into the near future. Most of these trees exhibit moderate to significant small dead material in outer crown areas, decreased shoot growth, and diminished leaf color and mass. Some stem and branch dieback is usually present and epicormic growth may be moderate to extensive. Cavities, pockets of decay, relatively significant fire damage, bark exfoliation, or cracks may be present. Moderate to significant amounts of insect or disease symptoms may be present; the tree may be shaded or crowded in such a way that it is expected to negatively impact the lifespan of the tree. Tree may be in early decline.
- D) Below Average/Poor trees whose growth habit and physiological or fire-induced symptoms indicate significant, irreversible decline. Most of these trees exhibit significant dieback of wood in the crown, possibly accompanied by significant epicormic sprouting. Shoot growth and leaf color and mass is either significantly diminished or nonexistent throughout the crown. Cavities, pockets of decay, significant fire damage, bark exfoliation, and/or cracks may be present. Significant amounts of insect or disease symptoms may be present; the tree may be shaded or crowded in such a way that it has negatively impacted the lifespan of the tree. Tree appears to be in irreversible decline.
- F) **Dead or in spiral of decline** this tree exhibits very little to no signs of life.

Structure

- A) Outstanding Trees with outstanding structure for their species exhibit trunk and branch arrangement and orientation that results in a sturdy form or architecture that can resist failure under normal circumstances. The spacing, orientation, and size of the branches relative to the trunk are quintessential for the species and free from defects. No outward signs of decay or pathological disease is present. Some trees exhibit naturally inherent branching defects, like multiple, narrow points of attachment from one point on the trunk, which would preclude them from achieving an "A" grade.
- B) Above average Trees with good to very good structure for their species. They exhibit trunk and branch arrangement and orientation that result in a relatively sturdy form or architecture that resists failure under normal circumstances, but may have some mechanical damage, over-pruning, or other minor structural defects. The spacing, orientation, and size of the branches relative to the trunk are still in the normal range for the species, but they exhibit a minor degree of defects. Minor, sub-critical levels of decay or pathological disease may be present, but the degree of damage is not yet structurally significant. Trees that exhibit naturally inherent branching defects, like multiple, narrow points of attachment from one point on the trunk, would generally fall in to this category. A small percentage of the canopy may be shaded or crowded, but not in such a way that it is expected to negatively impact the structural integrity or lifespan of the tree.





- C) Average Trees with moderately good structure for their species, but with obvious defects. They exhibit trunk and branch arrangement and orientation that result in a less than sturdy form or architecture, which reduces their resistance to failure under normal circumstances. Moderate levels of mechanical damage, over-pruning, or other structural defects may be present. The spacing, orientation, and size of some of the branches relative to the trunk are not in the normal range for the species. Moderate to significant levels of decay or pathological disease may be present that increase the likelihood of structural instability. Influences such as an excessive trunk lean, slope erosion, root pruning, or other growth-inhibiting factors may be present. A moderate to significant percentage of the canopy may be shaded or crowded in such a way that it is expected to negatively impact the structural integrity or lifespan of the tree. Risk of full or partial failure in the near future appears to be moderately elevated.
- D) Well Below Average/Poor Trees with poor structure for their species and with obvious defects. They exhibit trunk and branch arrangement and orientation that result in a significantly less than sturdy form or architecture, significantly reducing their resistance to failure under normal circumstances. Significant levels of mechanical damage, over-pruning, or other structural defects may be present. The spacing, orientation, and size of many of the branches relative to the trunk are not in the normal range for the species. Significant levels of decay or pathological disease may be present that increase the likelihood of structural instability. Influences such as an excessive trunk lean, slope erosion, root pruning, or other growth-inhibiting factors may be present. A significant percentage of the canopy may be shaded or crowded in such a way that it is expected to negatively impact the structural integrity or lifespan of the tree. Risk of full or partial failure in the near future appears to be advanced.
- F) Severely Compromised trees with very poor structure and numerous or severe defects due to growing conditions, historical or recent pruning, mechanical damage, history of limb or trunk failures, advanced and irreparable decay, disease, or severe fire damage. Trees with this rating are in severe, irreparable decline, or are barely alive. Risk of full or partial failures in the near future may be severe.



ARBORIST STATEMENT

Arborists are tree specialists who use their education, knowledge, training and experience to examine trees, recommend measures to enhance the beauty and health of trees, and attempt to reduce the risk of living near trees. Clients may choose to accept or disregard the recommendations of the arborist, or to seek additional advice.

Arborists cannot detect every condition that could possibly lead to the structural failure of a tree. Trees are living organisms that fail in ways we do not fully understand. Conditions are often hidden within trees and below ground. Arborists cannot guarantee that a tree will be healthy or safe under all circumstances, or for a specified period of time. Likewise, remedial treatments, like any medicine, cannot be guaranteed.

Treatment, pruning and removal of trees may involve considerations beyond the scope of the arborist's services, such as property boundaries, property ownership, site lines, disputes between neighbors, and other issues. Arborists cannot take such considerations into account unless complete and accurate information is disclosed to the arborist. An arborist should then be expected to reasonably rely upon the completeness and accuracy of the information provided.

Trees contribute greatly to our enjoyment and appreciation of life. Nonetheless, they are subject to the laws of gravity and physiological decline. Any tree, whether it has visible weaknesses or not, will fail if the forces applied exceed the strength of the tree or its parts. Therefore, neither arborists nor tree owners can be reasonably expected to warrant unfailing predictability or elimination of risk.

Trees can be managed, but they cannot be controlled. To live near trees is to accept some degree of risk. The only way to eliminate all risk associated with trees is to eliminate all trees.

No risk assessments were requested or performed for this project.

Health and structure information presented in this report represents the condition of the tree(s) at the time and date of assessment.

Execution of any/all recommendations for cultural care, maintenance, pest or disease treatment, pruning, tree removal, etc., when made verbally or in writing by the arborist, is/are the sole responsibility of the client.



TABLE 1 - SUMMARY OF OAK TREE HEALTH ASSESSMENT - DAVENPORT TRAILHEAD PROJECT

| TREE # | COMMON NAME | BOTANICAL NAME | HEALTH GRADE (A -D, F) | STRUCTURE GRADE (A-D, F) | OVERALL GRADE (A-D, F) |
|--------|-------------------|------------------------------------|---------------------------|-----------------------------|---------------------------|
| 65 | Tucker's oak | Quercus john-tuckeri | С | С | С |
| 66 | Tucker's oak | Quercus john-tuckeri | D | C- | D |
| 67 | Tucker's oak | Quercus john-tuckeri | С | С | С |
| 68 | Tucker's oak | Quercus john-tuckeri | C- | С | C- |
| 69 | Tucker's oak | Quercus john-tuckeri | D | C- | D |
| 70 | Tucker's oak | Quercus john-tuckeri | С | С | С |
| 71 | Tucker's oak | Quercus john-tuckeri | С | С | С |
| 72 | Tucker's oak | Quercus john-tuckeri | С | С | С |
| 73 | Tucker's oak | Quercus john-tuckeri | С | С | С |
| 74 | Tucker's oak | Quercus john-tuckeri | С | С | С |
| 75 | Tucker's oak | Quercus john-tuckeri | С | С | С |
| 76 | Interior live oak | Quercus wislizenii var. wislizenii | С | С | С |
| 77 | Tucker's oak | Quercus john-tuckeri | С | С | С |
| 78 | Interior live oak | Quercus wislizenii var. wislizenii | С | С | С |
| 79 | Tucker's oak | Quercus john-tuckeri | С | С | С |
| 80 | Tucker's oak | Quercus john-tuckeri | С | С | С |
| 81 | Blue oak | Quercus douglasii | С | С | C- |
| 82 | Tucker's oak | Quercus john-tuckeri | D | С | C- |
| 83 | Tucker's oak | Quercus john-tuckeri | C- | С | C- |
| 84 | Tucker's oak | Quercus john-tuckeri | A- | В | В |

Notes: Tree numbers and species identification are taken from the enclosed Helix Tree Location exhibit.

Oar bergassociates



Assessed Oak Tree Locations (Not to Scale)



Facing west – illustrating Tree #84

Carlberg_{associates}



Facing south – illustrating Trees #79, 80, and 81, from left to right. Tree #79 recently lost a large limb when the adjacent Tree #78 (left and out of photo) suffered two massive limb failures. Tree #81 has cavities and an active bee hive in in the main trunk.

Carlberg_{associates}



Facing roughly southeast – illustrating Trees #79, 78, 77, 76, 75, 74, and 71, from right to left. Tree #78 (center) recently suffered two massive limb failures. The failed half of Tree #78 is in the foreground.

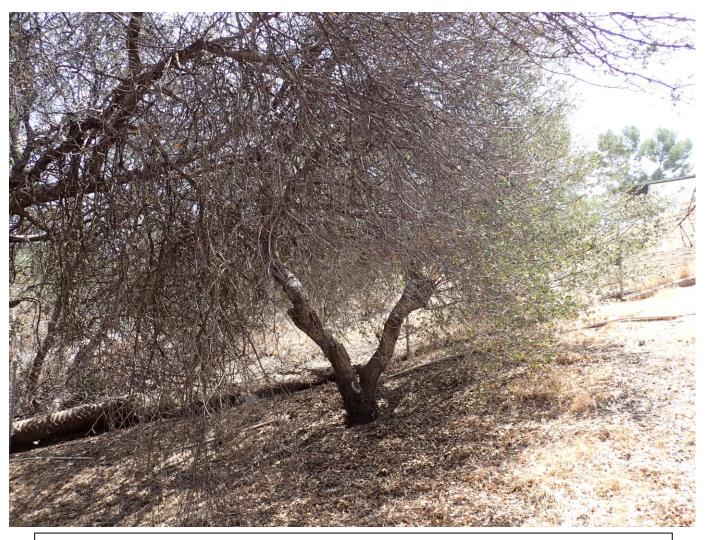


Facing roughly east – illustrating Trees #65-78 from left to right on the slope.

OAK TREE HEALTH ASSESSMENT - DAVENPORT TRAILHEAD, SANTA CLARITA



Facing north – illustrating Trees #78's limb failures. Cavities are present in the trunk and scaffolds, and this tree has an active bee hive in the main trunk.



Facing east – illustrating Tree 65 (center) and a dead portion of the canopy of Tree #68 in the foreground.

Carlberg ASSOCIATES



Facing roughly east – illustrating Tree #83 on the left and Tree #82 on the right.

Attachment C

Updated Oak Tree Survey Data

Oak Tree Survey Report for the Bouquet Canyon Road Project, Santa Clarita, CA

| Tree | | Circum- | Height | | | Can | ору | Exten | t (feet | t) | | Physical | Horticultural | Oak | | Proposed |
|------------|-------------------------------------|-------------------|--------|----|----|-----|-----|-------|---------|----|----|---|--|----------------|-------------------|----------|
| Tag No. | Species | ference (in) | (ft) | N | NE | E | SE | S | sw | W | NW | Evaluation | Evaluation | Tree Rating | Comments | Impacts |
| 1 | Tucker oak Quercus john-tuckeri | 6 | 10 | 3 | 1 | 1 | 5 | 6 | 1 | 1 | 3 | Deep v-crotch at 7", canopy is N-S oriented, does not extend E- W. | Appears vigorous, some small galls present, some old, healed trunk injuries. | В | | Removal |
| 2 | Tucker oak Quercus john-tuckeri | 7.5 | 9 | 8 | 6 | 3 | 6 | 5 | 6 | 6 | 6 | Trunk leaning northeast, canopy overall well-distributed. | Galls, insect damage. | В | | Removal |
| 3 | coast live oak Quercus agrifolia | 12.75 | 16 | 4 | 3 | 4 | 6 | 7 | 6 | 5 | 6 | Tree leaning south. | Has stress- related suckers, sapsucker holes. | В | No tag; off-site. | Removal |
| 4 | Tucker oak Quercus john-tuckeri | 10, 9, 7 | 9 | 2 | 6 | 3 | 1 | 4 | 3 | 4 | 3 | Tree has been topped. | All epicormic growth, tree in severe decline. | D | No tag; off-site. | Removal |
| 5 | Tucker oak Quercus john-tuckeri | 11.75, 12, 8.5 | 15 | 9 | 8 | 6 | 5 | 4 | 4 | 5 | 10 | Tree leaning north, away from adjacent eucalyptus. | Some galls present, bark damage present (chainsaw cut)-healing. | В | No tag; off-site. | Removal |
| 6 | Tucker oak Quercus john-tuckeri | 9, 13, 13 | 16 | 4 | 6 | 9 | 15 | 10 | 5 | 5 | 2 | Large failure at v-crotch with decay (old main stem), exposed roots. | Declining, significant amount of epicormic sprouting. | D | | Removal |
| 7 | Tucker oak Quercus john-tuckeri | 18, 19, 24 | 22 | 10 | 10 | 10 | 8 | 15 | 10 | 10 | 9 | Exposed roots, wide angle crotch at base. | Declining, epicormic sprouting, canopy dieback. | D | | Removal |



A-1

| Tree | | Circum- | Height | | | Can | ору | Exten | t (feet | t) | | Physical | Horticultural | Oak | | Proposed |
|------------|--|-----------------|--------|----|----|-----|-----|-------|---------|----|----|---|--|----------------|----------------------------------|-----------------------|
| Tag No. | Species | ference (in) | (ft) | N | NE | E | SE | S | sw | w | NW | Evaluation | Evaluation | Tree Rating | Comments | Impacts |
| 8 | Tucker oak Quercus john-tuckeri | 9.75, 6 | 5 | 2 | 8 | 2 | 2 | 5 | 10 | 2 | 4 | Severe lean to south, on steep slope. | Tree is being shaded, very sparse canopy, canopy dieback. | D | Stump shoots from old dead tree. | Removal |
| 9 | Tucker oak Quercus john-tuckeri | 20 | 15 | 6 | 3 | 12 | 12 | 5 | 5 | 2 | 7 | Exposed roots, on steep slope. | Large split with internal decay in trunk, internal decay throughout. | D | | Removal |
| 10 | blue oak Quercus douglasii | 85, 36 | 45 | 10 | 15 | 15 | 20 | 20 | 25 | 10 | 10 | Main trunk split long ago, large trunk leaning north, southern-most trunk with severe lean south, on steep slope. | Lots of mistletoe, canopy very sparse. | D | | Removal |
| 11 | Tucker oak Quercus john-tuckeri | 9 | 16 | 5 | 3 | 3 | 4 | 2 | 6 | 2 | 2 | On steep slope. | Most of canopy is dead, mistletoe present, epicormic sprouting. | D | Tree is almost completely dead. | Removal |
| 12 | scrub oak Quercus berberidifolia | 10 | 15 | 2 | 8 | 8 | 8 | 2 | 2 | 2 | 2 | Trunk leaning to north, multi-stem, one stem is dead, on steep slope. | Epicormic growth, very sparse canopy. | D | | Major Encroachment |



Oak Tree Survey Report for the Bouquet Canyon Road Project, Santa Clarita, CA

| Tree | | Circum- | Height | | | Can | ору | Exten | t (feet | t) | | Physical | Horticultural | Oak | | Proposed |
|------------|--|-----------------------------|--------|----|----|-----|-----|-------|---------|----|----|--|---|----------------|----------|-----------------------|
| Tag No. | Species | ference (in) | (ft) | N | NE | E | SE | S | sw | w | NW | Evaluation | Evaluation | Tree Rating | Comments | Impacts |
| 13 | scrub oak Quercus berberidifolia | 12, 9.5, 10, 10 | 15 | 5 | 6 | 8 | 8 | 9 | 5 | 2 | 2 | One dead stem, on steep slope. | Epicormic sprouting, severe decline, some galls present. | D | | Minor Encroachment |
| 14 | scrub oak Quercus berberidifolia | 22.5. 22, 17, 10, 7.5 | 20 | 12 | 12 | 12 | 5 | 12 | 10 | 10 | 12 | Some stems have internal decay, on steep slope. | Epicormic sprouting, mistletoe present, tree in decline. | D | | Avoided |
| 15 | scrub oak Quercus berberidifolia | 7.5. 7.5, 8, 5.5 | 14 | 5 | 3 | 8 | 6 | 8 | 5 | 5 | 9 | Good balance, on steep slope. | Some mistletoe present, significant amount of epicormic sprouting, some canopy dieback. | С | | Avoided |
| 16 | Tucker oak Quercus john-tuckeri | 9.5 | 10 | 1 | 1 | 1 | 10 | 10 | 10 | 2 | 1 | Most of canopy is in the south, shaded in the north, on steep slope. | Some dieback present, significant amount of epicormic sprouting. | С | | Avoided |
| 17 | Tucker oak Quercus john-tuckeri | 5.5, 6.5, 7, 9 | 12 | 7 | 3 | 3 | 4 | 8 | 8 | 8 | 8 | Some included bark at v-crotch about 5" above ground, tree on steep slope. | Small amounts of dieback and epicormic sprouting present. | В | | Avoided |



A-3

Oak Tree Survey Report for the Bouquet Canyon Road Project, Santa Clarita, CA

| Tree | | Circum- | Height | | | Can | ору | Exten | t (feet | :) | | Physical | Horticultural | Oak | | Proposed |
|------------|------------------------------------|--------------------------------|--------|----|----|-----|-----|-------|---------|----|----|---|--|----------------|--|----------|
| Tag No. | Species | ference (in) | (ft) | N | NE | E | SE | S | SW | W | NW | Evaluation | Evaluation | Tree Rating | Comments | Impacts |
| 18 | blue oak Quercus douglasii | 40.5, 24, 47, 52.5, 48 | 35 | 30 | 25 | 25 | 28 | 27 | 30 | 25 | 25 | Large multi- stem tree with big split and decay, all stems leaning towards the south, tree on steep slope. | Tree is experiencing some dieback, epicormic sprouting, sap sucker and borer holes present. | С | Tree tagged 61 in old survey, probably burned. | Avoided |
| 19 | Tucker oak Quercus john-tuckeri | 22, 16.5, 17, 13, 10, 11 | 30 | 18 | 15 | 10 | 15 | 15 | 22 | 15 | 15 | Included bark in all crotches, tree on a steep slope. | Appears vigorous, some cankers, canopy is somewhat sparse. | В | | Avoided |
| 20 | Tucker oak Quercus john-tuckeri | 17.5, 17, 14, 14 | 15 | 10 | 10 | 10 | 7 | 8 | 8 | 15 | 10 | Tree on steep slope, nexus of stems is 1' above ground. | Some canopy dieback present. | В | | Avoided |
| 21 | Tucker oak Quercus john-tuckeri | 21, 25, 20.5, 9 | 20 | 20 | 20 | 10 | 20 | 18 | 10 | 15 | 20 | Multiple trunks all leaning in different directions, tree on a steep slope. | Most of canopy is epicormic sprouting, borer and sapsucker holes are present. | С | | Avoided |
| 22 | Tucker oak Quercus john-tuckeri | 15, 19, 18.5, 19, 20 | 25 | 20 | 3 | 2 | 1 | 1 | 20 | 20 | 20 | Tree is on a steep slope, included bark present. | Tree appears healthy but is being shaded, canopy is somewhat sparse, significant dieback is present. | С | | Avoided |



A-4

| Tree | | Circum- | Height | | | Can | ору І | Exten | t (feet | t) | | Physical | Horticultural | Oak | | Proposed |
|------------|------------------------------------|---------------------------|--------|----|----|-----|-------|-------|---------|----|----|---|---|----------------|--|-----------------------|
| Tag No. | Species | ference (in) | (ft) | N | NE | E | SE | S | sw | W | NW | Evaluation | Evaluation | Tree Rating | Comments | Impacts |
| 23 | Tucker oak Quercus john-tuckeri | 44.5 | 35 | 20 | 20 | 5 | 1 | 1 | 10 | 18 | 20 | Strong lean to the north. | Significant amount of dieback in the lower canopy. | В | | Avoided |
| 24 | Tucker oak Quercus john-tuckeri | 18, 12.5, 42, 22.5 | 30 | 18 | 12 | 9 | 9 | 15 | 15 | 15 | 15 | V-crotch with included bark at 7", 1.5', and 2' above ground. | Some galls are present. | В | Tree tagged 60 in old survey. | Avoided |
| 25 | Tucker oak Quercus john-tuckeri | 9, 9, 10, 6 | 9 | 8 | 8 | 8 | 5 | 2 | 6 | 8 | 8 | Tree is on a steep slope. | Some epicormic sprouting is present, fairly even canopy. | В | | Avoided |
| 26 | Tucker oak Quercus john-tuckeri | 6.5 | 10 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | Even canopy spread, tree growing in the open. | Some galls are present, canopy is dense and healthy. | А | Shrub form, more than 25 stems, all 1-3 inches in circumference. | Removal |
| 27 | Tucker oak Quercus john-tuckeri | 6 | 9 | 6 | 4 | 4 | 4 | 6 | 6 | 4 | 5 | Structurally good, open, even canopy. | Significant amount of epicormic growth, most leaves are affected by aphids. | D | Some mechanical damage on the east side of the trunk. | Minor Encroachment |
| 28 | Tucker oak Quercus john-tuckeri | 6.5 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | Tree is on a steep slope. | Some galls are present. | В | No tag; off-site. | Avoided |
| 29 | Tucker oak Quercus john-tuckeri | 10, 6, 6.5, 5.5, 11 | 9 | 10 | 4 | 9 | 7 | 4 | 5 | 6 | 7 | | Dense canopy, tree appears vigorous. | А | No tag; off-site. | Avoided |
| 30 | Tucker oak Quercus john-tuckeri | 9, 11 | 12 | 7 | 5 | 6 | 5 | 5 | 6 | 6 | 6 | | Dense canopy, tree appears vigorous. | А | No tag; off-site. | Avoided |



| Tree | | Circum- | Height | | | Can | ору I | Exten | t (feet | t) | | Dhysical | Horticultural | Oak | | Droposed |
|------------|------------------------------------|-------------------|--------|----|----|-----|-------|-------|---------|----|----|---|--|----------------|-------------------|---------------------|
| Tag No. | Species | ference (in) | (ft) | N | NE | E | SE | S | sw | W | NW | Physical Evaluation | Evaluation | Tree Rating | Comments | Proposed Impacts |
| 31 | Tucker oak Quercus john-tuckeri | 6.5, 8, 6.5 | 8 | 7 | 6 | 4 | 3 | 4 | 4 | 7 | 6 | | Dense canopy, tree appears vigorous. | А | No tag; off-site. | Avoided |
| 32 | Tucker oak Quercus john-tuckeri | 6 | 9 | 7 | 5 | 6 | 5 | 5 | 5 | 6 | 6 | | Dense canopy, tree appears vigorous. | А | No tag; off-site. | Avoided |
| 33 | Tucker oak Quercus john-tuckeri | 12, 9.5, 14.5 | 13 | 14 | 5 | 7 | 1 | 1 | 4 | 12 | 10 | Strong lean downhill. | Tree is vigorous, some minor boring insect damage, significant amount of stress-related sprouting at base. | С | No tag; off-site. | Avoided |
| 34 | Tucker oak Quercus john-tuckeri | 14.5, 11 | 14 | 4 | 5 | 3 | 9 | 7 | 10 | 13 | 3 | Good structure. | Tree appears vigorous, lots of stress-related sprouting at base, epicormic sprouting present. | С | No tag; off-site. | Avoided |
| 35 | Tucker oak Quercus john-tuckeri | 8, 13, 16, 9.5 | 15 | 10 | 10 | 7 | 5 | 3 | 9 | 4 | 7 | Internal decay present in one main trunk. | Significant amount of stress-related sprouting at base. | С | No tag; off-site. | Avoided |
| 36 | Tucker oak Quercus john-tuckeri | 6 | 12 | 5 | 6 | 6 | 4 | 5 | 5 | 5 | 4 | | Significant amount of epicormic sprouting, some galls present. | С | No tag; off-site. | Avoided |



| Tree | | Circum- | Height | | | Can | ору І | Exter | it (feet | t) | | Physical | Horticultural | Oak | | Proposed |
|------------|------------------------------------|-----------------|--------|----|----|-----|-------|-------|----------|----|----|--|--|----------------|-------------------|----------|
| Tag No. | Species | ference (in) | (ft) | N | NE | E | SE | S | sw | W | NW | Evaluation | Evaluation | Tree Rating | Comments | Impacts |
| 37 | Tucker oak Quercus john-tuckeri | 8 | 12 | 5 | 5 | 5 | 5 | 4 | 3 | 3 | 5 | | Significant amount of epicormic sprouting, some galls present. | С | No tag; off-site. | Avoided |
| 38 | Tucker oak Quercus john-tuckeri | 9.5, 10, 8.5 | 12 | 12 | 10 | 5 | 10 | 10 | 6 | 5 | 2 | Lean is causing bark to split. | Some internal decay and stress-related sprouting at the base is present. | С | No tag; off-site. | Avoided |
| 39 | Tucker oak Quercus john-tuckeri | 7 | 10 | 4 | 3 | 3 | 3 | 4 | 4 | 5 | 5 | | Stress-related sprouting at the base and epicormic sprouting is present. | С | No tag; off-site. | Avoided |
| 40 | Tucker oak Quercus john-tuckeri | 6, 5 | 12 | 5 | 4 | 7 | 8 | 8 | 6 | 7 | 5 | | Some galls are present, tree is in good health overall. | В | No tag; off-site. | Avoided |
| 41 | Tucker oak Quercus john-tuckeri | 8, 6 | 15 | 7 | 6 | 5 | 3 | 10 | 10 | 3 | 3 | Bark has a healing fissure down the middle of the trunk. | Some epicormic sprouting is present. | В | No tag; off-site. | Avoided |
| 42 | Tucker oak Quercus john-tuckeri | 6.5, 6 | 12 | 8 | 8 | 2 | 2 | 8 | 7 | 7 | 7 | Several branches are rubbing against each other. | Some galls are present. | В | No tag; off-site. | Avoided |
| 43 | Tucker oak Quercus john-tuckeri | 6, 4 | 12 | 5 | 5 | 3 | 4 | 4 | 6 | 7 | 7 | | Some epicormic sprouting is present. | В | No tag; off-site. | Avoided |



| Tree | | Circum- | Height | | | Can | ору | Exten | t (feet | t) | | Dhysical | Horticultural | Oak | | Proposed |
|------------|------------------------------------|-----------------------|--------|----|----|-----|-----|-------|---------|----|----|--|--|----------------|-------------------|----------|
| Tag No. | Species | ference (in) | (ft) | N | NE | E | SE | s | sw | w | NW | Physical Evaluation | Evaluation | Tree Rating | Comments | Impacts |
| 44 | Tucker oak Quercus john-tuckeri | 6, 6 | 12 | 7 | 8 | 9 | 5 | 3 | 3 | 7 | 7 | | Some canopy dieback is present. | С | No tag; off-site. | Avoided |
| 45 | Tucker oak Quercus john-tuckeri | 7, 6, 6, 6, 5 | 13 | 8 | 8 | 6 | 6 | 9 | 10 | 9 | 9 | Tree is in shrub form, several widely-spaced branches. | Some epicormic sprouting and galls are present. | В | No tag; off-site. | Avoided |
| 46 | Tucker oak Quercus john-tuckeri | 6, 6, 6, 6, 8, 8.5 | 9 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | Tree is in shrub form, several widely-spaced branches. | Some epicormic sprouting is present, tree exhibiting vigorous growth. | В | No tag; off-site. | Avoided |
| 47 | Tucker oak Quercus john-tuckeri | 6.5, 4 | 9 | 9 | 8 | 7 | 4 | 4 | 5 | 7 | 9 | Tree is leaning downslope causing fissures in some stems. | Main stem has a large fissure with internal decay. | С | No tag; off-site. | Avoided |
| 48 | Tucker oak Quercus john-tuckeri | 6, 5, 5 | 9 | 7 | 9 | 6 | 3 | 3 | 8 | 9 | 8 | Some healing cracks are present at the base of main stems. | Some galls are present, some canopy dieback. | В | No tag; off-site. | Avoided |
| 49 | Tucker oak Quercus john-tuckeri | 10, 6.5, 9.5 | 13 | 11 | 11 | 5 | 5 | 5 | 2 | 5 | 10 | Good structure. | Some dieback and significant amounts of epicormic sprouting are present. | С | No tag; off-site. | Avoided |
| 50 | Tucker oak Quercus john-tuckeri | 9, 7, 6, 6 | 13 | 2 | 8 | 8 | 7 | 7 | 7 | 2 | 2 | Good structure. | Significant amount of epicormic sprouting is present. | С | No tag; off-site. | Avoided |



| Tree | | Circum- | Height | | | Can | ору і | Exten | t (feet | t) | | Dhysical | Horticultural | Oak | | Proposed |
|------------|------------------------------------|------------------------------------|--------|----|----|-----|-------|-------|---------|----|----|---|--|----------------|-------------------|----------|
| Tag No. | Species | ference (in) | (ft) | N | NE | E | SE | S | sw | w | NW | Physical Evaluation | Evaluation | Tree Rating | Comments | Impacts |
| 51 | Tucker oak Quercus john-tuckeri | 15, 16, 16, 17 | 18 | 12 | 14 | 15 | 10 | 5 | 9 | 14 | 14 | V-crotches are 1' above ground, some chainsaw wounds are present. | Significant amount of epicormic sprouting is present. | С | No tag; off-site. | Avoided |
| 52 | Tucker oak Quercus john-tuckeri | 16.5, 10, 9.5, 17, 6, 9, 8.5 | 17 | 10 | 9 | 9 | 5 | 3 | 4 | 10 | 11 | Many stems, but good structure. | Significant amount of epicormic sprouting and some canopy dieback are present. | С | | Avoided |
| 53 | Tucker oak Quercus john-tuckeri | 13 | 19 | 5 | 8 | 6 | 3 | 2 | 2 | 5 | 5 | V-crotch at 6" and 4' above ground, tree has a slight lean. | Most of canopy is epicormic sprouting. | С | No tag; off-site. | Avoided |
| 54 | Tucker oak Quercus john-tuckeri | 10, 8, 10 | 17 | 11 | 11 | 5 | 5 | 3 | 3 | 5 | 5 | | Most of canopy is epicormic sprouting, significant canopy dieback is present. | С | No tag; off-site. | Avoided |
| 55 | Tucker oak Quercus john-tuckeri | 12 | 17 | 11 | 9 | 9 | 1 | 1 | 6 | 8 | 9 | Tree is leaning northeast. | Borer holes and internal decay are present. | С | No tag; off-site. | Avoided |
| 56 | Tucker oak Quercus john-tuckeri | 12, 11, 7, 7, 8, 10.5 | 15 | 8 | 8 | 6 | 8 | 9 | 10 | 9 | 7 | | Borer holes, some epicormic sprouting, internal decay, and canopy dieback are present. | С | No tag; off-site. | Avoided |



| Tree | | Circum- | Height | | | Can | ору | Exten | t (feet | t) | | Physical | Horticultural | Oak | | Proposed |
|------------|--|---|--------|----|----|-----|-----|-------|---------|----|----|---|--|----------------|--|----------|
| Tag No. | Species | ference (in) | (ft) | N | NE | E | SE | S | sw | W | NW | Evaluation | Evaluation | Tree Rating | Comments | Impacts |
| 57 | scrub oak Quercus berberidifolia | 9.5, 9.5, 7, 10, 8, 6.5, 6 | 12 | 9 | 10 | 10 | 7 | 5 | 9 | 9 | 9 | Tree is in shrub form, mostly shaded by surrounding trees. | Some galls and epicormic sprouting are present. | В | No tag; off-site. | Avoided |
| 58 | scrub oak Quercus berberidifolia | 7, 6 | 11 | 5 | 1 | 3 | 8 | 8 | 8 | 8 | 3 | Tree is in shrub form. | Canopy is dying back, significant amount of epicormic sprouting is present. | С | No tag; off-site. | Avoided |
| 59 | Tucker oak Quercus john-tuckeri | 8, 8, 8, 8, 8, 12.5 | 11 | 6 | 6 | 8 | 5 | 5 | 5 | 7 | 7 | Tree is in shrub form. | A healing fissure and internal decay are present in one of the main stems. | С | No tag; off-site. | Avoided |
| 60 | Tucker oak Quercus john-tuckeri | 6, 6, 6, 9, 4 | 8 | 6 | 6 | 8 | 5 | 7 | 9 | 9 | 9 | Stems are all widely-spaced, spread out, tree is in shrubby form. | Some canopy dieback is present. | В | No tag; off-site, there is a packrat midden in the middle of the trunks. | Avoided |
| 61 | Tucker oak Quercus john-tuckeri | 6, 6, 4, 5, 8, 6, 4, 4 | 9 | 8 | 6 | 6 | 6 | 6 | 7 | 9 | 8 | Tree is in shrub form, stems are spread out. | Some canopy dieback, epicormic sprouting, and galls are present. | В | | Avoided |
| 62 | Tucker oak Quercus john-tuckeri | 9, 7.5, 5.5, 6.5, 5.5, 8.5, 8, 6.5, 4, 5, 6 | 9 | 11 | 6 | 5 | 6 | 6 | 7 | 8 | 5 | | Cankers, galls, epicormic sprouting, and canopy dieback are present. | С | | Avoided |



Oak Tree Survey Report for the Bouquet Canyon Road Project, Santa Clarita, CA

| Tree | | Circum- | Hoight | | | Can | ору | Exten | t (fee | t) | | Dhysical | Horticultural | Oak | | Droposed |
|------------|------------------------------------|-----------------|----------------|----|----|-----|-----|-------|--------|----|----|---|---|----------------|--|---------------------|
| Tag No. | Species | ference (in) | Height (ft) | N | NE | E | SE | S | sw | w | NW | Physical Evaluation | Evaluation | Tree Rating | Comments | Proposed Impacts |
| 63 | valley oak Quercus lobata | 12, 22 | 20 | 5 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | V-crotch at 1.5' and 5' with included bark, tree is growing straight. | Vigorous growth, healthy specimen, no obvious signs of disease. | А | Circumference and canopy were estimated- tree is on private property. | Avoided |
| 64 | Tucker oak Quercus john-tuckeri | 17, 32.5 | 19 | 10 | 10 | 10 | 10 | 10 | 8 | 8 | 10 | Included bark, exposed roots, tree is growing on a steep slope. | Vigorous growth, some canopy dieback is present. | В | | Avoided |



A-11

Appendix A.2

Addendum to the Oak Tree Report for the Bouquet Canyon Site

HELIX Environmental Planning, Inc.

16485 Laguna Canyon Road Suite 150 Irvine, CA 92618 949.234.8770 tel 619.462.0552 fax www.helixepi.com



February 16, 2022

Evan Knapp Integral Communities 888 San Clemente Drive, Suite 100 Newport Beach, CA 92660

Subject: Addendum to the Oak Tree Report for the Bouquet Canyon Project (Tentative Tract No.

82126)

Dear Mr. Knapp:

HELIX Environmental Planning, Inc. (HELIX) completed an oak tree survey report in August 2021 for the proposed Bouquet Canyon Road Project (Project) located in the City of Santa Clarita (City), Los Angeles County, California. This letter report is an addendum to the oak tree survey report to provide updates to the findings of that report based on revised project plans. The revised study area total 89.73 acres (56.91 acres on-site and 32.82 acres off-site). The revised project is shown on Figure 1, *Regional Location*, Figure 2, *USGS Topography*, and Figure 3, *Aerial Photograph*.

REVISED PROJECT AREAS

The Revised Project Areas and changes made to the project since the BTR are summarized below and depicted on Figure 4, *Revised Project Areas*.:

- Off-Site Flood Control Outlet- Additional temporary impacts to the concrete banks of the
 off-site concrete flood control channel required for the revisions related to the alignment of
 the outlet.
- 2. Copper Hill Road Improvements Additional grading/paving for Copper Hill Road.
- 3. <u>Davenport Trailhead</u> The addition of the Davenport parcel (APN 2812-008-008) for the construction of a city-required trailhead.
- 4. <u>Bouquet Canyon Road Improvements North</u> Additional off-site repaving and improvements to existing Bouquet Canyon Road near the northeast corner of the project.

- 5. <u>Flood Control Channel Inlet & Diversion Structure</u> Construction of a slightly larger concrete flow diversion structure intended to convey low flows into the low-flow channel and divert high flows into the proposed concrete-lined flood control channel.
- 6. <u>Sewer Line</u> Installation of a sewer line in the northeast portion of the site.
- 7. <u>Slope Grading</u> Additional slope grading for the new alignment of Bouquet Canyon Road along the southerly border of the study area.
- 8. <u>Bouquet Canyon Road Improvements South</u> Minor additional off-site road repaving and improvements to Bouquet Canyon Road located in the southwesterly portion of the project site.
- 9. Residential Addition Addition of the "donut hole" parcel (APN 2812-008-002) in the easterly portion of the project site. Note that this area was evaluated for impacts to biological resources in the 2019 BTR yet was not evaluated as part of the project in the EIR. Additional residential uses have been proposed in the donut hole area since the EIR was certified. As such, the donut hole parcel has been included in this addendum.
- 10. <u>Residential Reduction</u> Removal of Planning Area 1a, which was previously proposed to be constructed within the southern portion of the study area per the project BTR and EIR. This planning area presented in the Final EIR for the project will not be constructed as part of the revised project.

UPDATED OAK TREE SURVEY

On February 26, 2021, HELIX biologist and ISA-certified arborist Daniel Torres performed a preliminary oak tree survey on Revised Project Area 3 (Davenport Trailhead). On October 19, 2021, Mr. Torres performed an oak tree survey in Revised Project Area 9 (see *Attachment A*, Oak Tree Survey Report). On August 12, 2021, Carlsberg and Associates performed a follow-up oak tree survey on the Davenport Parcel. The Carlsberg report is included as Attachment B, *Davenport Oak Tree Survey Report*. On December 10, 2021, Mr. Torres performed an oak tree survey on Additional Project Areas 1, 2, 4-8, and 10. Of the Revised Project Areas, City-protected oak trees were detected on the Revised Project Area 3 only.

UPDATED RESULTS

A total of 20 new trees subject to an Oak Tree Permit were identified on Revised Project Area 3 (Attachment B). The total number of trees within the revised study area is 84. Of the 20 new trees, one was a blue oak (*Quercus douglasii*), two were interior live oak (*Quercus wislizeni* var. *wislizeni*), and 17 were Tucker oak (*Quercus john-tuckeri*). The locations of all oak trees are depicted on Figure 5, *Oak Tree Locations*).

REVISED PROJECT EFFECTS

The revised project includes avoidance for all oaks within Revised Project Area 3. Tree 27 (Tucker oak) located in the southwestern portion of the study area was avoided in the original project plan. This tree



will be subject to minor encroachment in the revised project plan. The updated oak tree impacts table is included as Attachment C, *Updated Oak Tree Survey Data*. According to the City's Oak Tree Preservation Ordinance, no mitigation is warranted for minor encroachments. With the removal of Planning Area 1a, 69 oaks are now being avoided. A summary of the revised impacts to oak trees is provided in Table 1, *Revised Impacts to Oak Trees*. A map within the location, canopy, and protected zone of the oak trees assessed during this survey is included as Figure 6, *Impacts to Oak Trees*.

Table 1
REVISED IMPACTS TO OAK TREES

| Species Name | Common Name | Removed | Major Encroachment | Minor Encroachment | Avoided |
|-------------------------------------|----------------------|---------|-----------------------|-----------------------|---------|
| Quercus agrifolia | coast live oak | 1 | 0 | 0 | 0 |
| Quercus berberidifolia | scrub oak | 0 | 1 | 1 | 4 |
| Quercus douglasii | blue oak | 1 | 0 | 0 | 2 |
| Quercus john-tuckeri | Tucker oak | 10 | 0 | 1 | 60 |
| Quercus lobata | valley oak | 0 | 0 | 0 | 1 |
| Quercus wislizeni var. wislizeni | interior live oak | 0 | 0 | 0 | 2 |
| TOTAL | | 12 | 1 | 1 | 69 |

OAK TREE APPRAISED VALUES

Since the oak trees within Revised Project Area 3 will be avoided, no oak tree appraisal is warranted for these trees. Additionally, no appraisal is warranted for minor encroachment to Tree 27. Therefore, the total appraised value of the oak trees (\$80,300) remains the same as presented in the Oak Tree Survey Report (Attachment A). The oak tree appraisals are detailed in Attachment C of Oak Tree Survey Report and summarized in Table 2, Summary of Tree Appraisals, below.

To mitigate for the full value of the appraised oak trees, an Oak Tree Mitigation Plan will be prepared detailing the installation of \$39,600 worth of oak trees. Additionally, blue oak #10 will be transplanted. If the blue oak tree does not survive after a 5-year monitoring period, the full appraised value of the tree (\$40,700) will be paid to the City.



Table 2
SUMMARY OF TREE APPRAISALS

| Tree Number | Species | DBH* | Appraised Value |
|-----------------------|----------------|-------|-----------------|
| 1 | Tucker oak | 1.9 | \$2,300 |
| 2 | Tucker oak | 2.4 | \$2,500 |
| 3 | coast live oak | 4.1 | \$3,100 |
| 4 | Tucker oak | 4.8* | \$3,700 |
| 5 | Tucker oak | 6.0* | \$5,200 |
| 6 | Tucker oak | 6.5* | \$3,700 |
| 7 | Tucker oak | 11.3* | \$7,000 |
| 8 | Tucker oak | 3.6* | \$2,100 |
| 9 | Tucker oak | 6.4 | \$3,100 |
| 10 | blue oak | 29.4* | \$40,700 |
| 11 | Tucker oak | 2.9 | \$2,200 |
| 12 | scrub oak | 3.2 | \$2,300 |
| 26 | Tucker oak | 2.1 | \$2,400 |
| TOTAL APPRAISED VALUE | | | \$80,300 |

Source: HELIX (2021)

CONCLUSIONS

The analysis provided above is intended to serve as an addendum to the Oak Tree Survey Report to document revisions to the original proposed project, including nine Revised Project Areas and the removal of Planning Area 1a. The revised study area includes 84 City-protected oak trees. All 20 new oak trees detected within Revised Project Area 3 will be completely avoided. The revised project plan includes minor encroachment to Tree 27. No appraisal or mitigation is warranted for minor encroachment according to the City's Oak Tree Preservation Ordinance. The total appraised value required to mitigate for impacted oak trees is \$80,300. This will occur through the planting of \$39,600 worth of mitigation oak trees on site and the transplantation of blue oak #10. If the blue oak does not survive the 5-year monitoring period following transplantation, the appraised value of the blue oak (\$40,700) will be paid to the City.

If you have any questions regarding the information presented in this letter report, please contact me at (619) 462-1515 or DanielT@helixepi.com.

Sincerely,

Daniel Torres Biologist

ISA-Certified Arborist (WE-12249)



^{*}Indicates a tree with multiple trunks at DBH where the aggregate diameter was calculated

Attachments:

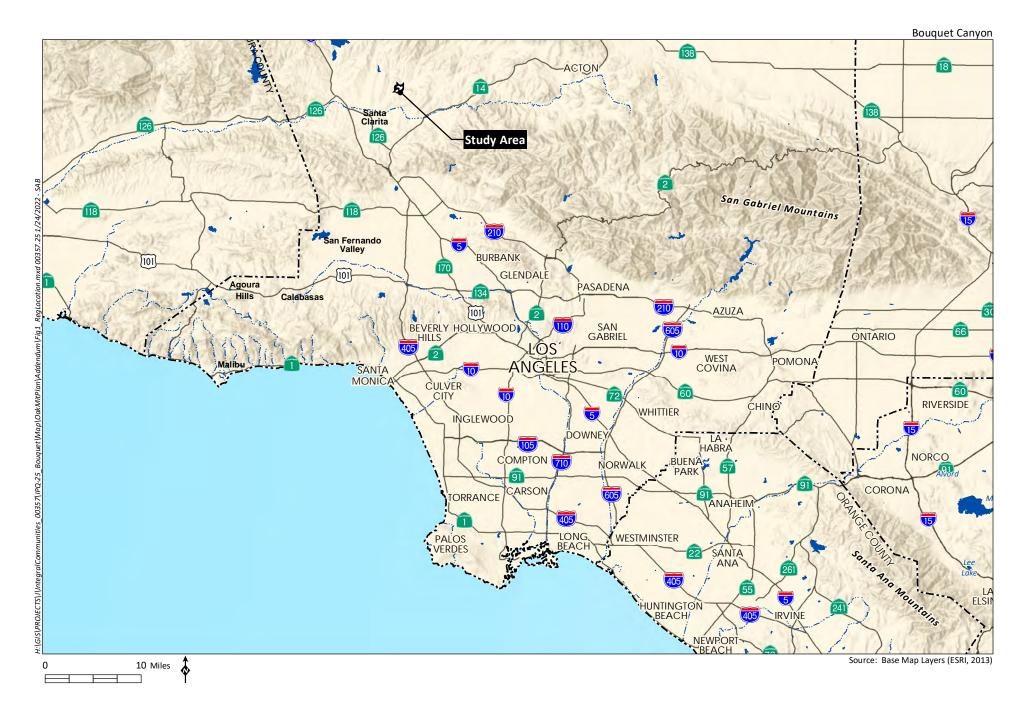
Figure 1: Regional Location Figure 2: USGS Topography Figure 3: Aerial Vicinity

Figure 4: Revised Project Areas Figure 5: Oak Tree Locations Figure 6: Impacts to Oak Trees

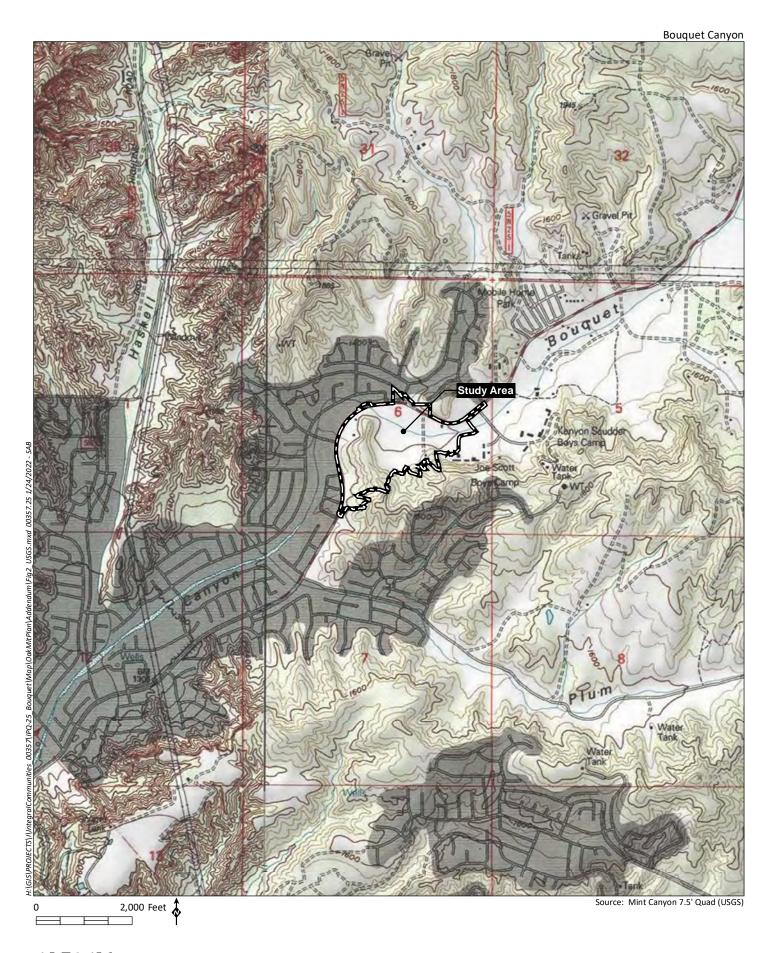
Attachment A: Oak Tree Survey Report

Attachment B: Davenport Oak Tree Survey Report Attachment C: Updated Oak Tree Survey Data









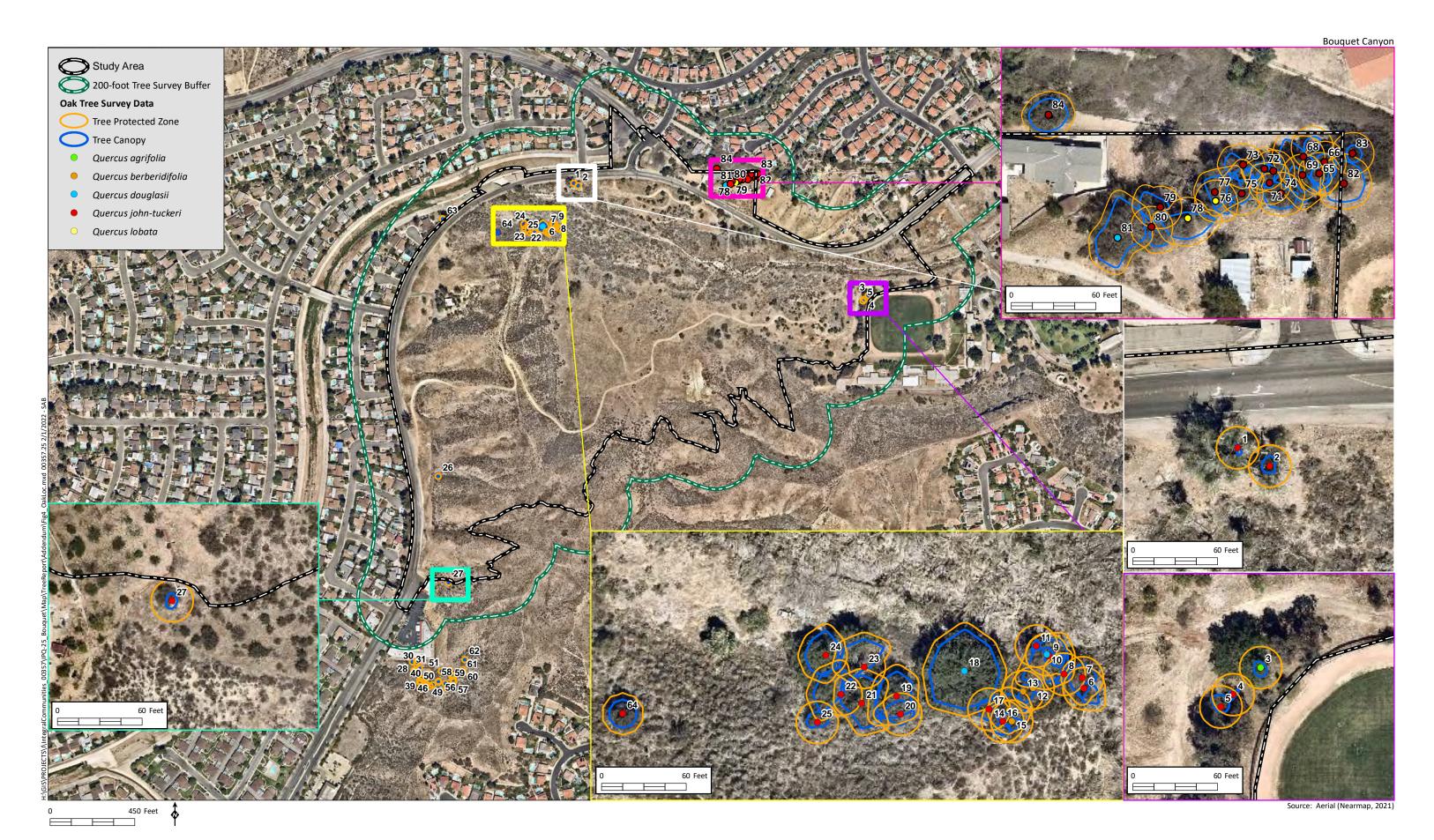




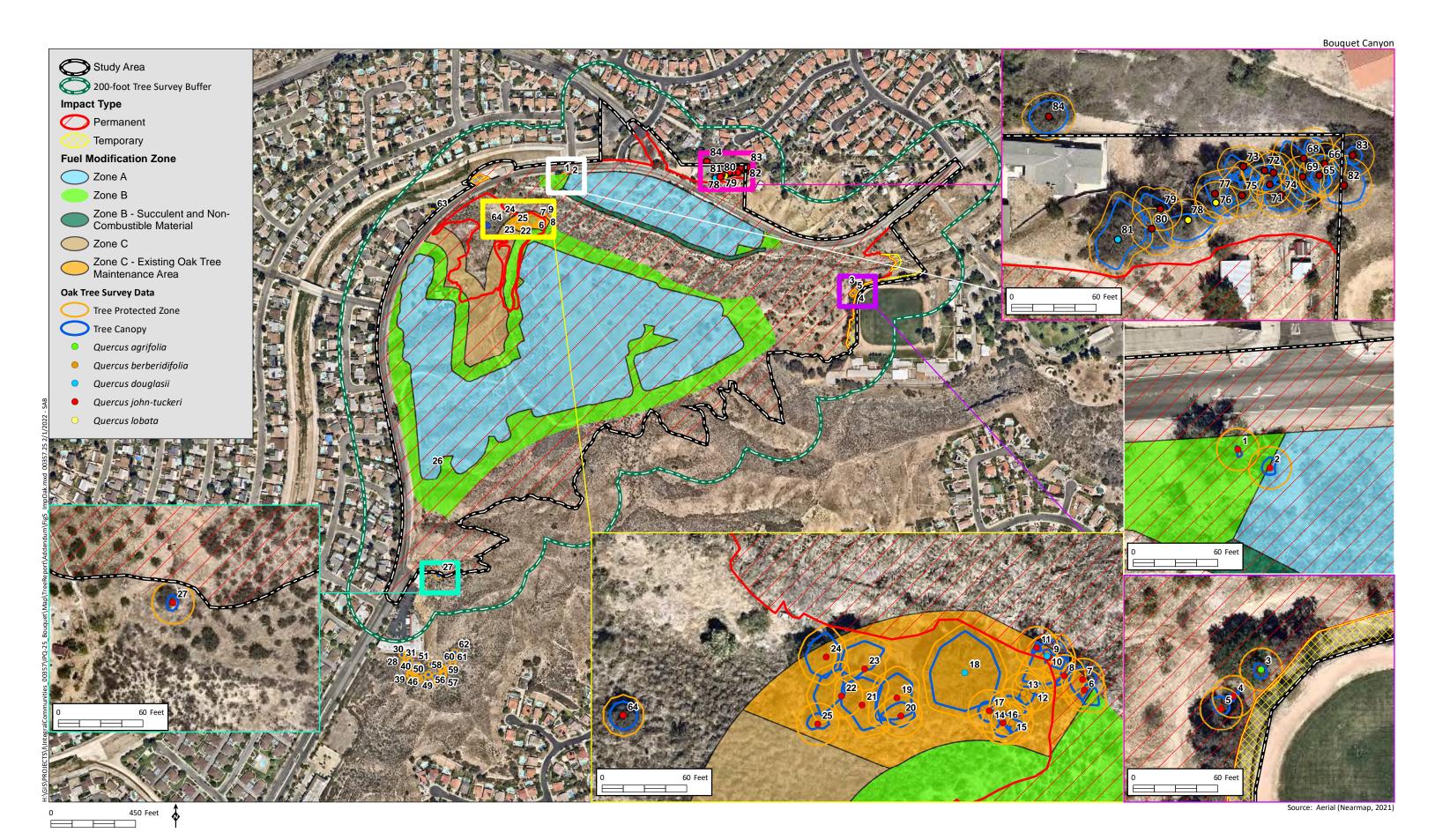


HELIX
Environmental Planning

Additional Project Areas









Attachment A

Oak Tree Survey Report

HELIX Environmental Planning, Inc. 16485 Laguna Canyon Road, Suite 150

Irvine, CA 91942 949.234.8770 tel 619.462.1515 fax www.helixepi.com



August 16, 2021 IPQ-25

Mr. Peter Vanek Integral Communities 888 San Clemente Drive Newport Beach, CA 92660

Subject: Oak Tree Survey Report for the Bouquet Canyon Road Project

Dear Mr. Covington:

HELIX Environmental Planning, Inc. (HELIX) prepared this report to document the results of an oak tree survey conducted for the proposed Bouquet Canyon Road Project (project) located the City of Santa Clarita (City), Los Angeles County, California. The purpose of this report is to provide an inventory of all species of oak tree (*Quercus* spp.) within 200-feet of the project footprint with at least one trunk over 6 inches in circumference at a point 4.5 feet above natural grade and to determine the presence of Heritage Trees as defined under the City's Oak Tree Preservation Ordinance (17.51.040; ordinance). This report was also prepared to provide supporting information for obtaining an Oak Tree Permit if sought in the future.

STUDY AREA LOCATION

The approximately 94-acre study area is generally located 6.9 miles to the east of Interstate 5 and 3.8 miles to the northwest of California State Route 14 in the City of Santa Clarita (Figure 1, *Regional Location*). Specifically, the study area is located directly south of the intersection of David Way and Bouquet Canyon Road. The study area is within Section 6 of Township 4 North, Range 15 West of the Mint Canyon, USGS 7.5-minute topographic quadrangle (Figure 2, *USGS Topography*).

Immediate surrounding land uses include existing residential developments to the north and west, a mixture of undeveloped land and residential development to the south, and undeveloped land and juvenile detention schools to the east (Figure 3, *Aerial Photograph*). The study area is located approximately 0.20 mile to the southeast of Haskell Canyon Open Space and 1.40 miles to the south of Angeles National Forest.

REGULATORY FRAMEWORK

The City's Oak Tree Preservation ordinance states, "No person shall cut, prune, remove, relocate, endanger, damage, or encroach into the protected zone of any oak tree on any public or private property within the City" (City of Santa Clarita [City] 2013). The protected zone of the oak tree includes

the area within five feet of the dripline (canopy extent), but no less than 15 feet from the trunk. To remove any oak tree or to subject its protected zone to major encroachment, an Oak Tree Permit must be obtained. Trees subject to the permit include all trees of the oak species (*Quercus* sp.) exceeding 6 inches in circumference when measured at a point 4.5 feet above the tree's natural grade. Encroachment is defined as intrusion into the protected zone of an oak tree, which includes but is not limited to, intrusion by trenching, paving, pruning, dumping, parking of commercial vehicles. Major encroachment is defined by the City's ordinance as "an area between the outer edge of the trunk and fifty percent of the diameter of the protected zone" and minor encroachment is defined as an area between the outermost edge of the protected zone and fifty percent of the diameter of the protected zone" (City 2013).

To obtain an Oak Tree Permit, an application must be submitted to the City Manager or designated representative ("Director") and a filing fee as established by the City Council must be paid. The conditions of the Oak Tree Permit may include replacement or relocation of trees, or payment of a fee based on the ISA's "Guide for Plant Appraisal."

Heritage Oak Trees are given special consideration and may be fully protected or subject to requirements stricter than those of a standard protected oak tree. A Heritage Oak Tree is defined as any oak tree measuring 108 inches in circumference when measured 4.5 feet above the tree's natural grade. In the case of trees with multiple trunks, two or more trunks each must measure 72 inches or greater in circumference when measured 4.5 feet above the tree's natural grade.

METHODS

HELIX International Society of Arboriculture (ISA) Certified Arborist Daniel Torres (WE-12249) and HELIX Biologist/Regulatory Specialist Ezekiel Cooley completed an oak tree survey on the study area and within a 200-foot buffer of the study area (survey area) on December 19 and 20, 2018. The purpose of the survey was to document the presence of: (1) oak trees with at least one trunk over 6 inches in circumference at a point 4.5 feet above natural grade and (2) Heritage Oak Trees.

All oak trees within the survey area that satisfied the previously mentioned criteria were identified to species. The circumference at a point 4.5 feet above natural grade was measured. For trees with codominant stems at 4.5 feet above natural grade, the circumference of each stem was measured at this height. Next, the height of each tree was estimated and an aluminum tag with a unique number was affixed to the north side of the tree at approximately three feet above natural grade. Trees located outside of the study area but located within the buffer area were not tagged since Integral Communities does not own this property. Additionally, trees located on the detention school property to the east were not surveyed since permission to access this property was not provided. Finally, the location of each individual tree and the canopy extent were recorded with a global positioning system device with sub-meter accuracy. The collected data are not considered survey-grade accuracy and should not be used for construction purposes.

Physical and horticultural evaluations were performed for each protected tree according to the City's Oak Tree Preservation and Protection Guidelines (City 1990). The physical evaluation included the assessment of structure, terrain, and general appearance. The horticultural evaluation included the detection of any disease or pathogens and an assessment of the tree's overall vigor. The physical and horticultural evaluations were used to rate each tree on a scale ranging from A to F as outlined in the



City's Preservation and Protection Guidelines. The rating system is reproduced below in Table 2, *Oak Tree Rating System*.

Table 2
OAK TREE RATING SYSTEM

| Rating | Description |
|-------------------------|--------------------------------------|
| | A healthy and vigorous tree |
| A. Outstanding | characteristic of its species and |
| A – Outstanding | reasonably free of any visible signs |
| | of stress, disease or pest |
| | infestation. |
| D. Al A | A healthy and vigorous tree with |
| B – Above Average | minor visible signs of stress, |
| | disease or pest infestation. |
| | Although healthy in overall |
| C – Average | appearance there is an abnormal |
| S | amount of stress or disease and/or |
| | pest infestation. |
| | This tree is characterized by |
| | exhibiting a greater degree of |
| | stress, disease and/or pest |
| | infestation than normal and |
| D – Below Average/Poor | appears to be in a state of rapid |
| D - Below Average/ Foor | decline. The degree of decline may |
| | vary greatly in signs of dieback, |
| | disease and pest infestation and |
| | appears to be in an advanced state |
| | of decline. |
| _ Dood | This tree exhibits no signs of life |
| F – Dead | whatsoever. |

Source: City of Santa Clarita (1990)

Following the oak tree survey, an impact assessment was conducted using the most recent project grading plans. The impact assessment was used to determine the number of oak trees that would be required to be removed or whose protected zone would be subject to major encroachment to complete project activities.

RESULTS

A total of 64 oak trees subject to an Oak Tree Permit were located within the survey area (Figure 4, *Oak Tree Locations*). Of these trees, one was coast live oak (*Quercus agrifolia*), six were scrub oak (*Quercus berberidifolia*), two were blue oak (*Quercus douglasii*), 54 were Tucker oak (*Quercus john-tuckeri*), and one was a valley oak (*Quercus lobata*). Six trees (approximately 9 percent) were assigned a rating of A – Outstanding, 22 trees (approximately 34 percent) were B – Above Average, 25 trees (approximately 40 percent) were C – Average, and 11 trees (approximately 17 percent) were D – Below Average. No dead trees were observed during the survey. Overall, there was very little disease noted on the oak trees within the survey area. The majority of trees (37 trees, approximately 58 percent) showed evidence of



stress-related growth such as epicormic sprouting and suckers. No Heritage Oak Trees were found during the survey. The locations of all oak tree surveyed are shown in Figure 4. The data collected during the survey is included as Attachment A, *Oak Tree Survey Data*. Representative site and tree photographs are included as Attachment B, *Representative Photographs*.

IMPACT ASSESSMENT

All oak trees within the project footprint will be removed. In addition, the project will be required to implement fuel modification. The County Fire Department requires fuel modification zones to create a defensible space in the event a wildlife breaks out (County of Los Angeles N.D.). There are five different zones, which are outlined below:

Zone A (Setback Zone) – This zone extends 30 feet beyond the edge of any structures. The only allowed vegetation within this zone is green lawns, ground cover not exceeding six inches in height, and well-spaced shrubs. The landscape must be irrigated to promote healthy vegetation and fire resistance.

Zone B (Irrigated Zone) – This zone extends from the outermost edge of Zone A to 100 feet from structures. Green lawn, ground cover not exceeding six inches in height, and well-spaced shrubs and trees are allowed in this zone. The landscape must be irrigated to promote healthy vegetation and fire resistance.

Zone B (Succulent and Non-Combustible Material) – This zone is in included within Zone B and will be comprised of a minimum of 50% succulent plant material and non-combustible material (including rock, decomposed granite [DG], or concrete), comprising a minimum 25% succulents and 25% non-combustible material.

Zone C (Native Brush Thinning Zone) – This zone extends from the outermost edge of Zone B to 200 feet from the structures. Well-spaced native vegetation and ornamental shrubs and trees are allowed. Vegetation must be thinned and species that constitute a fire risk are not allowed (e.g., chamise [Adenostoma fasciculatum], sages [Salvia spp.], California sagebrush, and California buckwheat). This zone does not require irrigation.

Zone C (Existing Oak Tree Maintenance Area) – This zone is included within Zone C and shall comply with the following requirements: (1) any plant material and tree litter under the oak canopies shall be cleared twice yearly, once by May 15th and August 15th of each calendar year; (2) in lieu of plant material where topography allows, DG may be placed, but is not required to be placed, within the drip line area of the oak trees beginning approximately 3-feet from the trunk of the tree with an approximately thickness of 2-inches, DG shall not be compacted, rather shall be loosely placed; and (3) use of soil sterilizers shall be prohibited under and around existing oak trees, use of pre-emergent weed killer shall be prohibited within 100 feet of any individual oak tree or within a natural drainage that seasonally irrigates oak trees.

According to County Fire Department guidelines, all vegetation within Zone A must be irrigated, and the only vegetation allowed is green lawns, ground cover not exceeding six inches in height, and well-spaced shrubs. It was determined that requirements of Zone A are incompatible with the retainment of native oak trees. For the purpose of this assessment, oak trees located within Fuel Modification Zone A were



considered removed, while oak trees located within Zones B and C were considered retained. In order to retain oaks within Zones A, authorization from the County Fire Department would be required. No tree pruning will be performed in any of the zones. The fuel modification zone plans were prepared by FireSafe Planning Solutions and were submitted to the County Fire Department on July 20, 2021.

Based on analyzing each surveyed oak's location in respect to the project grading plans and fuel modification zones, the project would require the removal of 12 oak trees, including one coast live oak (*Quercus agrifolia*, Tree 3), one blue oak (*Quercus douglasii*, Tree 10), and 10 Tucker oaks (*Quercus johntuckeri*, Trees 1,2, 4-9, 11, and 26). Finally, one scrub oak (Tree 12) would be subjected to major encroachment.

One scrub oak (Tree 13) would be subjected to minor encroachment. Additionally, a retaining wall will be built outside of the protected zone of one blue oak (Tree 18), therefore this tree will be avoided. A total of 50 oak trees would be completely avoided by the project (Table 3, *Impacts to Oak Trees*). A map with the location, canopy, and protected zone of the oak trees assessed during this survey is included as Figure 5, *Impacts to Oak Trees*.

Common Minor Major Removed Avoided **Species Name** Name **Encroachment Encroachment** Quercus agrifolia coast live oak 1 0 0 0 0 Quercus berberidifolia scrub oak 1 1 4 Quercus douglasii 1 0 0 blue oak 1 0 44 Quercus john-tuckeri Tucker oak 10 0 valley oak Quercus lobata 0 0 0 1 **TOTAL** 12 1 1 50

Table 3
IMPACTS TO OAK TREES

MITIGATION

Based on the impacts to oak trees as quantified by the impact assessment, 12 oak trees will be removed, and one will be subjected to major encroachment. In order to receive an Oak Tree Removal Permit for these impacts, the City may determine whether the project proponent shall replace or relocate, pay a fee, or donate boxed trees to the City of an equivalent value to all oak trees removed or subject to major encroachment. In order to determine the value of impacted trees, the appraised value of each tree subject to impacts was calculated using the 10th Edition of the Guide for Plant Appraisal (CTLA 2019). The total appraised value of trees subject to removal or major encroachment is \$80,300 (Attachment C). Trees that will be completely avoided or subject to minor encroachment will not require mitigation.

CONCLUSION

Sixty-four (64) oak trees on the survey area were considered City-protected trees. Construction of the project will require 12 of these trees to be removed and one to be subjected to major encroachment. It is anticipated that the City will require mitigation for the value of these trees, which totals \$80,300. Fifty



(50) of these trees will be completely avoided or subjected to minor encroachment during project activities and therefore will not require mitigation.

During construction, trees subject to minor or major encroachment will require protection measures, including but not limited to those outlined within Section VII. Standards for Performance of Permitted Work of the Oak Tree Preservation Guidelines. Other general guidelines to protect trees during for project construction are included as Attachment D, *Tree Protection Recommendations*.

Should you have any questions or require additional information, please do not hesitate to contact me at (949) 234-1515 or DanielT@helixepi.com.

Sincerely,

Daniel Torres

ISA Certified Arborist (WE-12249A)

Enclosures:

Figure 1: Regional Location
Figure 2: USGS Topography
Figure 3: Aerial Vicinity
Figure 4: Oak Tree Locations
Figure 5: Impacts to Oak Trees

Attachment A: Oak Tree Survey Data Attachment B: Representative Photos

Attachment C Oak Tree Appraisal Addendum
Attachment D: Tree Protection Recommendations

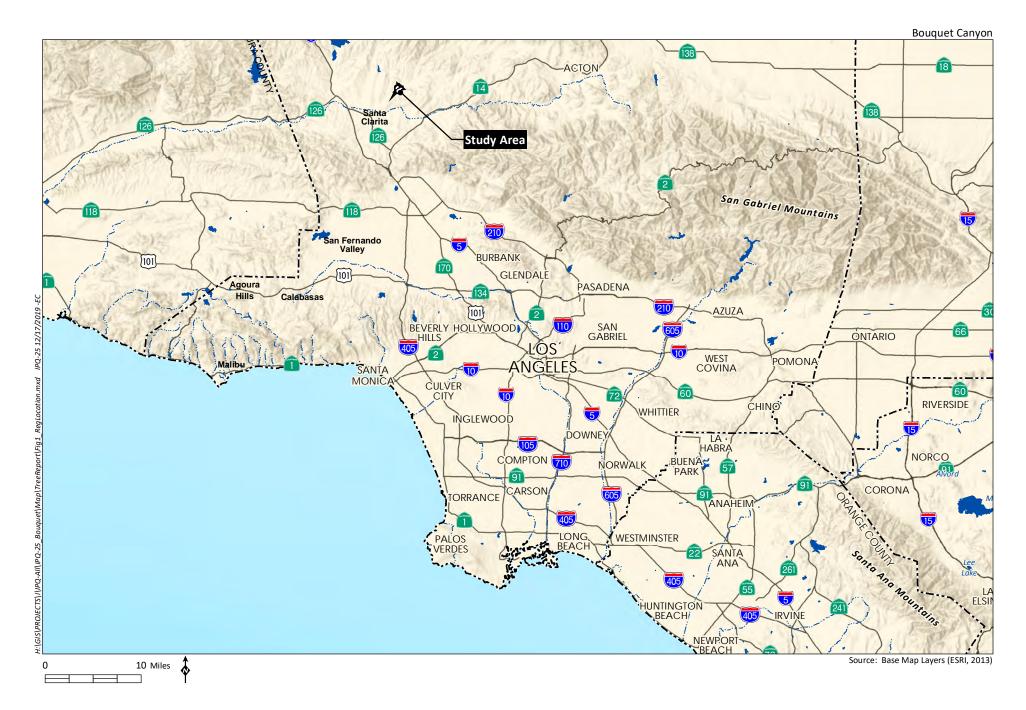


REFERENCES

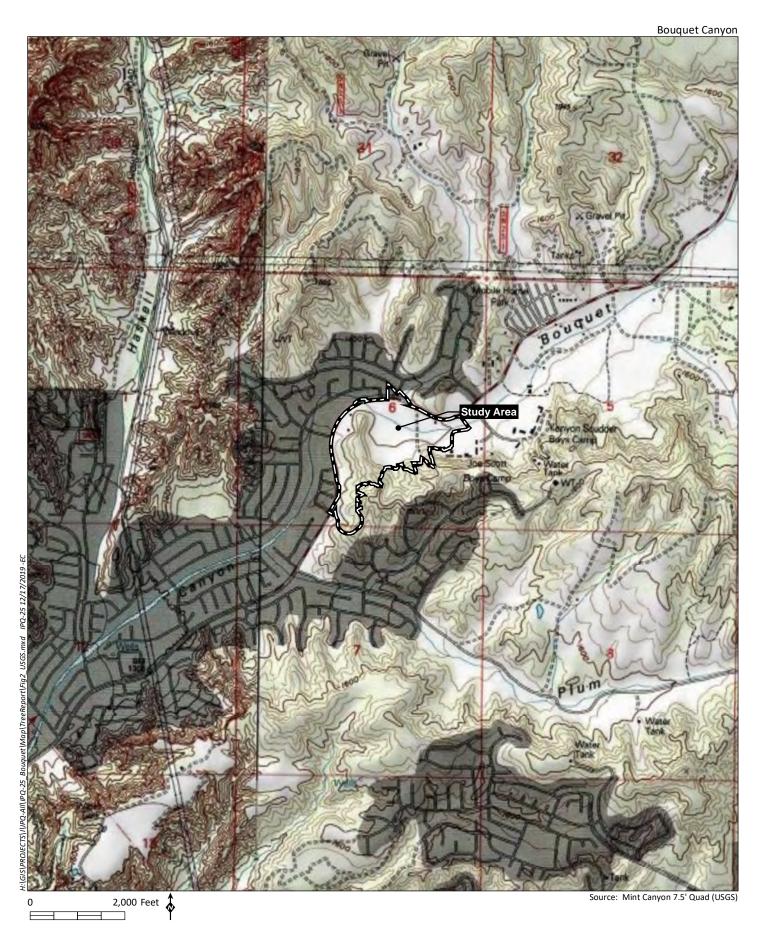
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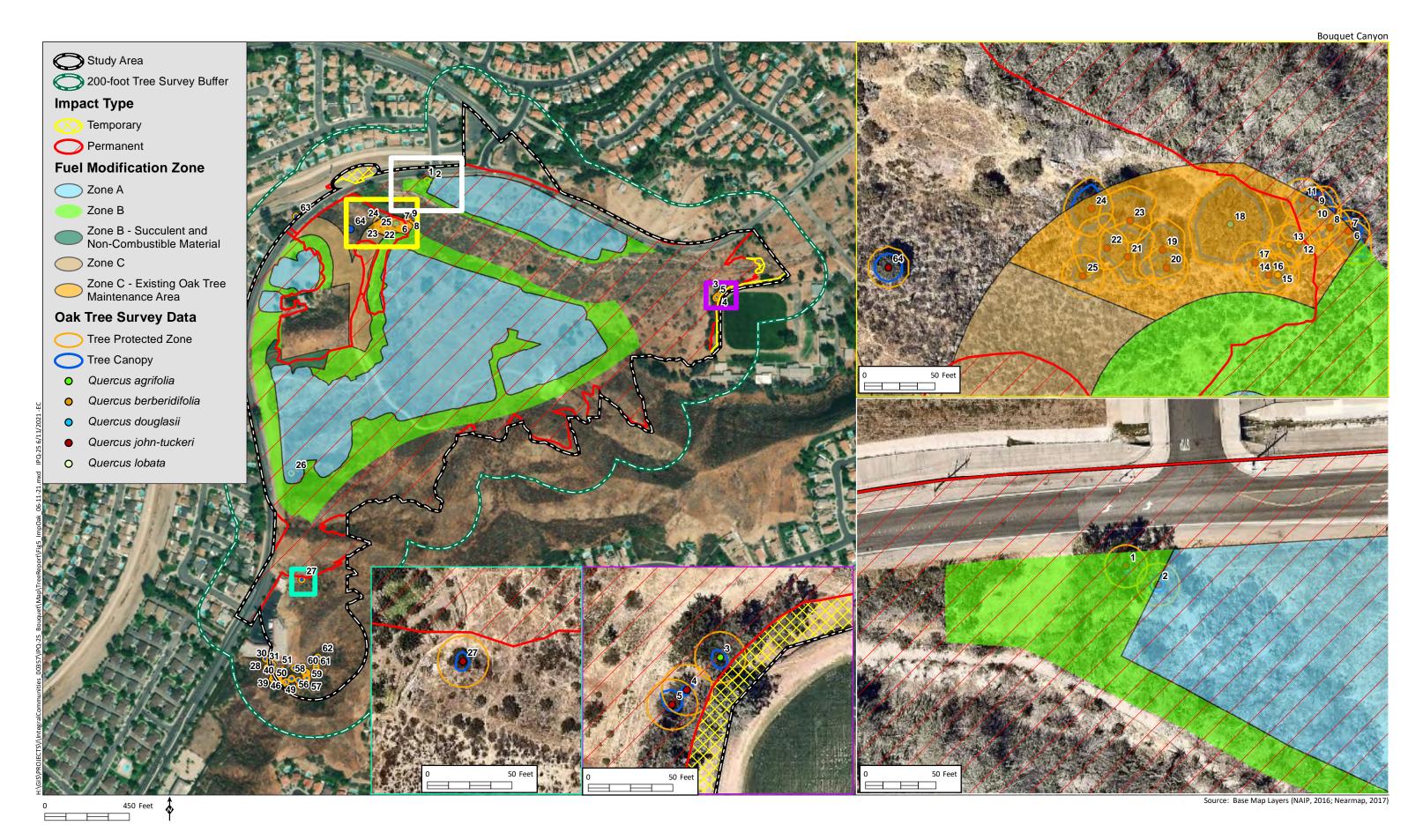




500 Feet 💠



0 375 Feet





Attachment A

| Tree | | Circum- | Height | | | Can | ору | Exten | t (feet | t) | | Physical | Horticultural | Oak | | Proposed |
|------------|-------------------------------------|-------------------|--------|----|----|-----|-----|-------|---------|----|----|---|--|----------------|-------------------|----------|
| Tag No. | Species | ference (in) | (ft) | N | NE | E | SE | S | sw | W | NW | Evaluation | Evaluation | Tree Rating | Comments | Impacts |
| 1 | Tucker oak Quercus john-tuckeri | 6 | 10 | 3 | 1 | 1 | 5 | 6 | 1 | 1 | 3 | Deep v-crotch at 7", canopy is N-S oriented, does not extend E- W. | Appears vigorous, some small galls present, some old, healed trunk injuries. | В | | Removal |
| 2 | Tucker oak Quercus john-tuckeri | 7.5 | 9 | 8 | 6 | 3 | 6 | 5 | 6 | 6 | 6 | Trunk leaning northeast, canopy overall well-distributed. | Galls, insect damage. | В | | Removal |
| 3 | coast live oak Quercus agrifolia | 12.75 | 16 | 4 | 3 | 4 | 6 | 7 | 6 | 5 | 6 | Tree leaning south. | Has stress- related suckers, sapsucker holes. | В | No tag; off-site. | Removal |
| 4 | Tucker oak Quercus john-tuckeri | 10, 9, 7 | 9 | 2 | 6 | 3 | 1 | 4 | 3 | 4 | 3 | Tree has been topped. | All epicormic growth, tree in severe decline. | D | No tag; off-site. | Removal |
| 5 | Tucker oak Quercus john-tuckeri | 11.75, 12, 8.5 | 15 | 9 | 8 | 6 | 5 | 4 | 4 | 5 | 10 | Tree leaning north, away from adjacent eucalyptus. | Some galls present, bark damage present (chainsaw cut)-healing. | В | No tag; off-site. | Removal |
| 6 | Tucker oak Quercus john-tuckeri | 9, 13, 13 | 16 | 4 | 6 | 9 | 15 | 10 | 5 | 5 | 2 | Large failure at v-crotch with decay (old main stem), exposed roots. | Declining, significant amount of epicormic sprouting. | D | | Removal |
| 7 | Tucker oak Quercus john-tuckeri | 18, 19, 24 | 22 | 10 | 10 | 10 | 8 | 15 | 10 | 10 | 9 | Exposed roots, wide angle crotch at base. | Declining, epicormic sprouting, canopy dieback. | D | | Removal |



| Tree | | Circum- | Height | | | Can | ору І | Exten | t (feet | t) | | Physical | Horticultural | Oak | | Proposed |
|------------|--|-----------------|--------|----|----|-----|-------|-------|---------|----|----|---|--|----------------|----------------------------------|-----------------------|
| Tag No. | Species | ference (in) | (ft) | N | NE | E | SE | S | sw | w | NW | Evaluation | Evaluation | Tree Rating | Comments | Impacts |
| 8 | Tucker oak Quercus john-tuckeri | 9.75, 6 | 5 | 2 | 8 | 2 | 2 | 5 | 10 | 2 | 4 | Severe lean to south, on steep slope. | Tree is being shaded, very sparse canopy, canopy dieback. | D | Stump shoots from old dead tree. | Removal |
| 9 | Tucker oak Quercus john-tuckeri | 20 | 15 | 6 | 3 | 12 | 12 | 5 | 5 | 2 | 7 | Exposed roots, on steep slope. | Large split with internal decay in trunk, internal decay throughout. | D | | Removal |
| 10 | blue oak Quercus douglasii | 85, 36 | 45 | 10 | 15 | 15 | 20 | 20 | 25 | 10 | 10 | Main trunk split long ago, large trunk leaning north, southern-most trunk with severe lean south, on steep slope. | Lots of mistletoe, canopy very sparse. | D | | Removal |
| 11 | Tucker oak Quercus john-tuckeri | 9 | 16 | 5 | 3 | 3 | 4 | 2 | 6 | 2 | 2 | On steep slope. | Most of canopy is dead, mistletoe present, epicormic sprouting. | D | Tree is almost completely dead. | Removal |
| 12 | scrub oak Quercus berberidifolia | 10 | 15 | 2 | 8 | 8 | 8 | 2 | 2 | 2 | 2 | Trunk leaning to north, multi-stem, one stem is dead, on steep slope. | Epicormic growth, very sparse canopy. | D | | Major Encroachment |



| Tree | | Circum- | Height | | | Can | ору | Exten | t (feet | t) | | Physical | Horticultural | Oak | | Proposed |
|------------|--|-----------------------------|--------|----|----|-----|-----|-------|---------|----|----|--|---|----------------|----------|-----------------------|
| Tag No. | Species | ference (in) | (ft) | N | NE | Ε | SE | S | sw | w | NW | Evaluation | Evaluation | Tree Rating | Comments | Impacts |
| 13 | scrub oak Quercus berberidifolia | 12, 9.5, 10, 10 | 15 | 5 | 6 | 8 | 8 | 9 | 5 | 2 | 2 | One dead stem, on steep slope. | Epicormic sprouting, severe decline, some galls present. | D | | Minor Encroachment |
| 14 | scrub oak Quercus berberidifolia | 22.5. 22, 17, 10, 7.5 | 20 | 12 | 12 | 12 | 5 | 12 | 10 | 10 | 12 | Some stems have internal decay, on steep slope. | Epicormic sprouting, mistletoe present, tree in decline. | D | | Avoided |
| 15 | scrub oak Quercus berberidifolia | 7.5. 7.5, 8, 5.5 | 14 | 5 | 3 | 8 | 6 | 8 | 5 | 5 | 9 | Good balance, on steep slope. | Some mistletoe present, significant amount of epicormic sprouting, some canopy dieback. | С | | Avoided |
| 16 | Tucker oak Quercus john-tuckeri | 9.5 | 10 | 1 | 1 | 1 | 10 | 10 | 10 | 2 | 1 | Most of canopy is in the south, shaded in the north, on steep slope. | Some dieback present, significant amount of epicormic sprouting. | С | | Avoided |
| 17 | Tucker oak Quercus john-tuckeri | 5.5, 6.5, 7, 9 | 12 | 7 | 3 | 3 | 4 | 8 | 8 | 8 | 8 | Some included bark at v-crotch about 5" above ground, tree on steep slope. | Small amounts of dieback and epicormic sprouting present. | В | | Avoided |



| Tree | | Circum- | Height | | | Can | пору | Exten | t (feet | t) | | Physical | Horticultural | Oak | | Proposed |
|------------|------------------------------------|--------------------------------|--------|----|----|-----|------|-------|---------|----|----|---|--|----------------|--|----------|
| Tag No. | Species | ference (in) | (ft) | N | NE | E | SE | S | sw | W | NW | Evaluation | Evaluation | Tree Rating | Comments | Impacts |
| 18 | blue oak Quercus douglasii | 40.5, 24, 47, 52.5, 48 | 35 | 30 | 25 | 25 | 28 | 27 | 30 | 25 | 25 | Large multi- stem tree with big split and decay, all stems leaning towards the south, tree on steep slope. | Tree is experiencing some dieback, epicormic sprouting, sap sucker and borer holes present. | С | Tree tagged 61 in old survey, probably burned. | Avoided |
| 19 | Tucker oak Quercus john-tuckeri | 22, 16.5, 17, 13, 10, 11 | 30 | 18 | 15 | 10 | 15 | 15 | 22 | 15 | 15 | Included bark in all crotches, tree on a steep slope. | Appears vigorous, some cankers, canopy is somewhat sparse. | В | | Avoided |
| 20 | Tucker oak Quercus john-tuckeri | 17.5, 17, 14, 14 | 15 | 10 | 10 | 10 | 7 | 8 | 8 | 15 | 10 | Tree on steep slope, nexus of stems is 1' above ground. | Some canopy dieback present. | В | | Avoided |
| 21 | Tucker oak Quercus john-tuckeri | 21, 25, 20.5, 9 | 20 | 20 | 20 | 10 | 20 | 18 | 10 | 15 | 20 | Multiple trunks all leaning in different directions, tree on a steep slope. | Most of canopy is epicormic sprouting, borer and sapsucker holes are present. | С | | Avoided |
| 22 | Tucker oak Quercus john-tuckeri | 15, 19, 18.5, 19, 20 | 25 | 20 | 3 | 2 | 1 | 1 | 20 | 20 | 20 | Tree is on a steep slope, included bark present. | Tree appears healthy but is being shaded, canopy is somewhat sparse, significant dieback is present. | С | | Avoided |



| Tree | | Circum- | Height | | | Can | ору I | Exten | t (feet | t) | | Physical | Horticultural | Oak | | Proposed |
|------------|------------------------------------|---------------------------|--------|----|----|-----|-------|-------|---------|----|----|---|---|----------------|---|----------|
| Tag No. | Species | ference (in) | (ft) | N | NE | E | SE | S | sw | W | NW | Evaluation | Evaluation | Tree Rating | Comments | Impacts |
| 23 | Tucker oak Quercus john-tuckeri | 44.5 | 35 | 20 | 20 | 5 | 1 | 1 | 10 | 18 | 20 | Strong lean to the north. | Significant amount of dieback in the lower canopy. | В | | Avoided |
| 24 | Tucker oak Quercus john-tuckeri | 18, 12.5, 42, 22.5 | 30 | 18 | 12 | 9 | 9 | 15 | 15 | 15 | 15 | V-crotch with included bark at 7", 1.5', and 2' above ground. | Some galls are present. | В | Tree tagged 60 in old survey. | Avoided |
| 25 | Tucker oak Quercus john-tuckeri | 9, 9, 10, 6 | 9 | 8 | 8 | 8 | 5 | 2 | 6 | 8 | 8 | Tree is on a steep slope. | Some epicormic sprouting is present, fairly even canopy. | В | | Avoided |
| 26 | Tucker oak Quercus john-tuckeri | 6.5 | 10 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | Even canopy spread, tree growing in the open. | Some galls are present, canopy is dense and healthy. | А | Shrub form, more than 25 stems, all 1-3 inches in circum-ference. | Removal |
| 27 | Tucker oak Quercus john-tuckeri | 6 | 9 | 6 | 4 | 4 | 4 | 6 | 6 | 4 | 5 | Structurally good, open, even canopy. | Significant amount of epicormic growth, most leaves are affected by aphids. | D | Some mechanical damage on the east side of the trunk. | Avoided |
| 28 | Tucker oak Quercus john-tuckeri | 6.5 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | Tree is on a steep slope. | Some galls are present. | В | No tag; off-site. | Avoided |
| 29 | Tucker oak Quercus john-tuckeri | 10, 6, 6.5, 5.5, 11 | 9 | 10 | 4 | 9 | 7 | 4 | 5 | 6 | 7 | | Dense canopy, tree appears vigorous. | А | No tag; off-site. | Avoided |
| 30 | Tucker oak Quercus john-tuckeri | 9, 11 | 12 | 7 | 5 | 6 | 5 | 5 | 6 | 6 | 6 | | Dense canopy, tree appears vigorous. | А | No tag; off-site. | Avoided |



| Tree | | Circum- | Height | | | Can | ору I | Exten | t (feet | t) | | Dhysical | Horticultural | Oak | | Droposed |
|------------|------------------------------------|-------------------|--------|----|----|-----|-------|-------|---------|----|----|---|--|----------------|-------------------|---------------------|
| Tag No. | Species | ference (in) | (ft) | N | NE | E | SE | S | sw | W | NW | Physical Evaluation | Evaluation | Tree Rating | Comments | Proposed Impacts |
| 31 | Tucker oak Quercus john-tuckeri | 6.5, 8, 6.5 | 8 | 7 | 6 | 4 | 3 | 4 | 4 | 7 | 6 | | Dense canopy, tree appears vigorous. | А | No tag; off-site. | Avoided |
| 32 | Tucker oak Quercus john-tuckeri | 6 | 9 | 7 | 5 | 6 | 5 | 5 | 5 | 6 | 6 | | Dense canopy, tree appears vigorous. | А | No tag; off-site. | Avoided |
| 33 | Tucker oak Quercus john-tuckeri | 12, 9.5, 14.5 | 13 | 14 | 5 | 7 | 1 | 1 | 4 | 12 | 10 | Strong lean downhill. | Tree is vigorous, some minor boring insect damage, significant amount of stress-related sprouting at base. | С | No tag; off-site. | Avoided |
| 34 | Tucker oak Quercus john-tuckeri | 14.5, 11 | 14 | 4 | 5 | 3 | 9 | 7 | 10 | 13 | 3 | Good structure. | Tree appears vigorous, lots of stress-related sprouting at base, epicormic sprouting present. | С | No tag; off-site. | Avoided |
| 35 | Tucker oak Quercus john-tuckeri | 8, 13, 16, 9.5 | 15 | 10 | 10 | 7 | 5 | 3 | 9 | 4 | 7 | Internal decay present in one main trunk. | Significant amount of stress-related sprouting at base. | С | No tag; off-site. | Avoided |
| 36 | Tucker oak Quercus john-tuckeri | 6 | 12 | 5 | 6 | 6 | 4 | 5 | 5 | 5 | 4 | | Significant amount of epicormic sprouting, some galls present. | С | No tag; off-site. | Avoided |



| Tree | | Circum- | Height | | | Can | ору | Exten | t (feet | t) | | Physical | Horticultural | Oak | | Proposed |
|------------|------------------------------------|-----------------|--------|----|----|-----|-----|-------|---------|----|----|--|--|----------------|-------------------|----------|
| Tag No. | Species | ference (in) | (ft) | N | NE | E | SE | S | sw | W | NW | Evaluation | Evaluation | Tree Rating | Comments | Impacts |
| 37 | Tucker oak Quercus john-tuckeri | 8 | 12 | 5 | 5 | 5 | 5 | 4 | 3 | 3 | 5 | | Significant amount of epicormic sprouting, some galls present. | С | No tag; off-site. | Avoided |
| 38 | Tucker oak Quercus john-tuckeri | 9.5, 10, 8.5 | 12 | 12 | 10 | 5 | 10 | 10 | 6 | 5 | 2 | Lean is causing bark to split. | Some internal decay and stress-related sprouting at the base is present. | С | No tag; off-site. | Avoided |
| 39 | Tucker oak Quercus john-tuckeri | 7 | 10 | 4 | 3 | 3 | 3 | 4 | 4 | 5 | 5 | | Stress-related sprouting at the base and epicormic sprouting is present. | С | No tag; off-site. | Avoided |
| 40 | Tucker oak Quercus john-tuckeri | 6, 5 | 12 | 5 | 4 | 7 | 8 | 8 | 6 | 7 | 5 | | Some galls are present, tree is in good health overall. | В | No tag; off-site. | Avoided |
| 41 | Tucker oak Quercus john-tuckeri | 8, 6 | 15 | 7 | 6 | 5 | 3 | 10 | 10 | 3 | 3 | Bark has a healing fissure down the middle of the trunk. | Some epicormic sprouting is present. | В | No tag; off-site. | Avoided |
| 42 | Tucker oak Quercus john-tuckeri | 6.5, 6 | 12 | 8 | 8 | 2 | 2 | 8 | 7 | 7 | 7 | Several branches are rubbing against each other. | Some galls are present. | В | No tag; off-site. | Avoided |
| 43 | Tucker oak Quercus john-tuckeri | 6, 4 | 12 | 5 | 5 | 3 | 4 | 4 | 6 | 7 | 7 | | Some epicormic sprouting is present. | В | No tag; off-site. | Avoided |



| Tree | | Circum- | Height | | | Can | ору І | Exten | t (feet | t) | | Physical | Horticultural | Oak | | Proposed |
|------------|------------------------------------|-----------------------|--------|----|----|-----|-------|-------|---------|----|----|--|--|----------------|-------------------|----------|
| Tag No. | Species | ference (in) | (ft) | N | NE | E | SE | S | sw | W | NW | Evaluation | Evaluation | Tree Rating | Comments | Impacts |
| 44 | Tucker oak Quercus john-tuckeri | 6, 6 | 12 | 7 | 8 | 9 | 5 | 3 | 3 | 7 | 7 | | Some canopy dieback is present. | С | No tag; off-site. | Avoided |
| 45 | Tucker oak Quercus john-tuckeri | 7, 6, 6, 6, 5 | 13 | 8 | 8 | 6 | 6 | 9 | 10 | 9 | 9 | Tree is in shrub form, several widely-spaced branches. | Some epicormic sprouting and galls are present. | В | No tag; off-site. | Avoided |
| 46 | Tucker oak Quercus john-tuckeri | 6, 6, 6, 6, 8, 8.5 | 9 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | Tree is in shrub form, several widely-spaced branches. | Some epicormic sprouting is present, tree exhibiting vigorous growth. | В | No tag; off-site. | Avoided |
| 47 | Tucker oak Quercus john-tuckeri | 6.5, 4 | 9 | 9 | 8 | 7 | 4 | 4 | 5 | 7 | 9 | Tree is leaning downslope causing fissures in some stems. | Main stem has a large fissure with internal decay. | С | No tag; off-site. | Avoided |
| 48 | Tucker oak Quercus john-tuckeri | 6, 5, 5 | 9 | 7 | 9 | 6 | 3 | 3 | 8 | 9 | 8 | Some healing cracks are present at the base of main stems. | Some galls are present, some canopy dieback. | В | No tag; off-site. | Avoided |
| 49 | Tucker oak Quercus john-tuckeri | 10, 6.5, 9.5 | 13 | 11 | 11 | 5 | 5 | 5 | 2 | 5 | 10 | Good structure. | Some dieback and significant amounts of epicormic sprouting are present. | С | No tag; off-site. | Avoided |
| 50 | Tucker oak Quercus john-tuckeri | 9, 7, 6, 6 | 13 | 2 | 8 | 8 | 7 | 7 | 7 | 2 | 2 | Good structure. | Significant amount of epicormic sprouting is present. | С | No tag; off-site. | Avoided |



| Tree | | Circum- | Height | | | Can | ору І | Exten | t (feet | t) | | Physical | Horticultural | Oak | | Proposed |
|------------|------------------------------------|------------------------------------|--------|----|----|-----|-------|-------|---------|----|----|---|--|----------------|-------------------|----------|
| Tag No. | Species | ference (in) | (ft) | N | NE | E | SE | S | sw | w | NW | Evaluation | Evaluation | Tree Rating | Comments | Impacts |
| 51 | Tucker oak Quercus john-tuckeri | 15, 16, 16, 17 | 18 | 12 | 14 | 15 | 10 | 5 | 9 | 14 | 14 | V-crotches are 1' above ground, some chainsaw wounds are present. | Significant amount of epicormic sprouting is present. | С | No tag; off-site. | Avoided |
| 52 | Tucker oak Quercus john-tuckeri | 16.5, 10, 9.5, 17, 6, 9, 8.5 | 17 | 10 | 9 | 9 | 5 | 3 | 4 | 10 | 11 | Many stems, but good structure. | Significant amount of epicormic sprouting and some canopy dieback are present. | С | | Avoided |
| 53 | Tucker oak Quercus john-tuckeri | 13 | 19 | 5 | 8 | 6 | 3 | 2 | 2 | 5 | 5 | V-crotch at 6" and 4' above ground, tree has a slight lean. | Most of canopy is epicormic sprouting. | С | No tag; off-site. | Avoided |
| 54 | Tucker oak Quercus john-tuckeri | 10, 8, 10 | 17 | 11 | 11 | 5 | 5 | 3 | 3 | 5 | 5 | | Most of canopy is epicormic sprouting, significant canopy dieback is present. | С | No tag; off-site. | Avoided |
| 55 | Tucker oak Quercus john-tuckeri | 12 | 17 | 11 | 9 | 9 | 1 | 1 | 6 | 8 | 9 | Tree is leaning northeast. | Borer holes and internal decay are present. | С | No tag; off-site. | Avoided |
| 56 | Tucker oak Quercus john-tuckeri | 12, 11, 7, 7, 8, 10.5 | 15 | 8 | 8 | 6 | 8 | 9 | 10 | 9 | 7 | | Borer holes, some epicormic sprouting, internal decay, and canopy dieback are present. | С | No tag; off-site. | Avoided |



| Tree | | Circum- | Height | | | Can | ору | Exten | t (feet | t) | | Physical | Horticultural | Oak | | Proposed |
|------------|--|---|--------|----|----|-----|-----|-------|---------|----|----|---|--|----------------|--|----------|
| Tag No. | Species | ference (in) | (ft) | N | NE | E | SE | S | sw | W | NW | Evaluation | Evaluation | Tree Rating | Comments | Impacts |
| 57 | scrub oak Quercus berberidifolia | 9.5, 9.5, 7, 10, 8, 6.5, 6 | 12 | 9 | 10 | 10 | 7 | 5 | 9 | 9 | 9 | Tree is in shrub form, mostly shaded by surrounding trees. | Some galls and epicormic sprouting are present. | В | No tag; off-site. | Avoided |
| 58 | scrub oak Quercus berberidifolia | 7, 6 | 11 | 5 | 1 | 3 | 8 | 8 | 8 | 8 | 3 | Tree is in shrub form. | Canopy is dying back, significant amount of epicormic sprouting is present. | С | No tag; off-site. | Avoided |
| 59 | Tucker oak Quercus john-tuckeri | 8, 8, 8, 8, 8, 12.5 | 11 | 6 | 6 | 8 | 5 | 5 | 5 | 7 | 7 | Tree is in shrub form. | A healing fissure and internal decay are present in one of the main stems. | С | No tag; off-site. | Avoided |
| 60 | Tucker oak Quercus john-tuckeri | 6, 6, 6, 9, 4 | 8 | 6 | 6 | 8 | 5 | 7 | 9 | 9 | 9 | Stems are all widely-spaced, spread out, tree is in shrubby form. | Some canopy dieback is present. | В | No tag; off-site, there is a packrat midden in the middle of the trunks. | Avoided |
| 61 | Tucker oak Quercus john-tuckeri | 6, 6, 4, 5, 8, 6, 4, 4 | 9 | 8 | 6 | 6 | 6 | 6 | 7 | 9 | 8 | Tree is in shrub form, stems are spread out. | Some canopy dieback, epicormic sprouting, and galls are present. | В | | Avoided |
| 62 | Tucker oak Quercus john-tuckeri | 9, 7.5, 5.5, 6.5, 5.5, 8.5, 8, 6.5, 4, 5, 6 | 9 | 11 | 6 | 5 | 6 | 6 | 7 | 8 | 5 | | Cankers, galls, epicormic sprouting, and canopy dieback are present. | С | | Avoided |



| Tree | | Circum- | Height | | | Can | ору | Exten | t (fee | t) | | Physical | Horticultural | Oak | | Proposed |
|------------|------------------------------------|-----------------|--------|----|----|-----|-----|-------|--------|----|----|---|---|----------------|--|----------|
| Tag No. | Species | ference (in) | (ft) | N | NE | E | SE | S | sw | W | NW | Evaluation | Evaluation | Tree Rating | Comments | Impacts |
| 63 | valley oak Quercus lobata | 12, 22 | 20 | 5 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | V-crotch at 1.5' and 5' with included bark, tree is growing straight. | Vigorous growth, healthy specimen, no obvious signs of disease. | А | Circumference and canopy were estimated- tree is on private property. | Avoided |
| 64 | Tucker oak Quercus john-tuckeri | 17, 32.5 | 19 | 10 | 10 | 10 | 10 | 10 | 8 | 8 | 10 | Included bark, exposed roots, tree is growing on a steep slope. | Vigorous growth, some canopy dieback is present. | В | | Avoided |



Attachment B

Representative Photos



Photo 1: Tree 10 (blue oak, Quercus douglasii) adjacent to the northwestern corner of the study area.



Photo 2: Tucker oak (Quercus john-tuckeri) scrub adjacent to the southwestern corner of the study area.





Photo 3: Tree 51 (Tucker oak, Quercus john-tuckeri) assigned an oak tree rating of C for displaying significant amounts of epicormic growth.



Photo 4: Tree 62 (Tucker oak, Quercus john-tuckeri) assigned an oak tree rating of C for displaying canopy dieback and significant amounts of epicormic growth.



Attachment C

Oak Tree Appraisal Addendum

HELIX Environmental Planning, Inc.

16485 Laguna Canyon Road, Suite 150 Irvine, CA 92618 619.462.1515 tel 619.462.0552 fax www.helixepi.com



July 7, 2021 IPQ-25

Mr. Peter Vanek Integral Communities 888 San Clemente Drive Newport Beach, CA 92660

Subject: Addendum to the Oak Tree Survey Report for the Bouquet Canyon Road Project

Dear Mr. Vanek:

HELIX Environmental Planning, Inc. (HELIX) completed an oak tree survey report for the proposed Bouquet Canyon Road Project (Project) located in the City of Santa Clarita (City), Los Angeles County, California. This letter report is an addendum to the oak tree survey report to provide the appraised value and a photograph of each tree to be removed or subjected to major encroachment by the proposed project. The appraised values and photographs were requested by the City in order to process the Oak Tree Permit, as defined under the City's Oak Tree Preservation Ordinance (17.51.040; ordinance).

METHODS

Photographs

HELIX International Society of Arboriculture (ISA) Certified Arborist Daniel Torres (WE-12249) performed a field visits on June 5, 2020 and October 20, 2020 in order to collect photographs of each oak tree that has been proposed for major encroachment or removal by the proposed project. During the field visits, Mr. Torres located each tree, verified the tree tag number, and collected photographs.

Oak Tree Appraised Values

In order to determine the appraised value of each tree subject to major encroachment or removal, the Trunk Formula Method as described in the 10th Edition of the Council of Tree and Landscape Appraisers (CTLA) Guide for Plant Appraisal was used (CTLA 2019). The Trunk Formula Method is used to extrapolate the costs to purchase the largest commonly available nursey plant to the size of the plant being appraised. Data collected during the oak tree survey was used to assess the condition, functional limitations, and external limitations of each tree. The condition ratings were intuitively designated based on each tree's ratings for health, structure, and form. For trees with multiple trunks at breast height, the aggregate diameter was calculated using the following formula:

Aggregate diameter = $\sqrt{(d1^2 + d2^2 + d3^2 + d4^2)}$

Where d1, d2, etc. are each trunk's diameter at breast height (DBH).

Replacement Tree

As discussed above, the cost of a replacement tree is extrapolated from the largest commonly available nursery stock. On June 12, 2020, several Southern California nurseries were contacted to determine the largest commonly available nursery stock and the cost of this stock., The nurseries contacted included Matilija Nursery in Moorpark, Boething Treeland Farms in Woodland Hills, and Tree of Life Nursey in San Juan Capistrano. The arborist determined that the largest commonly available nursery stock to replace coast live oaks (*Quercus agrifolia*) was a 36"-box sized coast live oak at a cost of \$870 per tree from Boething Treeland Farms. The largest commonly available replacement for scrub oaks (*Quercus berberidifolia*), Tucker oaks (*Quercus john-tuckeri*), and blue oaks (*Quercus douglasii*), was a 15-gallon scrub oak at a cost of \$63 per tree from Tree of Life Nursery.

Based on coordination with the nurseries mentioned it above, the following assumptions about trunk diameter were applied when calculation the cost of as replacement tree: 15-gallon scrub oaks were assumed to have a diameter of 0.75 inch, 24-inch box sized trees were assumed to have a diameter of 2 inches, and 36-inch box sized trees were assumed to have a diameter of 3 inches.

Blue oaks and Tucker oaks were not available at any of the nurseries mentioned above and are not commonly available. Scrub oaks were used as a replacement for Tucker oak, as this species is commonly available and has similar form, functional value, and growth rate.

On October 6, 2020, the City prepared a Draft Conditions of Approval (COA) for the project. According to OT6 of the draft COA, a scrub oak should be used as a replacement for blue oaks because this species closely matches the growth rate of the blue oak.

Additional Costs

Additional costs include the costs to plant and maintain a replacement tree. For the purposes of this appraisal, HELIX has assumed a maintenance and establishment period of one year. Additional costs include labor, installation of irrigation, equipment to plant a replacement tree, tree stakes, and pruning. Through consultation with HELIX Senior Construction Project Manager Peter Tomsovic, it was determined that the cost to plant and maintain a 36" box sized tree is \$2,000. This additional cost was applied to the appraised value of each oak tree to be impacted.

RESULTS AND CONCLUSION

As determined in the oak tree report, the project proposes to subject a total of 12 trees to removal and one tree to major encroachment. This includes one coast live oak (removal), one blue oak (removal), one scrub oak (major encroachment), and ten Tucker oaks (ten removals).

The total appraised value for the trees proposed for impacts is \$80,300. Table 1 below provides a summary of the tree appraisals. Attachment A provides a photograph of each tree and the detailed tree appraisal calculations.



Table 1
SUMMARY OF TREE APPRAISALS

| Tree Number | Species | DBH* | Appraised Value |
|----------------|----------------|-------|-----------------|
| 1 | Tucker oak | 1.9 | \$2,300 |
| 2 | Tucker oak | 2.4 | \$2,500 |
| 3 | coast live oak | 4.1 | \$3,100 |
| 4 | Tucker oak | 4.8* | \$3,700 |
| 5 | Tucker oak | 6.0* | \$5,200 |
| 6 | Tucker oak | 6.5* | \$3,700 |
| 7 | Tucker oak | 11.3* | \$7,000 |
| 8 | Tucker oak | 3.6* | \$2,100 |
| 9 | Tucker oak | 6.4 | \$3,100 |
| 10 | blue oak | 29.4* | \$40,700 |
| 11 | Tucker oak | 2.9 | \$2,200 |
| 12 | scrub oak | 3.2 | \$2,300 |
| 26 | Tucker oak | 2.1 | \$2,400 |
| TOTAL AF | PRAISED VALUE | | \$80,300 |

Source: HELIX (2021)

Should you have any questions or require additional information, please do not hesitate to contact me at (949) 234-1515 or DanielT@helixepi.com.

Daniel Torres

ISA Certified Arborist (WE-12249A)

Attachments:

Attachment A: Appraised Values and Photographs

anil & Zon



^{*}Indicates a tree with multiple trunks at DBH where the aggregate diameter was calculated

REFERENCES

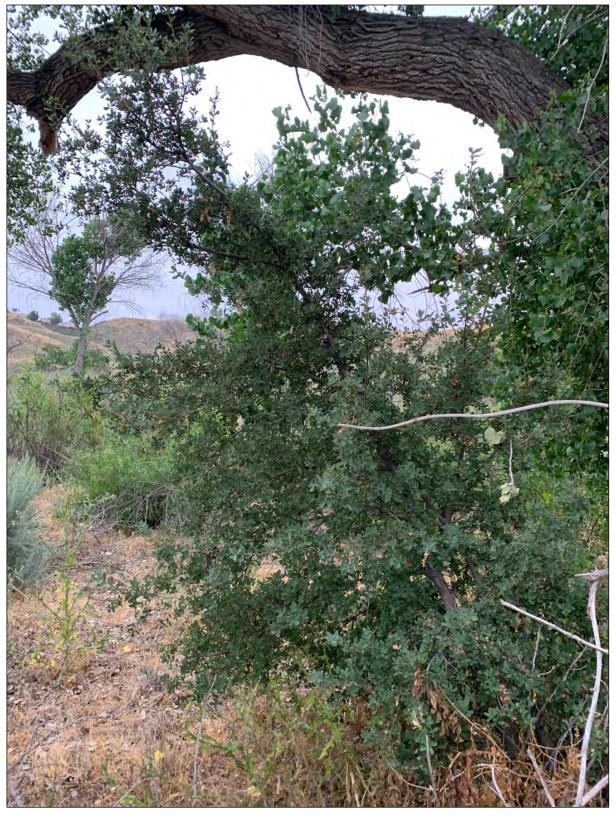
Council of Tree and Landscape Appraisers (CTLA). 2019. *Guide for Plant Appraisal, 10th Edition.*



Attachment A

Tree Appraisals and Photographs

Tree #1 - Tucker oak (Quercus john-tuckeri)





Appraised Values and Photographs

Tree #1 - Tucker oak (Quercus john-tuckeri)

| Subject Tree | Tree #1 |
|--------------|---------|
|--------------|---------|

| Species | Quercus john-tuckeri | | |
|--------------------------------------|---|-----|------|
| Trunk diameter, inches (inches) | | | 1.9 |
| Cross-sectional Area (square inches) | | | 2.8 |
| Condition Rating | | | 70% |
| Health | Health appears normal for this species | 80% | |
| Structure | There is a deep v-crotch at 7" above grade | 55% | |
| Form | The canopy in not symmetric due to shading by adjacent tree | 75% | |
| Functional Limitations | None | | 100% |
| External Limitations | None | | 100% |

Replacement Tree

| Species | Quercus berberidifolia | |
|--------------------------------------|------------------------|----------|
| Size (trunk diameter, inches) | 15-gallon | 0.75 |
| Cross-sectional Area (square inches) | | 0.4 |
| Cost | | \$ 63 |

Calculations

| Unit Tree Cost (\$/sq.in.) | \$ | 142.60 |
|------------------------------------|----|--------|
| Basic Replacement Cost | \$ | 404.32 |
| Depreciated Functional Replacement | | |
| Cost | \$ | 283.02 |

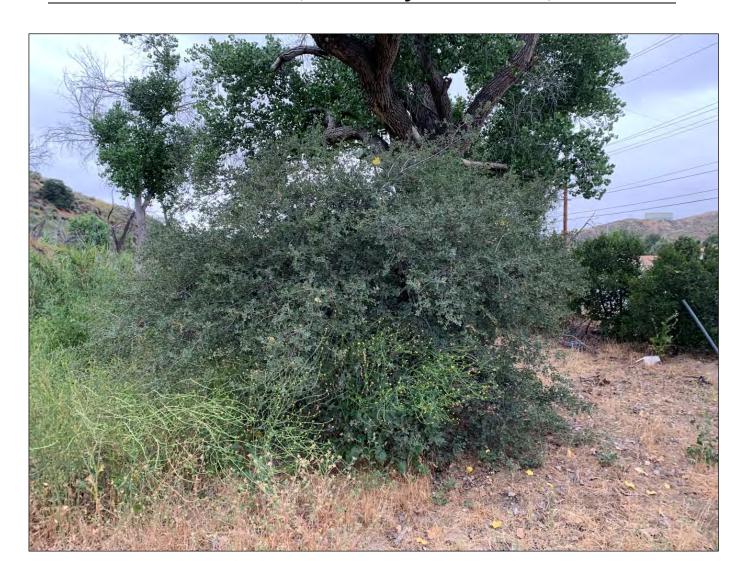
Additional Costs

| Installation of Replacement Tree | |
|----------------------------------|-------------|
| Maintenance during establishment | |
| Total Additional Costs | \$ 2,000.00 |

| Total Functional Replacement Cost | \$ 2,283.02 |
|-----------------------------------|-------------|
| Rounded Estimate | \$ 2,300.00 |



Tree #2 - Tucker oak (Quercus john-tuckeri)



Tree #2 - Tucker oak (Quercus john-tuckeri)

| Cubinet Tree | Troc #2 |
|--------------|---------|
| Subject Tree | Tree #2 |

| Species | Quercus john-tuckeri | | |
|----------------------------------|--|-----|------|
| Trunk diameter, inches (inches) | | | 2.4 |
| Cross-sectional Area (square inc | hes) | | 4.5 |
| Condition Rating | | | 75% |
| Health | Health appears normal for this species | 80% | |
| Structure | Structure appears normal for this species | 80% | |
| Form | The tree canopy is fairly symmetric; however, the trunk has a lean | 75% | |
| Functional Limitations | None | | 100% |
| External Limitations | None | | 100% |

Replacement Tree

| Species | Quercus berberidifolia | | |
|--------------------------------------|------------------------|----|------|
| Size (trunk diameter, inches) | 15-gallon | | 0.75 |
| Cross-sectional Area (square inches) | | | 0.4 |
| Cost | | \$ | 63 |

Calculations

| Unit Tree Cost (\$/sq.in.) | \$ 142.60 |
|------------------------------------|--------------|
| Basic Replacement Cost | \$ 645.12 |
| Depreciated Functional Replacement | |
| Cost | \$ 483.84 |

Additional Costs

| Installation of Replacement Tree | |
|----------------------------------|-------------|
| Maintenance during establishment | |
| Total Additional Costs | \$ 2,000.00 |

| Total Functional Replacement Cost | \$ 2,483.84 |
|-----------------------------------|-------------|
| Rounded Estimate | \$ 2,500.00 |



Tree #3 - coast live oak (Quercus agrifolia)





Appraised Values and Photographs

Tree #3 - coast live oak (Quercus agrifolia)

| Cubinet Tree | Tron #2 |
|--------------|---------|
| Subject Tree | Tree #3 |

| Species | Quercus agrifolia | | |
|----------------------------------|---|-----|------|
| Trunk diameter, inches (inches) | | | 4.1 |
| Cross-sectional Area (square ind | ches) | | 13.2 |
| Condition Rating | | | 65% |
| Health | Tree health appears good | 75% | |
| Structure | Structure appears normal for this species | 85% | |
| Form | Canopy is not symmetric due to shading by adjacent tree, trunk is leaning | 65% | |
| Functional Limitations | None | | 100% |
| External Limitations | None | | 100% |

Replacement Tree

| Species | Quercus agrifolia | |
|---------------------------------------|-------------------|-----------|
| Size (trunk diameter, inches, inches) | 36" box | 3 |
| Cross-sectional Area (square inches) | | 7.1 |
| Cost | | \$ 870 |

Calculations

| Unit Tree Cost (\$/sq.in.) | \$ 123.08 |
|------------------------------------|----------------|
| Basic Replacement Cost | \$ 1,624.97 |
| Depreciated Functional Replacement | |
| Cost | \$ 1,056.23 |

| Installation of Replacement Tree | |
|----------------------------------|----------------|
| Maintenance during establishment | |
| Total Additional Costs | \$ 2,000.00 |

| - | Total Functional Replacement Cost | \$ | 3,056.23 |
|---|-----------------------------------|----|----------|
| | Rounded Estimate | 5 | 3.100.00 |



Tree #4 - Tucker oak (Quercus john-tuckeri)





Appraised Values and Photographs

Tree #4 - Tucker oak (Quercus john-tuckeri)

| Codelant Torre | T 44 |
|----------------|---------|
| Subject Tree | Tree #4 |

| Species | Quercus john-tuckeri | | |
|--------------------------------------|--|-----|------|
| Trunk diameter, inches (inches) | 3.2, 2.9, 2.2 | | 4.8 |
| Cross-sectional Area (square inches) | | | 18.1 |
| Condition Rating | | | 65% |
| Health | Tree health appears fair, significant amounts of epicormic sprouting | 70% | |
| Structure | Structure appears normal for this species | 80% | |
| Form | Canopy is not symmetric; tree has been topped | 65% | |
| Functional Limitations | None | | 100% |
| External Limitations | None | | 100% |

Replacement Tree

| Species | Quercus berberidifolia | |
|---------------------------------------|------------------------|----------|
| Size (trunk diameter, inches, inches) | 15-gallon | 0.75 |
| Cross-sectional Area (square inches) | | 0.4 |
| Cost | | \$ 63 |

Calculations

| Unit Tree Cost (\$/sq.in.) | \$ 142.60 |
|------------------------------------|----------------|
| Basic Replacement Cost | \$ 2,580.48 |
| Depreciated Functional Replacement | |
| Cost | \$ 1,677.31 |

| Installation of Replacement Tree | |
|----------------------------------|----------------|
| Maintenance during establishment | |
| Total Additional Costs | \$ 2,000.00 |

| Rounded Estimate | , | 3.700.00 |
|-----------------------------------|--------------|----------|
| Total Functional Replacement Cost | Ś | 3.677.31 |



Tree #5 - Tucker oak (Quercus john-tuckeri)





Appraised Values and Photographs

Tree #5 - Tucker oak (Quercus john-tuckeri)

| Subject Tree | Tree #5 |
|--------------|---------|
| Subject free | 1166 #3 |

| Species | Quercus john-tuckeri | | |
|-------------------------------------|---|-----|------|
| Trunk diameter, inches (inches) | 3.7, 3.8, 2.7 | | 6.0 |
| Cross-sectional Area (square inches |) | | 28.3 |
| Condition Rating | | | 78% |
| Health | Health appears normal for this species | 80% | |
| Structure | Structure appears normal for this species | 80% | |
| Form | The tree canopy is fairly symmetric; however, the trunk has a lean due to shading by adjacent tree, some branches were pruned in the past | 75% | |
| Functional Limitations | None | | 100% |
| External Limitations | None | | 100% |

Replacement Tree

| Species | Quercus berberidifolia | |
|--------------------------------------|------------------------|----------|
| Size (trunk diameter, inches) | 15-gallon | 0.75 |
| Cross-sectional Area (square inches) | | 0.4 |
| Cost | | \$ 63 |

Calculations

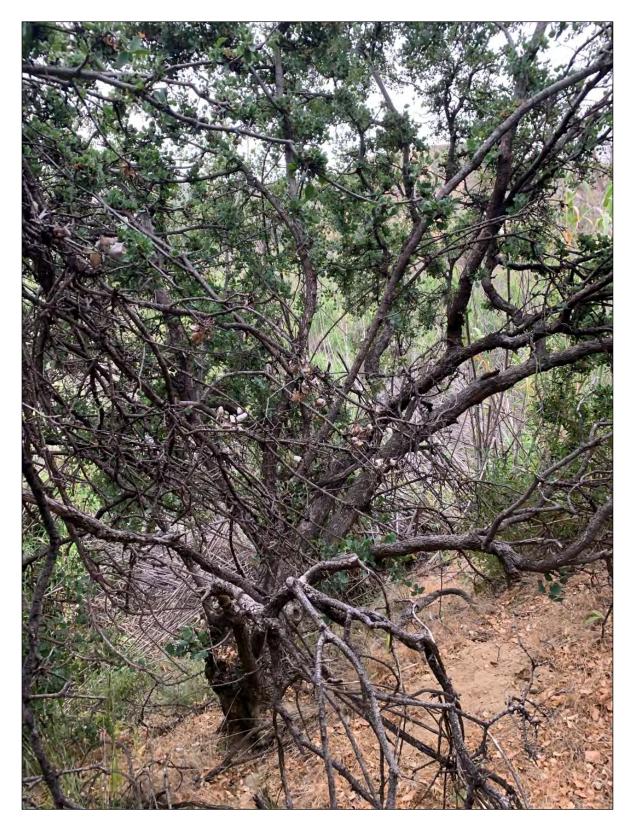
| Unit Tree Cost (\$/sq.in.) | \$ 142.60 |
|------------------------------------|----------------|
| Basic Replacement Cost | \$ 4,032.00 |
| Depreciated Functional Replacement | |
| Cost | \$ 3,158.40 |

| Installation of Replacement Tree | |
|----------------------------------|-------------|
| Maintenance during establishment | |
| Total Additional Costs | \$ 2,000.00 |

| Total Functional Replacement Cost | \$ 5,158.40 |
|-----------------------------------|-------------|
| Rounded Estimate | \$ 5,200.00 |



Tree #6 - Tucker oak (Quercus john-tuckeri)





Appraised Values and Photographs

Tree #6 - Tucker oak (Quercus john-tuckeri)

| Culpinat Tuna | Tuo 0 40 |
|---------------|----------|
| Subject Tree | Tree #6 |

| Species | Quercus john-tuckeri | | |
|-------------------------------------|--|-----|------|
| Trunk diameter, inches (inches) | 2.9, 4.1, 4.1 | | 6.5 |
| Cross-sectional Area (square inches | 5) | | 33.2 |
| Condition Rating | | | 35% |
| Health | Tree is in decline | 35% | |
| Structure | There was a large branch failure at the v-crotch | 35% | |
| Form | Tree canopy is not symmetric due to shading by adjacent tree | 35% | |
| Functional Limitations | None | | 100% |
| External Limitations | None | | 100% |

Replacement Tree

| Species | Quercus berberidifolia | |
|--------------------------------------|------------------------|----------|
| Size (trunk diameter, inches) | 15-gallon | 0.75 |
| Cross-sectional Area (square inches) | | 0.4 |
| Cost | | \$ 63 |

Calculations

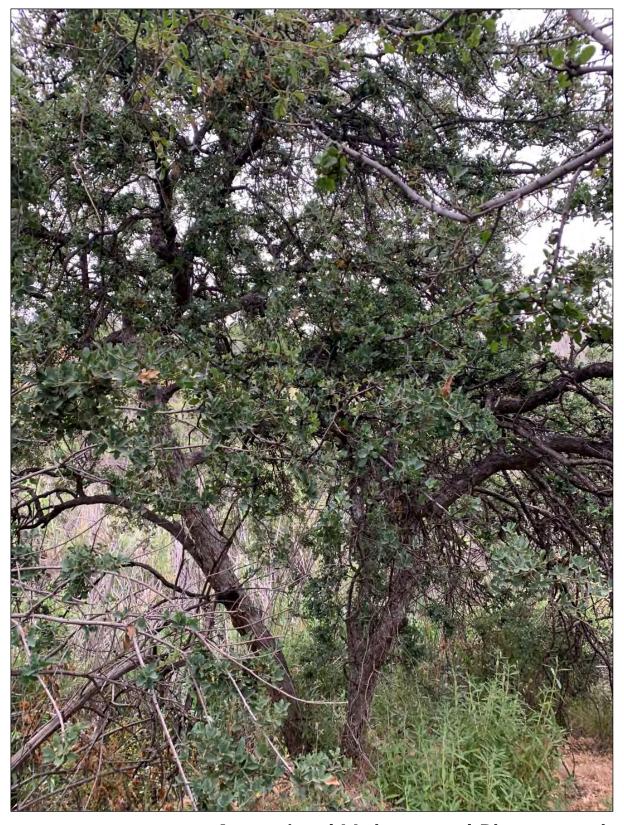
| Unit Tree Cost (\$/sq.in.) | \$ 142.60 |
|------------------------------------|----------------|
| Basic Replacement Cost | \$ 4,732.00 |
| Depreciated Functional Replacement | |
| Cost | \$ 1,656.20 |

| Installation of Replacement Tree | |
|----------------------------------|-------------|
| Maintenance during establishment | |
| Total Additional Costs | \$ 2,000.00 |

| Total Functional Replacement Cost | \$ 3,656.20 |
|-----------------------------------|-------------|
| Rounded Estimate | \$ 3,700.00 |



Tree #7 - Tucker oak (Quercus john-tuckeri)





Appraised Values and Photographs

Tree #7 - Tucker oak (Quercus john-tuckeri)

| Subject Tree | Troo #7 |
|--------------|---------|
| Subject Tree | Tree #7 |

| Species | Quercus john-tuckeri | | |
|-------------------------------------|--|-----|-------|
| Trunk diameter, inches (inches) | 5.7, 6.1, 7.6 | | 11.3 |
| Cross-sectional Area (square inches | | | 100.3 |
| Condition Rating | | | 35% |
| Health | Tree is in decline | 35% | |
| Structure | There was a large branch failure at the v-crotch | 35% | |
| Form | Tree canopy is not symmetric | 35% | |
| Functional Limitations | None | | 100% |
| External Limitations | None | | 100% |

Replacement Tree

| Species | Quercus berberidifolia | |
|--------------------------------------|------------------------|----------|
| Size (trunk diameter, inches) | 15-gallon | 0.75 |
| Cross-sectional Area (square inches) | | 0.4 |
| Cost | | \$ 63 |

Calculations

| Unit Tree Cost (\$/sq.in.) | \$ 142.60 |
|------------------------------------|-----------------|
| Basic Replacement Cost | \$ 14,301.28 |
| Depreciated Functional Replacement | |
| Cost | \$ 5,005.45 |

| Installation of Replacement Tree | |
|----------------------------------|----------------|
| Maintenance during establishment | |
| Total Additional Costs | \$ 2,000.00 |

| Total Functional Replacement Cost | \$ 7,005.45 |
|-----------------------------------|----------------|
| Rounded Estimate | \$ 7,000.00 |



Tree #8 - Tucker oak (Quercus john-tuckeri)





Appraised Values and Photographs

Tree #8 - Tucker oak (Quercus john-tuckeri)

| Culpinat Tuna | Tuo o 40 |
|---------------|----------|
| Subject Tree | Tree #8 |

| Species | Quercus john-tuckeri | | |
|--------------------------------------|---|-----|------|
| Trunk diameter, inches (inches) | 3.1, 1.9 | | 3.6 |
| Cross-sectional Area (square inches) | | | 10.2 |
| Condition Rating | | | 10% |
| Health | Tree is almost dead; canopy is extremely sparse | 10% | |
| Structure | Tree has a severe lean to the south | 20% | |
| Form | Tree has very poor form- strong lean | 20% | |
| Functional Limitations | None | | 100% |
| External Limitations | None | | 100% |

Replacement Tree

| Species | Quercus berberidifolia | |
|--------------------------------------|------------------------|----------|
| Size (trunk diameter, inches) | 15-gallon | 0.75 |
| Cross-sectional Area (square inches) | | 0.4 |
| Cost | | \$ 63 |

Calculations

| Unit Tree Cost (\$/sq.in.) | \$ 142.60 |
|------------------------------------|----------------|
| Basic Replacement Cost | \$ 1,451.52 |
| Depreciated Functional Replacement | |
| Cost | \$ 145.15 |

| Installation of Replacement Tree | |
|----------------------------------|----------------|
| Maintenance during establishment | |
| Total Additional Costs | \$ 2,000.00 |

| Total Functional Replacement Cost | \$ 2,145.15 |
|-----------------------------------|----------------|
| Rounded Estimate | \$ 2,100.00 |



Tree #9 - Tucker oak (Quercus john-tuckeri)



HELIX Environmental Planning

Appraised Values and Photographs

Tree #9 - Tucker oak (Quercus john-tuckeri)

| Subject Tree | Tree #9 |
|--------------|---------|
|--------------|---------|

| Species | Quercus john-tuckeri | | |
|---------------------------------|---|-----|------|
| Trunk diameter, inches (inches) | | | 6.4 |
| Cross-sectional Area (square in | ches) | | 32.2 |
| Condition Rating | | | 25% |
| Health | Tree appears to be in decline, exhibiting internal decay throughout | 20% | |
| Structure | Large split in main trunk | 20% | |
| Form | Form is fair | 45% | |
| Functional Limitations | None | | 100% |
| External Limitations | None | | 100% |

Replacement Tree

| Species | Quercus berberidifolia | | |
|--------------------------------------|------------------------|----|------|
| Size (trunk diameter, inches) | 15-gallon | | 0.75 |
| Cross-sectional Area (square inches) | | | 0.4 |
| Cost | | \$ | 63 |

Calculations

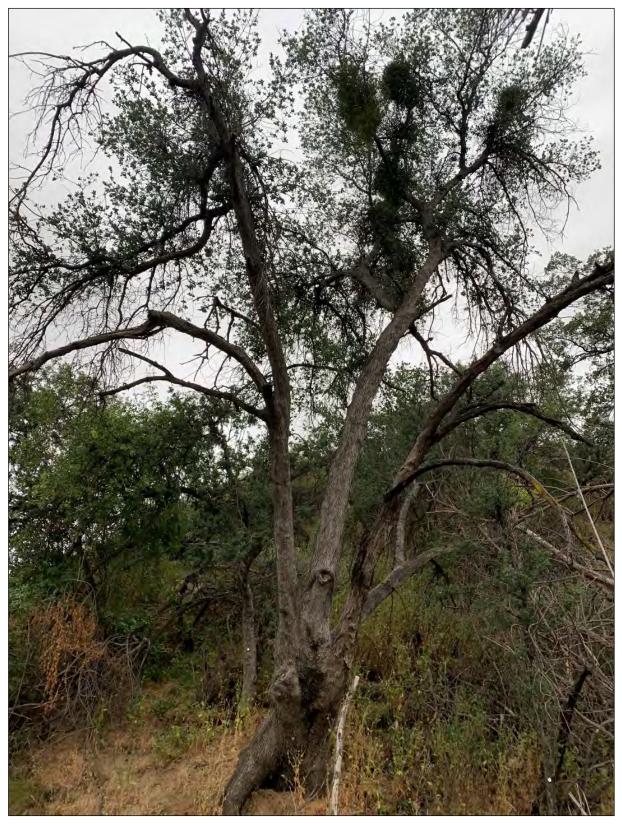
| Unit Tree Cost (\$/sq.in.) | \$ 142.60 |
|------------------------------------|----------------|
| Basic Replacement Cost | \$ 4,587.52 |
| Depreciated Functional Replacement | |
| Cost | \$ 1,146.88 |

| Installation of Replacement Tree | |
|----------------------------------|----------------|
| Maintenance during establishment | |
| Total Additional Costs | \$ 2,000.00 |

| Total Functional Replacement Cost | \$ 3,146.88 |
|-----------------------------------|----------------|
| Rounded Estimate | \$ 3,100.00 |



Tree #10 - blue oak (Quercus douglasii)





Appraised Values and Photographs

Tree #10 - blue oak (Quercus douglasii)

Subject Tree #10

| • | | | |
|--------------------------------------|---|-----|-------|
| Species | Quercus douglasii | | |
| Trunk diameter, inches (inches) | 27.1, 11.5 | | 29.4 |
| Cross-sectional Area (square inches) | | | 678.9 |
| Condition Rating | | | 40% |
| Health | Tree appears to be in decline | 40% | |
| Structure | Main trunk has split, trunks are widely divergent | 60% | |
| Form | Canopy is not symmetric | 60% | |
| Functional Limitations | None | | 100% |
| External Limitations | None | | 100% |

Replacement Tree

| Species | Quercus berberidifolia | |
|---------------------------------------|------------------------|----------|
| Size (trunk diameter, inches, inches) | 15-gallon | 0.75 |
| Cross-sectional Area (square inches) | | .4 |
| Cost | | \$ 63 |

Calculations

| Unit Tree Cost (\$/sq.in.) | \$ 142.60 |
|------------------------------------|-----------------|
| Basic Replacement Cost | \$ 96,808.32 |
| Depreciated Functional Replacement | |
| Cost | \$ 38,723.33 |

| Installation of Replacement Tree | |
|----------------------------------|----------------|
| Maintenance during establishment | |
| Total Additional Costs | \$ 2,000.00 |

| Total Functional Replacement Cost | \$ 40,723.33 |
|-----------------------------------|--------------|
| Rounded Estimate | \$ 40,700.00 |



Tree #11 - Tucker oak (Quercus john-tuckeri)





Appraised Values and Photographs

Tree #11 - Tucker oak (Quercus john-tuckeri)

| Subject Tree | Tree #11 |
|--------------|----------|
|--------------|----------|

| Species | Quercus john-tuckeri | | |
|----------------------------------|---|-----|------|
| Trunk diameter, inches (inches) | | | 2.9 |
| Cross-sectional Area (square inc | hes) | | 6.6 |
| Condition Rating | | | 25% |
| Health | Tree appears to be in decline, canopy is extremely sparse | 20% | |
| Structure | Structure appears normal | 80% | |
| Form | Form is fair | 45% | |
| Functional Limitations | None | | 100% |
| External Limitations | None | | 100% |

Replacement Tree

| Species | Quercus berberidifolia | |
|--------------------------------------|------------------------|----------|
| Size (trunk diameter, inches) | 15-gallon | 0.75 |
| Cross-sectional Area (square inches) | | 0.4 |
| Cost | | \$ 63 |

Calculations

| Unit Tree Cost (\$/sq.in.) | \$ 142.60 |
|------------------------------------|--------------|
| Basic Replacement Cost | \$ 941.92 |
| Depreciated Functional Replacement | |
| Cost | \$ 235.48 |

| Installation of Replacement Tree | |
|----------------------------------|----------------|
| Maintenance during establishment | |
| Total Additional Costs | \$ 2,000.00 |

| Total Functional Replacement Cost | \$ 2,235.48 |
|-----------------------------------|----------------|
| Rounded Estimate | \$ 2,200.00 |



Tree #12 - scrub oak (Quercus berberidifolia)





Appraised Values and Photographs

Tree #12 - scrub oak (Quercus berberidifolia)

| Subject Tree | Tree #12 |
|--------------|----------|
| Judiect Hee | 1166 #12 |

| Species | Quercus berberidifolia | | |
|----------------------------------|---|-----|------|
| Trunk diameter, inches (inches) | | | 3.2 |
| Cross-sectional Area (square inc | hes) | | 8.0 |
| Condition Rating | | | 25% |
| Health | Tree appears to be in decline, canopy is extremely sparse | 20% | |
| Structure | Structure is poor | 35% | |
| Form | Form is poor- not symmetrical and trunk is leaning | 25% | |
| Functional Limitations | None | | 100% |
| External Limitations | None | | 100% |

Replacement Tree

| Species | Quercus berberidifolia | |
|--------------------------------------|------------------------|----------|
| Size (trunk diameter, inches) | 15-gallon | 0.75 |
| Cross-sectional Area (square inches) | | 0.4 |
| Cost | | \$ 63 |

Calculations

| Unit Tree Cost (\$/sq.in.) | \$ 142.60 |
|------------------------------------|----------------|
| Basic Replacement Cost | \$ 1,146.88 |
| Depreciated Functional Replacement | |
| Cost | \$ 286.72 |

| Installation of Replacement Tree | |
|----------------------------------|----------------|
| Maintenance during establishment | |
| Total Additional Costs | \$ 2,000.00 |

| Total Functional Replacement Cost | \$ 2,286.72 |
|-----------------------------------|----------------|
| Rounded Estimate | \$ 2,300.00 |



Tree #26 - Tucker oak (Quercus john-tuckeri)



Tree #26 - Tucker oak (Quercus john-tuckeri)

| Subject Tree | Tree #26 |
|--------------|----------|
|--------------|----------|

| Species | Quercus john-tuckeri | | |
|--|---|-----|------|
| Trunk diameter, inches (inches) | | | 2.1 |
| Cross-sectional Area (square inches) Condition Rating | | | 3.5 |
| | | | 90% |
| Health | Tree health appears good | 90% | |
| Structure | Structure appears normal for this species | 90% | |
| Form | Canopy is symmetric | 90% | |
| Functional Limitations | None | | 100% |
| External Limitations | None | | 100% |

Replacement Tree

| Species | Quercus berberidifolia | | |
|--------------------------------------|------------------------|--|------|
| Size (trunk diameter, inches) | 15-gallon | | 0.75 |
| Cross-sectional Area (square inches) | | | 0.4 |
| Cost | | | 63 |

Calculations

| Unit Tree Cost (\$/sq.in.) | \$ | 142.60 |
|------------------------------------|----|--------|
| Basic Replacement Cost | | 493.92 |
| Depreciated Functional Replacement | | |
| Cost | \$ | 444.53 |

| Installation of Replacement Tree | |
|----------------------------------|----------------|
| Maintenance during establishment | |
| Total Additional Costs | \$ 2,000.00 |

| Total Functional Replacement Cost | \$ 2,444.53 |
|-----------------------------------|----------------|
| Rounded Estimate | \$ 2,400.00 |



Attachment D

Tree Protection Recommendations

Attachment D

Tree Protection Recommendations

Oak Tree Survey Report for the Bouquet Canyon Road Project, Santa Clarita County, CA

General Construction Site Recommendations

- A minimum 4-foot tall, brightly colored, synthetic fence should be installed around the
 outermost edge of the protected zone of trees that are designated for retention onsite. Encroachment into the fenced areas should be restricted to the minimum amount
 feasible and fencing should remain in place until all construction activities have ceased
- The fenced area should be kept clear of building materials, waste, and excess soil.
- No digging, trenching, compaction, or other soil disturbance should be allowed in the fenced area.
- The storage of construction equipment or hazardous materials such as gasoline, oil, or other toxic chemicals should not be allowed in or adjacent to the fenced area.
- Storage areas for equipment, soil, and construction materials as well as burn sites (if permitted), cement washout pits, and construction work zones should be kept away from protected trees and outside the fenced in area.
- Cable, chain, rope or signage should not be attached to retained trees.
- Designated roads and parking areas should be established. All construction personnel should be restricted to driving and parking in designated areas. Discharge of exhaust from construction vehicles and equipment should not be allowed near the protected zone of trees.
- Grade changes should be avoided near fenced areas to the maximum extent possible.

Recommendations for Construction Activities in the Vicinity of Retained Trees

- All necessary clearance pruning should be conducted by a Certified Tree Worker or Certified Arborist.
- Trenching within the dripline of retained trees should be avoided to the maximum extent practicable and kept a minimum distance of 10 times the diameter of the tree away from its trunk. If necessary, this trenching should be conducted using hand excavation or compressed air to reduce impacts to tree roots. Machine trenching should not be allowed within the dripline of retained trees. If pipes must be installed closer to the tree than a distance of 10 times the diameter of the tree away from its trunk, they should be bored beneath the tree a minimum of 3 feet below the ground surface to reduce impacts to roots.
- Excavation should also be minimized within the dripline of retained trees. Construction
 within the dripline of retained trees should be conducted in a manner that minimizes
 excavation and provides for the best preservation of roots as determined by the Project
 Arborist.
- If tree roots are severed outside of the fenced area, they should be severed cleanly and kept moist. All exposed roots outside of fenced areas should be covered with protective material during construction such as mulch or plywood sheets to reduce soil



Attachment D

Tree Protection Recommendations

Oak Tree Survey Report for the Bouquet Canyon Road Project, Santa Clarita County, CA

- compaction. Protective material should be removed upon completion of construction activities.
- Trenching and excavation should be avoided during hot, dry, weather and trees shall be watered before, during, and after trenching and excavation within the dripline of retained trees to offset water loss due to cut roots.
- Grading within the driplines of retained trees should be avoided wherever feasible.
- To prevent soil compaction, several inches of wood chips should be spread in the root zone area and covered with steel plates.

Recommendations for Protection of Trees Post-Construction

- Post-construction inspections of the trees should be conducted by a Certified Arborist or Certified Tree Worker to determine if retained trees are stressed (e.g., water stress, nutrient stress) or damaged (e.g., broken branches, trunk damage). Appropriate corrective actions should be implemented as necessary. Such corrective actions may include application of root stimulant to encourage new root growth in trees that have a significant portion of their roots lost due to cutting or soil compaction.
- Aeration of soil by vertical mulching or similar technique should be implemented around retained trees to offset the impacts of soil compaction that has already occurred due to construction activities and other site uses.
- Long term maintenance should also be conducted by a Certified Arborist or tree care specialist to assist the trees with recovering from construction related stress and may include watering, fertilization, pruning, and/or pest/disease control.



"Donut Hole" Parcel Addendum

Memorandum

HELIX Environmental Planning, Inc. 16485 Laguna Canyon Road, Suite 150 Irvine, CA 92618 949.234.8770 tel 619.462.0552 fax www.helixepi.com



Date: October 27, 2021

To: Mr. Peter Vanek

Integral Communities 888 San Clemente Drive Newport Beach, CA 92660

From: Daniel Torres, HELIX Environmental Planning, Inc.

Subject: Oak Tree Survey Addendum, Additional Survey Area

HELIX Project: 00357.00025.001

Message:

The oak tree survey report¹ and tree appraisal addendum² were both dated August 16, 2021. Since submittal of these reports, an additional property along Bouquet Canyon Road was added to the project site (Additional Survey Area; see Figure 5, *Impacts to Oak Trees*). The additional survey area was analyzed as part of the Project's EIR. However, this property was not owned by the project proponent during the time of the oak tree survey, and therefore, an oak tree survey was not performed within this area.

On October 19, 2021, HELIX International Society of Arboriculture (ISA) Certified Arborist Daniel Torres (WE-12249) performed an oak tree survey within the additional survey area. The purpose of the survey was to document the presence of (1) oak trees with at least one trunk over 6 inches in circumference at a point 4.5 feet above natural grade, and (2) Heritage Oak Trees within the additional survey area.

No oak trees, including Heritage trees, were found within the additional survey area.

If you have any questions regarding the information presented in this memorandum, please contact me at DanielT@helixepi.com or at (949) 234-8770.

Enclosures:

Figure 5: Impacts to Oak Trees

¹ HELIX Environmental Planning. 2021. Oak Tree Survey Report for the Bouquet Canyon Road Project. August.

² HELIX Environmental Planning. 2021. Addendum to the Oak Tree Survey Report for the Bouquet Canyon Road Project. August.



Attachment B

Davenport Oak Tree Survey Report



Horticulturists and Registered Consulting

ARBORISTS

August 15, 2021

Peter Vanek Vice President of Forward Planning Integral Communities 888 San Clemente, Suite 100 Newport Beach, California 92660

Re: Oak Tree Health Assessment
Davenport Trailhead Site – 28601 and 28635 Bouquet Canyon Road, Santa Clarita, California

Dear Mr. Vanek,

This letter is presented in response to your request for arboricultural consulting services. You requested a health assessment of 20 oak trees located on and immediately adjacent to 28601 and 28635 Bouquet Canyon Road, Santa Clarita, California. These properties are held by Integral Communities and are the proposed site of the project known as the 'Davenport Trailhead'.

On August 12, 2021, I conducted a site visit to perform a health evaluation of the 20 oak trees identified in the enclosed tree location exhibit (by Helix Environmental Planning) provided to us by you. The trees were assessed for health and structural integrity, and photographs were recorded to support my opinions. No other information was gathered or recorded regarding mapped tree trunk and canopy locations, genera or species identification, impact analysis, etc. I used Helix's exhibit to locate the trees and to fill in the tree number and species listings in the enclosed table.

Table 1 on page 5 summarizes my opinions on the trees' health ratings. Based on the health and structure rating, each tree was assigned an overall grade. In our opinion, both health and structure must be addressed when evaluating the condition of a tree. Definitions for the grading structure are enclosed before the table. Enclosed exhibits and representative photographs illustrate the setting, the oak trees, and their condition at the time of the site visit. Additional photographs are available upon request.

With the exception of one tree, Tree #84, the subject oaks appear to be in fair-to-poor condition. Severe drought stress is evident and most of the trees exhibit sparse foliage, cavities, poor form due to close growing conditions, and two trees were found to have active bee hives.

Please feel free to call or email me with any questions. Thank you.

Very truly yours,

Christy Cuba, Senior Arborist

Registered Consulting Arborist, #504

International Society of Arboriculture (ISA) Certified Arborist, #WE1982A

ISA Tree Risk Qualified

AMERICAN SOCIETY OF SO

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Sierra Madre Office

80 West Sierra Madre Boulevard, #241 Sierra Madre, California 91024 Office: 626.428.5072



HEALTH AND STRUCTURE GRADE DEFINITIONS

Health and structure ratings are based on an archetypal tree of the same species, determined by a subjective evaluation of physiological health, aesthetic quality, and structural integrity. Overall physiological condition (health) and structural condition are rated A-D and F:

Health

- A) Outstanding Exceptional trees comprising above-average foliage production and vigor for their age class; exhibiting very good to excellent health as evidenced by normal to exceptional shoot growth during the current growing season, good bud development and leaf color, lack of leaf, twig or branch dieback throughout the crown, and the absence of decay, bleeding, or cankers. Common leaf and/or twig pests may be noted at very minor levels.
- B) Above average Good to very good trees that exhibit minor necrotic (dead) or physiological symptoms of stress and/or disease; shoot growth is less than reasonably expected, leaf color is less than optimal in some areas, the crown may be thinning, minor levels of leaf, twig, and branch dieback may be present, and minor areas of decay, bleeding, or cankers may be manifesting. Minor amounts of epicormic growth may be present. Minor amounts of fire damage or mechanical damage may be present. Still healthy, but with moderately diminished vigor and vitality. No significant decline noted.
- C) Average Average, moderately good trees whose growth habit and physiological or fire-induced symptoms indicate an equal chance to either decline or continue with good health into the near future. Most of these trees exhibit moderate to significant small dead material in outer crown areas, decreased shoot growth, and diminished leaf color and mass. Some stem and branch dieback is usually present and epicormic growth may be moderate to extensive. Cavities, pockets of decay, relatively significant fire damage, bark exfoliation, or cracks may be present. Moderate to significant amounts of insect or disease symptoms may be present; the tree may be shaded or crowded in such a way that it is expected to negatively impact the lifespan of the tree. Tree may be in early decline.
- D) Below Average/Poor trees whose growth habit and physiological or fire-induced symptoms indicate significant, irreversible decline. Most of these trees exhibit significant dieback of wood in the crown, possibly accompanied by significant epicormic sprouting. Shoot growth and leaf color and mass is either significantly diminished or nonexistent throughout the crown. Cavities, pockets of decay, significant fire damage, bark exfoliation, and/or cracks may be present. Significant amounts of insect or disease symptoms may be present; the tree may be shaded or crowded in such a way that it has negatively impacted the lifespan of the tree. Tree appears to be in irreversible decline.
- F) **Dead or in spiral of decline** this tree exhibits very little to no signs of life.

Structure

- A) Outstanding Trees with outstanding structure for their species exhibit trunk and branch arrangement and orientation that results in a sturdy form or architecture that can resist failure under normal circumstances. The spacing, orientation, and size of the branches relative to the trunk are quintessential for the species and free from defects. No outward signs of decay or pathological disease is present. Some trees exhibit naturally inherent branching defects, like multiple, narrow points of attachment from one point on the trunk, which would preclude them from achieving an "A" grade.
- B) Above average Trees with good to very good structure for their species. They exhibit trunk and branch arrangement and orientation that result in a relatively sturdy form or architecture that resists failure under normal circumstances, but may have some mechanical damage, over-pruning, or other minor structural defects. The spacing, orientation, and size of the branches relative to the trunk are still in the normal range for the species, but they exhibit a minor degree of defects. Minor, sub-critical levels of decay or pathological disease may be present, but the degree of damage is not yet structurally significant. Trees that exhibit naturally inherent branching defects, like multiple, narrow points of attachment from one point on the trunk, would generally fall in to this category. A small percentage of the canopy may be shaded or crowded, but not in such a way that it is expected to negatively impact the structural integrity or lifespan of the tree.





- C) Average Trees with moderately good structure for their species, but with obvious defects. They exhibit trunk and branch arrangement and orientation that result in a less than sturdy form or architecture, which reduces their resistance to failure under normal circumstances. Moderate levels of mechanical damage, over-pruning, or other structural defects may be present. The spacing, orientation, and size of some of the branches relative to the trunk are not in the normal range for the species. Moderate to significant levels of decay or pathological disease may be present that increase the likelihood of structural instability. Influences such as an excessive trunk lean, slope erosion, root pruning, or other growth-inhibiting factors may be present. A moderate to significant percentage of the canopy may be shaded or crowded in such a way that it is expected to negatively impact the structural integrity or lifespan of the tree. Risk of full or partial failure in the near future appears to be moderately elevated.
- D) Well Below Average/Poor Trees with poor structure for their species and with obvious defects. They exhibit trunk and branch arrangement and orientation that result in a significantly less than sturdy form or architecture, significantly reducing their resistance to failure under normal circumstances. Significant levels of mechanical damage, over-pruning, or other structural defects may be present. The spacing, orientation, and size of many of the branches relative to the trunk are not in the normal range for the species. Significant levels of decay or pathological disease may be present that increase the likelihood of structural instability. Influences such as an excessive trunk lean, slope erosion, root pruning, or other growth-inhibiting factors may be present. A significant percentage of the canopy may be shaded or crowded in such a way that it is expected to negatively impact the structural integrity or lifespan of the tree. Risk of full or partial failure in the near future appears to be advanced.
- F) Severely Compromised trees with very poor structure and numerous or severe defects due to growing conditions, historical or recent pruning, mechanical damage, history of limb or trunk failures, advanced and irreparable decay, disease, or severe fire damage. Trees with this rating are in severe, irreparable decline, or are barely alive. Risk of full or partial failures in the near future may be severe.



ARBORIST STATEMENT

Arborists are tree specialists who use their education, knowledge, training and experience to examine trees, recommend measures to enhance the beauty and health of trees, and attempt to reduce the risk of living near trees. Clients may choose to accept or disregard the recommendations of the arborist, or to seek additional advice.

Arborists cannot detect every condition that could possibly lead to the structural failure of a tree. Trees are living organisms that fail in ways we do not fully understand. Conditions are often hidden within trees and below ground. Arborists cannot guarantee that a tree will be healthy or safe under all circumstances, or for a specified period of time. Likewise, remedial treatments, like any medicine, cannot be guaranteed.

Treatment, pruning and removal of trees may involve considerations beyond the scope of the arborist's services, such as property boundaries, property ownership, site lines, disputes between neighbors, and other issues. Arborists cannot take such considerations into account unless complete and accurate information is disclosed to the arborist. An arborist should then be expected to reasonably rely upon the completeness and accuracy of the information provided.

Trees contribute greatly to our enjoyment and appreciation of life. Nonetheless, they are subject to the laws of gravity and physiological decline. Any tree, whether it has visible weaknesses or not, will fail if the forces applied exceed the strength of the tree or its parts. Therefore, neither arborists nor tree owners can be reasonably expected to warrant unfailing predictability or elimination of risk.

Trees can be managed, but they cannot be controlled. To live near trees is to accept some degree of risk. The only way to eliminate all risk associated with trees is to eliminate all trees.

No risk assessments were requested or performed for this project.

Health and structure information presented in this report represents the condition of the tree(s) at the time and date of assessment.

Execution of any/all recommendations for cultural care, maintenance, pest or disease treatment, pruning, tree removal, etc., when made verbally or in writing by the arborist, is/are the sole responsibility of the client.



TABLE 1 - SUMMARY OF OAK TREE HEALTH ASSESSMENT - DAVENPORT TRAILHEAD PROJECT

| TREE # | COMMON NAME | BOTANICAL NAME | HEALTH GRADE (A -D, F) | STRUCTURE GRADE (A-D, F) | OVERALL GRADE (A-D, F) |
|--------|-------------------|------------------------------------|---------------------------|-----------------------------|---------------------------|
| 65 | Tucker's oak | Quercus john-tuckeri | С | С | С |
| 66 | Tucker's oak | Quercus john-tuckeri | D | C- | D |
| 67 | Tucker's oak | Quercus john-tuckeri | С | С | С |
| 68 | Tucker's oak | Quercus john-tuckeri | C- | С | C- |
| 69 | Tucker's oak | Quercus john-tuckeri | D | C- | D |
| 70 | Tucker's oak | Quercus john-tuckeri | С | С | С |
| 71 | Tucker's oak | Quercus john-tuckeri | С | С | С |
| 72 | Tucker's oak | Quercus john-tuckeri | С | С | С |
| 73 | Tucker's oak | Quercus john-tuckeri | С | С | С |
| 74 | Tucker's oak | Quercus john-tuckeri | С | С | С |
| 75 | Tucker's oak | Quercus john-tuckeri | С | С | С |
| 76 | Interior live oak | Quercus wislizenii var. wislizenii | С | С | С |
| 77 | Tucker's oak | Quercus john-tuckeri | С | С | С |
| 78 | Interior live oak | Quercus wislizenii var. wislizenii | С | С | С |
| 79 | Tucker's oak | Quercus john-tuckeri | С | С | С |
| 80 | Tucker's oak | Quercus john-tuckeri | С | С | С |
| 81 | Blue oak | Quercus douglasii | С | С | C- |
| 82 | Tucker's oak | Quercus john-tuckeri | D | С | C- |
| 83 | Tucker's oak | Quercus john-tuckeri | C- | С | C- |
| 84 | Tucker's oak | Quercus john-tuckeri | A- | В | В |

Notes: Tree numbers and species identification are taken from the enclosed Helix Tree Location exhibit.

Oar bergassociates



Assessed Oak Tree Locations (Not to Scale)



Facing west – illustrating Tree #84

Carlberg_{associates}



Facing south – illustrating Trees #79, 80, and 81, from left to right. Tree #79 recently lost a large limb when the adjacent Tree #78 (left and out of photo) suffered two massive limb failures. Tree #81 has cavities and an active bee hive in in the main trunk.

Carlberg_{associates}



Facing roughly southeast – illustrating Trees #79, 78, 77, 76, 75, 74, and 71, from right to left. Tree #78 (center) recently suffered two massive limb failures. The failed half of Tree #78 is in the foreground.

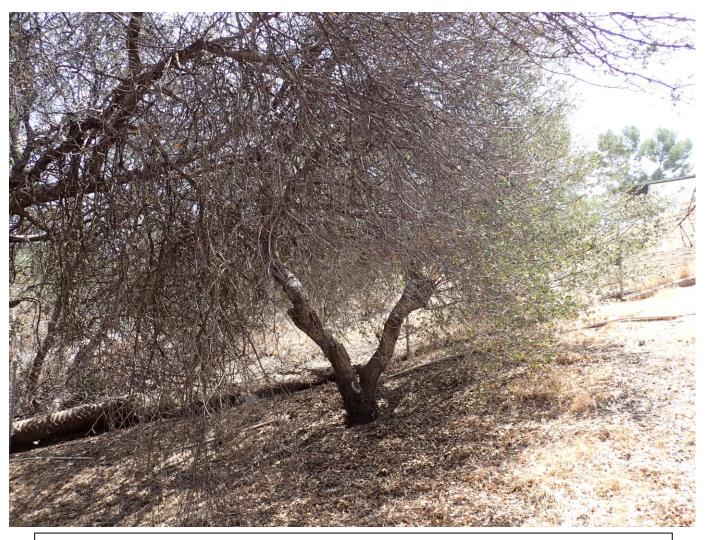


Facing roughly east – illustrating Trees #65-78 from left to right on the slope.

OAK TREE HEALTH ASSESSMENT - DAVENPORT TRAILHEAD, SANTA CLARITA



Facing north – illustrating Trees #78's limb failures. Cavities are present in the trunk and scaffolds, and this tree has an active bee hive in the main trunk.



Facing east – illustrating Tree 65 (center) and a dead portion of the canopy of Tree #68 in the foreground.

Carlberg ASSOCIATES



Facing roughly east – illustrating Tree #83 on the left and Tree #82 on the right.

Attachment C

Updated Oak Tree Survey Data

Oak Tree Survey Report for the Bouquet Canyon Road Project, Santa Clarita, CA

| Tree | | Circum- | Height | | | Can | ору | Exten | t (feet | t) | | Physical | Horticultural | Oak | | Proposed |
|------------|-------------------------------------|-------------------|--------|----|----|-----|-----|-------|---------|----|----|---|--|----------------|-------------------|----------|
| Tag No. | Species | ference (in) | (ft) | N | NE | E | SE | S | sw | W | NW | Evaluation | Evaluation | Tree Rating | Comments | Impacts |
| 1 | Tucker oak Quercus john-tuckeri | 6 | 10 | 3 | 1 | 1 | 5 | 6 | 1 | 1 | 3 | Deep v-crotch at 7", canopy is N-S oriented, does not extend E- W. | Appears vigorous, some small galls present, some old, healed trunk injuries. | В | | Removal |
| 2 | Tucker oak Quercus john-tuckeri | 7.5 | 9 | 8 | 6 | 3 | 6 | 5 | 6 | 6 | 6 | Trunk leaning northeast, canopy overall well-distributed. | Galls, insect damage. | В | | Removal |
| 3 | coast live oak Quercus agrifolia | 12.75 | 16 | 4 | 3 | 4 | 6 | 7 | 6 | 5 | 6 | Tree leaning south. | Has stress- related suckers, sapsucker holes. | В | No tag; off-site. | Removal |
| 4 | Tucker oak Quercus john-tuckeri | 10, 9, 7 | 9 | 2 | 6 | 3 | 1 | 4 | 3 | 4 | 3 | Tree has been topped. | All epicormic growth, tree in severe decline. | D | No tag; off-site. | Removal |
| 5 | Tucker oak Quercus john-tuckeri | 11.75, 12, 8.5 | 15 | 9 | 8 | 6 | 5 | 4 | 4 | 5 | 10 | Tree leaning north, away from adjacent eucalyptus. | Some galls present, bark damage present (chainsaw cut)-healing. | В | No tag; off-site. | Removal |
| 6 | Tucker oak Quercus john-tuckeri | 9, 13, 13 | 16 | 4 | 6 | 9 | 15 | 10 | 5 | 5 | 2 | Large failure at v-crotch with decay (old main stem), exposed roots. | Declining, significant amount of epicormic sprouting. | D | | Removal |
| 7 | Tucker oak Quercus john-tuckeri | 18, 19, 24 | 22 | 10 | 10 | 10 | 8 | 15 | 10 | 10 | 9 | Exposed roots, wide angle crotch at base. | Declining, epicormic sprouting, canopy dieback. | D | | Removal |



A-1

| Tree | | Circum- | Height | | | Can | ору | Exten | t (feet | t) | | Physical | Horticultural | Oak | | Proposed |
|------------|--|-----------------|--------|----|----|-----|-----|-------|---------|----|----|---|--|----------------|--|-----------------------|
| Tag No. | Species | ference (in) | (ft) | N | NE | E | SE | S | sw | W | NW | Evaluation | Evaluation | Tree Rating | Comments | Impacts |
| 8 | Tucker oak Quercus john-tuckeri | 9.75, 6 | 5 | 2 | 8 | 2 | 2 | 5 | 10 | 2 | 4 | Severe lean to south, on steep slope. | Tree is being shaded, very sparse canopy, canopy dieback. | D | Stump shoots from old dead tree. | Removal |
| 9 | Tucker oak Quercus john-tuckeri | 20 | 15 | 6 | 3 | 12 | 12 | 5 | 5 | 2 | 7 | Exposed roots, on steep slope. | Large split with internal decay in trunk, internal decay throughout. | D | | Removal |
| 10 | blue oak Quercus douglasii | 85, 36 | 45 | 10 | 15 | 15 | 20 | 20 | 25 | 10 | 10 | Main trunk split long ago, large trunk leaning north, southern-most trunk with severe lean south, on steep slope. | Lots of mistletoe, canopy very sparse. | D | | Removal |
| 11 | Tucker oak Quercus john-tuckeri | 9 | 16 | 5 | 3 | 3 | 4 | 2 | 6 | 2 | 2 | On steep slope. | Most of canopy is dead, mistletoe present, epicormic sprouting. | D | Tree is almost completely dead. | Removal |
| 12 | scrub oak Quercus berberidifolia | 10 | 15 | 2 | 8 | 8 | 8 | 2 | 2 | 2 | 2 | Trunk leaning to north, multi-stem, one stem is dead, on steep slope. | Epicormic growth, very sparse canopy. | D | | Major Encroachment |



Oak Tree Survey Report for the Bouquet Canyon Road Project, Santa Clarita, CA

| Tree | | Circum- | Height | | | Can | ору | Exten | t (feet | t) | | Physical | Horticultural | Oak | | Proposed |
|------------|--|-----------------------------|--------|----|----|-----|-----|-------|---------|----|----|---|---|----------------|----------|-----------------------|
| Tag No. | Species | ference (in) | (ft) | N | NE | E | SE | S | sw | w | NW | Evaluation | Evaluation | Tree Rating | Comments | Impacts |
| 13 | scrub oak Quercus berberidifolia | 12, 9.5, 10, 10 | 15 | 5 | 6 | 8 | 8 | 9 | 5 | 2 | 2 | One dead stem, on steep slope. | Epicormic sprouting, severe decline, some galls present. | D | | Minor Encroachment |
| 14 | scrub oak Quercus berberidifolia | 22.5. 22, 17, 10, 7.5 | 20 | 12 | 12 | 12 | 5 | 12 | 10 | 10 | 12 | Some stems have internal decay, on steep slope. | Epicormic sprouting, mistletoe present, tree in decline. | D | | Avoided |
| 15 | scrub oak Quercus berberidifolia | 7.5. 7.5, 8, 5.5 | 14 | 5 | 3 | 8 | 6 | 8 | 5 | 5 | 9 | Good balance, on steep slope. | Some mistletoe present, significant amount of epicormic sprouting, some canopy dieback. | С | | Avoided |
| 16 | Tucker oak Quercus john-tuckeri | 9.5 | 10 | 1 | 1 | 1 | 10 | 10 | 10 | 2 | 1 | Most of canopy is in the south, shaded in the north, on steep slope. | Some dieback present, significant amount of epicormic sprouting. | С | | Avoided |
| 17 | Tucker oak Quercus john-tuckeri | 5.5, 6.5, 7, 9 | 12 | 7 | 3 | 3 | 4 | 8 | 8 | 8 | 8 | Some included bark at v- crotch about 5" above ground, tree on steep slope. | Small amounts of dieback and epicormic sprouting present. | В | | Avoided |



A-3

Oak Tree Survey Report for the Bouquet Canyon Road Project, Santa Clarita, CA

| Tree | | Circum- | Height | | | Can | ору | Exten | t (feet | t) | | Physical | Horticultural | Oak | | Proposed |
|------------|------------------------------------|--------------------------------|--------|----|----|-----|-----|-------|---------|----|----|---|--|----------------|--|----------|
| Tag No. | Species | ference (in) | (ft) | N | NE | E | SE | S | sw | W | NW | Evaluation | Evaluation | Tree Rating | Comments | Impacts |
| 18 | blue oak Quercus douglasii | 40.5, 24, 47, 52.5, 48 | 35 | 30 | 25 | 25 | 28 | 27 | 30 | 25 | 25 | Large multi- stem tree with big split and decay, all stems leaning towards the south, tree on steep slope. | Tree is experiencing some dieback, epicormic sprouting, sap sucker and borer holes present. | С | Tree tagged 61 in old survey, probably burned. | Avoided |
| 19 | Tucker oak Quercus john-tuckeri | 22, 16.5, 17, 13, 10, 11 | 30 | 18 | 15 | 10 | 15 | 15 | 22 | 15 | 15 | Included bark in all crotches, tree on a steep slope. | Appears vigorous, some cankers, canopy is somewhat sparse. | В | | Avoided |
| 20 | Tucker oak Quercus john-tuckeri | 17.5, 17, 14, 14 | 15 | 10 | 10 | 10 | 7 | 8 | 8 | 15 | 10 | Tree on steep slope, nexus of stems is 1' above ground. | Some canopy dieback present. | В | | Avoided |
| 21 | Tucker oak Quercus john-tuckeri | 21, 25, 20.5, 9 | 20 | 20 | 20 | 10 | 20 | 18 | 10 | 15 | 20 | Multiple trunks all leaning in different directions, tree on a steep slope. | Most of canopy is epicormic sprouting, borer and sapsucker holes are present. | С | | Avoided |
| 22 | Tucker oak Quercus john-tuckeri | 15, 19, 18.5, 19, 20 | 25 | 20 | 3 | 2 | 1 | 1 | 20 | 20 | 20 | Tree is on a steep slope, included bark present. | Tree appears healthy but is being shaded, canopy is somewhat sparse, significant dieback is present. | С | | Avoided |



A-4

| Tree | | Circum- | Height | | | Can | ору І | Exten | t (feet | t) | | Physical | Horticultural | Oak | | Proposed |
|------------|------------------------------------|---------------------------|--------|----|----|-----|-------|-------|---------|----|----|---|---|----------------|--|-----------------------|
| Tag No. | Species | ference (in) | (ft) | N | NE | E | SE | S | sw | W | NW | Evaluation | Evaluation | Tree Rating | Comments | Impacts |
| 23 | Tucker oak Quercus john-tuckeri | 44.5 | 35 | 20 | 20 | 5 | 1 | 1 | 10 | 18 | 20 | Strong lean to the north. | Significant amount of dieback in the lower canopy. | В | | Avoided |
| 24 | Tucker oak Quercus john-tuckeri | 18, 12.5, 42, 22.5 | 30 | 18 | 12 | 9 | 9 | 15 | 15 | 15 | 15 | V-crotch with included bark at 7", 1.5', and 2' above ground. | Some galls are present. | В | Tree tagged 60 in old survey. | Avoided |
| 25 | Tucker oak Quercus john-tuckeri | 9, 9, 10, 6 | 9 | 8 | 8 | 8 | 5 | 2 | 6 | 8 | 8 | Tree is on a steep slope. | Some epicormic sprouting is present, fairly even canopy. | В | | Avoided |
| 26 | Tucker oak Quercus john-tuckeri | 6.5 | 10 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | Even canopy spread, tree growing in the open. | Some galls are present, canopy is dense and healthy. | А | Shrub form, more than 25 stems, all 1-3 inches in circumference. | Removal |
| 27 | Tucker oak Quercus john-tuckeri | 6 | 9 | 6 | 4 | 4 | 4 | 6 | 6 | 4 | 5 | Structurally good, open, even canopy. | Significant amount of epicormic growth, most leaves are affected by aphids. | D | Some mechanical damage on the east side of the trunk. | Minor Encroachment |
| 28 | Tucker oak Quercus john-tuckeri | 6.5 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | Tree is on a steep slope. | Some galls are present. | В | No tag; off-site. | Avoided |
| 29 | Tucker oak Quercus john-tuckeri | 10, 6, 6.5, 5.5, 11 | 9 | 10 | 4 | 9 | 7 | 4 | 5 | 6 | 7 | | Dense canopy, tree appears vigorous. | А | No tag; off-site. | Avoided |
| 30 | Tucker oak Quercus john-tuckeri | 9, 11 | 12 | 7 | 5 | 6 | 5 | 5 | 6 | 6 | 6 | | Dense canopy, tree appears vigorous. | А | No tag; off-site. | Avoided |



| Tree | | Circum- | Height | | | Can | ору I | Exten | t (feet | t) | | Dhysical | Horticultural | Oak | | Droposed |
|------------|------------------------------------|-------------------|--------|----|----|-----|-------|-------|---------|----|----|---|--|----------------|-------------------|---------------------|
| Tag No. | Species | ference (in) | (ft) | N | NE | E | SE | S | sw | W | NW | Physical Evaluation | Evaluation | Tree Rating | Comments | Proposed Impacts |
| 31 | Tucker oak Quercus john-tuckeri | 6.5, 8, 6.5 | 8 | 7 | 6 | 4 | 3 | 4 | 4 | 7 | 6 | | Dense canopy, tree appears vigorous. | А | No tag; off-site. | Avoided |
| 32 | Tucker oak Quercus john-tuckeri | 6 | 9 | 7 | 5 | 6 | 5 | 5 | 5 | 6 | 6 | | Dense canopy, tree appears vigorous. | А | No tag; off-site. | Avoided |
| 33 | Tucker oak Quercus john-tuckeri | 12, 9.5, 14.5 | 13 | 14 | 5 | 7 | 1 | 1 | 4 | 12 | 10 | Strong lean downhill. | Tree is vigorous, some minor boring insect damage, significant amount of stress-related sprouting at base. | С | No tag; off-site. | Avoided |
| 34 | Tucker oak Quercus john-tuckeri | 14.5, 11 | 14 | 4 | 5 | 3 | 9 | 7 | 10 | 13 | 3 | Good structure. | Tree appears vigorous, lots of stress-related sprouting at base, epicormic sprouting present. | С | No tag; off-site. | Avoided |
| 35 | Tucker oak Quercus john-tuckeri | 8, 13, 16, 9.5 | 15 | 10 | 10 | 7 | 5 | 3 | 9 | 4 | 7 | Internal decay present in one main trunk. | Significant amount of stress-related sprouting at base. | С | No tag; off-site. | Avoided |
| 36 | Tucker oak Quercus john-tuckeri | 6 | 12 | 5 | 6 | 6 | 4 | 5 | 5 | 5 | 4 | | Significant amount of epicormic sprouting, some galls present. | С | No tag; off-site. | Avoided |



Oak Tree Survey Report for the Bouquet Canyon Road Project, Santa Clarita, CA

| Tree | | Circum- | Height | | | Can | ору І | Exten | t (feet | t) | | Physical | Horticultural | Oak | | Proposed |
|------------|------------------------------------|-----------------|--------|----|----|-----|-------|-------|---------|----|----|--|--|----------------|-------------------|----------|
| Tag No. | Species | ference (in) | (ft) | N | NE | E | SE | S | sw | W | NW | Evaluation | Evaluation | Tree Rating | Comments | Impacts |
| 37 | Tucker oak Quercus john-tuckeri | 8 | 12 | 5 | 5 | 5 | 5 | 4 | 3 | 3 | 5 | | Significant amount of epicormic sprouting, some galls present. | С | No tag; off-site. | Avoided |
| 38 | Tucker oak Quercus john-tuckeri | 9.5, 10, 8.5 | 12 | 12 | 10 | 5 | 10 | 10 | 6 | 5 | 2 | Lean is causing bark to split. | Some internal decay and stress-related sprouting at the base is present. | С | No tag; off-site. | Avoided |
| 39 | Tucker oak Quercus john-tuckeri | 7 | 10 | 4 | 3 | 3 | 3 | 4 | 4 | 5 | 5 | | Stress-related sprouting at the base and epicormic sprouting is present. | С | No tag; off-site. | Avoided |
| 40 | Tucker oak Quercus john-tuckeri | 6, 5 | 12 | 5 | 4 | 7 | 8 | 8 | 6 | 7 | 5 | | Some galls are present, tree is in good health overall. | В | No tag; off-site. | Avoided |
| 41 | Tucker oak Quercus john-tuckeri | 8, 6 | 15 | 7 | 6 | 5 | 3 | 10 | 10 | 3 | 3 | Bark has a healing fissure down the middle of the trunk. | Some epicormic sprouting is present. | В | No tag; off-site. | Avoided |
| 42 | Tucker oak Quercus john-tuckeri | 6.5, 6 | 12 | 8 | 8 | 2 | 2 | 8 | 7 | 7 | 7 | Several branches are rubbing against each other. | Some galls are present. | В | No tag; off-site. | Avoided |
| 43 | Tucker oak Quercus john-tuckeri | 6, 4 | 12 | 5 | 5 | 3 | 4 | 4 | 6 | 7 | 7 | | Some epicormic sprouting is present. | В | No tag; off-site. | Avoided |



A-7

| Tree | | Circum- | Height | | | Can | ору | Exten | t (feet | t) | | Dhysical | Horticultural | Oak | | Proposed |
|------------|------------------------------------|-----------------------|--------|----|----|-----|-----|-------|---------|----|----|--|--|----------------|-------------------|----------|
| Tag No. | Species | ference (in) | (ft) | N | NE | E | SE | s | sw | w | NW | Physical Evaluation | Evaluation | Tree Rating | Comments | Impacts |
| 44 | Tucker oak Quercus john-tuckeri | 6, 6 | 12 | 7 | 8 | 9 | 5 | 3 | 3 | 7 | 7 | | Some canopy dieback is present. | С | No tag; off-site. | Avoided |
| 45 | Tucker oak Quercus john-tuckeri | 7, 6, 6, 6, 5 | 13 | 8 | 8 | 6 | 6 | 9 | 10 | 9 | 9 | Tree is in shrub form, several widely-spaced branches. | Some epicormic sprouting and galls are present. | В | No tag; off-site. | Avoided |
| 46 | Tucker oak Quercus john-tuckeri | 6, 6, 6, 6, 8, 8.5 | 9 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | Tree is in shrub form, several widely-spaced branches. | Some epicormic sprouting is present, tree exhibiting vigorous growth. | В | No tag; off-site. | Avoided |
| 47 | Tucker oak Quercus john-tuckeri | 6.5, 4 | 9 | 9 | 8 | 7 | 4 | 4 | 5 | 7 | 9 | Tree is leaning downslope causing fissures in some stems. | Main stem has a large fissure with internal decay. | С | No tag; off-site. | Avoided |
| 48 | Tucker oak Quercus john-tuckeri | 6, 5, 5 | 9 | 7 | 9 | 6 | 3 | 3 | 8 | 9 | 8 | Some healing cracks are present at the base of main stems. | Some galls are present, some canopy dieback. | В | No tag; off-site. | Avoided |
| 49 | Tucker oak Quercus john-tuckeri | 10, 6.5, 9.5 | 13 | 11 | 11 | 5 | 5 | 5 | 2 | 5 | 10 | Good structure. | Some dieback and significant amounts of epicormic sprouting are present. | С | No tag; off-site. | Avoided |
| 50 | Tucker oak Quercus john-tuckeri | 9, 7, 6, 6 | 13 | 2 | 8 | 8 | 7 | 7 | 7 | 2 | 2 | Good structure. | Significant amount of epicormic sprouting is present. | С | No tag; off-site. | Avoided |



| Tree | | Circum- | Height | | | Can | ору і | Exten | t (feet | t) | | Dhysical | Horticultural | Oak | | Proposed |
|------------|------------------------------------|------------------------------------|--------|----|----|-----|-------|-------|---------|----|----|---|--|----------------|-------------------|----------|
| Tag No. | Species | ference (in) | (ft) | N | NE | E | SE | S | sw | w | NW | Physical Evaluation | Evaluation | Tree Rating | Comments | Impacts |
| 51 | Tucker oak Quercus john-tuckeri | 15, 16, 16, 17 | 18 | 12 | 14 | 15 | 10 | 5 | 9 | 14 | 14 | V-crotches are 1' above ground, some chainsaw wounds are present. | Significant amount of epicormic sprouting is present. | С | No tag; off-site. | Avoided |
| 52 | Tucker oak Quercus john-tuckeri | 16.5, 10, 9.5, 17, 6, 9, 8.5 | 17 | 10 | 9 | 9 | 5 | 3 | 4 | 10 | 11 | Many stems, but good structure. | Significant amount of epicormic sprouting and some canopy dieback are present. | С | | Avoided |
| 53 | Tucker oak Quercus john-tuckeri | 13 | 19 | 5 | 8 | 6 | 3 | 2 | 2 | 5 | 5 | V-crotch at 6" and 4' above ground, tree has a slight lean. | Most of canopy is epicormic sprouting. | С | No tag; off-site. | Avoided |
| 54 | Tucker oak Quercus john-tuckeri | 10, 8, 10 | 17 | 11 | 11 | 5 | 5 | 3 | 3 | 5 | 5 | | Most of canopy is epicormic sprouting, significant canopy dieback is present. | С | No tag; off-site. | Avoided |
| 55 | Tucker oak Quercus john-tuckeri | 12 | 17 | 11 | 9 | 9 | 1 | 1 | 6 | 8 | 9 | Tree is leaning northeast. | Borer holes and internal decay are present. | С | No tag; off-site. | Avoided |
| 56 | Tucker oak Quercus john-tuckeri | 12, 11, 7, 7, 8, 10.5 | 15 | 8 | 8 | 6 | 8 | 9 | 10 | 9 | 7 | | Borer holes, some epicormic sprouting, internal decay, and canopy dieback are present. | С | No tag; off-site. | Avoided |



| Tree | | Circum- | Height | | | Can | ору | Exten | t (feet | t) | | Physical | Horticultural | Oak | | Proposed |
|------------|--|---|--------|----|----|-----|-----|-------|---------|----|----|---|--|----------------|--|----------|
| Tag No. | Species | ference (in) | (ft) | N | NE | E | SE | S | sw | W | NW | Evaluation | Evaluation | Tree Rating | Comments | Impacts |
| 57 | scrub oak Quercus berberidifolia | 9.5, 9.5, 7, 10, 8, 6.5, 6 | 12 | 9 | 10 | 10 | 7 | 5 | 9 | 9 | 9 | Tree is in shrub form, mostly shaded by surrounding trees. | Some galls and epicormic sprouting are present. | В | No tag; off-site. | Avoided |
| 58 | scrub oak Quercus berberidifolia | 7, 6 | 11 | 5 | 1 | 3 | 8 | 8 | 8 | 8 | 3 | Tree is in shrub form. | Canopy is dying back, significant amount of epicormic sprouting is present. | С | No tag; off-site. | Avoided |
| 59 | Tucker oak Quercus john-tuckeri | 8, 8, 8, 8, 8, 12.5 | 11 | 6 | 6 | 8 | 5 | 5 | 5 | 7 | 7 | Tree is in shrub form. | A healing fissure and internal decay are present in one of the main stems. | С | No tag; off-site. | Avoided |
| 60 | Tucker oak Quercus john-tuckeri | 6, 6, 6, 9, 4 | 8 | 6 | 6 | 8 | 5 | 7 | 9 | 9 | 9 | Stems are all widely-spaced, spread out, tree is in shrubby form. | Some canopy dieback is present. | В | No tag; off-site, there is a packrat midden in the middle of the trunks. | Avoided |
| 61 | Tucker oak Quercus john-tuckeri | 6, 6, 4, 5, 8, 6, 4, 4 | 9 | 8 | 6 | 6 | 6 | 6 | 7 | 9 | 8 | Tree is in shrub form, stems are spread out. | Some canopy dieback, epicormic sprouting, and galls are present. | В | | Avoided |
| 62 | Tucker oak Quercus john-tuckeri | 9, 7.5, 5.5, 6.5, 5.5, 8.5, 8, 6.5, 4, 5, 6 | 9 | 11 | 6 | 5 | 6 | 6 | 7 | 8 | 5 | | Cankers, galls, epicormic sprouting, and canopy dieback are present. | С | | Avoided |



Oak Tree Survey Report for the Bouquet Canyon Road Project, Santa Clarita, CA

| Tree | | Circum- | Height | | | Can | ору | Exten | t (fee | t) | | Physical | Horticultural | Oak | | Dronocod |
|------------|------------------------------------|-----------------|--------|----|----|-----|-----|-------|--------|----|----|---|---|----------------|--|---------------------|
| Tag No. | Species | ference (in) | (ft) | N | NE | E | SE | S | sw | w | NW | Evaluation | Evaluation | Tree Rating | Comments | Proposed Impacts |
| 63 | valley oak Quercus lobata | 12, 22 | 20 | 5 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | V-crotch at 1.5' and 5' with included bark, tree is growing straight. | Vigorous growth, healthy specimen, no obvious signs of disease. | А | Circumference and canopy were estimated- tree is on private property. | Avoided |
| 64 | Tucker oak Quercus john-tuckeri | 17, 32.5 | 19 | 10 | 10 | 10 | 10 | 10 | 8 | 8 | 10 | Included bark, exposed roots, tree is growing on a steep slope. | Vigorous growth, some canopy dieback is present. | В | | Avoided |



A-11

Appendix B

Addendum to the Cultural Resources Survey and Assessment



Bouquet Canyon Road Project

Addendum to the Cultural Resources Survey and Assessment

February 2022 | 00357.00025.001

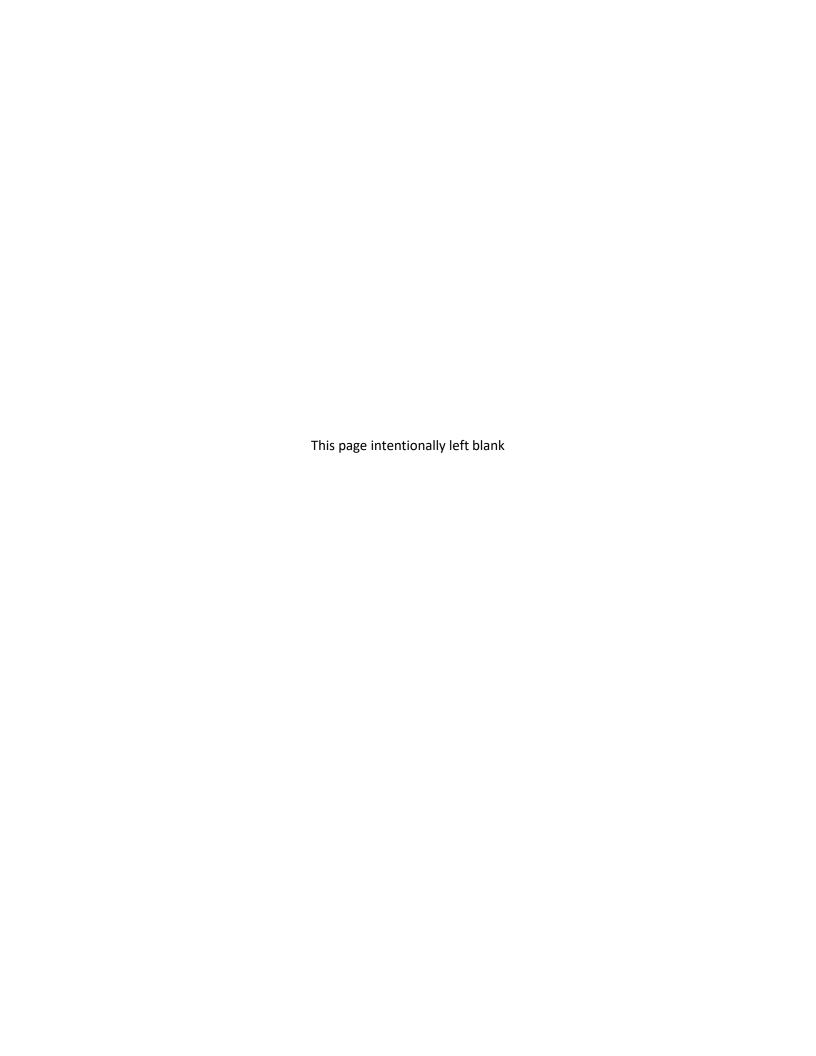
Prepared for:

Integral Communities

888 San Clemente Drive, Suite 100 Newport Beach, CA 92660

Prepared by:

HELIX Environmental Planning, Inc. 7578 El Cajon Boulevard La Mesa, CA 91942



National Archaeological Database Information

Authors: Trevor Gittelhough, M.A., RPA

Firm: HELIX Environmental Planning, Inc.

Client/Project: Integral Communities / Bouquet Canyon Road Project

Report Date: February 2022

Report Title: Addendum to the Cultural Resources Inventory and Assessment for the

Bouquet Canyon Road Project, Los Angeles County, California

Type of Study: Cultural Resources Survey and Assessment

New Sites: 28601 Bouquet Canyon Road

Updated Sites: None

USGS Quad: Mint Canyon 7.5-minute Quadrangle

Acreage: Approximately 7.5 acres

Key Words: Los Angeles County; Township 4 North, Range 15 West; Santa Clarita;

Bouquet Canyon; Bouquet Canyon Road; Copper Hill Road; Davenport

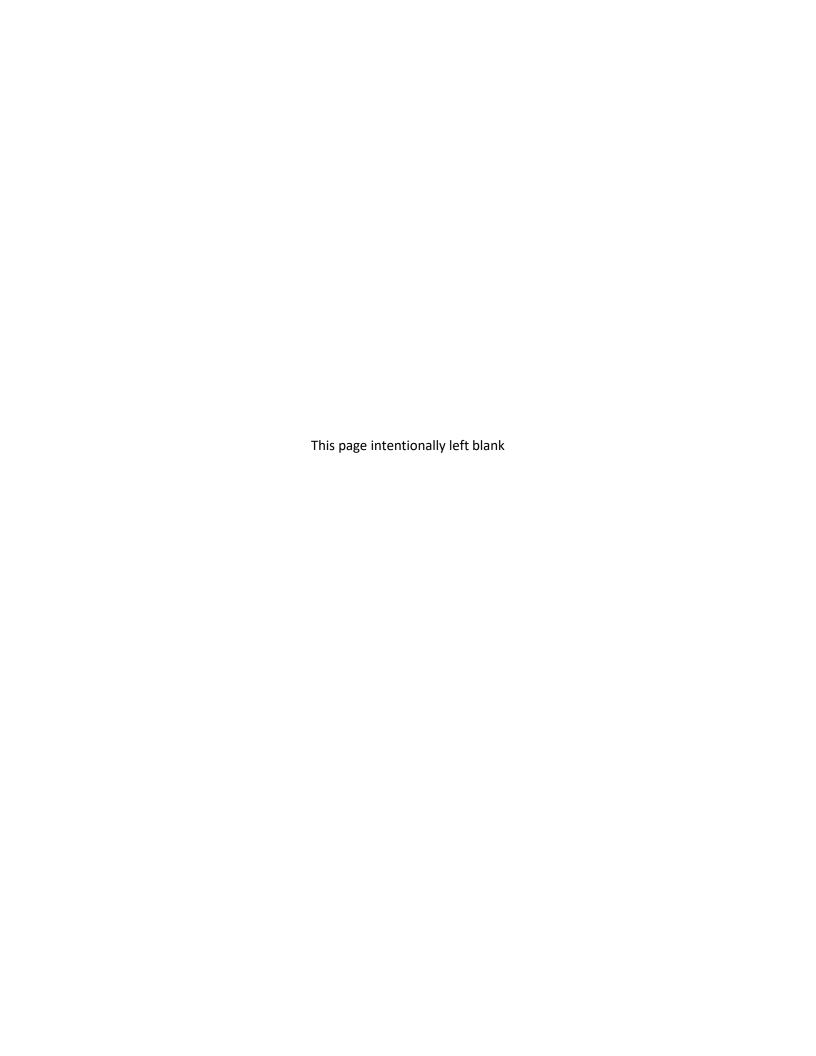


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ACRONYMS AND ABBREVIATIONS

APN Assessor's Parcel Number

BLM Bureau of Land Management

CEQA California Environmental Quality Act

CHRIS California Historical Resources Information System

CRHR California Register of Historical Resources

EIR Environmental Impact Report

GLO General Land Office

HELIX Environmental Planning, Inc.

NAHC Native American Heritage Commission
NRHP National Register of Historic Places

OHP Office of Historic Preservation

SCCIC South Central Coastal Information Center

SCH State Clearinghouse

USGS U.S. Geological Survey

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EXECUTIVE SUMMARY

HELIX Environmental Planning, Inc. (HELIX) was originally contracted by Integral Communities to provide cultural resources services for the Bouquet Canyon Road Project (project) in Los Angeles County, California. Results of the cultural resource survey conducted in 2018 for the project were presented in a Cultural Resources Inventory and Assessment Report (Wilson and Wright 2019) and included in the Final Environmental Impact Report (EIR) for the project, dated November 2020 (Michael Baker International 2020). Several design changes have been proposed following the certification of the Final EIR, resulting in revised project areas totaling 7.5 acres. This cultural resources survey addendum includes a summary of the results of additional historic research and a pedestrian survey undertaken for the revised project areas outside of the original 2019 study area.

The results of the cultural resources survey presented in the 2019 Cultural Resources Report (Wilson and Wright 2019) included the identification of four historic-period cultural resources: P-19-004853, P-19-004854 (CA-LAN-4854), P-19-192514, and P-19-004855. One of these resources, P-19-192514, is a residential structure constructed in the mid-twentieth century situated within Assessor's Parcel Number (APN) 2812-008-002, the residential addition ("donut hole" parcel) included in the revised project area. Resource P-19-192514 was assessed for significance in the 2019 Cultural Resources Report and it was concluded that the resource does not meet the criteria for inclusion in the California Register of Historical Resources (CRHR) or the National Register of Historic Places (NRHP).

The field investigations included an intensive pedestrian survey of the additional areas outside of the original 2019 study area on December 12 and 14, 2021. A single resource was identified during archival research: a single-family home located at 28601 Bouquet Canyon Road. This residence has had multiple modern additions to the main residential structure, and the buildings have undergone extensive changes, including new roofing, stucco siding, along with new windows and doors. As such, the structures do not retain enough of their historic character or appearance to be recognizable as a historical resource, and as such, the resource is not considered a significant historical resource for the purposes of the California Environmental Quality Act (CEQA).

Based on the results of the current study, no significant historical resources will be impacted by the revised project and the results of this addendum demonstrate that the revised project remains consistent with the findings documented in the "Cultural Resources" section of the Final EIR.

Per mitigation measure 3.4-1 within the project's Mitigation Monitoring and Reporting Program, contained within the final EIR, an archaeological and Native American monitoring program will be implemented, during which an archaeologist and Native American monitor shall be present to monitor initial ground disturbance for the project for all ground-disturbing activities within young (Holocene) alluvial deposits (Michael Baker International 2020).

Should the project limits change to incorporate new areas of proposed disturbance, a cultural resources survey of these areas will be required.



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1.0 INTRODUCTION

HELIX Environmental Planning, Inc. (HELIX) prepared this addendum to the Cultural Resources Inventory and Assessment Report (Wilson and Wright 2019) for the Bouquet Canyon Road Project (project). The Bouquet Canyon Project Final Environmental Impact Report (EIR; State Clearinghouse [SCH] Number 2018121009) was prepared by Michael Baker International, Inc. and certified by the City of Santa Clarita (California Environmental Quality Act [CEQA] lead agency) on November 10, 2020 (Michael Baker International 2020). Following certification of the Final EIR, some revisions were made to the project design (revised project), resulting in minor changes to the study area evaluated in the 2019 cultural report. HELIX conducted a review of historic aerial photographs and maps and a pedestrian survey for the portions of the revisions that were outside the original 2019 study area. The purpose of this addendum is to demonstrate that the revised project remains consistent with the findings documented in the "Cultural Resources" section of the Final EIR.

1.1 PROJECT LOCATION AND DESCRIPTION

The project is located in the Saugus Community of the City of Santa Clarita (City) in west-central Los Angeles County, within Section 6 of Township 4 North, Range 15 West, on the U.S. Geological Survey (USGS) 7.5-minute Mint Canyon topographic quadrangle (Figure 1 and 2, *Regional Location* and *USGS Topography*, respectively). The project site is generally located 6.9 miles to the east of Interstate (I-) 5 and 3.8 miles to the northwest of California State Route (SR) 14 and is bordered by Bouquet Canyon Road along the northern and western project boundaries (Figure 3, *Aerial Photograph*).

The previous design analyzed in the Final EIR proposed the development of 375 single-family homes organized into five distinct neighborhoods, along with extensive supporting site improvements including roads, storm drainage, utility facilities, private and public recreation areas, the construction of a new segment of Bouquet Canyon Road, as well as reconfiguration of Bouquet Creek and associated flood controls.

1.1.1 Revised Project Areas

The additional areas and revisions made to the project design since certification of the Final EIR are summarized below. The revised project areas comprise approximately 7.50 acres and are included within the approximately 85.86-acre revised study area for the project (Figure 3).

- Off-Site Flood Control Channel Additional temporary impacts to the concrete banks of the
 off-site concrete flood control channel required for the revisions related to the alignment of the
 outlet.
- 2. <u>Copper Hill Road Improvements</u> Additional grading/paving for Copper Hill Road.
- 3. <u>Davenport Trailhead</u> The addition of the Davenport parcel (Assessor's Parcel Number [APN] 2812-008-008) for the construction of a city-required trailhead.
- 4. <u>Bouquet Canyon Road Improvements North</u> Additional off-site repaving and improvements to existing Bouquet Canyon Road near the northeast corner of the project.



- 5. <u>Flow Diversion Structure</u> Construction of a slightly larger concrete flow diversion structure intended to convey low flows into the low-flow channel and divert high flows into the proposed concrete-lined flood control channel.
- 6. <u>Sewer Line</u> Installation of a sewer line in the northeast portion of the site.
- 7. <u>Slope Grading</u> Additional slope grading for the new alignment of Bouquet Canyon Road along the southerly border of the study area.
- 8. <u>Bouquet Canyon Road Improvements South</u> Minor additional off-site road repaying and improvements to Bouquet Canyon Road located in the southwesterly portion of the project site.
- 9. Residential Addition Addition of the "donut hole" parcel (APN 2812-008-002) in the easterly portion of the project site. Note that this area was evaluated for impacts to historical resources in the 2019 Cultural Resources Report yet was not evaluated as part of the project in the EIR. Additional residential uses have been proposed in the donut hole area since the Final EIR was certified. As such, the donut hole parcel has been included in the revised project area.
- 10. Residential Reduction Removal of Planning Area 1a, which previously proposed the construction of residential development within the southern portion of the study area per the project Biological Technical Report (BTR) and EIR. This planning area presented in the Final EIR for the project will not be impacted by construction as part of the revised project.

1.2 REGULATORY FRAMEWORK

The regulatory setting was outlined in the 2019 Cultural Resources Report (Wilson and Wright 2019). For a detailed discussion of regulations and applicable laws, please refer to that report.

1.3 PROJECT PERSONNEL

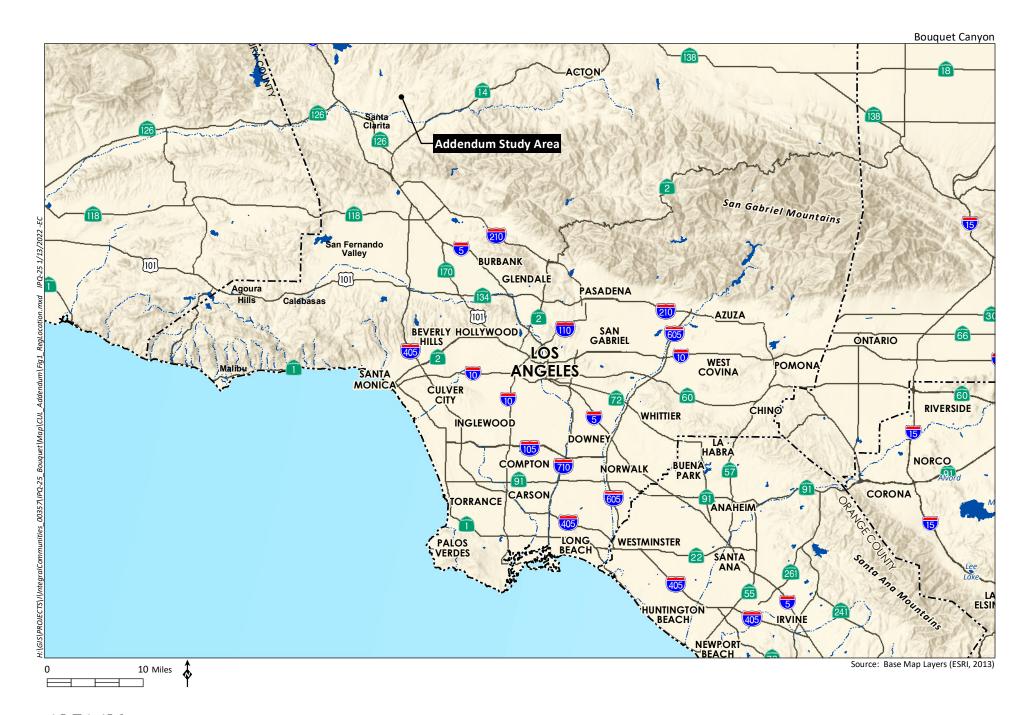
Stacie Wilson, M.S., RPA, served as principal investigator. Ms. Wilson meets the qualifications of the Secretary of Interior's Standards and Guidelines for Archaeology and was the principal investigator and primary author of the 2019 Cultural Resources Report (Wilson and Wright 2019). Trevor Gittelhough, M.A., RPA, conducted the field survey and is the primary author of this report. Mx. Gittelhough meets the qualifications of the Secretary of Interior's Standards and Guidelines for archaeology and history.

2.0 PROJECT SETTING

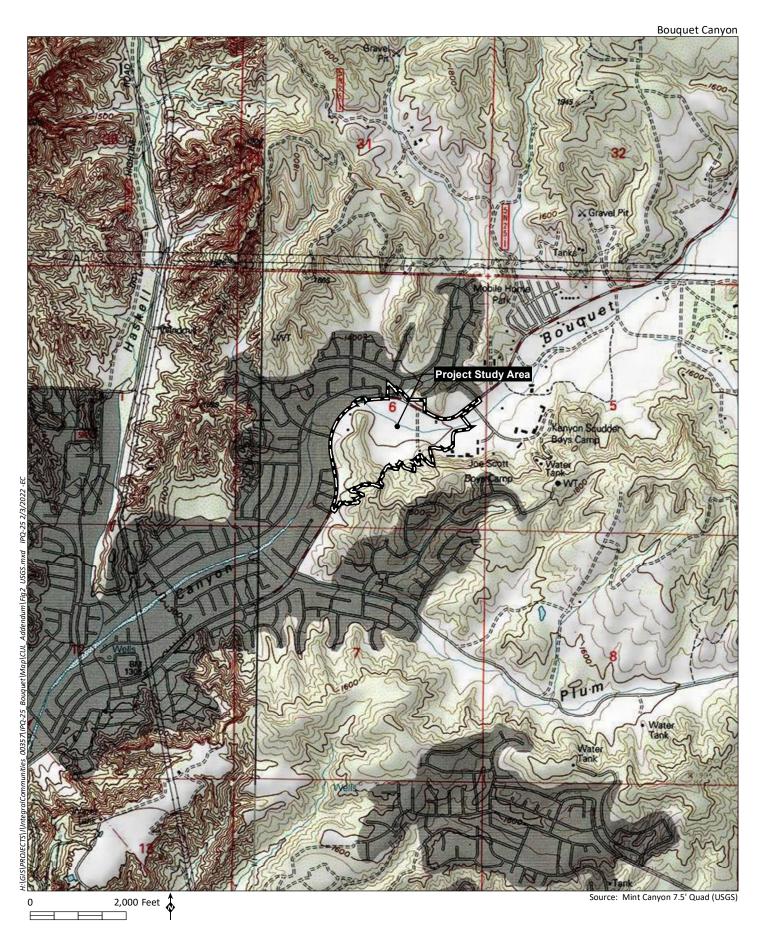
2.1 NATURAL SETTING

The natural context outlined in the 2019 Cultural Resources Report (Wilson and Wright 2019) included information about physiography, geology, flora, and fauna within the region of the study. For a detailed discussion of the natural setting of the Bouquet Canyon Road Project study area, please refer to that report.

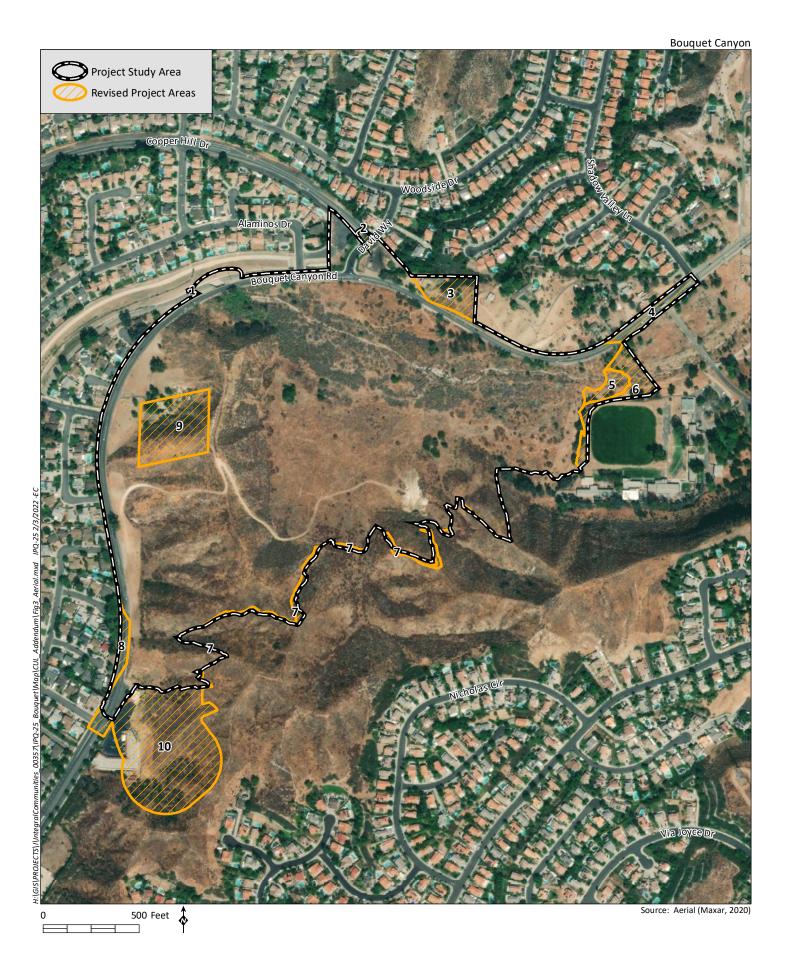














2.2 CULTURAL SETTING

2.2.1 Prehistoric Period

The prehistoric background for the proposed project was discussed at length in the 2019 Cultural Resources Report (Wilson and Wright 2019). This included a discussion of the Late Prehistoric period (Early, Milling Stone [Archaic Period], Intermediate, and Late horizons) prior to European contact. For a detailed discussion of the prehistoric background of the Bouquet Canyon Road Project study area, please refer to that report.

2.2.2 Ethnohistory

The ethnographic background for the proposed project was described in the 2019 Cultural Resources Report (Wilson and Wright 2019). This included a discussion of the Tataviam people. For a detailed discussion of the ethnohistory of the Bouquet Canyon Road Project study area, please refer to that report.

2.2.3 Historical Background

The historic context for the proposed was included in the 2019 Cultural Resources Report (Wilson and Wright 2019). This included discussions on the Spanish, Mexican, and American periods and the historical and twentieth-century growth of Santa Clarita, Saugus, and Bouquet Canyon. For a detailed discussion of the historical context for the Bouquet Canyon Road Project, please refer to that report.

3.0 ARCHIVAL RESEARCH AND CONTACT PROGRAM

3.1 RECORDS SEARCH

As part of the 2019 Cultural Resources Report (Wilson and Wright 2019), HELIX staff conducted a record search of the California Historical Resources Information System (CHRIS) at the South Coastal Information Center (SCIC) on March 6, 2016. The records search covered a half-mile radius around the project alignment and included the identification of previously recorded cultural resources and locations and citations for previous cultural resources studies. A review of the California Historical Resources and the state Office of Historic Preservation (OHP) historic properties directories were also included. As the revised project areas are all located within the original records search boundaries, no additional record search was requested by HELIX. A total of 24 previous cultural studies have been completed within the search limits, though none were located within the project study area. Prior to the 2019 survey of the project area, nine previously recorded resources were identified within the record search limits. For the full discussion of the results of the records search, please refer to the 2019 Cultural Resources Report (Wilson and Wright 2019).

3.2 HISTORIC TOPOGRAPHIC MAP AND AERIAL IMAGERY RESEARCH

As part of the 2019 Cultural Resources Report (Wilson and Wright 2019), various archival sources were also consulted, including historic topographic maps, aerial imagery (NETR Online 2018), and the Bureau of Land Management (BLM) General Land Office (GLO) Records. Historic aerials from 1947, 1952, 1959,



1969, 1974, and 1977 were reviewed (NETR Online 2018). Plat maps reviewed included the 1875 survey plat for the Rancho San Francisco and the 1877 survey plats for Township 4 North and Range 15 and 16 West. Topographic maps reviewed included the 1900 Fernando (1:62,500); the 1900 (1930 reprint), 1940, and 1945 San Fernando (1:62,500); the 1932 and 1946 edition of the Humphreys (1:24,000); and the 1960 and 1974 Mint Canyon (1:24,000) topographic maps. The purpose of this research was to identify historic structures and land use in the area.

An updated review of the archival resources was conducted as part of this addendum study. On the 1947 aerial photograph, a single-family home is present within the boundaries of the Davenport parcel (within revised project area number 3). The home was visible in the 1952 aerials with no changes and had an unattached garage in the 1959 aerial. Three additions appear to have been added to the structure between 1994 and 1997. The structure is also shown on topographic maps, beginning with the 1932 Humphreys (1:24,000) quadrangle maps.

3.3 NATIVE AMERICAN CONTACT PROGRAM

As part of the 2019 Cultural Resources Report (Wilson and Wright 2019), HELIX contacted the Native American Heritage Commission (NAHC) in May 2018 for a Sacred Lands File search and list of Native American contacts for the original project alignment. The NAHC responded in June 2018 that the search of their Sacred Lands File was complete for the project area with negative results; a list of Tribal Contacts to be contacted for additional information about the project area was provided with NAHC's response. Letters were sent to these contacts in June 2018, with no responses received. A Native American monitor from the Fernandeño Tataviam Band of Mission Indians accompanied the survey crew during the fieldwork, and upon coordination for the survey, Jairo Avila responded in an email dated June 22, 2018 that their records show the presence of a Tataviam Village and Native burial site in the vicinity of the project.

No new outreach was conducted for this addendum, though the Fernandeño Tataviam Tribe of Mission Indians were invited to participate in the survey for the revised project areas. Due to scheduling urgency, however, they were unable to send someone to be involved in the pedestrian survey.

For copies of the contact program correspondence, see Appendix C of the Cultural Resources Report (Wilson and Wright 2019).

4.0 PREVIOUS SURVEY RESULTS

HELIX performed an intensive pedestrian survey for the original study area in 2018 (Wilson and Wright 2019). The cultural resources study area for the project totaled approximately 94 acres and consisted of the four project-owned parcels (APNs 2812-008-003, 2812-008-013, 2812-008-022, and 2812-008-031) and areas of proposed off-site improvements. Additionally, APN 2812-008-002, which was a private in-holding situated within the western portion of the project, was included in the cultural resources study area.

Results of the cultural resource surveys were presented in the 2019 Cultural Resources Report (Wilson and Wright 2019). In summary, the survey resulted in the identification of four newly recorded historic-period cultural resources: P-19-004853, P-19-004854 (CA-LAN-4854), P-19-192514, and P-19-004855. The resources include a concrete foundation that may represent the remnants of the "New Era School" from the early twentieth century (P-19-004853), the remnants of a ranch dating to the early- to mid-



twentieth century (CA-LAN-4854), a residential structure constructed between 1952 and 1959 (P-19-192514), and the remnants of a residence from the turn of the twentieth century (P-19-004855). None of the resources meet the criteria for inclusion in the California Register of Historical Resources (CRHR) or the National Register of Historic Places (NRHP).

Of these resources, P-19-192514 is situated within APN 2812-008-002, the residential addition ("donut hole" parcel) included as revised project area number 9 (Figure 4, *Cultural Resources*). As described in Section 1.1.1. above, this parcel was evaluated for impacts to historical resources in the 2019 Cultural Resources Report as private in-holding situated within the western portion of the project (Wilson and Wright 2019). As such, although the donut hole parcel has been included in the revised project area, the evaluation of the resource (P-19-192514) can be found in that report.

5.0 FIELD SURVEY

5.1 METHODOLOGY

HELIX archaeologist Trevor Gittelhough surveyed the revised project areas on December 12 and 14, 2021 (Plates 1 and 2). During the pedestrian survey, the additional areas within the revised project area were walked in transects, spaced approximately 10 meters apart where possible. Slopes greater than 25 degrees were visually assessed but were not surveyed. Visibility was excellent (76 to 100 percent) throughout the revised project area, though the slope along the northern edge of Bouquet Canyon was very steep and overgrown with sagebrush and buckwheat, hindering visibility and the ability to survey. Mx. Gittelhough also visited the residence located on the Davenport parcel, as part of this pedestrian survey.



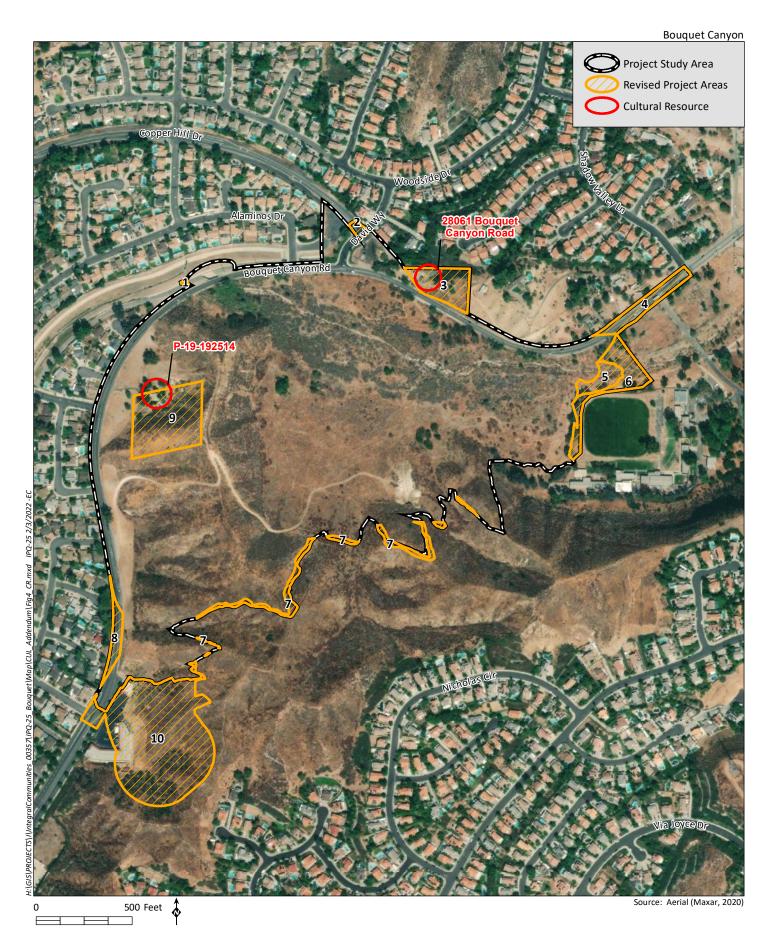


Plate 1. Overview of the area containing the Copper Hill reconfiguration. View to the southeast.



Plate 2. Overview of area north of Bouquet Canyon Road. View to the east.





5.2 RESULTS

One cultural resource was identified with the additional survey area: a single-family home at 28601 Bouquet Canyon Road (Figure 4; Appendix A). This resource was identified during archival research before being visited as part of the intensive pedestrian survey and is detailed below. No other cultural materials were observed within the additional project areas. Much of the newly added areas had been disturbed by nineteenth- and twentieth-century agriculture, road building, and urban development.

5.2.1 28601 Bouquet Canyon Road

This resource, 28601 Bouquet Canyon Road, is a residential structure situated within the Davenport parcel (APN 2812-008-008; Plates 3 and 4). A structure is indicated at this location on the 1932 Humphreys (1:24,000) topographic map, and two structures (a portion of the main house and the existing garage) appear on the 1947 aerial photograph. As noted earlier in this report, additions to the main structure occurred in the 1990s, as confirmed by the intensive pedestrian survey. These additions included multiple additions to the main residential structure, extending it westward. Furthermore, the structures have undergone extensive changes, including new roofing, stucco siding, along with new windows and doors. Permits from 2003 show that a retaining wall was added, a 247-square foot (sf) bedroom was added, and the remodel of a 210-sf bedroom was undertaken. Previously, in 1996, permits for the addition of a 496-sf master suite, a new bathroom, associated piping and duct work, and a new house connect for the addition were issued. Only a few historic-period components appear to remain—including the chimney, a shed, and a rock wall extending from the shed to the garage.

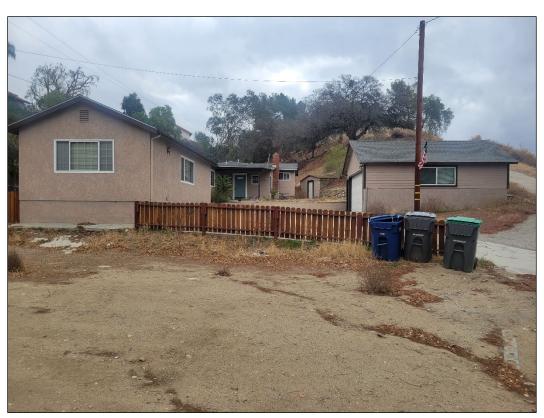


Plate 3. Overview of 28601 Bouquet Canyon Road. View to the east.





Plate 4. Overview of 28601 Bouquet Canyon Road, view to the north.

5.3 ELIGIBILITY RECOMMENDATION

28601 Bouquet Canyon Road is a historic residence originally constructed in the early twentieth century. The residence is comprised of a single-family home, unattached garage, and small shed. The residence does not appear to meet the criteria for inclusion in the NRHP or CRHR, as addressed below.

- Criterion A: Given the early to mid-twentieth century date of construction, the house does not represent the pioneering phase of Santa Clarita's development in the nineteenth century and is not associated with events that have made a significant contribution to the broad patterns of local or national history.
- Criterion B: The house and associated garage have no known significant association with the lives of persons important to local, California, or national history.
- Criterion C: The residential structures do not embody distinctive architectural characteristics, represent the work of a master, or possess artistic value.
- Criterion D: The structure does not appear to have the potential to yield important information
 about historic construction materials or technologies and would not be considered significant as
 a source of information important in history.

In summary, while a few original historic-period components appear to remain—such as the chimney, a shed, and a rock wall extending from the shed to the garage—the residential structure and detached garage have been modified to such degree that they lack historic integrity, and the original character of



the buildings is no longer evident. Because the house and the unattached garage do not retain enough of their historic character or appearance to be recognizable as historical resources and do not meet the criteria for inclusion in the NRHP or CRHR, 28601 Bouquet Canyon Road is recommended as not eligible for listing in the NRHP or the CRHR, and as such, is not considered a significant "historical resource" for the purposes of CEQA.

6.0 SUMMARY AND MANAGEMENT RECOMMENDATIONS

A study was undertaken to identify cultural resources that are present in the revised project areas and to determine the effects of the revised project on cultural resources. Based on the results of the 2019 Cultural Resources Report (Wilson and Wright 2019) and the current study addendum, no historical resources, per CEQA, will be affected by the Bouquet Canyon Project.

As such, the additional areas and revisions made to the project design since certification of the Final EIR would not result in new significant or adverse impacts on cultural resources pursuant to CEQA and applicable federal, state, and local policy. The results of this addendum demonstrate that the revised project remains consistent with the findings documented in the "Cultural Resources" section of the Final EIR.

Per mitigation measure 3.4-1 contained within the project's Mitigation Monitoring and Reporting Program contained within the Final EIR, an archaeological and Native American monitoring program will be implemented, during which an archaeologist and Native American monitor shall be present to monitor initial ground disturbance for the project for all ground-disturbing activities (Michael Baker International 2020).

Should the project limits change to incorporate new areas of proposed disturbance, cultural resources survey of these areas will be required.



7.0 REFERENCES

Michael Baker International Inc.

2020 Final Environmental Impact Report, Bouquet Canyon Project, Master Case 18-089/ Tentative Tract Map No. 82126. Prepared for the City of Santa Clarita.

NETR Online

Historic Aerials. Nationwide Environmental Title Research, LLC. Electronic document available at: http://www.historicaerials.com, accessed December 2021.

Wilson, Stacie and Catherine Wright

2019 Bouquet Canyon Road Project, City of Santa Clarita, Los Angelese County, California, Cultural Resources Survey and Assessment. Report on file at the South Coastal Information Center, San Diego State University, San Diego.



Appendix A

Site Form, 28601 Bouquet Canyon Road State of California — The Resources Agency DEPARTMENT OF PARKS AND RECREATION

PRIMARY RECORD

Primary # HRI # Trinomial

NRHP Status Code

Other Listings Review Code

Reviewer Date

Page 1 of 5 *Resource Name or #:

P1. Other Identifier: 28601 Bouquet Canyon Road
*P2. Location: ■ Not for Publication □ Unrestricted

*a. County: Los Angeles

and

*b. USGS 7.5' Quad: Mint Canyon Date: 1995 T 4N; R 15W; NW ¼ of SE ¼ of Sec 6; B.M. San Bernardino

c. Address: 28061 Bouquet Canyon

City: Santa Clarita Zip: 91351

d. UTM: Zone: 11N; 363142 mE/ 3814089 mN (G.P.S.)

e. Other Locational Data: From the intersection of Plum Canyon Road and Bouquet Canyon Road, take Bouquet Canyon Road north for approximately 0.92 miles. The resource will be located immediately to the north side of the road. Elevation: 1,412 feet amsl

*P3a. Description: This resource consists of residence structures located within the Davenport parcel (APN 2812-008-008) at 28601 Bouquet Canyon Road. The presence of this residence dates back to the 1930s, with a structure indicated at its location on the 1932 Humphreys (1:24,000) topographic map. Structures are notated on all later topographic maps. Later, in 1947, two structures are visible in a 1947 aerial photograph. The structure consists of a residential, single-family home with a detached garage, located at the bottom of a small hill, that has been modified to construct the residence. The house has asphalt roofing shingles, exterior stucco walls, and louvered window, and has been modified numerous times over the years. Permits from 2003 show that a retaining wall was added, a 247-sf bedroom was added, and 210 sf remodel of a bedroom was undertaken. Previously, in 1996, permits for the addition of 496-sf master suite, a new bathroom, associated piping and duct work, and a new house connect for the addition was issued. Only a few of the original historic-period components appear to remain – such as the chimney, a shed, and a rock wall extending from the shed to the garage.

*P3b. Resource Attributes: HP2. Single family property

*P4. Resources Present: ☐Building ■Structure ☐Object ☐Site ☐District ☐Element of District ☐Other (Isolates, etc.)

P5a. Photo or Drawing (Photo required for buildings, structures, and objects.)

P5b. Description of Photo: Overview of Residence, View facing east. Photo # 18, 12/13/2021

*P6. Date Constructed/Age and Sources: ■Historic

□Both

*P7. Owner and Address:

*P8. Recorded by:

□Prehistoric

Trevor Gittelhough, M.A., RPA HELIX Environmental Planning 7578 El Cajon Boulevard La Mesa, CA 91942

***P9. Date Recorded:** 12/13/2021

*P10. Survey Type: Pedestrian Survey

*P11. Report Citation: Addendum to the Cultural Resources Inventory and Assessment for the Bouquet Canyon Road Project, Los Angeles County, California.

*Attachments: □NONE ■Location Map ■Sketch Map ■Continuation Sheet □Building, Structure, and Object Record □Archaeological Record □District Record □Linear Feature Record □Milling Station Record □Rock Art Record □Artifact Record □Photograph Record □ Other (List):

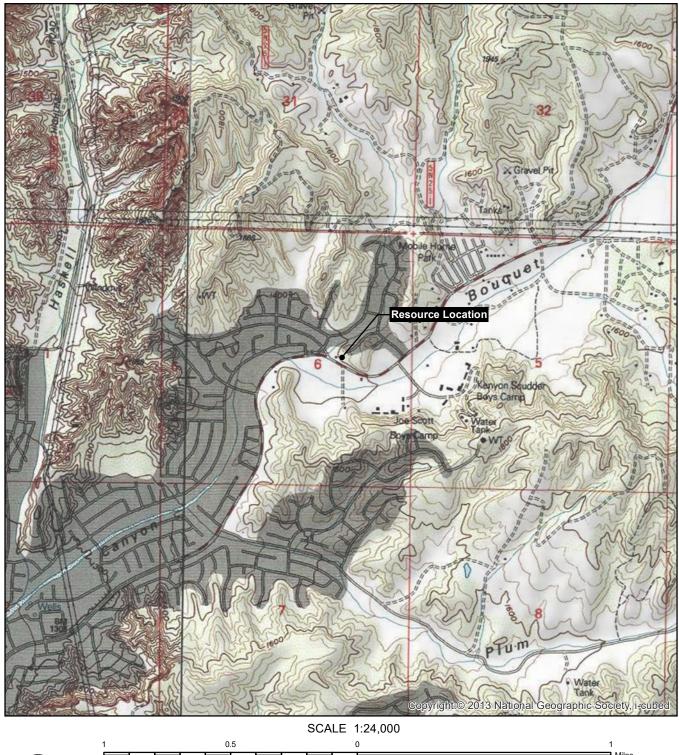
DPR 523A (1/95) *Required information

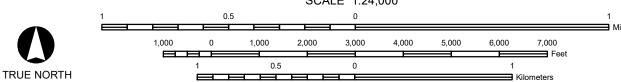
LOCATION MAP

Primary #: HRI # Trinomial:

Page 2 of <u>3</u>

*Resource Name or #: 28061 Bouquet Canyon Road





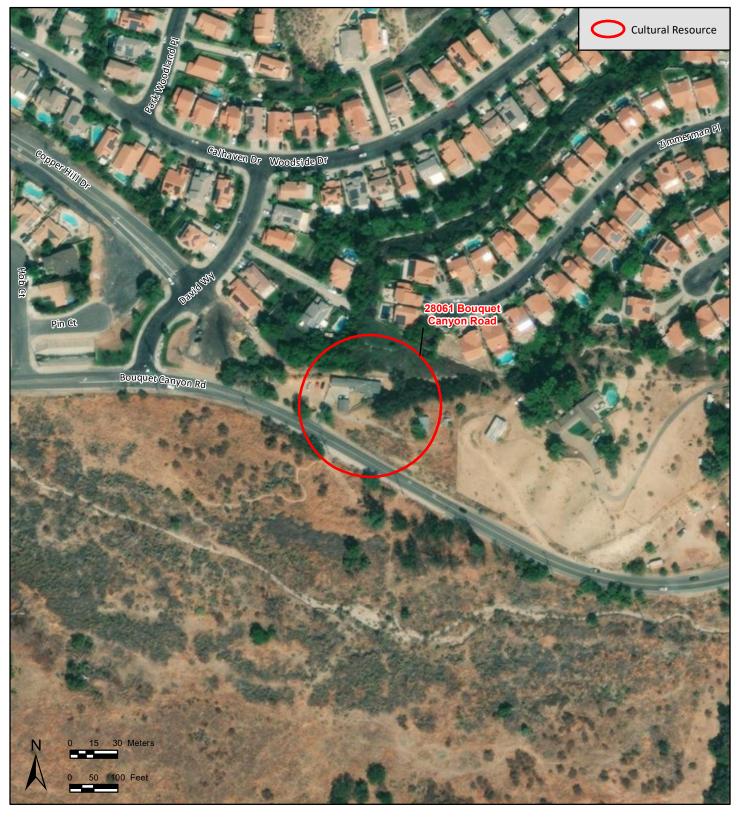
State of California - The Resources Agency DEPARTMENT OF PARKS AND RECREATION SKETCH MAP

Primary #: HRI # Trinomial:

Page 2 of 3

*Resource Name or #: 28061 Bouquet Canyon Road

*Drawn By: DY *Date of Map: Jan 2022



DPR 523K (1/95) *Required Information

DEPARTMENT OF PARKS AND RECREATION CONTINUATION SHEET

Primary # HRI# Trinomial

Page 4 of 5

*Resource Name or # (Assigned by recorder)

Recorded By: *Date: ■ Continuation □ Update



Overview of possible historic brick chimney, view to the north. Phot # 22, 12/13/2021



Overview of possible historic retaining wall, view to the south-southwest. Photo # 24, 12/13/2021

DPR 523L (1/95) *Required information

Primary # HRI# Trinomial

Page 5 **of** 5

*Resource Name or # (Assigned by recorder)

Recorded By: *Date: ■ Continuation □ Update



Overview of detached shed, view to the east-northeast. Photo # 23, 12/13/2022



Overview of detached garage, view to the southwest. Photo # 25, 12/13/202

DPR 523L (1/95) *Required information

Appendix C

Geology and Soils

Appendix C.1

Geotechnical Update Memorandum



October 20, 2021

Project No. 21095-01

Mr. Peter Vanek Integral Communities 888 San Clemente, Suite 100 Newport Beach, CA 92660

Subject:

Geotechnical Update to EIR, Revised Site Plan and Additional Developable Parcel, Proposed "Bouquet Canyon" Residential Development, Tract No. 82126, City of Santa Clarita, County of Los Angeles, California

References:

Petra Geosciences, Inc., 2019, Updated Geotechnical EIR-Level Assessment, Bouquet Canyon Project, Tentative Tract Map 82126, Southerly Adjacent to Bouquet Canyon Road at Copper Hill Drive, City of Santa Clarita, Los Angeles County, California, Job Number 18-322, dated October 18, 2019.

LGC Geotechnical, Inc., 2021, Change of Geotechnical Consultant of Record for Proposed "Bouquet Canyon" Residential Development, Tract No. 82126, City of Santa Clarita, County of Los Angeles, California, Project No. 21095-01, dated September 13, 2021.

Introduction

In accordance with your request, LGC Geotechnical, Inc. has prepared this letter to provide a geotechnical update to the Environmental Impact Report (EIR) document with regards to a proposed addition to the developable parcel for the proposed Bouquet Canyon Residential Development, Tract No. 82126, located in the City of Santa Clarita, County of Los Angeles, California.

The intent of this letter is to provide updated geotechnical conclusions for the EIR document with regards to the addition of approximately 2.7-acres of developable land located within the current limits of the subject approximately 75-acre Bouquet Canyon development that was addressed in the referenced report by Petra (2019). It should be noted LGC Geotechnical became the geotechnical consultant of record for the proposed development as explained in the reference letter report (LGC Geotechnical, 2021).

Updated Site Plan

The updated site plan includes a revision to a parallelogram-shaped parcel of land located within the subject development that was previously anticipated to remain undeveloped, see attached Exhibit of Additional Parcel on Geotechnical Map (Sheet 1). The updated site plan provides an additional 12

single-family residential units for the subject project as well as an extension of the north/south trending private street in the same area.

Conclusions

Based on our review of the modified site plan and the geotechnical conditions of the subject site, the conclusions and recommendations with regards to the site-specific geologic impacts and corresponding mitigations presented in the reference geotechnical EIR report (Petra, 2019) remain valid and applicable to the subject parcel addition. No additional changes or updates to the EIR report are required from a geotechnical perspective.

Design level geotechnical recommendations addressing the additional developable parcel located within the original limits of the subject site should be provided in an updated 40-scale grading plan review geotechnical report.

Should you have any questions regarding this letter, please do not hesitate to contact this office. We appreciate the opportunity to be of service.

Sincerely,

LGC Geotechnical, Inc.

Ryan Douglas, PE, GE 3147

Project Engineer

No. 3147

Katie Maes, CEG 2216

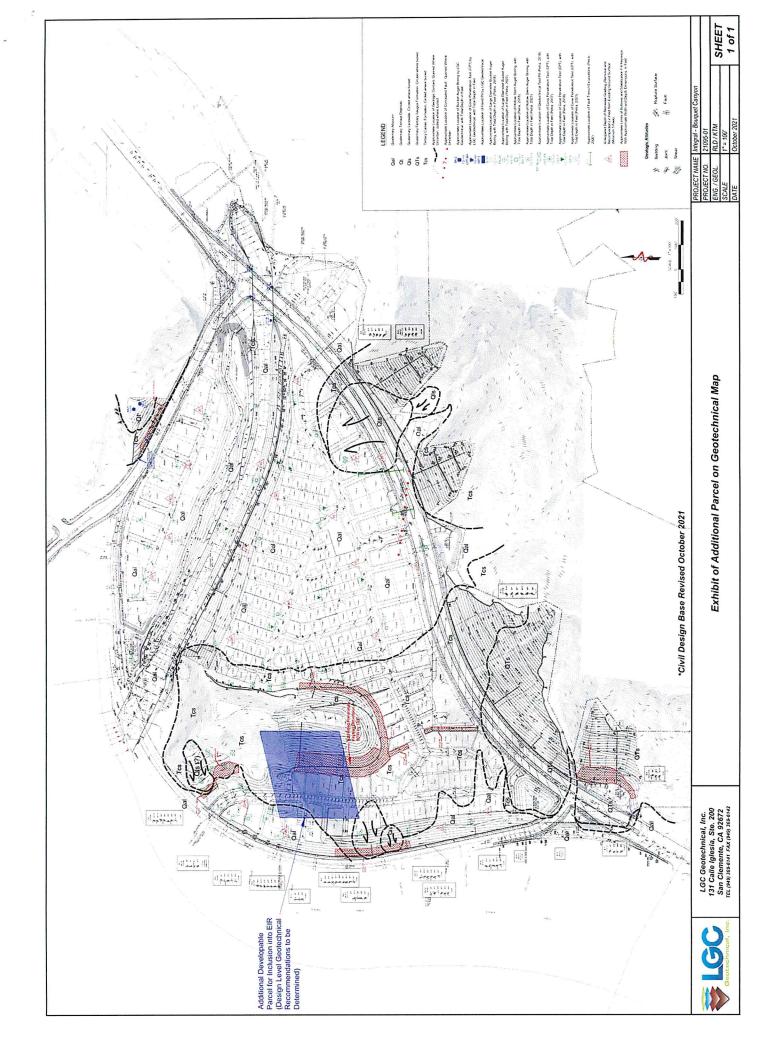
Project Geologist

No. 2216

RLD/KTM/amm

Attachments: Sheet 1 – Exhibit of Additional Parcel on Geotechnical Map

Distribution: (1) Addressee (electronic copy)





Geotechnical Review of Grading Plan Update



Project No. 21095-01 April 12, 2022

Mr. Peter Vanek **Integral Communities** 888 San Clemente, Suite 100 Newport Beach, CA 92660

Geotechnical Review of Updated 40-Scale Rough Grading Plan, Proposed Residential Subject:

Development, Tract No. 82126, City of Santa Clarita, County of Los Angeles,

California

Introduction

In accordance with your request, LGC Geotechnical, Inc. (LGC Geotechnical) has prepared this geotechnical review of the updated 40-scale rough grading plans for the proposed Bouquet Canyon residential development, Tract No. 82126, located in the City of Santa Clarita, Los Angeles County, California. The revised plan review is based on the updated grading plan prepared by Sikand (2022). This map was used as a base for our Geotechnical Map (Sheet 1). The purpose of this letter was to document the changes from the previous grading plan and to update any recommendations due to these changes.

This grading plan review report should be considered part of the project design documents in conjunction with our geotechnical reports (LGC Geotechnical, 2021a through 2021d) and previous geotechnical reports by Petra. In the case of conflict, the recommendations contained herein should supersede those provided in previous reports; the remaining recommendations remain valid and applicable.

Grading Plan Revisions

The major changes on the grading plan can be seen on the western half of the site, Planning Area 1A (see Sheet 1). Originally, an irregular shaped parcel was excluded from development along the western side of the central ridgeline adjacent to old Bouquet Canyon Road (LGC Geotechnical, 2021a). This parcel was referred to as the "donut hole." The original proposed entry road accessed the site from old Bouquet Canyon Road, across from Pam Court, and extended south until reaching a cul-de-sac which serviced a total of 7 single-family units. The updated grading plans present the entry road adjacent to Pam Court extending south and connecting with the remainder of PA-1. An additional 12 single-family units have been added to the development as part of the revised grading plan. A cemetery area exists in a proposed landscape area between Units 4, 6 and 45. Recommendations for grading around the cemetery area are provided in our referenced geotechnical report (LGC Geotechnical, 2022). An approximately 100-foot-tall westerly facing cut slope has been incorporated into the plans (see CrossSection W-W') cutting into the natural ridge to create building pads for the residential units and connecting the two portions of PA-1 with a road.

The general proximity of the grading plans revisions for PA-1 have been clouded in red on the updated Geotechnical Map (Sheet 1). Updated geotechnical recommendations are provided on Sheets 1 through 3 and should be included as part of the design documents.

Updated Slope Stability Analysis

Due to the changes in the rough grading plan, a portion of our geotechnical map (Sheet 1) and nine cross-sections (Sheets 2 & 3) were updated. The nine updated cross-sections are F-F', G-G', H-H', I-I', U-U', V-V', W-W', X-X' and Y-Y'. The majority of the cross sections only had minor changes. Cross-section W-W' was added to address the major new cut slope presented on the updated grading plans (Sikand, 2022). The revisions to the grading plan have been reflected on the updated Geotechnical Map (Sheet 1) and cross-sections (Sheets 2 & 3).

Updates to cross-sections F-F', I-I' and X-X' from the updated rough grading plans were negligible compared to the grading plans reviewed for our 40-scale geotechnical report (LGC Geotechnical, 2021a), refer to the 40-scale geotechnical report (LGC Geotechnical, 2021a) for slope stability analysis.

Updated slope stability analysis was performed on critical cross-sections V-V' and W-W' as part of this study. Shear strengths were taken from our 40-scale geotechnical report (LGC Geotechnical, 2021a). Slope stability analysis was performed using the computer program GSTABL7 with STEDwin version 2.005.3 (Gregory Geotechnical Software, 2013). Potential rotational and block failure modes were analyzed using Bishop's Modified Method and Janbu's Simplified Method, respectively. Slope stability analysis was performed for static and pseudo-static (seismic) loading conditions. A minimum factor of safety of 1.5 and 1.1 is typically required for static and seismic loading conditions.

Based on the proposed rough grading plan (Sikand, 2022), slope stability analysis indicates global factors of safety greater than 1.5 and 1.1 for static and seismic loading conditions, respectively. Slope stability analysis is provided in Appendix B.

Conclusions

Based on our review, it is our opinion that the subject rough grading plans (Sikand, 2022) are considered acceptable for construction from a geotechnical viewpoint and were found to be in general conformance with the recommendations provided in our reference geotechnical reports (LGC Geotechnical, 2021a through 2021d) and those contained in this report. The previously provided preliminary geotechnical recommendations (LGC Geotechnical, 2021a through 2021d) remain valid and applicable. Updated Geotechnical Map (Sheet 1) and Cross Sections (Sheets 2 & 3) attached to this report supersede previous version in the areas identified and should be included in the project design documents.

LGC Geotechnical should provide geotechnical observation and testing during grading and construction operations to confirm anticipated site geotechnical conditions. If geotechnical conditions

differ from those that are anticipated, additional recommendations will be provided during rough grading.

Closure

Our services were performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable soils engineers and geologists practicing in this or similar localities. No other warranty, expressed or implied, is made as to the conclusions and professional advice included in this report.

We appreciate this opportunity to be of service. Should you have any questions or concerns regarding this proposal, please do not hesitate to contact our office.

Respectfully,

LGC Geotechnical, Inc.

Ryan Douglas, PE, GE 3147 Project Engineer No. 3147

**COTECHNICATION

OF CALIFORNIA

Katie Maes, CEG 2216 Project Geologist No. 2216

RLD/KTM/BPP/klr

Attachment: Appendix A – References

Appendix B - Slope Stability Analysis

Sheet 1 – Geotechnical Map

Sheet 2 & 3 – Geotechnical Cross Sections

Distribution: (1) Addressee (electronic copy)

Appendix A References

References

- American Concrete Institute, 2014, Building Code Requirements for Structural Concrete (ACI 318-14) and Commentary (ACI 318R-14).
- California Building Standards Commission, 2019, California Building Code, California Code of Regulations Title 24, Volumes 1 and 2, dated July 2019.
- California Department of Transportation (Caltrans), 2021, Corrosion Guidelines, Version 3.2, dated May 2021.
- Gregory Geotechnical Software, 2013, GSTABL7, Version 2.005.3, March, 2013.
- Lew, et al, 2010, Seismic Earth Pressures on Deep Basements, Structural Engineers Association of California (SEAOC) Convention Proceedings.
- LGC Geotechnical, 2021a, Geotechnical 40-Scale Rough Grading Plan Review for Proposed "Bouquet Canyon" Residential Development, Tract No. 82126, City of Santa Clarita, County of Los Angeles, California, Project No. 21095-01, dated August 27, 2021.
- ______, 2021c, Second Response to Tentative Tract Map Geotechnical Review Comments, Proposed Bouquet Canyon Residential Development, Tentative Tract Map No. 82126, Santa Clarita, California, Project No. 21095-01, dated November 11, 2021.
- _______, 2021d, Response to Geotechnical Review Comments Regarding Geotechnical 40-Scale Rough Grading Plan Review Report for Proposed "Bouquet Canyon" Residential Development, Tract No. 82126, City of Santa Clarita, County of Los Angeles, California, Project No. 21095-01, dated November 24, 2021.
- _______, 2022, Supplemental Geotechnical Recommendations, Selected Buildings in PA-1A and PA-4, Proposed "Bouquet Canyon" Residential Development, Tract No. 82126, City of Santa Clarita, County of Los Angeles, California, dated March 31, 2022.
- Petra Geosciences (Petra), 2019a, Geotechnical EIR-Level Assessment, *Bouquet Canyon Project*, Tentative Tract Map 82126, Southerly Adjacent to Bouquet Canyon Road at Copper Hill Drive, City of Santa Clarita, Los Angeles County, California, Job No. 18-322, dated January 22, 2019
- _______, 2019b, Response to Peer Review Comments Regarding the Geotechnical EIR-Level Assessment, Bouquet Canyon Project, Tentative Tract Map 82126, Southerly Adjacent to Bouquet Canyon Road at Copper Hill Drive, City of Santa Clarita, Los Angeles County, California, Job No. 18-322, dated July 9, 2019.

| , 2019c, Response to Peer Review Comments regarding the Geotechnical EIR-Level Assessment, Bouquet Canyon Project, Tentative Tract Map 82126, Southerly Adjacent to Bouquet Canyon Road at Copperhill Drive, City of Santa Clarita, Los Angeles County, California, Job No. 18-322, dated September 18, 2019. |
|--|
| , 2020, Geotechnical Review of Tentative Tract Map No. 82116, <i>Bouquet Canyon Project</i> , Southerly Adjacent to Bouquet Canyon Road at Copper Hill Drive, City of Santa Clarita, Los Angeles County, California, J.N. 18-322, dated September 8, 2020. |
| , 2021, Response to Geotechnical Review Comments (dated November 5, 2020), Tentative Tract Map No. 82126, <i>Bouquet Canyon Project</i> , Southerly Adjacent to Bouquet Canyon Road at Copper Hill Drive, City of Santa Clarita, Los Angeles County, California, J.N. 18-322, dated June 21, 2021. |
| R.T. Frankian and Associates (RT&A), 2019a, Peer Review Geotechnical EIR-Level Assessment Report, Bouquet canyon Project, prepared by Petra Geosciences, Inc., Tentative Tract Map 82126, Southerly Adjacent to Bouquet Canyon Road at Copper Hill Drive, City of Santa Clarita, Los Angeles County, California, dated April 23, 2019. |
| , 2019b, 2 nd Peer Review, Response to Peer Review Comments, Geotechnical EIR-Level Assessment Report, Bouquet Canyon Project, Tentative Tract Map 82126, Prepared by Petra Geosciences, Inc., Dated September 18, 2019, J.N. 18-322, Santa Clarita, Los Angeles County, California, for Michael Baker International, dated October 14, 2019. |
| , 2020, Review of Petra Review of Petra Geosciences, Inc. Report, Geotechnical Review, Tentative Tract Map No. 82126, Bouquet Canyon Project, Santa Clarita, California, Job No. 2018-010-650, dated November 5, 2020. |
| , 2021a, Review of Petra Geosciences, Inc. Report, Response to Geotechnical Review Comments, Tentative Tract Map No. 82126, Bouquet Canyon Project, Santa Clarita, California, Job No. 2018-010-650, dated July 23, 2021. |
| , 2021b, Review of LGC Geotechnical Inc. Report, Geotechnical 40-scale Rough Grading Plan Review, Proposed "Bouquet Canyon" Residential Development, Tract No. 82126, Santa Clarita, California, dated October 4, 2021; Project No. 21095-01. |
| Sikand Engineering, 2022, Updated Rough Grading Plan, Bouquet Canyon, City of Santa Clarita, Tract Map No. 82126, dated March 3, 2022. |

Project No. 21095-01 A-2 April 12, 2022

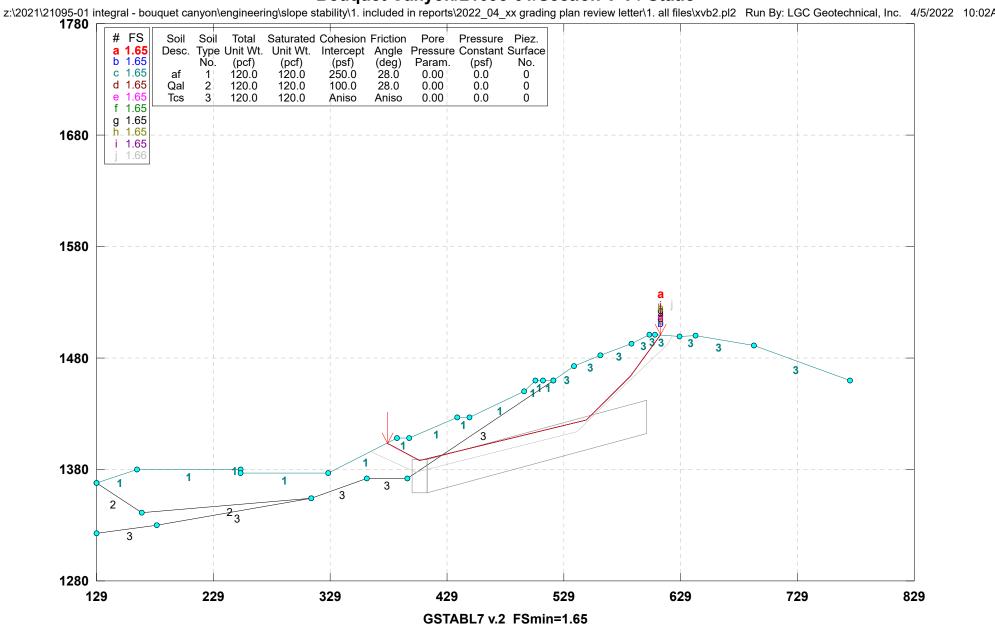
Appendix B Slope Stability Analysis

<u>Appendix B</u>
Summary of Slope Stability Analysis

| Cross- Section | File Name | Factor of Safety | Description |
|-------------------|-----------|---------------------|----------------------------|
| | xvb2 | 1.65 | Static; Block Search |
| | xvb2e | 1.16 | Seismic |
| | xvb2-1 | 1.60 | Static; Block Search |
| | xvb2-1e | 1.13 | Seismic |
| V-V' | xvb2-2 | 1.62 | Static; Block Search |
| V - V | xvb2-2e | 1.14 | Seismic |
| | xvc2 | 1.69 | Static; Circular Search |
| | xvc2e | 1.21 | Seismic |
| | xvb2t | 1.35 | Temporary; Block Search |
| | xvc2t | 1.42 | Temporary; Circular Search |
| | xwb | 1.65 | Static; Block Search |
| | xwbe | 1.14 | Seismic |
| | xwb-2 | 1.80 | Static; Block Search |
| | xwb-2e | 1.26 | Seismic |
| W-W' | xwb-3 | 1.68 | Static; Block Search |
| VV - VV | xwb-3e | 1.17 | Seismic |
| | xwc | 1.87 | Static; Circular Search |
| | xwce | 1.31 | Seismic |
| | xwtb | 1.48 | Temporary; Block Search |
| | xwtc | 1.65 | Temporary; Circular Search |

Project No. 21095-01 April, 2022

Bouquet Canyon/21095-01/Section V-V'/ Static



Safety Factors Are Calculated By The Simplified Janbu Method for the case of c & phi both > 0

| 1 *** GSTABL7 *** | 48 1 129.00 1368.00 164.00 1380.00 1 |
|---|--|
| 2 | 49 2 164.00 1380.00 252.00 1380.00 1 |
| 3 ** GSTABL7 by Dr. Garry H. Gregory, Ph.D.,P.E.,D.GE ** | 50 3 252.00 1380.00 252.10 1377.00 1 |
| 4 | 51 4 252.10 1377.00 327.00 1377.00 1 |
| ** Original Version 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 ** | 52 5 327.00 1377.00 386.00 1408.00 1 |
| 6 (All Rights Reserved-Unauthorized Use Prohibited) | 53 6 386.00 1408.00 397.00 1408.00 1 54 7 397.00 1408.00 438.00 1427.00 1 |
| 7 8 | 7 357.00 1100.00 150.00 1 |
| 8 9 | 55 8 438.00 1427.00 448.00 1427.00 1 56 9 448.00 1427.00 495.00 1450.00 1 |
| *************************************** | 57 10 495.00 1450.00 1450.00 1 1450.00 1450.00 1460.00 1 |
| ** | 58 11 505.00 1450.00 505.00 1460.00 1 |
| 10 SLOPE STABILITY ANALYSIS SYSTEM | 59 12 511.00 1460.00 520.00 1460.00 1 |
| Modified Bishop, Simplified Janbu, or GLE Method of Slices. | 60 13 520.00 1460.00 538.00 1473.00 3 |
| 12 (Includes Spencer & Morgenstern-Price Type Analysis) | 61 14 538.00 1473.00 560.00 1482.00 3 |
| Including Pier/Pile, Reinforcement, Soil Nail, Tieback, | 62 15 560.00 1482.00 587.00 1493.00 3 |
| 14 Nonlinear Undrained Shear Strength, Curved Phi Envelope, | 63 16 587.00 1493.00 602.00 1501.00 3 |
| 15 Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water | 64 17 602.00 1501.00 607.00 1501.00 3 |
| 16 Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces. | 65 18 607.00 1501.00 628.00 1499.00 3 |
| 17 | 66 19 628.00 1499.00 642.00 1500.00 3 |
| *************************************** | 67 20 642.00 1500.00 692.00 1491.00 3 |
| ** | 68 21 692.00 1491.00 774.00 1460.00 3 |
| 18 | 69 22 129.00 1368.00 168.00 1341.00 2 70 23 168.00 1341.00 313.00 1354.00 2 |
| 19 20 Analysis Run Date: 4/5/2022 | 70 23 168.00 1341.00 313.00 1354.00 2 71 24 313.00 1354.00 360.00 1372.00 3 |
| 20 Analysis Kun Date: 4/5/2022 21 Time of Run: 10:02AM | 71 24 313.00 1334.00 300.00 1372.00 3 |
| 22 Run By: LGC Geotechnical, | 73 26 395.00 1372.00 520.00 1460.00 3 |
| Inc. | 74 27 129.00 1323.00 181.00 1330.00 3 |
| - | 75 28 181.00 1330.00 313.00 1354.00 3 |
| | 76 |
| 23 Input Data Filename: Z:\2021\21095-01 Integral - Bouquet | 77 User Specified Y-Origin = 1280.00(ft) |
| Canyon\Engineering\slope stability\Sec V-V'\2022_04_05\xvb2.in | 78 79 Default X-Plus Value = 0.00(ft) |
| | 80 |
| 24 Output Filename: Z:\2021\21095-01 Integral - Bouquet | 81 Default Y-Plus Value = 0.00(ft) 82 1 |
| Output Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec | 83 |
| V-V'\2022 04 05\xvb2.OUT | 84 |
| | 85 ISOTROPIC SOIL PARAMETERS |
| | 86 |
| 25 Unit System: English | 87 |
| 26 | 88 3 Type(s) of Soil |
| 27 Plotted Output Filename: Z:\2021\21095-01 Integral - Bouquet | 89 |
| Canyon\Engineering\slope stability\Sec | 90 |
| V-V'\2022_04_05\xvb2.PLT | 91 Soil Total Saturated Cohesion Friction Pore Pressure Piez. |
| | Type Unit Wt. Unit Wt. Intercept Angle Pressure Constant Surface No. (pcf) (pcf) (psf) (deg) Param. (psf) No. |
| 28 | 93 No. (pcf) (pcf) (psf) (deg) Param. (psf) No. |
| 20 | 95 1 120.0 120.0 250.0 28.0 0.00 0.0 0 |
| 30 | 96 2 120.0 120.0 100.0 28.0 0.00 0.0 0 |
| 31 | 97 3 120.0 120.0 250.0 32.0 0.00 0.0 0 |
| 32 | 98 |
| 33 PROBLEM DESCRIPTION: Bouquet Canyon/21095-01/Section V-V'/ | 99 |
| 34 Static | 100 |
| 35 | 101 ANISOTROPIC STRENGTH PARAMETERS |
| 36 | 102 1 soil type(s) |
| 37 | 103 |
| 38 39 BOUNDARY COORDINATES | 104 105 Soil Type 3 Is Anisotropic |
| 39 BOUNDARY COORDINATES 40 | 105 Soil Type 3 is Anisotropic |
| 41 21 Top Boundaries | 107 Number Of Direction Ranges Specified = 3 |
| 42 28 Total Boundaries | 108 |
| 43 | 109 |
| 44 | 110 Direction Counterclockwise Cohesion Friction |
| 45 Boundary X-Left Y-Left X-Right Y-Right Soil Type | 111 Range Direction Limit Intercept Angle |
| 46 No. (ft) (ft) (ft) Below Bnd | 112 No. (deg) (psf) (deg) |
| 47 | 113 |
| | |

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| 1 | 10.0 | 250.00 | 32.00 |
|---|------|--------|-------|
| 2 | 15.0 | 150.00 | 25.00 |
| 3 | 90.0 | 250.00 | 32.00 |

ANISOTROPIC SOIL NOTES:

- (1) An input value of 0.01 for C and/or Phi will cause Aniso C and/or Phi to be ignored in that range.
- (2) An input value of 0.02 for Phi will set both Phi and C equal to zero, with no water weight in the tension crack.
- (3) An input value of 0.03 for Phi will set both Phi and C equal to zero, with water weight in the tension crack.

Janbus Empirical Coef is being used for the case of c & phi both > 0

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

4999 Trial Surfaces Have Been Generated.

2 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 55.0

| Box No. | X-Left (ft) | Y-Left (ft) | X-Right (ft) | Y-Right (ft) | Height (ft) | |
|------------|----------------|----------------|-----------------|-----------------|----------------|--|
| 1 | 399.00 | 1374.00 | 412.00 | 1374.00 | 30.00 | |
| 2 | 412.10 | 1374.00 | 600.00 | 1427.00 | 30.00 | |

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 5 Coordinate Points

| X-Surf (ft) | Y-Suri (ft) |
|----------------|--|
| 350.28 | 1389.23 |
| 355.60 | 1384.36 |
| 408.68 | 1369.99 |
| 429.70 | 1377.48 |
| 429.78 | 1423.19 |
| | (ft) 350.28 355.60 408.68 429.70 |

Factor of Safety for the Preceding Surface is Between89.790 and87.995

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 6 Coordinate Points

| 181 182 183 184 | Point No. | X-Surf (ft) | Y-Surf (ft) |
|--------------------------|--------------|----------------|----------------|
| 185 | 1 | 360.95 | 1394.84 |
| 186 | 2 | 366.54 | 1391.70 |
| 187 | 3 | 411.47 | 1359.99 |
| 188 | 4 | 440.71 | 1369.68 |
| 189 | 5 | 441.14 | 1424.68 |
| 190 | 6 | 441.93 | 1427.00 |
| 191 | | | |

Factor of Safety for the Preceding Surface is Between47.451 and47.442

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 5 Coordinate Points

| Point No. | X-Surf (ft) | Y-Sur (ft) |
|--------------|----------------|---------------|
| 1 | 380.07 | 1404.8 |
| 2 | 411.33 | 1380.7 |
| 3 | 558.66 | 1400.9 |
| 4 | 558.79 | 1455.9 |
| 5 | 567.63 | 1485.1 |

Factor of Safety for the Preceding Surface is Between 6.865 and 6.859

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 5 Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|--------------|----------------|----------------|
| 1 | 350.28 | 1389.23 |
| 2 | 355.60 | 1384.36 |
| 3 | 408.68 | 1369.95 |
| 4 | 429.70 | 1377.48 |
| 5 | 429.78 | 1423.19 |

Factor of Safety for the Preceding Surface is Between89.790 and87.995

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following $\,\,$ 6 Coordinate Points

| 246 | Point | X-Surf | Y-Surf | |
|------------|--------------|--------------|----------------|--|
| 247 | No. | (ft) | (ft) | |
| 248 | 110 • | (10) | (10) | |
| 249 | 1 | 360.95 | 1394.84 | |
| 250 | 2 | 366.54 | 1391.70 | |
| 251 | 3 | 411.47 | 1359.99 | |
| 252 | 4 | 440.71 | 1369.68 | |
| 253 | 5 | 441.14 | 1424.68 | |
| 254 | 6 | 441.93 | 1427.00 | |
| 255 | · · | 111.55 | 1127.00 | |
| 256 | | | | |
| 257 | Factor of | Safety for 1 | the Preceding | Surface is Between47.451 and47.442 |
| 258 | 140001 01 | barce, ror | one rrecearing | ballage is between 1, 191 and 1, 111 |
| 259 | | | | |
| 260 | WARNING! T | he factor of | f cafety calc | alation did not converge in 20 iterations. |
| 261 | WHIGHING. I | ne raccor o. | r barcey care | atacion ala not converge in 20 rectacions. |
| 262 | | | | |
| 263 | | | | |
| 264 | The Trial | Failure Sur | face In Ouest | on Is Defined |
| 265 | | | oordinate Poi | |
| 266 | by inc ror | TOWING 5 C | JOI GINGCE TOI | 105 |
| 267 | | | | |
| 268 | Point | X-Surf | Y-Surf | |
| 269 | No. | (ft) | (ft) | |
| 270 | 140 • | (10) | (10) | |
| 271 | 1 | 380.07 | 1404.89 | |
| 272 | 2 | 411.33 | 1380.78 | |
| 273 | 3 | 558.66 | 1400.95 | |
| 274 | 4 | 558.79 | 1455.95 | |
| 275 | 5 | 567.63 | 1485.11 | |
| 276 | 3 | 507.05 | 1105.11 | |
| 277 | | | | |
| 278 | Factor of | Safety for | the Preceding | Surface is Between 6.865 and 6.859 |
| 279 | | | | |
| 280 | | | | |
| 281 | WARNING! T | he factor of | f safety calc | alation did not converge in 20 iterations. |
| 282 | | | | |
| 283 | | | | |
| 284 | | | | |
| 285 | The Trial | Failure Sur | face In Quest | on Is Defined |
| 286 | By The Fol | lowing 5 Co | oordinate Poi | nts |
| 287 | | | | |
| 288 | | | | |
| 289 | Point | X-Surf | Y-Surf | |
| 290 | No. | (ft) | (ft) | |
| 291 | | | | |
| 292 | 1 | 350.28 | 1389.23 | |
| 293 | 2 | 355.60 | 1384.36 | |
| 294 | 3 | 408.68 | 1369.95 | |
| 295 | 4 | 429.70 | 1377.48 | |
| 296 | 5 | 429.78 | 1423.19 | |
| 297 | | | | |
| 298 | | | | |
| 299 | Factor of | Safety for | the Preceding | Surface is Between89.790 and87.995 |
| 300 | | | | |
| 301 | | | | 3 |
| 302 | WARNING! T | ne ractor of | L sarety calc | lation did not converge in 20 iterations. |
| 303 | | | | |
| 304 | | | | |
| 305 | mis a mari i | D | F T O : | To Believed |
| 306 | | | | on Is Defined |
| 307 | By The Fol | lowing 6 Co | oordinate Poi | ICS |
| 308 309 | | | | |
| 310 | Point. | X-Surf | Y-Surf | |
| 311 | No. | (ft) | (ft) | |
| 211 | 140 • | (+0) | (10) | |

```
313
                           360.95
                                      1394.84
                  1
314
                           366.54
                                      1391.70
315
                           411.47
                                      1359.99
                  3
316
                           440.71
                                      1369.68
                  4
317
                           441.14
                                      1424.68
                  5
318
                           441.93
                                      1427.00
319
320
321
               Factor of Safety for the Preceding Surface is Between47.451 and47.442
322
323
324
               WARNING! The factor of safety calculation did not converge in 20 iterations.
325
326
327
328
               The Trial Failure Surface In Ouestion Is Defined
329
               By The Following 5 Coordinate Points
330
331
332
                 Point
                           X-Surf
                                      Y-Surf
333
                  No.
                            (ft)
                                       (ft)
334
335
                           380.07
                                      1404.89
                           411.33
                                      1380.78
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                  2
337
                  3
                           558.66
                                      1400.95
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                           558.79
                                      1455.95
                  4
339
                           567.63
                                      1485.11
340
341
342
               Factor of Safety for the Preceding Surface is Between 6.865 and 6.859
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344
345
               WARNING! The factor of safety calculation did not converge in 20 iterations.
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349
               The Trial Failure Surface In Question Is Defined
350
               By The Following 5 Coordinate Points
351
352
353
                 Point
                           X-Surf
                                       Y-Surf
354
                            (ft)
                                       (ft)
                 No.
355
356
                  1
                           350.28
                                      1389.23
357
                           355.60
                                      1384.36
358
                           408.68
                                      1369.95
                  3
359
                  4
                           429.70
                                      1377.48
360
                  5
                           429.78
                                      1423.19
361
362
363
               Factor of Safety for the Preceding Surface is Between89.790 and87.995
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365
               WARNING! The factor of safety calculation did not converge in 20 iterations.
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370
               The Trial Failure Surface In Question Is Defined
371
               By The Following 6 Coordinate Points
372
373
374
                 Point
                           X-Surf
                                       Y-Surf
375
                 No.
                            (ft)
                                       (ft)
376
377
                           360.95
                                      1394.84
                  1
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378
                   2
                            366.54
                                       1391 70
379
                   3
                            411.47
                                       1359.99
380
                   4
                            440.71
                                       1369.68
381
                   5
                            441.14
                                       1424.68
382
                   6
                            441.93
                                       1427.00
383
384
385
               Factor of Safety for the Preceding Surface is Between47.451 and47.442
386
387
388
                WARNING! The factor of safety calculation did not converge in 20 iterations.
389
390
391
                The Trial Failure Surface In Ouestion Is Defined
392
393
               By The Following 5 Coordinate Points
394
395
                 Point.
                            X-Surf
                                        Y-Surf
396
397
                  No.
                             (ft)
                                         (ft)
398
399
                            380.07
                                       1404.89
400
                   2
                            411.33
                                       1380 78
401
                            558.66
                                       1400.95
402
                   4
                            558 79
                                       1455 95
403
                   5
                            567.63
                                       1485.11
404
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406
               Factor of Safety for the Preceding Surface is Between 6.865 and 6.859
407
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                WARNING! The factor of safety calculation did not converge in 20 iterations.
410
411
412
               The Trial Failure Surface In Ouestion Is Defined
413
414
                By The Following 5 Coordinate Points
415
416
417
                 Point
                            X-Surf
                                        Y-Surf
418
                  No.
                             (ft)
                                         (ft)
419
                            350.28
                                       1389.23
420
                   1
421
                   2
                            355.60
                                       1384 36
422
                            408.68
                                       1369.95
                   3
                             429.70
                                       1377.48
423
                            429 78
424
                                       1423.19
425
426
427
               Factor of Safety for the Preceding Surface is Between89.790 and87.995
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                WARNING! The factor of safety calculation did not converge in 20 iterations.
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433
434
                The Trial Failure Surface In Question Is Defined
               By The Following 6 Coordinate Points
435
436
437
438
                 Point
                            X-Surf
                                        Y-Surf
439
                  No.
                             (ft)
                                         (ft)
440
441
                   1
                            360.95
                                       1394.84
442
                   2
                            366.54
                                       1391.70
                            411.47
443
                   3
                                       1359.99
```

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444
                            440.71
                                       1369 68
                   4
445
                            441.14
                                       1424.68
446
                            441.93
                                       1427.00
447
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449
               Factor of Safety for the Preceding Surface is Between47.451 and47.442
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452
                WARNING! The factor of safety calculation did not converge in 20 iterations.
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456
                The Trial Failure Surface In Question Is Defined
457
               By The Following 5 Coordinate Points
458
459
                            X-Surf
                                        Y-Surf
460
                  Point
461
                  No.
                             (ft)
                                         (ft)
462
463
                            380.07
                                       1404.89
464
                                       1380.78
                   2
                             411.33
465
                             558.66
                                       1400.95
                   3
466
                            558 79
                                       1455 95
                   4
467
                            567.63
                                       1485.11
468
469
470
               Factor of Safety for the Preceding Surface is Between 6.865 and 6.859
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472
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               WARNING! The factor of safety calculation did not converge in 20 iterations.
474
475
476
                The Trial Failure Surface In Ouestion Is Defined
477
478
               By The Following 5 Coordinate Points
479
480
481
                 Point
                            X-Surf
                                        Y-Surf
482
                  No.
                             (ft)
                                         (ft)
483
                            350.28
                                       1389.23
484
485
                   2
                            355 60
                                       1384 36
486
                             408.68
                                       1369.95
                   3
487
                   4
                            429.70
                                       1377 48
488
                            429.78
                                       1423.19
                   5
489
490
491
               Factor of Safety for the Preceding Surface is Between89.790 and87.995
492
493
494
               WARNING! The factor of safety calculation did not converge in 20 iterations.
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496
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498
                The Trial Failure Surface In Question Is Defined
499
               By The Following 6 Coordinate Points
500
501
502
                 Point
                            X-Surf
                                        Y-Surf
                             (ft)
503
                  No.
                                         (ft)
504
                            360.95
                                       1394.84
505
506
                             366.54
                                       1391.70
507
                   3
                             411.47
                                       1359.99
                                       1369.68
508
                   4
                             440.71
509
                   5
                            441.14
                                       1424.68
```

| 510 | 6 | 441.93 | 1427.00 |
|------------|----------------|------------------|---|
| 511 | | | |
| 512 | | | |
| 513 | Factor of | Safety for | the Preceding Surface is Between47.451 and47.442 |
| 514 | | | |
| 515 | | | |
| 516 | WARNING! T | he factor of | f safety calculation did not converge in 20 iterations. |
| 517 | | | |
| 518 | | | |
| 519 520 | The Trial | Enilura Cur | face In Question Is Defined |
| 521 | | | cordinate Points |
| 522 | by The Pol | TOWING 5 CO | oordinate roints |
| 523 | | | |
| 524 | Point | X-Surf | Y-Surf |
| 525 | No. | (ft) | (ft) |
| 526 | | | |
| 527 | 1 | 380.07 | 1404.89 |
| 528 | 2 | 411.33 | 1380.78 |
| 529 | 3 | 558.66 | 1400.95 |
| 530 | 4 | 558.79 | 1455.95 |
| 531 | 5 | 567.63 | 1485.11 |
| 532 | | | |
| 533 | Footon of | Cafatu fam | the Deceding Confess is Detroop 6 065 and 6 050 |
| 534 535 | Factor of | sarety for | the Preceding Surface is Between 6.865 and 6.859 |
| 536 | | | |
| 537 | WARNING! T | he factor of | f safety calculation did not converge in 20 iterations. |
| 538 | WARRIER I | ne ractor o | r sarety carculation and not converge in 20 iterations. |
| 539 | | | |
| 540 | | | |
| 541 | The Trial | Failure Sur | face In Question Is Defined |
| 542 | By The Fol | lowing 5 Co | oordinate Points |
| 543 | | | |
| 544 | | | |
| 545 | Point | X-Surf | Y-Surf |
| 546 | No. | (ft) | (ft) |
| 547 | | 250.00 | 1200 02 |
| 548 549 | 1 2 | 350.28 355.60 | 1389.23 1384.36 |
| 550 | 3 | 408.68 | 1369.95 |
| 551 | 4 | 429.70 | 1377.48 |
| 552 | 5 | 429.78 | 1423.19 |
| 553 | _ | | |
| 554 | | | |
| 555 | Factor of | Safety for | the Preceding Surface is Between89.790 and87.995 |
| 556 | | | |
| 557 | | | |
| 558 | WARNING! T | he factor of | f safety calculation did not converge in 20 iterations. |
| 559 | | | |
| 560 | | | |
| 561 | mla a mari a l | T 1 C | for To Occapion to Defined |
| 562 563 | | | face In Question Is Defined |
| 564 | By IIIe FOI | TOWING 6 C | coordinate Points |
| 565 | | | |
| 566 | Point | X-Surf | Y-Surf |
| 567 | No. | (ft) | (ft) |
| 568 | | ·/ | • • • |
| 569 | 1 | 360.95 | 1394.84 |
| 570 | 2 | 366.54 | 1391.70 |
| 571 | 3 | 411.47 | 1359.99 |
| 572 | 4 | 440.71 | 1369.68 |
| 573 | 5 | 441.14 | 1424.68 |
| 574 | 6 | 441.93 | 1427.00 |
| 575 | | | |

```
577
               Factor of Safety for the Preceding Surface is Between47.451 and47.442
578
579
580
               WARNING! The factor of safety calculation did not converge in 20 iterations.
581
582
583
584
               The Trial Failure Surface In Question Is Defined
585
               By The Following 5 Coordinate Points
586
587
588
                 Point
                           X-Surf
                                       Y-Surf
589
                            (ft)
                                       (ft)
                  No.
590
591
                           380.07
                                      1404.89
592
                           411.33
                                      1380.78
                           558.66
                                      1400.95
593
                  3
594
                           558.79
                                      1455.95
                  4
595
                  5
                           567.63
                                      1485.11
596
597
598
               Factor of Safety for the Preceding Surface is Between 6.865 and 6.859
599
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601
               WARNING! The factor of safety calculation did not converge in 20 iterations.
602
603
604
605
               The Trial Failure Surface In Question Is Defined
606
               By The Following 5 Coordinate Points
607
608
609
                Point
                           X-Surf
                                      Y-Surf
610
                 No.
                            (ft)
                                       (ft)
611
612
                           350.28
                                      1389.23
613
                  2
                           355.60
                                      1384.36
614
                  3
                           408.68
                                      1369.95
615
                           429.70
                                      1377.48
                  4
616
                           429.78
                                      1423.19
617
618
619
               Factor of Safety for the Preceding Surface is Between89.790 and87.995
620
621
622
               WARNING! The factor of safety calculation did not converge in 20 iterations.
623
624
626
               The Trial Failure Surface In Question Is Defined
627
               By The Following 6 Coordinate Points
628
629
                           X-Surf
                                       Y-Surf
630
                 Point
631
                 No.
                            (ft)
                                       (ft)
632
633
                           360.95
                                      1394.84
634
                           366.54
                                      1391.70
```

411.47

440.71

441.14

441.93

3

4

5

1359.99

1369.68

1424.68

1427.00

Factor of Safety for the Preceding Surface is Between47.451 and47.442

635

636

637

638

639 640 641

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 5 Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|--------------|----------------|----------------|
| 1 | 380.07 | 1404.89 |
| 2 | 411.33 | 1380.78 |
| 3 | 558.66 | 1400.95 |
| 4 | 558.79 | 1455.95 |
| 5 | 567.63 | 1485.11 |
| | | |

Factor of Safety for the Preceding Surface is Between 6.865 and 6.859

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 5 Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|--------------|----------------|----------------|
| 1 | 350.28 | 1389.23 |
| 2 | 355.60 | 1384.36 |
| 3 | 408.68 | 1369.95 |
| 4 | 429.70 | 1377.48 |
| 5 | 429.78 | 1423.19 |

Factor of Safety for the Preceding Surface is Between89.790 and87.995

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 6 Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|--------------|----------------|----------------|
| 1 | 360.95 | 1394.84 |
| 2 | 366.54 | 1391.70 |
| 3 | 411.47 | 1359.99 |
| 4 | 440.71 | 1369.68 |
| 5 | 441.14 | 1424.68 |
| 6 | 441.93 | 1427.00 |

Factor of Safety for the Preceding Surface is Between47.451 and47.442

WARNING! The factor of safety calculation did not converge in 20 iterations. The Trial Failure Surface In Question Is Defined By The Following 5 Coordinate Points Point X-Surf Y-Surf No. (ft) (ft) 1404 89 - 1 380 07 411.33 1380.78 558.66 1400.95 558.79 1455.95 567.63 1485.11 Factor of Safety for the Preceding Surface is Between 6.865 and 6.859 Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Evaluated. They Are Ordered - Most Critical First. * * Safety Factors Are Calculated By The Simplified Janbu Method * * Total Number of Trial Surfaces Attempted = 4999 WARNING! The Factor of Safety Calculation for one or More Trial Surfaces Did Not Converge in 20 Iterations. Number of Trial Surfaces with Non-Converged FS = 27 Number of Trial Surfaces With Valid FS = 4972 Percentage of Trial Surfaces With Non-Valid FS Solutions of the Total Attempted = 0.5 % Statistical Data On All Valid FS Values: FS Max = 19.824 FS Min = 1.645 FS Ave = 2.931 Standard Deviation = 1.868 Coefficient of Variation = 63.73 % Failure Surface Specified By 5 Coordinate Points Y-Surf Point X-Surf (ft) (ft) No. 377.780 1403.681 405.639 1387.951 547.967 1424.267 585.779 1464.208 612 100 1500 514

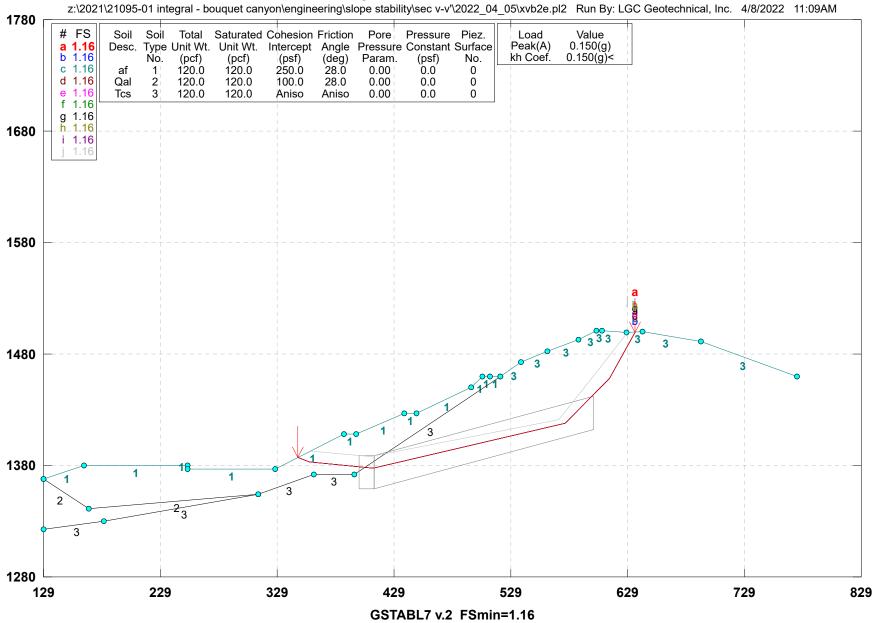
Factor of Safety

*** 1.645 ***

```
774
                                                                                                       840
775
                                                                                                       841
                                                                                                                       Failure Surface Specified By 5 Coordinate Points
776
                    Individual data on the
                                              18 slices
                                                                                                       842
777
                                                                                                       843
778
                                                                                                       844
779
                                                                                                       845
                                                                                                                                    X-Surf
                                                                                                                                                Y-Surf
                              Water Water
                                               Tie
                                                       Tie
                                                               Earthquake
                                                                                                                         Point
780
                              Force Force
                                              Force
                                                                  Force Surcharge
                                                                                                       846
                                                                                                                          No.
                                                                                                                                     (ft)
                                                                                                                                                (ft)
                                                      Force
781
      Slice Width
                               Top
                                                      Tan
                                                                      Ver
                                                                                                       847
                     Weight
                                     Bot.
                                              Norm
                                                               Hor
                                                                              Load
782
       No.
              (ft)
                      (lbs)
                              (lbs) (lbs)
                                              (lbs)
                                                      (lbs)
                                                              (lbs)
                                                                     (lbs)
                                                                             (lbs)
                                                                                                       848
                                                                                                                                    377.780
                                                                                                                                                1403.681
783
                                                                                                       849
                                                                                                                          2
                                                                                                                                    405 639
                                                                                                                                               1387 951
784
                      4419.4
                                 0.0
                                         0.0
                                                   0.
                                                           0.
                                                                  0.0
                                                                         0.0
                                                                                  0.0
                                                                                                       850
                                                                                                                                    547.967
                                                                                                                                                1424.267
785
        2
              11.0
                     15927.0
                                 0.0
                                         0 0
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                                                           0.
                                                                  0 0
                                                                         0 0
                                                                                  0 0
                                                                                                       851
                                                                                                                           4
                                                                                                                                    585 779
                                                                                                                                                1464 208
786
        3
                     20331.1
                                 0.0
                                         0.0
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                                                                         0.0
                                                                                  0.0
                                                                                                       852
                                                                                                                                    612.100
                                                                                                                                               1500.514
               8.6
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                                                           0.
787
              18.9
                     58849.7
                                                                                                       853
                                 0.0
                                         0.0
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                                                           0.
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                                                                         0.0
                                                                                  0.0
                     47640.2
788
              13.5
                                 0.0
                                         0.0
                                                   0.
                                                           0.
                                                                  0.0
                                                                         0.0
                                                                                  0.0
                                                                                                       854
                                                                                                       855
789
              10.0
                     35419.3
                                 0.0
                                         0.0
                                                   0.
                                                           0.
                                                                  0.0
                                                                         0.0
                                                                                  0.0
                                                                                                                             Factor of Safety
790
                    190316.3
                                                                                                       856
                                                                                                                                  1.645 ***
              47.0
                                 0.0
                                         0.0
                                                  0.
                                                           0.
                                                                  0.0
                                                                         0.0
                                                                                  0.0
791
              10.0
                     51566.5
                                 0.0
                                         0.0
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                                                                                                                       Failure Surface Specified By 5 Coordinate Points
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                     37372.4
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                                                                                                       865
                                                                                                                         Point
                                                                                                                                    X-Surf
                                                                                                                                                Y-Surf
              15.0
                                         0.0
                                                   0.
                                                           0.
                                                                         0.0
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                                                                                                                                                (ft)
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               Failure Surface Specified By 5 Coordinate Points
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                                                                                                       870
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                                                                                                                                    547.967
                                                                                                                                                1424.267
805
                                                                                                       871
                                                                                                                                    585.779
                                                                                                                                               1464.208
                 Point
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                            X-Surf
                                        Y-Surf
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                                                                                                                                    612.100
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                             (ft)
                                         (ft)
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807
                  No.
808
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                            377.780
                                        1403.681
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                            405.639
                                        1387.951
                                                                                                       876
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                            547.967
                                        1424.267
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                            585.779
                                        1464.208
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               Failure Surface Specified By 5 Coordinate Points
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                 Point
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                  No.
                             (ft)
                                         (ft)
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                                                                                                                             Factor of Safety
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                            377.780
                                        1403.681
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                                                                                                                             *** 1.645 ***
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                                        1387.951
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                                                                                                                       Failure Surface Specified By 5 Coordinate Points
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                      Factor of Safety
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                     *** 1.645 ***
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                                                                                                                         Point
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                                                                                                                                                Y-Surf
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                                                                                                                          No.
                                                                                                                                     (ft)
                                                                                                                                                 (ft)
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              Failure Surface Specified By 5 Coordinate Points
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                         405.639
                          547.967
                                    1424.267
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                                    1464.208
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                                    1500.514
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                   Factor of Safety
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              Failure Surface Specified By 6 Coordinate Points
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               Point
                         X-Surf
                                    Y-Surf
                         (ft)
963
                                     (ft)
                No.
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                 1
                         363.608
                                    1396.235
                                    1377.382
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                 2
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                          579.036
                                    1452.992
969
                 5
                          617.402
                                    1492.400
970
                          621.816
                                    1499.589
971
```

Bouquet Canyon/21095-01/Section V-V'/ Seismic



Safety Factors Are Calculated By The Simplified Janbu Method for the case of c & phi both > 0

| 1 | | *** GSTABL7 *** | 48 | | 1 | 129.00 | 1368.00 | 164.00 | 1380.00 | | 1 |
|----------|--|---|------------|---|--------------------------|------------------|--------------------|--------------------|----------------------|---------|--------|
| 2 | | | 49 | | 2 | 164.00 | 1380.00 | 252.00 | 1380.00 | | 1 |
| 3 | ** GSTABL7 | by Dr. Garry H. Gregory, Ph.D., P.E., D.GE ** | 50 | | 3 | 252.00 | 1380.00 | 252.10 | 1377.00 | | 1 |
| 4 | | | 51 | | 4 | 252.10 | 1377.00 | 327.00 | 1377.00 | | 1 |
| 5 | | 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 ** | 52 | | 5 | 327.00 | 1377.00 | 386.00 | 1408.00 | | 1 |
| 6 | (All Rig | hts Reserved-Unauthorized Use Prohibited) | 53 | | 6 | 386.00 | 1408.00 | 397.00 | 1408.00 | | 1 |
| 7 | | | 54 | | 7 | 397.00 | 1408.00 | 438.00 | 1427.00 | | 1 |
| 8 | | | 55 56 | | 8 9 | 438.00 448.00 | 1427.00 | 448.00 | 1427.00 | | 1 1 |
| 9 | | ************ | 57 | | - | | 1427.00 | 495.00 | 1450.00 | | 1 1 |
| | ** | | 57 | | 10 11 | 495.00 505.00 | 1450.00 1460.00 | 505.00 511.00 | 1460.00 | | ⊥ 1 |
| 10 | | PE STABILITY ANALYSIS SYSTEM | 59 | | 12 | 511.00 | 1460.00 | 520.00 | 1460.00 | | 1 |
| 11 | | Simplified Janbu, or GLE Method of Slices. | 60 | | 13 | 520.00 | 1460.00 | 538.00 | 1473.00 | | 3 |
| 12 | | r & Morgenstern-Price Type Analysis) | 61 | | 14 | 538.00 | 1473.00 | 560.00 | 1482.00 | | 3 |
| 13 | | ile, Reinforcement, Soil Nail, Tieback, | 62 | | 15 | 560.00 | 1482.00 | 587.00 | 1493.00 | | 3 |
| 14 | | ned Shear Strength, Curved Phi Envelope, | 63 | | 16 | 587.00 | 1493.00 | 602.00 | 1501.00 | | 3 |
| 15 | | , Fiber-Reinforced Soil, Boundary Loads, Water | 64 | | 17 | 602.00 | 1501.00 | 607.00 | 1501.00 | | 3 |
| 16 | | -Static & Newmark Earthquake, and Applied Forces. | 65 | | 18 | 607.00 | 1501.00 | 628.00 | 1499.00 |) | 3 |
| 17 | | - | 66 | | 19 | 628.00 | 1499.00 | 642.00 | 1500.00 |) | 3 |
| | | ****************** | 67 | | 20 | 642.00 | 1500.00 | 692.00 | 1491.00 | | 3 |
| | ** | | 68 | | 21 | 692.00 | 1491.00 | 774.00 | 1460.00 | | 3 |
| 18 | | | 69 | | 22 | 129.00 | 1368.00 | 168.00 | 1341.00 | | 2 |
| 19 | | | 70 | | 23 | 168.00 | 1341.00 | 313.00 | 1354.00 | | 2 |
| 20 | Analysis Run Date: | 4/8/2022 | 71 | | 24 | 313.00 | 1354.00 | 360.00 | 1372.00 | | 3 |
| 21 | Time of Run: | 11:09AM | 72 | | 25 | 360.00 | 1372.00 | 395.00 | 1372.00 | | 3 |
| 22 | Run By: | LGC Geotechnical, | 73 | | 26 | 395.00 | 1372.00 | 520.00 | 1460.00 | | 3 |
| | Inc. | | 74 75 | | 27 28 | 129.00 181.00 | 1323.00 1330.00 | 181.00 313.00 | 1330.00 | | 3 |
| | | | 76 | | 20 | 101.00 | 1330.00 | 313.00 | 1334.00 | , | 3 |
| 23 | Input Data Filename: | Z:\2021\21095-01 Integral - Bouquet | 77 | | User Specif | ied V-Oria | in = | 1280.00(ft) | | | |
| 23 | Canyon\Engineering\slop V-V'\2022_04_05\xvb2e.i | e stability\Sec | 78 79 | | Default X-F | | | 1200.00(10) | | | |
| | · · · (2022_01_03 \1102201 | . | 80 81 | | Default Y-F | | | | | | |
| 24 | Output Filename: | Z:\2021\21095-01 Integral - Bouquet | 82 | 1 | DCIUUIC I I | IUD VUIUC | - 0.00(10) | | | | |
| | Canyon\Engineering\slop | | 83 | | | | | | | | |
| | V-V'\2022_04_05\xvb2e.0 | UT | 84 | | | | | | | | |
| | | | 85 | I | SOTROPIC SC | IL PARAMET | ERS | | | | |
| | | | 86 | | | | | | | | |
| 25 | Unit System: | English | 87 | | | | | | | | |
| 26 | | | 88 | | 3 Type(s) | of Soil | | | | | |
| 27 | | : Z:\2021\21095-01 Integral - Bouquet | 89 | | | | | | | | |
| | Canyon\Engineering\slop | | 90 91 | | 0-11 m-1-1 | 0 - 1 | a | | D F | | Di |
| | V-V'\2022_04_05\xvb2e.P | LT | 91 | | Soil Total | | | | Pore I Pressure C | ressure | Piez. |
| | | | 93 | | Type Unit W No. (pcf) | | (psf) | t Angle I (deg) | Param. | (psf) | No. |
| 28 | | | 94 | | No. (pci) | (per) | (psi) | (deg) | raram. | (psi) | NO. |
| 29 | | | 95 | | 1 120.0 | 120.0 | 250.0 | 28.0 | 0.00 | 0.0 | 0 |
| 30 | | | 96 | | 2 120.0 | | 100.0 | | 0.00 | 0.0 | 0 |
| 31 | | | 97 | | 3 120.0 | | 250.0 | 32.0 | 0.00 | 0.0 | 0 |
| 32 | | | 98 | | | | | | | | |
| 33 | PROBLEM DESCRIPTION: B | ouquet Canyon/21095-01/Section V-V'/ | 99 | | | | | | | | |
| 34 | S | eismic | 100 | | | | | | | | |
| 35 | | | 101 | A | NISOTROPIC | STRENGTH P | ARAMETERS | | | | |
| 36 | | | 102 | | 1 soil | type(s) | | | | | |
| 37 | | | 103 | | | | | | | | |
| 38 | | | 104 | | | | | | | | |
| 39 | BOUNDARY COORDINATES | | 105 | | Soil Type | 3 Is Aniso | tropic | | | | |
| 40 41 | 21 Top Boundaries | | 106 107 | | Number of F | irosti P | angog (| ified = 2 | | | |
| 41 42 | 21 Top Boundaries 28 Total Boundaries | | 107 | | Number Of I | rrection R | anges spec | | | | |
| 42 | 20 local Boundaries | | 108 | | | | | | | | |
| 44 | | | 110 | | Direction | Counterd | lockwise | Cohesion | Frict | ion | |
| 45 | Boundary X-Left | Y-Left X-Right Y-Right Soil Type | 111 | | Range | | on Limit | Intercept | Ang | | |
| 46 | No. (ft) | (ft) (ft) Below Bnd | 112 | | No. | (de | | (psf) | (de | | |
| 47 | , | | 113 | | | , | - | | , | | |
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1 10.0 250.00 32.00
2 15.0 150.00 25.00
3 90.0 250.00 32.00
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ANISOTROPIC SOIL NOTES:

- (1) An input value of 0.01 for C and/or Phi will cause Aniso C and/or Phi to be ignored in that range.
- (2) An input value of 0.02 for Phi will set both Phi and C equal to zero, with no water weight in the tension crack.
- (3) An input value of 0.03 for Phi will set both Phi and C equal to zero, with water weight in the tension crack.

Specified Peak Ground Acceleration Coefficient (A) = 0.150(g)
Specified Horizontal Earthquake Coefficient (kh) = 0.150(g)
Specified Vertical Earthquake Coefficient (kv) = 0.000(g)

Specified Seismic Pore-Pressure Factor = 0.000

Janbus Empirical Coef is being used for the case of c & phi both > 0

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

- 4999 Trial Surfaces Have Been Generated.
- 2 Boxes Specified For Generation Of Central Block Base

 ${\bf Length}$ Of Line Segments For Active And Passive Portions Of Sliding Block Is 55.0

| Box No. | X-Left (ft) | Y-Left (ft) | X-Right (ft) | Y-Right (ft) | Height (ft) |
|------------|----------------|----------------|-----------------|-----------------|----------------|
| 1 | 399.00 | 1374.00 | 412.00 | 1374.00 | 30.00 |
| 2 | 412.10 | 1374.00 | 600.00 | 1427.00 | 30.00 |

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 5 Coordinate Points

| Point No. | X-Surf (ft) | Y-Suri (ft) |
|--------------|----------------|----------------|
| 1 | 350.28 | 1389.2 |
| 2 | 355.60 | 1384.3 |
| 3 | 408.68 | 1369.9 |
| 4 | 429.70 | 1377.48 |
| 5 | 429.78 | 1423.19 |

Factor of Safety for the Preceding Surface is Between10.595 and10.509

WARNING! The factor of safety calculation did not converge in 20 iterations. The Trial Failure Surface In Question Is Defined By The Following 6 Coordinate Points Point X-Surf Y-Surf No. (ft) (ft) - 1 360 95 1394 84 366.54 1391.70 411.47 1359.99 440.71 1369.68 441.14 1424.68 441.93 1427.00 Factor of Safety for the Preceding Surface is Between17.011 and16.974 WARNING! The factor of safety calculation did not converge in 20 iterations. The Trial Failure Surface In Question Is Defined By The Following 5 Coordinate Points Point X-Surf Y-Surf (ft) No. (ft.) - 1 350 28 1389 23 355.60 1384.36 408.68 1369 95 429.70 1377.48 429.78 1423.19 Factor of Safety for the Preceding Surface is Between10.595 and10.509 WARNING! The factor of safety calculation did not converge in 20 iterations. The Trial Failure Surface In Question Is Defined By The Following 6 Coordinate Points

| Point No. | X-Surf (ft) | Y-Suri (ft) |
|--------------|----------------|----------------|
| 1 | 360.95 | 1394.84 |
| 2 | 366.54 | 1391.70 |
| 3 | 411.47 | 1359.99 |
| 4 | 440.71 | 1369.68 |
| 5 | 441.14 | 1424.68 |
| 6 | 441.93 | 1427.00 |
| | | |

Factor of Safety for the Preceding Surface is Between17.011 and16.974

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 5 Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) | | | | |
|--------------|----------------|----------------|--|--|--|--|
| 1 | 350.28 | 1389.23 | | | | |
| 2 | 355.60 | 1384.36 | | | | |
| 3 | 408.68 | 1369.95 | | | | |
| 4 | 429.70 | 1377.48 | | | | |
| 5 | 429.78 | 1423.19 | | | | |

Factor of Safety for the Preceding Surface is Between10.595 and10.509

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 6 Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|--------------|----------------|----------------|
| 1 | 360.95 | 1394.84 |
| 2 | 366.54 | 1391.70 |
| 3 | 411.47 | 1359.99 |
| 4 | 440.71 | 1369.68 |
| 5 | 441.14 | 1424.68 |
| 6 | 441.93 | 1427.00 |
| | | |

Factor of Safety for the Preceding Surface is Between17.011 and16.974

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 5 Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|--------------|----------------|----------------|
| 1 | 350.28 | 1389.23 |
| 2 | 355.60 | 1384.36 |
| 3 | 408.68 | 1369.95 |
| 4 | 429.70 | 1377.48 |
| 5 | 429.78 | 1423.19 |
| | | |

Factor of Safety for the Preceding Surface is Between10.595 and10.509

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 6 Coordinate Points

| Poin No. | t X-Surf (ft) | Y-Surf (ft) |
|-------------|------------------|----------------|
| 1 | 360.95 | 1394.84 |
| 2 | 366.54 | 1391.70 |
| 3 | 411.47 | 1359.99 |
| 4 | 440.71 | 1369.68 |
| 5 | 441.14 | 1424.68 |
| 6 | 441.93 | 1427.00 |

Factor of Safety for the Preceding Surface is Between17.011 and16.974

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 5 Coordinate Points

| Point No. | X-Surf (ft) | Y-Sur (ft) |
|--------------|----------------|---------------|
| 1 | 350.28 | 1389.2 |
| 2 | 355.60 | 1384.3 |
| 3 | 408.68 | 1369.9 |
| 4 | 429.70 | 1377.4 |
| 5 | 429.78 | 1423.1 |
| | | |

Factor of Safety for the Preceding Surface is Between10.595 and10.509

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 6 Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|--------------|----------------|----------------|
| 1 | 360.95 | 1394.84 |
| 2 | 366.54 | 1391.70 |
| 3 | 411.47 | 1359.99 |
| 4 | 440.71 | 1369.68 |
| 5 | 441.14 | 1424.68 |
| 6 | 441.93 | 1427.00 |

Factor of Safety for the Preceding Surface is Between17.011 and16.974

WARNING! The factor of safety calculation did not converge in 20 iterations.

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| The Tria | al Failure | S١ | ırface | In | Qι | estion | Is | Defined |
|----------|------------|----|--------|------|----|--------|----|---------|
| By The F | following | 5 | Coord | inat | -e | Points | | |

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|--------------|----------------|----------------|
| 1 | 350.28 | 1389.23 |
| 2 | 355.60 | 1384.36 |
| 3 | 408.68 | 1369.95 |
| 4 | 429.70 | 1377.48 |
| 5 | 429.78 | 1423.19 |

Factor of Safety for the Preceding Surface is Between10.595 and10.509

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 6 Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|--------------|----------------|----------------|
| 1 | 360.95 | 1394.84 |
| 2 | 366.54 | 1391.70 |
| 3 | 411.47 | 1359.99 |
| 4 | 440.71 | 1369.68 |
| 5 | 441.14 | 1424.68 |
| 6 | 441.93 | 1427.00 |
| | | |

Factor of Safety for the Preceding Surface is Between17.011 and16.974

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 5 Coordinate Points

| Point No. | X-Surf (ft) | Y-Sur (ft) |
|--------------|----------------|---------------|
| 1 | 350.28 | 1389.2 |
| 2 | 355.60 | 1384.3 |
| 3 | 408.68 | 1369.9 |
| 4 | 429.70 | 1377.4 |
| 5 | 429.78 | 1423.1 |

Factor of Safety for the Preceding Surface is Between10.595 and10.509

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 6 Coordinate Points

| 445 446 447 448 | Point No. | X-Surf (ft) | Y-Sur |
|--------------------------|--------------|----------------|--------|
| 449 | 1 | 360.95 | 1394.8 |
| 450 | 2 | 366.54 | 1391.7 |
| 451 | 3 | 411.47 | 1359.9 |
| 452 | 4 | 440.71 | 1369.6 |
| 453 | 5 | 441.14 | 1424.6 |
| 454 | 6 | 441.93 | 1427.0 |
| 455 | | | |

Factor of Safety for the Preceding Surface is Between17.011 and16.974

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 5 Coordinate Points

| Point No. | X-Surf (ft) | Y-Sur: (ft) |
|--------------|----------------|----------------|
| 1 | 350.28 | 1389.2 |
| 2 | 355.60 | 1384.3 |
| 3 | 408.68 | 1369.9 |
| 4 | 429.70 | 1377.4 |
| 5 | 429.78 | 1423.1 |

Factor of Safety for the Preceding Surface is Between10.595 and10.509

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 6 Coordinate Points

| Point No. | X-Surf (ft) | Y-Sur: (ft) |
|--------------|----------------|----------------|
| 1 | 360.95 | 1394.8 |
| 2 | 366.54 | 1391.7 |
| 3 | 411.47 | 1359.9 |
| 4 | 440.71 | 1369.6 |
| 5 | 441.14 | 1424.6 |
| 6 | 441.93 | 1427.0 |

Factor of Safety for the Preceding Surface is Between17.011 and16.974

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 5 Coordinate Points

```
510
                            X-Surf
                                        Y-Surf
511
                 Point
512
                  No.
                             (ft)
                                         (ft)
513
                            350.28
                                       1389.23
514
515
                            355.60
                                       1384.36
                   2.
516
                            408.68
                                       1369.95
                   4
517
                            429.70
                                       1377.48
518
                            429.78
                                       1423.19
519
520
521
               Factor of Safety for the Preceding Surface is Between10.595 and10.509
522
523
                WARNING! The factor of safety calculation did not converge in 20 iterations.
524
525
526
527
528
               The Trial Failure Surface In Question Is Defined
529
               By The Following 6 Coordinate Points
530
531
532
                 Point
                            X-Surf
                                        Y-Surf
533
                  No.
                             (ft)
534
                            360.95
                                       1394.84
535
                            366.54
                                       1391.70
536
537
                            411.47
                                       1359.99
538
                            440.71
                                       1369.68
539
                            441.14
                   5
                                       1424.68
540
                            441.93
                                       1427.00
541
542
               Factor of Safety for the Preceding Surface is Between17.011 and16.974
543
544
545
546
               Following Are Displayed The Ten Most Critical Of The Trial
547
               Failure Surfaces Evaluated. They Are
548
               Ordered - Most Critical First.
549
550
551
               * * Safety Factors Are Calculated By The Simplified Janbu Method * *
552
553
554
555
               Total Number of Trial Surfaces Attempted = 4999
556
557
                WARNING! The Factor of Safety Calculation for one or More Trial Surfaces
558
               Did Not Converge in 20 Iterations.
559
560
561
               Number of Trial Surfaces with Non-Converged FS = 18
562
563
               Number of Trial Surfaces With Valid FS = 4981
564
565
               Percentage of Trial Surfaces With Non-Valid FS Solutions
566
567
               of the Total Attempted = 0.4 %
568
                Statistical Data On All Valid FS Values:
569
570
                  FS Max = 12.740 FS Min = 1.157 FS Ave = 1.973
571
                  Standard Deviation = 1.037 Coefficient of Variation = 52.57 %
572
573
574
               Failure Surface Specified By 6 Coordinate Points
575
```

| 576 | | | |
|-----|-------|---------------|----------|
| 577 | Point | X-Surf | Y-Surf |
| 578 | No. | (ft) | (ft) |
| 579 | | | |
| 580 | 1 | 346.853 | 1387.431 |
| 581 | 2 | 356.334 | 1383.224 |
| 582 | 3 | 411.066 | 1377.799 |
| 583 | 4 | 575.767 | 1418.090 |
| 584 | 5 | 613.237 | 1458.352 |
| 585 | 6 | 635.595 | 1499.542 |
| 586 | | | |
| 587 | | | |
| 588 | Fac | tor of Safety | 7 |

Factor of Safety *** 1.157 ***

Individual data on the 20 slices

| 333 | | | | | | | | | | |
|-----|-------|-------|----------|-------|-------|-------|-------|---------|--------|--------|
| 596 | | | | | | | | | | |
| 597 | | | | Water | Water | Tie | Tie | Earthqu | ıake | |
| 598 | | | | Force | Force | Force | Force | Ford | ce Sur | charge |
| 599 | Slice | Width | Weight | Top | Bot | Norm | Tan | Hor | Ver | Load |
| 600 | No. | (ft) | (lbs) | (lbs) | (lbs) | (lbs) | (lbs) | (lbs) | (lbs) | (lbs) |
| 601 | | | | | | | | | | |
| 602 | 1 | 9.5 | 5227.3 | 0.0 | 0.0 | 0. | 0. | 784.1 | 0.0 | 0.0 |
| 603 | 2 | 29.7 | 65689.3 | 0.0 | 0.0 | 0. | 0. | 9853.4 | 0.0 | 0.0 |
| 604 | 3 | 11.0 | 37305.0 | 0.0 | 0.0 | 0. | 0. | 5595.7 | 0.0 | 0.0 |
| 605 | 4 | 7.2 | 26653.8 | 0.0 | 0.0 | 0. | 0. | 3998.1 | 0.0 | 0.0 |
| 606 | 5 | 6.9 | 28647.5 | 0.0 | 0.0 | 0. | 0. | 4297.1 | 0.0 | 0.0 |
| 607 | 6 | 26.9 | 128201.3 | 0.0 | 0.0 | 0. | 0. | 19230.2 | 0.0 | 0.0 |
| 608 | 7 | 10.0 | 49666.3 | 0.0 | 0.0 | 0. | 0. | 7449.9 | 0.0 | 0.0 |
| 609 | 8 | 47.0 | 258969.8 | 0.0 | 0.0 | 0. | 0. | 38845.5 | 0.0 | 0.0 |
| 610 | 9 | 10.0 | 66533.6 | 0.0 | 0.0 | 0. | 0. | 9980.0 | 0.0 | 0.0 |
| 611 | 10 | 6.0 | 42111.1 | 0.0 | 0.0 | 0. | 0. | 6316.7 | 0.0 | 0.0 |
| 612 | 11 | 9.0 | 61185.2 | 0.0 | 0.0 | 0. | 0. | 9177.8 | 0.0 | 0.0 |
| 613 | 12 | 18.0 | 129277.0 | 0.0 | 0.0 | 0. | 0. | 19391.6 | 0.0 | 0.0 |
| 614 | 13 | 22.0 | 174128.8 | 0.0 | 0.0 | 0. | 0. | 26119.3 | 0.0 | 0.0 |
| 615 | 14 | 15.8 | 130646.2 | 0.0 | 0.0 | 0. | 0. | 19596.9 | 0.0 | 0.0 |
| 616 | 15 | 11.2 | 89755.9 | 0.0 | 0.0 | 0. | 0. | 13463.4 | 0.0 | 0.0 |
| 617 | 16 | 15.0 | 105805.8 | 0.0 | 0.0 | 0. | 0. | 15870.9 | 0.0 | 0.0 |
| 618 | 17 | 5.0 | 31221.5 | 0.0 | 0.0 | 0. | 0. | 4683.2 | 0.0 | 0.0 |
| 619 | 18 | 6.2 | 34204.1 | 0.0 | 0.0 | 0. | 0. | 5130.6 | 0.0 | 0.0 |
| 620 | 19 | 14.8 | 49165.3 | 0.0 | 0.0 | 0. | 0. | 7374.8 | 0.0 | 0.0 |
| 621 | 20 | 7.6 | 6129.5 | 0.0 | 0.0 | 0. | 0. | 919.4 | 0.0 | 0.0 |
| 622 | | | | | | | | | | |

Failure Surface Specified By 6 Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|--------------|----------------|----------------|
| 1 | 346.853 | 1387.431 |
| 2 | 356.334 | 1383.224 |
| 3 | 411.066 | 1377.799 |
| 4 | 575.767 | 1418.090 |
| 5 | 613.237 | 1458.352 |
| 6 | 635.595 | 1499.542 |

Factor of Safety *** 1.157 ***

```
642 1
                                                                                                                              X-Surf
                                                                                                                                          Y-Surf
                                                                                                   708
                                                                                                                    Point
643
                                                                                                   709
                                                                                                                               (ft)
                                                                                                                                          (ft)
                                                                                                                     No.
               Failure Surface Specified By 6 Coordinate Points
                                                                                                   710
644
                                                                                                   711
                                                                                                                               346.853
                                                                                                                                          1387.431
645
                                                                                                   712
                                                                                                                               356.334
                                                                                                                                          1383.224
646
                                                                                                                      2
                                                                                                                                          1377.799
647
                Point
                           X-Surf
                                       Y-Surf
                                                                                                   713
                                                                                                                               411.066
                                                                                                                      3
648
                 No.
                            (ft)
                                       (ft)
                                                                                                   714
                                                                                                                      4
                                                                                                                               575.767
                                                                                                                                          1418.090
649
                                                                                                   715
                                                                                                                      5
                                                                                                                               613.237
                                                                                                                                          1458.352
650
                           346.853
                                      1387.431
                                                                                                   716
                                                                                                                      6
                                                                                                                               635.595
                                                                                                                                          1499.542
651
                  2
                           356.334
                                      1383 224
                                                                                                   717
652
                           411.066
                                      1377.799
                                                                                                   718
653
                  4
                           575 767
                                       1418.090
                                                                                                   719
                                                                                                                        Factor of Safety
654
                  5
                           613.237
                                       1458.352
                                                                                                                        *** 1.157 ***
655
                           635.595
                                      1499.542
                                                                                                   721
                  6
                                                                                                   722
656
                                                                                                   723
657
                     Factor of Safety
                                                                                                   724
658
                    *** 1.157 ***
659
                                                                                                   725
660
                                                                                                   726
                                                                                                                  Failure Surface Specified By 6 Coordinate Points
661
                                                                                                   727
662
                                                                                                   728
663
                                                                                                   729
                                                                                                                    Point
                                                                                                                               X-Surf
                                                                                                                                          Y-Surf
664
               Failure Surface Specified By 6 Coordinate Points
                                                                                                                     No.
                                                                                                                               (ft)
                                                                                                                                          (ft)
665
                                                                                                   731
                                                                                                                              346.853
                                                                                                                                          1387.431
666
                                                                                                   732
                                                                                                                      -1
667
                 Point
                           X-Surf
                                       Y-Surf
                                                                                                   733
                                                                                                                               356.334
                                                                                                                                          1383.224
                           (ft)
                                       (ft)
                                                                                                   734
                                                                                                                               411.066
                                                                                                                                          1377.799
668
                 No.
                                                                                                                      3
669
                                                                                                   735
                                                                                                                               575.767
                                                                                                                                          1418.090
                           346.853
670
                  1
                                      1387.431
                                                                                                   736
                                                                                                                      5
                                                                                                                               613.237
                                                                                                                                          1458.352
                           356.334
                                       1383.224
                                                                                                   737
                                                                                                                              635.595
671
                  2
                                                                                                                                          1499.542
672
                           411.066
                                       1377.799
                                                                                                   738
                           575.767
                                      1418.090
673
                                                                                                   739
674
                  5
                           613.237
                                      1458.352
                                                                                                   740
                                                                                                                         Factor of Safety
675
                           635.595
                                      1499.542
                                                                                                   741
                                                                                                                        *** 1.157 ***
                  6
676
                                                                                                   742
677
                                                                                                   743
                     Factor of Safety
                                                                                                   744
                    *** 1.157 ***
679
                                                                                                   745
680
                                                                                                   746
                                                                                                                  Failure Surface Specified By 6 Coordinate Points
                                                                                                   747
681
682
                                                                                                   749
683 1
                                                                                                                    Point
                                                                                                                               X-Surf
                                                                                                                                          Y-Surf
684
                                                                                                   750
                                                                                                                     No.
                                                                                                                               (ft)
                                                                                                                                          (ft)
685
               Failure Surface Specified By 6 Coordinate Points
                                                                                                   751
                                                                                                                               346.853
686
                                                                                                   752
                                                                                                                      1
                                                                                                                                          1387.431
687
                                                                                                   753
                                                                                                                      2
                                                                                                                               356.334
                                                                                                                                          1383.224
                 Point
                           X-Surf
                                      Y-Surf
                                                                                                   754
                                                                                                                               411.066
                                                                                                                                          1377.799
688
                                                                                                                      3
689
                 No.
                            (ft)
                                       (ft)
                                                                                                   755
                                                                                                                      4
                                                                                                                               575.767
                                                                                                                                          1418.090
690
                                                                                                   756
                                                                                                                               613.237
                                                                                                                                          1458.352
                                                                                                                      5
691
                           346.853
                                      1387.431
                                                                                                   757
                                                                                                                               635.595
                                                                                                                                          1499.542
692
                  2
                           356.334
                                      1383.224
                                                                                                   758
693
                  3
                           411.066
                                       1377.799
                                                                                                   759
                           575.767
                                      1418.090
                                                                                                   760
694
                  4
                                                                                                                        Factor of Safety
695
                  5
                           613.237
                                      1458.352
                                                                                                   761
                                                                                                                        *** 1.157 ***
696
                  6
                           635.595
                                      1499.542
                                                                                                   762
697
                                                                                                   763
698
                                                                                                   764
699
                     Factor of Safety
                                                                                                   765 1
700
                    *** 1.157 ***
                                                                                                   766
701
                                                                                                   767
                                                                                                                  Failure Surface Specified By 6 Coordinate Points
702
                                                                                                   768
703
                                                                                                   769
704
                                                                                                   770
                                                                                                                    Point
                                                                                                                               X-Surf
                                                                                                                                          Y-Surf
705
               Failure Surface Specified By 6 Coordinate Points
                                                                                                   771
                                                                                                                     No.
                                                                                                                               (ft)
                                                                                                                                           (ft)
706
                                                                                                   772
                                                                                                   773
707
                                                                                                                      1
                                                                                                                               346.853
                                                                                                                                          1387.431
```

```
774
                          356.334
                                     1383.224
                  2
775
                  3
                           411.066
                                      1377.799
776
                  4
                           575.767
                                      1418.090
777
                  5
                           613.237
                                      1458.352
778
                  6
                           635.595
                                      1499.542
779
780
781
                    Factor of Safety *** 1.157 ***
782
783
784
785
786
787
               Failure Surface Specified By 5 Coordinate Points
788
789
790
                Point
                           X-Surf
                                      Y-Surf
791
                           (ft)
                                       (ft)
                 No.
792
793
                           357.902
                                      1393.237
794
                  2
                           408.965
                                      1388.361
795
                  3
                           569.620
                                      1420.941
                                      1464.811
796
                  4
                           602.792
797
                           629.108
                                      1499.079
798
799
                    Factor of Safety
*** 1.158 ***
800
801
802
803
804
805
806
807
                        **** END OF GSTABL7 OUTPUT ****
808
```

Bouquet Canyon/21095-01/Section V-V'/ Static

z:\2021\21095-01 integral - bouquet canyon\engineering\slope stability\1. included in reports\2022 04 xx grading plan review letter\1. all files\xvb2-1.pl2 Run By: LGC Geotechnical, Inc. 4/5/2022 10:03 # FS Soil Soil Total Saturated Cohesion Friction Pore Pressure Piez. Intercept Angle Pressure Constant Surface (psf) (deg) Param. (psf) No. 250.0 28.0 0.00 0.0 0 Desc. Type Unit Wt. Unit Wt. (pcf) 120.0 (pcf) b 1.60 No. c 1.60 120.0 af d 1.60 Qal 120.0 120.0 100.0 28.0 0.00 0.0 0 0.00 0.0 0 120.0 120.0 Aniso Aniso f 1.60 g 1.60 h_1.60 1680 i 1.60 1.61 1580 1480 1380 1280 329 529 129 229 429 629 729 829 GSTABL7 v.2 FSmin=1.60

Safety Factors Are Calculated By The Simplified Janbu Method for the case of c & phi both > 0

| 1 | | *** GSTABL7 *** | 48 | 1 | 129.00 | 1368.00 | 164.00 | 1380.00 | | 1 |
|----------|---|---|----------|------------|------------------|--------------------|------------------|------------|----------|---------|
| 2 | ** ************************************ | | 49 | 2 | 164.00 | 1380.00 | 252.00 | 1380.00 | | 1 |
| 3 | ** GSTABL7 b | by Dr. Garry H. Gregory, Ph.D., P.E., D.GE ** | 50 | 3 | 252.00 | 1380.00 | 252.10 | 1377.00 | | 1 |
| 4 | ** 0-1-1-1-1 | 0 T 1006 G 77 0 005 2 T-b 0012 ## | 51 | 4 | 252.10 | 1377.00 1377.00 | 327.00 | 1377.00 | | 1 |
| 6 | | 0, January 1996; Current Ver. 2.005.3, Feb. 2013 ** | 52 53 | 6 | 327.00 386.00 | 1408.00 | 386.00 397.00 | 1408.00 | | 1 |
| 5 | (All Right | s Reserved-Unauthorized Use Prohibited) | 54 | 7 | 386.00 | 1408.00 | 438.00 | 1408.00 | | 1 |
| 8 | | | 54 | 8 | 438.00 | 1408.00 | 438.00 | 1427.00 | | 1 |
| 9 | | | 56 | 9 | 448.00 | 1427.00 | 495.00 | 1427.00 | | 1 |
| 9 | | ************** | 57 | 10 | 495.00 | 1450.00 | 505.00 | 1450.00 | | 1 |
| | ** | | 58 | 11 | 505.00 | 1460.00 | 511.00 | 1460.00 | | 1 |
| 1.0 | STODE | STABILITY ANALYSIS SYSTEM | 59 | 12 | 511.00 | 1460.00 | 520.00 | 1460.00 | | 1 |
| 11 | | Simplified Janbu, or GLE Method of Slices. | 60 | 13 | 520.00 | 1460.00 | 538.00 | 1473.00 | | 3 |
| 12 | | & Morgenstern-Price Type Analysis) | 61 | 14 | 538.00 | 1473.00 | 560.00 | 1482.00 | | 3 |
| 13 | | e, Reinforcement, Soil Nail, Tieback, | 62 | 15 | 560.00 | 1482.00 | 587.00 | 1493.00 | | 3 |
| 14 | | ed Shear Strength, Curved Phi Envelope, | 63 | 16 | 587.00 | 1493.00 | 602.00 | 1501.00 | 0 | 3 |
| 15 | | Fiber-Reinforced Soil, Boundary Loads, Water | 64 | 17 | 602.00 | 1501.00 | 607.00 | 1501.00 | | 3 |
| 16 | | Static & Newmark Earthquake, and Applied Forces. | 65 | 18 | 607.00 | 1501.00 | 628.00 | 1499.00 | 0 | 3 |
| 17 | | - | 66 | 19 | 628.00 | 1499.00 | 642.00 | 1500.00 | 0 | 3 |
| | | **************** | 67 | 20 | 642.00 | 1500.00 | 692.00 | 1491.00 | | 3 |
| | ** | | 68 | 21 | 692.00 | 1491.00 | 774.00 | 1460.00 | | 3 |
| 18 | | | 69 | 22 | 129.00 | 1368.00 | 168.00 | 1341.00 | | 2 |
| 19 | | | 70 | 23 | 168.00 | 1341.00 | 313.00 | 1354.00 | | 2 |
| 20 | Analysis Run Date: | 4/5/2022 | 71 | 24 | 313.00 | 1354.00 | 360.00 | 1372.00 | | 3 |
| 21 | Time of Run: | 10:03AM | 72 | 25 | 360.00 | 1372.00 | 395.00 | 1372.00 | | 3 |
| 22 | Run By: | LGC Geotechnical, | 73 | 26 | 395.00 | 1372.00 | 520.00 | 1460.00 | | 3 |
| | Inc. | | 74 | 27 | 129.00 | 1323.00 | 181.00 | 1330.00 | | 3 |
| | | | 75 76 | 28 | 181.00 | 1330.00 | 313.00 | 1354.00 | J | 3 |
| 23 | Input Data Filename: | Z:\2021\21095-01 Integral - Bouquet | 77 | Haar Cros | ified Y-Oriq | in = 1 | 280.00(ft) | | | |
| 23 | Canyon\Engineering\slope | stability\Sec | 78 | - | | | 1280.00(11) | | | |
| | V-V'\2022_04_05\xvb2-1.ir | | 79 80 | | -Plus Value | | | | | |
| | | | 81 | | -Plus Value | = 0.00(ft) | | | | |
| 24 | Output Filename: | Z:\2021\21095-01 Integral - Bouquet | 0.2 | 1 | | | | | | |
| | Canyon\Engineering\slope | | 83 | | | | | | | |
| | V-V'\2022_04_05\xvb2-1.0U | TI Company | 84 85 | TOOMBODIO | OCT DEDENMEN | ED.C | | | | |
| | | | 86 | ISOTROPIC | SOIL PARAMET | ERS | | | | |
| 25 | Unit System: | English | 87 | | | | | | | |
| 26 | onic bybeem. | nigiton | 88 | 3 Type(s |) of Soil | | | | | |
| 27 | Plotted Output Filename: | Z:\2021\21095-01 Integral - Bouquet | 89 | 3 1/10(3 | , 01 0011 | | | | | |
| | Canyon\Engineering\slope | | 90 | | | | | | | |
| | V-V'\2022_04_05\xvb2-1.PI | | 91 | Soil Total | al Saturate | d Cohesion | riction | Pore I | Pressure | Piez. |
| | | | 92 | Type Unit | Wt. Unit Wt | . Intercept | Angle | Pressure (| Constant | Surface |
| | | | 93 | No. (pc | f) (pcf) | (psf) | (deg) | Param. | (psf) | No. |
| 28 | | | 94 | | | | | | | |
| 29 | | | 95 | 1 120 | | 250.0 | 28.0 | 0.00 | 0.0 | 0 |
| 30 | | | 96 | 2 120 | | 100.0 | 28.0 | 0.00 | 0.0 | 0 |
| 31 | | | 97 | 3 120 | .0 120.0 | 250.0 | 32.0 | 0.00 | 0.0 | 0 |
| 32 33 | DRODI DU DEGGREDATON. D. | | 98 99 | | | | | | | |
| 34 | | quet Canyon/21095-01/Section V-V'/ | 100 | | | | | | | |
| 35 | Ste | icic | 101 | ANTSOTROBE | C STRENGTH P | AD AMETED C | | | | |
| 36 | | | 102 | | l type(s) | AKAMETEKS | | | | |
| 37 | | | 103 | 1 501 | r cypc(b) | | | | | |
| 38 | | | 104 | | | | | | | |
| 39 | BOUNDARY COORDINATES | | 105 | Soil Type | 3 Is Aniso | tropic | | | | |
| 40 | | | 106 | ** | | = | | | | |
| 41 | 21 Top Boundaries | | 107 | Number Of | Direction R | anges Speci | fied = 3 | | | |
| 42 | 28 Total Boundaries | | 108 | | | | | | | |
| 43 | | | 109 | | | | | | | |
| 44 | | | 110 | Direction | | | Cohesion | | | |
| 45 | | -Left X-Right Y-Right Soil Type | 111 | Range | | on Limit | Intercept | | gle | |
| 46 | No. (ft) | (ft) (ft) Below Bnd | 112 | No. | (de | g) | (psf) | (de | eg) | |
| 47 | | | 113 | | | | | | | |
| | | | | | | | | | | |

| 114 | 1 | | 0.0 | 250.0 | | 32.00 | |
|------------|--------------------|------------------------------|--------------------|------------------|--------------------|---------------|-------------|
| 115 | 2 | | 5.0 | 150.0 | | 25.00 | |
| 116 | 3 | 91 | 0.0 | 250.0 | 0 | 32.00 | |
| 117 | ANT COMPO | DIG GOIL NOW | na . | | | | |
| 118 119 | | PIC SOIL NOT | | | ph.: | | |
| 120 | | and/or Phi | | | | cause Aniso | |
| 121 | | n input value | | | | Dhi and | |
| 122 | | | | | | tension crack | |
| 123 | | n input valu | | | | | |
| 124 | C | equal to ze | ro, with w | ater weight | in the te | nsion crack. | |
| 125 | | | | | | | |
| 126 | | | | | | | |
| 127 | | | | | | = 0.150(g) | |
| 128 | | d Horizontal | | | | | |
| 129 | Specifie | d Vertical E | arthquake | Coefficient | (kv) = | 0.000(g) | |
| 130 131 | Considia | d Coiemie Do | D | . Fastan - | 0.000 | | |
| 132 | Specifie | d Seismic Po | re-Pressur | e ractor = | 0.000 | | |
| 133 | EARTHOUA | KE DATA HAS | BEEN SUPPR | ESSED | | | |
| 134 | | | | | | | |
| 135 | Janbus E | mpirical Coe | f is being | used for t | he case of | c & phi both | n > 0 |
| 136 1 | | | | | | | |
| 137 | | | | | | | |
| 138 139 | | 1 = 11 = 0 | | | | | |
| 140 | | al Failure S e For Genera | | | | | |
| 141 | Specifie | | cing silui. | ing block so | irraces, na | s been | |
| 142 | opcorr. | •• | | | | | |
| 143 | | | | | | | |
| 144 | 4999 Tria | al Surfaces 1 | Have Been | Generated. | | | |
| 145 | | | | | | | |
| 146 | | | | | | | |
| 147 | 2 Boxes | Specified Fo | r Generati | on Of Centr | al Block B | ase | |
| 148 149 | | | | | | | |
| 150 | Length O | f Line Segmen | nts For Ac | tive And Da | ssive Port | ions Of | |
| 151 | | Block Is 55 | | orve inia ra | | 20110 01 | |
| 152 | \$== 5 | | | | | | |
| 153 | | | | | | | |
| 154 | Box | X-Left | Y-Left | X-Right | Y-Right | Height | |
| 155 | No. | (ft) | (ft) | (ft) | (ft) | (ft) | |
| 156 | | 200 00 | 1250 00 | 440.00 | 1274 00 | 30.00 | |
| 157 158 | 1 2 | 329.00 442.10 | 1350.00 1374.00 | 442.00 630.00 | 1374.00 1427.00 | 30.00 | |
| 159 | 2 | 112.10 | 1374.00 | 030.00 | 1427.00 | 30.00 | |
| 160 | | | | | | | |
| 161 | WARNING! | The factor | of safety | calculation | did not c | onverge in 20 | iterations. |
| 162 | | | _ | | | _ | |
| 163 | | | | | | | |
| 164 | | | _ | | | | |
| 165 | | l Failure Su | | | Defined | | |
| 166 167 | By The F | ollowing 6 | coordinate | roints | | | |
| 168 | | | | | | | |
| 169 | Point | X-Surf | Y-Sur | £ | | | |
| 170 | No. | (ft) | (ft) | | | | |
| 171 | | | | | | | |
| 172 | 1 | 382.59 | 1406.2 | | | | |
| 173 | 2 | 387.20 | 1401.8 | | | | |
| 174 | 3 | 428.89 | 1365.9 | | | | |
| 175 | 4 | 491.40 | | | | | |
| 176 177 | 5 | 492.10 496.93 | 1434.7 1451.9 | | | | |
| 170 | 0 | 400.33 | 1731.7 | _ | | | |

```
180
               Factor of Safety for the Preceding Surface is Between14.754 and14.747
181
182
183
               WARNING! The factor of safety calculation did not converge in 20 iterations.
184
185
186
187
               The Trial Failure Surface In Question Is Defined
188
               By The Following 6 Coordinate Points
189
190
                 Point
                           X-Surf
                                       Y-Surf
191
192
                  No.
                            (ft)
                                       (ft)
193
194
                           382.59
                                      1406.21
                           387.20
                                      1401.86
195
                  2
196
                  3
                           428.89
                                      1365.98
                           491.40
                                      1379.79
197
                  4
198
                           492.10
                                      1434.79
                  5
199
                           496.93
                                      1451.93
200
201
202
               Factor of Safety for the Preceding Surface is Between14.754 and14.747
203
204
205
               WARNING! The factor of safety calculation did not converge in 20 iterations.
206
207
208
209
               The Trial Failure Surface In Question Is Defined
210
               By The Following 6 Coordinate Points
211
212
213
                 Point
                           X-Surf
                                       Y-Surf
214
                 No.
                            (ft)
                                       (ft)
215
216
                           382.59
                                      1406.21
217
                  2
                           387.20
                                      1401.86
218
                  3
                           428.89
                                      1365.98
219
                           491.40
                                      1379.79
                  4
220
                           492.10
                                      1434.79
221
                  6
                           496.93
                                      1451.93
222
223
224
               Factor of Safety for the Preceding Surface is Between14.754 and14.747
225
226
227
               WARNING! The factor of safety calculation did not converge in 20 iterations.
228
229
230
231
               The Trial Failure Surface In Question Is Defined
232
               By The Following 6 Coordinate Points
233
234
235
                 Point
                           X-Surf
                                       Y-Surf
236
                  No.
                            (ft)
                                       (ft)
237
238
                           382.59
                                      1406.21
239
                  2
                           387.20
                                      1401.86
                                      1365.98
240
                  3
                           428.89
241
                           491.40
                                      1379.79
                  4
242
                           492.10
                                      1434.79
                           496.93
243
                                      1451.93
244
245
```

| 0.46 | T | Q - E - L E | -1 D | C |
|------|------------|-------------|---------------|---|
| 246 | Factor of | Safety for | the Preceding | Surface is Between14.754 and14.747 |
| 247 | | | | |
| 248 | MADATAGE E | | ££ | |
| 249 | WARNING! T | ne factor o | r sarety cald | sulation did not converge in 20 iterations. |
| 250 | | | | |
| 251 | | | | |
| 252 | | | _ | |
| 253 | | | | ion Is Defined |
| 254 | By The Fol | lowing 6 C | oordinate Poi | nts |
| 255 | | | | |
| 256 | | | | |
| 257 | Point | X-Surf | Y-Surf | |
| 258 | No. | (ft) | (ft) | |
| 259 | | | | |
| 260 | 1 | 382.59 | 1406.21 | |
| 261 | 2 | 387.20 | 1401.86 | |
| 262 | 3 | 428.89 | 1365.98 | |
| 263 | 4 | 491.40 | 1379.79 | |
| 264 | 5 | 492.10 | 1434.79 | |
| 265 | 6 | 496.93 | 1451.93 | |
| 266 | | | | |
| 267 | | | | |
| 268 | Factor of | Safety for | the Preceding | Surface is Between14.754 and14.747 |
| 269 | | | | |
| 270 | | | | |
| 271 | WARNING! T | he factor o | f safety cal | ulation did not converge in 20 iterations. |
| 272 | | | | |
| 273 | | | | |
| 274 | | | | |
| 275 | | | | ion Is Defined |
| 276 | By The Fol | lowing 6 C | oordinate Poi | nts |
| 277 | | | | |
| 278 | | | | |
| 279 | Point | X-Surf | Y-Surf | |
| 280 | No. | (ft) | (ft) | |
| 281 | | | | |
| 282 | 1 | 382.59 | 1406.21 | |
| 283 | 2 | 387.20 | 1401.86 | |
| 284 | 3 | 428.89 | 1365.98 | |
| 285 | 4 | 491.40 | 1379.79 | |
| 286 | 5 | 492.10 | 1434.79 | |
| 287 | 6 | 496.93 | 1451.93 | |
| 288 | | | | |
| 289 | | | | |
| 290 | Factor of | Safety for | the Preceding | Surface is Between14.754 and14.747 |
| 291 | | | | |
| 292 | | | | |
| 293 | WARNING! T | he factor o | f safety cald | ulation did not converge in 20 iterations. |
| 294 | | | | |
| 295 | | | | |
| 296 | | | | |
| 297 | The Trial | Failure Sur | face In Quest | ion Is Defined |
| 298 | By The Fol | lowing 6 C | oordinate Poi | nts |
| 299 | | | | |
| 300 | | | | |
| 301 | Point | X-Surf | Y-Surf | |
| 302 | No. | (ft) | (ft) | |
| 303 | | | | |
| 304 | 1 | 382.59 | 1406.21 | |
| 305 | 2 | 387.20 | 1401.86 | |
| 306 | 3 | 428.89 | 1365.98 | |
| 307 | 4 | 491.40 | 1379.79 | |
| 308 | 5 | 492.10 | 1434.79 | |
| 309 | 6 | 496.93 | 1451.93 | |
| 310 | | | | |

```
312
               Factor of Safety for the Preceding Surface is Between14.754 and14.747
313
314
315
               WARNING! The factor of safety calculation did not converge in 20 iterations.
316
317
318
319
               The Trial Failure Surface In Question Is Defined
320
               By The Following 6 Coordinate Points
321
322
                 Point
                            X-Surf
                                       Y-Surf
323
324
                  No.
                             (ft)
                                        (ft)
325
                            382.59
                                       1406.21
326
327
                            387.20
                                       1401.86
328
                            428.89
                                       1365.98
                   3
                            491.40
                                       1379.79
329
                   4
330
                            492.10
                                       1434.79
                   5
331
                            496.93
                                       1451.93
332
333
334
               Factor of Safety for the Preceding Surface is Between14.754 and14.747
335
336
337
               WARNING! The factor of safety calculation did not converge in 20 iterations.
338
339
340
341
               The Trial Failure Surface In Question Is Defined
342
               By The Following 6 Coordinate Points
343
344
345
                 Point
                            X-Surf
                                       Y-Surf
346
                  No.
                             (ft)
                                        (ft)
347
348
                            382.59
                                       1406.21
349
                   2
                            387.20
                                       1401.86
350
                   3
                            428.89
                                       1365.98
351
                            491.40
                                       1379.79
                   4
352
                            492.10
                                       1434.79
353
                   6
                            496.93
                                       1451.93
354
355
356
               Factor of Safety for the Preceding Surface is Between14.754 and14.747
357
358
359
               WARNING! The factor of safety calculation did not converge in 20 iterations.
360
361
362
363
               The Trial Failure Surface In Question Is Defined
364
               By The Following 6 Coordinate Points
365
366
367
                 Point
                            X-Surf
                                       Y-Surf
368
                  No.
                             (ft)
                                        (ft)
369
370
                            382.59
                                       1406.21
371
                   2
                            387.20
                                       1401.86
                                       1365.98
372
                   3
                            428.89
373
                            491.40
                                       1379.79
                   4
374
                            492.10
                                       1434.79
375
                            496.93
                                       1451.93
```

376

```
378
                Factor of Safety for the Preceding Surface is Between14.754 and14.747
379
380
                Following Are Displayed The Ten Most Critical Of The Trial
381
382
                Failure Surfaces Evaluated. They Are
383
                Ordered - Most Critical First.
384
385
386
                * * Safety Factors Are Calculated By The Simplified Janbu Method * *
387
388
389
390
                Total Number of Trial Surfaces Attempted = 4999
391
392
                WARNING! The Factor of Safety Calculation for one or More Trial Surfaces
393
                Did Not Converge in 20 Iterations.
394
395
396
                Number of Trial Surfaces with Non-Converged FS = 10
397
398
                Number of Trial Surfaces With Valid FS = 4989
399
400
401
                Percentage of Trial Surfaces With Non-Valid FS Solutions
402
                of the Total Attempted = 0.2 %
403
                Statistical Data On All Valid FS Values:
404
405
                  FS Max = 18.080 FS Min = 1.596 FS Ave = 2.470
406
                  Standard Deviation = 1.153 Coefficient of Variation = 46.69 %
407
408
409
                Failure Surface Specified By 5 Coordinate Points
410
411
412
                 Point
                            X-Surf
                                         Y-Surf
                             (ft)
                                         (ft)
413
                  No.
414
415
                            330.374
                                         1378.773
                             366.789
                                         1370.263
416
                   2
                                        1415.809
417
                   3
                            541.176
                             572.918
                                         1460.725
418
419
                   5
                             605.344
                                        1501 000
420
421
422
                      Factor of Safety
                     *** 1.596 ***
423
424
425
426
427
428
                    Individual data on the
                                              20 slices
429
430
431
                                               Tie
                               Water Water
                                                       Tie
                                                                Earthquake
432
                               Force Force
                                              Force
                                                      Force
                                                                   Force
                                                                          Surcharge
433
      Slice Width
                     Weight
                               Top
                                                                       Ver
                                                                              Load
                                      Bot.
                                               Norm
                                                       Tan
                                                                Hor
434
       No.
              (ft)
                      (lbs)
                               (lbs)
                                      (lbs)
                                               (lbs)
                                                       (lbs)
                                                               (lbs)
                                                                       (lbs)
                                                                              (lbs)
435
436
              29.4
                      39319.6
                                  0.0
                                         0.0
                                                                   0.0
                                                                          0.0
                                                                                   0.0
                                                                   0.0
437
        2
               0.2
                       657 0
                                 0 0
                                         0 0
                                                                          0 0
                                                                                   0 0
                                                   Ο
                                                            Ω
438
               6.8
                      20419.6
                                 0.0
                                         0.0
                                                   0.
                                                            0.
                                                                   0.0
                                                                          0.0
                                                                                   0.0
439
               6.7
                     22765.1
                                 0.0
                                         0.0
                                                   0.
                                                            0.
                                                                   0.0
                                                                          0.0
                                                                                   0.0
440
              12.6
                      46814.2
                                  0.0
                                         0.0
                                                   0.
                                                            0.
                                                                   0.0
                                                                          0.0
                                                                                   0.0
441
              11.0
                     41293.7
                                 0.0
                                         0.0
                                                   0.
                                                            0.
                                                                   0.0
                                                                          0.0
                                                                                   0.0
442
              10.7
                     39774.2
                                  0.0
                                         0.0
                                                   0.
                                                            0.
                                                                   0.0
                                                                          0.0
                                                                                   0.0
443
              30.3 127469.2
                                 0.0
                                         0.0
                                                   0.
                                                            0.
                                                                   0.0
                                                                          0.0
                                                                                   0.0
```

```
444
               10.0 44199.0
                                  0 0
                                          0 0
                                                            Ω
                                                                   0 0
                                                                           0 0
                                                                                    0 0
                                                    Ω
               47.0 230614.2
445
        10
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                   0.0
                                                                           0.0
                                                                                    0.0
446
        11
               10.0
                      59934.5
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                    0.0
                                                                           0.0
                                                                                    0.0
                      38056.4
447
        12
                6.0
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                    0.0
                                                                           0.0
                                                                                    0.0
                      54969.0
448
        13
               9.0
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                   0.0
                                                                           0.0
                                                                                    0.0
449
               18.0 116362.1
                                                                   0.0
        14
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                           0.0
                                                                                    0.0
450
        15
               3.2
                     22205.6
                                  0.0
                                          0.0
                                                            0.
                                                                   0.0
                                                                           0.0
                                                                                    0.0
451
                    110733.7
        16
               18.8
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                   0.0
                                                                           0.0
                                                                                    0.0
452
        17
               12.9
                     51227.4
                                  0.0
                                          0.0
                                                            0.
                                                                   0.0
                                                                           0.0
                                                                                    0.0
453
        1.8
               14 1
                     34913 6
                                  0 0
                                          0 0
                                                                   0 0
                                                                           0 0
                                                                                    0 0
                                                    Ω
                                                            Ω
454
        19
               15.0
                     17043.3
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                    0.0
                                                                           0.0
                                                                                    0.0
455
        20
               3 3
                        833 1
                                  0 0
                                          0 0
                                                    Ω
                                                            Ω
                                                                   0.0
                                                                           0 0
                                                                                    0 0
456
457
                Failure Surface Specified By 5 Coordinate Points
458
459
                             X-Surf
                                         Y-Surf
460
                  Point
461
                   No.
                              (ft)
                                          (ft)
462
463
                             330.374
                                         1378.773
464
                             366.789
                                         1370.263
                   2
465
                             541.176
                                         1415.809
                   3
466
                             572 918
                                         1460 725
                   4
467
                             605.344
                                         1501.000
468
469
470
                      Factor of Safety
471
                          1.596 ***
472
473
474
475
476
477
                Failure Surface Specified By 5 Coordinate Points
478
479
480
                  Point
                             X-Surf
                                         Y-Surf
481
                   No.
                              (ft)
                                          (ft)
482
483
                             330.374
                                         1378.773
                             366.789
                                         1370.263
484
                   2
485
                   3
                             541.176
                                         1415 809
486
                   4
                             572.918
                                         1460.725
487
                    5
                             605.344
                                         1501.000
488
489
                      Factor of Safety
490
491
                      ***
                            1.596 ***
492
493
494
495
496
                Failure Surface Specified By 5 Coordinate Points
497
498
499
                  Point
                             X-Surf
                                         Y-Surf
500
                   No.
                              (ft)
                                          (ft)
501
502
                             330.374
                                         1378.773
                                         1370.263
503
                             366 789
                   2
504
                   3
                             541.176
                                         1415.809
505
                    4
                             572.918
                                         1460.725
506
                             605.344
                                         1501.000
507
508
509
                       Factor of Safety
```

```
*** 1.596 ***
510
                                                                                                  576
511
                                                                                                                              X-Surf
                                                                                                                                         Y-Surf
                                                                                                   577
                                                                                                                   Point
512
                                                                                                   578
                                                                                                                    No.
                                                                                                                               (ft)
                                                                                                                                          (ft)
513
                                                                                                   579
                                                                                                                              330.374
                                                                                                                                         1378.773
514
                                                                                                   580
515
                                                                                                   581
                                                                                                                              366.789
                                                                                                                                         1370.263
                                                                                                                     2
516
               Failure Surface Specified By 5 Coordinate Points
                                                                                                                              541.176
                                                                                                                                         1415.809
                                                                                                   583
                                                                                                                     4
                                                                                                                              572.918
                                                                                                                                         1460.725
517
518
                                                                                                   584
                                                                                                                     5
                                                                                                                              605.344
                                                                                                                                         1501.000
519
                Point
                           X-Surf
                                      Y-Surf
                                                                                                  585
520
                 No.
                           (ft)
                                       (ft)
521
                                                                                                   587
                                                                                                                        Factor of Safety
522
                           330.374
                                      1378.773
                                                                                                   588
                                                                                                                       *** 1.596 ***
                  2
                           366.789
                                      1370.263
                                                                                                  589
523
                           541.176
                                      1415.809
                                                                                                  590
524
                  3
                           572.918
                                      1460.725
                                                                                                  591
525
                  4
                           605.344
                                      1501.000
                                                                                                   592 1
526
527
                                                                                                  593
528
                                                                                                   594
                                                                                                                  Failure Surface Specified By 5 Coordinate Points
529
                     Factor of Safety
                                                                                                   595
                    *** 1.596 ***
                                                                                                   596
530
531
                                                                                                   597
                                                                                                                    Point
                                                                                                                              X-Surf
                                                                                                                                         Y-Surf
532
                                                                                                   598
                                                                                                                              (ft)
                                                                                                                                          (ft)
                                                                                                                    No.
533
                                                                                                   599
                                                                                                                              330.374
534
                                                                                                   600
                                                                                                                     1
                                                                                                                                         1378.773
535
               Failure Surface Specified By 5 Coordinate Points
                                                                                                   601
                                                                                                                              366.789
                                                                                                                                         1370.263
                                                                                                                              541.176
                                                                                                                                         1415.809
536
                                                                                                   602
                                                                                                                     3
537
                                                                                                                              572.918
                                                                                                                                         1460.725
                                                                                                   603
538
                Point
                           X-Surf
                                      Y-Surf
                                                                                                   604
                                                                                                                     5
                                                                                                                              605.344
                                                                                                                                         1501.000
539
                 No.
                           (ft)
                                       (ft)
                                                                                                   605
540
                                                                                                   606
                           330.374
                                      1378.773
541
                  1
                                                                                                  607
                                                                                                                       Factor of Safety
                                                                                                                       *** 1.596 ***
542
                  2
                           366.789
                                      1370.263
                                                                                                   608
                           541.176
                                      1415.809
                                                                                                   609
543
                  3
544
                  4
                           572.918
                                      1460.725
                                                                                                   610
545
                           605.344
                                      1501.000
                                                                                                   611
546
                                                                                                   612
547
                                                                                                   613
                                                                                                                 Failure Surface Specified By 6 Coordinate Points
548
                     Factor of Safety
                                                                                                   614
                    *** 1.596 ***
549
                                                                                                  615
550
                                                                                                                   Point
                                                                                                                              X-Surf
                                                                                                                                         Y-Surf
                                                                                                  616
551
                                                                                                  617
                                                                                                                    No.
                                                                                                                              (ft)
                                                                                                                                          (ft)
552
                                                                                                   618
553 1
                                                                                                   619
                                                                                                                              308.772
                                                                                                                                         1377.000
                                                                                                                                         1362.123
554
                                                                                                   620
                                                                                                                     2
                                                                                                                              341.601
555
               Failure Surface Specified By 5 Coordinate Points
                                                                                                   621
                                                                                                                              541.498
                                                                                                                                         1401.332
                                                                                                                                         1440.225
                                                                                                   622
                                                                                                                     4
                                                                                                                              580.386
556
557
                                                                                                   623
                                                                                                                     5
                                                                                                                              619.259
                                                                                                                                         1479.134
558
                Point
                           X-Surf
                                      Y-Surf
                                                                                                  624
                                                                                                                              632.597
                                                                                                                                         1499.328
559
                 No.
                           (ft)
                                       (ft)
                                                                                                   625
560
                                                                                                   626
561
                           330.374
                                      1378.773
                                                                                                   627
                                                                                                                        Factor of Safety
                                                                                                                       *** 1.611 ***
                           366.789
                                      1370.263
562
                  2
                                                                                                   628
563
                           541.176
                                      1415.809
                                                                                                   629
                  3
564
                  4
                           572.918
                                      1460.725
                                                                                                   630
565
                  5
                           605.344
                                      1501.000
                                                                                                   631
566
                                                                                                   632
567
                                                                                                  633
568
                     Factor of Safety
                                                                                                   634
                                                                                                                           **** END OF GSTABL7 OUTPUT ****
569
                    *** 1.596 ***
570
571
572
573
574
               Failure Surface Specified By 5 Coordinate Points
575
```

Bouquet Canyon/21095-01/Section V-V'/ Seismic

z:\2021\21095-01 integral - bouquet canyon\engineering\slope stability\1. included in reports\2022_04_xx grading plan review letter\1. all files\xvb2-1e.pl2 Run By: LGC Geotechnical, Inc. 4/5/2022 10:04 # FS Soil Saturated Cohesion Friction Pore Pressure Piez. Load Value Desc. Type Unit Wt. Unit Wt. Intercept Angle Pressure Constant Surface No. (pcf) (pcf) (psf) (deg) Param. (psf) No. 0.150(g) 0.150(g)< Peak(A) (pcf) 120.0 kh Coef. c 1.13 120.0 375.0 28.0 0.0 af 0.00 0 d 1.13 Qal 120.0 120.0 100.0 28.0 0.00 0.0 0 0.00 0.0 0 120.0 120.0 Aniso Aniso f 1.13 g 1.13 h_1.13 1680 i 1.13 1580 1480 1380 1280 129 229 329 429 529 629 729 829

GSTABL7 v.2 FSmin=1.13 Safety Factors Are Calculated By The Simplified Janbu Method for the case of c & phi both > 0

| 1 | | *** GSTABL7 *** | 48 | 1 | 129.00 | 1368.00 | 164.00 | 1380.00 | |
|----------|--|---|------------|-----------|------------------|--------------------|------------------|--------------------|-----------------|
| 2 | | | 49 | 2 | 164.00 | 1380.00 | 252.00 | 1380.00 | |
| 3 | ** GSTABL7 | by Dr. Garry H. Gregory, Ph.D., P.E., D.GE ** | 50 | 3 | 252.00 | 1380.00 | 252.10 | 1377.00 | |
| 4 | | | 51 | 4 | 252.10 | 1377.00 | 327.00 | 1377.00 | |
| 5 | | 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 ** | 52 | 5 | 327.00 | 1377.00 | 386.00 | 1408.00 | |
| 6 | (All Rig | hts Reserved-Unauthorized Use Prohibited) | 53 | 6 7 | 386.00 | 1408.00 | 397.00 | 1408.00 | |
| 8 | | | 54 55 | 7 | 397.00 | 1408.00 | 438.00 | 1427.00 1427.00 | |
| 9 | | | 56 | 9 | 438.00 448.00 | 1427.00 1427.00 | 448.00 495.00 | 1427.00 | |
| 9 | **************** | ************* | 57 | 10 | 495.00 | 1450.00 | 505.00 | 1450.00 | |
| | ** | | 58 | 11 | 505.00 | 1460.00 | 511.00 | 1460.00 | |
| 10 | SLO | PE STABILITY ANALYSIS SYSTEM | 59 | 12 | 511.00 | 1460.00 | 520.00 | 1460.00 | |
| 11 | | Simplified Janbu, or GLE Method of Slices. | 60 | 13 | 520.00 | 1460.00 | 538.00 | 1473.00 | |
| 12 | | r & Morgenstern-Price Type Analysis) | 61 | 14 | 538.00 | 1473.00 | 560.00 | 1482.00 | |
| 13 | | ile, Reinforcement, Soil Nail, Tieback, | 62 | 15 | 560.00 | 1482.00 | 587.00 | 1493.00 | 3 |
| 14 | | ned Shear Strength, Curved Phi Envelope, | 63 | 16 | 587.00 | 1493.00 | 602.00 | 1501.00 | 3 |
| 15 | Anisotropic Soil | , Fiber-Reinforced Soil, Boundary Loads, Water | 64 | 17 | 602.00 | 1501.00 | 607.00 | 1501.00 | |
| 16 | Surfaces, Pseudo | -Static & Newmark Earthquake, and Applied Forces. | 65 | 18 | 607.00 | 1501.00 | 628.00 | 1499.00 | |
| 17 | | | 66 | 19 | 628.00 | 1499.00 | 642.00 | 1500.00 | |
| | | ***************** | 67 | 20 | 642.00 | 1500.00 | 692.00 | 1491.00 | |
| | ** | | 68 | 21 | 692.00 | 1491.00 | 774.00 | 1460.00 | |
| 18 | | | 69 | 22 | 129.00 | 1368.00 | 168.00 | 1341.00 | |
| 19 20 | Annalousia Don Date | 4.45.40000 | 70 71 | 23 24 | 168.00 313.00 | 1341.00 1354.00 | 313.00 360.00 | 1354.00 1372.00 | |
| 21 | Analysis Run Date: Time of Run: | 4/5/2022 10:04AM | 71 72 | 24 25 | 313.00 | 1372.00 | 360.00 | 1372.00 | |
| 22 | Run By: | LGC Geotechnical, | 73 | 26 | 395.00 | 1372.00 | 520.00 | 1460.00 | |
| 22 | Inc. | LGC Geotechnical, | 74 | 27 | 129.00 | 1323.00 | 181.00 | 1330.00 | |
| | 1110 • | | 75 | 28 | 181.00 | 1330.00 | 313.00 | 1354.00 | |
| | | | 76 | | | | | | _ |
| 23 | Input Data Filename: | Z:\2021\21095-01 Integral - Bouquet | 77 | User Spe | cified Y-Orio | gin = | 1280.00(ft) | | |
| | Canyon\Engineering\slop V-V'\2022_04_05\xvb2-1e | | 78 79 | Default | X-Plus Value | = 0.00(ft) | | | |
| | | | 80 81 | Default | Y-Plus Value | = 0.00(ft) | | | |
| 24 | Output Filename: | Z:\2021\21095-01 Integral - Bouquet | 82 1 | | | | | | |
| | Canyon\Engineering\slop | | 83 | | | | | | |
| | V-V'\2022_04_05\xvb2-1e | OUT | 84 | | | | | | |
| | | | 85 | ISOTROPIO | SOIL PARAME | TERS | | | |
| | | | 86 | | | | | | |
| 25 | Unit System: | English | 87 | | | | | | |
| 26 | | = \ 0.001\ 0.1005 0.1 = \ | 88 | 3 Type | s) of Soil | | | | |
| 27 | | : Z:\2021\21095-01 Integral - Bouquet | 89 90 | | | | | | |
| | Canyon\Engineering\slop V-V'\2022_04_05\xvb2-1e | | 91 | Coil To | otal Saturate | od Cohogio | o Eriation | Pore P | ressure Piez. |
| | V-V \2022_04_03\XVD2-16 | | 92 | | t Wt. Unit W | | | | onstant Surface |
| | | | 93 | No. (r | | (psf) | (deg) | Param. | (psf) No. |
| 28 | | | 94 | | (100) | (11 | (5) | | (1) |
| 29 | | | 95 | 1 12 | 20.0 120.0 | 375.0 | 28.0 | 0.00 | 0.0 0 |
| 30 | | | 96 | 2 12 | 20.0 120.0 | 100.0 | 28.0 | 0.00 | 0.0 |
| 31 | | | 97 | 3 12 | 20.0 120.0 | 250.0 | 32.0 | 0.00 | 0.0 |
| 32 | | | 98 | | | | | | |
| 33 | | ouquet Canyon/21095-01/Section V-V'/ | 99 | | | | | | |
| 34 35 | S | eismic | 100 101 | ANTGOMPO | TA AMPRINAMI | DADAMEMEDO | | | |
| 36 | | | 101 | | PIC STRENGTH | PARAMETERS | | | |
| 37 | | | 103 | 1 80 | oil type(s) | | | | |
| 38 | | | 103 | | | | | | |
| 39 | BOUNDARY COORDINATES | | 105 | Soil Tvr | oe 3 Is Anis | otropic | | | |
| 40 | DOGINET COORDINATED | | 106 | DOLL TYP | | | | | |
| 41 | 21 Top Boundaries | | 107 | Number (| of Direction 1 | Ranges Spec | ified = 3 | | |
| 42 | 28 Total Boundaries | | 108 | | | | | | |
| 43 | | | 109 | | | | | | |
| 44 | | | 110 | Directio | | clockwise | Cohesion | Frict | |
| 45 | Boundary X-Left | Y-Left X-Right Y-Right Soil Type | 111 | Range | | ion Limit | Intercept | Ang | |
| 46 | No. (ft) | (ft) (ft) Below Bnd | 112 | No. | (de | eg) | (psf) | (de | g) |
| 47 | | | 113 | | | | | | |
| | | | | | | | | | |

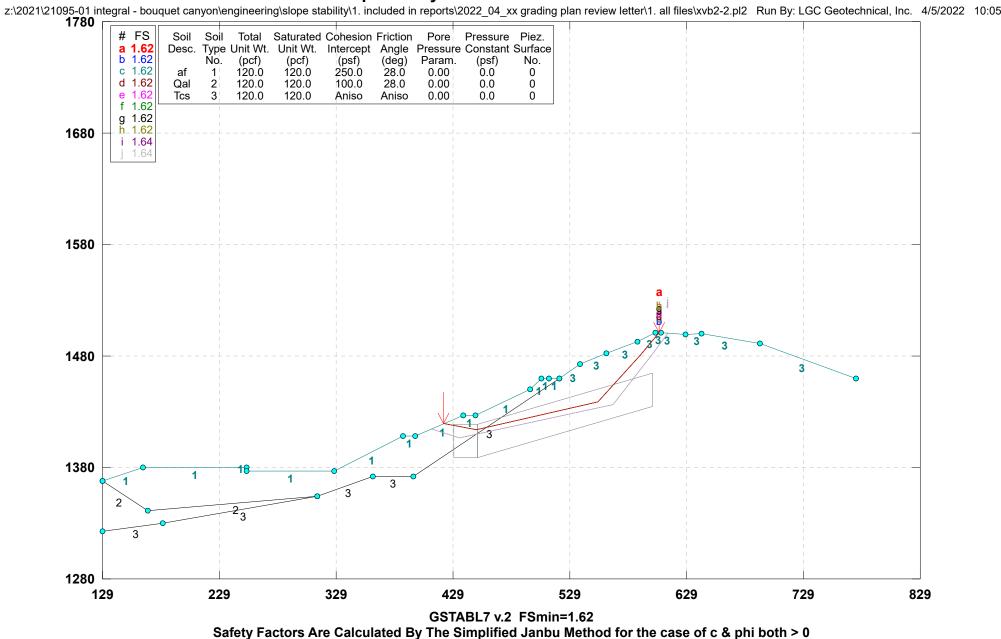
```
114
                   1
                                  10.0
                                                   250 00
                                                                  32 00
115
                   2
                                  15.0
                                                   150.00
                                                                   25.00
116
                   3
                                  90.0
                                                   250.00
                                                                   32.00
117
118
                ANISOTROPIC SOIL NOTES:
                  (1) An input value of 0.01 for C and/or Phi will cause Aniso
119
                       C and/or Phi to be ignored in that range.
                   (2) An input value of 0.02 for Phi will set both Phi and
122
                       C equal to zero, with no water weight in the tension crack.
                   (3) An input value of 0.03 for Phi will set both Phi and
124
                       C equal to zero, with water weight in the tension crack.
125
126
                Specified Peak Ground Acceleration Coefficient (A) = 0.150(g)
128
                Specified Horizontal Earthquake Coefficient (kh) = 0.150(q)
129
                Specified Vertical Earthquake Coefficient (kv) = 0.000(g)
130
131
                Specified Seismic Pore-Pressure Factor = 0.000
133
                Janbus Empirical Coef is being used for the case of c & phi both > 0
134
136
                A Critical Failure Surface Searching Method, Using A Random
                Technique For Generating Sliding Block Surfaces, Has Been
138
139
                Specified.
140
141
142
                4999 Trial Surfaces Have Been Generated.
143
144
                2 Boxes Specified For Generation Of Central Block Base
145
146
147
148
                Length Of Line Segments For Active And Passive Portions Of
                Sliding Block Is 55.0
149
151
152
                Box
                          X-Left
                                     Y-Left
                                               X-Right
                                                          Y-Right
                                                                       Height
153
                No.
                           (ft)
                                      (ft.)
                                                 (ft)
                                                            (ft)
                                                                        (ft.)
154
155
                           329 00
                                    1350 00
                                                442 00
                                                          1374 00
                                                                       30 00
156
                           442.10
                                    1374.00
                                                630.00
                                                          1427.00
                                                                       30.00
157
158
                Following Are Displayed The Ten Most Critical Of The Trial
159
                Failure Surfaces Evaluated. They Are
160
161
                Ordered - Most Critical First.
162
163
164
                * * Safety Factors Are Calculated By The Simplified Janbu Method * *
165
166
167
168
                Total Number of Trial Surfaces Attempted = 4999
169
170
                Number of Trial Surfaces With Valid FS = 4999
171
172
                Statistical Data On All Valid FS Values:
174
                  FS Max = 7.731 FS Min = 1.125 FS Ave = 1.693
175
                  Standard Deviation = 0.567 Coefficient of Variation = 33.49 %
176
178
                Failure Surface Specified By 6 Coordinate Points
179
```

```
181
                  Point
                            X-Surf
                                         Y-Surf
182
                              (ft)
                                         (ft)
                  No.
183
184
                             284.115
                                         1377.000
                            307.794
                                        1371.329
185
                   2
                             362.209
                                         1363.328
186
187
                   4
                             575.398
                                         1420.086
188
                             612.835
                                         1460.378
                   5
189
                            645 327
                                        1499.401
190
191
                      Factor of Safety
192
193
                           1.125 ***
194
195
196
197
                    Individual data on the
198
                                               25 slices
199
                               Water Water
                                               Tie
                                                        Tie
                                                                Earthquake
                               Force Force
                                               Force
                                                      Force
                                                                  Force Surcharge
203
             Width
                     Weight
                               Top
                                      Bot
                                               Norm
                                                        Tan
                                                                Hor
                                                                        Ver
                                                                               Load
204
       No.
              (ft)
                      (lbs)
                               (lbs) (lbs)
                                               (lbs)
                                                      (lbs)
                                                               (lbs) (lbs)
                                                                               (lbs)
205
               23.7
                      8056.3
                                 0.0
                                          0.0
                                                            0. 1208.5
                                                                           0.0
                                                                                    0.0
                     16323.2
207
               19.2
                                 0.0
                                          0.0
                                                            0. 2448.5
                                                                           0.0
                                                                                    0.0
                                                    0.
208
        3
              17.3
                     29593.8
                                 0.0
                                          0.0
                                                    0.
                                                            0.
                                                               4439.1
                                                                           0.0
                                                                                    0.0
209
        4
                      47983.6
                                                                7197.5
               15.7
                                 0.0
                                          0.0
                                                    0.
                                                            0.
                                                                           0.0
                                                                                    0.0
210
               2 2
                      8330 8
                                 0.0
                                          0.0
                                                            Ω
                                                                1249 6
                                                                           0.0
                                                                                    0.0
211
              23.8
                    100649.1
                                         0.0
                                                            0. 15097.4
        6
                                 0.0
                                                    0.
                                                                           0.0
                                                                                    0.0
212
               8 8
                     39167.2
                                 0 0
                                         0.0
                                                            Ω
                                                               5875.1
                                                                           0.0
                                                                                    0.0
213
        8
               0 4
                      1517 2
                                 0 0
                                         0 0
                                                    Ω
                                                            Ω
                                                                 227 6
                                                                           0 0
                                                                                    0 0
214
               1.9
                       7988.8
                                                                1198.3
        9
                                 0.0
                                          0.0
                                                    0.
                                                                           0.0
                                                                                    0.0
              41.0 194102.2
                                                            0 29115 3
       1.0
                                 0 0
                                         0 0
                                                    Ω
                                                                           0 0
                                                                                    0 0
216
       11
              10.0
                     50595.3
                                          0.0
                                                    0.
                                                            0. 7589.3
                                                                           0.0
                                                                                    0.0
217
       12
               47.0 259864.1
                                 0.0
                                          0.0
                                                    0.
                                                            0. 38979.6
                                                                           0.0
                                                                                    0.0
                     65985.2
218
       13
               10 0
                                  0.0
                                          0.0
                                                    0.
                                                                9897 8
                                                                           0.0
                                                                                    0.0
                     41657.6
                                                               6248.6
219
       14
               6.0
                                 0.0
                                         0.0
                                                    0.
                                                            0.
                                                                           0.0
                                                                                    0.0
220
       15
               9 0
                     60330 0
                                 0.0
                                         0.0
                                                            0 9049 5
                                                                           0.0
                                                                                    0.0
                                                    0.
221
       16
              18 0 126936 6
                                 0 0
                                         0 0
                                                            0 19040 5
                                                                           0 0
                                                                                    0 0
222
       17
               22.0
                    170127.9
                                 0.0
                                                            0. 25519.2
                                                                           0.0
                                         0.0
                                                   0.
                                                                                    0.0
       1.8
              15 4 123989 8
                                 0 0
                                         0 0
                                                            0 18598 5
                                                                           0 0
                                                                                    0 0
224
       19
              11.6
                    89528.4
                                         0.0
                                                            0. 13429.3
                                 0.0
                                                    0.
                                                                           0.0
                                                                                    0.0
       20
               15.0 101439.8
                                                            0. 15216.0
                                          0.0
                                                    0.
                                                                           0.0
                                                                                    0.0
       21
                                                               4463 3
226
               5 0
                     29755 5
                                 0 0
                                         0 0
                                                   0
                                                            Ω
                                                                           0 0
                                                                                    0 0
227
       22
               5.8
                     30447.5
                                 0.0
                                          0.0
                                                            0.
                                                                4567.1
                                                                           0.0
                                                                                    0.0
                                                    0.
228
       23
                     55025.8
                                                               8253 9
              15 2
                                 0 0
                                         0 0
                                                    Ω
                                                            0
                                                                           0 0
                                                                                    0 0
229
               14 0
                     21002.7
                                  0.0
                                         0.0
                                                    0.
                                                            0 3150 4
                                                                           0.0
                                                                                    0.0
230
               3.3
                       917.2
                                 0.0
                                         0.0
                                                            0. 137.6
                                                                           0.0
                                                                                    0.0
231
               Failure Surface Specified By 6 Coordinate Points
233
234
235
                  Point
                            X-Surf
                                         Y-Surf
236
                  No.
                              (ft)
                                          (ft)
237
238
                             284.115
                                         1377.000
                                         1371.329
239
                             307 794
                   2
240
                   3
                             362.209
                                         1363.328
2.41
                   4
                             575.398
                                         1420.086
242
                             612.835
                                         1460 378
243
                            645.327
                                        1499.401
244
245
```

```
246
                     Factor of Safety
                                                                                                    312
247
                     *** 1.125 ***
                                                                                                    313
                                                                                                                   Failure Surface Specified By 6 Coordinate Points
248
                                                                                                    314
                                                                                                    315
249
                                                                                                    316
250
251
                                                                                                    317
                                                                                                                               X-Surf
                                                                                                                                          Y-Surf
                                                                                                                     Point
252
                                                                                                    318
                                                                                                                      No.
                                                                                                                                (ft)
                                                                                                                                           (ft)
               Failure Surface Specified By 6 Coordinate Points
                                                                                                    319
254
                                                                                                    320
                                                                                                                               284.115
                                                                                                                                          1377.000
255
                                                                                                    321
                                                                                                                      2
                                                                                                                               307 794
                                                                                                                                          1371 329
256
                 Point
                           X-Surf
                                       Y-Surf
                                                                                                    322
                                                                                                                               362.209
                                                                                                                                          1363.328
257
                  No.
                            (ft)
                                        (ft)
                                                                                                    323
                                                                                                                      4
                                                                                                                               575 398
                                                                                                                                          1420.086
258
                                                                                                    324
                                                                                                                      5
                                                                                                                               612.835
                                                                                                                                          1460.378
                                      1377.000
259
                           284.115
                                                                                                    325
                                                                                                                               645.327
                                                                                                                                          1499.401
                                                                                                                      6
                           307.794
                                      1371.329
260
                  2
                                                                                                    326
                  3
                           362.209
                                       1363.328
                                                                                                    327
261
262
                           575.398
                                       1420.086
                                                                                                    328
                                                                                                                         Factor of Safety
                  4
                           612.835
                                      1460.378
                                                                                                                        *** 1.125 ***
263
                  5
                                                                                                    329
264
                           645.327
                                      1499.401
                                                                                                    330
                  6
265
                                                                                                    331
266
                                                                                                    332
267
                     Factor of Safety
                                                                                                    333
268
                    *** 1.125 ***
                                                                                                    334
269
                                                                                                    335
                                                                                                                   Failure Surface Specified By 6 Coordinate Points
270
                                                                                                    336
271
                                                                                                    337
272
                                                                                                    338
                                                                                                                     Point
                                                                                                                               X-Surf
                                                                                                                                          Y-Surf
273
               Failure Surface Specified By 6 Coordinate Points
                                                                                                                                (ft)
                                                                                                                                           (ft)
                                                                                                                     No.
274
                                                                                                    340
275
                                                                                                    341
                                                                                                                               284.115
                                                                                                                                          1377.000
276
                 Point
                           X-Surf
                                       Y-Surf
                                                                                                    342
                                                                                                                      2
                                                                                                                               307.794
                                                                                                                                          1371.329
                                                                                                                               362.209
                                                                                                                                          1363.328
277
                           (ft)
                                       (ft)
                                                                                                   343
                  No.
                                                                                                                      3
278
                                                                                                   344
                                                                                                                      4
                                                                                                                               575.398
                                                                                                                                          1420.086
                  1
                           284.115
                                       1377.000
                                                                                                    345
                                                                                                                      5
                                                                                                                               612.835
                                                                                                                                          1460.378
279
280
                           307.794
                                       1371.329
                                                                                                    346
                                                                                                                               645.327
                                                                                                                                          1499.401
281
                           362,209
                                      1363.328
                                                                                                    347
                  3
282
                           575.398
                                       1420.086
283
                  5
                           612.835
                                       1460.378
                                                                                                    349
                                                                                                                         Factor of Safety
284
                           645.327
                                                                                                    350
                                                                                                                        *** 1.125 ***
                                                                                                    351
285
286
                     Factor of Safety
287
                                                                                                   353
                    *** 1.125 ***
                                                                                                    354
288
289
                                                                                                    355
                                                                                                                   Failure Surface Specified By 6 Coordinate Points
290
                                                                                                    356
291
                                                                                                    357
292 1
                                                                                                    358
                                                                                                                     Point
                                                                                                                               X-Surf
                                                                                                                                          Y-Surf
293
                                                                                                    359
                                                                                                                      No.
                                                                                                                                (ft)
                                                                                                                                           (ft)
294
               Failure Surface Specified By 6 Coordinate Points
                                                                                                    360
295
                                                                                                                               284.115
                                                                                                                                           1377.000
                                                                                                                               307.794
296
                                                                                                    362
                                                                                                                      2
                                                                                                                                          1371.329
297
                 Point
                           X-Surf
                                       Y-Surf
                                                                                                    363
                                                                                                                      3
                                                                                                                               362.209
                                                                                                                                           1363.328
                           (ft)
                                                                                                    364
                                                                                                                               575.398
                                                                                                                                          1420.086
298
                  No.
                                       (ft.)
                                                                                                                      4
299
                                                                                                    365
                                                                                                                               612.835
                                                                                                                                          1460.378
300
                  1
                           284.115
                                       1377.000
                                                                                                    366
                                                                                                                               645.327
                                                                                                                                          1499.401
301
                  2
                           307.794
                                       1371.329
                                                                                                    367
                                       1363.328
302
                  3
                           362,209
                                                                                                    368
303
                           575.398
                                      1420.086
                                                                                                    369
                  4
                                                                                                                         Factor of Safety
304
                           612.835
                                      1460.378
                                                                                                    370
                                                                                                                        *** 1.125 ***
305
                           645.327
                                      1499.401
                                                                                                    371
306
                                                                                                    372
307
                                                                                                    373
308
                     Factor of Safety
                                                                                                    374
                    *** 1.125 ***
309
                                                                                                    375
310
                                                                                                    376
                                                                                                                   Failure Surface Specified By 6 Coordinate Points
311
                                                                                                    377
```

```
378
379
               Point
                         X-Surf
                                    Y-Surf
380
                          (ft)
                                     (ft)
                No.
381
382
                         284.115
                                    1377.000
                         307.794
                                    1371.329
383
                 2
384
                         362.209
                                    1363.328
                 4
385
                         575.398
                                    1420.086
386
                 5
                         612.835
                                    1460.378
387
                 6
                         645.327
                                    1499.401
388
389
390
                   Factor of Safety
                   *** 1.125 ***
391
392
393
394
395
396
              Failure Surface Specified By 6 Coordinate Points
397
398
399
               Point
                         X-Surf
                                    Y-Surf
400
                No.
                         (ft)
                                     (ft)
401
                         284.115
                 1
                                    1377.000
402
403
                 2
                         307.794
                                    1371.329
404
                 3
                         362.209
                                    1363.328
405
                 4
                         575.398
                                    1420.086
406
                 5
                         612.835
                                    1460.378
407
                         645.327
                                    1499.401
                 6
408
409
410
                   Factor of Safety
411
                   *** 1.125 ***
412
413
414
415
416
                       **** END OF GSTABL7 OUTPUT ****
417
418
```

Bouquet Canyon/21095-01/Section V-V'/ Static



| 1 | | *** GSTABL7 *** | 48 | | 1 | 129.00 | 1368.00 | 164.00 | 1380.00 | | L |
|----------|--|---|------------|----|------------|------------------|--------------------|------------------|------------|---------|-------|
| 2 | | | 49 | | 2 | 164.00 | 1380.00 | 252.00 | 1380.00 | | |
| 3 | ** GSTABL7 | by Dr. Garry H. Gregory, Ph.D., P.E., D.GE ** | 50 | | 3 | 252.00 | 1380.00 | 252.10 | 1377.00 | | _ |
| 4 | | | 51 | | 4 | 252.10 | 1377.00 | 327.00 | 1377.00 | | |
| 5 | | 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 ** | 52 | | 5 | 327.00 | 1377.00 | 386.00 | 1408.00 | | - |
| 6 | (All Rig | hts Reserved-Unauthorized Use Prohibited) | 53 | | 6 | 386.00 | 1408.00 | 397.00 | 1408.00 | | - |
| 7 | | | 54 | | 7 | 397.00 | 1408.00 | 438.00 | 1427.00 | | |
| 8 | | | 55 56 | | 8 9 | 438.00 448.00 | 1427.00 | 448.00 495.00 | 1427.00 | | |
| 9 | | ************ | 57 | | | | 1427.00 | | 1450.00 | | - |
| | ** | | 58 | | 10 11 | 495.00 505.00 | 1450.00 1460.00 | 505.00 511.00 | 1460.00 | | |
| 10 | | PE STABILITY ANALYSIS SYSTEM | 59 | | 12 | 511.00 | 1460.00 | 520.00 | 1460.00 | | |
| 11 | | Simplified Janbu, or GLE Method of Slices. | 60 | | 13 | 520.00 | 1460.00 | 538.00 | 1473.00 | | - |
| 12 | | r & Morgenstern-Price Type Analysis) | 61 | | 14 | 538.00 | 1473.00 | 560.00 | 1482.00 | | |
| 13 | | ile, Reinforcement, Soil Nail, Tieback, | 62 | | 15 | 560.00 | 1482.00 | 587.00 | 1493.00 | | - |
| 14 | | ned Shear Strength, Curved Phi Envelope, | 63 | | 16 | 587.00 | 1493.00 | 602.00 | 1501.00 | | 3 |
| 15 | | , Fiber-Reinforced Soil, Boundary Loads, Water | 64 | | 17 | 602.00 | 1501.00 | 607.00 | 1501.00 | | 3 |
| 16 | | -Static & Newmark Earthquake, and Applied Forces. | 65 | | 18 | 607.00 | 1501.00 | 628.00 | 1499.00 |) : | 3 |
| 17 | | - | 66 | | 19 | 628.00 | 1499.00 | 642.00 | 1500.00 |) : | 3 |
| | | ***************** | 67 | | 20 | 642.00 | 1500.00 | 692.00 | 1491.00 | | 3 |
| | ** | | 68 | | 21 | 692.00 | 1491.00 | 774.00 | 1460.00 | | - |
| 18 | | | 69 | | 22 | 129.00 | 1368.00 | 168.00 | 1341.00 | | |
| 19 | | | 70 | | 23 | 168.00 | 1341.00 | 313.00 | 1354.00 | | |
| 20 | Analysis Run Date: | 4/5/2022 | 71 | | 24 | 313.00 | 1354.00 | 360.00 | 1372.00 | | - |
| 21 | Time of Run: | 10:05AM | 72 | | 25 | 360.00 | 1372.00 | 395.00 | 1372.00 | | - |
| 22 | Run By: | LGC Geotechnical, | 73 | | 26 | 395.00 | 1372.00 | 520.00 | 1460.00 | | - |
| | Inc. | | 74 75 | | 27 28 | 129.00 181.00 | 1323.00 1330.00 | 181.00 313.00 | 1330.00 | | 3 |
| | | | 76 | | 20 | 101.00 | 1330.00 | 313.00 | 1334.00 | ' | • |
| 23 | Input Data Filename: | Z:\2021\21095-01 Integral - Bouquet | 77 | TT | cer Specif | ied Y-Orig | in = | 1280.00(ft) | | | |
| 23 | Canyon\Engineering\slop V-V'\2022_04_05\xvb2-2. | e stability\Sec | 78 79 | | - | | = 0.00(ft) | 1200.00(12) | | | |
| | v v (2022_01_05 \xvb2 2. | | 80 81 | | | | = 0.00(ft) | | | | |
| 24 | Output Filename: | Z:\2021\21095-01 Integral - Bouquet | | 1 | eraure i-r | ius vaiue | - 0.00(10) | | | | |
| | Canyon\Engineering\slop | | 83 | _ | | | | | | | |
| | V-V'\2022_04_05\xvb2-2. | OUT | 84 | | | | | | | | |
| | | | 85 | IS | OTROPIC SO | IL PARAMET | ERS | | | | |
| | | | 86 | | | | | | | | |
| 25 | Unit System: | English | 87 | | | | | | | | |
| 26 | | | 88 | | 3 Type(s) | of Soil | | | | | |
| 27 | | : Z:\2021\21095-01 Integral - Bouquet | 89 | | | | | | | | |
| | Canyon\Engineering\slop | | 90 | _ | | | | | | | |
| | V-V'\2022_04_05\xvb2-2. | PLT | 91 | | | | d Cohesion | | | ressure | Piez. |
| | | | 92 93 | | | | . Intercept | | Pressure C | | |
| 28 | | | 94 | | No. (pcf) | (pcf) | (psf) | (deg) | Param. | (psf) | No. |
| 29 | | | 95 | | 1 120.0 | 120.0 | 250.0 | 28.0 | 0.00 | 0.0 | 0 |
| 30 | | | 96 | | 2 120.0 | | 100.0 | | 0.00 | 0.0 | 0 |
| 31 | | | 97 | | 3 120.0 | | 250.0 | 32.0 | 0.00 | 0.0 | 0 |
| 32 | | | 98 | | | | | | | | |
| 33 | PROBLEM DESCRIPTION: B | ouquet Canyon/21095-01/Section V-V'/ | 99 | | | | | | | | |
| 34 | S | tatic | 100 | | | | | | | | |
| 35 | | | 101 | AN | ISOTROPIC | STRENGTH P | ARAMETERS | | | | |
| 36 | | | 102 | | 1 soil | type(s) | | | | | |
| 37 | | | 103 | | | | | | | | |
| 38 | | | 104 | | | | | | | | |
| 39 | BOUNDARY COORDINATES | | 105 | S | oil Type | 3 Is Aniso | tropic | | | | |
| 40 | 21 | | 106 | | | | | | | | |
| 41 42 | 21 Top Boundaries 28 Total Boundaries | | 107 108 | N | unber Of D | rrection R | anges Spec | 111ea = 3 | | | |
| 42 | 20 local Boundaries | | 108 | | | | | | | | |
| 4.4 | | | 110 | T) | irection | Counter | lockwise | Cohesion | Frict | ion | |
| 45 | Boundary X-Left | Y-Left X-Right Y-Right Soil Type | 111 | D | Range | | on Limit | Intercept | Ang | | |
| 46 | No. (ft) | (ft) (ft) (ft) Below Bnd | 112 | | No. | (de | | (psf) | (de | | |
| 47 | (20) | , | 113 | | | (40 | J. | (F/ | (44 | ٠. | |
| | | | | | | | | | | | |
| | | | 1 | | | | | | | | |

| 114 | 1 | |
|-------|---|---|
| | | |
| 115 |) | |
| 116 | 5 | |
| 11' | 7 | |
| 118 | 2 | |
| 110 | | |
| 119 |) | |
| 120 | | |
| 123 | 1 | |
| 122 | 2 | |
| | | |
| 123 | 3 | |
| 124 | 1 | |
| 125 | 5 | |
| 126 | | |
| | | |
| 12 | | |
| 128 | 3 | 1 |
| 129 | | |
| 130 | 1 | |
| T 2 (| | |
| 133 | L | |
| 132 | 2 | |
| | 3 | |
| 10. | 4 | |
| 134 | ± | |
| 134 | 5 | |
| 136 | 5 | |
| 13 | 7 | |
| 138 | , | |
| T 2 (| 5 | |
| 139 | 9 | |
| 140 |) | |
| 143 | 1 | |
| 142 | | |
| | | |
| 143 | 3 | |
| 144 | 1 | |
| 145 | 5 | |
| 146 | - | |
| | | |
| 14' | | |
| 148 | 3 | |
| 149 | | |
| 150 | | |
| | | |
| 153 | L | |
| 152 | 2 | |
| 153 | | |
| 154 | | |
| | | |
| 155 | | |
| 156 | 5 | |
| 15 | 7 | |
| 158 | | |
| | | |
| 159 | | |
| 160 |) | |
| 163 | | |
| | | |
| 162 | | |
| | 3 | |
| 164 | 1 | |
| | 5 | |
| | | |
| 166 | | |
| 16' | 7 | |
| 168 | | |
| 169 | | |
| | | |
| | | |
| 173 | 1 | |
| | _ | |

| 1 | 10.0 | 250.00 | 32.00 |
|---|------|--------|-------|
| 2 | 15.0 | 150.00 | 25.00 |
| 3 | 90.0 | 250.00 | 32.00 |

ANISOTROPIC SOIL NOTES:

- (1) An input value of 0.01 for C and/or Phi will cause Aniso C and/or Phi to be ignored in that range.
- (2) An input value of 0.02 for Phi will set both Phi and C equal to zero, with no water weight in the tension crack.
- (3) An input value of 0.03 for Phi will set both Phi and C equal to zero, with water weight in the tension crack.

Janbus Empirical Coef is being used for the case of c & phi both > 0

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

4999 Trial Surfaces Have Been Generated.

2 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 55.0

| Box No. | X-Left (ft) | Y-Left (ft) | X-Right (ft) | Y-Right (ft) | Height (ft) |
|------------|----------------|----------------|-----------------|-----------------|----------------|
| 1 | 430.00 | 1404.00 | 450.00 | 1404.00 | 30.00 |
| 2 | 450.10 | 1404.00 | 600.00 | 1450.00 | 30.00 |

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following $\ 4$ Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|--------------|----------------|----------------|
| 1 | 426.81 | 1421.81 |
| 2 | 446.49 | 1403.05 |
| 3 | 487.86 | 1402.67 |
| 4 | 488.22 | 1446.68 |
| | | |

Factor of Safety for the Preceding Surface is Between48.909 and48.901

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following $\ 4$ Coordinate Points

| 181 182 183 | Point No. | X-Surf (ft) | Y-Surf (ft) |
|-------------------|--------------|----------------|----------------|
| 184 | 1 | 426.81 | 1421.81 |
| 185 | 2 | 446.49 | 1403.05 |
| 186 | 3 | 487.86 | 1402.67 |
| 187 | 4 | 488.22 | 1446.68 |
| 100 | | | |

Factor of Safety for the Preceding Surface is Between48.909 and48.901

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 4 Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|--------------|----------------|----------------|
| 1 | 426.81 | 1421.81 |
| 2 | 446.49 | 1403.05 |
| 3 | 487.86 | 1402.67 |
| 4 | 488.22 | 1446.68 |

Factor of Safety for the Preceding Surface is Between48.909 and48.901

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 4 Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|--------------|----------------|----------------|
| 1 | 426.81 | 1421.81 |
| 2 | 446.49 | 1403.05 |
| 3 | 487.86 | 1402.67 |
| 4 | 488.22 | 1446.68 |

Factor of Safety for the Preceding Surface is Between48.909 and48.901

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 4 Coordinate Points

| 241 242 | Point No. | X-Surf (ft) | Y-Surf (ft) |
|------------|--------------|----------------|----------------|
| 243 244 | 1 | 426.81 | 1421.81 |
| 245 | 2 | 446.49 | 1403.05 |

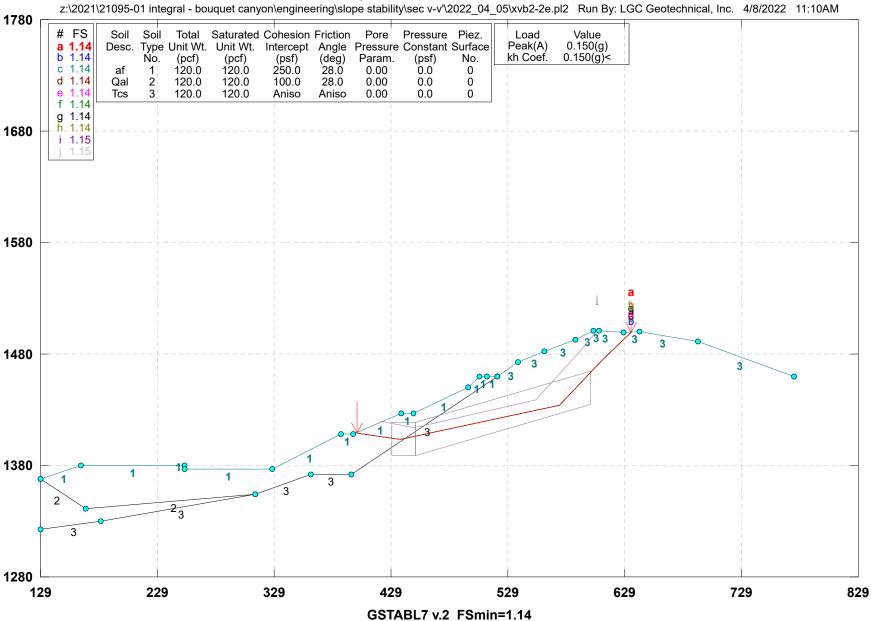
```
246
                             487.86
                                        1402 67
                   3
247
                             488.22
                                        1446.68
248
249
                Factor of Safety for the Preceding Surface is Between48.909 and48.901
251
252
                WARNING! The factor of safety calculation did not converge in 20 iterations.
254
255
256
                The Trial Failure Surface In Ouestion Is Defined
                By The Following 4 Coordinate Points
258
259
260
                             X-Surf
261
                  Point
                                         Y-Surf
262
                  No.
                              (ft)
                                          (ft)
263
                             426.81
                                        1421.81
264
                   1
265
                    2
                             446.49
                                        1403.05
                             487.86
                                        1402.67
266
                   3
                             488.22
                                        1446.68
267
268
269
                Factor of Safety for the Preceding Surface is Between48.909 and48.901
271
                WARNING! The factor of safety calculation did not converge in 20 iterations.
273
274
276
277
                The Trial Failure Surface In Question Is Defined
278
                By The Following 4 Coordinate Points
279
280
                  Point
                             X-Surf
                                         Y-Surf
281
282
                   No.
                              (ft)
                                          (ft)
283
                             426.81
                                        1421.81
284
285
                   2
                             446.49
                                        1403.05
286
                   3
                             487.86
                                        1402.67
287
                    4
                             488.22
                                        1446.68
288
289
290
                Factor of Safety for the Preceding Surface is Between48.909 and48.901
291
292
293
                WARNING! The factor of safety calculation did not converge in 20 iterations.
294
295
296
297
                The Trial Failure Surface In Question Is Defined
                By The Following 4 Coordinate Points
298
299
300
301
                  Point
                             X-Surf
                                         Y-Surf
302
                  No.
                              (ft)
                                          (ft)
303
304
                             426.81
                                        1421.81
                             446.49
                   2
                                        1403 05
305
306
                   3
                             487.86
                                        1402.67
307
                    4
                             488.22
                                        1446.68
308
309
310
                Factor of Safety for the Preceding Surface is Between48.909 and48.901
311
```

```
312
313
               Following Are Displayed The Ten Most Critical Of The Trial
314
               Failure Surfaces Evaluated. They Are
315
               Ordered - Most Critical First.
316
317
318
                * * Safety Factors Are Calculated By The Simplified Janbu Method * *
319
321
               Total Number of Trial Surfaces Attempted = 4999
323
324
                WARNING! The Factor of Safety Calculation for one or More Trial Surfaces
325
               Did Not Converge in 20 Iterations.
326
327
328
               Number of Trial Surfaces with Non-Converged FS = 8
329
330
               Number of Trial Surfaces With Valid FS = 4991
331
332
333
               Percentage of Trial Surfaces With Non-Valid FS Solutions
334
               of the Total Attempted = 0.2 %
335
336
               Statistical Data On All Valid FS Values:
                  FS Max = 28.257 FS Min = 1.621 FS Ave = 2.714
337
                  Standard Deviation = 1.686 Coefficient of Variation = 62.12 %
338
339
340
341
               Failure Surface Specified By 5 Coordinate Points
342
343
344
                 Point
                            X-Surf
                                        Y-Surf
345
                  No.
                             (ft)
                                        (ft)
346
                            420.945
                                        1419 096
347
348
                            449.374
                                        1413.761
349
                   3
                            553.367
                                        1438.991
                            589.159
                                        1480.751
350
                   4
351
                   5
                            605.510
                                        1501.000
352
353
354
                      Factor of Safety
355
                           1 621 ***
356
357
358
359
360
                    Individual data on the
                                              15 slices
362
363
                              Water Water
                                               Tie
                                                       Tie
                                                               Earthquake
364
                              Force Force
                                              Force
                                                     Force
                                                                 Force Surcharge
365
      Slice Width
                     Weight
                              Top
                                     Bot.
                                              Norm
                                                       Tan
                                                               Hor
                                                                      Ver
                                                                             Load
366
       No.
              (ft)
                      (lbs)
                              (lbs) (lbs)
                                              (lbs)
                                                     (lbs)
                                                              (lbs) (lbs)
                                                                            (lbs)
367
368
              17.1
                     11363 4
                                 0.0
                                         0.0
                                                           0.
                                                                  0.0
                                                                         0.0
                                                                                  0.0
369
              10.0
                     14451.1
                                        0.0
                                                                 0.0
                                                                                  0.0
                                 0 0
                                                           Ω
                                                                         0 0
        2
                                                  Ω
370
               1.4
                      2216.6
                                 0.0
                                         0.0
                                                   0.
                                                           0.
                                                                 0.0
                                                                         0.0
                                                                                  0.0
                     13441.9
371
        4
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                                                                                  0 0
               7 5
                                 0 0
                                         0 0
                                                  Ω
                                                           Ω
                                                                         0 0
        5
              38.1
                     93543.3
                                 0.0
                                         0.0
                                                   0.
                                                           0.
                                                                  0.0
                                                                         0.0
                                                                                  0.0
373
                     34747.6
              10.0
                                 0.0
                                         0.0
                                                   0.
                                                           0.
                                                                  0.0
                                                                         0.0
                                                                                  0.0
374
               6.0
                     23051.1
                                 0.0
                                         0.0
                                                   0.
                                                           0.
                                                                  0.0
                                                                         0.0
                                                                                  0.0
        8
               9.0
                     32611.5
                                 0.0
                                         0.0
                                                   0.
                                                           0.
                                                                  0.0
                                                                         0.0
                                                                                  0.0
376
              18.0
                     72188.6
                                 0.0
                                         0.0
                                                   0.
                                                           0.
                                                                  0.0
                                                                         0.0
                                                                                  0.0
377
       10
              15.4
                     71946.1
                                 0.0
                                         0.0
                                                   0.
                                                           0.
                                                                  0.0
                                                                         0.0
                                                                                  0.0
```

```
378
       11
              6.6 30074.9
                               0 0
                                       0.0
                                                 0.
                                                        0.
                                                               0 0
                                                                       0.0
                                                                               0.0
                                                                                                   444
              27.0 81062.5
379
       12
                               0.0
                                       0.0
                                                 0.
                                                         0.
                                                               0.0
                                                                       0.0
                                                                               0.0
                                                                                                   445
                                                                                                                                          Y-Surf
380
       13
               2.2
                     3649.9
                               0.0
                                       0.0
                                                 0.
                                                         0.
                                                               0.0
                                                                       0.0
                                                                               0.0
                                                                                                   446
                                                                                                                     Point.
                                                                                                                               X-Surf
381
       14
              12.8
                    13673.3
                               0.0
                                       0.0
                                                 0.
                                                         0.
                                                               0.0
                                                                       0.0
                                                                               0.0
                                                                                                   447
                                                                                                                     No.
                                                                                                                                (ft)
                                                                                                                                           (ft)
       15
382
               3.5
                      915.2
                               0.0
                                       0.0
                                                 0.
                                                         0.
                                                               0.0
                                                                       0.0
                                                                               0.0
                                                                                                   448
383
                                                                                                   449
                                                                                                                               420.945
                                                                                                                                          1419.096
               Failure Surface Specified By 5 Coordinate Points
384
                                                                                                   450
                                                                                                                      2
                                                                                                                               449.374
                                                                                                                                          1413.761
385
                                                                                                   451
                                                                                                                               553.367
                                                                                                                                          1438.991
                                                                                                                      3
386
                                                                                                   452
                                                                                                                      4
                                                                                                                               589.159
                                                                                                                                          1480.751
387
                 Point
                           X-Surf
                                      Y-Surf
                                                                                                   453
                                                                                                                      5
                                                                                                                               605.510
                                                                                                                                          1501.000
388
                 No.
                            (ft)
                                       (ft)
                                                                                                   454
389
                                                                                                   455
390
                           420.945
                                      1419.096
                                                                                                   456
                                                                                                                         Factor of Safety
                  2
                           449.374
                                      1413.761
                                                                                                   457
                                                                                                                        *** 1.621 ***
391
                           553.367
                                      1438.991
392
                  3
                                                                                                   458
                                      1480.751
                                                                                                   459
393
                  4
                           589.159
                           605.510
                                      1501.000
                                                                                                   460
394
395
                                                                                                   461
396
                                                                                                   462
                                                                                                                   Failure Surface Specified By 5 Coordinate Points
397
                     Factor of Safety
                                                                                                   463
                     *** 1.621 ***
                                                                                                   464
398
399
                                                                                                   465
                                                                                                                     Point
                                                                                                                               X-Surf
                                                                                                                                          Y-Surf
400
                                                                                                   466
                                                                                                                                (ft)
                                                                                                                                           (ft)
                                                                                                                     No.
401
                                                                                                   467
                                                                                                                               420.945
                                                                                                                                          1419.096
402 1
                                                                                                   468
                                                                                                                      -1
403
                                                                                                   469
                                                                                                                               449.374
                                                                                                                                          1413.761
               Failure Surface Specified By 5 Coordinate Points
                                                                                                                               553.367
                                                                                                                                          1438.991
404
                                                                                                   470
                                                                                                                      3
                                                                                                   471
                                                                                                                               589.159
                                                                                                                                          1480.751
405
                                                                                                   472
406
                                                                                                                      5
                                                                                                                               605.510
                                                                                                                                          1501.000
407
                 Point
                           X-Surf
                                      Y-Surf
                                                                                                   473
408
                 No.
                            (ft)
                                       (ft)
                                                                                                   474
409
                                                                                                   475
                                                                                                                        Factor of Safety
                                                                                                                        *** 1.621 ***
410
                  1
                           420.945
                                      1419.096
                                                                                                   476
                           449.374
                                      1413.761
                                                                                                   477
411
                  2
412
                           553.367
                                      1438.991
                                                                                                   478
                           589.159
                                      1480.751
                                                                                                   479
413
                  4
414
                           605.510
                                      1501.000
                                                                                                   480 1
415
                                                                                                   481
                                                                                                   482
                                                                                                                   Failure Surface Specified By 5 Coordinate Points
416
417
                     Factor of Safety
                                                                                                   483
418
                    *** 1.621 ***
419
                                                                                                   485
                                                                                                                    Point
                                                                                                                               X-Surf
                                                                                                                                          Y-Surf
420
                                                                                                   486
                                                                                                                     No.
                                                                                                                                (ft)
                                                                                                                                           (ft)
421
                                                                                                   487
422
                                                                                                   488
                                                                                                                      1
                                                                                                                               420.945
                                                                                                                                          1419.096
423
               Failure Surface Specified By 5 Coordinate Points
                                                                                                   489
                                                                                                                               449.374
                                                                                                                                          1413.761
                                                                                                                                          1438.991
                                                                                                   490
                                                                                                                      3
                                                                                                                               553 367
424
425
                                                                                                   491
                                                                                                                      4
                                                                                                                               589.159
                                                                                                                                          1480.751
426
                 Point
                           X-Surf
                                      Y-Surf
                                                                                                   492
                                                                                                                               605.510
                                                                                                                                          1501.000
427
                 No.
                            (ft)
                                       (ft)
428
                                                                                                   494
429
                           420.945
                                      1419.096
                                                                                                   495
                                                                                                                         Factor of Safety
                                      1413.761
                                                                                                                        *** 1.621 ***
                           449.374
430
                  2
                                                                                                   496
431
                           553.367
                                      1438.991
                                                                                                   497
                  3
432
                  4
                           589.159
                                      1480.751
                                                                                                   498
433
                  5
                           605.510
                                      1501.000
                                                                                                   499
434
                                                                                                   500
435
                                                                                                   501
                                                                                                                  Failure Surface Specified By 5 Coordinate Points
436
                     Factor of Safety
                                                                                                   502
437
                     *** 1.621 ***
                                                                                                   503
                                                                                                                                          Y-Surf
438
                                                                                                   504
                                                                                                                    Point
                                                                                                                               X-Surf
439
                                                                                                   505
                                                                                                                                           (ft)
                                                                                                                     No.
                                                                                                                                (ft)
440
441
                                                                                                   507
                                                                                                                      1
                                                                                                                               420.945
                                                                                                                                          1419.096
                                                                                                   508
                                                                                                                      2
                                                                                                                               449.374
                                                                                                                                          1413.761
443
               Failure Surface Specified By 5 Coordinate Points
                                                                                                   509
                                                                                                                      3
                                                                                                                               553.367
                                                                                                                                          1438.991
```

```
510
                         589.159
                                    1480.751
                 4
511
                 5
                         605.510
                                    1501.000
512
513
514
                   Factor of Safety
515
                   *** 1.621 ***
516
517
518
519 1
520
              Failure Surface Specified By 5 Coordinate Points
521
522
523
524
                Point
                         X-Surf
                                    Y-Surf
525
                          (ft)
                                     (ft)
                No.
526
527
                         410.622
                                    1414.313
                          434.408
                                    1406.693
528
                 2
                                    1436.744
529
                          566.212
                                    1480.910
530
                 4
                          598.989
531
                          613.116
                                    1500.417
532
533
                   Factor of Safety
534
535
                   *** 1.643 ***
536
537
538
539
540
              Failure Surface Specified By 5 Coordinate Points
541
542
543
                Point
                         X-Surf
                                    Y-Surf
544
                No.
                          (ft)
                                     (ft)
545
546
                         410.622
                                    1414.313
                                    1406.693
547
                 2
                          434.408
548
                 3
                          566.212
                                     1436.744
                                    1480.910
                         598.989
549
                 4
550
                         613.116
                                    1500.417
551
552
553
                    Factor of Safety
554
                   *** 1.643 ***
555
556
557
558
559
                       **** END OF GSTABL7 OUTPUT ****
560
```

Bouquet Canyon/21095-01/Section V-V'/ Seismic



Safety Factors Are Calculated By The Simplified Janbu Method for the case of c & phi both > 0

| 1 | | *** GSTABL7 *** | 48 | | 1 | 129.00 | 1368.00 | 164.00 | 1380.00 | | L |
|----------|--|---|------------|----|-------------|------------------|--------------------|------------------|------------|---------|-------|
| 2 | | | 49 | | 2 | 164.00 | 1380.00 | 252.00 | 1380.00 | | |
| 3 | ** GSTABL7 | by Dr. Garry H. Gregory, Ph.D., P.E., D.GE ** | 50 | | 3 | 252.00 | 1380.00 | 252.10 | 1377.00 | | _ |
| 4 | | | 51 | | 4 | 252.10 | 1377.00 | 327.00 | 1377.00 | | |
| 5 | | 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 ** | 52 | | 5 | 327.00 | 1377.00 | 386.00 | 1408.00 | | - |
| 6 | (All Rig | hts Reserved-Unauthorized Use Prohibited) | 53 | | 6 | 386.00 | 1408.00 | 397.00 | 1408.00 | | - |
| -7 | | | 54 | | 7 | 397.00 | 1408.00 | 438.00 | 1427.00 | | |
| 8 | | | 55 56 | | 8 9 | 438.00 448.00 | 1427.00 | 448.00 495.00 | 1427.00 | | |
| 9 | | *************** | | | | | 1427.00 | | 1450.00 | | - |
| | ** | | 5 / 58 | | 10 11 | 495.00 505.00 | 1450.00 1460.00 | 505.00 511.00 | 1460.00 | | |
| 10 | | PE STABILITY ANALYSIS SYSTEM | 59 | | 12 | 511.00 | 1460.00 | 520.00 | 1460.00 | | - |
| 11 | | Simplified Janbu, or GLE Method of Slices. | 60 | | 13 | 520.00 | 1460.00 | 538.00 | 1473.00 | | - |
| 12 | | r & Morgenstern-Price Type Analysis) | 61 | | 14 | 538.00 | 1473.00 | 560.00 | 1482.00 | | |
| 13 | | ile, Reinforcement, Soil Nail, Tieback, | 62 | | 15 | 560.00 | 1482.00 | 587.00 | 1493.00 | | - |
| 14 | | ned Shear Strength, Curved Phi Envelope, | 63 | | 16 | 587.00 | 1493.00 | 602.00 | 1501.00 | | 3 |
| 15 | | , Fiber-Reinforced Soil, Boundary Loads, Water | 64 | | 17 | 602.00 | 1501.00 | 607.00 | 1501.00 | | 3 |
| 16 | | -Static & Newmark Earthquake, and Applied Forces. | 65 | | 18 | 607.00 | 1501.00 | 628.00 | 1499.00 |) : | 3 |
| 17 | | | 66 | | 19 | 628.00 | 1499.00 | 642.00 | 1500.00 |) : | 3 |
| | | ***************** | 0 / | | 20 | 642.00 | 1500.00 | 692.00 | 1491.00 | | 3 |
| | ** | | 68 | | 21 | 692.00 | 1491.00 | 774.00 | 1460.00 | | - |
| 18 | | | 69 | | 22 | 129.00 | 1368.00 | 168.00 | 1341.00 | | |
| 19 | | | 70 | | 23 | 168.00 | 1341.00 | 313.00 | 1354.00 | | |
| 20 | Analysis Run Date: | 4/8/2022 | 71 | | 24 | 313.00 | 1354.00 | 360.00 | 1372.00 | | - |
| 21 | Time of Run: | 11:10AM | 72 | | 25 | 360.00 | 1372.00 | 395.00 | 1372.00 | | - |
| 22 | Run By: | LGC Geotechnical, | 73 | | 26 | 395.00 | 1372.00 | 520.00 | 1460.00 | | - |
| | Inc. | | 74 75 | | 27 28 | 129.00 181.00 | 1323.00 1330.00 | 181.00 313.00 | 1330.00 | | 3 |
| | | | 76 | | 20 | 101.00 | 1330.00 | 313.00 | 1334.00 | ' | • |
| 23 | Input Data Filename: | Z:\2021\21095-01 Integral - Bouquet | 77 | TT | Jser Specif | ied V-Orio | in = 1 | L280.00(ft) | | | |
| 23 | Canyon\Engineering\slop V-V'\2022_04_05\xvb2-2e | e stability\Sec | 78 79 | | efault X-P | | | 200.00(10) | | | |
| | v v (2022_01_05\xvb2 20 | | 80 81 | | Default Y-P | | | | | | |
| 24 | Output Filename: | Z:\2021\21095-01 Integral - Bouquet | | 1 | eraurt 1-r | ius vaiue | - 0.00(10) | | | | |
| | Canyon\Engineering\slop | | 83 | _ | | | | | | | |
| | V-V'\2022_04_05\xvb2-2e | OUT | 84 | | | | | | | | |
| | | | 85 | IS | SOTROPIC SO | IL PARAMET | ERS | | | | |
| | | | 86 | | | | | | | | |
| 25 | Unit System: | English | 87 | | | | | | | | |
| 26 | | | 88 | | 3 Type(s) | of Soil | | | | | |
| 27 | | : Z:\2021\21095-01 Integral - Bouquet | 89 | | | | | | | | |
| | Canyon\Engineering\slop | | 90 | _ | | | | | | | |
| | V-V'\2022_04_05\xvb2-2e | .PLT | 91 | | | | d Cohesion | | | ressure | Piez. |
| | | | 92 93 | | | | . Intercept | | Pressure C | | |
| 28 | | | 94 | | No. (pcf) | (pcf) | (psf) | (deg) | Param. | (psf) | No. |
| 29 | | | 95 | | 1 120.0 | 120.0 | 250.0 | 28.0 | 0.00 | 0.0 | 0 |
| 30 | | | 96 | | 2 120.0 | | 100.0 | | 0.00 | 0.0 | 0 |
| 31 | | | 97 | | 3 120.0 | | 250.0 | | 0.00 | 0.0 | 0 |
| 32 | | | 98 | | | | | | | | |
| 33 | PROBLEM DESCRIPTION: B | ouquet Canyon/21095-01/Section V-V'/ | 99 | | | | | | | | |
| 34 | S | eismic | 100 | | | | | | | | |
| 35 | | | 101 | AN | IISOTROPIC | STRENGTH P | ARAMETERS | | | | |
| 36 | | | 102 | | 1 soil | type(s) | | | | | |
| 37 | | | 103 | | | | | | | | |
| 38 | | | 104 | | | | | | | | |
| 39 | BOUNDARY COORDINATES | | 105 | S | Soil Type | 3 Is Aniso | tropic | | | | |
| 40 | 21 | | 106 | | | | | | | | |
| 41 42 | 21 Top Boundaries 28 Total Boundaries | | 107 108 | N | unber Of D | rrection R | anges Speci | 111ea = 3 | | | |
| 4.3 | 20 local Boundaries | | 108 | | | | | | | | |
| 4.4 | | | 110 | T) | irection | Counter | lockwise | Cohesion | Frict | ion | |
| 45 | Boundary X-Left | Y-Left X-Right Y-Right Soil Type | 111 | D | Range | | on Limit | Intercept | Ang | | |
| 46 | No. (ft) | (ft) (ft) (ft) Below Bnd | 112 | | No. | (de | | (psf) | (de | | |
| 47 | • • • | | 113 | | | , | - | | , | | |
| | | | | | | | | | | | |
| | | | l | | | | | | | | |

```
114
                   1
                                   10.0
                                                    250 00
                                                                   32 00
115
                   2
                                   15.0
                                                    150.00
                                                                   25.00
                                                    250.00
116
                   3
                                   90.0
                                                                   32.00
117
118
                ANISOTROPIC SOIL NOTES:
                   (1) An input value of 0.01 for C and/or Phi will cause Aniso
119
120
                       C and/or Phi to be ignored in that range.
                   (2) An input value of 0.02 for Phi will set both Phi and
122
                       C equal to zero, with no water weight in the tension crack.
123
                   (3) An input value of 0.03 for Phi will set both Phi and
124
                       C equal to zero, with water weight in the tension crack.
125
126
                Specified Peak Ground Acceleration Coefficient (A) = 0.150(g)
128
                Specified Horizontal Earthquake Coefficient (kh) = 0.150(q)
                Specified Vertical Earthquake Coefficient (kv) = 0.000(g)
129
130
131
                Specified Seismic Pore-Pressure Factor = 0.000
132
133
                Janbus Empirical Coef is being used for the case of c & phi both > 0
134 1
135
136
                A Critical Failure Surface Searching Method, Using A Random
138
                Technique For Generating Sliding Block Surfaces, Has Been
139
                Specified.
140
141
                4999 Trial Surfaces Have Been Generated.
142
143
144
145
                2 Boxes Specified For Generation Of Central Block Base
146
147
148
                Length Of Line Segments For Active And Passive Portions Of
                Sliding Block Is 55.0
149
150
151
                                      Y-Left
152
                Box
                           X-Left
                                               X-Right
                                                           Y-Right
                                                                        Height
153
                No.
                            (ft)
                                       (ft.)
                                                  (ft.)
                                                             (ft)
                                                                         (ft.)
154
155
                1
                           430 00
                                     1404 00
                                                 450 00
                                                          1404 00
                                                                        30 00
156
                           450.10
                                     1404.00
                                                 600.00
                                                          1450.00
                                                                        30.00
157
158
159
                WARNING! The factor of safety calculation did not converge in 20 iterations.
160
161
162
163
                The Trial Failure Surface In Question Is Defined
164
                By The Following 4 Coordinate Points
165
166
167
                  Point
                            X-Surf
                                         Y-Surf
168
                   No.
                              (ft)
                                          (ft)
169
170
                    1
                             426.81
                                        1421 81
                             446.49
                                        1403.05
                   2
172
                             487.86
                                        1402.67
                    4
                             488 22
                                        1446 68
174
175
176
                Factor of Safety for the Preceding Surface is Between19.512 and19.461
```

WARNING! The factor of safety calculation did not converge in 20 iterations.

178

```
180
181
182
183
                The Trial Failure Surface In Ouestion Is Defined
184
                By The Following 4 Coordinate Points
185
186
187
                  Point.
                             X-Surf
                                         Y-Surf
188
                   No.
                              (ft)
                                          (ft)
189
190
                             426.81
                                        1421.81
191
                    2
                             446 49
                                        1403 05
192
                             487.86
                                        1402.67
                    3
                             488.22
193
                    4
                                        1446.68
194
195
196
                Factor of Safety for the Preceding Surface is Between19.512 and19.461
197
198
199
                WARNING! The factor of safety calculation did not converge in 20 iterations.
203
                The Trial Failure Surface In Question Is Defined
204
                By The Following 4 Coordinate Points
205
                  Point
                             X-Surf
                                         Y-Surf
207
208
                   No.
                              (ft)
                                          (ft)
209
                                        1421.81
210
                             426 81
211
                             446.49
                                        1403.05
                    2
212
                    3
                             487.86
                                        1402.67
213
                             488.22
                                        1446.68
                    4
214
215
216
                Factor of Safety for the Preceding Surface is Between19.512 and19.461
217
218
219
                WARNING! The factor of safety calculation did not converge in 20 iterations.
220
222
                The Trial Failure Surface In Question Is Defined
224
                By The Following 4 Coordinate Points
225
226
227
                  Point
                             X-Surf
                                         Y-Surf
228
                              (ft)
                                          (ft)
                   No.
229
230
                             426.81
                                        1421.81
231
                             446.49
                                        1403.05
                             487.86
                    3
                                        1402.67
233
                             488.22
                                        1446.68
234
235
236
                Factor of Safety for the Preceding Surface is Between19.512 and19.461
237
238
239
                WARNING! The factor of safety calculation did not converge in 20 iterations.
240
241
242
243
                The Trial Failure Surface In Question Is Defined
244
                By The Following 4 Coordinate Points
245
```

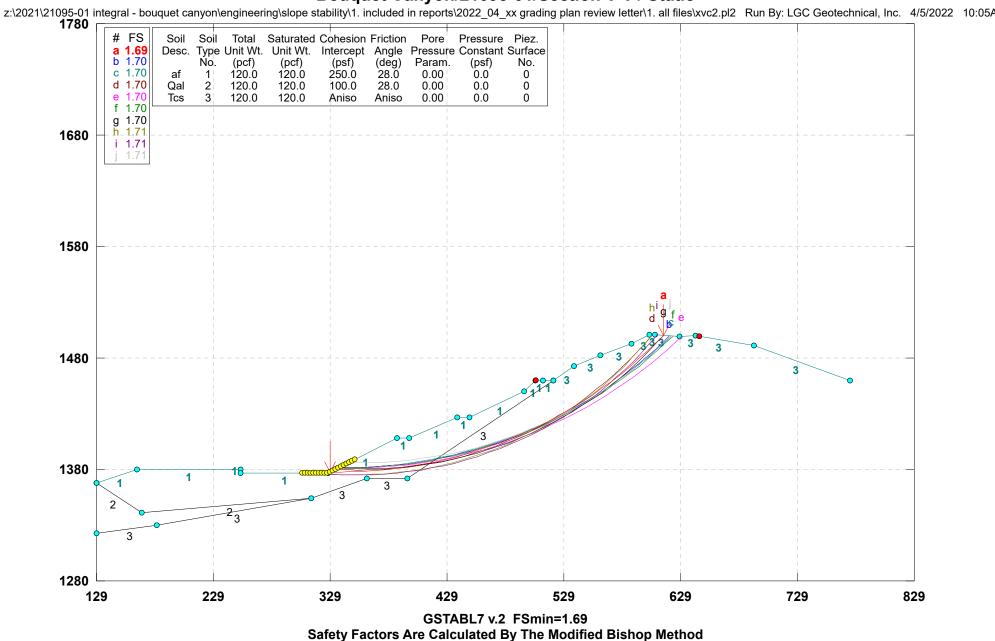
```
246
                                         Y-Surf
247
                  Point
                             X-Surf
248
                   No.
                              (ft)
                                          (ft)
249
                             426.81
                                        1421.81
                             446.49
                                        1403.05
                   2
252
                             487.86
                                        1402.67
                    4
                             488.22
                                        1446.68
254
255
256
                Factor of Safety for the Preceding Surface is Between19.512 and19.461
258
259
                WARNING! The factor of safety calculation did not converge in 20 iterations.
260
261
262
                The Trial Failure Surface In Question Is Defined
263
                By The Following 4 Coordinate Points
264
265
266
267
                  Point
                             X-Surf
                                         Y-Surf
268
                              (ft)
                                          (ft)
                  No.
269
                                        1421.81
                   1
                             426 81
                             446.49
                                        1403.05
271
                             487.86
                   3
                                        1402.67
273
                             488.22
                                        1446.68
274
276
                Factor of Safety for the Preceding Surface is Between19.512 and19.461
277
278
279
                WARNING! The factor of safety calculation did not converge in 20 iterations.
280
281
282
283
                The Trial Failure Surface In Question Is Defined
                By The Following 4 Coordinate Points
284
285
286
287
                  Point
                             X-Surf
                                         Y-Surf
288
                              (ft)
                                          (ft)
                  No.
289
290
                   1
                             426.81
                                        1421.81
291
                   2
                             446.49
                                        1403.05
                             487 86
292
                   3
                                        1402 67
293
                             488.22
                                        1446.68
                    4
294
295
296
                Factor of Safety for the Preceding Surface is Between19.512 and19.461
297
298
299
                WARNING! The factor of safety calculation did not converge in 20 iterations.
300
301
302
303
                The Trial Failure Surface In Ouestion Is Defined
304
                By The Following 4 Coordinate Points
305
306
                             X-Surf
                                         Y-Surf
307
                  Point
308
                   No.
                              (ft)
                                          (ft)
309
310
                   1
                             426.81
                                        1421.81
311
                   2
                             446.49
                                        1403.05
```

```
312
                            487.86
                                       1402 67
                   3
313
                            488.22
                                       1446.68
314
315
316
               Factor of Safety for the Preceding Surface is Between19.512 and19.461
317
318
319
               Following Are Displayed The Ten Most Critical Of The Trial
320
               Failure Surfaces Evaluated. They Are
321
               Ordered - Most Critical First.
323
324
               * * Safety Factors Are Calculated By The Simplified Janbu Method * *
325
326
327
328
               Total Number of Trial Surfaces Attempted = 4999
329
330
               WARNING! The Factor of Safety Calculation for one or More Trial Surfaces
331
               Did Not Converge in 20 Iterations.
332
333
334
               Number of Trial Surfaces with Non-Converged FS = 8
335
336
               Number of Trial Surfaces With Valid FS = 4991
337
338
               Percentage of Trial Surfaces With Non-Valid FS Solutions
339
340
               of the Total Attempted = 0.2 %
341
342
               Statistical Data On All Valid FS Values:
343
                  FS Max = 16.243 FS Min = 1.140 FS Ave = 1.868
344
                  Standard Deviation = 0.976 Coefficient of Variation = 52.23 %
345
346
347
               Failure Surface Specified By 5 Coordinate Points
348
349
                            X-Surf
                                        Y-Surf
350
                 Point
351
                  No.
                             (ft)
                                        (ft)
352
353
                   1
                            399 754
                                       1409 276
354
                            437.191
                                        1403.310
                   2
355
                   3
                            573 605
                                       1434 340
356
                            610.291
                                       1475.316
357
                   5
                            634.376
                                       1499.455
358
359
360
                     Factor of Safety
                     *** 1.140 ***
362
363
364
365
366
                    Individual data on the
                                             17 slices
367
368
369
                                                      Tie
                              Water Water
                                              Tie
                                                              Earthquake
370
                              Force Force
                                              Force
                                                     Force
                                                                Force Surcharge
      Slice Width
371
                     Weight
                              goT
                                                                     Ver
                                     Rot
                                              Norm
                                                      Tan
                                                              Hor
                                                                            Load
372
       No.
              (ft)
                     (lbs)
                              (lbs) (lbs)
                                             (lbs)
                                                     (lbs)
                                                             (lbs) (lbs)
                                                                             (lbs)
373
374
              37.4
                     52371.6
                                 0.0
                                        0.0
                                                  0.
                                                          0. 7855.7
                                                                         0.0
                                                                                  0.0
                                                              340.8
        2
               0.8
                      2272.3
                                0.0
                                        0.0
                                                  0.
                                                          0.
                                                                         0.0
                                                                                  0.0
376
        3
               2.6
                      7141.8
                                 0.0
                                         0.0
                                                  0.
                                                          0.
                                                              1071.3
                                                                         0.0
                                                                                  0.0
                                                          0. 2955.1
377
        4
               7.4
                     19700.9
                                 0.0
                                        0.0
                                                  0.
                                                                         0.0
                                                                                  0.0
```

```
378
              47.0 154457.7
                               0 0
                                       0 0
                                                 0.
                                                         0. 23168.6
                                                                       0 0
                                                                                0.0
                                                                                                    444
                                                                                                                          Factor of Safety
              10.0 44883.8
                                                         0. 6732.6
                                                                                                                         *** 1.140 ***
379
                                0.0
                                       0.0
                                                 0.
                                                                       0.0
                                                                                0.0
                                                         0. 4383.0
380
               6.0
                    29220.1
                                0.0
                                        0.0
                                                                       0.0
                                                                                0.0
                                                                                                    446
                                                         0. 6298.1
381
        8
               9.0
                    41987.6
                                0.0
                                        0.0
                                                 0.
                                                                       0.0
                                                                                0.0
                                                                                                    447
                    91382.3
                                                         0. 13707.4
382
              18.0
                                0.0
                                        0.0
                                                 0.
                                                                       0.0
                                                                                0.0
                                                                                                    448
                                0.0
383
              22.0 128719.0
                                                         0. 19307.9
                                                                                                    449
       1.0
                                       0.0
                                                 0.
                                                                       0.0
                                                                                0.0
384
              13.6
                    84859.1
                                0.0
                                        0.0
                                                 0.
                                                         0. 12728.9
                                                                                0.0
                                                                                                    450
385
                    77881.7
                                0.0
                                                         0. 11682.3
                                                                                                    451
                                                                                                                    Failure Surface Specified By 5 Coordinate Points
       12
              13.4
                                       0.0
                                                 0.
                                                                       0.0
                                                                                0.0
386
       13
              15.0
                    70778.8
                                0.0
                                        0.0
                                                 0.
                                                         0. 10616.8
                                                                       0.0
                                                                                0.0
                                                                                                    452
387
       14
              5 0
                    19291.3
                                0.0
                                        0 0
                                                 Ο
                                                         0. 2893.7
                                                                       0 0
                                                                                0 0
                                                                                                    453
388
               3.3
                    10807.6
                                0.0
                                        0.0
                                                 0.
                                                         0. 1621.1
                                                                       0.0
                                                                                0.0
                                                                                                    454
                                                                                                                     Point
                                                                                                                                X-Surf
                                                                                                                                           Y-Surf
                                                         0. 4989.4
389
              17 7
                    33262 6
                                0 0
                                       0 0
                                                 0.
                                                                       0 0
                                                                                0 0
                                                                                                    455
                                                                                                                      No.
                                                                                                                                 (ft)
                                                                                                                                            (ft)
390
       17
                     2270.6
                                0.0
                                       0.0
                                                         0.
                                                             340.6
                                                                       0.0
                                                                                0.0
                                                                                                    456
               6.4
                                                                                                    457
                                                                                                                                399.754
                                                                                                                                           1409.276
391
               Failure Surface Specified By 5 Coordinate Points
                                                                                                                                437.191
                                                                                                                                           1403.310
392
                                                                                                    458
                                                                                                                       2
                                                                                                    459
                                                                                                                                573.605
                                                                                                                                           1434.340
393
                                                                                                                       3
394
                                                                                                    460
                                                                                                                       4
                                                                                                                                610.291
                                                                                                                                           1475.316
                Point
                           X-Surf
                                       Y-Surf
395
                                                                                                    461
                                                                                                                       5
                                                                                                                                634.376
                                                                                                                                           1499.455
396
                           (ft)
                                       (ft)
                                                                                                    462
                 No.
397
                                                                                                    463
                           399.754
                                       1409.276
                                                                                                    464
                                                                                                                         Factor of Safety
398
                  1
399
                  2
                           437.191
                                       1403.310
                                                                                                    465
                                                                                                                         *** 1.140 ***
400
                           573.605
                                       1434.340
                                                                                                    466
                  3
401
                           610.291
                                       1475.316
                                                                                                    467
                                      1499.455
402
                  5
                           634.376
                                                                                                    468
403
                                                                                                    470
                                                                                                                   Failure Surface Specified By 5 Coordinate Points
404
                     Factor of Safety
                                                                                                    471
405
                    *** 1.140 ***
406
                                                                                                    472
407
                                                                                                    473
                                                                                                                     Point
                                                                                                                                X-Surf
                                                                                                                                           Y-Surf
408
                                                                                                    474
                                                                                                                      No.
                                                                                                                                 (ft)
                                                                                                                                            (ft)
409
                                                                                                    475
410 1
                                                                                                    476
                                                                                                                       -1
                                                                                                                                399.754
                                                                                                                                           1409.276
                                                                                                    477
                                                                                                                                437.191
                                                                                                                                           1403.310
411
                                                                                                                       2
412
               Failure Surface Specified By 5 Coordinate Points
                                                                                                    478
                                                                                                                       3
                                                                                                                                573.605
                                                                                                                                           1434.340
                                                                                                    479
                                                                                                                                610.291
                                                                                                                                           1475.316
413
                                                                                                                       4
414
                                                                                                    480
                                                                                                                                634.376
                                                                                                                                           1499.455
415
                 Point
                           X-Surf
                                       Y-Surf
                                                                                                    481
                            (ft)
                                                                                                    482
416
                 No.
                                        (ft)
417
                                                                                                    483
                                                                                                                          Factor of Safety
                           399.754
                                       1409.276
                                                                                                                         *** 1.140 ***
418
419
                  2
                           437.191
                                       1403.310
                                                                                                    485
420
                  3
                           573.605
                                       1434.340
                                                                                                    486
421
                  4
                           610.291
                                       1475.316
                                                                                                    487
422
                           634.376
                                      1499.455
                                                                                                    488 1
423
                                                                                                    489
                                                                                                                   Failure Surface Specified By 5 Coordinate Points
                                                                                                    490
424
425
                     Factor of Safety
                                                                                                    491
426
                    *** 1.140 ***
                                                                                                    492
427
                                                                                                                     Point
                                                                                                                                X-Surf
                                                                                                                                           Y-Surf
428
                                                                                                    494
                                                                                                                      No.
                                                                                                                                 (ft)
                                                                                                                                            (ft)
429
                                                                                                    495
                                                                                                                                399.754
                                                                                                                                           1409.276
430
                                                                                                    496
431
               Failure Surface Specified By 5 Coordinate Points
                                                                                                    497
                                                                                                                       2
                                                                                                                                437.191
                                                                                                                                           1403.310
432
                                                                                                    498
                                                                                                                       3
                                                                                                                                573.605
                                                                                                                                           1434.340
433
                                                                                                    499
                                                                                                                       4
                                                                                                                                610.291
                                                                                                                                           1475.316
434
                 Point
                           X-Surf
                                       Y-Surf
                                                                                                    500
                                                                                                                       5
                                                                                                                                634.376
                                                                                                                                           1499.455
435
                            (ft)
                                       (ft)
                                                                                                    501
                 No.
436
                                                                                                    502
                  1
                           399.754
                                       1409.276
                                                                                                    503
                                                                                                                          Factor of Safety
437
438
                  2
                           437.191
                                       1403.310
                                                                                                    504
                                                                                                                         *** 1.140 ***
                           573.605
                                       1434.340
                                                                                                    505
439
                  3
440
                           610.291
                                       1475.316
                                                                                                    506
441
                  5
                           634.376
                                       1499.455
                                                                                                    507
442
                                                                                                    508
                                                                                                                   Failure Surface Specified By 5 Coordinate Points
443
                                                                                                    509
```

```
510
511
                Point
                          X-Surf
                                     Y-Surf
512
513
                          (ft)
                                      (ft)
                 No.
514
515
                          399.754
                                     1409.276
                                     1403.310
516
                 2
                          437.191
517
                 3
                          573.605
                                     1434.340
518
                 4
                          610.291
                                     1475.316
519
                 5
                          634.376
                                     1499.455
520
521
522
                    Factor of Safety
                    *** 1.140 ***
523
524
525
526
527 1
528
              Failure Surface Specified By 5 Coordinate Points
529
530
531
                                     Y-Surf
532
                Point
                          X-Surf
533
                 No.
                          (ft)
                                      (ft)
534
535
                 1
                          420.945
                                     1419.096
                                     1413.761
536
                 2
                          449.374
537
                          553.367
                                     1438.991
                 3
538
                  4
                          589.159
                                     1480.751
                 5
                          605.510
                                     1501.000
539
540
541
542
                    Factor of Safety
543
                   *** 1.146 ***
544
545
546
547
548
              Failure Surface Specified By 5 Coordinate Points
549
550
551
                Point
                          X-Surf
                                     Y-Surf
552
                          (ft)
                                      (ft)
                 No.
553
554
                 1
                          420.945
                                     1419.096
555
                          449.374
                                     1413.761
                          553.367
                                     1438.991
556
                 3
557
                          589.159
                                     1480.751
558
                          605.510
                                     1501.000
559
560
561
                    Factor of Safety
                   *** 1.146 ***
562
563
564
565
566
567
                       **** END OF GSTABL7 OUTPUT ****
568
569
```

Bouquet Canyon/21095-01/Section V-V'/ Static



| 1 | | *** GSTABL7 *** | 48 | | | 129.00 | 1368.00 | 164.00 | 1380.0 | | 1 |
|----------|--|---|------------|-------|-----------------------|------------------|--|------------------|----------------------|----------|-------|
| 2 | | | 49 | | | 164.00 | 1380.00 | 252.00 | 1380.0 | | 1 |
| 3 | ** GSTABL7 | by Dr. Garry H. Gregory, Ph.D., P.E., D.GE ** | 50 | | | 252.00 | 1380.00 | 252.10 | 1377.0 | | 1 |
| 4 | | | 51 | | | 252.10 | 1377.00 | 327.00 | 1377.0 | | 1 |
| 5 | | 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 ** | 52 | | | 327.00 | 1377.00 | 386.00 | 1408.0 | | 1 |
| 6 | (All Rig | hts Reserved-Unauthorized Use Prohibited) | 53 | | | 386.00 | 1408.00 | 397.00 | 1408.0 | | 1 |
| 7 | | | 54 | | | 397.00 | 1408.00 | 438.00 | 1427.0 | | 1 |
| 8 | | | 55 56 | | | 438.00 448.00 | 1427.00 | 448.00 | 1427.00 | | 1 |
| 9 | | ************ | 57 | | - | | 1427.00 | 495.00 | 1450.00 | | 1 |
| | ** | | 58 | | | 495.00 505.00 | 1450.00 1460.00 | 505.00 511.00 | 1460.0 | | 1 |
| 10 | | PE STABILITY ANALYSIS SYSTEM | 59 | | | 511.00 | 1460.00 | 520.00 | 1460.00 | | 1 |
| 11 | | Simplified Janbu, or GLE Method of Slices. | 60 | | | 520.00 | 1460.00 | 538.00 | 1473.0 | | 3 |
| 12 | | r & Morgenstern-Price Type Analysis) | 61 | | | 538.00 | 1473.00 | 560.00 | 1482.0 | | 3 |
| 13 | | ile, Reinforcement, Soil Nail, Tieback, | 62 | | | 560.00 | 1482.00 | 587.00 | 1493.0 | | 3 |
| 14 | | ned Shear Strength, Curved Phi Envelope, | 63 | | | 587.00 | 1493.00 | 602.00 | 1501.0 | | 3 |
| 15 | | , Fiber-Reinforced Soil, Boundary Loads, Water | 64 | | | 602.00 | 1501.00 | 607.00 | 1501.0 | | 3 |
| 16 | | -Static & Newmark Earthquake, and Applied Forces. | 65 | | 18 | 607.00 | 1501.00 | 628.00 | 1499.0 |) | 3 |
| 17 | | | 66 | 1 | 19 | 628.00 | 1499.00 | 642.00 | 1500.00 |) | 3 |
| | | ************** | 67 | | | 642.00 | 1500.00 | 692.00 | 1491.0 | | 3 |
| | ** | | 68 | | | 692.00 | 1491.00 | 774.00 | 1460.0 | | 3 |
| 18 | | | 69 | | | 129.00 | 1368.00 | 168.00 | 1341.0 | | 2 |
| 19 | | | 70 | | | 168.00 | 1341.00 | 313.00 | 1354.0 | | 2 |
| 20 | Analysis Run Date: | 4/5/2022 | 71 | | | 313.00 | 1354.00 | 360.00 | 1372.0 | | 3 |
| 21 | Time of Run: | 10:05AM | 72 | | | 360.00 | 1372.00 | 395.00 | 1372.0 | | 3 |
| 22 | Run By: | LGC Geotechnical, | 73 | | | 395.00 | 1372.00 | 520.00 | 1460.00 | | 3 |
| | Inc. | | 74 75 | | | 129.00 181.00 | 1323.00 1330.00 | 181.00 313.00 | 1330.00 | | 3 |
| | | | 76 | • | 20 | 101.00 | 1330.00 | 313.00 | 1354.00 | J | 3 |
| 23 | Input Data Filename: | Z:\2021\21095-01 Integral - Bouquet | 77 | IIce | r Specifie | d V-Oria | in - | 1280.00(ft) | | | |
| 23 | Canyon\Engineering\slop V-V'\2022_04_05\xvc2.in | e stability\Sec | 78 79 | | - | | = 0.00(ft) | 1200.00(10) | | | |
| | V (2022_01_03 (MV0241M | | 80 81 | | | | = 0.00(ft) | | | | |
| 24 | Output Filename: | Z:\2021\21095-01 Integral - Bouquet | | 1 | | o varac | 0.00(10) | | | | |
| | Canyon\Engineering\slop | | 83 | | | | | | | | |
| | V-V'\2022_04_05\xvc2.0U | T | 84 | | | | | | | | |
| | | | 85 | ISOTE | ROPIC SOIL | PARAMET | ERS | | | | |
| | | | 86 | | | | | | | | |
| 25 | Unit System: | English | 87 | | | | | | | | |
| 26 | | | 88 | 3 5 | Type(s) of | Soil | | | | | |
| 27 | | : Z:\2021\21095-01 Integral - Bouquet | 89 | | | | | | | | |
| | Canyon\Engineering\slop | | 90 | | | | | | | | |
| | V-V'\2022_04_05\xvc2.PL | T | 91 92 | | | | d Cohesion | | Pore l Pressure (| Pressure | Piez. |
| | | | 93 | | e unit wt. . (pcf) | (pcf) | Intercept (psf) | t Angle I (deg) | Param. | (psf) | No. |
| 28 | | | 94 | INO. | . (per) | (per) | (psi) | (deg) | Param. | (psr) | NO. |
| 29 | | | 95 | 1 | 120.0 | 120.0 | 250.0 | 28.0 | 0.00 | 0.0 | 0 |
| 30 | | | 96 | 2 | | 120.0 | 100.0 | | 0.00 | 0.0 | 0 |
| 31 | | | 97 | 3 | | 120.0 | 250.0 | 32.0 | 0.00 | 0.0 | 0 |
| 32 | | | 98 | | | | | | | | |
| 33 | PROBLEM DESCRIPTION: B | ouquet Canyon/21095-01/Section V-V'/ | 99 | | | | | | | | |
| 34 | S | tatic | 100 | | | | | | | | |
| 35 | | | 101 | ANISC | OTROPIC ST | RENGTH P | ARAMETERS | | | | |
| 36 | | | 102 | | 1 soil ty | pe(s) | | | | | |
| 37 | | | 103 | | | | | | | | |
| 38 | | | 104 | | _ | | | | | | |
| 39 | BOUNDARY COORDINATES | | 105 | Soil | l Type 3 | Is Aniso | tropic | | | | |
| 40 | Ol Man Davidson | | 106 107 | 371 | han Of Bi | | C | : 6: - 2 | | | |
| 41 42 | 21 Top Boundaries 28 Total Boundaries | | 107 | Numb | ber of Dir | ection R | anges Spec | 111ea = 3 | | | |
| 42 | 20 local Boundaries | | 108 | | | | | | | | |
| 44 | | | 110 | Dire | ection | Counterc | lockwise | Cohesion | Frict | ion | |
| 45 | Boundary X-Left | Y-Left X-Right Y-Right Soil Type | 111 | | ange | | on Limit | Intercept | | gle | |
| 46 | No. (ft) | (ft) (ft) Below Bnd | 112 | | No. | (de | | (psf) | | ed) | |
| 47 | ,, | | 113 | - | - | , | | , | , | ٥. | |
| | | | | | | | | | | | |
| | | | 1 | | | | | | | | |

```
114
                   1
                                  10.0
                                                    250 00
                                                                   32 00
115
                   2
                                   15.0
                                                    150.00
                                                                   25.00
                                                    250.00
116
                   3
                                   90.0
                                                                   32.00
117
118
                ANTSOTROPIC SOIL NOTES:
                   (1) An input value of 0.01 for C and/or Phi will cause Aniso
119
120
                       C and/or Phi to be ignored in that range.
                   (2) An input value of 0.02 for Phi will set both Phi and
122
                       C equal to zero, with no water weight in the tension crack.
                   (3) An input value of 0.03 for Phi will set both Phi and
124
                       C equal to zero, with water weight in the tension crack.
125
126
128
129
                A Critical Failure Surface Searching Method, Using A Random
130
                Technique For Generating Circular Surfaces, Has Been Specified.
131
133
                4980 Trial Surfaces Have Been Generated.
134
135
136
                249 Surface(s) Initiate(s) From Each Of 20 Points Equally Spaced
                Along The Ground Surface Between X = 305.00(ft)
138
                                            and X = 350 00 (ft)
139
140
                Each Surface Terminates Between X = 505.00(ft)
141
142
                                            and X = 645.00(ft)
143
144
145
                Unless Further Limitations Were Imposed, The Minimum Elevation
146
                At Which A Surface Extends Is Y =
                                                       0.00(ft)
147
148
                10.00(ft) Line Segments Define Each Trial Failure Surface.
149
150
151
152
153
                Following Are Displayed The Ten Most Critical Of The Trial
154
                Failure Surfaces Evaluated. They Are
155
156
                Ordered - Most Critical First.
157
158
159
                * * Safety Factors Are Calculated By The Modified Bishop Method * *
160
161
162
163
                Total Number of Trial Surfaces Attempted = 4980
164
165
                Number of Trial Surfaces With Valid FS = 4980
166
167
168
                Statistical Data On All Valid FS Values:
169
                   FS Max = 3.488 FS Min = 1.689 FS Ave = 2.400
                   Standard Deviation = 0.411 Coefficient of Variation = 17.13 %
171
172
                Failure Surface Specified By 34 Coordinate Points
174
175
176
                  Point
                            X-Surf
                                         Y-Surf
                  No.
                             (ft)
                                          (ft)
178
179
                   1
                            328.684
                                        1377 885
```

```
180
                             338 684
                                         1377 818
181
                             348.682
                                         1378.016
182
                             358.671
                                         1378.479
183
                    5
                             368.645
                                         1379,207
                             378.595
                                         1380.200
184
185
                             388.516
                                         1381.456
186
                             398.400
                                         1382.974
187
                    9
                             408.240
                                         1384.754
188
                   10
                             418.030
                                         1386.795
189
                   11
                             427 762
                                         1389 094
190
                   12
                             437.430
                                         1391.651
191
                   13
                             447 026
                                         1394 463
192
                   14
                             456.545
                                         1397.529
                             465.978
                                         1400 846
193
                   15
194
                   16
                             475.321
                                         1404.412
                                         1408.224
195
                   17
                             484.566
                             493.706
196
                   18
                                         1412.281
                             502.736
197
                   19
                                         1416 578
198
                   20
                             511.648
                                         1421.114
199
                   21
                             520.437
                                         1425.884
                   22
                             529.096
                                         1430.885
201
                   23
                             537.620
                                         1436.115
                   24
                             546 002
                                         1441 568
                   25
                             554.236
                                         1447.242
204
                   26
                             562 317
                                         1453 133
                   27
                             570.239
                                         1459.235
205
                             577.997
                                         1465.546
                   28
207
                   29
                             585.584
                                         1472.060
208
                   30
                             592.996
                                         1478.773
209
                   31
                             600.227
                                         1485.681
210
                   32
                             607.272
                                         1492 777
211
                   33
                             614.127
                                         1500.058
212
                   34
                             614.343
                                         1500.301
213
214
                Circle Center At X = 336.215; Y = 1754.814; and Radius = 377.005
215
216
217
                      Factor of Safety
                           1.689 ***
218
219
222
                     Individual data on the
                                               47 slices
224
225
226
                                                                Earthquake
                               Water Water
                                                Tie
                                                        Tie
227
                               Force Force
                                                       Force
                                               Force
                                                                   Force Surcharge
228
       Slice Width
                      Weight
                               goT
                                      Bot
                                               Norm
                                                        Tan
                                                                Hor
                                                                        Ver
                                                                               Load
229
               (ft)
                      (lbs)
                               (lbs) (lbs)
                                               (lbs) (lbs)
                                                               (lbs) (lbs)
                                                                                (lbs)
230
231
               10.0
                       3192.6
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                   0.0
                                                                           0.0
                                                                                    0.0
               10.0
                      9416.5
        2
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                   0.0
                                                                           0.0
                                                                                    0.0
233
               10.0
                      15306.0
                                  0.0
                                          0.0
                                                                   0.0
                                                                           0.0
                                                                                    0.0
                                                    0.
                                                            0.
234
         4
               10.0
                      20845 6
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                    0.0
                                                                           0.0
                                                                                    0.0
235
        5
               10.0
                      26021.1
                                  0.0
                                          0.0
                                                            0.
                                                                    0.0
                                                                           0.0
                                                                                    0.0
                                                    0.
236
        6
                7.4
                      22557 5
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                   0.0
                                                                           0.0
                                                                                    0.0
237
                      8062.8
                2 5
                                  0 0
                                          0 0
                                                            Ο
                                                                   0 0
                                                                           0 0
                                                                                    0 0
                                                    Ω
238
                8.5
                      26360.5
                                  0.0
                                          0.0
                                                            0.
                                                                   0.0
                                                                           0.0
                                                                                    0.0
                       4277.4
239
        9
                                                                   0 0
                                                                           0 0
                                                                                    0 0
                1 4
                                  0 0
                                          0 0
                                                    0
                                                            Ω
240
        10
                9.8
                      31958.9
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                   0.0
                                                                           0.0
                                                                                    0.0
        11
                      24388.7
2.41
                6.9
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                   0.0
                                                                           0.0
                                                                                    0.0
242
        12
                2 9
                      10504.8
                                  0 0
                                          0.0
                                                    0.
                                                            Ω
                                                                    0.0
                                                                           0.0
                                                                                    0.0
243
        13
                9.7
                      37436 5
                                  0 0
                                          0.0
                                                    0.
                                                            0.
                                                                   0.0
                                                                           0.0
                                                                                    0.0
244
        14
                9 7
                      39586.7
                                  0 0
                                          0 0
                                                    0.
                                                            0.
                                                                    0.0
                                                                           0 0
                                                                                    0.0
245
        15
               0.6
                      2404.3
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                   0.0
                                                                           0.0
                                                                                    0.0
```

```
246
       16
                     36674.5
                                  0 0
                                          0 0
                                                    0.
                                                            0.
                                                                   0 0
                                                                           0 0
                                                                                     0.0
                                                                                                          312
                                                                                                                             28
                                                                                                                                       585.472
                                                                                                                                                   1468.290
                9 0
247
       17
                1.0
                      3784.0
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                   0.0
                                                                           0.0
                                                                                     0.0
                                                                                                          313
                                                                                                                             29
                                                                                                                                       593.090
                                                                                                                                                   1474.768
248
       18
                8.5
                      33773.2
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                   0.0
                                                                           0.0
                                                                                     0.0
                                                                                                          314
                                                                                                                             30
                                                                                                                                       600.534
                                                                                                                                                    1481.446
249
       19
                9.4
                      38832.5
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                   0.0
                                                                           0.0
                                                                                     0.0
                                                                                                          315
                                                                                                                             31
                                                                                                                                       607.798
                                                                                                                                                    1488.318
                                                                                                                                                   1495.380
250
       20
                9.3
                      39748.9
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                   0.0
                                                                           0.0
                                                                                     0.0
                                                                                                          316
                                                                                                                             32
                                                                                                                                       614.878
251
                      40285.1
                                                                                                          317
                                                                                                                             33
                                                                                                                                                   1499.845
       21
                9.2
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                   0.0
                                                                           0.0
                                                                                     0.0
                                                                                                                                       619.124
252
                      40449.0
                                  0.0
                                          0.0
                                                    0.
                                                                   0.0
                                                                           0.0
                                                                                     0.0
                                                                                                          318
                                                                                                          319
253
       2.3
                1.3
                      5759.9
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                   0.0
                                                                           0.0
                                                                                     0.0
                                                                                                                          Circle Center At X = 344.570; Y = 1759.298; and Radius = 377.782
254
       24
                7.7
                      36323.4
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                   0.0
                                                                           0.0
                                                                                     0.0
                                                                                                          320
255
       25
                2 3
                     11335.1
                                  0 0
                                          0 0
                                                            0.
                                                                   0 0
                                                                           0 0
                                                                                     0 0
                                                                                                          321
                                                    Ο
256
       26
                6.0
                      29334.8
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                   0.0
                                                                           0.0
                                                                                     0.0
                                                                                                          322
                                                                                                                                 Factor of Safety
                                                                                                                                *** 1.697 ***
       27
                0.6
                       3036 2
                                  0 0
                                          0.0
                                                    0.
                                                            0.
                                                                   0 0
                                                                           0 0
                                                                                     0 0
                                                                                                          323
258
        28
                      36702.4
                                                            0.
                                                                                                          324
                8.4
                                  0.0
                                          0.0
                                                    0.
                                                                   0.0
                                                                           0.0
                                                                                     0.0
                      1803.1
                                                                                                          325
259
       29
                0.4
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                   0.0
                                                                           0.0
                                                                                     0.0
260
       30
                8.7
                      36429.6
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                   0.0
                                                                           0.0
                                                                                     0.0
                                                                                                          326
                                                                                                          327
261
       31
                8.5
                      36973.1
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                   0.0
                                                                           0.0
                                                                                     0.0
262
       32
                0.4
                      1670.4
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                   0.0
                                                                           0.0
                                                                                     0.0
                                                                                                          328
263
       33
                8.0
                      34252.7
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                   0.0
                                                                           0.0
                                                                                     0.0
                                                                                                          329
                                                                                                                          Failure Surface Specified By 33 Coordinate Points
                     33153.9
                                                                                                          330
264
       34
                8.2
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                   0.0
                                                                           0.0
                                                                                     0.0
265
       35
                      21771.6
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                   0.0
                                                                           0.0
                                                                                     0.0
                                                                                                          331
       36
                      8393.3
                                                                                                          332
                                                                                                                                                   Y-Surf
266
                2.3
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                   0.0
                                                                           0.0
                                                                                     0.0
                                                                                                                            Point
                                                                                                                                       X-Surf
267
       37
                      26972.9
                                  0.0
                                          0.0
                                                            0.
                                                                                                          333
                                                                                                                                        (ft)
                                                                                                                                                    (ft)
                7.9
                                                    0.
                                                                   0.0
                                                                           0.0
                                                                                     0.0
                                                                                                                             No.
268
       3.8
                7 8
                     23607.9
                                  0.0
                                          0.0
                                                                   0.0
                                                                           0.0
                                                                                     0.0
                                                                                                          334
                                                    0.
                                                            0.
269
       39
                7.6
                      20097.8
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                   0.0
                                                                           0.0
                                                                                     0.0
                                                                                                          335
                                                                                                                                       335.789
                                                                                                                                                    1381.618
270
       40
                1 4
                       3400 7
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                   0.0
                                                                           0.0
                                                                                     0 0
                                                                                                          336
                                                                                                                              2
                                                                                                                                       345.789
                                                                                                                                                   1381.644
                      13339.4
                                                                                                          337
                                                                                                                                       355.785
                                                                                                                                                   1381.924
271
       41
                6.0
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                   0.0
                                                                           0.0
                                                                                     0.0
                                                                                                                              3
                      13796.1
                                                                                                                                       365.771
                                                                                                                                                   1382.457
       42
                7.2
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                   0.0
                                                                           0.0
                                                                                     0.0
                                                                                                          338
                                                                                                                              4
                                                                                                                                       375.740
273
        43
                1.8
                       2969.3
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                   0.0
                                                                           0.0
                                                                                     0.0
                                                                                                          339
                                                                                                                                                   1383.243
274
       44
                5.0
                       6609.1
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                   0.0
                                                                           0.0
                                                                                     0.0
                                                                                                          340
                                                                                                                              6
                                                                                                                                       385.686
                                                                                                                                                   1384.281
275
        45
                       272.5
                                  0.0
                                                                   0.0
                                                                                                          341
                                                                                                                              7
                                                                                                                                       395.603
                                                                                                                                                   1385.572
                0.3
                                          0.0
                                                    0.
                                                            0.
                                                                           0.0
                                                                                     0.0
276
       46
                6.9
                       3479.5
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                   0.0
                                                                           0.0
                                                                                     0.0
                                                                                                          342
                                                                                                                              8
                                                                                                                                       405.483
                                                                                                                                                   1387.114
277
       47
                                                                                                          343
                                                                                                                              9
                                                                                                                                       415.321
                                                                                                                                                   1388.906
                0.2
                          3.4
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                   0.0
                                                                           0.0
                                                                                     0.0
278
                                                                                                          344
                                                                                                                             10
                                                                                                                                       425.111
                                                                                                                                                   1390.946
                Failure Surface Specified By 33 Coordinate Points
                                                                                                          345
                                                                                                                                       434.845
                                                                                                                                                   1393.235
279
                                                                                                                             11
280
                                                                                                          346
                                                                                                                             12
                                                                                                                                       444.519
                                                                                                                                                   1395.769
                                                                                                          347
                                                                                                                                       454.125
                                                                                                                                                   1398.548
281
                                                                                                                             13
282
                  Point
                             X-Surf
                                         Y-Surf
                                                                                                          348
                                                                                                                             14
                                                                                                                                       463.657
                                                                                                                                                   1401.570
283
                  No.
                              (ft)
                                          (ft)
                                                                                                          349
                                                                                                                             15
                                                                                                                                       473.110
                                                                                                                                                   1404.833
                                                                                                          350
                                                                                                                                       482.477
                                                                                                                                                    1408.334
284
                                                                                                                             16
                             335.789
                                                                                                          351
                                                                                                                                       491.752
285
                                         1381.618
                                                                                                                             17
                                                                                                                                                   1412.072
                             345.789
                                         1381.518
                                                                                                                                       500.930
                                                                                                                                                   1416.044
286
                   2
                                                                                                          352
                                                                                                                             18
287
                   3
                             355.787
                                         1381.683
                                                                                                          353
                                                                                                                             19
                                                                                                                                       510.004
                                                                                                                                                   1420.247
288
                    4
                             365.778
                                         1382.112
                                                                                                          354
                                                                                                                             20
                                                                                                                                       518.968
                                                                                                                                                   1424.679
289
                             375.754
                                         1382 805
                                                                                                          355
                                                                                                                             21
                                                                                                                                       527.817
                                                                                                                                                   1429 337
290
                             385.708
                                         1383.763
                                                                                                          356
                                                                                                                             22
                                                                                                                                       536.545
                                                                                                                                                   1434.218
                    6
291
                             395.634
                                         1384.983
                                                                                                          357
                                                                                                                             23
                                                                                                                                       545.146
                                                                                                                                                   1439.318
                                         1386.466
                   8
                             405.523
                                                                                                          358
                                                                                                                             24
                                                                                                                                       553.615
                                                                                                                                                   1444.636
292
293
                   9
                             415.370
                                         1388.210
                                                                                                          359
                                                                                                                             25
                                                                                                                                       561.947
                                                                                                                                                   1450.166
294
                             425.167
                                         1390.214
                                                                                                          360
                                                                                                                             26
                                                                                                                                       570.135
                                                                                                                                                   1455 906
                   10
295
                   11
                             434.908
                                         1392.476
                                                                                                          361
                                                                                                                             27
                                                                                                                                       578.176
                                                                                                                                                   1461.852
296
                   12
                             444.585
                                         1394.996
                                                                                                          362
                                                                                                                             28
                                                                                                                                       586.063
                                                                                                                                                   1467.999
297
                   13
                             454.192
                                         1397.771
                                                                                                          363
                                                                                                                             29
                                                                                                                                       593.792
                                                                                                                                                   1474.345
                                         1400.799
298
                   14
                             463.723
                                                                                                          364
                                                                                                                             30
                                                                                                                                       601.357
                                                                                                                                                   1480.885
299
                   15
                             473.170
                                         1404.078
                                                                                                          365
                                                                                                                             31
                                                                                                                                       608.754
                                                                                                                                                   1487.614
300
                   16
                             482.527
                                         1407.606
                                                                                                          366
                                                                                                                             32
                                                                                                                                       615.977
                                                                                                                                                   1494.529
301
                   17
                             491.787
                                         1411.381
                                                                                                          367
                                                                                                                             33
                                                                                                                                       621.072
                                                                                                                                                   1499.660
302
                   18
                             500.944
                                         1415.399
                                                                                                          368
                   19
                             509.992
                                         1419.659
                                                                                                          369
303
                                                                                                                          Circle Center At X = 339.766; Y = 1775.850; and Radius = 394.252
304
                   20
                             518.923
                                         1424.156
                                                                                                          370
                   21
                                         1428.888
305
                             527 733
                                                                                                          371
306
                   22
                             536.414
                                         1433.852
                                                                                                          372
                                                                                                                                 Factor of Safety
                   23
                                         1439.044
                                                                                                          373
                                                                                                                                *** 1.700 ***
307
                             544.960
308
                   24
                             553.367
                                         1444.460
                                                                                                          374
309
                   25
                             561.627
                                         1450.096
                                                                                                          375
310
                   26
                             569.735
                                         1455.950
                                                                                                          376
311
                   27
                             577.685
                                         1462.016
                                                                                                          377
```

```
444.793
378
                Failure Surface Specified By 32 Coordinate Points
                                                                                                        444
                                                                                                                           12
                                                                                                                                                1393.527
379
                                                                                                                                     454.457
                                                                                                        445
                                                                                                                           13
                                                                                                                                                 1396.096
                                                                                                                                     464.054
                                                                                                                                                 1398.907
380
                                                                                                        446
                                                                                                                           14
                                                                                                                                     473.577
                                                                                                                                                 1401.958
381
                 Point
                            X-Surf
                                        Y-Surf
                                                                                                        447
                                                                                                                           15
                                                                                                                                    483.021
                                                                                                                                                1405.248
382
                  No.
                             (ft)
                                         (ft)
                                                                                                        448
                                                                                                                           16
383
                                                                                                        449
                                                                                                                           17
                                                                                                                                    492.378
                                                                                                                                                1408.775
384
                            333.421
                                        1380.374
                                                                                                        450
                                                                                                                           18
                                                                                                                                     501.644
                                                                                                                                                 1412.536
385
                            343.404
                                        1379.800
                                                                                                        451
                                                                                                                           19
                                                                                                                                    510.812
                                                                                                                                                1416.528
                   2
386
                   3
                            353.401
                                        1379.545
                                                                                                        452
                                                                                                                           20
                                                                                                                                    519.877
                                                                                                                                                1420.750
387
                   4
                            363.401
                                        1379.607
                                                                                                        453
                                                                                                                           21
                                                                                                                                    528.833
                                                                                                                                                1425.199
388
                   5
                            373.394
                                        1379.987
                                                                                                        454
                                                                                                                           22
                                                                                                                                     537.674
                                                                                                                                                 1429.872
                            383.369
                                        1380.684
389
                   6
                                                                                                        455
                                                                                                                           23
                                                                                                                                    546.395
                                                                                                                                                 1434.765
390
                            393.318
                                        1381.698
                                                                                                        456
                                                                                                                           24
                                                                                                                                     554.990
                                                                                                                                                 1439.876
                   7
391
                            403.229
                                        1383.027
                                                                                                        457
                                                                                                                           25
                                                                                                                                    563.454
                                                                                                                                                1445.202
                   8
                            413.093
                                        1384.670
                                                                                                                                     571.781
                                                                                                                                                1450.740
392
                   9
                                                                                                        458
                                                                                                                           26
                            422.900
                                        1386.627
                                                                                                        459
                                                                                                                                    579.966
                                                                                                                                                1456.484
393
                  10
                                                                                                                           2.7
                  11
                            432.640
                                        1388.893
                                                                                                        460
                                                                                                                                     588.004
                                                                                                                                                 1462.433
394
                                                                                                                           28
                            442.302
                                        1391.469
                                                                                                                                    595.890
                                                                                                                                                1468.583
395
                  12
                                                                                                        461
                                                                                                                           29
396
                  13
                            451.878
                                        1394.349
                                                                                                        462
                                                                                                                           30
                                                                                                                                    603.619
                                                                                                                                                1474.928
397
                  14
                            461.358
                                        1397.533
                                                                                                        463
                                                                                                                           31
                                                                                                                                     611.185
                                                                                                                                                 1481.466
                  15
                            470.732
                                        1401.016
                                                                                                        464
                                                                                                                           32
                                                                                                                                    618.585
                                                                                                                                                1488.193
398
399
                  16
                            479.990
                                        1404.796
                                                                                                        465
                                                                                                                           33
                                                                                                                                     625.813
                                                                                                                                                 1495.103
400
                  17
                            489.124
                                        1408.868
                                                                                                        466
                                                                                                                           34
                                                                                                                                    629.819
                                                                                                                                                1499.130
401
                  18
                            498.123
                                        1413.227
                                                                                                        467
                                                                                                                        Circle Center At X = 347.563; Y = 1778.764; and Radius = 397.320
402
                  19
                            506.980
                                        1417.871
                                                                                                        468
403
                  20
                            515.684
                                        1422.794
                                                                                                        469
                  21
                            524.228
                                        1427.990
                                                                                                        470
404
                  22
                            532.602
                                        1433.456
                                                                                                                              Factor of Safety
405
                                                                                                        471
                                                                                                                              *** 1.701 ***
406
                  23
                            540.798
                                        1439.185
                                                                                                        472
407
                  24
                            548.808
                                        1445.172
                                                                                                        473
408
                  25
                            556.624
                                        1451.410
                                                                                                        474
                                        1457.893
409
                  26
                            564.238
                                                                                                        475
410
                  27
                            571.642
                                        1464.615
                                                                                                        476
                  28
                            578.828
                                        1471.568
                                                                                                        477
                                                                                                                        Failure Surface Specified By 33 Coordinate Points
411
412
                  29
                            585.790
                                        1478.747
                                                                                                        478
                  30
                            592.520
                                        1486.143
                                                                                                        479
413
414
                  31
                            599.012
                                        1493.749
                                                                                                        480
                                                                                                                          Point
                                                                                                                                    X-Surf
                                                                                                                                                 Y-Surf
415
                  32
                            604.813
                                        1501.000
                                                                                                        481
                                                                                                                           No.
                                                                                                                                     (ft)
                                                                                                                                                 (ft)
                                                                                                        482
416
                                                                                                                                    335.789
417
               Circle Center At X = 356.455; Y = 1694.159; and Radius = 314.630
                                                                                                        483
                                                                                                                                                 1381.618
                                                                                                                                    345.789
                                                                                                                                                 1381.537
418
                                                                                                        484
                                                                                                                           2
419
                                                                                                        485
                                                                                                                           3
                                                                                                                                    355.787
                                                                                                                                                 1381.715
420
                                                                                                        486
                                                                                                                           4
                                                                                                                                     365.778
                                                                                                                                                 1382.150
                      Factor of Safety
421
                     *** 1.701 ***
                                                                                                        487
                                                                                                                           5
                                                                                                                                    375.754
                                                                                                                                                1382 843
422
                                                                                                        488
                                                                                                                           6
                                                                                                                                    385.709
                                                                                                                                                1383.793
423
                                                                                                        489
                                                                                                                                    395.636
                                                                                                                                                 1384.999
                                                                                                        490
                                                                                                                           8
                                                                                                                                                 1386.461
                                                                                                                                    405.528
424
425
                                                                                                        491
                                                                                                                           9
                                                                                                                                    415.380
                                                                                                                                                 1388.178
                                                                                                        492
                                                                                                                           1.0
                                                                                                                                    425.184
                                                                                                                                                1390.149
426
427
                Failure Surface Specified By 34 Coordinate Points
                                                                                                        493
                                                                                                                           11
                                                                                                                                    434.933
                                                                                                                                                 1392.372
428
                                                                                                        494
                                                                                                                           12
                                                                                                                                    444.622
                                                                                                                                                 1394.846
429
                                                                                                        495
                                                                                                                           13
                                                                                                                                     454.245
                                                                                                                                                 1397.569
                                                                                                                                    463.793
                 Point
                            X-Surf
                                        Y-Surf
430
                                                                                                        496
                                                                                                                           14
                                                                                                                                                1400.540
431
                  No.
                             (ft)
                                         (ft)
                                                                                                        497
                                                                                                                           15
                                                                                                                                    473.262
                                                                                                                                                1403.755
432
                                                                                                        498
                                                                                                                           16
                                                                                                                                    482.645
                                                                                                                                                 1407.214
433
                            335.789
                                        1381.618
                                                                                                        499
                                                                                                                           17
                                                                                                                                     491.935
                                                                                                                                                 1410.914
                   1
                            345.788
                                        1381.448
434
                   2
                                                                                                        500
                                                                                                                           18
                                                                                                                                    501.127
                                                                                                                                                1414.853
435
                            355.788
                                        1381.530
                                                                                                        501
                                                                                                                           19
                                                                                                                                    510.214
                                                                                                                                                1419.027
                   3
436
                            365.782
                                        1381.864
                                                                                                        502
                                                                                                                           20
                                                                                                                                    519.190
                                                                                                                                                1423.435
                                        1382.449
                                                                                                        503
                                                                                                                                     528.050
                                                                                                                                                1428.072
437
                   5
                            375 765
                                                                                                                           21
438
                            385.730
                                        1383.284
                                                                                                        504
                                                                                                                           22
                                                                                                                                    536.787
                                                                                                                                                1432.937
                            395.671
                                        1384.370
                                                                                                        505
                                                                                                                                    545.395
                                                                                                                                                1438.025
439
                                                                                                                           23
440
                   8
                            405.581
                                        1385.706
                                                                                                        506
                                                                                                                           24
                                                                                                                                     553.870
                                                                                                                                                 1443.334
441
                   9
                            415.455
                                        1387.291
                                                                                                        507
                                                                                                                           25
                                                                                                                                    562.204
                                                                                                                                                 1448.860
442
                  10
                             425.285
                                        1389.123
                                                                                                        508
                                                                                                                           26
                                                                                                                                     570.394
                                                                                                                                                 1454.599
443
                  11
                            435.067
                                        1391.203
                                                                                                        509
                                                                                                                           27
                                                                                                                                    578.432
                                                                                                                                                1460.548
```

```
510
                  28
                            586.314
                                        1466.701
                                                                                                       576
                                                                                                                       Failure Surface Specified By 34 Coordinate Points
                            594.035
                                        1473.057
511
                  29
                                                                                                       577
                                        1479.609
512
                  30
                            601.589
                                                                                                       578
                                        1486.354
513
                  31
                            608.972
                                                                                                       579
                                                                                                                         Point
                                                                                                                                   X-Surf
                                                                                                                                               Y-Surf
                  32
                            616.178
                                        1493.287
514
                                                                                                       580
                                                                                                                          No.
                                                                                                                                    (ft)
                                                                                                                                                (ft)
515
                  33
                            622.348
                                        1499.538
                                                                                                       581
516
                                                                                                       582
                                                                                                                                    316.842
                                                                                                                                               1377.000
               Circle Center At X = 343.920; Y = 1769.051; and Radius = 387.518
                                                                                                       583
                                                                                                                                    326.801
                                                                                                                                               1376.094
517
                                                                                                                          2
518
                                                                                                       584
                                                                                                                          3
                                                                                                                                   336.783
                                                                                                                                               1375.499
519
                                                                                                       585
                                                                                                                          4
                                                                                                                                   346.779
                                                                                                                                               1375.217
520
                      Factor of Safety
                                                                                                       586
                                                                                                                                    356.779
                                                                                                                                               1375.248
                     *** 1.702 ***
521
                                                                                                       587
                                                                                                                          6
                                                                                                                                   366.773
                                                                                                                                               1375.591
522
                                                                                                       588
                                                                                                                                   376.752
                                                                                                                                                1376.246
                                                                                                       589
                                                                                                                                   386.705
                                                                                                                                               1377.213
523
                                                                                                                          8
                                                                                                                                               1378.491
524
                                                                                                       590
                                                                                                                                   396.623
    1
                                                                                                       591
                                                                                                                                               1380.078
525
                                                                                                                          10
                                                                                                                                   406.496
                                                                                                                                   416.315
                                                                                                                                               1381.973
526
                                                                                                       592
                                                                                                                          11
                                                                                                                                   426.070
527
               Failure Surface Specified By 33 Coordinate Points
                                                                                                       593
                                                                                                                          12
                                                                                                                                               1384.174
528
                                                                                                       594
                                                                                                                          13
                                                                                                                                   435.751
                                                                                                                                               1386.679
529
                                                                                                       595
                                                                                                                          14
                                                                                                                                   445.349
                                                                                                                                               1389.486
                 Point
                            X-Surf
                                        Y-Surf
                                                                                                       596
                                                                                                                          15
                                                                                                                                   454.855
                                                                                                                                               1392.591
530
531
                  No.
                             (ft)
                                         (ft)
                                                                                                       597
                                                                                                                          16
                                                                                                                                   464.259
                                                                                                                                               1395.992
532
                                                                                                       598
                                                                                                                          17
                                                                                                                                   473.552
                                                                                                                                               1399.685
533
                            335.789
                                        1381.618
                                                                                                       599
                                                                                                                          18
                                                                                                                                    482.725
                                                                                                                                               1403.667
                                        1381.040
534
                   2
                            345.773
                                                                                                       600
                                                                                                                          19
                                                                                                                                   491.769
                                                                                                                                               1407.934
                            355.769
                                        1380.765
                                                                                                       601
                                                                                                                          20
                                                                                                                                   500.675
                                                                                                                                               1412.481
535
                   3
                            365.769
                                        1380.792
                                                                                                                                   509.435
                                                                                                                                               1417.305
536
                   4
                                                                                                       602
                                                                                                                          21
                            375.763
                                        1381.122
                                                                                                                                   518.039
                                                                                                                                               1422,400
537
                   5
                                                                                                       603
                                                                                                                          22
538
                   6
                            385.743
                                        1381.754
                                                                                                       604
                                                                                                                          23
                                                                                                                                   526.480
                                                                                                                                               1427.762
539
                   7
                            395.700
                                        1382.687
                                                                                                       605
                                                                                                                          24
                                                                                                                                   534.750
                                                                                                                                               1433.385
540
                   8
                            405.623
                                        1383.921
                                                                                                       606
                                                                                                                          25
                                                                                                                                   542.839
                                                                                                                                               1439.263
541
                   9
                            415.505
                                        1385.455
                                                                                                       607
                                                                                                                          26
                                                                                                                                   550.741
                                                                                                                                               1445.392
542
                  10
                            425.336
                                        1387.287
                                                                                                       608
                                                                                                                          27
                                                                                                                                   558.447
                                                                                                                                               1451.765
                  11
                            435.107
                                        1389.415
                                                                                                       609
                                                                                                                                   565.951
                                                                                                                                               1458.375
543
                                                                                                                          28
544
                  12
                            444.808
                                        1391.839
                                                                                                       610
                                                                                                                          29
                                                                                                                                   573.244
                                                                                                                                               1465.217
545
                  13
                            454.433
                                        1394.554
                                                                                                       611
                                                                                                                          3.0
                                                                                                                                   580.319
                                                                                                                                               1472.284
546
                  14
                            463.970
                                        1397.560
                                                                                                       612
                                                                                                                          31
                                                                                                                                    587.170
                                                                                                                                               1479.568
547
                  15
                            473.413
                                        1400.852
                                                                                                       613
                                                                                                                          32
                                                                                                                                   593.790
                                                                                                                                               1487.063
                  16
                            482.751
                                        1404.429
                                                                                                       614
                                                                                                                          33
                                                                                                                                    600.173
                                                                                                                                               1494.762
548
                  17
                            491.977
                                        1408.287
549
                                                                                                       615
                                                                                                                          34
                                                                                                                                   605.024
                                                                                                                                               1501.000
                  18
                            501.082
                                        1412.422
550
                                                                                                       616
551
                  19
                            510.058
                                        1416.830
                                                                                                       617
                                                                                                                       Circle Center At X = 350.818; Y = 1694.912; and Radius = 319.723
                                        1421.508
552
                  20
                            518.896
                                                                                                       618
553
                  21
                            527.589
                                        1426.452
                                                                                                       619
554
                  22
                            536.128
                                        1431.656
                                                                                                       620
                                                                                                                             Factor of Safety
555
                  23
                            544.506
                                        1437.116
                                                                                                       621
                                                                                                                             *** 1.705 ***
                            552.715
                                        1442.827
                  24
                                                                                                       622
556
557
                  25
                            560.747
                                        1448.783
                                                                                                       623
558
                  26
                            568.596
                                        1454.980
                                                                                                       624
559
                  27
                            576.253
                                        1461.411
                                                                                                       625 1
560
                  28
                            583.713
                                        1468.072
                                                                                                       626
561
                  29
                            590.967
                                        1474.954
                                                                                                       627
                                                                                                                       Failure Surface Specified By 35 Coordinate Points
                                        1482.053
562
                  30
                            598.010
                                                                                                       628
563
                  31
                            604.835
                                        1489.362
                                                                                                       629
564
                  32
                            611.436
                                        1496.874
                                                                                                       630
                                                                                                                         Point
                                                                                                                                   X-Surf
                                                                                                                                               Y-Surf
565
                  33
                            614.273
                                        1500.307
                                                                                                       631
                                                                                                                         No.
                                                                                                                                    (ft)
                                                                                                                                                (ft)
566
                                                                                                       632
567
               Circle Center At X = 359.874; Y = 1711.263; and Radius = 330.523
                                                                                                       633
                                                                                                                                   316.842
                                                                                                                                               1377.000
                                                                                                                          - 1
568
                                                                                                       634
                                                                                                                                   326.796
                                                                                                                                               1376.046
569
                                                                                                                                    336.776
                                                                                                                                               1375,401
                                                                                                       635
                                                                                                                          3
570
                      Factor of Safety
                                                                                                       636
                                                                                                                          4
                                                                                                                                   346.770
                                                                                                                                               1375.063
571
                     *** 1.703 ***
                                                                                                       637
                                                                                                                                   356.770
                                                                                                                                               1375.035
572
                                                                                                       638
                                                                                                                                    366.766
                                                                                                                                               1375.316
573
                                                                                                       639
                                                                                                                          7
                                                                                                                                   376.749
                                                                                                                                               1375.905
574
                                                                                                       640
                                                                                                                          8
                                                                                                                                    386.708
                                                                                                                                                1376.802
575
                                                                                                       641
                                                                                                                                   396.635
                                                                                                                                               1378.006
```

```
642
                  10
                           406.521
                                      1379.517
                           416.355
                                      1381.332
643
                  11
644
                  12
                            426.128
                                       1383.450
645
                  13
                            435.831
                                       1385.868
                           445.455
646
                  14
                                       1388.586
647
                           454.990
                                       1391.599
                  15
648
                  16
                           464.427
                                       1394.905
                  17
649
                           473.758
                                       1398.501
650
                  18
                           482.974
                                       1402.384
651
                  19
                           492.065
                                       1406.550
652
                  20
                           501.023
                                       1410.994
653
                  21
                           509.840
                                       1415.713
654
                  22
                           518.507
                                       1420.702
                  23
                           527.015
                                       1425.956
655
                           535.357
                                       1431.470
656
                  24
                  25
657
                           543.525
                                       1437.240
                  26
                           551.511
                                       1443.259
658
659
                  27
                           559.307
                                       1449.522
                           566.905
                                       1456.022
660
                  28
661
                  29
                           574.300
                                       1462.754
                  30
662
                           581.483
                                       1469.712
663
                  31
                           588.447
                                       1476.888
664
                  32
                           595.187
                                       1484.275
665
                  33
                           601.695
                                       1491.868
666
                  34
                           607.966
                                       1499.657
667
                  35
                           608.847
                                       1500.824
668
               Circle Center At X = 352.687; Y = 1698.738; and Radius = 323.729
669
670
671
672
                     Factor of Safety
673
                     *** 1.705 ***
674
675
676
677
678
               Failure Surface Specified By 32 Coordinate Points
679
680
681
                 Point
                           X-Surf
                                       Y-Surf
                            (ft)
682
                 No.
                                        (ft)
683
684
                  1
                           345.263
                                       1386.596
685
                  2
                           355.261
                                       1386.389
686
                           365.261
                                       1386.460
                  3
687
                           375.254
                                       1386.809
                                       1387.435
688
                  5
                           385.235
689
                   6
                           395.194
                                       1388.338
                           405.124
                                       1389.517
690
691
                  8
                           415.018
                                       1390.971
692
                  9
                           424.868
                                       1392.699
693
                  10
                           434.665
                                       1394.700
694
                  11
                           444.404
                                       1396.973
695
                  12
                           454.075
                                       1399.515
696
                  13
                           463.672
                                       1402.324
697
                  14
                           473.188
                                       1405.399
698
                  15
                           482.614
                                       1408.737
699
                           491.945
                                       1412.335
                  16
700
                  17
                           501.171
                                       1416.191
                  18
                           510 287
                                       1420.302
                  19
                           519.286
                                       1424.664
703
                                       1429.274
                  20
                           528.160
704
                  21
                           536.902
                                       1434.129
705
                  22
                           545.506
                                       1439.224
706
                  23
                            553.966
                                       1444.557
707
                  24
                           562.274
                                       1450.123
```

```
708
                  25
                           570.424
                                       1455.917
                           578.411
709
                  26
                                       1461.935
                  27
                           586.227
                                       1468.172
711
                  28
                           593.867
                                       1474.624
712
                  29
                           601.325
                                       1481.286
713
                  30
                           608.595
                                       1488.152
714
                  31
                           615.672
                                       1495.217
715
                  32
                           619.980
                                       1499.764
716
717
               Circle Center At X = 357.735; Y = 1746.344; and Radius = 359.965
718
719
                     Factor of Safety
721
                     *** 1.706 ***
722
723
724
725
726
727
                        **** END OF GSTABL7 OUTPUT ****
728
```

Bouquet Canyon/21095-01/Section V-V'/ Seismic

z:\2021\21095-01 integral - bouquet canyon\engineering\slope stability\1. included in reports\2022_04_xx grading plan review letter\1. all files\xvc2e.pl2 Run By: LGC Geotechnical, Inc. 4/5/2022 10:06/ # FS Soil Soil Saturated Cohesion Friction Pore Pressure Piez. Load Value Desc. Type Unit Wt. Unit Wt. Intercept Angle Pressure Constant Surface No. (pcf) (pcf) (psf) (deg) Param. (psf) No. af 1 120.0 120.0 375.0 28.0 0.00 0.0 0 0.150(g) 0.150(g)< Peak(A) kh Coef. c 1.21 d 1.22 Qal 120.0 120.0 100.0 28.0 0.00 0.0 0 0.0 120.0 0.00 0 120.0 Aniso Aniso f 1.22 g 1.22 h_1.22 1680 i 1.22 1580 1480 1380 1280 529 129 229 329 429 629 729 829 GSTABL7 v.2 FSmin=1.21

GSTABL7 v.2 FSmin=1.21
Safety Factors Are Calculated By The Modified Bishop Method

| 1 | | *** GSTABL7 *** | 48 | 1 | 129.00 | 1368.00 | 164.00 | 1380.0 | | 1 |
|----------|--|---|------------|------------------|-----------------|---------------|-------------|----------|----------|---------|
| 2 | | | 49 | 2 | 164.00 | 1380.00 | 252.00 | 1380.0 | | 1 |
| 3 | ** GSTABL | 7 by Dr. Garry H. Gregory, Ph.D., P.E., D.GE ** | 50 | 3 | 252.00 | 1380.00 | 252.10 | 1377.0 | 0 | 1 |
| 4 | | | 51 | 4 | 252.10 | 1377.00 | 327.00 | 1377.0 | 0 | 1 |
| 5 | ** Original Version | 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 ** | 52 | 5 | 327.00 | 1377.00 | 386.00 | 1408.0 | 0 | 1 |
| 6 | (All Ri | ghts Reserved-Unauthorized Use Prohibited) | 53 | 6 | 386.00 | 1408.00 | 397.00 | 1408.0 | 0 | 1 |
| 7 | | | 54 | 7 | 397.00 | 1408.00 | 438.00 | 1427.0 | 0 | 1 |
| 8 | | | 55 | 8 | 438.00 | 1427.00 | 448.00 | 1427.0 | 0 | 1 |
| 9 | | | 56 | 9 | 448.00 | 1427.00 | 495.00 | 1450.0 | 0 | 1 |
| | ************ | **************** | 57 | 10 | 495.00 | 1450.00 | 505.00 | 1460.0 | 0 | 1 |
| | ** | | 58 | 11 | 505.00 | 1460.00 | 511.00 | 1460.0 | 0 | 1 |
| 10 | SL | OPE STABILITY ANALYSIS SYSTEM | 59 | 12 | 511.00 | 1460.00 | 520.00 | 1460.0 | 0 | 1 |
| 11 | Modified Bishop | , Simplified Janbu, or GLE Method of Slices. | 60 | 13 | 520.00 | 1460.00 | 538.00 | 1473.0 | 0 | 3 |
| 12 | (Includes Spenc | er & Morgenstern-Price Type Analysis) | 61 | 14 | 538.00 | 1473.00 | 560.00 | 1482.0 | 0 | 3 |
| 13 | Including Pier/ | Pile, Reinforcement, Soil Nail, Tieback, | 62 | 15 | 560.00 | 1482.00 | 587.00 | 1493.0 | 0 | 3 |
| 14 | Nonlinear Undra | ined Shear Strength, Curved Phi Envelope, | 63 | 16 | 587.00 | 1493.00 | 602.00 | 1501.0 | 0 | 3 |
| 15 | Anisotropic Soi | l, Fiber-Reinforced Soil, Boundary Loads, Water | 64 | 17 | 602.00 | 1501.00 | 607.00 | 1501.0 | 0 | 3 |
| 16 | Surfaces, Pseud | o-Static & Newmark Earthquake, and Applied Forces. | 65 | 18 | 607.00 | 1501.00 | 628.00 | 1499.0 | 0 | 3 |
| 17 | | | 66 | 19 | 628.00 | 1499.00 | 642.00 | 1500.0 | 0 | 3 |
| | | *************** | 67 | 20 | 642.00 | 1500.00 | 692.00 | 1491.0 | 0 | 3 |
| | ** | | 68 | 21 | 692.00 | 1491.00 | 774.00 | 1460.0 | | 3 |
| 18 | | | 69 | 22 | 129.00 | 1368.00 | 168.00 | 1341.0 | | 2 |
| 19 | | | 70 | 23 | 168.00 | 1341.00 | 313.00 | 1354.0 | | 2 |
| 20 | Analysis Run Date: | 4/5/2022 | 71 | 24 | 313.00 | 1354.00 | 360.00 | 1372.0 | | 3 |
| 21 | Time of Run: | 10:06AM | 72 | 25 | 360.00 | 1372.00 | 395.00 | 1372.0 | | 3 |
| 22 | Run By: | LGC Geotechnical, | 73 | 26 | 395.00 | 1372.00 | 520.00 | 1460.0 | | 3 |
| | Inc. | | 74 | 27 | 129.00 | 1323.00 | 181.00 | 1330.0 | | 3 |
| | | | 75 | 28 | 181.00 | 1330.00 | 313.00 | 1354.0 | 0 | 3 |
| 0.0 | | = \0001\0100F 01 = | 76 | | c. 1 o . | | 000 0045 | | | |
| 23 | Input Data Filename: Canyon\Engineering\slo | | 77 78 | _ | fied Y-Orig | | .280.00(ft) | | | |
| | V-V'\2022_04_05\xvc2e. | in | 79 80 | | Plus Value | | | | | |
| 0.4 | Outroot Billians | T.\0001\01005 01 Tuberral December | 81 82 1 | Default Y- | Plus Value | = 0.00(ft) | | | | |
| 24 | Output Filename: Canyon\Engineering\slo | Z:\2021\21095-01 Integral - Bouquet | 82 1 | | | | | | | |
| | V-V'\2022_04_05\xvc2e. | | 84 | | | | | | | |
| | V=V*\2022_04_03\xvc2e• | 501 | 85 | ISOTROPIC S | OTT DADAMET | FDC | | | | |
| | | | 86 | IDOIROFIC D | OID FAKAMEI | EKS | | | | |
| 25 | Unit System: | English | 87 | | | | | | | |
| 26 | onic by beem. | 21.51.1011 | 88 | 3 Type(s) | of Soil | | | | | |
| 27 | Plotted Output Filenam | e: Z:\2021\21095-01 Integral - Bouquet | 89 | | | | | | | |
| | Canyon\Engineering\slo | | 90 | | | | | | | |
| | V-V'\2022 04 05\xvc2e. | | 91 | Soil Tota | l Saturate | d Cohesior | Friction | Pore | Pressure | Piez. |
| | | | 92 | Type Unit | Wt. Unit Wt | . Intercept | . Angle I | Pressure | Constant | Surface |
| | | | 93 | No. (pcf |) (pcf) | (psf) | (deg) | Param. | (psf) | No. |
| 28 | | | 94 | | | | | | | |
| 29 | | | 95 | 1 120. | | 375.0 | 28.0 | 0.00 | 0.0 | 0 |
| 30 | | | 96 | 2 120. | | 100.0 | 28.0 | 0.00 | 0.0 | 0 |
| 31 | | | 97 | 3 120. | 0 120.0 | 250.0 | 32.0 | 0.00 | 0.0 | 0 |
| 32 | | | 98 | | | | | | | |
| 33 | | Bouquet Canyon/21095-01/Section V-V'/ | 99 | | | | | | | |
| 34 | | Seismic | 100 | **************** | CERTIFICATION D | 3 D 3 MEMEE C | | | | |
| 35 36 | | | 101 102 | ANISOTROPIC | | ARAMETERS | | | | |
| 37 | | | 103 | 1 8011 | type(s) | | | | | |
| 38 | | | 104 | | | | | | | |
| 39 | BOUNDARY COORDINATES | | 104 | Soil Time | 3 Is Aniso | tronic | | | | |
| 40 | DOUDDEL COOKDINATED | | 106 | SOII TYPE | 2 to MILLSO | CIOPIC | | | | |
| 41 | 21 Top Boundaries | | 107 | Number Of | Direction R | anges Speci | fied = 3 | | | |
| 42 | 28 Total Boundaries | | 108 | TAMBET OF | | 500 00001 | | | | |
| 43 | | | 109 | | | | | | | |
| 44 | | | 110 | Direction | Counterc | lockwise | Cohesion | Fric | tion | |
| 45 | Boundary X-Left | Y-Left X-Right Y-Right Soil Type | 111 | Range | | on Limit | Intercept | | gle | |
| 46 | No. (ft) | (ft) (ft) (ft) Below Bnd | 112 | No. | (de | g) | (psf) | | eg) | |
| 47 | | | 113 | | | | | | | |
| | | | | | | | | | | |
| | | | 1 | | | | | | | |

```
32.00
114
                   1
                                  10.0
                                                  250.00
115
                   2
                                  15.0
                                                  150.00
                                                                  25.00
                                  90.0
                                                  250.00
116
                   3
                                                                  32.00
117
               ANISOTROPIC SOIL NOTES:
118
119
                  (1) An input value of 0.01 for C and/or Phi will cause Aniso
120
                      C and/or Phi to be ignored in that range.
                  (2) An input value of 0.02 for Phi will set both Phi and
122
                      C equal to zero, with no water weight in the tension crack.
123
                  (3) An input value of 0.03 for Phi will set both Phi and
124
                      C equal to zero, with water weight in the tension crack.
125
126
127
                Specified Peak Ground Acceleration Coefficient (A) = 0.150(g)
                Specified Horizontal Earthquake Coefficient (kh) = 0.150(q)
128
                Specified Vertical Earthquake Coefficient (kv) = 0.000(g)
129
130
131
                Specified Seismic Pore-Pressure Factor = 0.000
132 1
133
134
135
               A Critical Failure Surface Searching Method, Using A Random
136
               Technique For Generating Circular Surfaces, Has Been Specified.
137
138
139
                4980 Trial Surfaces Have Been Generated.
140
141
                249 Surface(s) Initiate(s) From Each Of 20 Points Equally Spaced
142
143
                Along The Ground Surface Between X = 305.00(ft)
144
                                           and X = 350.00(ft)
145
146
147
                Each Surface Terminates Between X = 505.00(ft)
148
                                           and X = 655.00(ft)
149
150
151
               Unless Further Limitations Were Imposed, The Minimum Elevation
                At Which A Surface Extends Is Y =
152
153
154
155
               10.00(ft) Line Segments Define Each Trial Failure Surface.
156
157
158
159
               Following Are Displayed The Ten Most Critical Of The Trial
160
161
                Failure Surfaces Evaluated. They Are
162
               Ordered - Most Critical First.
163
164
165
                * * Safety Factors Are Calculated By The Modified Bishop Method * *
166
167
168
169
               Total Number of Trial Surfaces Attempted = 4980
170
171
               Number of Trial Surfaces With Valid FS = 4980
172
174
                Statistical Data On All Valid FS Values:
175
                  FS Max = 3.048 FS Min = 1.207 FS Ave = 1.740
176
                  Standard Deviation = 0.303 Coefficient of Variation = 17.40 %
177
178
179
               Failure Surface Specified By 34 Coordinate Points
```

| 180 | | | | | | | | | | |
|-----|-------|-------|-----------|-----------|---------|--------|----------|---------|---------|---------|
| 181 | | | | | | | | | | |
| 182 | | Po | int X | -Surf | Y-Sur | f | | | | |
| 183 | | No | ٠. | (ft) | (ft) | | | | | |
| 184 | | | | | , , | | | | | |
| 185 | | | 1 3 | 328.684 | 1377. | 005 | | | | |
| 186 | | | | | | | | | | |
| | | | | 38.682 | 1377. | | | | | |
| 187 | | | | 48.682 | 1377. | | | | | |
| 188 | | | | 358.677 | 1378. | | | | | |
| 189 | | | 5 3 | 868.662 | 1378. | 583 | | | | |
| 190 | | 6 | 5 3 | 78.628 | 1379. | 398 | | | | |
| 191 | | | 7 3 | 888.571 | 1380. | 469 | | | | |
| 192 | | 8 | | 98.483 | 1381. | | | | | |
| 193 | | | | 108.357 | 1383. | | | | | |
| | | | | | | | | | | |
| 194 | | 10 | | 18.188 | 1385. | | | | | |
| 195 | | 13 | | 127.969 | 1387. | | | | | |
| 196 | | 12 | 2 4 | 137.693 | 1389. | 620 | | | | |
| 197 | | 13 | 3 4 | 47.354 | 1392. | 202 | | | | |
| 198 | | 14 | 1 4 | 156.945 | 1395. | 031 | | | | |
| 199 | | 19 | | 66.461 | 1398. | | | | | |
| 200 | | 16 | | 75.895 | 1401. | | | | | |
| | | | | | | | | | | |
| 201 | | 1' | | 85.241 | 1404. | | | | | |
| 202 | | 18 | | 194.492 | 1408. | | | | | |
| 203 | | 19 | 9 5 | 03.643 | 1412. | 809 | | | | |
| 204 | | 20 |) 5 | 12.688 | 1417. | 074 | | | | |
| 205 | | 23 | 1 5 | 21.620 | 1421. | 571 | | | | |
| 206 | | 22 | | 30.434 | 1426. | | | | | |
| 207 | | 23 | | 39.123 | 1431. | | | | | |
| | | | | | | | | | | |
| 208 | | 24 | | 47.683 | 1436. | | | | | |
| 209 | | 25 | 5 5 | 56.108 | 1441. | 800 | | | | |
| 210 | | 26 | 5 5 | 64.392 | 1447. | 402 | | | | |
| 211 | | 2" | 7 5 | 72.529 | 1453. | 214 | | | | |
| 212 | | 28 | | 80.515 | 1459. | | | | | |
| 213 | | 29 | | 88.343 | 1465. | | | | | |
| | | | | | | | | | | |
| 214 | | 30 | | 96.010 | 1471. | | | | | |
| 215 | | 33 | | 03.509 | 1478. | | | | | |
| 216 | | 32 | 2 6 | 10.836 | 1485. | 297 | | | | |
| 217 | | 33 | 3 6 | 17.986 | 1492. | 288 | | | | |
| 218 | | 34 | 4 6 | 24.803 | 1499. | 304 | | | | |
| 219 | | | | | | | | | | |
| 220 | | Circ | le Center | Δ+ Y = | 341 875 | • v = | 1767 514 | • and F | adine = | 389.852 |
| | | CIIC. | re center | AC A = | 341.073 | , | 1707.314 | , and i | auius = | 309.032 |
| 221 | | | | | | | | | | |
| 222 | | | | | | | | | | |
| 223 | | | | of Safe | ty | | | | | |
| 224 | | | *** 1 | .207 | *** | | | | | |
| 225 | | | | | | | | | | |
| 226 | | | | | | | | | | |
| 227 | | | | | | | | | | |
| 228 | | | | | | | | | | |
| | | | | | | | | | | |
| 229 | | | Individua | ıl data (| on the | 47 sli | .ces | | | |
| 230 | | | | | | | | | | |
| 231 | | | | | | | | | | |
| 232 | | | | Water | Water | Tie | Tie | Eartho | guake | |
| 233 | | | | Force | | Force | Force | | _ | charge |
| 234 | Slice | Width | Weight | Top | Bot | Norm | Tan | Hor | Ver | Load |
| 235 | No. | (ft) | | (lbs) | (lbs) | (lbs) | (lbs) | (lbs) | (lbs) | (lbs) |
| | NO. | (11) | (lbs) | (IDS) | (IDS) | (TDS) | (IDS) | (IDS) | (LDS) | (TDS) |
| 236 | | | | | | | | | | |
| 237 | 1 | 10.0 | 3277.2 | 0.0 | | 0. | | | | 0.0 |
| 238 | 2 | 10.0 | 9680.3 | 0.0 | 0.0 | 0. | 0. | 1452.0 | 0.0 | 0.0 |
| 239 | 3 | 10.0 | 15767.4 | 0.0 | 0.0 | 0. | 0. | 2365.1 | 0.0 | 0.0 |
| 240 | 4 | 10.0 | 21522.3 | 0.0 | 0.0 | 0. | | | | 0.0 |
| 241 | 5 | 10.0 | 26931.2 | 0.0 | | 0. | | 4039.7 | | 0.0 |
| 242 | 6 | 7.4 | 23237.2 | 0.0 | 0.0 | 0. | | | | 0.0 |
| 444 | 0 | 7.4 | 43431.4 | 0.0 | 0.0 | U. | υ. | J+0⊃.0 | , 0.0 | 0.0 |

244

245

8

2.6 8536.0

8.4 27278.1

4741.3

1.5

0.0

0.0

0.0

0.0

0.0

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0.

0.

0. 1280.4

0. 4091.7

711.2

0.

0.0

0.0

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0.0

0.0

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1424.624
246
       1.0
                     33643 0
                                  0 0
                                          0 0
                                                    0.
                                                            0. 5046.5
                                                                           0.0
                                                                                    0 0
                                                                                                         312
                                                                                                                            22
                                                                                                                                      530.864
                9 9
247
       11
                3.8
                      13883.4
                                  0.0
                                          0.0
                                                    0.
                                                            0. 2082.5
                                                                           0.0
                                                                                    0.0
                                                                                                         313
                                                                                                                            23
                                                                                                                                      539.605
                                                                                                                                                   1429.482
248
       12
                      22985.3
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                3447.8
                                                                           0.0
                                                                                    0.0
                                                                                                         314
                                                                                                                            24
                                                                                                                                      548.219
                                                                                                                                                   1434.561
249
       13
                9.8
                      39716.6
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                5957.5
                                                                           0.0
                                                                                    0.0
                                                                                                         315
                                                                                                                            25
                                                                                                                                      556.701
                                                                                                                                                   1439.858
250
       14
                9.7
                      42183.4
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                6327.5
                                                                           0.0
                                                                                    0.0
                                                                                                         316
                                                                                                                            26
                                                                                                                                      565.045
                                                                                                                                                  1445.369
                      1374.3
                                                                 206.1
                                                                                                         317
                                                                                                                            2.7
                                                                                                                                      573.246
                                                                                                                                                  1451.091
       15
                0.3
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                           0.0
                                                                                    0.0
252
                      40461.0
                                  0.0
                                          0.0
                                                                6069.2
                                                                                    0.0
                                                                                                         318
                                                                                                                            28
                                                                                                                                      581.299
                                                                                                                                                   1457.020
                                                                 403.7
                                                                                                         319
                                                                                                                            29
                                                                                                                                      589.199
       17
                0.6
                      2691.6
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                           0.0
                                                                                    0.0
                                                                                                                                                   1463.152
254
       18
                8.9
                      38081.4
                                  0.0
                                          0.0
                                                            0.
                                                                5712.2
                                                                           0.0
                                                                                    0.0
                                                                                                         320
                                                                                                                            30
                                                                                                                                      596.939
                                                                                                                                                  1469.483
255
       19
                      42407.4
                                 0 0
                                          0.0
                                                            0. 6361.1
                                                                           0.0
                                                                                    0 0
                                                                                                         321
                                                                                                                            31
                                                                                                                                      604.516
                                                                                                                                                  1476.009
                9 5
                                                    0
256
       20
                9.4
                      43673.7
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                               6551.1
                                                                           0.0
                                                                                    0.0
                                                                                                                            32
                                                                                                                                      611.925
                                                                                                                                                   1482.726
       21
                9 3
                      44563 8
                                  0 0
                                          0.0
                                                    0.
                                                            0.
                                                               6684.6
                                                                           0.0
                                                                                    0 0
                                                                                                         323
                                                                                                                            33
                                                                                                                                      619.160
                                                                                                                                                   1489 629
        22
                      45083.5
                                                            0.
                                                                6762.5
                                                                                                         324
                                                                                                                            34
                                                                                                                                      626.216
                                                                                                                                                   1496.714
258
                9.3
                                  0.0
                                          0.0
                                                    0.
                                                                           0.0
                                                                                    0.0
                      2498.7
                                                                374.8
                                                                                                         325
                                                                                                                            35
259
       23
                0.5
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                           0.0
                                                                                    0.0
                                                                                                                                      628.407
                                                                                                                                                   1499.029
                                                                6754.6
260
       24
                      45030.3
                                  0.0
                                          0.0
                                                            0.
                                                                           0.0
                                                                                    0.0
                                                                                                         326
                8.6
                                                    0.
                                                               1128.4
                                                                                                         327
261
       25
                1.4
                      7522.4
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                           0.0
                                                                                    0.0
                                                                                                                         Circle Center At X = 344.465; Y = 1770.276; and Radius = 392.708
262
       26
                      32498.3
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                4874.7
                                                                           0.0
                                                                                    0.0
                                                                                                         328
                6.0
263
       27
                1.7
                       8773.0
                                  0.0
                                          0.0
                                                    0.
                                                            0. 1316.0
                                                                           0.0
                                                                                    0.0
                                                                                                         329
                      36052.2
                                                            0. 5407.8
                                                                                                         330
264
       2.8
                7.3
                                  0.0
                                          0.0
                                                    0.
                                                                           0.0
                                                                                    0.0
                                                                                                                                Factor of Safety
265
       29
                       7661.8
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                               1149.3
                                                                                    0.0
                                                                                                         331
                                                                                                                               ***
                                                                                                                                     1.211 ***
       3.0
                      42750.9
                                                            0.
                                                               6412.6
                                                                                                         332
266
                8.8
                                 0.0
                                          0.0
                                                    0.
                                                                           0.0
                                                                                    0.0
267
        31
                      37970.5
                                                            0.
                                                                5695.6
                                                                                                         333
                7.6
                                  0.0
                                          0.0
                                                    0.
                                                                           0.0
                                                                                    0.0
268
       32
                      5703.0
                                 0.0
                                                            0.
                                                                855.5
                                                                           0.0
                                                                                    0.0
                                                                                                         334
                1 1
                                          0.0
                                                    0.
269
       33
                8.6
                      42508.6
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                6376.3
                                                                           0.0
                                                                                    0.0
                                                                                                         335
270
       34
                8.4
                      40011.8
                                 0.0
                                          0.0
                                                    0.
                                                            0.
                                                               6001.8
                                                                           0.0
                                                                                    0.0
                                                                                                         336
                      17788.4
                                                                2668.3
                                                                                                         337
271
       35
                3.9
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                           0.0
                                                                                    0.0
                                                                                                                         Failure Surface Specified By 34 Coordinate Points
                                                               2923.1
                                                                                                         338
272
       36
                4.4
                      19487.5
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                           0.0
                                                                                    0.0
273
       37
                8.1
                      34312.2
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                               5146.8
                                                                           0.0
                                                                                    0.0
                                                                                                         339
274
       38
                8.0
                     31150.5
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                               4672.6
                                                                           0.0
                                                                                    0.0
                                                                                                         340
                                                                                                                           Point
                                                                                                                                      X-Surf
                                                                                                                                                   Y-Surf
275
       39
                      23245.0
                                 0.0
                                                            0.
                                                               3486.7
                                                                                                         341
                                                                                                                                       (ft)
                                                                                                                                                   (ft)
                6.5
                                          0.0
                                                    0.
                                                                           0.0
                                                                                    0.0
                                                                                                                            No.
276
        40
                1.3
                       4583.3
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                 687.5
                                                                           0.0
                                                                                    0.0
                                                                                                         342
277
       41
                7.7
                      24926.4
                                                                3739.0
                                                                                                         343
                                                                                                                                      333.421
                                                                                                                                                   1380.374
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                                           0.0
                                                                                    0.0
278
        42
                6.0
                      17888.2
                                  0.0
                                          0.0
                                                    0.
                                                            0.
                                                               2683.2
                                                                           0.0
                                                                                    0.0
                                                                                                         344
                                                                                                                             2
                                                                                                                                      343.415
                                                                                                                                                   1380.042
                                                                                                                                      353.415
                                                                                                                                                   1379.976
279
       43
                1 5
                       4195.6
                                  0 0
                                          0.0
                                                    0.
                                                            0.
                                                                 629.3
                                                                           0.0
                                                                                    0 0
                                                                                                         345
                                                                                                                             3
                       8750.7
                                  0.0
                                          0.0
                                                                1312.6
                                                                                    0.0
                                                                                                         346
                                                                                                                             4
                                                                                                                                      363.413
                                                                                                                                                   1380.175
280
       44
                3.5
                                                                           0.0
                       7963.8
                                                               1194.6
                                                                                                         347
                                                                                                                                      373.402
                                                                                                                                                  1380.639
281
       45
                3.8
                                  0 0
                                          0.0
                                                    0.
                                                            0.
                                                                           0.0
                                                                                    0 0
                                                                                                                             5
282
        46
                7.2
                       9868.6
                                  0.0
                                          0.0
                                                    0.
                                                            0. 1480.3
                                                                           0.0
                                                                                    0.0
                                                                                                         348
                                                                                                                                      383.376
                                                                                                                                                   1381.368
283
       47
                6.8
                       3135.5
                                 0.0
                                          0.0
                                                            0.
                                                                 470.3
                                                                           0.0
                                                                                    0.0
                                                                                                         349
                                                                                                                             7
                                                                                                                                      393.326
                                                                                                                                                   1382.361
                                                                                                         350
                                                                                                                                      403.247
                                                                                                                                                   1383.617
284
                                                                                                                             8
                                                                                                         351
285
                Failure Surface Specified By 35 Coordinate Points
                                                                                                                             q
                                                                                                                                      413.131
                                                                                                                                                  1385.136
                                                                                                                                      422.971
286
                                                                                                         352
                                                                                                                            10
                                                                                                                                                   1386.917
287
                                                                                                         353
                                                                                                                            11
                                                                                                                                      432.761
                                                                                                                                                   1388.958
288
                  Point
                             X-Surf
                                         Y-Surf
                                                                                                         354
                                                                                                                            12
                                                                                                                                      442.493
                                                                                                                                                   1391.258
289
                  No.
                             (ft)
                                          (ft)
                                                                                                         355
                                                                                                                            13
                                                                                                                                      452.160
                                                                                                                                                   1393.815
290
                                                                                                         356
                                                                                                                            14
                                                                                                                                      461.757
                                                                                                                                                  1396.628
291
                             328.684
                                         1377.885
                                                                                                         357
                                                                                                                            15
                                                                                                                                      471.275
                                                                                                                                                   1399.694
                             338.680
                   2
                                         1377.610
                                                                                                         358
                                                                                                                                      480.709
                                                                                                                                                   1403.012
292
                                                                                                                            16
```

360

361

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1.8

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23

24

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29

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31

32

33

34

490.051

499.295

508.436

517.465

526.377

535.166

543.825

552.349

560.730

568,965

577.045

584.967

592.724

600.312

607.723

614.954

622.000

625.994

1406.578

1410 391

1414.448

1418.746

1423.282

1428.052

1433.054

1438.284

1443.738

1449.412

1455.303

1461.406

1467.716

1474.231

1480.944

1487.851

1494.948

1499.191

293

294

295

296

297

298

299

300

301

302

303

304

305

306

307

308

309

310

311

348.680

358.678

368.666

378.638

388.588

398.510

408.396

418.241

428.039

437.782

447.464

457.080

466 623

476.086

485.464

494.751

503.940

513.026

522.003

4

8

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14

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16

17

18

19

20

21

1377.590

1377.825

1378.314

1379.057

1380.054

1381.304

1382.806

1384.560

1386.563

1388.816

1391.315

1394.061

1397.050

1400.282

1403.753

1407.462

1411.406

1415.583

1419.990

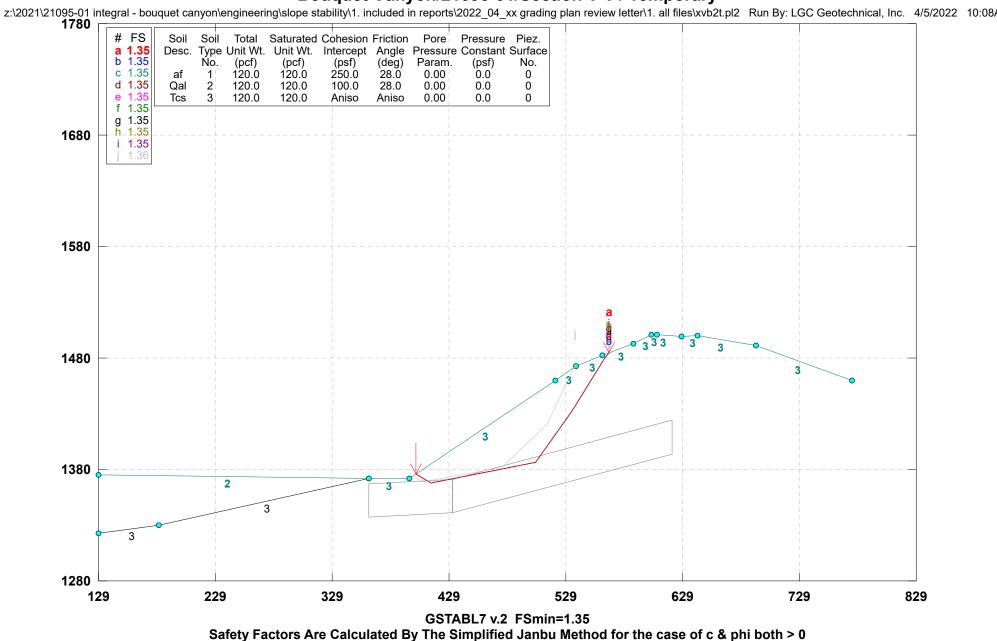
```
378
               Circle Center At X = 350.942; Y = 1756.851; and Radius = 376.885
                                                                                                       444
                                                                                                                                   328.684
                                                                                                                                              1377 885
379
                                                                                                       445
                                                                                                                          2
                                                                                                                                   338.684
                                                                                                                                               1377.931
380
                                                                                                       446
                                                                                                                                   348.680
                                                                                                                                               1378.227
381
                      Factor of Safety
                                                                                                       447
                                                                                                                          4
                                                                                                                                   358.665
                                                                                                                                               1378.771
382
                      *** 1.211 ***
                                                                                                       448
                                                                                                                          5
                                                                                                                                   368.633
                                                                                                                                               1379.565
383
                                                                                                      449
                                                                                                                                   378.579
                                                                                                                                               1380.607
                                                                                                                          6
384
                                                                                                       450
                                                                                                                                   388.495
                                                                                                                                               1381.897
                                                                                                       451
                                                                                                                          8
                                                                                                                                   398.376
                                                                                                                                               1383.433
385
386
                                                                                                       452
                                                                                                                          9
                                                                                                                                   408.216
                                                                                                                                               1385.216
387
               Failure Surface Specified By 34 Coordinate Points
                                                                                                       453
                                                                                                                         1.0
                                                                                                                                   418.009
                                                                                                                                               1387.243
388
                                                                                                       454
                                                                                                                         11
                                                                                                                                   427.747
                                                                                                                                               1389.515
389
                                                                                                       455
                                                                                                                         12
                                                                                                                                   437.426
                                                                                                                                               1392 028
390
                 Point
                            X-Surf
                                        Y-Surf
                                                                                                       456
                                                                                                                         13
                                                                                                                                   447.040
                                                                                                                                               1394.782
                                                                                                       457
                                                                                                                                   456.581
                                                                                                                                               1397.775
391
                  No.
                             (ft)
                                         (ft)
                                                                                                                         14
392
                                                                                                       458
                                                                                                                         15
                                                                                                                                   466.045
                                                                                                                                               1401.005
                            335.789
                                        1381.618
                                                                                                                                   475.426
393
                                                                                                       459
                                                                                                                         16
                                                                                                                                               1404.469
                            345.789
                                        1381.537
                                                                                                                                   484.717
394
                   2
                                                                                                       460
                                                                                                                         17
                                                                                                                                               1408.167
395
                   3
                            355.788
                                        1381.702
                                                                                                       461
                                                                                                                         18
                                                                                                                                   493.913
                                                                                                                                               1412.096
                            365.779
                                        1382.111
                                                                                                       462
                                                                                                                         19
                                                                                                                                   503.008
                                                                                                                                               1416.252
396
397
                            375.758
                                        1382.766
                                                                                                       463
                                                                                                                         20
                                                                                                                                   511.997
                                                                                                                                               1420.635
                            385.717
                                        1383.665
                                                                                                       464
                                                                                                                         21
                                                                                                                                   520.873
                                                                                                                                               1425.240
398
                   6
399
                            395.652
                                        1384.807
                                                                                                       465
                                                                                                                         22
                                                                                                                                   529.632
                                                                                                                                               1430.064
400
                   8
                            405.555
                                        1386.193
                                                                                                       466
                                                                                                                         23
                                                                                                                                   538 268
                                                                                                                                               1435.106
401
                            415.422
                                        1387.822
                                                                                                       467
                                                                                                                         24
                                                                                                                                   546.776
                                                                                                                                               1440.362
402
                  10
                            425.245
                                        1389.691
                                                                                                       468
                                                                                                                         25
                                                                                                                                   555 150
                                                                                                                                               1445 828
                  11
                            435.020
                                        1391.802
                                                                                                       469
                                                                                                                         26
                                                                                                                                   563.384
                                                                                                                                               1451.502
403
                            444.740
                                        1394.151
                                                                                                                         27
                                                                                                                                   571.475
                                                                                                                                               1457.379
404
                  12
                                                                                                       470
                                        1396.737
405
                  13
                            454.400
                                                                                                       471
                                                                                                                         28
                                                                                                                                   579.417
                                                                                                                                               1463.456
406
                  14
                            463.993
                                        1399.560
                                                                                                       472
                                                                                                                         29
                                                                                                                                   587.204
                                                                                                                                               1469.729
407
                  15
                            473.515
                                        1402.617
                                                                                                       473
                                                                                                                         30
                                                                                                                                   594.833
                                                                                                                                               1476.195
408
                  16
                            482.958
                                        1405.907
                                                                                                       474
                                                                                                                         31
                                                                                                                                   602.298
                                                                                                                                               1482.848
409
                  17
                            492.318
                                        1409.427
                                                                                                       475
                                                                                                                         32
                                                                                                                                   609.595
                                                                                                                                               1489.686
410
                  18
                            501.589
                                        1413.176
                                                                                                       476
                                                                                                                         33
                                                                                                                                   616.719
                                                                                                                                               1496.704
                  19
                            510.765
                                                                                                       477
                                                                                                                                   619.700
411
                                        1417.151
                                                                                                                         34
                                                                                                                                               1499.791
412
                  20
                            519.841
                                        1421.349
                                                                                                       478
                                                                                                                      Circle Center At X = 331.872; Y = 1778.588; and Radius = 400.715
                  21
                            528.811
                                        1425.769
                                                                                                       479
413
414
                  22
                            537.670
                                        1430.408
                                                                                                       480
415
                  23
                            546.413
                                        1435.262
                                                                                                       481
                  24
                            555.034
                                        1440.329
                                                                                                                             Factor of Safety
416
                                                                                                       482
                                                                                                                            *** 1.219 ***
417
                  25
                            563.528
                                        1445.607
                                                                                                       483
                            571.890
                                        1451.090
418
                  26
419
                  27
                            580.116
                                        1456.777
                                                                                                       485
420
                  28
                            588.199
                                        1462.665
                                                                                                       486
421
                  29
                            596.136
                                        1468 748
                                                                                                       487
422
                  30
                            603.921
                                        1475.024
                                                                                                       488
                                                                                                                      Failure Surface Specified By 33 Coordinate Points
423
                  31
                            611.550
                                        1481.490
                                                                                                       489
                  32
                            619 018
                                        1488.140
                                                                                                       490
424
425
                  33
                            626.321
                                        1494.972
                                                                                                       491
                                                                                                                        Point
                                                                                                                                   X-Surf
                                                                                                                                               Y-Surf
                  34
                            630.610
                                        1499.186
                                                                                                       492
                                                                                                                                    (ft)
                                                                                                                                               (ft)
426
                                                                                                                         No.
427
                                                                                                       493
428
               Circle Center At X = 344.117; Y = 1789.175; and Radius = 407.642
                                                                                                       494
                                                                                                                          1
                                                                                                                                   331.052
                                                                                                                                               1379.129
429
                                                                                                       495
                                                                                                                                   341.050
                                                                                                                                               1378.915
430
                                                                                                       496
                                                                                                                          3
                                                                                                                                   351.050
                                                                                                                                               1378.977
431
                      Factor of Safety
                                                                                                       497
                                                                                                                                   361.044
                                                                                                                                               1379.315
432
                     *** 1.217 ***
                                                                                                       498
                                                                                                                          5
                                                                                                                                   371.026
                                                                                                                                               1379.927
433
                                                                                                       499
                                                                                                                          6
                                                                                                                                   380.986
                                                                                                                                               1380.815
434
                                                                                                       500
                                                                                                                          7
                                                                                                                                   390.918
                                                                                                                                               1381.977
                                                                                                       501
                                                                                                                                   400.815
                                                                                                                                               1383.412
435
                                                                                                                          8
436
                                                                                                       502
                                                                                                                                   410.668
                                                                                                                                               1385.119
                                                                                                       503
                                                                                                                                   420.470
                                                                                                                                               1387.097
                                                                                                                         1.0
437
438
                Failure Surface Specified By 34 Coordinate Points
                                                                                                       504
                                                                                                                         11
                                                                                                                                   430.215
                                                                                                                                               1389.345
                                                                                                       505
                                                                                                                                   439.893
                                                                                                                                               1391.860
439
                                                                                                                         12
440
                                                                                                       506
                                                                                                                         13
                                                                                                                                   449.498
                                                                                                                                               1394.641
441
                 Point
                            X-Surf
                                        Y-Surf
                                                                                                       507
                                                                                                                         14
                                                                                                                                   459.024
                                                                                                                                               1397.686
442
                  No.
                             (ft)
                                                                                                       508
                                                                                                                         15
                                                                                                                                   468.461
                                                                                                                                               1400.992
443
                                                                                                       509
                                                                                                                         16
                                                                                                                                   477.804
                                                                                                                                               1404.557
```

```
576
510
                  17
                            487.045
                                        1408.379
                                                                                                                          33
                                                                                                                                    612.174 1500.507
                                        1412.453
511
                  18
                            496.178
                                                                                                       577
                                        1416.778
512
                  19
                            505.194
                                                                                                       578
                                                                                                                       Circle Center At X = 345.321; Y = 1732.412; and Radius = 353.571
                                        1421.349
513
                  20
                            514.088
                                                                                                       579
                  21
                            522.853
                                        1426.164
514
                                                                                                       580
515
                            531.481
                                        1431.218
                                                                                                       581
                  22
                                                                                                                              Factor of Safety
516
                  23
                            539.967
                                        1436.509
                                                                                                                             *** 1.221 ***
                  24
                            548.304
                                        1442.031
                                                                                                       583
517
518
                  25
                            556.485
                                        1447.781
                                                                                                       584
519
                  26
                            564.505
                                        1453.755
                                                                                                       585
520
                  27
                            572.357
                                        1459.947
521
                  28
                            580.036
                                        1466.353
                                                                                                       587
                                                                                                                       Failure Surface Specified By 34 Coordinate Points
522
                  29
                            587.535
                                        1472.968
                                                                                                       588
                            594.849
                                        1479.788
                                                                                                       589
523
                  30
                                                                                                                                    X-Surf
                                                                                                                                                Y-Surf
524
                  31
                            601.972
                                        1486.806
                                                                                                       590
                                                                                                                         Point
                                        1494.019
525
                  32
                            608.899
                                                                                                       591
                                                                                                                          No.
                                                                                                                                     (ft)
                                                                                                                                                 (ft)
                  33
526
                            614.587
                                        1500.277
                                                                                                       592
527
                                                                                                       593
                                                                                                                                    328.684
                                                                                                                                                1377.885
528
               Circle Center At X = 343.808; Y = 1741.696; and Radius = 362.791
                                                                                                       594
                                                                                                                                    338.683
                                                                                                                                                1378.058
                                                                                                                           2
529
                                                                                                       595
                                                                                                                                    348.674
                                                                                                                                                1378.470
                                                                                                       596
                                                                                                                           4
                                                                                                                                    358.653
                                                                                                                                                1379.119
530
531
                      Factor of Safety
                                                                                                       597
                                                                                                                                    368.614
                                                                                                                                                1380.005
532
                      *** 1.220 ***
                                                                                                       598
                                                                                                                                    378.550
                                                                                                                                                1381.128
                                                                                                                           6
533
                                                                                                       599
                                                                                                                                    388.458
                                                                                                                                                1382.487
                                                                                                       600
534
                                                                                                                           8
                                                                                                                                    398.330
                                                                                                                                                1384.082
                                                                                                       601
                                                                                                                                    408.161
                                                                                                                                                1385.911
535
     1
                                                                                                                                    417.946
                                                                                                                                                1387.974
536
                                                                                                       602
                                                                                                                          10
                                                                                                                                    427.679
537
                                                                                                       603
                                                                                                                          11
                                                                                                                                                1390.268
538
               Failure Surface Specified By 33 Coordinate Points
                                                                                                       604
                                                                                                                          12
                                                                                                                                    437.355
                                                                                                                                                1392.794
                                                                                                       605
                                                                                                                          13
                                                                                                                                    446.968
                                                                                                                                                1395.550
539
540
                                                                                                       606
                                                                                                                          14
                                                                                                                                    456.512
                                                                                                                                                1398.533
541
                 Point
                            X-Surf
                                        Y-Surf
                                                                                                       607
                                                                                                                          15
                                                                                                                                    465.983
                                                                                                                                                1401.742
542
                  No.
                             (ft)
                                         (ft)
                                                                                                       608
                                                                                                                          16
                                                                                                                                    475.375
                                                                                                                                                1405.177
                                                                                                       609
                                                                                                                                    484.683
                                                                                                                                                1408.833
543
                                                                                                                          17
544
                            331.052
                                        1379.129
                                                                                                       610
                                                                                                                          18
                                                                                                                                    493.900
                                                                                                                                                1412.710
                            341.049
                                        1378 867
                                                                                                       611
                                                                                                                                    503.023
                                                                                                                                                1416.806
545
                   2
                                                                                                                          19
546
                            351.049
                                        1378.888
                                                                                                       612
                                                                                                                          20
                                                                                                                                    512.046
                                                                                                                                                1421.117
547
                            361.044
                                        1379.191
                                                                                                       613
                                                                                                                          21
                                                                                                                                    520.964
                                                                                                                                                1425.642
                            371.027
                                        1379.777
                                                                                                       614
                                                                                                                          22
                                                                                                                                    529.772
                                                                                                                                                1430.377
548
                   5
549
                   6
                            380.989
                                        1380.645
                                                                                                       615
                                                                                                                          23
                                                                                                                                    538.464
                                                                                                                                                1435.321
                            390.923
                                        1381.794
                                                                                                                                    547.036
                                                                                                                                                1440.471
550
                                                                                                       616
                                                                                                                          24
551
                   8
                            400.820
                                        1383.224
                                                                                                       617
                                                                                                                          25
                                                                                                                                    555.484
                                                                                                                                                1445.823
552
                   9
                            410.673
                                        1384.933
                                                                                                       618
                                                                                                                          26
                                                                                                                                    563.801
                                                                                                                                                1451.374
553
                  10
                            420.474
                                        1386.921
                                                                                                       619
                                                                                                                          27
                                                                                                                                    571.984
                                                                                                                                                1457.122
554
                  11
                            430.214
                                        1389.184
                                                                                                       620
                                                                                                                          28
                                                                                                                                    580.028
                                                                                                                                                1463.063
555
                  12
                            439.887
                                        1391.722
                                                                                                       621
                                                                                                                          29
                                                                                                                                    587.928
                                                                                                                                                1469.194
                            449.484
                  13
                                        1394.533
                                                                                                       622
                                                                                                                          3.0
                                                                                                                                    595.680
                                                                                                                                                1475 510
556
557
                  14
                            458.997
                                        1397.614
                                                                                                       623
                                                                                                                          31
                                                                                                                                    603.280
                                                                                                                                                1482.010
558
                  15
                            468.420
                                        1400.962
                                                                                                       624
                                                                                                                          32
                                                                                                                                    610 723
                                                                                                                                                1488 689
559
                  16
                            477.744
                                        1404.576
                                                                                                       625
                                                                                                                          33
                                                                                                                                    618.005
                                                                                                                                                1495.543
560
                  17
                            486.962
                                        1408.452
                                                                                                       626
                                                                                                                          34
                                                                                                                                    622.078
                                                                                                                                                1499.564
561
                  18
                            496.067
                                        1412.587
                                                                                                       627
                            505.052
                                        1416.978
562
                  19
                                                                                                       628
                                                                                                                       Circle Center At X = 326.433; Y = 1797.869; and Radius = 419.990
563
                  20
                            513.908
                                        1421.622
                                                                                                       629
564
                  21
                            522.630
                                        1426.514
                                                                                                       630
565
                  22
                            531.210
                                        1431.650
                                                                                                       631
                                                                                                                              Factor of Safety
566
                  23
                            539.641
                                        1437.027
                                                                                                       632
                                                                                                                             *** 1.221 ***
567
                  24
                            547.917
                                        1442.641
                                                                                                       633
568
                  25
                            556.031
                                        1448.486
                                                                                                       634
                                        1454.559
569
                  26
                            563 976
                                                                                                       635
570
                  27
                            571.746
                                        1460.853
                                                                                                       636
571
                            579.335
                                        1467.365
                  28
                                                                                                       637
572
                   29
                            586.737
                                        1474.089
                                                                                                       638
                                                                                                                       Failure Surface Specified By 35 Coordinate Points
573
                  30
                            593.946
                                        1481.020
                                                                                                       639
574
                  31
                            600.956
                                        1488.152
                                                                                                       640
575
                  32
                            607.761
                                        1495.479
                                                                                                       641
                                                                                                                         Point
                                                                                                                                    X-Surf
                                                                                                                                                Y-Surf
```

```
642
                  No.
                            (ft)
                                        (ft)
643
                                      1380.374
644
                           333.421
                           343.420
                                       1380.484
645
                  2
                           353.415
                                       1380.821
646
                  3
647
                           363.399
                                      1381.383
648
                           373.368
                                       1382.171
                           383.316
                                      1383.184
649
                  6
650
                           393.239
                                      1384.422
651
                  8
                           403.132
                                      1385.884
652
                           412.989
                                      1387.570
                                       1389.478
653
                  10
                           422.805
654
                  11
                           432.576
                                       1391.607
                  12
                           442.296
                                      1393.957
655
                           451.960
                                      1396.526
656
                  13
657
                  14
                           461.564
                                      1399.313
                  15
                           471.102
                                      1402.316
658
659
                  16
                           480.570
                                      1405.535
                  17
                           489.963
                                      1408.966
660
661
                  18
                           499.276
                                      1412.609
                  19
                           508.504
                                      1416.462
662
663
                  20
                           517.642
                                       1420.522
664
                  21
                           526.687
                                      1424.789
665
                  22
                           535.632
                                      1429.258
666
                  23
                           544.474
                                      1433.929
667
                  24
                           553.209
                                      1438.798
                  25
                           561.831
                                      1443.864
668
                           570.336
                                      1449.123
669
                  26
670
                  27
                           578.720
                                      1454.574
671
                  28
                           586.979
                                      1460.212
672
                  29
                           595.108
                                      1466.036
673
                  30
                           603.103
                                      1472.042
674
                  31
                           610.961
                                      1478.228
                           618.676
                                      1484.589
675
                  32
676
                  33
                           626.246
                                       1491.124
677
                  34
                           633,666
                                      1497.828
678
                  35
                           635.470
                                      1499.534
679
               Circle Center At X = 333.539; Y = 1822.553; and Radius = 442.180
680
681
682
683
                     Factor of Safety
                     *** 1.221 ***
684
685
686
687
688
689
               Failure Surface Specified By 34 Coordinate Points
690
691
692
                Point
                           X-Surf
                                       Y-Surf
693
                 No.
                            (ft)
                                       (ft)
694
695
                  1
                           338.158
                                      1382.863
696
                  2
                           348.157
                                       1382.715
697
                  3
                           358.156
                                       1382.814
698
                  4
                           368.150
                                       1383.158
699
                           378.133
                                      1383.748
                  5
700
                           388.098
                                      1384.583
                                       1385.662
                  7
                           398.040
                  8
                           407.952
                                       1386.985
703
                                      1388.551
                  9
                           417.828
704
                  10
                           427.663
                                       1390.360
705
                  11
                           437.451
                                       1392.409
706
                  12
                           447.185
                                       1394.699
707
                  13
                           456.861
                                      1397.227
```

```
708
                  14
                           466.471
                                       1399.991
                           476.010
709
                  15
                                       1402.992
                  16
                           485.473
                                       1406.225
                           494.853
711
                  17
                                       1409.690
712
                  18
                           504.146
                                       1413.385
713
                  19
                           513.345
                                       1417.306
714
                  20
                           522.445
                                       1421.453
715
                  21
                           531.440
                                       1425.822
716
                  22
                           540.325
                                       1430.410
717
                  23
                           549.095
                                       1435.215
718
                  24
                            557.744
                                       1440.234
719
                  25
                           566.267
                                       1445.465
                  26
                           574.659
                                       1450.903
721
                  27
                           582.915
                                       1456.546
722
                  28
                           591.030
                                       1462.389
723
                  29
                           598.999
                                       1468.431
724
                  30
                           606.817
                                       1474.666
725
                  31
                           614.479
                                       1481.092
726
                  32
                           621.981
                                       1487.703
727
                  33
                            629.319
                                       1494.498
728
                  34
                           634.419
                                       1499.458
729
               Circle Center At X = 349.171; Y = 1789.565; and Radius = 406.851
731
732
733
                     Factor of Safety
734
                     *** 1.222 ***
735
736
737
738
739
740
                         **** END OF GSTABL7 OUTPUT ****
741
```

Bouquet Canyon/21095-01/Section V-V'/ Temporary



| 1 | *** GSTABL7 *** |
|----------|--|
| 2 | |
| 3 | ** GSTABL7 by Dr. Garry H. Gregory, Ph.D.,P.E.,D.GE ** |
| 4 5 | ** Original Managian 1 0 Tangang 1006, Guyunant Man 2 005 2 Est 2012 ** |
| 6 | ** Original Version 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 ** (All Rights Reserved-Unauthorized Use Prohibited) |
| 7 | (All rights reserved-unauthorized use Prohibited) |
| 8 | |
| 9 | |
| | ******************* |
| | ** |
| 10 | SLOPE STABILITY ANALYSIS SYSTEM |
| 11 | Modified Bishop, Simplified Janbu, or GLE Method of Slices. |
| 12 | (Includes Spencer & Morgenstern-Price Type Analysis) |
| 13 14 | Including Pier/Pile, Reinforcement, Soil Nail, Tieback, |
| 15 | Nonlinear Undrained Shear Strength, Curved Phi Envelope, Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water |
| 16 | Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces. |
| 17 | barraces, recade beautic & normarit rational and reprint recept. |
| | ****************** |
| | ** |
| 18 | |
| 19 | |
| 20 21 | Analysis Run Date: 4/5/2022 |
| 22 | Time of Run: 10:08AM Run By: LGC Geotechnical, |
| 22 | Inc. |
| | The • |
| | |
| 23 | Input Data Filename: Z:\2021\21095-01 Integral - Bouquet |
| | Canyon\Engineering\slope stability\Sec |
| | V-V'\2022_04_05\xvb2t.in |
| | |
| 24 | Output Filename: Z:\2021\21095-01 Integral - Bouquet |
| | Canyon\Engineering\slope stability\Sec |
| | V-V'\2022_04_05\xvb2t.OUT |
| | |
| 25 | Unit System: English |
| 26 | 5 " |
| 27 | Plotted Output Filename: Z:\2021\21095-01 Integral - Bouquet |
| | Canyon\Engineering\slope stability\Sec |
| | V-V'\2022_04_05\xvb2t.PLT |
| | |
| 28 | |
| 29 | |
| 30 | |
| 31 | |
| 32 | |
| 33 | PROBLEM DESCRIPTION: Bouquet Canyon/21095-01/Section V-V'/ |
| 34 | Temporary |
| 35 36 | |
| 36 | |
| 38 | |
| 39 | BOUNDARY COORDINATES |
| 40 | |
| 41 | 12 Top Boundaries |
| 42 | 14 Total Boundaries |
| 43 | |
| 44 | Davidson Wilde Wilde William Co. |
| 45 46 | Boundary X-Left Y-Left X-Right Y-Right Soil Type No. (ft) (ft) (ft) Below Bnd |
| 46 | No. (ft) (ft) (ft) Below Bnd |
| T/ | |
| | |

| | 1 | 129.00 | 1375.00 | 360.00 | 1372.00 | 2 |
|---|----|--------|---------|--------|---------|---|
| | 2 | 360.00 | 1372.00 | 395.00 | 1372.00 | 3 |
| | 3 | 395.00 | 1372.00 | 520.00 | 1460.00 | 3 |
| | 4 | 520.00 | 1460.00 | 538.00 | 1473.00 | 3 |
| | 5 | 538.00 | 1473.00 | 560.00 | 1482.00 | 3 |
| | 6 | 560.00 | 1482.00 | 587.00 | 1493.00 | 3 |
| | 7 | 587.00 | 1493.00 | 602.00 | 1501.00 | 3 |
| | 8 | 602.00 | 1501.00 | 607.00 | 1501.00 | 3 |
| | 9 | 607.00 | 1501.00 | 628.00 | 1499.00 | 3 |
| 1 | .0 | 628.00 | 1499.00 | 642.00 | 1500.00 | 3 |
| 1 | .1 | 642.00 | 1500.00 | 692.00 | 1491.00 | 3 |
| 1 | .2 | 692.00 | 1491.00 | 774.00 | 1460.00 | 3 |
| 1 | .3 | 129.00 | 1323.00 | 181.00 | 1330.00 | 3 |
| 1 | .4 | 181.00 | 1330.00 | 360.00 | 1372.00 | 3 |
| | | | | | | |

User Specified Y-Origin = 1280.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

| Soil | Total | Saturated | Cohesion | Friction | Pore | Pressure | Piez. |
|------|-------|-----------|------------------------------|----------|------|----------|-------|
| * * | | | <pre>Intercept (psf)</pre> | _ | | | |
| | | | | | | | |
| 1 | 120.0 | 120.0 | 250.0 | 28.0 | 0.00 | 0.0 | 0 |
| 2 | 120.0 | 120.0 | 100.0 | 28.0 | 0.00 | 0.0 | 0 |
| 3 | 120.0 | 120.0 | 250.0 | 36.0 | 0.00 | 0.0 | 0 |
| | | | | | | | |

ANISOTROPIC STRENGTH PARAMETERS 1 soil type(s)

Soil Type 3 Is Anisotropic

Number Of Direction Ranges Specified = 3

| Direction Range No. | Counterclockwise Direction Limit (deg) | Cohesion Intercept (psf) | Friction Angle (deg) |
|---------------------------|--|--------------------------------|----------------------------|
| 1 | 10.0 | 250.00 | 36.00 |
| 2 | 15.0 | 150.00 | 25.00 |
| 3 | 90.0 | 250.00 | 36.00 |

ANISOTROPIC SOIL NOTES:

- (1) An input value of 0.01 for C and/or Phi will cause Aniso C and/or Phi to be ignored in that range.
- (2) An input value of 0.02 for Phi will set both Phi and C equal to zero, with no water weight in the tension crack.
- (3) An input value of 0.03 for Phi will set both Phi and C equal to zero, with water weight in the tension crack.

Janbus Empirical Coef is being used for the case of $\ c \ \& \ phi \ both > 0$

| 114 | 1 |
|------------|---|
| 115 | |
| 116 | |
| 117 | |
| 118 119 | |
| 119 120 | |
| 121 | |
| 122 | |
| 123 | |
| 124 | |
| 125 | |
| 126 | |
| 127 | |
| 128 129 | |
| 130 | |
| 131 | |
| 131 132 | |
| 133 | |
| 134 | |
| 135 | |
| 136 137 | |
| 137 138 | |
| 139 | |
| 140 | |
| 141 142 | |
| 142 | |
| 143 144 | |
| 144 | |
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| 148 | |
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| 152 153 | |
| 154 | |
| 154 155 | |
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| 159 160 | |
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179

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

4999 Trial Surfaces Have Been Generated.

2 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 55.0

| Box No. | X-Left (ft) | Y-Left (ft) | X-Right (ft) | Y-Right (ft) | Height (ft) |
|------------|----------------|----------------|-----------------|-----------------|----------------|
| 1 | 360.00 | 1352.00 | 432.00 | 1356.00 | 30.00 |
| 2 | 432.10 | 1356.00 | 620.00 | 1409.00 | 30.00 |

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 5 Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|--------------|----------------|----------------|
| 1 | 326.73 | 1372.43 |
| 2 | 365.34 | 1354.44 |
| 3 | 481.54 | 1368.44 |
| 4 | 481.86 | 1423.44 |
| 5 | 511.96 | 1454.34 |

Factor of Safety for the Preceding Surface is Between 8.482 and 8.466

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 4 Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|--------------|----------------|----------------|
| 1 | 396.82 | 1373.28 |
| 2 | 416.26 | 1353.97 |
| 3 | 454.80 | 1365.62 |
| 4 | 454.84 | 1414.13 |

Factor of Safety for the Preceding Surface is Between22.157 and21.551

180 WARNING! The factor of safety calculation did not converge in 20 iterations. 181 182 183 The Trial Failure Surface In Question Is Defined 184 185 By The Following 5 Coordinate Points 186 187 188 Point X-Surf Y-Surf 189 No. (ft) (ft) 190 1372.43 191 326.73 192 365.34 1354.44 481.54 1368.44 193 3 1423.44 194 4 481.86 1454.34 195 5 511.96 196 197 198 Factor of Safety for the Preceding Surface is Between 8.482 and 8.466 199 200 201 WARNING! The factor of safety calculation did not converge in 20 iterations. 202 203 204 205 The Trial Failure Surface In Ouestion Is Defined 206 By The Following 4 Coordinate Points 207 208 209 Point X-Surf Y-Surf 210 No. (ft) (ft) 211 212 396.82 1373.28 213 416.26 1353.97 2 214 3 454.80 1365.62 215 454.84 1414 13 4 216 217 218 Factor of Safety for the Preceding Surface is Between22.157 and21.551 219 220 221 222 223

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 5 Coordinate Points

| Point No. | X-Surf (ft) | Y-Sur (ft) |
|--------------|----------------|---------------|
| 1 | 326.73 | 1372.4 |
| 2 | 365.34 | 1354.4 |
| 3 | 481.54 | 1368.4 |
| 4 | 481.86 | 1423.4 |
| 5 | 511.96 | 1454.3 |

224 225

226

227 228 229

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244

245

Factor of Safety for the Preceding Surface is Between 8.482 and 8.466

WARNING! The factor of safety calculation did not converge in 20 iterations.

| 16 | | | face In Question Is Defined |
|-----|-------------|--------------|---|
| 17 | | | coordinate Points |
| 18 | | | |
| 19 | | | |
| 50 | Point | X-Surf | Y-Surf |
| 51 | No. | (ft) | (ft) |
| 52 | | | |
| 53 | 1 | 396.82 | 1373.28 |
| 54 | 2 | 416.26 | 1353.97 |
| 55 | 3 | 454.80 | 1365.62 |
| 6 | 4 | 454.84 | 1414.13 |
| 57 | | | |
| 8 | | | |
| 59 | Factor of | Safety for | the Preceding Surface is Between22.157 and21.551 |
| 50 | | | |
| 51 | | | |
| 52 | WARNING! T | he factor o | f safety calculation did not converge in 20 iterati |
| 3 | | | |
| 54 | | | |
| 55 | | | |
| 6 | The Trial | Failure Sur | face In Question Is Defined |
| 7 | | | Coordinate Points |
| 8 | , 101 | . 5 2 0 | |
| 9 | | | |
| 0 | Point | X-Surf | Y-Surf |
| 1 | No. | (ft) | (ft) |
| 2 | 1.0 | (20) | (20) |
| 3 | 1 | 326.73 | 1372.43 |
| 4 | 2 | 365.34 | 1354.44 |
| 5 | 3 | 481.54 | 1368.44 |
| 6 | 4 | 481.86 | 1423.44 |
| 7 | 5 | 511.96 | 1454.34 |
| 78 | 3 | 311.50 | 1131.31 |
| 19 | | | |
| 30 | Factor of | Cafety for | the Preceding Surface is Between 8.482 and 8.466 |
| 31 | ractor or | Salety IOI | the Frededing Surface is between 6.462 and 6.400 |
| 32 | | | |
| 33 | WADNINGLI | he factor o | f safety calculation did not converge in 20 iterati |
| 34 | WARNING: I | THE TACCOT O | i sarety carculation did not converge in 20 iterati |
| 35 | | | |
| 36 | | | |
| 37 | The Trial | Failure Cur | face In Question Is Defined |
| 38 | | | Coordinate Points |
| 39 | by life rol | .iowing i c | ooldinate roints |
| 90 | | | |
| 91 | Point | X-Surf | Y-Surf |
| 92 | | | |
| | No. | (ft) | (ft) |
| 13 | 1 | 206 00 | 1272 20 |
| 14 | _ | 396.82 | 1373.28 |
| 5 | 2 | 416.26 | 1353.97 |
| 16 | 3 4 | 454.80 | 1365.62 |
| 7 | 4 | 454.84 | 1414.13 |
| 8 | | | |
| 19 | | ~ | ., |
| 10 | Factor of | Salety for | the Preceding Surface is Between22.157 and21.551 |
| 1 | | | |
| 12 | | | |
| 13 | WARNING! T | he factor o | f safety calculation did not converge in 20 iterati |
| 14 | | | |
| 15 | | | |
|)6 | | | |
| 7 | | | face In Question Is Defined |
| 8 (| By The Fol | lowing 5 C | coordinate Points |
| 19 | | | |
| .0 | | | |
| .1 | | X-Surf | Y-Surf |

```
(ft)
                                       (ft)
312
                  No.
313
                                      1372.43
314
                           326.73
315
                           365.34
                                      1354.44
                  2
316
                  3
                           481.54
                                      1368.44
317
                           481.86
                                      1423.44
                  4
318
                           511.96
                                      1454.34
319
320
321
               Factor of Safety for the Preceding Surface is Between 8.482 and 8.466
322
323
324
               WARNING! The factor of safety calculation did not converge in 20 iterations.
325
326
327
328
               The Trial Failure Surface In Ouestion Is Defined
329
               By The Following 4 Coordinate Points
330
331
332
                 Point
                           X-Surf
                                      Y-Surf
333
                  No.
                            (ft)
                                       (ft)
334
                           396.82
                                      1373.28
                           416.26
                                      1353.97
336
                  2
337
                  3
                           454.80
                                      1365.62
338
                  4
                           454.84
                                      1414.13
339
340
341
               Factor of Safety for the Preceding Surface is Between22.157 and21.551
342
343
344
               WARNING! The factor of safety calculation did not converge in 20 iterations.
345
346
347
348
               The Trial Failure Surface In Question Is Defined
349
               By The Following 5 Coordinate Points
350
351
352
                 Point
                           X-Surf
                                       Y-Surf
353
                 No.
                            (ft)
                                       (ft)
354
                                      1372.43
355
                           326.73
                                      1354.44
356
                  2
                           365.34
357
                           481.54
                                      1368.44
358
                  4
                                      1423.44
                           481.86
359
                  5
                           511.96
                                      1454.34
360
362
               Factor of Safety for the Preceding Surface is Between 8.482 and 8.466
363
364
365
               WARNING! The factor of safety calculation did not converge in 20 iterations.
366
367
368
369
               The Trial Failure Surface In Ouestion Is Defined
370
               By The Following 4 Coordinate Points
371
372
373
                 Point
                           X-Surf
                                       Y-Surf
374
                  No.
                            (ft)
                                       (ft)
375
376
                           396.82
                                      1373.28
377
                  2
                           416.26
                                      1353.97
```

```
378
                   3
                            454.80
                                       1365.62
379
                            454.84
                                       1414.13
380
381
382
                Factor of Safety for the Preceding Surface is Between22.157 and21.551
383
384
                WARNING! The factor of safety calculation did not converge in 20 iterations.
385
386
387
388
389
                The Trial Failure Surface In Ouestion Is Defined
390
                By The Following 5 Coordinate Points
391
392
                 Point
                            X-Surf
                                        Y-Surf
393
394
                  No.
                             (ft)
                                         (ft)
395
                            326.73
                                       1372.43
396
                   1
397
                   2
                            365.34
                                       1354.44
                                       1368.44
398
                   3
                            481.54
399
                             481.86
                                       1423.44
                   4
400
                            511.96
                                       1454 34
                   5
401
402
               Factor of Safety for the Preceding Surface is Between 8.482 and 8.466
403
404
405
406
                WARNING! The factor of safety calculation did not converge in 20 iterations.
407
408
409
410
                The Trial Failure Surface In Question Is Defined
               By The Following 4 Coordinate Points
411
412
413
414
                 Point
                            X-Surf
                                        Y-Surf
415
                  No.
                             (ft)
                                         (ft)
416
417
                            396.82
                                       1373.28
                            416.26
                                       1353.97
418
                   2
419
                   3
                            454 80
                                       1365.62
420
                   4
                            454.84
                                       1414.13
421
422
                Factor of Safety for the Preceding Surface is Between22.157 and21.551
423
424
425
               WARNING! The factor of safety calculation did not converge in 20 iterations.
426
427
428
429
                The Trial Failure Surface In Question Is Defined
430
431
                By The Following 5 Coordinate Points
432
433
434
                 Point
                            X-Surf
                                        Y-Surf
                             (ft)
                                         (ft)
435
                  No.
436
                            326.73
                                       1372.43
                   1
437
438
                            365.34
                                       1354.44
                            481.54
                                       1368.44
439
                   3
440
                            481.86
                                       1423.44
441
                   5
                            511.96
                                       1454.34
442
```

```
444
               Factor of Safety for the Preceding Surface is Between 8.482 and 8.466
445
446
447
               WARNING! The factor of safety calculation did not converge in 20 iterations.
448
449
450
451
                The Trial Failure Surface In Question Is Defined
452
               By The Following 4 Coordinate Points
453
454
455
                 Point
                            X-Surf
                                        Y-Surf
456
                             (ft)
                                         (ft)
                  No.
457
                            396.82
                                       1373.28
458
459
                   2
                            416.26
                                       1353.97
460
                   3
                            454.80
                                       1365.62
461
                   4
                            454.84
                                       1414.13
462
463
464
               Factor of Safety for the Preceding Surface is Between22.157 and21.551
465
466
467
                WARNING! The factor of safety calculation did not converge in 20 iterations.
468
469
470
                The Trial Failure Surface In Ouestion Is Defined
471
               By The Following 5 Coordinate Points
472
473
474
475
                 Point
                            X-Surf
                                        Y-Surf
476
                  No.
                             (ft)
                                         (ft)
477
478
                            326.73
                                       1372.43
479
                            365 34
                                       1354 44
                   2
480
                            481.54
                                       1368.44
481
                   4
                            481.86
                                       1423.44
                            511.96
                                       1454.34
482
483
485
               Factor of Safety for the Preceding Surface is Between 8.482 and 8.466
486
487
488
                WARNING! The factor of safety calculation did not converge in 20 iterations.
489
490
491
492
               The Trial Failure Surface In Ouestion Is Defined
493
               By The Following 4 Coordinate Points
494
495
                                        Y-Surf
                            X-Surf
496
                 Point.
497
                             (ft)
                                         (ft)
                  No.
498
499
                            396.82
                                       1373.28
500
                   2
                            416.26
                                       1353.97
501
                            454.80
                                       1365.62
                   3
502
                   4
                            454.84
                                       1414.13
503
504
505
               Factor of Safety for the Preceding Surface is Between 22.157 and 21.551
506
```

WARNING! The factor of safety calculation did not converge in 20 iterations.

507

508

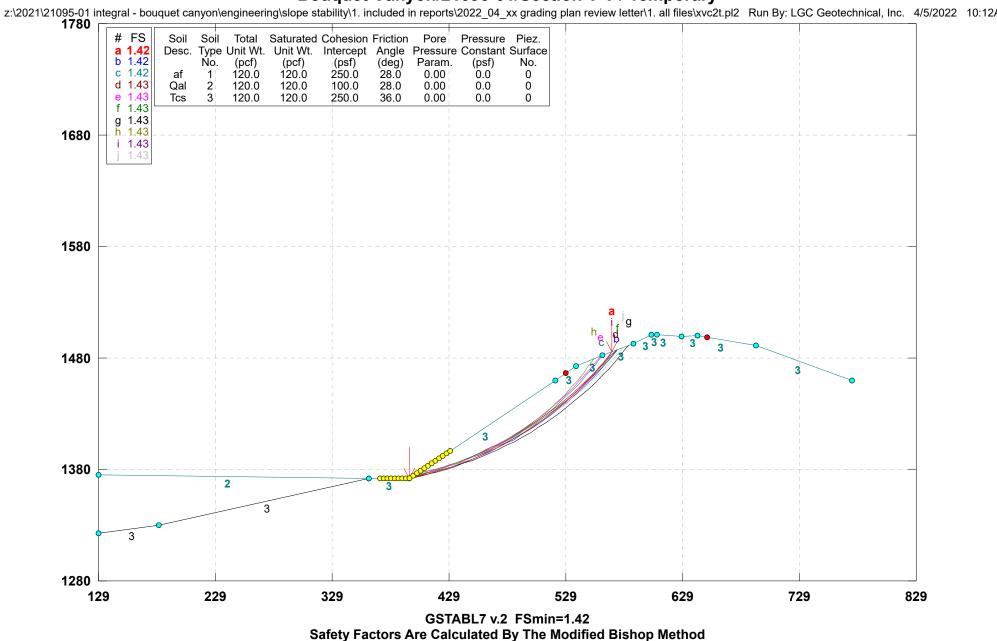
| E10 | | | | | | | | | |
|------------|-------------|--------------|--------------|------------|-----------|-----------|----------|-----------|----|
| 510 511 | | | | | | | | | |
| 512 | The Trial | Failure Cur | face In Ques | tion To De | afined | | | | |
| 513 | | | oordinate Po | | erinea | | | | |
| 514 | by The FOI | 10w1iig 5 C | oorarnace ro | IIICS | | | | | |
| 515 | | | | | | | | | |
| 516 | Point | X-Surf | Y-Surf | | | | | | |
| 517 | No. | (ft) | (ft) | | | | | | |
| 518 | 1.0 • | (20) | (20) | | | | | | |
| 519 | 1 | 326.73 | 1372.43 | | | | | | |
| 520 | 2 | 365.34 | | | | | | | |
| 521 | 3 | 481.54 | | | | | | | |
| 522 | 4 | 481.86 | 1423.44 | | | | | | |
| 523 | 5 | 511.96 | 1454.34 | | | | | | |
| 524 | | | | | | | | | |
| 525 | | | | | | | | | |
| 526 | Factor of | Safety for t | the Precedin | g Surface | is Betwe | een 8.482 | 2 and 8 | .466 | |
| 527 | | | | | | | | | |
| 528 | | | | | | | | | |
| 529 | WARNING! T | he factor of | f safety cal | culation o | did not | converge | in 20 | iteration | s. |
| 530 | | | | | | | | | |
| 531 532 | | | | | | | | | |
| 532 | The Trial | Enilura Cur | face In Ques | tion Ta Da | ofined | | | | |
| 534 | | | oordinate Po | | erinea | | | | |
| 535 | by The FOI | 10w1iig 4 C | oorarnace ro | IIICS | | | | | |
| 536 | | | | | | | | | |
| 537 | Point | X-Surf | Y-Surf | | | | | | |
| 538 | No. | (ft) | (ft) | | | | | | |
| 539 | | , | | | | | | | |
| 540 | 1 | 396.82 | 1373.28 | | | | | | |
| 541 | 2 | 416.26 | 1353.97 | | | | | | |
| 542 | 3 | 454.80 | 1365.62 | | | | | | |
| 543 | 4 | 454.84 | 1414.13 | | | | | | |
| 544 | | | | | | | | | |
| 545 | | | | | | | | | |
| 546 | Factor of | Safety for t | the Precedin | g Surface | is Betwe | een22.157 | 7 and21 | •551 | |
| 547 | | | | | | | | | |
| 548 | | | | | | | | | |
| 549 | Following . | Are Display | ed The Ten M | ost Critic | cal Of T | ne Trial | | | |
| 550 | | | uated. They | Are | | | | | |
| 551 552 | Ordered - | Most Critica | al First. | | | | | | |
| 552 | | | | | | | | | |
| 554 | * * Cafety | Factors Are | e Calculated | Dy The Ci | implifie | d Janhu N | Method | * * | |
| 555 | Salety | ractors Are | e carcuraceu | by The 5 | шртттте | a danba r | ne ciioa | | |
| 556 | | | | | | | | | |
| 557 | | | | | | | | | |
| 558 | Total Numb | er of Trial | Surfaces At | tempted = | 4999 | | | | |
| 559 | | | | - | | | | | |
| 560 | WARNING! T | he Factor of | f Safety Cal | culation f | for one | or More 1 | Trial S | urfaces | |
| 561 | | | 0 Iterations | | | | | | |
| 562 | | | | | | | | | |
| 563 | | | | | | | | | |
| 564 | Number of | Trial Surfa | ces with Non | -Converged | d FS = | 20 | | | |
| 565 | | | | | | | | | |
| 566 | Number of | Trial Surfac | ces With Val | id FS = 49 | 979 | | | | |
| 567 | | | | | | | | | |
| 568 | D | - 6 m- 1 3 = | | | 1 00 0 7 | | | | |
| 569 | | | urfaces With | Non-Valid | ı FS Solı | utions | | | |
| 570 | or the Tot | al Attempted | d = 0.4 % | | | | | | |
| 571 572 | Ctatiation | 1 Data Or 3 | ll Valid FS | Values. | | | | | |
| 573 | | | FS Min = | | S Ave = | 2.170 | | | |
| 574 | | | = 0.776 | | | | n = 3 | 5 74 % | |
| 575 | Scandar | ~ DCVIACIOII | 0.770 | COCLITC | LUITO OF | | 3 | J. / 1 '0 | |
| | | | | | | | | | |
| | | | | | | | | | |

```
577
               Failure Surface Specified By 6 Coordinate Points
578
579
580
                Point
                          X-Surf
                                      Y-Surf
581
                           (ft)
                                      (ft)
                 No.
583
                           400.442
                                      1375.831
584
                  2
                           413.503
                                      1367.693
585
                  3
                           503.010
                                      1386.246
586
                           533.940
                                      1431.724
587
                  5
                           561.682
                                      1479.215
588
                           566.083
                                     1484.478
589
590
591
                     Factor of Safety
592
                    *** 1.352 ***
593
594
595
596
597
                   Individual data on the
                                            8 slices
598
599
                                                           Earthquake
600
                            Water Water
                                            Tie
                                                   Tie
601
                             Force Force
                                           Force
                                                  Force
                                                            Force Surcharge
602
      Slice Width
                                                                 Ver
                    Weight
                             Top
                                   Bot
                                           Norm
                                                    Tan
                                                           Hor
                                                                        Load
603
             (ft)
                    (lbs)
                            (lbs) (lbs)
                                           (lbs) (lbs)
                                                         (lbs) (lbs) (lbs)
       No.
604
605
              13.1
                   13584.2
                                      0.0
                                                                      0.0
                                                                              0.0
                               0.0
                                                0.
                                                       0.
                                                              0.0
606
              89.5 424940.6
                               0.0
                                      0.0
                                                0.
                                                       0.
                                                              0.0
                                                                      0.0
                                                                              0.0
607
             17.0 112712.2
                               0.0
                                      0.0
                                                              0.0
                                                                      0.0
                                                                              0.0
                                                0.
                                                       0.
608
              13.9 72866.1
                               0.0
                                      0.0
                                                              0.0
                                                                      0.0
                                                                              0.0
609
       5
                    17700.7
                                                              0.0
                                                                      0.0
                                                                              0.0
              4.1
                               0.0
                                      0.0
                                                0.
                                                       0.
610
              22.0
                    52787.4
                               0.0
                                       0.0
                                                0.
                                                       0.
                                                              0.0
                                                                      0.0
                                                                              0.0
611
                      922.0
                                                              0.0
              1.7
                               0.0
                                      0.0
                                                0.
                                                       0.
                                                                      0.0
                                                                              0.0
612
              4.4
                      916.3
                               0.0
                                       0.0
                                                0.
                                                              0.0
                                                                      0.0
                                                                              0.0
613
614
              Failure Surface Specified By 6 Coordinate Points
615
616
617
                Point
                           X-Surf
                                      Y-Surf
618
                                      (ft)
                 No.
                           (ft)
619
620
                           400.442
                                      1375.831
621
                           413.503
                                      1367.693
                           503.010
                                      1386.246
622
                  3
623
                  4
                           533.940
                                      1431.724
624
                           561.682
                                     1479.215
                  5
625
                           566.083
                                     1484.478
626
627
628
                     Factor of Safety
629
                    *** 1.352 ***
630
631
632
633
634
635
               Failure Surface Specified By 6 Coordinate Points
636
637
                 Point
                           X-Surf
                                      Y-Surf
639
                 No.
                           (ft)
                                      (ft)
640
641
                  1
                           400.442
                                     1375.831
```

```
642
                          413.503
                                      1367.693
                                                                                                   708
643
                           503.010
                                      1386.246
                  3
                                                                                                   709
                           533.940
                                      1431.724
                                                                                                                        Factor of Safety
644
                  4
                           561.682
                                      1479.215
                                                                                                                        *** 1.352 ***
645
                  5
                                                                                                   711
                           566.083
                                      1484.478
                                                                                                   712
646
                  6
647
                                                                                                   713
648
                                                                                                   714
649
                     Factor of Safety
                                                                                                   715 1
650
                    *** 1.352 ***
                                                                                                   716
651
                                                                                                   717
                                                                                                                  Failure Surface Specified By 6 Coordinate Points
652
                                                                                                   718
653
                                                                                                   719
654
                                                                                                                    Point
                                                                                                                              X-Surf
                                                                                                                                          Y-Surf
655
               Failure Surface Specified By 6 Coordinate Points
                                                                                                   721
                                                                                                                     No.
                                                                                                                               (ft)
                                                                                                                                          (ft)
656
                                                                                                   722
                                                                                                                              400.442
                                                                                                   723
                                                                                                                                          1375.831
657
                 Point
                           X-Surf
                                       Y-Surf
                                                                                                   724
                                                                                                                              413.503
                                                                                                                                          1367.693
658
                                                                                                                              503.010
                                                                                                                                          1386.246
659
                 No.
                           (ft)
                                       (ft)
                                                                                                   725
                                                                                                                      3
660
                                                                                                   726
                                                                                                                              533.940
                                                                                                                                          1431.724
                           400.442
                                      1375.831
661
                  1
                                                                                                   727
                                                                                                                              561.682
                                                                                                                                          1479.215
662
                  2
                           413.503
                                      1367.693
                                                                                                   728
                                                                                                                              566.083
                                                                                                                                          1484.478
663
                  3
                           503.010
                                       1386.246
                                                                                                   729
664
                  4
                           533.940
                                      1431.724
                                                                                                   730
665
                           561.682
                                      1479.215
                                                                                                                        Factor of Safety
                                                                                                                        *** 1.352 ***
                           566.083
                                      1484.478
666
                  6
                                                                                                   732
667
                                                                                                   733
                                                                                                   734
668
                     Factor of Safety
                                                                                                   735
669
                    *** 1.352 ***
670
                                                                                                   736
                                                                                                   737
671
                                                                                                                  Failure Surface Specified By 6 Coordinate Points
672
                                                                                                   738
673
                                                                                                   739
674 1
                                                                                                   740
                                                                                                                    Point
                                                                                                                              X-Surf
                                                                                                                                          Y-Surf
                                                                                                   741
                                                                                                                               (ft)
                                                                                                                                          (ft)
675
                                                                                                                     No.
676
               Failure Surface Specified By 6 Coordinate Points
                                                                                                   742
677
                                                                                                   743
                                                                                                                              400.442
                                                                                                                                          1375.831
678
                                                                                                   744
                                                                                                                      2
                                                                                                                              413.503
                                                                                                                                          1367.693
679
                Point
                           X-Surf
                                      Y-Surf
                                                                                                   745
                                                                                                                      3
                                                                                                                              503.010
                                                                                                                                          1386.246
680
                            (ft)
                                       (ft)
                                                                                                   746
                                                                                                                      4
                                                                                                                               533.940
                                                                                                                                          1431.724
                 No.
                                                                                                                              561.682
                                                                                                   747
681
                                                                                                                      5
                                                                                                                                          1479.215
                           400.442
                                      1375.831
                                                                                                                              566.083
                                                                                                                                          1484.478
682
                           413.503
683
                  2
                                      1367.693
                                                                                                   749
                           503.010
                                       1386.246
684
                  3
                                                                                                   750
                                                                                                                        Factor of Safety
685
                  4
                           533.940
                                      1431.724
                                                                                                   751
686
                  5
                           561.682
                                      1479.215
                                                                                                   752
                                                                                                                        *** 1.352 ***
687
                           566.083
                                      1484.478
                                                                                                   753
                                                                                                   754
688
689
                                                                                                   755
690
                    Factor of Safety
                                                                                                   756
691
                    *** 1.352 ***
                                                                                                   757
692
                                                                                                   758
                                                                                                                  Failure Surface Specified By 6 Coordinate Points
693
                                                                                                   759
                                                                                                   760
694
695
                                                                                                   761
                                                                                                                    Point
                                                                                                                              X-Surf
                                                                                                                                          Y-Surf
696
               Failure Surface Specified By 6 Coordinate Points
                                                                                                   762
                                                                                                                     No.
                                                                                                                               (ft)
                                                                                                                                          (ft)
697
                                                                                                   763
                                                                                                                              400.442
698
                                                                                                   764
                                                                                                                                          1375.831
699
                Point
                           X-Surf
                                      Y-Surf
                                                                                                   765
                                                                                                                      2
                                                                                                                              413.503
                                                                                                                                          1367.693
700
                 No.
                            (ft)
                                       (ft)
                                                                                                   766
                                                                                                                              503.010
                                                                                                                                          1386.246
701
                                                                                                   767
                                                                                                                      4
                                                                                                                              533.940
                                                                                                                                          1431.724
702
                           400.442
                                      1375.831
                                                                                                   768
                                                                                                                      5
                                                                                                                              561.682
                                                                                                                                          1479.215
703
                           413.503
                                      1367.693
                                                                                                   769
                                                                                                                              566.083
                                                                                                                                          1484.478
                  2
704
                  3
                           503.010
                                       1386.246
                                                                                                   770
705
                  4
                           533.940
                                      1431.724
                                                                                                   771
706
                  5
                           561.682
                                       1479.215
                                                                                                   772
                                                                                                                        Factor of Safety
                                                                                                   773
                                                                                                                        *** 1.352 ***
707
                  6
                           566.083
                                      1484.478
```

```
774
775
776
777
778
                Failure Surface Specified By 6 Coordinate Points
779
780
781
                 Point
                            X-Surf
                                        Y-Surf
782
                  No.
                            (ft)
                                        (ft)
783
                                       1374.365
1368.721
784
                            398.360
                            405.382
785
                   2
786
                            473.742
                                        1381.462
                   3
                                        1420.538
787
                            512.448
                            535.318 1470.557
537.112 1472.359
788
                   5
789
                   6
790
791
792
                     Factor of Safety
*** 1.362 ***
793
794
795
796
797
798
                         **** END OF GSTABL7 OUTPUT ****
799
```

Bouquet Canyon/21095-01/Section V-V'/ Temporary



| 1 | *** GSTABL7 *** |
|----------|---|
| 2 3 | ** GSTABL7 by Dr. Garry H. Gregory, Ph.D.,P.E.,D.GE ** |
| 4 5 | ** Original Version 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 ** |
| 6 7 | (All Rights Reserved-Unauthorized Use Prohibited) |
| 8 | |
| 9 | ******************* |
| | ** |
| 10 11 | SLOPE STABILITY ANALYSIS SYSTEM Modified Bishop, Simplified Janbu, or GLE Method of Slices. |
| 12 | (Includes Spencer & Morgenstern-Price Type Analysis) |
| 13 14 | Including Pier/Pile, Reinforcement, Soil Nail, Tieback, Nonlinear Undrained Shear Strength, Curved Phi Envelope, |
| 15 | Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water |
| 16 17 | Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces. |
| | *************************************** |
| 18 | |
| 19 20 | Analysis Run Date: 4/5/2022 |
| 21 | Time of Run: 10:12AM |
| 22 | Run By: LGC Geotechnical, Inc. |
| | |
| 23 | <pre>Input Data Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec V-V'\2022_04_05\xxx21.in</pre> |
| 24 | Output Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec V-V'\2022_04_05\xvc2t.OUT |
| 25 | Unit System: English |
| 26 27 | Plotted Output Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec V-V'\2022_04_05\xvc2t.PLT |
| 28 | |
| 29 30 | |
| 31 | |
| 32 33 | PROBLEM DESCRIPTION: Bouquet Canyon/21095-01/Section V-V'/ |
| 34 | Temporary |
| 35 36 | |
| 37 | |
| 38 | |
| 39 40 | BOUNDARY COORDINATES |
| 41 | 12 Top Boundaries |
| 42 | 14 Total Boundaries |
| 43 44 | |
| 45 | Boundary X-Left Y-Left X-Right Y-Right Soil Type |
| 46 47 | No. (ft) (ft) (ft) Below Bnd |
| ±/ | |

| 1 | 129.00 | 1375.00 | 360.00 | 1372.00 | 2 |
|----|--------|---------|--------|---------|---|
| 2 | 360.00 | 1372.00 | 395.00 | 1372.00 | 3 |
| 3 | 395.00 | 1372.00 | 520.00 | 1460.00 | 3 |
| 4 | 520.00 | 1460.00 | 538.00 | 1473.00 | 3 |
| 5 | 538.00 | 1473.00 | 560.00 | 1482.00 | 3 |
| 6 | 560.00 | 1482.00 | 587.00 | 1493.00 | 3 |
| 7 | 587.00 | 1493.00 | 602.00 | 1501.00 | 3 |
| 8 | 602.00 | 1501.00 | 607.00 | 1501.00 | 3 |
| 9 | 607.00 | 1501.00 | 628.00 | 1499.00 | 3 |
| 10 | 628.00 | 1499.00 | 642.00 | 1500.00 | 3 |
| 11 | 642.00 | 1500.00 | 692.00 | 1491.00 | 3 |
| 12 | 692.00 | 1491.00 | 774.00 | 1460.00 | 3 |
| 13 | 129.00 | 1323.00 | 181.00 | 1330.00 | 3 |
| 14 | 181.00 | 1330.00 | 360.00 | 1372.00 | 3 |

User Specified Y-Origin = 1280.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS

3 Type(s) of Soil

| Type | Unit Wt. | Unit Wt. | Cohesion Intercept (psf) | Angle | Pressure | Constant | Surface |
|------|----------|-------------------------|--------------------------------|-------|----------|----------|-------------|
| 2 | 120.0 | 120.0 120.0 120.0 | 100.0 | 28.0 | | 0.0 | 0 0 0 |

ANISOTROPIC STRENGTH PARAMETERS 1 soil type(s)

Soil Type 3 Is Anisotropic

Number Of Direction Ranges Specified = 3

| Direction Range No. | Counterclockwise Direction Limit (deg) | Cohesion Intercept (psf) | Friction Angle (deg) |
|---------------------------|--|--------------------------------|----------------------------|
| 1 | 10.0 | 250.00 | 36.00 |
| 2 | 15.0 | 150.00 | 25.00 |
| 3 | 90.0 | 250.00 | 36.00 |

ANISOTROPIC SOIL NOTES:

- (1) An input value of 0.01 for C and/or Phi will cause Aniso C and/or Phi to be ignored in that range.
- (2) An input value of 0.02 for Phi will set both Phi and C equal to zero, with no water weight in the tension crack.
- (3) An input value of 0.03 for Phi will set both Phi and C equal to zero, with water weight in the tension crack.

```
114
115
                ANISOTROPIC STRENGTH DATA HAS BEEN SUPPRESSED
116 1
117
118
119
                A Critical Failure Surface Searching Method, Using A Random
120
                Technique For Generating Circular Surfaces, Has Been Specified.
122
123
                4980 Trial Surfaces Have Been Generated.
124
125
                249 Surface(s) Initiate(s) From Each Of 20 Points Equally Spaced
126
                Along The Ground Surface Between X = 370.00(ft)
128
                                            and X = 430.00(ft)
129
130
131
                Each Surface Terminates Between X = 529.00(ft)
                                           and X = 650.00(ft)
133
134
135
                Unless Further Limitations Were Imposed, The Minimum Elevation
136
               At Which A Surface Extends Is Y =
                                                       0.00(ft)
138
                8.00(ft) Line Segments Define Each Trial Failure Surface.
139
140
141
142
143
144
                Following Are Displayed The Ten Most Critical Of The Trial
                Failure Surfaces Evaluated. They Are
145
146
                Ordered - Most Critical First.
147
148
                * * Safety Factors Are Calculated By The Modified Bishop Method * *
149
150
151
152
153
               Total Number of Trial Surfaces Attempted = 4980
154
155
               Number of Trial Surfaces With Valid FS = 4980
156
157
158
                Statistical Data On All Valid FS Values:
159
                  FS Max = 2.927 FS Min = 1.419 FS Ave = 2.112
                  Standard Deviation = 0.405 Coefficient of Variation = 19.16 %
160
161
162
163
               Failure Surface Specified By 28 Coordinate Points
164
165
                 Point
                            X-Surf
                                        Y-Surf
166
167
                  No.
                             (ft)
                                         (ft)
168
169
                            395.263
                                        1372.185
                   1
                                        1373.956
170
                   2
                            403.065
                            410.813
                                        1375.945
                   3
                            418.503
                                        1378.151
173
                            426 129
                                        1380 571
                   5
174
                            433.683
                                        1383.204
175
                            441.160
                                        1386.048
176
                            448.555
                                        1389.100
                   Q
                            455.862
                                        1392.358
178
                  10
                            463.074
                                        1395.820
179
                  11
                            470.186
                                        1399.482
```

```
180
                  12
                            477 193
                                       1403 343
                            484.089
181
                  13
                                       1407.398
182
                  14
                            490.868
                                       1411.646
183
                  15
                            497.526
                                       1416.081
                            504.057
                                       1420.702
184
                  16
185
                  17
                            510.456
                                       1425.503
186
                  18
                            516.717
                                       1430.482
187
                            522.837
                                       1435.635
                  19
188
                  20
                            528.810
                                       1440.957
189
                  21
                            534 631
                                       1446 445
190
                  2.2
                            540.296
                                       1452.094
191
                  23
                            545 800
                                       1457.899
192
                  24
                            551.140
                                       1463.856
                            556.311
                                       1469.961
193
                  25
194
                  26
                            561.308
                                       1476.208
195
                  2.7
                            566.128
                                       1482.593
                            568.037
196
                  28
                                       1485.275
197
198
               Circle Center At X = 336.075; Y = 1651.136; and Radius = 285.161
199
201
                     Factor of Safety
                     *** 1.419 ***
204
205
206
207
                    Individual data on the
                                             30 slices
208
209
210
                              Water Water
                                              Tie
                                                      Tie
                                                              Earthquake
211
                                                              Force Surcharge
                              Force Force
                                             Force
                                                   Force
212
      Slice Width
                     Weight
                                     Bot
                                             Norm
                                                      Tan
                                                              Hor
                                                                     Ver
                                                                            Load
                              goT
213
              (ft)
       No.
                     (lbs)
                              (lbs) (lbs)
                                             (lbs) (lbs)
                                                           (lbs) (lbs) (lbs)
214
               7 8
                      1741 9
                                                                        0 0
                                0 0
                                        0 0
                                                  Ω
                                                          Ω
                                                                0 0
                                                                                 0 0
216
        2
               7.7
                      5071.7
                                0.0
                                        0.0
                                                  0.
                                                          0.
                                                                0.0
                                                                        0.0
                                                                                 0.0
217
        3
               7.7
                      8112.8
                                0.0
                                        0.0
                                                  0.
                                                          0.
                                                                0.0
                                                                        0.0
                                                                                 0.0
                     10860.9
218
        4
               7.6
                                0.0
                                        0.0
                                                  0.
                                                          0.
                                                                 0.0
                                                                        0.0
                                                                                 0.0
                     13313.3
219
        5
               7.6
                                0.0
                                        0.0
                                                  0.
                                                          0.
                                                                0.0
                                                                        0.0
                                                                                 0.0
               7.5
                     15468.8
                                0.0
                                        0.0
                                                  0.
                                                                0.0
                                                                        0.0
                                                                                 0.0
               7.4
                    17327 3
                                0 0
                                        0 0
                                                          Ω
                                                                0 0
                                                                        0 0
                                                                                 0 0
222
        8
               7.3
                     18890.7
                                0.0
                                        0.0
                                                                0.0
                                                                        0.0
                                                                                 0.0
                                                  0.
                                                          0.
        9
               7 2
                     20162 2
                                0 0
                                        0 0
                                                  0.
                                                          Ω
                                                                0 0
                                                                        0 0
                                                                                 0 0
224
       10
               7.1
                     21146.2
                                        0.0
                                                                0.0
                                                                        0.0
                                                                                 0.0
                                0.0
                                                  0.
                                                          0.
225
       11
               7.0
                     21848.7
                                        0.0
                                0.0
                                                  0.
                                                                0.0
                                                                        0.0
                                                                                 0.0
226
               6 9
                     22276 9
                                                                0 0
       12
                                0 0
                                        0 0
                                                  0
                                                          Ω
                                                                        0 0
                                                                                 0 0
227
       13
               6.8
                     22439.8
                                0.0
                                        0.0
                                                                0.0
                                                                        0.0
                                                                                 0.0
                                                  0.
                                                          0.
228
       14
               6 7
                     22347.4
                                        0 0
                                                                0 0
                                0 0
                                                  0
                                                          Ω
                                                                        0 0
                                                                                 0 0
229
       15
               6.5
                     22010.9
                                0 0
                                        0.0
                                                  0.
                                                          0.
                                                                0.0
                                                                        0.0
                                                                                 0.0
230
       16
               6.4
                     21443.0
                                0.0
                                        0.0
                                                  0.
                                                          0.
                                                                0.0
                                                                        0.0
                                                                                 0.0
231
       17
               6.3
                     20657.3
                                0 0
                                        0 0
                                                  0.
                                                          0.
                                                                0.0
                                                                                 0.0
       18
               3.3
                     10627.8
                                0.0
                                        0.0
                                                  0.
                                                          0.
                                                                0.0
                                                                        0.0
                                                                                 0.0
233
       19
               2.8
                     9050.1
                                0.0
                                        0.0
                                                                0.0
                                                                        0.0
                                                                                 0.0
                                                  0.
                                                          0.
234
       20
               6.0
                     18570.0
                                0.0
                                        0.0
                                                  0.
                                                         0.
                                                                0.0
                                                                        0.0
                                                                                 0.0
235
       21
               5.8
                     17298.2
                                0.0
                                        0.0
                                                          0.
                                                                0.0
                                                                        0.0
                                                                                 0.0
                                                  0.
236
       22
               3.4
                     9565.1
                                0.0
                                        0.0
                                                  0.
                                                          0.
                                                                0.0
                                                                        0.0
                                                                                 0.0
237
       23
               2.3
                     6204.8
                                0 0
                                        0 0
                                                         Ο
                                                                0 0
                                                                        0 0
                                                                                 0 0
                                                  0
238
       24
               5.5
                    13256.4
                                0.0
                                        0.0
                                                                0.0
                                                                        0.0
                                                                                 0.0
                     10512.1
239
       25
               5 3
                                0 0
                                        0 0
                                                                0 0
                                                                        0 0
                                                                                 0 0
                                                  0
                                                          Ω
240
       26
               5.2
                      7771.1
                                0.0
                                        0.0
                                                          0.
                                                                0.0
                                                                        0.0
                                                                                 0.0
       27
                      3975 1
2.41
               3.7
                                0.0
                                        0.0
                                                  0.
                                                          0.
                                                                0.0
                                                                        0.0
                                                                                 0.0
242
       28
               1.3
                      1079.3
                                0 0
                                        0.0
                                                  0.
                                                                0.0
                                                                        0.0
                                                                                 0.0
2.43
       29
               4.8
                      2380.0
                                0.0
                                        0.0
                                                  0.
                                                         0.
                                                                0.0
                                                                        0.0
                                                                                 0.0
244
       30
               1 9
                       218.1
                                                                0 0
245
```

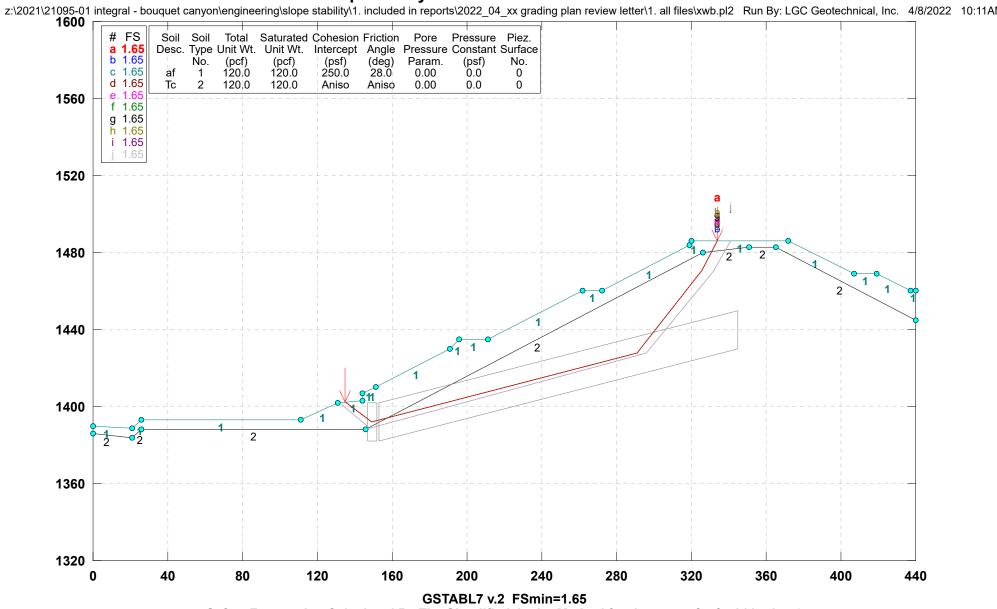
```
499.819
246
               Failure Surface Specified By 29 Coordinate Points
                                                                                                       312
                                                                                                                          15
                                                                                                                                                1419.939
247
                                                                                                                                    506.182
                                                                                                                                                1424.789
                                                                                                       313
                                                                                                                          16
                                                                                                                                    512.393
248
                                                                                                       314
                                                                                                                          17
                                                                                                                                                1429.831
                                                                                                                                    518.447
                                                                                                                                                1435.060
249
                 Point
                            X-Surf
                                        Y-Surf
                                                                                                       315
                                                                                                                          18
                                                                                                                                    524.338
                                                                                                                                                1440.472
250
                  No.
                             (ft)
                                         (ft)
                                                                                                       316
                                                                                                                          19
251
                                                                                                       317
                                                                                                                          20
                                                                                                                                    530.062
                                                                                                                                                1446.062
252
                            395.263
                                        1372.185
                                                                                                       318
                                                                                                                          21
                                                                                                                                    535.611
                                                                                                                                                1451.824
                            403.063
                                        1373.963
                                                                                                       319
                                                                                                                                    540.982
                                                                                                                                                1457.753
                   2.
                                                                                                                          2.2
254
                   3
                            410.813
                                        1375.950
                                                                                                       320
                                                                                                                          23
                                                                                                                                    546.170
                                                                                                                                                1463.843
255
                   4
                            418.505
                                        1378.145
                                                                                                       321
                                                                                                                          24
                                                                                                                                    551.168
                                                                                                                                                1470.089
256
                   5
                            426.136
                                        1380.548
                                                                                                       322
                                                                                                                          25
                                                                                                                                    555.974
                                                                                                                                                1476.485
                            433.699
                   6
                                        1383.156
                                                                                                       323
                                                                                                                          26
                                                                                                                                    559.803
                                                                                                                                                1481 919
258
                            441.189
                                        1385.967
                                                                                                       324
                            448.600
                                        1388.979
                                                                                                       325
                                                                                                                       Circle Center At X = 344.408; Y = 1630.365; and Radius = 261.593
259
                   8
                            455.928
                                        1392.190
260
                   9
                                                                                                       326
                            463.166
                                        1395.597
                                                                                                       327
261
                  10
                  11
                            470.309
                                        1399.199
262
                                                                                                       328
                                                                                                                              Factor of Safety
                            477.352
263
                  12
                                        1402.993
                                                                                                       329
                                                                                                                             *** 1.424 ***
                  13
                            484.291
                                        1406.975
                                                                                                       330
264
265
                  14
                            491.119
                                        1411.143
                                                                                                       331
                  15
                            497.833
                                        1415.494
                                                                                                       332
266
267
                  16
                            504.426
                                        1420.025
                                                                                                       333
268
                  17
                            510.895
                                        1424.731
                                                                                                       334
                                                                                                                       Failure Surface Specified By 28 Coordinate Points
269
                  18
                            517.234
                                        1429.611
                                                                                                       335
                  19
                            523.439
                                        1434 661
                                                                                                       336
                  20
                            529.506
                                        1439.875
                                                                                                       337
                                                                                                                         Point
                                                                                                                                    X-Surf
                                                                                                                                                Y-Surf
271
                  21
                            535.430
                                        1445.252
                                                                                                       338
                                                                                                                                                (ft)
                                                                                                                          No.
                                                                                                                                     (ft)
                            541.206
                                        1450.787
273
                  22
                                                                                                       339
274
                  23
                            546.831
                                        1456.476
                                                                                                       340
                                                                                                                           1
                                                                                                                                    395.263
                                                                                                                                                1372.185
275
                  24
                            552.300
                                        1462.314
                                                                                                       341
                                                                                                                           2
                                                                                                                                    402.960
                                                                                                                                                1374.365
276
                  25
                            557.610
                                        1468.298
                                                                                                       342
                                                                                                                           3
                                                                                                                                    410.605
                                                                                                                                                1376.724
277
                  26
                            562.756
                                        1474.423
                                                                                                       343
                                                                                                                                    418.192
                                                                                                                                                1379.261
278
                  27
                            567.735
                                        1480.685
                                                                                                       344
                                                                                                                           5
                                                                                                                                    425.718
                                                                                                                                                1381.975
                            572.543
                                        1487.079
                                                                                                       345
                                                                                                                                    433.178
                                                                                                                                                1384.863
279
                  28
                                                                                                                           6
280
                  29
                            572.574
                                        1487.123
                                                                                                       346
                                                                                                                           7
                                                                                                                                    440.569
                                                                                                                                                1387.925
                                                                                                       347
                                                                                                                                    447.886
                                                                                                                                                1391.158
281
                                                                                                                           8
282
               Circle Center At X = 333.346; Y = 1661.940; and Radius = 296.297
                                                                                                       348
                                                                                                                           9
                                                                                                                                    455.126
                                                                                                                                                1394.561
283
                                                                                                       349
                                                                                                                          10
                                                                                                                                    462.285
                                                                                                                                                1398.133
284
                                                                                                        350
                                                                                                                          11
                                                                                                                                    469.358
                                                                                                                                                1401.870
                                                                                                       351
                                                                                                                                    476.342
                                                                                                                                                1405.772
285
                      Factor of Safety
                                                                                                                          12
                     *** 1.421 ***
                                                                                                       352
                                                                                                                                    483.233
                                                                                                                                                1409.836
286
                                                                                                                          13
287
                                                                                                       353
                                                                                                                          14
                                                                                                                                    490.028
                                                                                                                                                1414.059
                                                                                                                                    496.721
288
                                                                                                       354
                                                                                                                          15
                                                                                                                                                1418.440
289
                                                                                                       355
                                                                                                                          16
                                                                                                                                    503.311
                                                                                                                                                1422 976
290
    1
                                                                                                       356
                                                                                                                          17
                                                                                                                                    509.793
                                                                                                                                                1427.665
291
                                                                                                       357
                                                                                                                          18
                                                                                                                                    516.164
                                                                                                                                                1432.503
               Failure Surface Specified By 26 Coordinate Points
                                                                                                       358
                                                                                                                                    522.420
                                                                                                                                                1437.489
                                                                                                                          19
292
293
                                                                                                       359
                                                                                                                          20
                                                                                                                                    528.558
                                                                                                                                                1442.620
294
                                                                                                       360
                                                                                                                          21
                                                                                                                                    534.575
                                                                                                                                                1447.893
295
                 Point
                            X-Surf
                                        Y-Surf
                                                                                                       361
                                                                                                                          22
                                                                                                                                    540.467
                                                                                                                                                1453.304
296
                  No.
                             (ft)
                                         (ft)
                                                                                                       362
                                                                                                                          2.3
                                                                                                                                    546.231
                                                                                                                                                1458.852
297
                                                                                                       363
                                                                                                                          24
                                                                                                                                    551.863
                                                                                                                                                1464.533
                            398.421
                                        1374.408
                                                                                                                                    557.362
                                                                                                                                                1470.344
298
                   1
                                                                                                       364
                                                                                                                          25
299
                   2
                            406.222
                                        1376.180
                                                                                                       365
                                                                                                                          26
                                                                                                                                    562.724
                                                                                                                                                1476.281
300
                   3
                            413.966
                                        1378.190
                                                                                                       366
                                                                                                                          27
                                                                                                                                    567.945
                                                                                                                                                1482.342
301
                   4
                            421.644
                                        1380.435
                                                                                                       367
                                                                                                                          28
                                                                                                                                    571.520
                                                                                                                                                1486.693
302
                   5
                            429.251
                                        1382.914
                                                                                                       368
303
                            436.777
                                        1385.624
                                                                                                       369
                                                                                                                       Circle Center At X = 305.827; Y = 1702.757; and Radius = 342.456
                   6
304
                            444.218
                                        1388.563
                                                                                                       370
                            451.565
                                        1391.728
305
                   8
                                                                                                       371
306
                   9
                            458.812
                                        1395.117
                                                                                                       372
                                                                                                                              Factor of Safety
307
                            465.953
                                        1398.725
                                                                                                       373
                                                                                                                             *** 1.425 ***
                  10
308
                  11
                            472.979
                                        1402.549
                                                                                                       374
309
                  12
                            479.885
                                        1406.587
                                                                                                       375
310
                  13
                             486.665
                                        1410.834
                                                                                                       376
311
                  14
                            493.312
                                        1415.286
                                                                                                       377 1
```

```
378
                                                                                                      444
                                                                                                                         18
                                                                                                                                   519.651
                                                                                                                                              1433.767
379
               Failure Surface Specified By 26 Coordinate Points
                                                                                                      445
                                                                                                                         19
                                                                                                                                   525.870
                                                                                                                                              1438.800
380
                                                                                                      446
                                                                                                                         20
                                                                                                                                   531.961
                                                                                                                                              1443.986
381
                                                                                                      447
                                                                                                                         21
                                                                                                                                   537.920
                                                                                                                                               1449.323
                            X-Surf
                                                                                                                                   543.744
                                                                                                                                              1454.808
382
                 Point
                                        Y-Surf
                                                                                                      448
                                                                                                                         22
383
                                                                                                      449
                                                                                                                         23
                                                                                                                                   549.430
                                                                                                                                              1460.436
                  No.
                            (ft)
                                        (ft)
384
                                                                                                      450
                                                                                                                         24
                                                                                                                                   554.972
                                                                                                                                               1466.205
                            398.421
                                        1374.408
                                                                                                      451
                                                                                                                                              1472.110
385
                   1
                                                                                                                         25
                                                                                                                                   560.369
386
                   2
                            406.183
                                       1376.346
                                                                                                      452
                                                                                                                         26
                                                                                                                                   565.616
                                                                                                                                              1478.149
387
                            413.885
                                       1378.510
                                                                                                      453
                                                                                                                         27
                                                                                                                                   570.711
                                                                                                                                              1484.317
                   3
388
                            421.520
                                        1380.898
                                                                                                      454
                                                                                                                         28
                                                                                                                                   573.073
                                                                                                                                              1487.326
389
                   5
                            429 082
                                        1383 508
                                                                                                      455
390
                            436.565
                                        1386.338
                                                                                                      456
                                                                                                                      Circle Center At X = 321.591; Y = 1684.770; and Radius = 319.729
                   6
                            443.962
                                        1389.385
                                                                                                      457
391
392
                   8
                            451.267
                                        1392.647
                                                                                                      458
393
                  9
                            458.473
                                        1396.121
                                                                                                      459
                                                                                                                            Factor of Safety
                            465.575
                                                                                                                            *** 1.428 ***
394
                  10
                                        1399.804
                                                                                                      460
                            472.566
395
                  11
                                       1403.693
                                                                                                      461
                            479.440
                                       1407.785
                                                                                                      462
396
                  12
397
                  13
                            486.192
                                        1412.076
                                                                                                      463
                  14
                            492.816
                                        1416.562
                                                                                                      464 1
398
399
                  15
                            499.306
                                        1421.240
                                                                                                      465
400
                  16
                            505.656
                                       1426.105
                                                                                                      466
                                                                                                                      Failure Surface Specified By 30 Coordinate Points
401
                  17
                            511.862
                                       1431.154
                                                                                                      467
402
                  18
                            517.917
                                        1436.382
                                                                                                      468
                  19
                            523.818
                                        1441.785
                                                                                                      469
                                                                                                                                   X-Surf
                                                                                                                                               Y-Surf
403
                                                                                                                        Point
                            529.557
                                        1447.357
404
                  20
                                                                                                      470
                                                                                                                         No.
                                                                                                                                    (ft)
                                                                                                                                               (ft)
                                       1453.095
405
                  21
                            535.132
                                                                                                      471
406
                  2.2
                            540.536
                                        1458.994
                                                                                                      472
                                                                                                                          - 1
                                                                                                                                   395.263
                                                                                                                                              1372.185
407
                  23
                            545.766
                                        1465.048
                                                                                                      473
                                                                                                                                   403.086
                                                                                                                                              1373.860
                                                                                                                          2.
408
                  24
                            550.816
                                        1471.252
                                                                                                      474
                                                                                                                          3
                                                                                                                                   410.863
                                                                                                                                              1375.737
409
                  25
                            555.684
                                       1477.601
                                                                                                      475
                                                                                                                                   418.588
                                                                                                                                              1377.815
410
                  26
                            558.378
                                       1481.336
                                                                                                      476
                                                                                                                          5
                                                                                                                                   426.257
                                                                                                                                              1380.092
                                                                                                                                              1382.567
411
                                                                                                      477
                                                                                                                          6
                                                                                                                                   433.865
412
               Circle Center At X = 336.077; Y = 1640.777; and Radius = 273.567
                                                                                                      478
                                                                                                                          7
                                                                                                                                   441.405
                                                                                                                                              1385.238
                                                                                                      479
                                                                                                                                   448.875
                                                                                                                                              1388.104
413
                                                                                                                          8
414
                                                                                                      480
                                                                                                                                   456.267
                                                                                                                                               1391.163
415
                     Factor of Safety
                                                                                                      481
                                                                                                                         10
                                                                                                                                   463.577
                                                                                                                                               1394.412
                     *** 1.427 ***
                                                                                                                                   470.801
                                                                                                                                               1397.849
416
                                                                                                      482
                                                                                                                         11
                                                                                                                                   477.934
417
                                                                                                      483
                                                                                                                         12
                                                                                                                                              1401.472
                                                                                                                                   484.970
                                                                                                                                              1405.279
418
                                                                                                      484
                                                                                                                         13
419
                                                                                                      485
                                                                                                                         14
                                                                                                                                   491.905
                                                                                                                                              1409.267
420
                                                                                                      486
                                                                                                                         15
                                                                                                                                   498.735
                                                                                                                                              1413.433
421
               Failure Surface Specified By 28 Coordinate Points
                                                                                                      487
                                                                                                                         16
                                                                                                                                   505.454
                                                                                                                                              1417.775
422
                                                                                                      488
                                                                                                                         17
                                                                                                                                   512.059
                                                                                                                                              1422.289
423
                                                                                                      489
                                                                                                                         18
                                                                                                                                   518.544
                                                                                                                                              1426.974
                 Point
                           X-Surf
                                        Y-Surf
                                                                                                                                   524.906
                                                                                                      490
                                                                                                                                              1431 824
424
                                                                                                                         19
425
                  No.
                             (ft)
                                        (ft)
                                                                                                      491
                                                                                                                         20
                                                                                                                                   531.140
                                                                                                                                              1436.838
                                                                                                      492
                                                                                                                         21
                                                                                                                                   537 242
                                                                                                                                              1442 011
426
427
                            398.421
                                        1374.408
                                                                                                      493
                                                                                                                         22
                                                                                                                                   543.208
                                                                                                                                              1447.341
428
                   2
                            406.162
                                        1376.429
                                                                                                      494
                                                                                                                         2.3
                                                                                                                                   549.034
                                                                                                                                              1452.824
429
                   3
                            413.850
                                        1378.642
                                                                                                      495
                                                                                                                         24
                                                                                                                                   554.715
                                                                                                                                               1458.455
430
                   4
                            421.480
                                        1381.046
                                                                                                      496
                                                                                                                         25
                                                                                                                                   560.249
                                                                                                                                              1464.232
431
                   5
                            429.047
                                        1383.641
                                                                                                      497
                                                                                                                         26
                                                                                                                                   565.632
                                                                                                                                              1470.151
432
                            436.548
                                        1386.424
                                                                                                      498
                                                                                                                         27
                                                                                                                                   570.859
                                                                                                                                              1476.207
433
                   7
                            443.976
                                        1389.394
                                                                                                      499
                                                                                                                         28
                                                                                                                                   575.928
                                                                                                                                              1482.396
434
                   8
                            451.328
                                        1392.548
                                                                                                      500
                                                                                                                         29
                                                                                                                                   580.834
                                                                                                                                              1488.715
                            458.598
                                        1395.885
                                                                                                      501
                                                                                                                         30
                                                                                                                                   582.697
                                                                                                                                              1491.247
435
                  9
436
                  10
                            465.783
                                        1399.403
                                                                                                      502
                            472.878
                                        1403.100
                                                                                                      503
                                                                                                                      Circle Center At X = 334.615; Y = 1674.727; and Radius = 308.560
437
                  1.1
438
                  12
                            479.878
                                        1406.973
                                                                                                      504
                                       1411.019
                                                                                                      505
439
                  13
                            486.779
440
                  14
                            493.577
                                        1415.237
                                                                                                                            Factor of Safety
                                                                                                                            *** 1.428 ***
441
                  15
                            500.267
                                        1419.624
                                                                                                      507
442
                  16
                            506.846
                                        1424.176
                                                                                                      508
443
                  17
                            513.308
                                        1428.891
                                                                                                      509
```

```
510
                                                                                                     576
                                                                                                                        17
                                                                                                                                 516.611
                                                                                                                                             1429 935
511
                                                                                                     577
                                                                                                                        18
                                                                                                                                 522.788
                                                                                                                                             1435.019
512
               Failure Surface Specified By 25 Coordinate Points
                                                                                                     578
                                                                                                                        19
                                                                                                                                 528.809
                                                                                                                                             1440.286
513
                                                                                                     579
                                                                                                                        20
                                                                                                                                 534.670
                                                                                                                                             1445.731
514
                                                                                                     580
                                                                                                                        21
                                                                                                                                 540.366
                                                                                                                                             1451.349
515
                           X-Surf
                                       Y-Surf
                                                                                                     581
                                                                                                                                 545.890
                                                                                                                                             1457.136
                 Point
                                                                                                                        2.2
516
                  No.
                            (ft)
                                        (ft)
                                                                                                     582
                                                                                                                        23
                                                                                                                                 551.238
                                                                                                                                             1463.085
                                                                                                     583
517
                                                                                                                        2.4
                                                                                                                                 556.406
                                                                                                                                             1469.192
518
                           398.421
                                       1374.408
                                                                                                     584
                                                                                                                        25
                                                                                                                                 561.389
                                                                                                                                             1475.451
519
                  2
                           406.233
                                       1376 133
                                                                                                     585
                                                                                                                        26
                                                                                                                                 566.181
                                                                                                                                             1481.856
                                                                                                     586
520
                           413.984
                                       1378.114
                                                                                                                        27
                                                                                                                                 568.801
                                                                                                                                             1485.586
521
                   4
                            421.665
                                       1380 350
                                                                                                     587
                   5
                            429.268
                                       1382.838
                                                                                                     588
                                                                                                                     Circle Center At X = 350.074; Y = 1638.556; and Radius = 266.940
522
                           436.785
                                       1385.576
                                                                                                     589
523
                   6
524
                           444.207
                                       1388.561
                                                                                                     590
525
                   8
                           451.527
                                       1391.789
                                                                                                     591
                                                                                                                           Factor of Safety
                           458.736
                                                                                                                           *** 1.431 ***
526
                  9
                                       1395.258
                                                                                                     592
527
                  10
                           465.827
                                       1398.962
                                                                                                     593
                  11
                           472.791
                                       1402.899
                                                                                                     594
528
529
                  12
                           479.622
                                       1407.063
                                                                                                     595
                  13
                           486.311
                                                                                                     596
530
                                       1411.451
531
                  14
                            492.852
                                       1416.057
                                                                                                     597
                                                                                                                     Failure Surface Specified By 29 Coordinate Points
532
                  15
                           499.237
                                       1420.877
                                                                                                     598
533
                  16
                           505.460
                                       1425.905
                                                                                                     599
                                                                                                                                             Y-Surf
534
                  17
                           511.513
                                       1431.135
                                                                                                     600
                                                                                                                       Point
                                                                                                                                 X-Surf
                  18
                            517.390
                                       1436.563
                                                                                                     601
535
                                                                                                                        No.
                                                                                                                                  (ft)
                                                                                                                                              (ft)
                           523.085
536
                  19
                                       1442.182
                                                                                                     602
                                       1447.985
                                                                                                                                 398.421
                                                                                                                                             1374.408
537
                  20
                           528.591
                                                                                                     603
538
                  21
                           533.902
                                       1453.968
                                                                                                     604
                                                                                                                        2.
                                                                                                                                 406.175
                                                                                                                                             1376.376
                  22
                            539.013
                                       1460.122
                                                                                                     605
                                                                                                                                 413.879
                                                                                                                                             1378.533
539
                                                                                                                        3
540
                  23
                            543.918
                                       1466.442
                                                                                                     606
                                                                                                                        4
                                                                                                                                 421.527
                                                                                                                                             1380.879
541
                  24
                           548.612
                                       1472.921
                                                                                                     607
                                                                                                                                 429.116
                                                                                                                                             1383.411
                                                                                                                        5
542
                  25
                           552.736
                                       1479.028
                                                                                                     608
                                                                                                                                 436.641
                                                                                                                                             1386.128
                                                                                                                                 444.096
                                                                                                                                             1389.028
543
                                                                                                     609
                                                                                                                        7
544
               Circle Center At X = 350.131; Y = 1611.776; and Radius = 242.230
                                                                                                     610
                                                                                                                        8
                                                                                                                                 451.479
                                                                                                                                             1392.110
                                                                                                                                 458.784
                                                                                                                                             1395 373
545
                                                                                                     611
546
                                                                                                     612
                                                                                                                        10
                                                                                                                                 466.006
                                                                                                                                             1398.813
547
                     Factor of Safety
                                                                                                     613
                                                                                                                        11
                                                                                                                                 473.142
                                                                                                                                             1402.429
                     *** 1.429 ***
                                                                                                                                 480.188
                                                                                                                                             1406.218
548
                                                                                                     614
                                                                                                                        12
                                                                                                                                 487.138
549
                                                                                                     615
                                                                                                                        13
                                                                                                                                             1410.179
                                                                                                                                 493.990
                                                                                                                                             1414.310
550
                                                                                                     616
                                                                                                                        14
551
                                                                                                     617
                                                                                                                        15
                                                                                                                                 500.738
                                                                                                                                             1418.606
552 1
                                                                                                     618
                                                                                                                        16
                                                                                                                                 507.379
                                                                                                                                             1423.067
553
                                                                                                     619
                                                                                                                        17
                                                                                                                                 513.908
                                                                                                                                             1427.689
554
               Failure Surface Specified By 27 Coordinate Points
                                                                                                     620
                                                                                                                        18
                                                                                                                                 520.323
                                                                                                                                             1432.470
555
                                                                                                     621
                                                                                                                        19
                                                                                                                                 526.618
                                                                                                                                             1437.406
                                                                                                                                 532 791
                                                                                                                                             1442 495
556
                                                                                                     622
                                                                                                                        20
557
                 Point
                           X-Surf
                                       Y-Surf
                                                                                                     623
                                                                                                                        21
                                                                                                                                 538.837
                                                                                                                                             1447.734
558
                            (ft)
                                        (ft)
                                                                                                                        22
                                                                                                                                 544 753
                                                                                                                                             1453 120
                  No.
                                                                                                     624
559
                                                                                                     625
                                                                                                                        23
                                                                                                                                 550.535
                                                                                                                                             1458.648
560
                   1
                           401.579
                                       1376.632
                                                                                                     626
                                                                                                                        2.4
                                                                                                                                 556.180
                                                                                                                                             1464.317
561
                            409.405
                                       1378.293
                                                                                                     627
                                                                                                                        25
                                                                                                                                  561.685
                                                                                                                                             1470.122
562
                   3
                           417.177
                                       1380.187
                                                                                                     628
                                                                                                                        26
                                                                                                                                 567.045
                                                                                                                                             1476.060
563
                           424.889
                                       1382.314
                                                                                                     629
                                                                                                                        27
                                                                                                                                 572.259
                                                                                                                                             1482.128
564
                   5
                           432.534
                                       1384.671
                                                                                                     630
                                                                                                                        28
                                                                                                                                 577.323
                                                                                                                                             1488.321
565
                   6
                            440.105
                                       1387.256
                                                                                                     631
                                                                                                                        29
                                                                                                                                 578.160
                                                                                                                                             1489.398
566
                           447.595
                                       1390.067
                                                                                                     632
                           454.997
                                       1393.101
                                                                                                                     Circle Center At X = 321.973; Y = 1691.910; and Radius = 326.575
567
                                                                                                     633
                   8
568
                   9
                           462.305
                                       1396.355
                                                                                                     634
569
                  1.0
                           469 513
                                       1399 827
                                                                                                     635
570
                  11
                           476.613
                                       1403.513
                                                                                                     636
                                                                                                                           Factor of Safety
571
                                       1407.411
                                                                                                                           *** 1.431 ***
                  12
                            483.599
                                                                                                     637
572
                  13
                            490.466
                                       1411.516
573
                  14
                            497.206
                                       1415.825
                                                                                                     639
574
                  15
                            503.815
                                       1420.333
                                                                                                     640
575
                  16
                           510.285
                                       1425.038
                                                                                                     641
```

644 **** END OF GSTABL7 OUTPUT ****

Bouquet Canyon/21095-01/Section W-W'/ Static



Safety Factors Are Calculated By The Simplified Janbu Method for the case of c & phi both > 0

| 1 | | *** GSTABL7 *** | 48 | 1 | 0.00 | 1390.00 | 21.00 | 1389.00 | 1 |
|----------|-------------------------|---|----------|--------------|--------------|------------|-------------|-----------|---------------|
| 2 | | | 49 | 2 | 21.00 | 1389.00 | 26.00 | 1393.00 | 1 |
| 3 | ** GSTABL | by Dr. Garry H. Gregory, Ph.D., P.E., D.GE ** | 50 | 3 | 26.00 | 1393.00 | 111.00 | 1393.00 | 1 |
| 4 | | | 51 | 4 | 111.00 | 1393.00 | 131.00 | 1402.00 | 1 |
| 5 | | 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 ** | 52 | 5 | 131.00 | 1402.00 | 144.00 | 1403.00 | 1 |
| 6 | (All Rig | hts Reserved-Unauthorized Use Prohibited) | 53 | 6 | 144.00 | 1403.00 | 144.10 | 1407.00 | 1 |
| 7 | | | 54 | 7 | 144.10 | 1407.00 | 151.00 | 1410.00 | 1 |
| 8 | | | 55 | 8 | 151.00 | 1410.00 | 191.00 | 1430.00 | 1 |
| 9 | | | 56 | 9 | 191.00 | 1430.00 | 196.00 | 1435.00 | 1 |
| | ******** | ************* | 57 | 10 | 196.00 | 1435.00 | 211.00 | 1435.00 | 1 |
| | ** | | 58 | 11 | 211.00 | 1435.00 | 262.00 | 1460.00 | 1 |
| 10 | SLO | PE STABILITY ANALYSIS SYSTEM | 59 | 12 | 262.00 | 1460.00 | 272.00 | 1460.00 | 1 |
| 11 | Modified Bishop | Simplified Janbu, or GLE Method of Slices. | 60 | 13 | 272.00 | 1460.00 | 319.00 | 1484.00 | 1 |
| 12 | (Includes Spence | er & Morgenstern-Price Type Analysis) | 61 | 14 | 319.00 | 1484.00 | 320.00 | 1486.00 | 1 |
| 13 | Including Pier/ | Pile, Reinforcement, Soil Nail, Tieback, | 62 | 15 | 320.00 | 1486.00 | 372.00 | 1486.00 | 1 |
| 14 | Nonlinear Undra: | ned Shear Strength, Curved Phi Envelope, | 63 | 16 | 372.00 | 1486.00 | 407.00 | 1469.00 | 1 |
| 15 | Anisotropic Soil | , Fiber-Reinforced Soil, Boundary Loads, Water | 64 | 17 | 407.00 | 1469.00 | 419.00 | 1469.00 | 1 |
| 16 | Surfaces, Pseudo | -Static & Newmark Earthquake, and Applied Forces. | 65 | 18 | 419.00 | 1469.00 | 437.00 | 1460.00 | 1 |
| 17 | | | 66 | 19 | 437.00 | 1460.00 | 440.00 | 1460.00 | 1 |
| | ********** | *************** | 67 | 20 | 0.00 | 1386.00 | 21.00 | 1384.00 | 2 |
| | ** | | 68 | 21 | 21.00 | 1384.00 | 26.00 | 1388.00 | 2 |
| 18 | | | 69 | 22 | 26.00 | 1388.00 | 146.00 | 1388.00 | 2 |
| 19 | | | 70 | 23 | 146.00 | 1388.00 | 326.00 | 1480.00 | 2 |
| 20 | Analysis Run Date: | 4/8/2022 | 71 | 24 | 326.00 | 1480.00 | 351.00 | 1483.00 | 2 |
| 21 | Time of Run: | 10:11AM | 72 | 25 | 351.00 | 1483.00 | 365.00 | 1483.00 | 2 |
| 22 | Run By: | LGC Geotechnical, | 73 | 26 | 365.00 | 1483.00 | 440.00 | 1445.00 | 2 |
| | Inc. | | 74 | | | | | | |
| | | | 75 | User Specif | ied Y-Origi | in = | 1320.00(ft) | | |
| | | | 76 | | | | | | |
| 23 | Input Data Filename: | Z:\2021\21095-01 Integral - Bouquet | 77 | Default X-I | Plus Value = | = 0.00(ft) | | | |
| | Canyon\Engineering\slop | pe stability\Sec | 78 | | | | | | |
| | W-W'\2022_04_08\xwb.in | | 79 | Default Y-I | Plus Value = | = 0.00(ft) | | | |
| | | | 80 1 | | | | | | |
| | | | 81 | | | | | | |
| 24 | Output Filename: | Z:\2021\21095-01 Integral - Bouquet | 82 | | | | | | |
| | Canyon\Engineering\slop | | 83 | ISOTROPIC SC | OIL PARAMETE | ERS | | | |
| | W-W'\2022_04_08\xwb.OU | | 84 | | | | | | |
| | | | 85 | | | | | | |
| | | | 86 | 2 Type(s) | of Soil | | | | |
| 25 | Unit System: | English | 87 | | | | | | |
| 26 | | | 88 | | | | | | |
| 27 | | : Z:\2021\21095-01 Integral - Bouquet | 89 | | Saturated | | | | sure Piez. |
| | Canyon\Engineering\slop | | 90 | | Vt. Unit Wt. | - | | | stant Surface |
| | W-W'\2022_04_08\xwb.PL? | | 91 | No. (pcf) | (pcf) | (psf) | (deg) | Param. (g | osf) No. |
| | | | 92 | | | | | | |
| 0.0 | | | 93 | 1 120.0 | | 250.0 | 28.0 | | 0.0 |
| 28 29 | | | 94 95 | 2 120.0 | 120.0 | 250.0 | 32.0 | 0.00 | 0.0 |
| 30 | | | 96 | | | | | | |
| 31 | | | 97 | | | | | | |
| 32 | | | 98 | ANISOTROPIC | CODENCOL DA | DAMEMEDO | | | |
| 33 | DROBLEM DESCRIPTION. | Souguet Canyon/21095-01/Section W-W'/ | 99 | | type(s) | ARAMEIERS | | | |
| 34 | | Static | 100 | 1 5011 | cype(s) | | | | |
| 35 | • | reacic | 101 | | | | | | |
| 36 | | | 102 | Soil Tyme | 2 Is Anisot | ronia | | | |
| 37 | | | 103 | SOII TYPE | Z IS AIIISUU | LIOPIC | | | |
| 38 | | | 104 | Number Of I | Direction Ra | anges Spec | ified = 3 | | |
| 39 | BOUNDARY COORDINATES | | 105 | Transce Of I | | | | | |
| 40 | | | 106 | | | | | | |
| 41 | 19 Top Boundaries | | 107 | Direction | Countercl | Lockwise | Cohesion | Friction | 1 |
| 42 | 26 Total Boundaries | | 108 | Range | Directio | | Intercept | Angle | |
| 43 | | | 109 | No. | (deg | | (psf) | (deg) | |
| 44 | | | 110 | =:== | , | | , | 37 | |
| 45 | Boundary X-Left | Y-Left X-Right Y-Right Soil Type | 111 | 1 | 9. | . 0 | 250.00 | 32.0 | 00 |
| 46 | No. (ft) | (ft) (ft) (ft) Below Bnd | 112 | 2 | 15. | . 0 | 150.00 | 25.0 | 00 |
| 47 | | | 113 | 3 | 90. | . 0 | 250.00 | 32.0 | 00 |
| | | | 1 | | | | | | |
| | | | 1 | | | | | | |

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114
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125 1
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ANISOTROPIC SOIL NOTES:
```

- (1) An input value of 0.01 for C and/or Phi will cause Aniso C and/or Phi to be ignored in that range.
- (2) An input value of 0.02 for Phi will set both Phi and C equal to zero, with no water weight in the tension crack.
- (3) An input value of 0.03 for Phi will set both Phi and C equal to zero, with water weight in the tension crack.

Janbus Empirical Coef is being used for the case of $\ c$ & phi both > 0

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

4999 Trial Surfaces Have Been Generated.

2 Boxes Specified For Generation Of Central Block Base

 ${\bf Length}$ Of Line Segments For Active And Passive Portions Of Sliding Block Is $-55.0\,$

| Box No. | X-Left (ft) | Y-Left (ft) | X-Right (ft) | Y-Right (ft) | Height (ft) |
|------------|----------------|----------------|-----------------|-----------------|----------------|
| 1 | 147.00 | 1392.00 | 152.00 | 1392.00 | 20.00 |
| 2 | 153.00 | 1392.00 | 345.00 | 1440.00 | 20.00 |

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following $\ 4$ Coordinate Points

| X-Surf (ft) | Y-Surf (ft) |
|----------------|---------------------------|
| 144.00 | 1403.12 |
| 147.58 | 1401.81 |
| 237.32 | 1411.75 |
| 237.46 | 1447.97 |
| | (ft) 144.00 147.58 237.32 |

Factor of Safety for the Preceding Surface is Between10.374 and10.344

WARNING! The factor of safety calculation did not converge in 20 iterations.

Point

No.

X-Surf

(ft)

144.00

147.58

237.32

237.46

Y-Surf

(ft)

1403.12

1401.81

1411.75

The Trial Failure Surface In Question Is Defined By The Following $\ 4$ Coordinate Points

| Point | X-Surf | Y-Surf |
|-------|--------|--------|
| No. | (ft) | (ft) |

| 180 | | | | | | |
|-----|--------------|--------------|----------------|-----------------|----------------|----------------|
| 181 | 1 | 139.30 | 1402.64 | | | |
| 182 | 2 | 151.12 | 1391.37 | | | |
| 183 | 3 | 201.36 | 1395.48 | | | |
| 184 | 4 | 201.68 | 1435.00 | | | |
| 185 | - | 201.00 | 1133.00 | | | |
| 186 | | | | | | |
| 187 | Factor of 9 | Safety for t | he Drecedino | Surface is Bet | tween18 765 a | nd18 723 |
| 188 | ractor or . | barety for t | ine Freceding | Durrace is be | cweeniio.705 a | 11010.723 |
| 189 | | | | | | |
| 190 | WADNING! Th | e factor of | f cafety calc | ulation did not | t converce in | 20 iterations. |
| 191 | WHICHING: 11 | ic ractor of | barcey care | aracion ara no | c converge in | 20 1001001015. |
| 192 | | | | | | |
| 193 | | | | | | |
| 194 | The Trial I | Tailure Surf | face In Onest | ion Is Defined | | |
| 195 | | | oordinate Poi | | | |
| 196 | 27 1110 1011 | .0,,,,,, | JOI GINGUU TOI | | | |
| 197 | | | | | | |
| 198 | Point | X-Surf | Y-Surf | | | |
| 199 | No. | (ft) | (ft) | | | |
| 200 | 1.0 • | (20) | (20) | | | |
| 201 | 1 | 144.00 | 1403.12 | | | |
| 202 | 2 | 147.58 | 1401.81 | | | |
| 203 | 3 | 237.32 | 1411.75 | | | |
| 204 | 4 | 237.46 | 1447.97 | | | |
| 205 | - | 237.10 | 2227.57 | | | |
| 206 | | | | | | |
| 207 | Factor of S | Safety for t | the Preceding | Surface is Bet | tween10.374 a | nd10.344 |
| 208 | | | | | | |
| 209 | | | | | | |
| 210 | WARNING! Th | ne factor of | f safety calc | ulation did not | t converge in | 20 iterations. |
| 211 | | | | | | |
| 212 | | | | | | |
| 213 | | | | | | |
| 214 | The Trial H | ailure Surf | face In Ouest | ion Is Defined | | |
| 215 | | | oordinate Poi | | | |
| 216 | • | _ | | | | |
| 217 | | | | | | |
| 218 | Point | X-Surf | Y-Surf | | | |
| 219 | No. | (ft) | (ft) | | | |
| 220 | | | | | | |
| 221 | 1 | 139.30 | 1402.64 | | | |
| 222 | 2 | 151.12 | 1391.37 | | | |
| 223 | 3 | 201.36 | 1395.48 | | | |
| 224 | 4 | 201.68 | 1435.00 | | | |
| 225 | | | | | | |
| 226 | | | | | | |
| 227 | Factor of S | Safety for t | the Preceding | Surface is Bet | tween18.765 a | nd18.723 |
| 228 | | | | | | |
| 229 | | | | | | |
| 230 | WARNING! Th | ne factor of | f safety calc | ulation did not | t converge in | 20 iterations. |
| 231 | | | | | | |
| 232 | | | | | | |
| 233 | | | | | | |
| 234 | The Trial H | Failure Surf | face In Quest | ion Is Defined | | |
| 235 | By The Foll | lowing 4 Co | oordinate Poi | nts | | |
| 000 | | | | | | |

Factor of Safety for the Preceding Surface is Between10.374 and10.344

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following $\ 4$ Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) | |
|--------------|----------------|----------------|--|
| 1 | 139.30 | 1402.64 | |
| 2 | 151.12 | 1391.37 | |
| 3 | 201.36 | 1395.48 | |
| 4 | 201.68 | 1435.00 | |

Factor of Safety for the Preceding Surface is Between18.765 and18.723

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following $\ 4$ Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) | |
|--------------|----------------|----------------|--|
| 1 | 144.00 | 1403.12 | |
| 2 | 147.58 | 1401.81 | |
| 3 | 237.32 | 1411.75 | |
| 4 | 237.46 | 1447.97 | |

Factor of Safety for the Preceding Surface is Between10.374 and10.344

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 4 Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|--------------|----------------|----------------|
| 1 | 139.30 | 1402.64 |
| 2 | 151.12 | 1391.37 |
| 3 | 201.36 | 1395.48 |
| 4 | 201.68 | 1435.00 |

Factor of Safety for the Preceding Surface is Between18.765 and18.723

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 4 Coordinate Points

| 318 319 320 | Point No. | X-Surf (ft) | Y-Surf (ft) |
|-------------------|--------------|----------------|----------------|
| 321 | 1 | 144.00 | 1403.12 |
| 322 | 2 | 147.58 | 1401.81 |
| 323 | 3 | 237.32 | 1411.75 |
| 324 | 4 | 237.46 | 1447.97 |
| 325 | | | |

Factor of Safety for the Preceding Surface is Between10.374 and10.344

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 4 Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|--------------|----------------|----------------|
| 1 | 139.30 | 1402.64 |
| 2 | 151.12 | 1391.37 |
| 3 | 201.36 | 1395.48 |
| 4 | 201.68 | 1435.00 |

Factor of Safety for the Preceding Surface is Between18.765 and18.723

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 4 Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|--------------|----------------|----------------|
| 1 | 144.00 | 1403.12 |
| 2 | 147.58 | 1401.81 |
| 3 | 237.32 | 1411.75 |
| 4 | 237.46 | 1447.97 |

Factor of Safety for the Preceding Surface is Between10.374 and10.344

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following $\ 4$ Coordinate Points

```
Y-Surf
378
                  Point
                            X-Surf
379
                   No.
                             (ft)
                                         (ft)
380
                                        1402.64
381
                             139.30
                             151.12
                                        1391.37
382
                   2
383
                             201.36
                                        1395.48
384
                             201.68
                                        1435.00
385
386
387
                Factor of Safety for the Preceding Surface is Between18.765 and18.723
388
389
390
                WARNING! The factor of safety calculation did not converge in 20 iterations.
391
392
393
                The Trial Failure Surface In Ouestion Is Defined
394
395
                By The Following 4 Coordinate Points
396
397
                            X-Surf
                                        Y-Surf
398
                  Point.
399
                             (ft)
                                          (ft)
                  No.
400
401
                            144.00
                                        1403.12
                            147.58
402
                   2
                                        1401 81
                             237.32
                                        1411.75
403
                   3
                            237.46
                                        1447.97
404
                    4
405
406
407
                Factor of Safety for the Preceding Surface is Between10.374 and10.344
408
409
410
                WARNING! The factor of safety calculation did not converge in 20 iterations.
411
412
413
414
                The Trial Failure Surface In Question Is Defined
415
                By The Following 4 Coordinate Points
416
417
                  Point
                            X-Surf
                                         Y-Surf
418
419
                  No.
                             (ft)
                                         (ft)
420
421
                            139.30
                                        1402.64
422
                            151.12
                                        1391.37
                   2
                             201.36
                                        1395.48
423
                             201 68
                                        1435.00
424
425
426
427
                Factor of Safety for the Preceding Surface is Between18.765 and18.723
428
429
430
                WARNING! The factor of safety calculation did not converge in 20 iterations.
431
432
433
434
                The Trial Failure Surface In Question Is Defined
                By The Following 4 Coordinate Points
435
436
437
438
                  Point
                             X-Surf
                                         Y-Surf
439
                   No.
                             (ft)
                                         (ft.)
440
441
                   1
                             144.00
                                        1403 12
                   2
                             147.58
                                        1401.81
```

3

237.32

1411.75

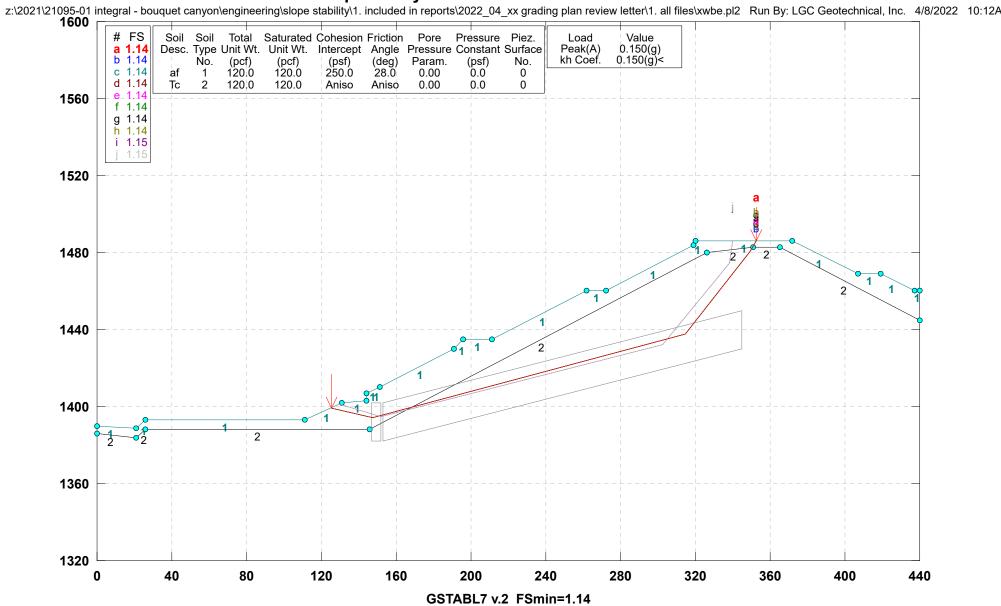
```
444
                            237.46
                                      1447.97
445
446
447
               Factor of Safety for the Preceding Surface is Between10.374 and10.344
448
449
450
                WARNING! The factor of safety calculation did not converge in 20 iterations.
451
452
453
454
                The Trial Failure Surface In Question Is Defined
455
                By The Following 4 Coordinate Points
456
457
                            X-Surf
                                        Y-Surf
458
                 Point
459
                  No.
                             (ft)
                                         (ft)
460
                                       1402.64
461
                            139 30
462
                            151.12
                                       1391.37
                   2
463
                            201.36
                                       1395.48
464
                   4
                            201.68
                                       1435.00
465
466
467
                Factor of Safety for the Preceding Surface is Between18.765 and18.723
468
469
470
                Following Are Displayed The Ten Most Critical Of The Trial
471
                Failure Surfaces Evaluated. They Are
472
               Ordered - Most Critical First.
473
474
475
                * * Safety Factors Are Calculated By The Simplified Janbu Method * *
476
477
478
479
               Total Number of Trial Surfaces Attempted = 4999
480
481
                WARNING! The Factor of Safety Calculation for one or More Trial Surfaces
482
                Did Not Converge in 20 Iterations.
483
485
                Number of Trial Surfaces with Non-Converged FS = 16
486
487
                Number of Trial Surfaces With Valid FS = 4983
488
489
                Percentage of Trial Surfaces With Non-Valid FS Solutions
490
491
               of the Total Attempted = 0.3 %
492
                Statistical Data On All Valid FS Values:
494
                  FS Max = 13.789 FS Min = 1.648 FS Ave = 2.382
495
                   Standard Deviation = 0.977 Coefficient of Variation = 41.02 %
496
497
498
                Failure Surface Specified By 5 Coordinate Points
499
500
501
                            X-Surf
                                        Y-Surf
                 Point
502
                             (ft)
                                         (ft)
503
504
                            134.600
                                        1402.277
505
                            148.848
                                        1391.799
                   2
                             290.988
                                        1428.005
507
                   4
                             325.725
                                        1470.647
508
                            333.711
                                        1486.000
509
```

```
510
                                                                                                                            Factor of Safety
                                                                                                                           *** 1.648 ***
511
                      Factor of Safety
                     *** 1.648 ***
512
                                                                                                      578
513
                                                                                                      579
514
                                                                                                      580
515
                                                                                                      581
516
                                                                                                      582
                                                                                                                      Failure Surface Specified By 5 Coordinate Points
                    Individual data on the
                                                                                                      583
517
                                             17 slices
518
                                                                                                      584
519
                                                                                                      585
                                                                                                                        Point
                                                                                                                                  X-Surf
                                                                                                                                              Y-Surf
520
                              Water Water
                                              Tie
                                                      Tie
                                                              Earthquake
                                                                                                      586
                                                                                                                        No.
                                                                                                                                   (ft)
                                                                                                                                               (ft)
521
                              Force Force
                                             Force
                                                   Force
                                                                 Force Surcharge
                                                                                                      587
522
      Slice Width
                     Weight
                                                                             Load
                                                                                                      588
                                                                                                                                  134.600
                                                                                                                                              1402.277
                              Top
                                     Bot
                                              Norm
                                                      Tan
                                                              Hor
                                                                      Ver
                                                                                                      589
                                                                                                                         2
                                                                                                                                  148.848
                                                                                                                                              1391.799
523
       No.
              (ft)
                      (lbs)
                              (lbs)
                                    (lbs)
                                             (lbs)
                                                     (lbs)
                                                             (lbs)
                                                                     (lbs)
                                                                             (lbs)
                                                                                                                                  290.988
                                                                                                                                              1428.005
524
                                                                                                      590
                                                                                                                         3
                      4307.0
                                                                 0.0
                                                                         0.0
                                                                                  0.0
                                                                                                      591
                                                                                                                                  325.725
                                                                                                                                              1470.647
525
               9.4
                                 0.0
                                        0.0
                                                  0.
                                                          0.
                                                                                                                         4
                                                                 0.0
                                                                                                      592
                                                                                                                                  333.711
                                                                                                                                              1486.000
526
        2
               0.1
                       116.1
                                0.0
                                        0.0
                                                  0.
                                                          0.
                                                                         0.0
                                                                                  0.0
527
               4.7
                      8254.2
                                0.0
                                        0.0
                                                  0.
                                                          0.
                                                                 0.0
                                                                         0.0
                                                                                  0.0
                                                                                                      593
528
                      4509.1
                                0.0
                                                                                                      594
               2.2
                                        0.0
                                                  0.
                                                          0.
                                                                 0.0
                                                                         0.0
                                                                                  0.0
529
               7.0
                     15518.0
                                 0.0
                                        0.0
                                                  0.
                                                          0.
                                                                 0.0
                                                                         0.0
                                                                                  0.0
                                                                                                      595
                                                                                                                            Factor of Safety
530
                     92764.4
                                0.0
                                                                 0.0
                                                                                                      596
                                                                                                                           *** 1.648 ***
        6
              33.0
                                        0.0
                                                  0.
                                                          0.
                                                                         0.0
                                                                                  0.0
531
                     17596.6
                                 0.0
                                        0.0
                                                  0.
                                                          0.
                                                                 0.0
                                                                         0.0
                                                                                  0.0
                                                                                                      597
532
              15 0
                     52704.7
                                0.0
                                        0.0
                                                          0.
                                                                 0.0
                                                                         0.0
                                                                                  0 0
                                                                                                      598
                                                  0.
533
              51.0
                    204252.8
                                 0.0
                                        0.0
                                                  0.
                                                          0.
                                                                 0.0
                                                                         0.0
                                                                                  0.0
                                                                                                      599
534
       1.0
              10 0
                     45726 9
                                0.0
                                        0.0
                                                  0.
                                                          0.
                                                                 0.0
                                                                         0.0
                                                                                  0 0
                                                                                                      600 1
535
       11
              19.0
                     89461.5
                                 0.0
                                                                                                      601
                                        0.0
                                                  0.
                                                          0.
                                                                 0.0
                                                                         0.0
                                                                                  0.0
       12
                    106388.6
                                0.0
                                                                                                      602
                                                                                                                     Failure Surface Specified By 5 Coordinate Points
536
              28.0
                                        0.0
                                                  0.
                                                          0.
                                                                 0.0
                                                                         0.0
                                                                                  0.0
537
       13
               1.0
                      2639.4
                                0.0
                                        0.0
                                                  0.
                                                          0.
                                                                 0.0
                                                                         0.0
                                                                                  0.0
                                                                                                      603
538
       14
               5.7
                     12961.6
                                0.0
                                        0.0
                                                  0.
                                                          0.
                                                                 0.0
                                                                         0.0
                                                                                  0.0
                                                                                                      604
539
       15
                       498.0
                                0.0
                                        0.0
                                                  0.
                                                          0.
                                                                 0.0
                                                                         0.0
                                                                                 0.0
                                                                                                      605
                                                                                                                        Point
                                                                                                                                  X-Surf
                                                                                                                                              Y-Surf
               0.3
540
       16
               4.9
                      5944.0
                                 0.0
                                        0.0
                                                  0.
                                                          0.
                                                                 0.0
                                                                         0.0
                                                                                  0.0
                                                                                                      606
                                                                                                                        No.
                                                                                                                                   (ft)
                                                                                                                                               (ft)
541
       17
                       914.3
                                0.0
                                                                 0.0
                                                                        0.0
                                                                                 0.0
                                                                                                      607
               2.8
                                        0.0
                                                  0.
                                                          0.
542
                                                                                                      608
                                                                                                                         - 1
                                                                                                                                  134.600
                                                                                                                                              1402.277
               Failure Surface Specified By 5 Coordinate Points
                                                                                                      609
                                                                                                                                  148.848
                                                                                                                                              1391.799
543
                                                                                                                         2
544
                                                                                                      610
                                                                                                                         3
                                                                                                                                  290.988
                                                                                                                                              1428.005
545
                                                                                                      611
                                                                                                                                  325.725
                                                                                                                                              1470 647
                                                                                                                         4
546
                 Point
                            X-Surf
                                        Y-Surf
                                                                                                      612
                                                                                                                                  333.711
                                                                                                                                              1486.000
547
                  No.
                             (ft)
                                        (ft)
                                                                                                      613
548
                                                                                                      614
                                       1402.277
549
                            134.600
                                                                                                      615
                                                                                                                            Factor of Safety
                   2
                            148.848
                                       1391.799
                                                                                                                           *** 1.648 ***
550
                                                                                                      616
551
                   3
                            290.988
                                        1428.005
                                                                                                      617
552
                   4
                            325.725
                                        1470.647
                                                                                                      618
553
                   5
                            333.711
                                       1486.000
                                                                                                      619
554
                                                                                                      620
555
                                                                                                      621
                                                                                                                      Failure Surface Specified By 5 Coordinate Points
                     Factor of Safety
                                                                                                      622
556
557
                     *** 1.648 ***
                                                                                                      623
558
                                                                                                      624
                                                                                                                       Point
                                                                                                                                  X-Surf
                                                                                                                                              Y-Surf
559
                                                                                                      625
                                                                                                                        No.
                                                                                                                                   (ft)
                                                                                                                                               (ft)
560
                                                                                                      626
561
                                                                                                      627
                                                                                                                                  134.600
                                                                                                                                              1402.277
                                                                                                                                  148.848
                                                                                                                                              1391.799
562
                                                                                                      628
                                                                                                                         2
563
               Failure Surface Specified By 5 Coordinate Points
                                                                                                      629
                                                                                                                                  290.988
                                                                                                                                              1428.005
                                                                                                                         3
564
                                                                                                      630
                                                                                                                         4
                                                                                                                                  325.725
                                                                                                                                              1470.647
565
                                                                                                      631
                                                                                                                                  333.711
                                                                                                                                              1486.000
566
                 Point
                            X-Surf
                                        Y-Surf
                                                                                                      632
567
                            (ft)
                                        (ft)
                                                                                                      633
                  No.
568
                                                                                                      634
                                                                                                                            Factor of Safety
                            134.600
                                        1402.277
                                                                                                      635
                                                                                                                                 1.648 ***
569
                   1
570
                   2
                            148.848
                                       1391.799
                                                                                                      636
571
                            290.988
                                       1428.005
                                                                                                      637
                   3
572
                            325.725
                                        1470.647
                                                                                                      638
573
                   5
                            333.711
                                       1486.000
                                                                                                      639
574
                                                                                                      640
575
                                                                                                      641
                                                                                                                     Failure Surface Specified By 5 Coordinate Points
```

```
642
643
                Point
                          X-Surf
                                     Y-Surf
644
645
                          (ft)
                                      (ft)
                 No.
646
                                     1402.277
647
                          134.600
648
                 2
                          148.848
                                     1391.799
649
                 3
                          290.988
                                     1428.005
650
                 4
                          325.725
                                     1470.647
651
                 5
                          333.711
                                     1486.000
652
653
654
                    Factor of Safety
655
                    *** 1.648 ***
656
657
658
659
660
              Failure Surface Specified By 5 Coordinate Points
661
662
663
                Point
                          X-Surf
                                     Y-Surf
664
                 No.
                          (ft)
                                      (ft)
665
                 1
                          134.600
                                     1402.277
666
667
                          148.848
                                     1391.799
                          290.988
                                     1428.005
668
                 3
669
                  4
                          325.725
                                     1470.647
                          333.711
                                     1486.000
670
                 5
671
672
673
                    Factor of Safety
674
                   *** 1.648 ***
675
676
677
678 1
679
680
              Failure Surface Specified By 5 Coordinate Points
681
682
683
                Point
                          X-Surf
                                     Y-Surf
                          (ft)
                                      (ft)
684
                 No.
685
                                     1402.097
686
                 1
                          132.261
687
                 2
                          148.081
                                     1388.810
                          296.051
                                     1428.001
688
                 3
689
                          331.691
                                     1469.891
690
                          341.092
                                     1486.000
691
692
693
                    Factor of Safety
                   *** 1.652 ***
694
695
696
697
698
699
              Failure Surface Specified By 5 Coordinate Points
700
701
                Point
                          X-Surf
                                     Y-Surf
702
703
                          (ft)
                                      (ft)
                 No.
704
                                     1402.097
705
                  1
                          132.261
                                     1388.810
706
                  2
                          148.081
707
                          296.051
                                     1428.001
                 3
```

```
331.691
                                     1469.891
                  4
709
                          341.092
                                     1486.000
710
711
712
                     Factor of Safety
                    *** 1.652 ***
713
714
715
716
717
718
                        **** END OF GSTABL7 OUTPUT ****
719
```

Bouquet Canyon/21095-01/Section W-W'/ Seismic



Safety Factors Are Calculated By The Simplified Janbu Method for the case of c & phi both > 0

| 1 | | *** GSTABL7 *** | 48 | 1 | 0.00 | 1390.00 | 21.00 | 1389.00 | 1 |
|----|--------------------------|---|----------|--------------|--------------|------------|-------------|----------|---------------|
| 2 | | | 49 | 2 | 21.00 | 1389.00 | 26.00 | 1393.00 | 1 |
| 3 | ** GSTABL | 7 by Dr. Garry H. Gregory, Ph.D., P.E., D.GE ** | 50 | 3 | 26.00 | 1393.00 | 111.00 | 1393.00 | 1 |
| 4 | | | 51 | 4 | 111.00 | 1393.00 | 131.00 | 1402.00 | 1 |
| 5 | | 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 ** | 52 | 5 | 131.00 | 1402.00 | 144.00 | 1403.00 | 1 |
| 6 | (All Rig | hts Reserved-Unauthorized Use Prohibited) | 53 | 6 | 144.00 | 1403.00 | 144.10 | 1407.00 | 1 |
| 7 | | | 54 | 7 | 144.10 | 1407.00 | 151.00 | 1410.00 | 1 |
| 8 | | | 55 | 8 | 151.00 | 1410.00 | 191.00 | 1430.00 | 1 |
| 9 | | | 56 | 9 | 191.00 | 1430.00 | 196.00 | 1435.00 | 1 |
| | ********** | **************** | 57 | 10 | 196.00 | 1435.00 | 211.00 | 1435.00 | 1 |
| | ** | | 58 | 11 | 211.00 | 1435.00 | 262.00 | 1460.00 | 1 |
| 10 | SLO | DPE STABILITY ANALYSIS SYSTEM | 59 | 12 | 262.00 | 1460.00 | 272.00 | 1460.00 | 1 |
| 11 | Modified Bishop | , Simplified Janbu, or GLE Method of Slices. | 60 | 13 | 272.00 | 1460.00 | 319.00 | 1484.00 | 1 |
| 12 | (Includes Spence | er & Morgenstern-Price Type Analysis) | 61 | 14 | 319.00 | 1484.00 | 320.00 | 1486.00 | 1 |
| 13 | Including Pier/ | Pile, Reinforcement, Soil Nail, Tieback, | 62 | 15 | 320.00 | 1486.00 | 372.00 | 1486.00 | 1 |
| 14 | Nonlinear Undra: | ined Shear Strength, Curved Phi Envelope, | 63 | 16 | 372.00 | 1486.00 | 407.00 | 1469.00 | 1 |
| 15 | Anisotropic Soil | , Fiber-Reinforced Soil, Boundary Loads, Water | 64 | 17 | 407.00 | 1469.00 | 419.00 | 1469.00 | 1 |
| 16 | Surfaces, Pseudo | o-Static & Newmark Earthquake, and Applied Forces. | 65 | 18 | 419.00 | 1469.00 | 437.00 | 1460.00 | 1 |
| 17 | | | 66 | 19 | 437.00 | 1460.00 | 440.00 | 1460.00 | 1 |
| | *********** | *************** | 67 | 20 | 0.00 | 1386.00 | 21.00 | 1384.00 | 2 |
| | ** | | 68 | 21 | 21.00 | 1384.00 | 26.00 | 1388.00 | 2 |
| 18 | | | 69 | 22 | 26.00 | 1388.00 | 146.00 | 1388.00 | 2 |
| 19 | | | 70 | 23 | 146.00 | 1388.00 | 326.00 | 1480.00 | 2 |
| 20 | Analysis Run Date: | 4/8/2022 | 71 | 24 | 326.00 | 1480.00 | 351.00 | 1483.00 | 2 |
| 21 | Time of Run: | 10:12AM | 72 | 25 | 351.00 | 1483.00 | 365.00 | 1483.00 | 2 |
| 22 | Run By: | LGC Geotechnical, | 73 | 26 | 365.00 | 1483.00 | 440.00 | 1445.00 | 2 |
| | Inc. | | 74 | | | | | | |
| | | | 75 | User Specif | ied Y-Origi | in = | 1320.00(ft) | | |
| | | | 76 | | | | | | |
| 23 | Input Data Filename: | Z:\2021\21095-01 Integral - Bouquet | 77 | Default X-I | Plus Value = | = 0.00(ft) | | | |
| | Canyon\Engineering\slop | | 78 | | | | | | |
| | W-W'\2022_04_08\xwbe.ir | 1 | 79 | Default Y-I | Plus Value = | = 0.00(ft) | | | |
| | | | 80 1 | | | | | | |
| | | | 81 | | | | | | |
| 24 | Output Filename: | Z:\2021\21095-01 Integral - Bouquet | 82 | | | | | | |
| | Canyon\Engineering\slop | | 83 | ISOTROPIC SO | OIL PARAMETE | ERS | | | |
| | W-W'\2022_04_08\xwbe.OU |).T. | 84 | | | | | | |
| | | | 85 86 | 0 = () | | | | | |
| 25 | TT | more likely | 87 | 2 Type(s) | OI SOII | | | | |
| 26 | Unit System: | English | 88 | | | | | | |
| 27 | Diottod Output Filonome | e: Z:\2021\21095-01 Integral - Bouquet | 89 | Coil Total | Saturated | d Cohogio | o Eriation | Pore Pre | ssure Piez. |
| 21 | Canyon\Engineering\slop | | 90 | | Vt. Unit Wt. | | | | stant Surface |
| | W-W'\2022 04 08\xwbe.Pl | | 91 | No. (pcf) | | (psf) | (deg) | | psf) No. |
| | " " (2022_01_00 \AWDC*11 | <u> </u> | 92 | No. (per | (per) | (PDI) | (deg) | raram. (| pbi, No. |
| | | | 93 | 1 120.0 | 120.0 | 250.0 | 28.0 | 0.00 | 0.0 |
| 28 | | | 94 | 2 120.0 | | 250.0 | 32.0 | | 0.0 0 |
| 29 | | | 95 | | | | | | |
| 30 | | | 96 | | | | | | |
| 31 | | | 97 | | | | | | |
| 32 | | | 98 | ANISOTROPIC | STRENGTH PA | ARAMETERS | | | |
| 33 | PROBLEM DESCRIPTION: 1 | Bouquet Canyon/21095-01/Section W-W'/ | 99 | 1 soil | type(s) | | | | |
| 34 | 2 | Seismic | 100 | | | | | | |
| 35 | | | 101 | | | | | | |
| 36 | | | 102 | Soil Type | 2 Is Anisot | tropic | | | |
| 37 | | | 103 | | | | | | |
| 38 | | | 104 | Number Of I | Direction Ra | anges Spec | ified = 3 | | |
| 39 | BOUNDARY COORDINATES | | 105 | | | | | | |
| 40 | | | 106 | | | | | | |
| 41 | 19 Top Boundaries | | 107 | Direction | Countercl | | Cohesion | Friction | |
| 42 | 26 Total Boundaries | | 108 | Range | Directio | | Intercept | Angle | |
| 43 | | | 109 | No. | (deg | 3) | (psf) | (deg) | |
| 44 | | | 110 | _ | _ | • | 0-0-0- | | 0.0 |
| 45 | Boundary X-Left | Y-Left X-Right Y-Right Soil Type | 111 | 1 | 9. | | 250.00 | 32. | |
| 46 | No. (ft) | (ft) (ft) Below Bnd | 112 | 2 | 15. | | 150.00 | 25. | |
| 47 | | | 113 | 3 | 90. | . U | 250.00 | 32. | υυ |
| | | | 1 | | | | | | |

```
114
115
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129
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131 1
132
133
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135
136
137
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139
140
141
142
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174
```

ANISOTROPIC SOIL NOTES:

- (1) An input value of 0.01 for C and/or Phi will cause Aniso C and/or Phi to be ignored in that range.
- (2) An input value of 0.02 for Phi will set both Phi and C equal to zero, with no water weight in the tension crack.
- (3) An input value of 0.03 for Phi will set both Phi and C equal to zero, with water weight in the tension crack.

Specified Peak Ground Acceleration Coefficient (A) = 0.150(q)Specified Horizontal Earthquake Coefficient (kh) = 0.150(g) Specified Vertical Earthquake Coefficient (kv) = 0.000(q)

Specified Seismic Pore-Pressure Factor = 0.000

Janbus Empirical Coef is being used for the case of c & phi both > 0

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

4999 Trial Surfaces Have Been Generated.

2 Boxes Specified For Generation Of Central Block Base

Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 55.0

| Box No. | X-Left (ft) | Y-Left (ft) | X-Right (ft) | Y-Right (ft) | Height (ft) |
|------------|----------------|----------------|-----------------|-----------------|----------------|
| 1 | 147.00 | 1392.00 | 152.00 | 1392.00 | 20.00 |
| 2 | 153.00 | 1392.00 | 345.00 | 1440.00 | 20.00 |

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Ouestion Is Defined By The Following 4 Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|--------------|----------------|----------------|
| 1 | 139.30 | 1402.64 |
| 2 | 151.12 | 1391.37 |
| 3 | 201.36 | 1395.48 |
| 4 | 201.68 | 1435.00 |
| | | |

Factor of Safety for the Preceding Surface is Between 6.358 and 6.351

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Ouestion Is Defined By The Following 4 Coordinate Points Y-Surf Point X-Surf

(ft) No. (ft) 139.30 1402.64 151.12 1391.37 201.36 1395 48 201.68 1435.00

Factor of Safety for the Preceding Surface is Between 6.358 and 6.351

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 4 Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|--------------|----------------|----------------|
| 1 | 139.30 | 1402.64 |
| 2 | 151.12 | 1391.37 |
| 3 | 201.36 | 1395.48 |
| 4 | 201.68 | 1435.00 |

Factor of Safety for the Preceding Surface is Between 6.358 and 6.351

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 4 Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|--------------|----------------|----------------|
| 1 | 139.30 | 1402.64 |
| 2 | 151.12 | 1391.37 |
| 3 | 201.36 | 1395.48 |
| 4 | 201.68 | 1435.00 |

Factor of Safety for the Preceding Surface is Between 6.358 and 6.351

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 4 Coordinate Points

| Poin | t X-Surf | Y-Surf |
|------|----------|--------|
| No. | (ft) | (ft) |

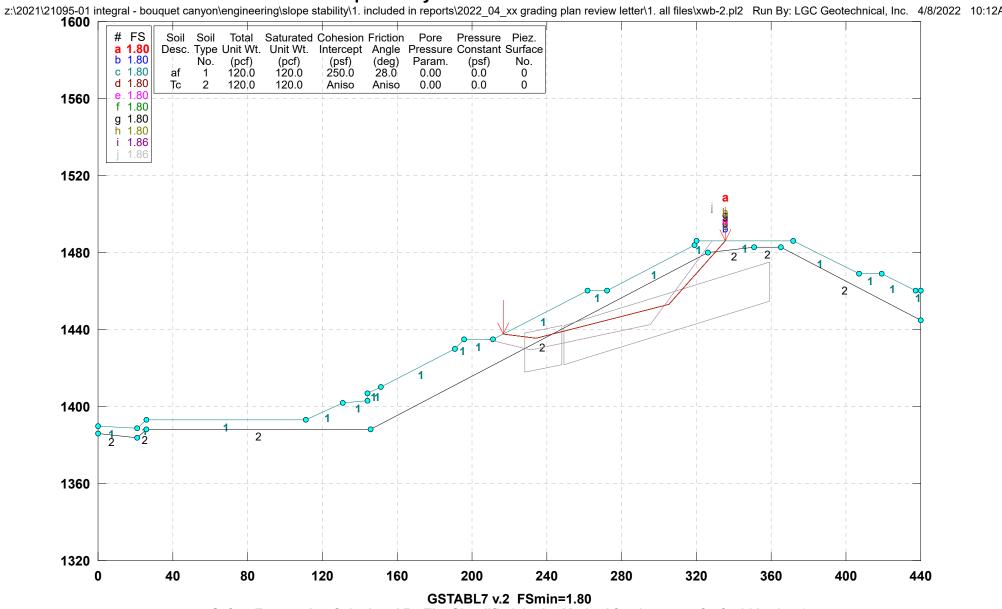
```
246
247
                   1
                            139.30
                                        1402.64
248
                   2
                             151.12
                                        1391.37
249
                   3
                             201.36
                                        1395.48
                    4
                             201.68
                                        1435.00
251
252
                Factor of Safety for the Preceding Surface is Between 6.358 and 6.351
254
255
256
                WARNING! The factor of safety calculation did not converge in 20 iterations.
258
259
                The Trial Failure Surface In Ouestion Is Defined
260
261
                By The Following 4 Coordinate Points
262
263
                  Point.
                            X-Surf
                                         Y-Surf
264
265
                   No.
                             (ft)
                                          (ft)
266
267
                             139.30
                                        1402.64
268
                   2
                            151.12
                                        1391 37
269
                             201.36
                                        1395.48
                    4
                             201.68
                                        1435.00
271
273
                Factor of Safety for the Preceding Surface is Between 6.358 and 6.351
274
275
276
                WARNING! The factor of safety calculation did not converge in 20 iterations.
277
278
279
280
                The Trial Failure Surface In Question Is Defined
                By The Following 4 Coordinate Points
281
282
283
                            X-Surf
                                         Y-Surf
284
                  Point
285
                  No.
                             (ft)
                                          (ft)
286
287
                    1
                             139 30
                                        1402.64
288
                   2
                             151.12
                                        1391.37
289
                   3
                             201 36
                                        1395 48
290
                             201.68
                                        1435.00
291
292
293
                Factor of Safety for the Preceding Surface is Between 6.358 and 6.351
294
295
296
                WARNING! The factor of safety calculation did not converge in 20 iterations.
297
298
299
                The Trial Failure Surface In Question Is Defined
300
301
                By The Following 4 Coordinate Points
302
303
304
                  Point
                             X-Surf
                                         Y-Surf
                             (ft)
305
                  No.
                                          (ft)
306
                            139.30
                                        1402.64
307
308
                             151.12
                                        1391.37
309
                   3
                             201.36
                                        1395.48
310
                             201.68
                                        1435.00
311
```

```
312
313
               Factor of Safety for the Preceding Surface is Between 6.358 and 6.351
314
315
316
               Following Are Displayed The Ten Most Critical Of The Trial
317
               Failure Surfaces Evaluated. They Are
318
               Ordered - Most Critical First.
319
320
321
               * * Safety Factors Are Calculated By The Simplified Janbu Method * *
323
324
325
               Total Number of Trial Surfaces Attempted = 4999
326
327
               WARNING! The Factor of Safety Calculation for one or More Trial Surfaces
328
               Did Not Converge in 20 Iterations.
329
330
331
               Number of Trial Surfaces with Non-Converged FS = 8
332
333
               Number of Trial Surfaces With Valid FS = 4991
334
335
               Percentage of Trial Surfaces With Non-Valid FS Solutions
336
337
               of the Total Attempted = 0.2 %
338
               Statistical Data On All Valid FS Values:
339
340
                  FS Max = 10.120 FS Min = 1.138 FS Ave = 1.654
341
                  Standard Deviation = 0.671 Coefficient of Variation = 40.56 %
342
343
               Failure Surface Specified By 5 Coordinate Points
344
345
346
347
                 Point
                            X-Surf
                                       Y-Surf
348
                  No.
                             (ft)
                                        (ft)
349
                            125.355
                                        1399.460
350
                            147.571
                                       1394.465
351
                   2
                            314.707
                                       1437.616
352
                   3
353
                   4
                            349 045
                                       1480 580
354
                            352.824
                                       1486.000
355
356
357
                      Factor of Safety
                           1.138 ***
358
359
360
362
363
                    Individual data on the
                                             18 slices
364
365
366
                              Water Water
                                              Tie
                                                      Tie
                                                              Earthquake
367
                                             Force
                                                     Force
                                                               Force Surcharge
                              Force Force
368
      Slice Width
                     Weight
                              Top
                                     Bot
                                              Norm
                                                      Tan
                                                                      Ver
                                                                            Load
369
              (ft)
                     (lbs)
                              (lbs) (lbs)
                                             (lbs) (lbs)
                                                            (lbs) (lbs) (lbs)
       No.
370
                      1290.4
                                                               193.6
371
               5 6
                                0 0
                                        0 0
                                                  Ω
                                                          Ω
                                                                         0 0
                                                                                 0 0
        - 1
        2
              13.0
                      9002.9
                                0.0
                                        0.0
                                                  0.
                                                          0.
                                                              1350.4
                                                                         0.0
                                                                                 0.0
373
        3
               0.1
                       116.9
                                0.0
                                        0.0
                                                  0.
                                                          0.
                                                               17.5
                                                                         0.0
                                                                                 0.0
374
               3.5
                      5373.0
                                 0.0
                                        0.0
                                                  0.
                                                               805.9
                                                                         0.0
                                                                                 0.0
        5
               3.4
                      5903.7
                                 0.0
                                        0.0
                                                  0.
                                                          0.
                                                               885.5
                                                                         0.0
                                                                                 0.0
376
        6
              19.0
                     38536.5
                                 0.0
                                        0.0
                                                  0.
                                                          0.
                                                              5780.5
                                                                         0.0
                                                                                 0.0
377
              21.0
                     54998.3
                                0.0
                                        0.0
                                                  0.
                                                          0.
                                                             8249.7
                                                                         0.0
                                                                                 0.0
```

```
378
              5.0 15706.4
                               0 0
                                       0.0
                                                         0. 2356.0
                                                                       0.0
                                                                                0.0
                                                                                                    444
              15.0 46972.0
                                                         0. 7045.8
                                                                                                    445
379
                                0.0
                                       0.0
                                                 0.
                                                                       0.0
                                                                                0.0
              51.0 184062.4
                                                         0. 27609.4
380
       10
                                0.0
                                        0.0
                                                                       0.0
                                                                                0.0
                                                                                                    446
                                                         0. 6246.2
                                                                                                    447
381
       11
              10.0
                    41641.3
                                0.0
                                       0.0
                                                 0.
                                                                       0.0
                                                                                0.0
              42.7 198849.2
                                                         0. 29827.4
382
                                0.0
                                        0.0
                                                 0.
                                                                       0.0
                                                                                0.0
                                                                                                    448
                                                         0. 3292.0
                                                                                                                   Failure Surface Specified By 5 Coordinate Points
383
       1.3
                    21946.8
                                0.0
                                       0.0
                                                                                                    449
              4.3
                                                 0.
                                                                       0.0
                                                                                0.0
384
                     4966.4
                                0.0
                                        0.0
                                                 0.
                                                         0. 745.0
                                                                                0.0
                                                                                                    450
385
       1.5
                     27365.6
                                0.0
                                                         0. 4104.8
                                                                                                    451
               6.0
                                       0.0
                                                 0.
                                                                       0.0
                                                                                0.0
386
              23.0
                    54857.2
                                0.0
                                        0.0
                                                 0.
                                                         0. 8228.6
                                                                       0.0
                                                                                0.0
                                                                                                    452
                                                                                                                     Point
                                                                                                                                X-Surf
                                                                                                                                           Y-Surf
                                                         0. 126.5
387
       17
              1 7
                      843.6
                                0.0
                                       0 0
                                                 0.
                                                                       0 0
                                                                                0.0
                                                                                                    453
                                                                                                                      No.
                                                                                                                                (ft)
                                                                                                                                            (ft)
388
               2.1
                      385.4
                                0.0
                                       0.0
                                                             57.8
                                                                       0.0
                                                                                0.0
                                                                                                    454
                                                                                                                                           1399.460
389
                                                                                                    455
                                                                                                                                125.355
390
               Failure Surface Specified By 5 Coordinate Points
                                                                                                    456
                                                                                                                       2
                                                                                                                                147.571
                                                                                                                                           1394.465
                                                                                                                                314.707
391
                                                                                                    457
                                                                                                                                           1437.616
                                                                                                                       3
                                                                                                                                349.045
                                                                                                                                           1480.580
392
                                                                                                    458
                 Point
                           X-Surf
                                       Y-Surf
                                                                                                    459
                                                                                                                       5
                                                                                                                                352.824
                                                                                                                                           1486.000
393
394
                            (ft)
                                        (ft)
                                                                                                    460
                  No.
395
                                                                                                    461
396
                           125.355
                                       1399.460
                                                                                                    462
                                                                                                                          Factor of Safety
397
                  2
                           147.571
                                       1394.465
                                                                                                    463
                                                                                                                              1.138 ***
398
                           314.707
                                       1437.616
                                                                                                    464
                  3
399
                   4
                           349.045
                                       1480.580
                                                                                                    465
400
                           352.824
                                       1486.000
                                                                                                    466
401
                                                                                                                   Failure Surface Specified By 5 Coordinate Points
402
                                                                                                    468
403
                     Factor of Safety
                                                                                                    469
                     *** 1.138 ***
                                                                                                    470
404
                                                                                                    471
                                                                                                                     Point
                                                                                                                                X-Surf
                                                                                                                                           Y-Surf
405
406
                                                                                                    472
                                                                                                                      No.
                                                                                                                                 (ft)
                                                                                                                                            (ft)
407
                                                                                                    473
408
                                                                                                    474
                                                                                                                                125.355
                                                                                                                                           1399.460
                                                                                                                               147.571
                                                                                                                                           1394.465
409
                                                                                                    475
                                                                                                                       2.
410
               Failure Surface Specified By 5 Coordinate Points
                                                                                                    476
                                                                                                                       3
                                                                                                                                314.707
                                                                                                                                           1437.616
                                                                                                    477
                                                                                                                       4
                                                                                                                                349.045
                                                                                                                                           1480.580
411
412
                                                                                                    478
                                                                                                                       5
                                                                                                                                352.824
                                                                                                                                           1486.000
                 Point
                           X-Surf
                                       Y-Surf
                                                                                                    479
413
414
                  No.
                            (ft)
                                        (ft)
415
                                                                                                    481
                                                                                                                          Factor of Safety
                  1
                           125.355
                                       1399.460
                                                                                                    482
                                                                                                                         *** 1.138 ***
416
                           147.571
                                       1394.465
417
                  2
                                                                                                    483
418
                           314.707
                                       1437.616
                  3
419
                   4
                           349.045
                                       1480.580
                                                                                                    485
                                       1486.000
420
                  5
                           352.824
                                                                                                    486
421
                                                                                                    487
422
                                                                                                    488
                                                                                                                   Failure Surface Specified By 5 Coordinate Points
                     Factor of Safety
                                                                                                    489
                     *** 1.138 ***
                                                                                                    490
424
425
                                                                                                    491
                                                                                                                     Point
                                                                                                                                X-Surf
                                                                                                                                           Y-Surf
426
                                                                                                    492
                                                                                                                                 (ft)
                                                                                                                                            (ft)
                                                                                                                      No.
427
428
                                                                                                    494
                                                                                                                                125.355
                                                                                                                                           1399.460
429
               Failure Surface Specified By 5 Coordinate Points
                                                                                                    495
                                                                                                                                147.571
                                                                                                                                           1394.465
                                                                                                                                           1437.616
430
                                                                                                    496
                                                                                                                       3
                                                                                                                                314.707
431
                                                                                                    497
                                                                                                                                349.045
                                                                                                                                           1480.580
432
                 Point
                           X-Surf
                                       Y-Surf
                                                                                                    498
                                                                                                                       5
                                                                                                                                352.824
                                                                                                                                           1486.000
433
                  No.
                            (ft)
                                       (ft)
                                                                                                    499
434
                                                                                                    500
435
                           125.355
                                       1399.460
                                                                                                    501
                                                                                                                          Factor of Safety
436
                  2
                           147.571
                                       1394.465
                                                                                                                         *** 1.138 ***
437
                           314.707
                                       1437.616
                                                                                                    503
                  3
438
                  4
                           349.045
                                       1480.580
                                                                                                    504
439
                           352.824
                                       1486.000
                                                                                                    505
440
                                                                                                    506
                                                                                                    507
441
                                                                                                                   Failure Surface Specified By 5 Coordinate Points
                     Factor of Safety
                                                                                                    508
                     *** 1.138 ***
443
                                                                                                    509
```

```
510
                Point
                          X-Surf
                                     Y-Surf
511
                 No.
                          (ft)
                                      (ft)
512
                 1
                          125.355
                                     1399.460
513
514
                 2
                          147.571
                                     1394.465
515
                          314.707
                                     1437.616
                 3
516
                  4
                          349.045
                                     1480.580
517
                 5
                          352.824
                                     1486.000
518
519
520
                    Factor of Safety
                   *** 1.138 ***
521
522
523
524
525 1
526
527
              Failure Surface Specified By 5 Coordinate Points
528
529
530
                Point
                          X-Surf
                                     Y-Surf
531
                 No.
                          (ft)
                                     (ft)
532
533
                          129.394
                                     1401.277
                 2
                          151.824
                                     1394.992
534
535
                 3
                          302.520
                                     1432.440
                                     1474.409
536
                 4
                          338.067
537
                          339.894
                                     1486.000
538
539
540
                    Factor of Safety
541
                    *** 1.148 ***
542
543
544
545
546
              Failure Surface Specified By 5 Coordinate Points
547
548
                          X-Surf
                                     Y-Surf
549
                Point
550
                 No.
                          (ft)
                                      (ft)
551
552
                          129.394
                                     1401.277
                 1
553
                 2
                          151.824
                                     1394.992
                                     1432.440
554
                 3
                          302.520
555
                          338.067
                                     1474.409
                          339.894
                                     1486.000
556
557
558
559
                    Factor of Safety
                   *** 1.148 ***
560
561
562
563
564
565
                       **** END OF GSTABL7 OUTPUT ****
566
567
```

Bouquet Canyon/21095-01/Section W-W'/ Static



Safety Factors Are Calculated By The Simplified Janbu Method for the case of c & phi both > 0

| 1 | | *** GSTABL7 *** | 48 | 1 | 0.00 | 1390.00 | 21.00 | 1389.00 | 1 |
|----------|--|---|------------|--------------------|--------------|------------|-------------|---------------|---------------|
| 2 | | | 49 | 2 | 21.00 | 1389.00 | 26.00 | 1393.00 | 1 |
| 3 | ** GSTABL | by Dr. Garry H. Gregory, Ph.D., P.E., D.GE ** | 50 | 3 | 26.00 | 1393.00 | 111.00 | 1393.00 | 1 |
| 4 | | | 51 | 4 | 111.00 | 1393.00 | 131.00 | 1402.00 | 1 |
| 5 | | 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 ** | 52 | 5 | 131.00 | 1402.00 | 144.00 | 1403.00 | 1 |
| 6 | (All Rig | hts Reserved-Unauthorized Use Prohibited) | 53 | 6 | 144.00 | 1403.00 | 144.10 | 1407.00 | 1 |
| 7 | | | 54 | 7 | 144.10 | 1407.00 | 151.00 | 1410.00 | 1 |
| 8 | | | 55 | 8 | 151.00 | 1410.00 | 191.00 | 1430.00 | 1 |
| 9 | | | 56 | 9 | 191.00 | 1430.00 | 196.00 | 1435.00 | 1 |
| | ************ | ************* | 57 | 10 | 196.00 | 1435.00 | 211.00 | 1435.00 | 1 |
| | ** | | 58 | 11 | 211.00 | 1435.00 | 262.00 | 1460.00 | 1 |
| 10 | SLO | PE STABILITY ANALYSIS SYSTEM | 59 | 12 | 262.00 | 1460.00 | 272.00 | 1460.00 | 1 |
| 11 | Modified Bishop | Simplified Janbu, or GLE Method of Slices. | 60 | 13 | 272.00 | 1460.00 | 319.00 | 1484.00 | 1 |
| 12 | (Includes Spence | r & Morgenstern-Price Type Analysis) | 61 | 14 | 319.00 | 1484.00 | 320.00 | 1486.00 | 1 |
| 13 | Including Pier/ | ile, Reinforcement, Soil Nail, Tieback, | 62 | 15 | 320.00 | 1486.00 | 372.00 | 1486.00 | 1 |
| 14 | Nonlinear Undra | ned Shear Strength, Curved Phi Envelope, | 63 | 16 | 372.00 | 1486.00 | 407.00 | 1469.00 | 1 |
| 15 | Anisotropic Soil | , Fiber-Reinforced Soil, Boundary Loads, Water | 64 | 17 | 407.00 | 1469.00 | 419.00 | 1469.00 | 1 |
| 16 | Surfaces, Pseudo | -Static & Newmark Earthquake, and Applied Forces. | 65 | 18 | 419.00 | 1469.00 | 437.00 | 1460.00 | 1 |
| 17 | | | 66 | 19 | 437.00 | 1460.00 | 440.00 | 1460.00 | 1 |
| | *********** | ************* | 67 | 20 | 0.00 | 1386.00 | 21.00 | 1384.00 | 2 |
| | ** | | 68 | 21 | 21.00 | 1384.00 | 26.00 | 1388.00 | 2 |
| 18 | | | 69 | 22 | 26.00 | 1388.00 | 146.00 | 1388.00 | 2 |
| 19 | | | 70 | 23 | 146.00 | 1388.00 | 326.00 | 1480.00 | 2 |
| 20 | Analysis Run Date: | 4/8/2022 | 71 | 24 | 326.00 | 1480.00 | 351.00 | 1483.00 | 2 |
| 21 | Time of Run: | 10:12AM | 72 | 25 | 351.00 | 1483.00 | 365.00 | 1483.00 | 2 |
| 22 | Run By: | LGC Geotechnical, | 73 | 26 | 365.00 | 1483.00 | 440.00 | 1445.00 | 2 |
| | Inc. | | 74 | | | | | | |
| | | | 75 | User Specif | ied Y-Orig | in = | 1320.00(ft) | | |
| | | | 76 | | | | | | |
| 23 | Input Data Filename: | Z:\2021\21095-01 Integral - Bouquet | 77 | Default X-I | Plus Value : | = 0.00(ft) | | | |
| | Canyon\Engineering\slop | | 78 | | | | | | |
| | W-W'\2022_04_08\xwb-2.i | n | 79 | Default Y-I | Plus Value : | = 0.00(ft) | | | |
| | | | 80 1 | | | | | | |
| 0.4 | | - \ 0001\ 01005 01 | 81 | | | | | | |
| 24 | Output Filename: | Z:\2021\21095-01 Integral - Bouquet | 82 | | | | | | |
| | Canyon\Engineering\slop | | 83 84 | ISOTROPIC SO | DIL PARAMETI | ERS | | | |
| | W-W'\2022_04_08\xwb-2.0 | 01 | 85 | | | | | | |
| | | | 86 | 2 Type(s) | of Coil | | | | |
| 25 | Unit System: | English | 87 | Z Type(S) | 01 2011 | | | | |
| 26 | onic System. | Eligitali | 88 | | | | | | |
| 27 | Plotted Output Filename | : Z:\2021\21095-01 Integral - Bouquet | 89 | Soil Total | Saturated | d Cohesio | Friction | Pore Pres | ssure Piez. |
| 27 | Canyon\Engineering\slop | | 90 | | Vt. Unit Wt. | | | | stant Surface |
| | W-W'\2022 04 08\xwb-2.I | | 91 | No. (pcf) | | (psf) | (deg) | | psf) No. |
| | (================================= | | 92 | (F | (1) | (1) | (5, | | |
| | | | 93 | 1 120.0 | 120.0 | 250.0 | 28.0 | 0.00 | 0.0 |
| 28 | | | 94 | 2 120.0 | | 250.0 | 32.0 | | 0.0 |
| 29 | | | 95 | | | | | | |
| 30 | | | 96 | | | | | | |
| 31 | | | 97 | | | | | | |
| 32 | | | 98 | ANISOTROPIC | STRENGTH PA | ARAMETERS | | | |
| 33 | | ouquet Canyon/21095-01/Section W-W'/ | 99 | 1 soil | type(s) | | | | |
| 34 | 5 | tatic | 100 | | | | | | |
| 35 | | | 101 | | | | | | |
| 36 | | | 102 | Soil Type | 2 Is Anisot | tropic | | | |
| 37 | | | 103 | | | _ | | | |
| 38 | | | 104 | Number Of I | Direction Ra | anges Spec | 111ed = 3 | | |
| 39 | BOUNDARY COORDINATES | | 105 106 | | | | | | |
| 40 | 10 Ton Boundard | | 106 | Direction | Courter | l oakuri | Cohoois | Park and it - | n |
| 41 42 | 19 Top Boundaries 26 Total Boundaries | | 107 | Direction Range | Counterc | | Cohesion | Friction | |
| 43 | 20 IOCAI BOUNDARIES | | 108 | _ | | on Limit | Intercept | Angle | |
| 43 | | | 1109 | No. | (de | 3 / | (psf) | (deg) | |
| 44 | Boundary X-Left | Y-Left X-Right Y-Right Soil Type | 110 | 1 | 0 | . 0 | 250.00 | 32.0 | nn |
| 46 | No. (ft) | (ft) (ft) (ft) Below Bnd | 111 | 2 | 15 | | 150.00 | 25.0 | |
| 47 | 110. | (10) (10) Delow blid | 113 | 3 | 90 | | 250.00 | 32.0 | |
| ± / | | | 1 11 | 3 | 30 | | 250.00 | 52.0 | |
| | | | | | | | | | |

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114
115
116
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119
120
121
122
123
124
125 1
126
127
128
129
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131
132
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134
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139
140
141
142
143
144
145
146
147
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149
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166
167
168
169
170
171
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174
175
```

ANISOTROPIC SOIL NOTES:

- (1) An input value of 0.01 for C and/or Phi will cause Aniso C and/or Phi to be ignored in that range.
- (2) An input value of 0.02 for Phi will set both Phi and C equal to zero, with no water weight in the tension crack.
- (3) An input value of 0.03 for Phi will set both Phi and C equal to zero, with water weight in the tension crack.

Janbus Empirical Coef is being used for the case of $\ c$ & phi both > 0

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

4999 Trial Surfaces Have Been Generated.

2 Boxes Specified For Generation Of Central Block Base

 ${\bf Length}$ Of Line Segments For Active And Passive Portions Of Sliding Block Is $-55.0\,$

| Box No. | X-Left (ft) | Y-Left (ft) | X-Right (ft) | Y-Right (ft) | Height (ft) |
|------------|----------------|----------------|-----------------|-----------------|----------------|
| 1 | 228.00 | 1428.00 | 248.00 | 1432.00 | 20.00 |
| 2 | 249.00 | 1432.00 | 359.00 | 1465.00 | 20.00 |

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following $\ 4$ Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|--------------|----------------|----------------|
| 1 | 214.49 | 1436.71 |
| 2 | 229.48 | 1429.73 |
| 3 | 277.94 | 1439.68 |
| 4 | 278.08 | 1463.10 |

Factor of Safety for the Preceding Surface is Between 7.088 and 7.082

WARNING! The factor of safety calculation did not converge in 20 iterations.

Point

No.

X-Surf

(ft)

214.49

229.48

277.94

278.08

Y-Surf

(ft)

1436.71

1429.73

1439.68

1463.10

The Trial Failure Surface In Question Is Defined By The Following $\ 4$ Coordinate Points

| Point | X-Surf | Y-Surf |
|-------|--------|--------|
| No. | (ft) | (ft) |

| 180 | | | | |
|-----|--------------|-------------|----------------|---|
| 181 | 1 | 214.49 | 1436.71 | |
| 182 | 2 | 229.48 | 1429.73 | |
| 183 | 3 | 277.94 | 1439.68 | |
| 184 | 4 | 278.08 | | |
| 185 | 7 | 270.00 | 1403.10 | |
| 186 | | | | |
| 187 | Factor of | Safety for | the Dreceding | g Surface is Between 7.088 and 7.082 |
| 188 | ractor or i | Salety IOI | the Freceding | g Surface is between 7.000 and 7.002 |
| 189 | | | | |
| 190 | WADNING! T | he factor o | f cafety cal | culation did not converge in 20 iterations. |
| 191 | WHINTING. II | ic ractor o | i barcey care | cutacion ala not converge in 20 rectacions. |
| 192 | | | | |
| 193 | | | | |
| 194 | The Trial | Failure Cur | face In Ouest | tion Is Defined |
| 195 | | | oordinate Poi | |
| 196 | Dj inc roi. | iowing i c | oorarnace ro. | incb |
| 197 | | | | |
| 198 | Point | X-Surf | Y-Surf | |
| 199 | No. | (ft) | (ft) | |
| 200 | 140 • | (10) | (10) | |
| 201 | 1 | 214.49 | 1436.71 | |
| 202 | 2 | 229.48 | 1429.73 | |
| 203 | 3 | 277.94 | 1439.68 | |
| 204 | 4 | 278.08 | 1463.10 | |
| 205 | • | 270.00 | 1103.10 | |
| 206 | | | | |
| 207 | Factor of | Safety for | the Preceding | g Surface is Between 7.088 and 7.082 |
| 208 | 140001 01 | ource, ror | one rrecearing | 5 Darrage 15 Beeween 7,000 and 7,002 |
| 209 | | | | |
| 210 | WARNING! T | he factor o | f safety calc | culation did not converge in 20 iterations. |
| 211 | | | | |
| 212 | | | | |
| 213 | | | | |
| 214 | The Trial | Failure Sur | face In Ouest | tion Is Defined |
| 215 | | | oordinate Poi | |
| 216 | • | | | |
| 217 | | | | |
| 218 | Point | X-Surf | Y-Surf | |
| 219 | No. | (ft) | (ft) | |
| 220 | | | | |
| 221 | 1 | 214.49 | 1436.71 | |
| 222 | 2 | 229.48 | 1429.73 | |
| 223 | 3 | 277.94 | 1439.68 | |
| 224 | 4 | 278.08 | 1463.10 | |
| 225 | | | | |
| 226 | | | | |
| 227 | Factor of | Safety for | the Preceding | g Surface is Between 7.088 and 7.082 |
| 228 | | | | |
| 229 | | | | |
| 230 | WARNING! T | he factor o | f safety cald | culation did not converge in 20 iterations. |
| 231 | | | | |
| 232 | | | | |
| 233 | | | | |
| 234 | The Trial | Failure Sur | face In Quest | tion Is Defined |
| 235 | By The Fol | lowing 4 C | oordinate Poi | ints |
| 236 | | | | |

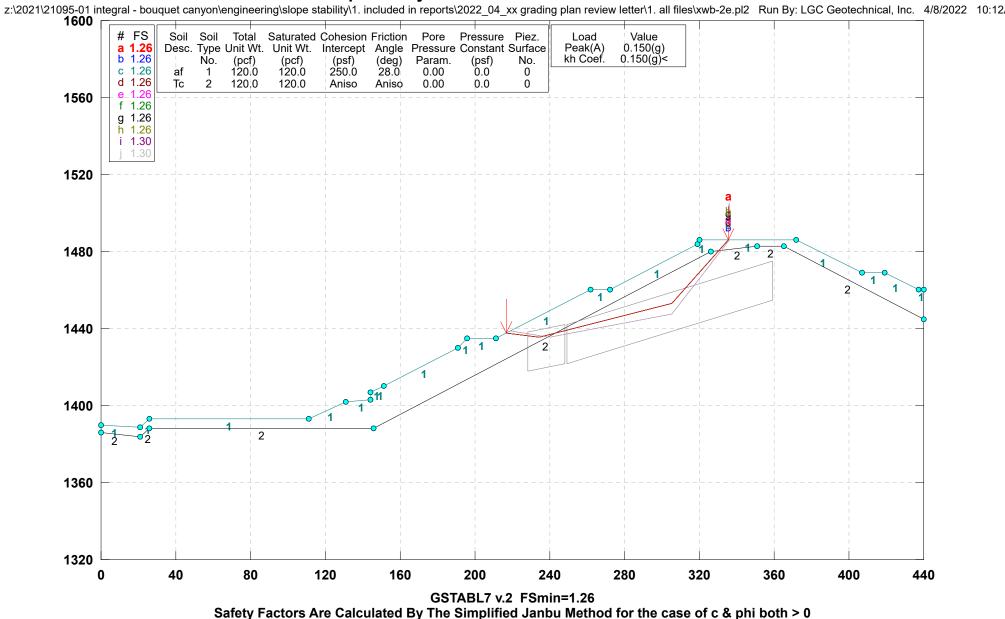
```
246
247
                Factor of Safety for the Preceding Surface is Between 7.088 and 7.082
248
249
                WARNING! The factor of safety calculation did not converge in 20 iterations.
251
252
254
                The Trial Failure Surface In Question Is Defined
255
                By The Following 4 Coordinate Points
256
258
                  Point
                             X-Surf
                                         Y-Surf
259
                   No.
                              (ft)
                                          (ft)
260
                             214.49
                                        1436.71
261
                                        1429.73
262
                    2
                             229.48
                             277.94
263
                                        1439 68
264
                             278.08
                                        1463.10
265
266
267
                Factor of Safety for the Preceding Surface is Between 7.088 and 7.082
268
269
                WARNING! The factor of safety calculation did not converge in 20 iterations.
271
273
274
                The Trial Failure Surface In Question Is Defined
275
                By The Following 4 Coordinate Points
276
277
278
                  Point
                             X-Surf
                                         Y-Surf
279
                   No.
                             (ft)
                                          (ft)
280
                   1
                             214.49
                                        1436 71
281
282
                             229.48
                                        1429.73
283
                    3
                             277.94
                                        1439.68
                             278.08
284
                                        1463.10
285
286
287
                Factor of Safety for the Preceding Surface is Between 7.088 and 7.082
288
289
290
                Following Are Displayed The Ten Most Critical Of The Trial
291
                Failure Surfaces Evaluated. They Are
                Ordered - Most Critical First.
292
293
294
295
                * * Safety Factors Are Calculated By The Simplified Janbu Method * *
296
297
298
299
                Total Number of Trial Surfaces Attempted = 4999
300
301
                WARNING! The Factor of Safety Calculation for one or More Trial Surfaces
302
                Did Not Converge in 20 Iterations.
303
304
                Number of Trial Surfaces with Non-Converged FS = 7
305
306
307
                Number of Trial Surfaces With Valid FS = 4992
308
309
310
                Percentage of Trial Surfaces With Non-Valid FS Solutions
311
                of the Total Attempted = 0.1 %
```

```
312
313
               Statistical Data On All Valid FS Values:
314
                  FS Max = 48.290 FS Min = 1.799 FS Ave = 2.993
315
                  Standard Deviation = 2.509 Coefficient of Variation = 83.82 %
316
317
318
               Failure Surface Specified By 4 Coordinate Points
319
320
321
                 Point
                           X-Surf
                                       Y-Surf
322
                  No.
                            (ft)
                                        (ft)
323
324
                            216.972
                                       1437.927
                           234.483
                                       1435.726
325
                   2
326
                            305.443
                                       1452.931
                  3
327
                           335.503
                                       1486.000
328
329
330
                     Factor of Safety
331
                     ***
                          1.799 ***
332
333
334
                    Individual data on the
336
                                            10 slices
337
338
339
                              Water Water
                                             Tie
                                                     Tie
                                                             Earthquake
340
                              Force Force
                                             Force
                                                   Force
                                                                Force Surcharge
341
      Slice Width
                     Weight
                              Top
                                    Bot.
                                             Norm
                                                      Tan
                                                             Hor
                                                                     Ver
                                                                            Load
342
       No.
              (ft)
                     (lbs)
                              (lbs) (lbs)
                                             (lbs)
                                                     (lbs)
                                                            (lbs)
                                                                    (lbs)
                                                                            (lbs)
343
344
              17.5
                     11331.8
                                0.0
                                        0.0
                                                  0.
                                                         Ω
                                                                0 0
                                                                        0 0
                                                                                0 0
                     13338.8
                                                                0.0
345
        2
              9 3
                                0 0
                                        0.0
                                                 Ω
                                                         Ω
                                                                        0 0
                                                                                0 0
346
              18.2
                     33529.3
                                0.0
                                        0.0
                                                                0.0
                                                                        0.0
                                                                                0.0
                                                  0.
                                                         0.
347
              10 0
                     19668.0
                                0 0
                                        0 0
                                                  Ω
                                                         Ω
                                                                0 0
                                                                        0 0
                                                                                0 0
348
              33.4
                     78908.8
                                0.0
                                        0.0
                                                  0.
                                                         0.
                                                                0.0
                                                                        0.0
                                                                                0.0
349
        6
              13.6
                     32781.3
                                0.0
                                        0.0
                                                 0.
                                                         0.
                                                                0.0
                                                                        0.0
                                                                                0.0
                      1992.6
350
               1.0
                                0.0
                                        0.0
                                                 0.
                                                         0.
                                                                0.0
                                                                        0.0
                                                                                0.0
351
        8
               6.0
                      9903.5
                                0.0
                                        0.0
                                                  0.
                                                         0.
                                                                0.0
                                                                        0.0
                                                                                0.0
                      4338.4
352
               4.5
                                0.0
                                        0.0
                                                         0.
                                                                0.0
                                                                        0.0
                                                                                0.0
                                                  0.
353
       1.0
              5.0
                     1622 7
                                0 0
                                       0.0
                                                                0.0
                                                                        0 0
                                                                                0.0
354
355
               Failure Surface Specified By 4 Coordinate Points
356
357
                                       Y-Surf
358
                 Point
                           X-Surf
359
                            (ft)
                                        (ft)
                  No.
360
                            216.972
                                       1437.927
362
                   2
                           234.483
                                       1435.726
363
                   3
                            305.443
                                       1452.931
                           335.503
364
                                       1486.000
365
366
367
                     Factor of Safety
368
                          1.799 ***
369
370
371
372
373
374
               Failure Surface Specified By 4 Coordinate Points
375
376
377
                 Point
                           X-Surf
                                       Y-Surf
```

```
(ft)
                                        (ft)
378
                  No.
                                                                                                    444
379
                                                                                                    445
                           216.972
                                       1437.927
380
                                                                                                    446
381
                           234.483
                                       1435.726
                                                                                                    447
                   2
                                       1452.931
                           305.443
                                                                                                                   Failure Surface Specified By 4 Coordinate Points
382
                  3
                                                                                                    448
383
                           335.503
                                      1486.000
                                                                                                    449
384
                                                                                                    450
385
                                                                                                    451
                                                                                                                     Point
                                                                                                                               X-Surf
                                                                                                                                           Y-Surf
386
                     Factor of Safety
                                                                                                    452
                                                                                                                      No.
                                                                                                                                (ft)
                                                                                                                                            (ft)
387
                    *** 1.799 ***
                                                                                                    453
388
                                                                                                    454
                                                                                                                               216.972
                                                                                                                                           1437.927
                                                                                                                               234.483
                                                                                                                                           1435.726
389
                                                                                                    455
                                                                                                                      2
390
                                                                                                    456
                                                                                                                      3
                                                                                                                                305.443
                                                                                                                                           1452.931
391
                                                                                                    457
                                                                                                                      4
                                                                                                                               335.503
                                                                                                                                           1486.000
392
               Failure Surface Specified By 4 Coordinate Points
                                                                                                    458
                                                                                                    459
393
394
                                                                                                    460
                                                                                                                         Factor of Safety
                 Point
                           X-Surf
                                       Y-Surf
                                                                                                                         *** 1.799 ***
395
                                                                                                    461
396
                           (ft)
                                       (ft)
                                                                                                    462
                  No.
397
                                                                                                    463
398
                  1
                           216.972
                                       1437.927
                                                                                                    464
399
                  2
                           234.483
                                       1435.726
                                                                                                    465
400
                  3
                           305.443
                                      1452.931
                                                                                                    466
                                                                                                                   Failure Surface Specified By 4 Coordinate Points
401
                           335.503
                                      1486.000
                                                                                                    467
402
                                                                                                    468
403
                                                                                                    469
                                                                                                                     Point
                                                                                                                               X-Surf
                                                                                                                                           Y-Surf
                     Factor of Safety
                                                                                                    470
                                                                                                                                (ft)
                                                                                                                                           (ft)
404
                                                                                                                      No.
405
                    *** 1.799 ***
                                                                                                    471
                                                                                                                                           1437.927
                                                                                                    472
406
                                                                                                                               216.972
                                                                                                                               234.483
                                                                                                                                           1435.726
407
                                                                                                    473
                                                                                                                      2
408
                                                                                                    474
                                                                                                                      3
                                                                                                                               305.443
                                                                                                                                           1452.931
                                                                                                                               335.503
409
                                                                                                    475
                                                                                                                                           1486.000
410
                                                                                                    476
               Failure Surface Specified By 4 Coordinate Points
                                                                                                    477
411
412
                                                                                                    478
                                                                                                                         Factor of Safety
                                                                                                                         *** 1.799 ***
413
                                                                                                    479
414
                 Point
                           X-Surf
                                       Y-Surf
                                                                                                    480
415
                  No.
                            (ft)
                                       (ft)
                                                                                                    481
416
                                                                                                    482
                           216.972
                                      1437.927
417
                                                                                                    483
418
                  2
                           234.483
                                      1435.726
419
                  3
                           305.443
                                      1452.931
                                                                                                    485
                                                                                                                   Failure Surface Specified By 4 Coordinate Points
                           335.503
                                      1486.000
                                                                                                    486
420
421
                                                                                                    487
422
                                                                                                    488
                                                                                                                     Point
                                                                                                                               X-Surf
                                                                                                                                           Y-Surf
423
                     Factor of Safety
                                                                                                    489
                                                                                                                      No.
                                                                                                                                (ft)
                                                                                                                                           (ft)
                     *** 1.799 ***
                                                                                                    490
424
425
                                                                                                    491
                                                                                                                               207.853
                                                                                                                                           1435.000
426
                                                                                                    492
                                                                                                                      2
                                                                                                                               231.739
                                                                                                                                           1429.191
427
                                                                                                    493
                                                                                                                      3
                                                                                                                               295.077
                                                                                                                                           1442.507
428
                                                                                                    494
                                                                                                                               328.466
                                                                                                                                           1486.000
429
               Failure Surface Specified By 4 Coordinate Points
                                                                                                    495
430
                                                                                                    496
431
                                                                                                    497
                                                                                                                         Factor of Safety
                           X-Surf
                                       Y-Surf
                                                                                                                         *** 1.855 ***
432
                 Point
                                                                                                    498
433
                  No.
                            (ft)
                                       (ft)
                                                                                                    499
434
                                                                                                    500
435
                  1
                           216.972
                                      1437.927
                                                                                                    501
436
                  2
                           234.483
                                      1435.726
                                                                                                    502
437
                           305.443
                                       1452.931
                                                                                                    503
                                                                                                                   Failure Surface Specified By 4 Coordinate Points
                  3
                           335.503
438
                                      1486.000
                                                                                                    504
439
                                                                                                    505
440
                                                                                                    506
                                                                                                                     Point
                                                                                                                               X-Surf
                                                                                                                                           Y-Surf
441
                     Factor of Safety
                                                                                                    507
                                                                                                                      No.
                                                                                                                                (ft)
                                                                                                                                            (ft)
442
                     *** 1.799 ***
                                                                                                    508
                                                                                                                               207.853
443
                                                                                                    509
                                                                                                                      1
                                                                                                                                           1435.000
```

```
510
                  2
                         231.739
                                    1429.191
                         295.077 1442.507
328.466 1486.000
                 3
511
512
513
514
                  Factor of Safety
*** 1.855 ***
515
516
517
518
519
520
521
522
                      **** END OF GSTABL7 OUTPUT ****
523
```

Bouquet Canyon/21095-01/Section W-W'/ Seismic



| 1 *** GSTABL7 *** | 48 | 1 | 0.00 1390.00 | 21.00 | 1389.00 | 1 |
|---|----------|--------------|---|---------------------|----------------------------------|-------|
| 2 | 49 | 2 | 21.00 1389.00 | 26.00 | 1393.00 | 1 |
| <pre>3 ** GSTABL7 by Dr. Garry H. Gregory, Ph.D.,P.E.,D.GE **</pre> | 50 | 3 | 26.00 1393.00 | 111.00 | 1393.00 | 1 |
| 4 | 51 | 4 | 111.00 1393.00 | 131.00 | 1402.00 | 1 |
| ** Original Version 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 ** | 52 | 5 | 131.00 1402.00 | 144.00 | 1403.00 | 1 |
| 6 (All Rights Reserved-Unauthorized Use Prohibited) | 53 | 6 | 144.00 1403.00 | 144.10 | 1407.00 | 1 |
| 7 | 54 | 7 | 144.10 1407.00 | 151.00 | 1410.00 | 1 |
| 8 | 55 | 8 | 151.00 1410.00 | 191.00 | 1430.00 | 1 |
| 9 | 56 | 9 | 191.00 1430.00 | 196.00 | 1435.00 | 1 |
| ******************* | 57 | 10 | 196.00 1435.00 | 211.00 | 1435.00 | 1 |
| ** | 58 | 11 | 211.00 1435.00 | 262.00 | 1460.00 | 1 |
| 10 SLOPE STABILITY ANALYSIS SYSTEM | 59 | 12 | 262.00 1460.00 | 272.00 | 1460.00 | 1 |
| 11 Modified Bishop, Simplified Janbu, or GLE Method of Slices. | 60 | 13 | 272.00 1460.00 | 319.00 | 1484.00 | 1 |
| 12 (Includes Spencer & Morgenstern-Price Type Analysis) | 61 | 14 | 319.00 1484.00 | 320.00 | 1486.00 | 1 |
| Including Pier/Pile, Reinforcement, Soil Nail, Tieback, | 62 | 15 | 320.00 1486.00 | 372.00 | 1486.00 | 1 |
| Nonlinear Undrained Shear Strength, Curved Phi Envelope, | 63 | 16 | 372.00 1486.00 | 407.00 | 1469.00 | 1 |
| 15 Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water | 64 | 17 | 407.00 1469.00 | 419.00 | 1469.00 | 1 |
| 16 Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces. | 65 | 18 | 419.00 1469.00 | 437.00 | 1460.00 | 1 |
| 17 | 66 | 19 | 437.00 1460.00 | 440.00 | 1460.00 | 1 |
| ****************** | 67 | 20 | 0.00 1386.00 | 21.00 | 1384.00 | 2 |
| ** | 68 | 21 | 21.00 1384.00 | 26.00 | 1388.00 | 2 |
| 18 | 69 | 22 | 26.00 1388.00 | 146.00 | 1388.00 | 2 |
| 19 | 70 | 23 | 146.00 1388.00 | 326.00 | 1480.00 | 2 |
| 20 Analysis Run Date: 4/8/2022 | 71 | 24 | 326.00 1480.00 | 351.00 | 1483.00 | 2 |
| 21 Time of Run: 10:12AM | 72 | 25 | 351.00 1483.00 | 365.00 | 1483.00 | 2 |
| 22 Run By: LGC Geotechnical, | 73 | 26 | 365.00 1483.00 | 440.00 | 1445.00 | 2 |
| Inc. | 74 | | | | | |
| | 75 | User Specif | ied Y-Origin = | 1320.00(ft) | | |
| | 76 | | | | | |
| 23 Input Data Filename: Z:\2021\21095-01 Integral - Bouquet | 77 | Default X-F | Plus Value = 0.00(ft |) | | |
| Canyon\Engineering\slope stability\Sec | 78 | | | | | |
| W-W'\2022_04_08\xwb-2e.in | 79 | Default Y-F | Plus Value = 0.00(ft |) | | |
| | 80 1 | | | | | |
| | 81 | | | | | |
| Output Filename: Z:\2021\21095-01 Integral - Bouquet | 82 | | | | | |
| Canyon\Engineering\slope stability\Sec | 83 | ISOTROPIC SC | OIL PARAMETERS | | | |
| W-W'\2022_04_08\xwb-2e.OUT | 84 | | | | | |
| | 85 | | 0 - 12 | | | |
| | 86 | 2 Type(s) | of Soil | | | |
| 25 Unit System: English | 87 | | | | | |
| 26 | 88 | | | | _ | |
| 27 Plotted Output Filename: Z:\2021\21095-01 Integral - Bouquet | 89 90 | | Saturated Cohesi | | Pore Pressu | |
| Canyon\Engineering\slope stability\Sec W-W'\2022 04 08\xwb-2e.PLT | 91 | No. (pcf) | <pre>It. Unit Wt. Interce (pcf) (psf)</pre> | ot Angle i (deg) | Pressure Constant Param. (psf | |
| W-W-\2022_04_06\XWD-ZE.FLI | 92 | No. (pcl) | (pcf) (psf) | (deg) | Param. (psi | , NO. |
| | 93 | 1 120.0 | 120.0 250.0 | 28.0 | 0.00 0.0 | 0 |
| 28 | 94 | 2 120.0 | | 32.0 | 0.00 0.0 | |
| 29 | 95 | 2 120.0 | 120.0 250.0 | 32.0 | 0.00 | · · |
| 30 | 96 | | | | | |
| 31 | 97 | | | | | |
| 32 | 98 | ANTSOTROPIC | STRENGTH PARAMETERS | | | |
| 33 PROBLEM DESCRIPTION: Bouquet Canyon/21095-01/Section W-W'/ | 99 | | type(s) | | | |
| 34 Seismic | 100 | | -11 | | | |
| 35 | 101 | | | | | |
| 36 | 102 | Soil Type | 2 Is Anisotropic | | | |
| 37 | 103 | | | | | |
| 38 | 104 | Number Of I | Direction Ranges Spe | cified = 3 | | |
| 39 BOUNDARY COORDINATES | 105 | | | | | |
| 40 | 106 | | | | | |
| 41 19 Top Boundaries | 107 | Direction | Counterclockwise | Cohesion | Friction | |
| 42 26 Total Boundaries | 108 | Range | Direction Limit | Intercept | Angle | |
| 43 | 109 | No. | (deg) | (psf) | (deg) | |
| 44 | 110 | | | | | |
| 45 Boundary X-Left Y-Left X-Right Y-Right Soil Type | 111 | 1 | 9.0 | 250.00 | 32.00 | |
| 46 No. (ft) (ft) (ft) Below Bnd | 112 | 2 | 15.0 | 150.00 | 25.00 | |
| 47 | 113 | 3 | 90.0 | 250.00 | 32.00 | |
| | | | | | | |

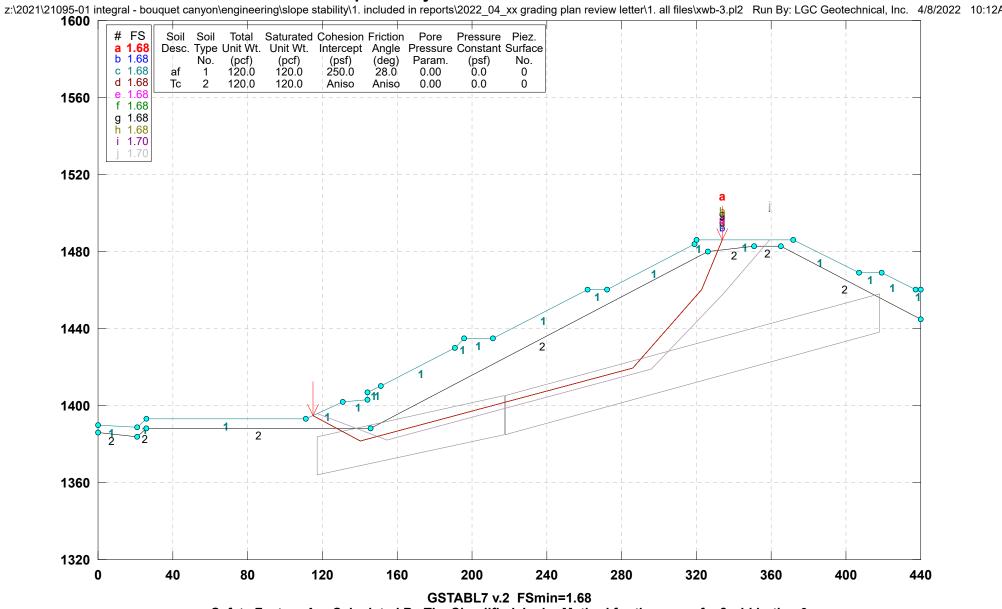
```
114
115
                ANISOTROPIC SOIL NOTES:
                   (1) An input value of 0.01 for C and/or Phi will cause Aniso
116
117
                      C and/or Phi to be ignored in that range.
                   (2) An input value of 0.02 for Phi will set both Phi and
118
119
                      C equal to zero, with no water weight in the tension crack.
120
                   (3) An input value of 0.03 for Phi will set both Phi and
                      C equal to zero, with water weight in the tension crack.
122
124
                Specified Peak Ground Acceleration Coefficient (A) = 0.150(g)
                Specified Horizontal Earthquake Coefficient (kh) = 0.150(g)
125
126
                Specified Vertical Earthquake Coefficient (kv) = 0.000(q)
128
                Specified Seismic Pore-Pressure Factor = 0.000
129
130
                Janbus Empirical Coef is being used for the case of c & phi both > 0
131
132
133
               A Critical Failure Surface Searching Method, Using A Random
134
135
                Technique For Generating Sliding Block Surfaces, Has Been
136
                Specified.
137
138
139
                4999 Trial Surfaces Have Been Generated.
140
141
142
                2 Boxes Specified For Generation Of Central Block Base
143
144
145
                Length Of Line Segments For Active And Passive Portions Of
146
                Sliding Block Is 55.0
147
148
                Box
                          X-Left
                                     Y-Left X-Right
                                                          Y-Right
                                                                       Height
149
150
                No.
                           (ft)
                                      (ft)
                                                 (ft)
                                                            (ft)
                                                                        (ft)
151
                           228.00
                                    1428.00
                                                248.00
                                                          1432.00
152
                                    1432.00
                                                359.00
                                                         1465.00
153
                2
                          249.00
                                                                       20.00
154
155
156
                Following Are Displayed The Ten Most Critical Of The Trial
157
                Failure Surfaces Evaluated. They Are
158
               Ordered - Most Critical First.
159
160
161
                * * Safety Factors Are Calculated By The Simplified Janbu Method * *
162
163
164
165
                Total Number of Trial Surfaces Attempted = 4999
166
167
               Number of Trial Surfaces With Valid FS = 4999
168
169
170
                Statistical Data On All Valid FS Values:
171
                  FS Max = 28.337 FS Min = 1.261 FS Ave = 2.022
172
                  Standard Deviation = 1.498 Coefficient of Variation = 74.08 %
174
175
                Failure Surface Specified By 4 Coordinate Points
176
178
                 Point
                            X-Surf
                                         Y-Surf
179
                  No.
                             (ft)
                                         (ft)
```

```
180
181
                   1
                           216.972
                                       1437.927
182
                   2
                            234.483
                                       1435.726
                            305.443
                                       1452.931
183
                   3
                           335.503
184
                   4
                                       1486.000
185
186
187
                     Factor of Safety
188
                     ***
                         1.261 ***
189
190
191
192
193
                    Individual data on the
                                             10 slices
194
195
196
                              Water Water
                                             Tie
                                                     Tie
                                                             Earthquake
197
                              Force Force
                                             Force
                                                    Force
                                                               Force Surcharge
198
      Slice Width
                     Weight
                              Top
                                    Bot.
                                             Norm
                                                     Tan
                                                             Hor
                                                                    Ver Load
199
       No.
              (ft)
                     (lbs)
                              (lbs) (lbs)
                                             (lbs)
                                                   (lbs)
                                                            (lbs) (lbs) (lbs)
201
                     11331.8
                                                             1699.8
                                0.0
                                        0.0
                                                  0.
                                                          0.
                                                                        0.0
                                                                                 0.0
        2
              9 3
                     13338.8
                                0.0
                                       0.0
                                                         0. 2000.8
                                                                        0.0
                                                                                0 0
                                                  0.
203
              18.2
                     33529.3
                                0.0
                                        0.0
                                                  0.
                                                         0. 5029.4
                                                                        0.0
                                                                                0.0
                     19668.0
204
        4
              10 0
                                0 0
                                        0 0
                                                 Ω
                                                         0 2950 2
                                                                        0 0
                                                                                0 0
205
              33.4
                     78908.8
                                                         0. 11836.3
                                0 0
                                        0.0
                                                 0.
                                                                        0.0
                                                                                0.0
              13.6
                     32781.3
                                                         0. 4917.2
                                0.0
                                        0.0
                                                  0.
                                                                        0.0
                                                                                0.0
                     1992.6
207
              1.0
                                0.0
                                        0.0
                                                  0.
                                                              298.9
                                                                        0.0
                                                                                0.0
208
        8
               6.0
                      9903.5
                                0.0
                                        0.0
                                                 0.
                                                         0. 1485.5
                                                                        0.0
                                                                                0.0
209
        9
               4.5
                      4338.4
                                0.0
                                                              650.8
                                                                        0.0
                                        0.0
                                                 0.
                                                         0.
                                                                                0.0
210
       10
               5.0
                     1622.7
                                0.0
                                        0.0
                                                  0.
                                                         0
                                                              243.4
                                                                        0 0
                                                                                0.0
211
212
               Failure Surface Specified By 4 Coordinate Points
213
214
215
                 Point
                           X-Surf
                                       Y-Surf
216
                  No.
                            (ft)
                                        (ft)
217
                            216.972
                                       1437.927
218
                           234.483
                                       1435.726
219
                   2
                            305.443
                                       1452.931
220
                   3
221
                   4
                           335.503
                                       1486.000
222
223
224
                     Factor of Safety
225
                     *** 1.261 ***
226
227
228
229
230
231
               Failure Surface Specified By 4 Coordinate Points
233
234
                 Point
                           X-Surf
                                       Y-Surf
235
                            (ft)
                                        (ft)
                  No.
236
237
                           216.972
                                       1437.927
238
                   2
                           234.483
                                       1435.726
239
                            305.443
                                       1452.931
                  3
                           335.503
240
                   4
                                       1486.000
241
242
243
                     Factor of Safety
244
                          1.261 ***
245
```

```
246
                                                                                                                              234.483
                                                                                                                                         1435.726
247
                                                                                                                              305.443
                                                                                                                                         1452.931
                                                                                                   313
                                                                                                                     3
                                                                                                   314
                                                                                                                              335.503
                                                                                                                                         1486.000
248
               Failure Surface Specified By 4 Coordinate Points
                                                                                                   315
249
250
                                                                                                   316
251
                                                                                                   317
                                                                                                                        Factor of Safety
                Point
                           X-Surf
                                      Y-Surf
                                                                                                                       *** 1.261 ***
252
                                                                                                   318
253
                           (ft.)
                                       (ft)
                                                                                                   319
                 No.
254
                                                                                                   320
255
                  1
                           216.972
                                      1437.927
                                                                                                   321
256
                           234.483
                                      1435.726
                                                                                                   322
                                      1452.931
                                                                                                                  Failure Surface Specified By 4 Coordinate Points
257
                  3
                           305.443
                                                                                                   323
258
                           335.503
                                      1486.000
                                                                                                   324
259
                                                                                                   325
260
                                                                                                                    Point
                                                                                                                              X-Surf
                                                                                                                                          Y-Surf
                                                                                                   326
                     Factor of Safety
                                                                                                   327
                                                                                                                               (ft)
                                                                                                                                          (ft)
261
                                                                                                                     No.
262
                    *** 1.261 ***
                                                                                                   328
                                                                                                                              216.972
                                                                                                                                         1437.927
263
                                                                                                   329
                                                                                                                              234.483
                                                                                                                                         1435.726
264
                                                                                                   330
                                                                                                                     2.
265
                                                                                                   331
                                                                                                                              305.443
                                                                                                                                         1452.931
266 1
                                                                                                   332
                                                                                                                     4
                                                                                                                              335.503
                                                                                                                                         1486.000
267
                                                                                                   333
268
               Failure Surface Specified By 4 Coordinate Points
                                                                                                   334
269
                                                                                                                        Factor of Safety
                                                                                                                        *** 1.261 ***
270
                                                                                                   336
271
                 Point
                           X-Surf
                                      Y-Surf
                                                                                                   337
272
                           (ft)
                                       (ft)
                                                                                                   338
                 No.
273
                                                                                                   339
                           216.972
274
                  1
                                      1437.927
                                                                                                   340 1
                                      1435.726
275
                  2
                           234.483
                                                                                                   341
276
                  3
                           305.443
                                      1452.931
                                                                                                   342
                                                                                                                  Failure Surface Specified By 4 Coordinate Points
                           335.503
277
                                      1486.000
                                                                                                   343
278
                                                                                                   344
279
                                                                                                   345
                                                                                                                    Point
                                                                                                                              X-Surf
                                                                                                                                         Y-Surf
280
                     Factor of Safety
                                                                                                   346
                                                                                                                     No.
                                                                                                                               (ft)
                                                                                                                                          (ft)
                    *** 1.261 ***
281
                                                                                                   347
282
                                                                                                   348
                                                                                                                              219.153
                                                                                                                                         1438.997
283
                                                                                                   349
                                                                                                                     2
                                                                                                                              239.595
                                                                                                                                         1435.552
284
                                                                                                   350
                                                                                                                     3
                                                                                                                              304.987
                                                                                                                                          1447.809
                                                                                                   351
                                                                                                                              336.299
                                                                                                                                         1486.000
285
                                                                                                                     4
286
               Failure Surface Specified By 4 Coordinate Points
287
                                                                                                   353
                                                                                                   354
288
                                                                                                                        Factor of Safety
                                      Y-Surf
                                                                                                                        *** 1.297 ***
289
                 Point
                           X-Surf
                                                                                                   355
290
                 No.
                           (ft)
                                       (ft)
                                                                                                   356
291
                                                                                                   357
                           216.972
                                      1437.927
                                                                                                   358
292
                  1
293
                  2
                           234.483
                                      1435.726
                                                                                                   359
294
                           305.443
                                      1452.931
                                                                                                   360
                                                                                                                  Failure Surface Specified By 4 Coordinate Points
                  3
295
                           335.503
                                      1486.000
                                                                                                   361
296
                                                                                                   362
297
                                                                                                   363
                                                                                                                    Point
                                                                                                                              X-Surf
                                                                                                                                         Y-Surf
                     Factor of Safety
                                                                                                   364
                                                                                                                                          (ft)
298
                                                                                                                     No.
                                                                                                                               (ft)
299
                    *** 1.261 ***
                                                                                                   365
                                                                                                                                         1438.997
300
                                                                                                   366
                                                                                                                     1
                                                                                                                              219.153
301
                                                                                                   367
                                                                                                                     2
                                                                                                                              239.595
                                                                                                                                         1435.552
302
                                                                                                   368
                                                                                                                     3
                                                                                                                              304.987
                                                                                                                                         1447 809
303 1
                                                                                                   369
                                                                                                                     4
                                                                                                                              336.299
                                                                                                                                         1486.000
304
                                                                                                   370
               Failure Surface Specified By 4 Coordinate Points
                                                                                                   371
305
306
                                                                                                   372
                                                                                                                        Factor of Safety
307
                                                                                                   373
                                                                                                                        *** 1.297 ***
308
                 Point
                           X-Surf
                                      Y-Surf
                                                                                                   374
                                                                                                   375
309
                 No.
                            (ft)
                                       (ft)
310
                                                                                                   376
                           216.972
311
                  1
                                      1437.927
                                                                                                   377
```

```
378
379
380
                          **** END OF GSTABL7 OUTPUT ****
```

Bouquet Canyon/21095-01/Section W-W'/ Static



Safety Factors Are Calculated By The Simplified Janbu Method for the case of c & phi both > 0

| 1 | | *** GSTABL7 *** | 48 | 1 | 0.00 | 1390.00 | 21.00 | 1389.00 | 1 |
|----------|--|---|------------|--------------------|--------------|------------|-------------|------------|---------------|
| 2 | | | 49 | 2 | 21.00 | 1389.00 | 26.00 | 1393.00 | 1 |
| 3 | ** GSTABL | 7 by Dr. Garry H. Gregory, Ph.D., P.E., D.GE ** | 50 | 3 | 26.00 | 1393.00 | 111.00 | 1393.00 | 1 |
| 4 | | | 51 | 4 | 111.00 | 1393.00 | 131.00 | 1402.00 | 1 |
| 5 | | 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 ** | 52 | 5 | 131.00 | 1402.00 | 144.00 | 1403.00 | 1 |
| 6 | (All Rig | ghts Reserved-Unauthorized Use Prohibited) | 53 | 6 | 144.00 | 1403.00 | 144.10 | 1407.00 | 1 |
| 7 | | | 54 | 7 | 144.10 | 1407.00 | 151.00 | 1410.00 | 1 |
| 8 | | | 55 | 8 | 151.00 | 1410.00 | 191.00 | 1430.00 | 1 |
| 9 | | | 56 | 9 | 191.00 | 1430.00 | 196.00 | 1435.00 | 1 |
| | ********** | **************** | 57 | 10 | 196.00 | 1435.00 | 211.00 | 1435.00 | 1 |
| | ** | | 58 | 11 | 211.00 | 1435.00 | 262.00 | 1460.00 | 1 |
| 10 | SLO | DPE STABILITY ANALYSIS SYSTEM | 59 | 12 | 262.00 | 1460.00 | 272.00 | 1460.00 | 1 |
| 11 | Modified Bishop | , Simplified Janbu, or GLE Method of Slices. | 60 | 13 | 272.00 | 1460.00 | 319.00 | 1484.00 | 1 |
| 12 | (Includes Spence | er & Morgenstern-Price Type Analysis) | 61 | 14 | 319.00 | 1484.00 | 320.00 | 1486.00 | 1 |
| 13 | Including Pier/ | Pile, Reinforcement, Soil Nail, Tieback, | 62 | 15 | 320.00 | 1486.00 | 372.00 | 1486.00 | 1 |
| 14 | Nonlinear Undra: | ined Shear Strength, Curved Phi Envelope, | 63 | 16 | 372.00 | 1486.00 | 407.00 | 1469.00 | 1 |
| 15 | Anisotropic Soil | l, Fiber-Reinforced Soil, Boundary Loads, Water | 64 | 17 | 407.00 | 1469.00 | 419.00 | 1469.00 | 1 |
| 16 | Surfaces, Pseudo | o-Static & Newmark Earthquake, and Applied Forces. | 65 | 18 | 419.00 | 1469.00 | 437.00 | 1460.00 | 1 |
| 17 | | | 66 | 19 | 437.00 | 1460.00 | 440.00 | 1460.00 | 1 |
| | ********** | *************** | 67 | 20 | 0.00 | 1386.00 | 21.00 | 1384.00 | 2 |
| | ** | | 68 | 21 | 21.00 | 1384.00 | 26.00 | 1388.00 | 2 |
| 18 | | | 69 | 22 | 26.00 | 1388.00 | 146.00 | 1388.00 | 2 |
| 19 | | | 70 | 23 | 146.00 | 1388.00 | 326.00 | 1480.00 | 2 |
| 20 | Analysis Run Date: | 4/8/2022 | 71 | 24 | 326.00 | 1480.00 | 351.00 | 1483.00 | 2 |
| 21 | Time of Run: | 10:12AM | 72 | 25 | 351.00 | 1483.00 | 365.00 | 1483.00 | 2 |
| 22 | Run By: | LGC Geotechnical, | 73 | 26 | 365.00 | 1483.00 | 440.00 | 1445.00 | 2 |
| | Inc. | | 74 | | | | | | |
| | | | 75 | User Specif | ied Y-Origi | in = | 1320.00(ft) | | |
| | | | 76 | | | | | | |
| 23 | Input Data Filename: | Z:\2021\21095-01 Integral - Bouquet | 77 | Default X-I | Plus Value = | = 0.00(ft) | | | |
| | Canyon\Engineering\slop | | 78 | | | | | | |
| | W-W'\2022_04_08\xwb-3. | in | 79 | Default Y-I | Plus Value = | = 0.00(ft) | | | |
| | | | 80 1 | | | | | | |
| 0.4 | 0.1.1.1.1.1 | - \ 0.001\ 0.1005 0.1 | 81 | | | | | | |
| 24 | Output Filename: | Z:\2021\21095-01 Integral - Bouquet | 82 | | | | | | |
| | Canyon\Engineering\slop | | 83 84 | ISOTROPIC SO | OIL PARAMETE | SKS | | | |
| | W-W'\2022_04_08\xwb-3.0 | JU1 | 85 | | | | | | |
| | | | 86 | 2 Type(s) | of Coil | | | | |
| 25 | Unit System: | English | 87 | z Type(s) | 01 3011 | | | | |
| 26 | OHIC System: | Engitan | 88 | | | | | | |
| 27 | Plotted Output Filename | e: Z:\2021\21095-01 Integral - Bouquet | 89 | Soil Total | Saturated | Cohesio | n Friction | Pore Pre | ssure Piez. |
| 27 | Canyon\Engineering\slop | | 90 | | Vt. Unit Wt. | | | | stant Surface |
| | W-W'\2022 04 08\xwb-3.1 | | 91 | No. (pcf) | | (psf) | (deg) | | psf) No. |
| | (================================= | | 92 | (1 | (1) | (1) | (5, | | |
| | | | 93 | 1 120.0 | 120.0 | 250.0 | 28.0 | 0.00 | 0.0 |
| 28 | | | 94 | 2 120.0 | | 250.0 | 32.0 | | 0.0 |
| 29 | | | 95 | | | | | | |
| 30 | | | 96 | | | | | | |
| 31 | | | 97 | | | | | | |
| 32 | | | 98 | ANISOTROPIC | STRENGTH PA | ARAMETERS | | | |
| 33 | | Bouquet Canyon/21095-01/Section W-W'/ | 99 | 1 soil | type(s) | | | | |
| 34 | 5 | Static | 100 | | | | | | |
| 35 | | | 101 | | | | | | |
| 36 | | | 102 | Soil Type | 2 Is Anisot | tropic | | | |
| 37 | | | 103 | | | _ | | | |
| 38 | DOINIDADI. COCCESSION TO | | 104 | Number Of I | Direction Ra | anges Spec | 111ea = 3 | | |
| 39 | BOUNDARY COORDINATES | | 105 106 | | | | | | |
| 40 | 10 Top Boundard - | | 106 | Direction | Country | l oakui aa | Cohoois | Product in | n |
| 41 42 | 19 Top Boundaries 26 Total Boundaries | | 107 | Direction Range | Countercl | | Cohesion | Friction | |
| 43 | 20 IOLAI BOUNDARIES | | 108 | _ | Directio | | Intercept | Angle | |
| 43 | | | 1109 | No. | (deg | 3) | (psf) | (deg) | |
| 44 | Boundary X-Left | Y-Left X-Right Y-Right Soil Type | 110 | 1 | 9. | 0 | 250.00 | 32.0 | nn |
| 46 | No. (ft) | (ft) (ft) (ft) Below Bnd | 111 | 2 | 9. 15. | | 150.00 | 25.0 | |
| 47 | 110. | (IC) (IC) DEIOW BIRG | 113 | 3 | 90. | | 250.00 | 32.0 | |
| ± / | | | 143 | 3 | <i>5</i> 0. | | 250.00 | 52.1 | |
| | | | 1 | | | | | | |

```
114
115
                ANISOTROPIC SOIL NOTES:
                   (1) An input value of 0.01 for C and/or Phi will cause Aniso
116
117
                       C and/or Phi to be ignored in that range.
                   (2) An input value of 0.02 for Phi will set both Phi and
118
119
                       C equal to zero, with no water weight in the tension crack.
120
                   (3) An input value of 0.03 for Phi will set both Phi and
                       C equal to zero, with water weight in the tension crack.
122
123
124
                Janbus Empirical Coef is being used for the case of c & phi both > 0
125 1
126
                A Critical Failure Surface Searching Method, Using A Random
128
129
                Technique For Generating Sliding Block Surfaces, Has Been
130
                Specified.
131
133
                4999 Trial Surfaces Have Been Generated.
134
135
136
                2 Boxes Specified For Generation Of Central Block Base
137
138
139
                Length Of Line Segments For Active And Passive Portions Of
                Sliding Block Is 55.0
140
141
142
                                                          Y-Right
                          X-Left
                                     Y-Left
                                               X-Right
143
                Box
                                                                       Height.
144
                No.
                            (ft)
                                       (ft)
                                                 (ft)
                                                             (ft)
                                                                        (ft)
145
146
                1
                           117 00
                                    1374 00
                                                217 00
                                                          1395 00
                                                                        20 00
                           218.00
                                   1395.00
                                                418.00
                                                          1448.00
147
                2
                                                                       20 00
148
149
150
                WARNING! The factor of safety calculation did not converge in 20 iterations.
151
152
153
                The Trial Failure Surface In Question Is Defined
154
155
                By The Following 4 Coordinate Points
156
157
158
                  Point
                            X-Surf
                                        Y-Surf
159
                             (ft)
                                         (ft)
                   No.
160
161
                             145.49
                                       1407.60
                            170.39
                                       1394.14
162
                   2
163
                   3
                             230.93
                                       1402.54
164
                    4
                             231.45
                                       1445.02
165
166
167
                Factor of Safety for the Preceding Surface is Between10.956 and10.951
168
169
170
                WARNING! The factor of safety calculation did not converge in 20 iterations.
171
172
174
                The Trial Failure Surface In Question Is Defined
175
                By The Following 5 Coordinate Points
176
178
                  Point
                             X-Surf
                                         Y-Surf
179
                  No.
                             (ft)
                                          (ft)
```

```
180
                                        1406.31
181
                   1
                             144.08
182
                             174.32
                                        1391.59
183
                   3
                             275.12
                                        1404.35
                             275.19
                                        1459.35
184
                   4
185
                             279.84
                                        1464.00
                   5
186
187
188
                Factor of Safety for the Preceding Surface is Between14.802 and14.663
189
190
191
                WARNING! The factor of safety calculation did not converge in 20 iterations.
192
193
194
195
                The Trial Failure Surface In Question Is Defined
196
                By The Following 4 Coordinate Points
197
198
                             X-Surf
                                         Y-Surf
199
                  Point
                              (ft)
                                         (ft.)
                   No.
                             145.49
                                        1407.60
203
                             170.39
                                        1394.14
204
                   3
                             230 93
                                        1402 54
205
                             231.45
                                        1445.02
                    4
206
207
208
                Factor of Safety for the Preceding Surface is Between10.956 and10.951
209
210
211
                WARNING! The factor of safety calculation did not converge in 20 iterations.
212
213
214
215
                The Trial Failure Surface In Ouestion Is Defined
216
                By The Following 5 Coordinate Points
217
218
219
                  Point
                             X-Surf
                                         Y-Surf
220
                   No.
                              (ft)
                                         (ft)
222
                             144.08
                                        1406.31
                   2
                             174 32
                                        1391 59
224
                             275.12
                                        1404.35
                   3
225
                             275.19
                                        1459.35
226
                             279 84
                                        1464 00
227
228
229
                Factor of Safety for the Preceding Surface is Between14.802 and14.663
230
231
232
                WARNING! The factor of safety calculation did not converge in 20 iterations.
233
234
235
236
                The Trial Failure Surface In Question Is Defined
237
                By The Following 4 Coordinate Points
238
239
240
                  Point
                             X-Surf
                                         Y-Surf
2.41
                   No.
                              (ft)
                                         (ft)
242
                                        1407.60
243
                             145 49
244
                   2
                             170.39
                                        1394.14
245
                   3
                             230.93
                                        1402.54
```

| 0.4.6 | | 001 45 | 1445.00 | |
|-------|-------------|--------------|--|---|
| 246 | 4 | 231.45 | 1445.02 | |
| 247 | | | | |
| 248 | | | | |
| 249 | Factor of | Safety for t | the Preceding | Surface is Between10.956 and10.951 |
| 250 | | | | |
| 251 | | | | |
| 252 | WARNING! T | he factor of | f cafety cal | culation did not converge in 20 iterations. |
| 253 | WHICHING. I | ne raccor o. | i barcey care | atacion ala noc converge in 20 icciacions. |
| | | | | |
| 254 | | | | |
| 255 | | | | |
| 256 | The Trial | Failure Sur | face In Quest | ion Is Defined |
| 257 | By The Fol | lowing 5 Co | oordinate Poi | nts |
| 258 | | | | |
| 259 | | | | |
| 260 | Point | X-Surf | Y-Surf | |
| 261 | No. | | (ft) | |
| | NO. | (ft) | (10) | |
| 262 | | | | |
| 263 | 1 | 144.08 | 1406.31 | |
| 264 | 2 | 174.32 | 1391.59 | |
| 265 | 3 | 275.12 | 1404.35 | |
| 266 | 4 | 275.19 | 1459.35 | |
| 267 | 5 | 279.84 | 1464.00 | |
| 268 | 3 | 2,7.04 | 1101.00 | |
| 269 | | | | |
| | | | | |
| 270 | Factor of | Safety for | the Preceding | Surface is Between14.802 and14.663 |
| 271 | | | | |
| 272 | | | | |
| 273 | WARNING! T | he factor of | f safety cald | ulation did not converge in 20 iterations. |
| 274 | | | - | - |
| 275 | | | | |
| | | | | |
| 276 | m1 m : 1 | - 11 | | |
| 277 | | | | ion Is Defined |
| 278 | By The Fol | lowing 4 Co | oordinate Poi | nts |
| 279 | | | | |
| 280 | | | | |
| 281 | Point | X-Surf | Y-Surf | |
| 282 | No. | (ft) | (ft) | |
| 283 | | (/ | (/ | |
| 284 | 1 | 145.49 | 1407.60 | |
| | | | | |
| 285 | 2 | 170.39 | 1394.14 | |
| 286 | 3 | 230.93 | 1402.54 | |
| 287 | 4 | 231.45 | 1445.02 | |
| 288 | | | | |
| 289 | | | | |
| 290 | Factor of | Safety for | the Preceding | Surface is Between10.956 and10.951 |
| 291 | | | | |
| 292 | | | | |
| | MADATES - | ha fast | £ ==£================================= | unlabian did was manusare in 00 issuesi |
| 293 | WAKNING! T | ne ractor of | L sarety cald | ulation did not converge in 20 iterations. |
| 294 | | | | |
| 295 | | | | |
| 296 | | | | |
| 297 | The Trial | Failure Sur | face In Ouest | ion Is Defined |
| 298 | | | oordinate Poi | |
| 299 | -2 | | | |
| 300 | | | | |
| | D. J | W C | W. C | |
| 301 | Point | X-Surf | Y-Surf | |
| 302 | No. | (ft) | (ft) | |
| 303 | | | | |
| 304 | 1 | 144.08 | 1406.31 | |
| 305 | 2 | 174.32 | 1391.59 | |
| 306 | 3 | 275.12 | 1404.35 | |
| 307 | 4 | 275.12 | 1459.35 | |
| | 5 | | | |
| 308 | 5 | 279.84 | 1464.00 | |
| 309 | | | | |
| 310 | | | | |
| 211 | Tooton of | Cofotes for | the Dunnadius | Company is Detrocen14 000 and14 663 |

Factor of Safety for the Preceding Surface is Between14.802 and14.663

311

```
312
313
314
               WARNING! The factor of safety calculation did not converge in 20 iterations.
315
316
317
               The Trial Failure Surface In Question Is Defined
318
319
               By The Following 4 Coordinate Points
320
321
322
                 Point
                           X-Surf
                                       Y-Surf
323
                  No.
                            (ft)
                                        (ft)
324
                            145.49
325
                                      1407.60
                            170.39
                                      1394.14
326
                   2
327
                   3
                            230.93
                                      1402.54
328
                   4
                            231.45
                                      1445.02
329
330
               Factor of Safety for the Preceding Surface is Between10.956 and10.951
331
332
333
334
               WARNING! The factor of safety calculation did not converge in 20 iterations.
335
336
337
338
               The Trial Failure Surface In Question Is Defined
339
               By The Following 5 Coordinate Points
340
341
342
                 Point
                           X-Surf
                                       Y-Surf
343
                            (ft)
                                        (ft)
                  No.
344
345
                           144.08
                                      1406.31
                   1
346
                            174.32
                                      1391.59
347
                            275.12
                                      1404.35
                   3
348
                            275.19
                                      1459.35
349
                   5
                            279.84
                                      1464.00
350
351
352
               Factor of Safety for the Preceding Surface is Between14.802 and14.663
353
354
355
               WARNING! The factor of safety calculation did not converge in 20 iterations.
356
357
358
359
               The Trial Failure Surface In Question Is Defined
360
               By The Following 4 Coordinate Points
361
362
363
                 Point
                            X-Surf
                                       Y-Surf
                  No.
                                        (ft)
364
                            (ft)
365
                                      1407.60
366
                   1
                            145.49
367
                   2
                            170.39
                                      1394.14
368
                   3
                            230.93
                                      1402.54
369
                   4
                            231.45
                                      1445.02
370
371
372
               Factor of Safety for the Preceding Surface is Between10.956 and10.951
```

373 374 375

376

377

WARNING! The factor of safety calculation did not converge in 20 iterations.

| 37 | Ω | |
|----------|---|--|
| | | |
| 37 | | |
| 38 | | |
| 38 | 1 | |
| 38 | 2 | |
| | | |
| 38 | | |
| 38 | | |
| 38 | 5 | |
| 38 | 6 | |
| 38 | | |
| 38 | | |
| | | |
| 38 | | |
| 39 | 0 | |
| 39 | 1 | |
| 39 | | |
| | | |
| 39 | | |
| 39 | | |
| 39 | 5 | |
| 39 | | |
| 39 | | |
| | | |
| 39 | | |
| 39 | | |
| 40 | 0 | |
| 40 | 1 | |
| 40 | | |
| | | |
| 40 | | |
| 40 | | |
| 40 | 5 | |
| 40 | 6 | |
| 40 | | |
| | | |
| 40 | | |
| 40 | | |
| 41 | 0 | |
| 41 | | |
| 41 | | |
| 41 | 2 | |
| 41 | 3 | |
| 41 | | |
| 41 | 5 | |
| 41 | | |
| 41 | | |
| 41 | , | |
| 41 | Q | |
| 41 | 9 | |
| 42 | 0 | |
| 42 | | |
| 42 | | |
| 42 | 2 | |
| 42 | 5 | |
| 42 | | |
| 42 | 5 | |
| 42 | 6 | |
| 42 | | |
| 42 42 | 0 | |
| | | |
| 42 | | |
| 43 | 0 | |
| 43 | 1 | |
| 43 | | |
| | | |
| | 3 | |
| 43 | | |
| 43 | | |
| 43 | 6 | |
| 43 | | |
| ıυ | / | |

The Trial Failure Surface In Question Is Defined By The Following 5 Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|--------------|----------------|----------------|
| 1 | 144.08 | 1406.31 |
| 2 | 174.32 | 1391.59 |
| 3 | 275.12 | 1404.35 |
| 4 | 275.19 | 1459.35 |
| 5 | 279.84 | 1464.00 |

Factor of Safety for the Preceding Surface is Between14.802 and14.663

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 4 Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|--------------|----------------|----------------|
| 1 | 145.49 | 1407.60 |
| 2 | 170.39 | 1394.14 |
| 3 | 230.93 | 1402.54 |
| 4 | 231.45 | 1445.02 |
| | | |

Factor of Safety for the Preceding Surface is Between10.956 and10.951

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 5 Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|--------------|----------------|----------------|
| 1 | 144.08 | 1406.31 |
| 2 | 174.32 | 1391.59 |
| 3 | 275.12 | 1404.35 |
| 4 | 275.19 | 1459.35 |
| 5 | 279.84 | 1464.00 |
| | | |

Factor of Safety for the Preceding Surface is Between14.802 and14.663

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following $\ 4$ Coordinate Points

| 445 446 447 | Point No. | X-Surf (ft) | Y-Surf (ft) |
|-------------------|--------------|----------------|----------------|
| 448 | 1 | 145.49 | 1407.60 |
| 449 | 2 | 170.39 | 1394.14 |
| 450 | 3 | 230.93 | 1402.54 |
| 451 | 4 | 231.45 | 1445.02 |
| 452 | | | |

Factor of Safety for the Preceding Surface is Between10.956 and10.951

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 5 Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|--------------|----------------|----------------|
| 1 | 144.08 | 1406.31 |
| 2 | 174.32 | 1391.59 |
| 3 | 275.12 | 1404.35 |
| 4 | 275.19 | 1459.35 |
| 5 | 279.84 | 1464.00 |

Factor of Safety for the Preceding Surface is Between14.802 and14.663

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following $\ 4$ Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|--------------|----------------|----------------|
| 1 | 145.49 | 1407.60 |
| 2 | 170.39 | 1394.14 |
| 3 | 230.93 | 1402.54 |
| 4 | 231.45 | 1445.02 |

Factor of Safety for the Preceding Surface is Between10.956 and10.951

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Evaluated. They Are Ordered - Most Critical First.

* * Safety Factors Are Calculated By The Simplified Janbu Method * *

Total Number of Trial Surfaces Attempted = 4999

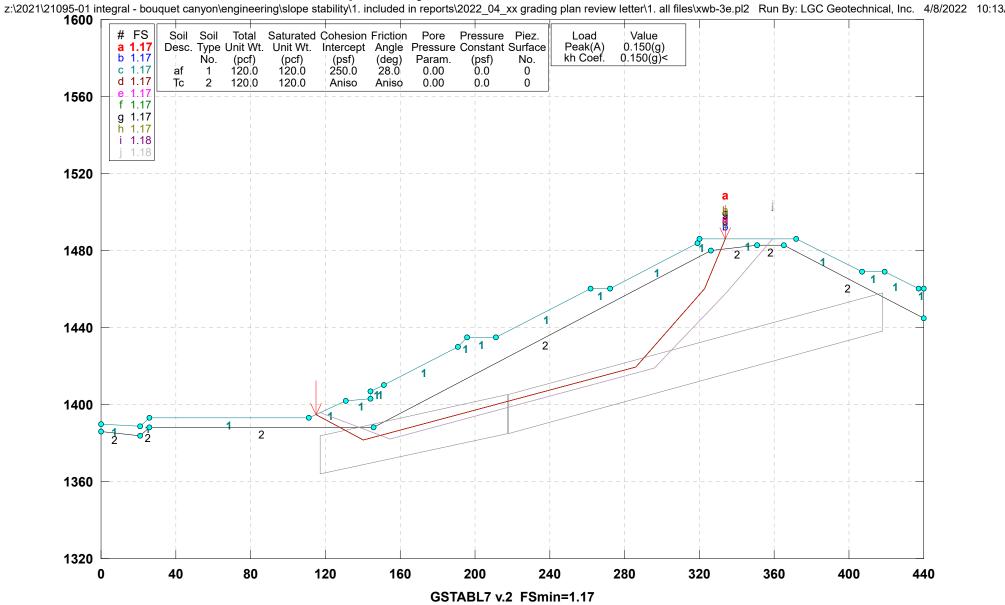
WARNING! The Factor of Safety Calculation for one or More Trial Surfaces

```
Y-Surf
510
               Did Not Converge in 20 Iterations.
                                                                                                      576
                                                                                                                        Point
                                                                                                                                   X-Surf
511
                                                                                                      577
                                                                                                                         No.
                                                                                                                                    (ft)
                                                                                                                                               (ft)
512
                                                                                                      578
                                                                                                                                               1394.665
513
               Number of Trial Surfaces with Non-Converged FS = 17
                                                                                                      579
                                                                                                                                   114.700
                                                                                                                                   140.383
                                                                                                                                               1381.541
514
                                                                                                      580
                                                                                                                          2
515
                                                                                                      581
                                                                                                                                   286.152
                                                                                                                                              1419.431
               Number of Trial Surfaces With Valid FS = 4982
                                                                                                                          3
516
                                                                                                      582
                                                                                                                                   322.801
                                                                                                                                               1460.442
                                                                                                      583
                                                                                                                                   333.651
                                                                                                                                              1486.000
517
518
               Percentage of Trial Surfaces With Non-Valid FS Solutions
                                                                                                      584
519
               of the Total Attempted = 0.3 %
                                                                                                      585
520
                                                                                                                            Factor of Safety
                                                                                                                            *** 1.677 ***
521
               Statistical Data On All Valid FS Values:
                                                                                                      587
522
                  FS Max = 10.601 FS Min = 1.677 FS Ave = 2.531
                                                                                                      588
                  Standard Deviation = 0.712 Coefficient of Variation = 28.11 %
                                                                                                      589
523
524
                                                                                                      590
525
                                                                                                      591
               Failure Surface Specified By 5 Coordinate Points
526
                                                                                                      592
527
                                                                                                      593
                                                                                                                      Failure Surface Specified By 5 Coordinate Points
528
                                                                                                      594
                            X-Surf
529
                 Point
                                        Y-Surf
                                                                                                      595
                             (ft)
                                         (ft)
                                                                                                      596
                                                                                                                        Point.
                                                                                                                                   X-Surf
                                                                                                                                              Y-Surf
530
                  No.
531
                                                                                                      597
                                                                                                                                    (ft)
                                                                                                                                               (ft)
                                                                                                                         No.
532
                   1
                            114.700
                                        1394.665
                                                                                                      598
533
                            140.383
                                        1381.541
                                                                                                      599
                                                                                                                                   114.700
                                                                                                                                               1394.665
534
                   3
                            286.152
                                        1419 431
                                                                                                      600
                                                                                                                          2
                                                                                                                                   140.383
                                                                                                                                               1381 541
                            322.801
                                        1460.442
                                                                                                      601
                                                                                                                                   286.152
                                                                                                                                               1419.431
535
                   4
                                                                                                                          3
                            333.651
                                       1486.000
                                                                                                                                   322.801
                                                                                                                                              1460.442
536
                   5
                                                                                                      602
                                                                                                                          4
                                                                                                                                   333.651
537
                                                                                                      603
                                                                                                                                              1486.000
538
                                                                                                      604
                      Factor of Safety
                                                                                                      605
539
540
                     *** 1.677 ***
                                                                                                      606
                                                                                                                            Factor of Safety
541
                                                                                                      607
                                                                                                                            *** 1.677 ***
542
                                                                                                      608
                                                                                                      609
543
544
                                                                                                      610
545
                    Individual data on the
                                             19 slices
                                                                                                      611
546
                                                                                                      612
                                                                                                                      Failure Surface Specified By 5 Coordinate Points
547
                                                                                                      613
                                              Tie
548
                              Water Water
                                                      Tie
                                                              Earthquake
                                                                                                      614
549
                              Force Force
                                              Force
                                                      Force
                                                               Force Surcharge
                                                                                                      615
                                                                                                                        Point
                                                                                                                                   X-Surf
                                                                                                                                               Y-Surf
             Width
550
                     Weight
                              Top
                                     Bot
                                              Norm
                                                      Tan
                                                               Hor
                                                                      Ver
                                                                             Load
                                                                                                      616
                                                                                                                         No.
                                                                                                                                    (ft)
                                                                                                                                               (ft)
551
              (ft)
                      (lbs)
                              (lbs) (lbs)
                                              (lbs)
                                                      (lbs)
                                                             (lbs) (lbs)
                                                                             (lbs)
                                                                                                      617
552
                                                                                                      618
                                                                                                                                   114.700
                                                                                                                                               1394.665
553
              13 0
                      9808.9
                                 0.0
                                         0.0
                                                  0.
                                                           0.
                                                                 0.0
                                                                         0.0
                                                                                  0 0
                                                                                                      619
                                                                                                                          2
                                                                                                                                   140 383
                                                                                                                                               1381.541
554
               3.3
                      5511.6
                                 0.0
                                         0.0
                                                  0.
                                                           0.
                                                                 0.0
                                                                         0.0
                                                                                  0.0
                                                                                                      620
                                                                                                                                   286.152
                                                                                                                                              1419.431
                                                                                                                          3
555
                     20742.2
                                 0.0
                                         0.0
                                                                 0.0
                                                                         0.0
                                                                                                      621
                                                                                                                                   322.801
                                                                                                                                               1460.442
               9.4
                                                   0.
                                                           0.
                                                                                  0.0
                                                                                                                                              1486.000
556
                      9050 7
                                 0 0
                                                                                                      622
                                                                                                                                   333.651
        4
               3 6
                                         0 0
                                                  Ο
                                                           0.
                                                                 0 0
                                                                         0 0
                                                                                  0 0
557
                       270.1
                                 0.0
                                         0.0
                                                  0.
                                                           0.
                                                                 0.0
                                                                         0.0
                                                                                  0.0
                                                                                                      623
558
                      5622 2
                                 0 0
                                                                 0 0
                                                                         0 0
                                                                                                      624
               1 9
                                         0 0
                                                  0
                                                           Ω
                                                                                  0 0
559
               5.0
                     15157.3
                                 0.0
                                         0.0
                                                  0.
                                                           0.
                                                                 0.0
                                                                         0.0
                                                                                  0.0
                                                                                                                            Factor of Safety
                                                                                                                            *** 1.677 ***
560
              40.0
                    146402.3
                                 0.0
                                         0.0
                                                  0.
                                                           0.
                                                                 0.0
                                                                         0.0
                                                                                  0.0
                                                                                                      626
561
               5.0
                     22291.3
                                 0.0
                                         0.0
                                                  0.
                                                           0.
                                                                 0.0
                                                                                  0.0
                                                                                                      627
562
       1.0
              15.0
                     66694.9
                                 0.0
                                         0.0
                                                  0.
                                                           0.
                                                                 0.0
                                                                         0.0
                                                                                  0.0
                                                                                                      628
563
       11
              51.0
                    250766.8
                                 0.0
                                         0.0
                                                  0.
                                                           0.
                                                                 0.0
                                                                         0.0
                                                                                  0.0
                                                                                                      629
564
       12
              10.0
                     54656.4
                                 0.0
                                         0.0
                                                  0.
                                                           0.
                                                                 0.0
                                                                         0.0
                                                                                  0.0
                                                                                                      630 1
565
       13
              14.2
                     78154.5
                                 0.0
                                         0.0
                                                  0.
                                                           0.
                                                                 0.0
                                                                         0.0
                                                                                  0.0
                                                                                                      631
566
       14
              32 8
                    149012 4
                                 0.0
                                         0.0
                                                  0.
                                                           0.
                                                                 0.0
                                                                         0.0
                                                                                  0.0
                                                                                                      632
                                                                                                                      Failure Surface Specified By 5 Coordinate Points
567
                      3390.2
                                 0.0
                                                                         0.0
                                                                                                      633
       15
               1 0
                                         0 0
                                                  Ο
                                                          Ω
                                                                 0 0
                                                                                  0 0
568
                      9116.5
                                 0.0
                                         0.0
                                                  0.
                                                                 0.0
                                                                         0.0
                                                                                  0.0
                                                                                                      634
                      8365.6
                                                                                                                        Point
                                                                                                                                   X-Surf
                                                                                                                                               Y-Surf
569
       17
                                 0 0
                                                                 0 0
                                                                         0 0
                                                                                  0 0
                                                                                                      635
               3 2
                                         0 0
                                                  0
                                                           Ω
570
       18
                      7543.3
                                 0.0
                                         0.0
                                                  0.
                                                           0.
                                                                 0.0
                                                                         0.0
                                                                                  0.0
                                                                                                      636
                                                                                                                         No.
                                                                                                                                    (ft)
                                                                                                                                               (ft)
571
                                                                                                      637
       19
               2.3
                       730.4
                                 0.0
                                         0.0
                                                   0.
                                                           0.
                                                                 0.0
                                                                         0.0
                                                                                  0.0
572
                                                                                                                                   114.700
                                                                                                                                               1394.665
573
               Failure Surface Specified By 5 Coordinate Points
                                                                                                      639
                                                                                                                          2
                                                                                                                                   140.383
                                                                                                                                               1381.541
574
                                                                                                      640
                                                                                                                          3
                                                                                                                                   286.152
                                                                                                                                               1419.431
575
                                                                                                      641
                                                                                                                          4
                                                                                                                                   322.801
                                                                                                                                              1460.442
```

```
642
                          333.651 1486.000
643
644
                    Factor of Safety
645
                    *** 1.677 ***
646
647
648
649
650
651
              Failure Surface Specified By 5 Coordinate Points
652
653
654
                Point
                          X-Surf
                                      Y-Surf
655
                           (ft)
                 No.
                                      (ft)
656
                          114.700
                                     1394.665
657
                  2
                          140.383
                                      1381.541
658
                                     1419.431
659
                  3
                          286.152
                                     1460.442
660
                          322.801
                  4
661
                          333.651
                                     1486.000
662
663
664
                    Factor of Safety
665
                    *** 1.677 ***
666
667
668
669 1
670
671
              Failure Surface Specified By 5 Coordinate Points
672
673
                Point
674
                          X-Surf
                                      Y-Surf
                           (ft)
                                      (ft)
675
                 No.
676
677
                  1
                          114.700
                                     1394.665
678
                  2
                          140.383
                                      1381.541
679
                  3
                          286.152
                                      1419.431
680
                  4
                           322.801
                                      1460.442
681
                  5
                          333.651
                                     1486.000
682
683
684
                    Factor of Safety
                    *** 1.677 ***
685
686
687
688
689
690
              Failure Surface Specified By 5 Coordinate Points
691
692
693
                Point
                          X-Surf
                                      Y-Surf
                           (ft)
694
                 No.
                                      (ft)
695
696
                  1
                          114.700
                                      1394.665
697
                  2
                          140.383
                                      1381.541
698
                  3
                          286.152
                                     1419.431
699
                          322.801
                                     1460.442
                  4
700
                  5
                          333.651
                                     1486.000
701
702
703
                    Factor of Safety
704
                    *** 1.677 ***
705
706
707
```

```
708 1
709
               Failure Surface Specified By 5 Coordinate Points
711
712
713
                           X-Surf
                                      Y-Surf
                Point
714
                 No.
                            (ft)
                                       (ft)
715
716
                           117.002
                                      1395.701
717
                  2
                           154.299
                                      1382,208
718
                  3
                           296.015
                                      1418.930
719
                  4
                           334 601
                                      1458.124
                  5
                           359.073
                                      1486.000
721
722
723
                     Factor of Safety
724
                    *** 1.701 ***
725
726
727
728
729
               Failure Surface Specified By 5 Coordinate Points
731
                Point
                           X-Surf
                                      Y-Surf
732
733
                 No.
                            (ft)
                                       (ft)
734
735
                           117.002
                                      1395.701
                           154.299
736
                  2
                                      1382.208
737
                           296.015
                                      1418.930
                  3
738
                  4
                           334.601
                                      1458.124
                           359.073
739
                  5
                                      1486.000
740
741
742
                     Factor of Safety
                    *** 1.701 ***
743
744
745
746
747
748
749
                        **** END OF GSTABL7 OUTPUT ****
750
```

Bouquet Canyon/21095-01/Section W-W'/ Seismic



Safety Factors Are Calculated By The Simplified Janbu Method for the case of c & phi both > 0

| 1 | | *** GSTABL7 *** | 48 | 1 | 0.00 | 1390.00 | 21.00 | 1389.00 | 1 |
|----|--------------------------|---|----------|--------------|--------------|------------|-------------|-----------|---------------|
| 2 | | | 49 | 2 | 21.00 | 1389.00 | 26.00 | 1393.00 | 1 |
| 3 | ** GSTABL | by Dr. Garry H. Gregory, Ph.D., P.E., D.GE ** | 50 | 3 | 26.00 | 1393.00 | 111.00 | 1393.00 | 1 |
| 4 | | | 51 | 4 | 111.00 | 1393.00 | 131.00 | 1402.00 | 1 |
| 5 | | 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 ** | 52 | 5 | 131.00 | 1402.00 | 144.00 | 1403.00 | 1 |
| 6 | (All Rig | hts Reserved-Unauthorized Use Prohibited) | 53 | 6 | 144.00 | 1403.00 | 144.10 | 1407.00 | 1 |
| 7 | | | 54 | 7 | 144.10 | 1407.00 | 151.00 | 1410.00 | 1 |
| 8 | | | 55 | 8 | 151.00 | 1410.00 | 191.00 | 1430.00 | 1 |
| 9 | | | 56 | 9 | 191.00 | 1430.00 | 196.00 | 1435.00 | 1 |
| | *********** | ************** | 57 | 10 | 196.00 | 1435.00 | 211.00 | 1435.00 | 1 |
| | ** | | 58 | 11 | 211.00 | 1435.00 | 262.00 | 1460.00 | 1 |
| 10 | SLO | PE STABILITY ANALYSIS SYSTEM | 59 | 12 | 262.00 | 1460.00 | 272.00 | 1460.00 | 1 |
| 11 | Modified Bishop | Simplified Janbu, or GLE Method of Slices. | 60 | 13 | 272.00 | 1460.00 | 319.00 | 1484.00 | 1 |
| 12 | (Includes Spence | r & Morgenstern-Price Type Analysis) | 61 | 14 | 319.00 | 1484.00 | 320.00 | 1486.00 | 1 |
| 13 | Including Pier/ | ile, Reinforcement, Soil Nail, Tieback, | 62 | 15 | 320.00 | 1486.00 | 372.00 | 1486.00 | 1 |
| 14 | Nonlinear Undrai | ned Shear Strength, Curved Phi Envelope, | 63 | 16 | 372.00 | 1486.00 | 407.00 | 1469.00 | 1 |
| 15 | Anisotropic Soil | , Fiber-Reinforced Soil, Boundary Loads, Water | 64 | 17 | 407.00 | 1469.00 | 419.00 | 1469.00 | 1 |
| 16 | Surfaces, Pseudo | -Static & Newmark Earthquake, and Applied Forces. | 65 | 18 | 419.00 | 1469.00 | 437.00 | 1460.00 | 1 |
| 17 | | | 66 | 19 | 437.00 | 1460.00 | 440.00 | 1460.00 | 1 |
| | *********** | ************** | 67 | 20 | 0.00 | 1386.00 | 21.00 | 1384.00 | 2 |
| | ** | | 68 | 21 | 21.00 | 1384.00 | 26.00 | 1388.00 | 2 |
| 18 | | | 69 | 22 | 26.00 | 1388.00 | 146.00 | 1388.00 | 2 |
| 19 | | | 70 | 23 | 146.00 | 1388.00 | 326.00 | 1480.00 | 2 |
| 20 | Analysis Run Date: | 4/8/2022 | 71 | 24 | 326.00 | 1480.00 | 351.00 | 1483.00 | 2 |
| 21 | Time of Run: | 10:13AM | 72 | 25 | 351.00 | 1483.00 | 365.00 | 1483.00 | 2 |
| 22 | Run By: | LGC Geotechnical, | 73 | 26 | 365.00 | 1483.00 | 440.00 | 1445.00 | 2 |
| | Inc. | | 74 | | | | | | |
| | | | 75 | User Specif | fied Y-Origi | in = | 1320.00(ft) | | |
| | | | 76 | | | | | | |
| 23 | Input Data Filename: | Z:\2021\21095-01 Integral - Bouquet | 77 | Default X-I | Plus Value = | = 0.00(ft) | | | |
| | Canyon\Engineering\slop | | 78 | | | | | | |
| | W-W'\2022_04_08\xwb-3e | in | 79 | Default Y-F | Plus Value = | = 0.00(ft) | | | |
| | | | 80 1 | | | | | | |
| | | | 81 | | | | | | |
| 24 | Output Filename: | Z:\2021\21095-01 Integral - Bouquet | 82 | | | | | | |
| | Canyon\Engineering\slop | | 83 | ISOTROPIC SC | DIL PARAMETI | ERS | | | |
| | W-W'\2022_04_08\xwb-3e | OUT | 84 | | | | | | |
| | | | 85 86 | 0 = () | 6 6 11 | | | | |
| 25 | TT | more all deaths | 87 | 2 Type(s) | OI SOII | | | | |
| 26 | Unit System: | English | 88 | | | | | | |
| 27 | Distract Output Filonome | : Z:\2021\21095-01 Integral - Bouquet | 89 | Coil Total | l Saturated | d Cohonio | n Eriation | Pore Pres | ssure Piez. |
| 21 | Canyon\Engineering\slop | | 90 | | Vt. Unit Wt. | | | | stant Surface |
| | W-W'\2022 04 08\xwb-3e. | | 91 | No. (pcf) | | (psf) | (deg) | | psf) No. |
| | W W (2022_01_00 (AWD 3C | | 92 | NO. (PCI) | (pcr) | (PDI) | (deg) | raram. (I | , no. |
| | | | 93 | 1 120.0 | 120.0 | 250.0 | 28.0 | 0.00 | 0.0 |
| 28 | | | 94 | 2 120.0 | | 250.0 | 32.0 | | 0.0 0 |
| 29 | | | 95 | | | | | | |
| 30 | | | 96 | | | | | | |
| 31 | | | 97 | | | | | | |
| 32 | | | 98 | ANISOTROPIC | STRENGTH PA | ARAMETERS | | | |
| 33 | PROBLEM DESCRIPTION: E | ouquet Canyon/21095-01/Section W-W'/ | 99 | 1 soil | type(s) | | | | |
| 34 | S | eismic | 100 | | | | | | |
| 35 | | | 101 | | | | | | |
| 36 | | | 102 | Soil Type | 2 Is Anisot | tropic | | | |
| 37 | | | 103 | | | | | | |
| 38 | | | 104 | Number Of I | Direction Ra | anges Spec | ified = 3 | | |
| 39 | BOUNDARY COORDINATES | | 105 | | | | | | |
| 40 | | | 106 | | | | | | |
| 41 | 19 Top Boundaries | | 107 | Direction | Counterc | | Cohesion | Friction | |
| 42 | 26 Total Boundaries | | 108 | Range | Directio | | Intercept | Angle | |
| 43 | | | 109 | No. | (deg | 3) | (psf) | (deg) | |
| 44 | | W = C | 110 | _ | _ | | | | |
| 45 | Boundary X-Left | Y-Left X-Right Y-Right Soil Type | 111 | 1 | 9. | | 250.00 | 32.0 | |
| 46 | No. (ft) | (ft) (ft) Below Bnd | 112 | 2 | 15. | | 150.00 | 25.0 | |
| 47 | | | 113 | 3 | 90. | . U | 250.00 | 32.0 | JU |
| | | | | | | | | | |

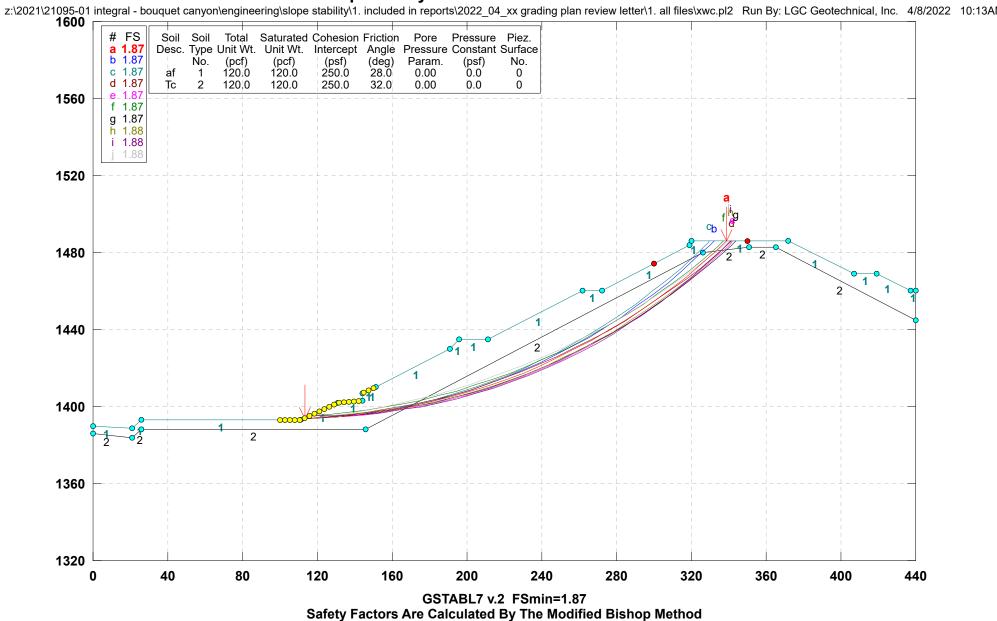
```
114
115
                ANISOTROPIC SOIL NOTES:
                  (1) An input value of 0.01 for C and/or Phi will cause Aniso
116
117
                      C and/or Phi to be ignored in that range.
118
                   (2) An input value of 0.02 for Phi will set both Phi and
                      C equal to zero, with no water weight in the tension crack.
119
120
                   (3) An input value of 0.03 for Phi will set both Phi and
                      C equal to zero, with water weight in the tension crack.
122
124
                Specified Peak Ground Acceleration Coefficient (A) = 0.150(g)
125
                Specified Horizontal Earthquake Coefficient (kh) = 0.150(g)
126
                Specified Vertical Earthquake Coefficient (kv) = 0.000(q)
128
                Specified Seismic Pore-Pressure Factor = 0.000
129
130
                Janbus Empirical Coef is being used for the case of c & phi both > 0
131
133
               A Critical Failure Surface Searching Method, Using A Random
134
135
                Technique For Generating Sliding Block Surfaces, Has Been
136
                Specified.
137
138
139
                4999 Trial Surfaces Have Been Generated.
140
141
142
                2 Boxes Specified For Generation Of Central Block Base
143
144
145
                Length Of Line Segments For Active And Passive Portions Of
146
                Sliding Block Is 55.0
147
148
                          X-Left
                                     Y-Left
                                              X-Right
                                                          Y-Right
                                                                       Height
149
                Rox
150
                No.
                           (ft)
                                      (ft)
                                                 (ft)
                                                            (ft)
                                                                        (ft)
151
                                    1374.00
                                                          1395.00
152
                                                                       20 00
                                   1395.00
                                                          1448.00
153
                2
                          218.00
                                                418.00
                                                                       20.00
154
155
156
                Following Are Displayed The Ten Most Critical Of The Trial
157
                Failure Surfaces Evaluated. They Are
158
                Ordered - Most Critical First.
159
160
161
                * * Safety Factors Are Calculated By The Simplified Janbu Method * *
162
163
164
165
                Total Number of Trial Surfaces Attempted = 4999
166
167
               Number of Trial Surfaces With Valid FS = 4999
168
169
170
                Statistical Data On All Valid FS Values:
171
                  FS Max = 5.694 FS Min = 1.174 FS Ave = 1.663
172
                  Standard Deviation = 0.430 Coefficient of Variation = 25.85 %
174
175
                Failure Surface Specified By 5 Coordinate Points
176
178
                 Point
                            X-Surf
                                        Y-Surf
179
                  No.
                             (ft)
                                         (ft)
```

```
180
181
                            114.700
                                        1394.665
                                        1381.541
182
                            140.383
183
                   3
                            286.152
                                        1419.431
                            322.801
                                        1460.442
184
                   4
185
                            333.651
                                        1486.000
186
187
188
                      Factor of Safety
189
                     *** 1 174 ***
190
191
192
193
194
                    Individual data on the
                                              19 slices
195
196
197
                              Water Water
                                              Tie
                                                       Tie
                                                              Earthquake
198
                              Force Force
                                              Force
                                                     Force
                                                               Force Surcharge
199
       Slice Width
                     Weight
                                     Bot
                                              Norm
                                                       Tan
                                                              Hor
                                                                      Ver Load
                               Top
              (ft)
                              (lbs) (lbs)
                                              (lbs)
                                                             (lbs) (lbs)
                                                                            (lbs)
       No.
                      (lbs)
                                                    (lbs)
201
              13 0
                      9808 9
                                 0 0
                                         0.0
                                                           0 1471 3
                                                                         0 0
                                                                                  0 0
203
               3.3
                      5511.6
                                 0.0
                                        0.0
                                                  0.
                                                          0. 826.7
                                                                         0.0
                                                                                  0.0
                     20742.2
                                                              3111.3
204
        3
               9 4
                                 0 0
                                        0 0
                                                  0
                                                          Ω
                                                                         0 0
                                                                                  0 0
                      9050.7
                                                              1357.6
               3 6
                                 0 0
                                         0.0
                                                  0.
                                                                         0.0
                                                                                  0.0
        5
               0.1
                       270.1
                                 0.0
                                         0.0
                                                  0.
                                                          0.
                                                                40.5
                                                                         0.0
                                                                                  0.0
                      5622.2
                                                               843.3
207
               1.9
                                 0.0
                                         0.0
                                                                         0.0
                                                                                  0.0
                                                  0.
208
               5.0
                     15157.3
                                 0.0
                                         0.0
                                                  0.
                                                          0. 2273.6
                                                                         0.0
                                                                                  0.0
209
        8
              40.0 146402.3
                                 0.0
                                                          0. 21960.4
                                         0.0
                                                  0.
                                                                         0.0
                                                                                  0.0
210
        9
               5 0
                     22291 3
                                 0 0
                                         0 0
                                                  0.
                                                          0 3343 7
                                                                         0.0
                                                                                  0.0
211
              15.0
                     66694.9
                                        0.0
                                                          0. 10004.2
       10
                                 0.0
                                                  0.
                                                                         0.0
                                                                                  0.0
212
       1.1
              51 0 250766 8
                                 0 0
                                        0 0
                                                          0. 37615.0
                                                                         0.0
                                                                                  0.0
213
              10.0
                     54656.4
                                                          0. 8198.5
       12
                                 0 0
                                        0 0
                                                  Ω
                                                                         0 0
                                                                                  0 0
214
       13
              14.2
                     78154.5
                                 0.0
                                         0.0
                                                          0. 11723.2
                                                                         0.0
                                                                                  0.0
                                                  0.
              32.8 149012.4
                                                          0 22351 9
       14
                                 0 0
                                        0 0
                                                  0
                                                                         0 0
                                                                                  0 0
216
       15
               1.0
                      3390.2
                                 0.0
                                         0.0
                                                  0.
                                                               508.5
                                                                         0.0
                                                                                  0.0
                                                          0. 1367.5
217
       16
               2.8
                      9116.5
                                 0.0
                                         0.0
                                                  0.
                                                                         0.0
                                                                                  0.0
218
       17
                      8365.6
                                                              1254.8
               3.2
                                 0.0
                                         0.0
                                                  0.
                                                          0.
                                                                         0.0
                                                                                  0.0
                      7543.3
                                                          0. 1131.5
219
       18
               5.4
                                 0.0
                                         0.0
                                                  0.
                                                                         0.0
                                                                                  0.0
                       730.4
220
               2 3
                                 0.0
                                         0.0
                                                          0 109 6
                                                                         0 0
                                                                                  0.0
222
               Failure Surface Specified By 5 Coordinate Points
224
225
                 Point
                            X-Surf
                                        Y-Surf
226
                             (ft)
                                         (ft)
                  No.
227
228
                            114.700
                                        1394.665
                   - 1
229
                            140.383
                                        1381.541
                   3
                            286.152
                                        1419.431
231
                            322.801
                                        1460.442
                            333.651
                   5
                                        1486.000
233
234
235
                      Factor of Safety
236
                          1.174 ***
237
238
239
240
2.41
242
               Failure Surface Specified By 5 Coordinate Points
243
244
245
                 Point
                            X-Surf
                                        Y-Surf
```

```
(ft)
                                       (ft)
246
                 No.
247
                                                                                                   313
                                                                                                                        Factor of Safety
                           114.700
                                      1394.665
                                                                                                   314
                                                                                                                        *** 1.174 ***
248
                           140.383
                                       1381.541
                                                                                                   315
249
                  2
                           286.152
                                      1419.431
                                                                                                   316
250
                  3
                                      1460.442
251
                           322.801
                                                                                                   317
252
                           333.651
                                      1486.000
                                                                                                   318 1
253
                                                                                                   319
254
                                                                                                   320
                                                                                                                  Failure Surface Specified By 5 Coordinate Points
255
                     Factor of Safety
                                                                                                   321
256
                    *** 1.174 ***
                                                                                                   322
                                                                                                                              X-Surf
                                                                                                                                          Y-Surf
257
                                                                                                   323
                                                                                                                    Point
258
                                                                                                   324
                                                                                                                     No.
                                                                                                                               (ft)
                                                                                                                                           (ft)
259
                                                                                                   325
260
                                                                                                                              114.700
                                                                                                                                          1394.665
                                                                                                   326
               Failure Surface Specified By 5 Coordinate Points
                                                                                                   327
                                                                                                                              140.383
                                                                                                                                          1381.541
261
                                                                                                                      2.
262
                                                                                                   328
                                                                                                                      3
                                                                                                                              286.152
                                                                                                                                          1419.431
                                                                                                                              322.801
                                                                                                                                          1460.442
263
                                                                                                   329
                                                                                                                      4
264
                Point.
                           X-Surf
                                      Y-Surf
                                                                                                   330
                                                                                                                      5
                                                                                                                              333.651
                                                                                                                                          1486.000
265
                 No.
                            (ft)
                                       (ft)
                                                                                                   331
266
                                                                                                   332
267
                           114.700
                                      1394.665
                                                                                                   333
                                                                                                                        Factor of Safety
268
                  2
                           140.383
                                      1381.541
                                                                                                   334
                                                                                                                        *** 1.174 ***
269
                           286.152
                                      1419.431
                                                                                                   335
                           322.801
                                      1460.442
270
                  4
                                                                                                   336
271
                           333.651
                                      1486.000
                                                                                                   337
272
                                                                                                   338
                                                                                                                  Failure Surface Specified By 5 Coordinate Points
273
274
                     Factor of Safety
                                                                                                   340
                    *** 1.174 ***
275
                                                                                                   341
276
                                                                                                   342
                                                                                                                    Point
                                                                                                                              X-Surf
                                                                                                                                          Y-Surf
277
                                                                                                   343
                                                                                                                               (ft)
                                                                                                                                          (ft)
                                                                                                                     No.
278
                                                                                                   344
279 1
                                                                                                   345
                                                                                                                              114.700
                                                                                                                                          1394.665
                                                                                                                      1
280
                                                                                                   346
                                                                                                                              140.383
                                                                                                                                          1381.541
281
               Failure Surface Specified By 5 Coordinate Points
                                                                                                   347
                                                                                                                              286.152
                                                                                                                                          1419.431
                                                                                                                      3
282
                                                                                                   348
                                                                                                                              322.801
                                                                                                                                          1460.442
283
                                                                                                   349
                                                                                                                      5
                                                                                                                              333.651
                                                                                                                                          1486.000
284
                 Point
                           X-Surf
                                      Y-Surf
                                                                                                   350
                                                                                                   351
285
                 No.
                           (ft)
                                       (ft)
286
                                                                                                                        Factor of Safety
                                      1394.665
                                                                                                                        *** 1.174 ***
287
                  1
                           114.700
                                                                                                   353
                           140.383
                                       1381.541
                                                                                                   354
288
                  2
289
                  3
                           286.152
                                      1419.431
                                                                                                   355
290
                  4
                           322.801
                                      1460.442
                                                                                                   356
291
                           333.651
                                      1486.000
                                                                                                   357 1
                                                                                                   358
292
293
                                                                                                   359
                                                                                                                  Failure Surface Specified By 5 Coordinate Points
294
                     Factor of Safety
                                                                                                   360
                    *** 1.174 ***
296
                                                                                                   362
                                                                                                                    Point
                                                                                                                              X-Surf
                                                                                                                                          Y-Surf
297
                                                                                                   363
                                                                                                                     No.
                                                                                                                               (ft)
                                                                                                                                          (ft)
                                                                                                   364
298
299
                                                                                                   365
                                                                                                                              117.002
                                                                                                                                          1395.701
300
               Failure Surface Specified By 5 Coordinate Points
                                                                                                   366
                                                                                                                      2
                                                                                                                              154.299
                                                                                                                                          1382.208
301
                                                                                                   367
                                                                                                                      3
                                                                                                                              296.015
                                                                                                                                          1418.930
302
                                                                                                   368
                                                                                                                      4
                                                                                                                              334.601
                                                                                                                                          1458.124
303
                 Point
                           X-Surf
                                      Y-Surf
                                                                                                   369
                                                                                                                      5
                                                                                                                              359.073
                                                                                                                                          1486.000
304
                 No.
                            (ft)
                                       (ft)
                                                                                                   370
305
                                                                                                   371
                           114.700
306
                                      1394.665
                                                                                                   372
                                                                                                                        Factor of Safety
307
                           140.383
                                      1381.541
                                                                                                   373
                                                                                                                        *** 1.176 ***
                  2
308
                  3
                           286.152
                                       1419.431
                                                                                                   374
                                                                                                   375
309
                  4
                           322.801
                                       1460.442
310
                           333.651
                                      1486.000
                                                                                                   376
311
                                                                                                   377
```

```
378
               Failure Surface Specified By 5 Coordinate Points
379
380
                            X-Surf
                                        Y-Surf
381
                 Point
382
                  No.
                            (ft)
                                        (ft)
383
384
                            117.002
                                       1395.701
                                       1382.208
1418.930
385
                   2
                            154.299
386
                            296.015
387
                            334.601
                                       1458.124
                   4
388
                            359.073
                                       1486.000
389
390
391
                     Factor of Safety
*** 1.176 ***
392
393
394
395
396
397
398
                         **** END OF GSTABL7 OUTPUT ****
399
```

Bouquet Canyon/21095-01/Section W-W'/ Static



| 1 | | *** GSTABL7 *** | 48 | 1 | 0.00 | 1390.00 | 21.00 | 1389.00 | 1 |
|----------|--|---|------------|--------------|------------------|--------------------|------------------|--------------------|----------|
| 2 | | | 49 | 2 | 21.00 | 1389.00 | 26.00 | 1393.00 | 1 |
| 3 | ** GSTABL | 7 by Dr. Garry H. Gregory, Ph.D., P.E., D.GE ** | 50 | 3 | 26.00 | 1393.00 | 111.00 | 1393.00 | 1 |
| 4 | | | 51 | 4 | 111.00 | 1393.00 | 131.00 | 1402.00 | 1 |
| 5 | | 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 ** | 52 | 5 | 131.00 | 1402.00 | 144.00 | 1403.00 | 1 |
| 6 7 | (All Ri | ghts Reserved-Unauthorized Use Prohibited) | 53 | 6 7 | 144.00 | 1403.00 | 144.10 | 1407.00 | 1 |
| 8 | | | 54 | 8 | 144.10 | 1407.00 | 151.00 | 1410.00 1430.00 | 1 |
| 9 | | | 55 56 | 9 | 151.00 191.00 | 1410.00 1430.00 | 191.00 196.00 | 1430.00 | 1 1 |
| 9 | | ************ | 57 | 10 | 191.00 | 1430.00 | 211.00 | 1435.00 | 1 |
| | ** | | 57 | 10 | 211.00 | 1435.00 | 262.00 | 1435.00 | 1 |
| 10 | | OPE STABILITY ANALYSIS SYSTEM | 59 | 12 | 262.00 | 1435.00 | 272.00 | 1460.00 | 1 |
| 11 | | , Simplified Janbu, or GLE Method of Slices. | 60 | 13 | 272.00 | 1460.00 | 319.00 | 1484.00 | 1 |
| 12 | | er & Morgenstern-Price Type Analysis) | 61 | 14 | 319.00 | 1484.00 | 320.00 | 1486.00 | 1 |
| 13 | | Pile, Reinforcement, Soil Nail, Tieback, | 62 | 15 | 320.00 | 1486.00 | 372.00 | 1486.00 | 1 |
| 14 | | ined Shear Strength, Curved Phi Envelope, | 63 | 16 | 372.00 | 1486.00 | 407.00 | 1469.00 | 1 |
| 15 | | l, Fiber-Reinforced Soil, Boundary Loads, Water | 64 | 17 | 407.00 | 1469.00 | 419.00 | 1469.00 | 1 |
| 16 | | o-Static & Newmark Earthquake, and Applied Forces. | 65 | 18 | 419.00 | 1469.00 | 437.00 | 1460.00 | 1 |
| 17 | | | 66 | 19 | 437.00 | 1460.00 | 440.00 | 1460.00 | 1 |
| | ******* | *************** | 67 | 20 | 0.00 | 1386.00 | 21.00 | 1384.00 | 2 |
| | ** | | 68 | 21 | 21.00 | 1384.00 | 26.00 | 1388.00 | 2 |
| 18 | | | 69 | 22 | 26.00 | 1388.00 | 146.00 | 1388.00 | 2 |
| 19 | | | 70 | 23 | 146.00 | 1388.00 | 326.00 | 1480.00 | 2 |
| 20 | Analysis Run Date: | 4/8/2022 | 71 | 24 | 326.00 | 1480.00 | 351.00 | 1483.00 | 2 |
| 21 | Time of Run: | 10:13AM | 72 | 25 | 351.00 | 1483.00 | 365.00 | 1483.00 | 2 |
| 22 | Run By: | LGC Geotechnical, | 73 | 26 | 365.00 | 1483.00 | 440.00 | 1445.00 | 2 |
| | Inc. | | 74 | | | | | | |
| | | | 75 | User Specif | fied Y-Origin | n = | 1320.00(ft) | | |
| 0.0 | | = \0001\01005 01 = | 76 | - 6 1 | | 0.00(5) | | | |
| 23 | Input Data Filename: Canyon\Engineering\slo | Z:\2021\21095-01 Integral - Bouquet | 77 78 | Default X-I | Plus Value = | 0.00(it) | | | |
| | W-W'\2022_04_08\xwc.in | pe scapility (sec | 79 | Default Y-N | Plus Value = | 0.00(ft) | | | |
| | | | 80 1 | | | | | | |
| | | | 81 | | | | | | |
| 24 | Output Filename: | Z:\2021\21095-01 Integral - Bouquet | 82 | | | | | | |
| | Canyon\Engineering\slo | | 83 | ISOTROPIC SO | OIL PARAMETE | RS | | | |
| | W-W'\2022_04_08\xwc.OU | Γ | 84 | | | | | | |
| | | | 85 | | | | | | |
| | | | 86 | 2 Type(s) | of Soil | | | | |
| 25 | Unit System: | English | 87 | | | | | | |
| 26 | | | 88 | | | | | | |
| 27 | | e: Z:\2021\21095-01 Integral - Bouquet | 89 | | l Saturated | | | Pore Pressu | |
| | Canyon\Engineering\slo W-W'\2022 04 08\xwc.PL | | 90 91 | | Wt. Unit Wt. | (psf) | | ressure Consta | |
| | W-W'\2022_04_08\XWC.PL | 1 | 92 | No. (pcf) |) (pcf) | (psr) | (deg) | Param. (psf |) No. |
| | | | 93 | 1 120.0 | 120.0 | 250.0 | 28.0 | 0.00 0.0 | 0 |
| 28 | | | 94 | 2 120.0 | | 250.0 | | 0.00 0.0 | |
| 29 | | | 95 | | | | | | <u> </u> |
| 30 | | | 96 | | | | | | |
| 31 | | | 97 | | | | | | |
| 32 | | | 98 | ANISOTROPIC | STRENGTH PAR | RAMETERS | | | |
| 33 | PROBLEM DESCRIPTION: | Bouquet Canyon/21095-01/Section W-W'/ | 99 | 1 soil | type(s) | | | | |
| 34 | | Static | 100 | | | | | | |
| 35 | | | 101 | | | | | | |
| 36 | | | 102 | Soil Type | 2 Is Anisota | ropic | | | |
| 37 | | | 103 | | | _ | | | |
| 38 | DOINIDADU GOODEING | | 104 | Number Of I | Direction Ran | nges Spec: | 111ea = 3 | | |
| 39 40 | BOUNDARY COORDINATES | | 105 106 | | | | | | |
| 40 | 19 Top Boundaries | | 106 | Direction | Countercl | oakwise | Cohesion | Friction | |
| 41 | 26 Total Boundaries | | 107 | Range | Direction | | Intercept | Angle | |
| 43 | 20 IOCAL BOUNDAFIES | | 109 | No. | (deg | | (psf) | (deg) | |
| 44 | | | 110 | INO • | (deg | , | (ber) | (deg) | |
| 45 | Boundary X-Left | Y-Left X-Right Y-Right Soil Type | 111 | 1 | 9.0 | 0 | 250.00 | 32.00 | |
| 46 | No. (ft) | (ft) (ft) (ft) Below Bnd | 112 | 2 | 15.0 | | 150.00 | 25.00 | |
| 47 | | , | 113 | 3 | 90.0 | | 250.00 | 32.00 | |
| • | | | | - | 30. | - | | 22.00 | |
| | | | 1 | | | | | | |

```
114
115
                ANISOTROPIC SOIL NOTES:
116
                   (1) An input value of 0.01 for C and/or Phi will cause Aniso
117
                      C and/or Phi to be ignored in that range.
118
                   (2) An input value of 0.02 for Phi will set both Phi and
119
                      C equal to zero, with no water weight in the tension crack.
                   (3) An input value of 0.03 for Phi will set both Phi and
                      C equal to zero, with water weight in the tension crack.
122
124
125
126
                ANISOTROPIC STRENGTH DATA HAS BEEN SUPPRESSED
128
129
130
                A Critical Failure Surface Searching Method, Using A Random
131
                Technique For Generating Circular Surfaces, Has Been Specified.
133
                4980 Trial Surfaces Have Been Generated.
134
135
136
                249 Surface(s) Initiate(s) From Each Of 20 Points Equally Spaced
138
                Along The Ground Surface Between X = 100.00(ft)
                                            and X = 150.00(ft)
139
140
141
142
                Each Surface Terminates Between X = 300.00(ft)
                                           and X = 350.00(ft)
143
144
145
146
                Unless Further Limitations Were Imposed, The Minimum Elevation
147
                At Which A Surface Extends Is Y =
                                                       0 00(ft)
148
149
                10.00(ft) Line Segments Define Each Trial Failure Surface.
151
152
153
154
155
                Following Are Displayed The Ten Most Critical Of The Trial
                Failure Surfaces Evaluated. They Are
156
157
                Ordered - Most Critical First.
158
159
                * * Safety Factors Are Calculated By The Modified Bishop Method * *
160
161
162
163
164
                Total Number of Trial Surfaces Attempted = 4980
165
166
                Number of Trial Surfaces With Valid FS = 4980
167
168
169
                Statistical Data On All Valid FS Values:
170
                  FS Max = 3.242 FS Min = 1.867 FS Ave = 2.490
                   Standard Deviation = 0.399 Coefficient of Variation = 16.02 %
172
174
                Failure Surface Specified By 26 Coordinate Points
175
176
                  Point.
                            X-Surf
                                         Y-Surf
178
                  No.
                             (ft)
                                         (ft)
179
```

```
180
                           113 158
                                       1393 971
181
                            123.150
                                       1394.366
182
                            133.127
                                       1395.052
183
                            143.079
                                       1396.027
                            152.999
                                       1397.290
184
                   5
                            162.878
                                       1398.841
185
                            172.708
                                       1400.678
187
                            182.480
                                       1402.800
                   8
188
                   9
                            192.186
                                       1405.205
189
                  1.0
                            201.819
                                       1407 890
190
                  11
                            211.370
                                       1410.855
191
                  12
                            220 830
                                       1414 095
192
                  13
                            230.193
                                       1417.609
                            239 449
                                       1421.393
193
                  14
194
                  15
                            248.592
                                       1425.444
195
                  16
                            257.613
                                       1429.759
196
                  17
                            266.505
                                       1434.334
197
                  18
                            275 260
                                       1439 166
                            283.871
                                       1444.249
198
                  19
199
                  20
                            292.332
                                       1449.581
                  21
                            300.633
                                       1455,156
201
                  22
                            308.770
                                       1460.970
                  23
                            316 734
                                       1467 017
                  24
                            324.519
                                       1473.294
204
                  25
                            332 118
                                       1479 793
                  26
                            338.962
205
                                       1486.000
206
               Circle Center At X = 104.557; Y = 1738.110; and Radius = 344.246
207
208
209
210
                     Factor of Safety
211
                     *** 1.867 ***
212
213
214
215
                    Individual data on the
                                             39 slices
217
218
219
                              Water Water
                                              Tie
                                                      Tie
                                                              Earthquake
                              Force Force
                                             Force
                                                     Force
                                                              Force Surcharge
      Slice Width
                     Weight
                                     Bot
                                             Norm
                                                      Tan
                                                              Hor
                                                                     Ver
                                                                            Load
222
       No.
              (ft)
                     (lbs)
                              (lbs) (lbs)
                                             (lbs)
                                                    (lbs)
                                                             (lbs) (lbs)
                                                                           (lbs)
224
              10.0
                      2458.6
                                                                0.0
                                                                        0.0
                                                                                 0.0
                                0.0
                                        0.0
                                                  0.
                                                          0.
225
               7.8
                      5273.0
                                0.0
                                        0.0
                                                                 0.0
                                                                        0.0
                                                                                 0.0
                                                  0.
                                                          0.
                      1812 6
226
        3
               2 1
                                0 0
                                        0 0
                                                  Ω
                                                          Ω
                                                                 0 0
                                                                        0 0
                                                                                 0 0
227
        4
              10.0
                      8368.5
                                0.0
                                        0.0
                                                                 0.0
                                                                        0.0
                                                                                 0.0
                                                  0.
                                                          0.
               0.9
                       760 4
                                                                0 0
228
                                0 0
                                        0 0
                                                  Ω
                                                          Ω
                                                                        0 0
                                                                                 0 0
229
               0.1
                       106.2
                                0.0
                                        0.0
                                                  0.
                                                          Ω
                                                                0.0
                                                                        0.0
                                                                                 0.0
               6.9
                      9856.3
                                0.0
                                        0.0
                                                  0.
                                                          0.
                                                                0.0
                                                                        0.0
                                                                                 0.0
231
               2 0
                      3198.9
                                0 0
                                        0 0
                                                  0.
                                                          0.
                                                                 0 0
                                                                        0 0
                                                                                 0 0
        9
               9.9
                     18260.5
                                0.0
                                        0.0
                                                  0.
                                                          0.
                                                                0.0
                                                                        0.0
                                                                                 0.0
233
       10
               6.8
                     14891.6
                                0.0
                                        0.0
                                                                0.0
                                                                        0.0
                                                                                 0.0
                                                  0.
                                                          0.
234
       11
               3.0
                     7091.8
                                0.0
                                        0.0
                                                  0.
                                                          0.
                                                                 0.0
                                                                        0.0
                                                                                 0.0
235
       12
               9.8
                     25280.2
                                0.0
                                        0.0
                                                          0.
                                                                 0.0
                                                                        0.0
                                                                                 0.0
                                                  0.
236
       13
               8.5
                     24552 8
                                0.0
                                        0.0
                                                  0.
                                                          0.
                                                                0.0
                                                                        0.0
                                                                                 0.0
237
                     3635.5
       14
               1 2
                                0 0
                                        0 0
                                                                0 0
                                                                        0 0
                                                                                 0 0
                                                  0
                                                          Ω
238
       15
               3.8
                     12519.2
                                        0.0
                                                                0.0
                                                                        0.0
                                                                                 0.0
                     19496.7
239
               5 8
                                                                0 0
       16
                                0 0
                                        0 0
                                                  0
                                                          Ω
                                                                        0 0
                                                                                 0 0
240
       17
               9.2
                     28297.3
                                0.0
                                        0.0
                                                  0.
                                                          0.
                                                                 0.0
                                                                        0.0
                                                                                 0.0
                     1077 6
2.41
       18
               0.4
                                0.0
                                        0.0
                                                  0.
                                                          0.
                                                                0.0
                                                                        0.0
                                                                                 0.0
       19
               9 5
                     28410.1
                                0.0
                                        0.0
                                                  0.
                                                                 0.0
                                                                        0.0
                                                                                 0.0
243
       2.0
               9.4
                     29504 7
                                0.0
                                        0.0
                                                  0.
                                                          0.
                                                                0.0
                                                                        0.0
                                                                                 0.0
244
       21
               9 3
                     30186.7
                                0 0
                                        0.0
                                                  0.
                                                          0.
                                                                 0.0
                                                                        0 0
                                                                                 0.0
245
       22
               9.1 30464.9
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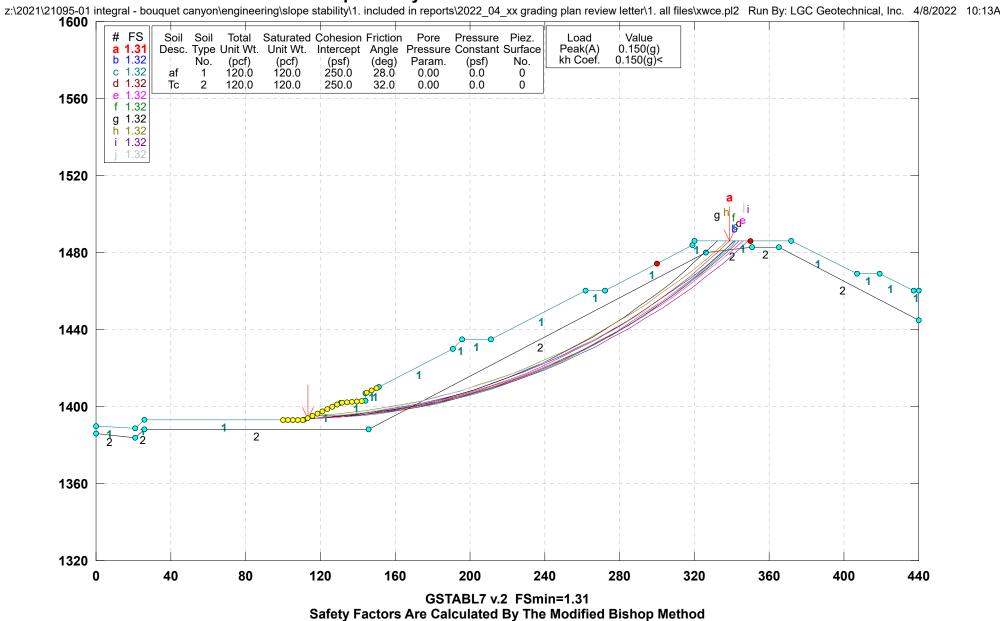
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                                                                                                      312
247
       24
               4.4
                     14761.0
                                0.0
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                                                                         0.0
                                                                                  0.0
                                                                                                      313
                                                                                                                         1
                                                                                                                                  113.158
                                                                                                                                              1393.971
248
       25
               4.5
                     14500.4
                                 0.0
                                         0.0
                                                  0.
                                                          0.
                                                                 0.0
                                                                         0.0
                                                                                  0.0
                                                                                                      314
                                                                                                                                  123.146
                                                                                                                                              1394.451
249
       26
               5.5
                     15925.2
                                 0.0
                                         0.0
                                                  0.
                                                          0.
                                                                 0.0
                                                                         0.0
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                                                                                                      315
                                                                                                                         3
                                                                                                                                  133.115
                                                                                                                                              1395.238
250
       2.7
               3.3
                      8828.2
                                 0.0
                                         0.0
                                                  0.
                                                          0.
                                                                 0.0
                                                                         0.0
                                                                                  0.0
                                                                                                      316
                                                                                                                         4
                                                                                                                                  143.056
                                                                                                                                              1396.330
                     22895.3
                                                                                                      317
                                                                                                                                  152.958
                                                                                                                                              1397.726
251
       2.8
               8.6
                                 0.0
                                         0.0
                                                  0.
                                                          0.
                                                                 0.0
                                                                         0.0
                                                                                  0.0
252
                     21631.2
                                 0.0
                                         0.0
                                                                 0.0
                                                                                  0.0
                                                                                                      318
                                                                                                                                  162.812
                                                                                                                                              1399.425
                                                                                                      319
                                                                                                                                              1401.426
       3.0
               8.3
                     20057.0
                                 0.0
                                        0.0
                                                  0.
                                                          0.
                                                                 0.0
                                                                         0.0
                                                                                  0.0
                                                                                                                         7
                                                                                                                                  172.610
254
       31
               8.1
                     18195.2
                                 0.0
                                         0.0
                                                          0.
                                                                 0.0
                                                                         0.0
                                                                                  0.0
                                                                                                      320
                                                                                                                         8
                                                                                                                                  182.342
                                                                                                                                              1403.726
255
       32
                     16070 8
                                 0 0
                                        0 0
                                                                 0 0
                                                                         0 0
                                                                                  0 0
                                                                                                      321
                                                                                                                         9
                                                                                                                                  191.999
                                                                                                                                              1406.323
               8 0
                                                  0
                                                          0.
256
       33
               2.3
                      4212.6
                                 0.0
                                         0.0
                                                  0.
                                                          0.
                                                                 0.0
                                                                         0.0
                                                                                  0.0
                                                                                                      322
                                                                                                                         10
                                                                                                                                  201.571
                                                                                                                                              1409.216
257
       34
               1 0
                      1890 3
                                 0 0
                                        0 0
                                                  0.
                                                          0.
                                                                 0 0
                                                                         0 0
                                                                                  0 0
                                                                                                      323
                                                                                                                         1.1
                                                                                                                                  211 050
                                                                                                                                              1412 401
258
       35
                      7878.0
                                 0.0
                                                                                                      324
                                                                                                                         12
                                                                                                                                  220.428
                                                                                                                                              1415.875
               4.5
                                         0.0
                                                  0.
                                                          0.
                                                                 0.0
                                                                         0.0
                                                                                  0.0
                      2145.8
                                                                                                      325
                                                                                                                                  229.694
                                                                                                                                              1419.635
259
       36
               1.5
                                 0.0
                                         0.0
                                                  0.
                                                          0.
                                                                 0.0
                                                                         0.0
                                                                                  0.0
                                                                                                                         13
260
       37
                      6478.0
                                 0.0
                                         0.0
                                                          0.
                                                                 0.0
                                                                         0.0
                                                                                  0.0
                                                                                                      326
                                                                                                                         14
                                                                                                                                  238.840
                                                                                                                                              1423.677
               6.1
                                                  0.
                                                                                                      327
261
       38
               1.2
                       812.7
                                 0.0
                                         0.0
                                                  0.
                                                          0.
                                                                 0.0
                                                                         0.0
                                                                                  0.0
                                                                                                                         15
                                                                                                                                  247.858
                                                                                                                                              1427.998
262
                      1736.0
                                 0.0
                                         0.0
                                                          0.
                                                                 0.0
                                                                         0.0
                                                                                  0.0
                                                                                                      328
                                                                                                                         16
                                                                                                                                  256.740
                                                                                                                                              1432.594
               5.6
263
                                                                                                      329
                                                                                                                         17
                                                                                                                                  265.476
                                                                                                                                              1437.460
                                                                                                      330
                                                                                                                                  274.059
                                                                                                                                              1442.591
264
               Failure Surface Specified By 26 Coordinate Points
                                                                                                                         18
265
                                                                                                      331
                                                                                                                         19
                                                                                                                                  282.481
                                                                                                                                              1447.984
                                                                                                      332
                                                                                                                         20
                                                                                                                                  290.733
266
                                                                                                                                              1453.632
267
                 Point
                            X-Surf
                                        Y-Surf
                                                                                                      333
                                                                                                                         21
                                                                                                                                  298.808
                                                                                                                                              1459.530
268
                            (ft)
                                        (ft)
                                                                                                      334
                                                                                                                         22
                                                                                                                                  306.698
                                                                                                                                              1465.674
                  No.
269
                                                                                                      335
                                                                                                                         23
                                                                                                                                  314.397
                                                                                                                                              1472.056
                           113.158
270
                   1
                                       1393.971
                                                                                                      336
                                                                                                                         24
                                                                                                                                  321.895
                                                                                                                                              1478.672
                            123.150
                                        1394.375
                                                                                                      337
                                                                                                                         25
                                                                                                                                  329.188
                                                                                                                                              1485.515
271
                   2
                           133.124
                                       1395.086
                   3
                                                                                                      338
                                                                                                                         26
                                                                                                                                  329.674
                                                                                                                                              1486.000
273
                   4
                           143.073
                                        1396.102
                                                                                                      339
274
                   5
                           152.985
                                        1397.423
                                                                                                      340
                                                                                                                     Circle Center At X = 102.513; Y = 1719.730; and Radius = 325.932
275
                           162.852
                                        1399.047
                                                                                                      341
                   6
276
                           172.665
                                        1400.974
                                                                                                      342
277
                           182.414
                                       1403.200
                                                                                                      343
                   8
                                                                                                                            Factor of Safety
278
                   9
                           192.090
                                       1405.724
                                                                                                      344
                                                                                                                           *** 1.871 ***
                           201.684
279
                  10
                                       1408 544
                                                                                                      345
280
                  11
                            211.187
                                        1411.657
                                                                                                      346
                           220.591
                                       1415 060
                                                                                                      347
281
                  12
282
                  13
                            229.885
                                       1418.750
283
                  14
                            239.062
                                        1422.723
                                                                                                      349
                                                                                                                     Failure Surface Specified By 27 Coordinate Points
                  15
                            248.112
                                        1426.976
284
                                                                                                      350
                            257.028
285
                  16
                                       1431.504
                                                                                                      351
                  17
                            265.801
                                                                                                                                  X-Surf
                                                                                                                                              Y-Surf
286
                                       1436.304
                                                                                                      352
                                                                                                                       Point
287
                  18
                            274.423
                                       1441.371
                                                                                                      353
                                                                                                                        No.
                                                                                                                                   (ft)
                                                                                                                                               (ft)
288
                  19
                            282.885
                                       1446.699
                                                                                                      354
289
                  20
                            291.179
                                       1452.285
                                                                                                      355
                                                                                                                                  113.158
                                                                                                                                              1393.971
290
                  21
                            299.299
                                       1458.123
                                                                                                      356
                                                                                                                         2
                                                                                                                                  123.141
                                                                                                                                              1394.545
291
                  22
                            307.235
                                        1464.206
                                                                                                      357
                                                                                                                                  133.106
                                                                                                                                              1395.388
                  23
                            314 981
                                        1470.531
                                                                                                      358
                                                                                                                         4
                                                                                                                                  143 044
                                                                                                                                              1396 500
292
293
                  24
                            322.529
                                        1477.090
                                                                                                      359
                                                                                                                         5
                                                                                                                                  152.948
                                                                                                                                              1397.881
                            329.873
                                        1483 877
                                                                                                      360
                                                                                                                                  162 811
                                                                                                                                              1399 528
294
                  25
                                                                                                                         6
295
                            332.033
                                        1486.000
                                                                                                      361
                                                                                                                                  172.627
                                                                                                                                              1401.442
296
                                                                                                      362
                                                                                                                         8
                                                                                                                                  182.386
                                                                                                                                              1403.620
297
               Circle Center At X = 105.026; Y = 1719.603; and Radius = 325.733
                                                                                                      363
                                                                                                                                  192.084
                                                                                                                                              1406.061
298
                                                                                                      364
                                                                                                                         10
                                                                                                                                  201.712
                                                                                                                                              1408.764
299
                                                                                                      365
                                                                                                                         11
                                                                                                                                  211.263
                                                                                                                                              1411.725
300
                     Factor of Safety
                                                                                                      366
                                                                                                                         12
                                                                                                                                  220.731
                                                                                                                                              1414.944
301
                     *** 1.868 ***
                                                                                                      367
                                                                                                                         13
                                                                                                                                  230.109
                                                                                                                                              1418.417
302
                                                                                                      368
                                                                                                                         14
                                                                                                                                  239.389
                                                                                                                                              1422.142
                                                                                                      369
                                                                                                                                  248.565
                                                                                                                                              1426.117
303
                                                                                                                         15
304
                                                                                                      370
                                                                                                                         16
                                                                                                                                  257.630
                                                                                                                                              1430.339
    - 1
                                                                                                      371
                                                                                                                                  266 578
                                                                                                                                              1434 804
305
                                                                                                                         17
306
                                                                                                      372
                                                                                                                         18
                                                                                                                                  275.402
                                                                                                                                              1439.509
                                                                                                      373
307
               Failure Surface Specified By 26 Coordinate Points
                                                                                                                         19
                                                                                                                                  284.095
                                                                                                                                              1444.451
308
                                                                                                      374
                                                                                                                         20
                                                                                                                                  292.652
                                                                                                                                              1449.626
309
                                                                                                      375
                                                                                                                         21
                                                                                                                                  301.066
                                                                                                                                              1455.030
310
                 Point
                            X-Surf
                                        Y-Surf
                                                                                                      376
                                                                                                                         22
                                                                                                                                  309.331
                                                                                                                                              1460.660
311
                  No.
                             (ft)
                                         (ft)
                                                                                                      377
                                                                                                                         23
                                                                                                                                  317.440
                                                                                                                                              1466.511
```

```
378
                  24
                            325.389
                                       1472.580
                                                                                                      444
                                                                                                                                  135.721
                                                                                                                                              1396.786
                                       1478.860
379
                  25
                            333.170
                                                                                                      445
                                                                                                                                  145.646
                                                                                                                                              1398.011
                                                                                                                                              1399.508
380
                  26
                            340.779
                                        1485.349
                                                                                                      446
                                                                                                                                  155.533
                  27
381
                            341.501
                                       1486.000
                                                                                                      447
                                                                                                                         6
                                                                                                                                  165.375
                                                                                                                                              1401.276
                                                                                                                                  175.166
382
                                                                                                      448
                                                                                                                         7
                                                                                                                                              1403.313
               Circle Center At X =
                                                                                                      449
                                                                                                                                  184.896
                                                                                                                                              1405.619
383
                                      96.928 ; Y = 1763.588 ; and Radius = 369.973
                                                                                                                         8
384
                                                                                                      450
                                                                                                                                  194.560
                                                                                                                                              1408.190
                                                                                                      451
                                                                                                                                              1411.026
385
                                                                                                                         10
                                                                                                                                  204.149
386
                      Factor of Safety
                                                                                                      452
                                                                                                                         11
                                                                                                                                  213.657
                                                                                                                                              1414.124
387
                     *** 1.871 ***
                                                                                                      453
                                                                                                                         12
                                                                                                                                  223.077
                                                                                                                                              1417.482
388
                                                                                                      454
                                                                                                                         13
                                                                                                                                  232.400
                                                                                                                                              1421.098
389
                                                                                                      455
                                                                                                                         14
                                                                                                                                  241 621
                                                                                                                                              1424 967
390
                                                                                                      456
                                                                                                                         15
                                                                                                                                  250.732
                                                                                                                                              1429.089
                                                                                                      457
                                                                                                                                  259.727
                                                                                                                                              1433.459
391
                                                                                                                         16
392
                                                                                                      458
                                                                                                                         17
                                                                                                                                  268.598
                                                                                                                                              1438.074
                                                                                                                                              1442.932
393
               Failure Surface Specified By 27 Coordinate Points
                                                                                                      459
                                                                                                                         18
                                                                                                                                  277.339
394
                                                                                                      460
                                                                                                                         19
                                                                                                                                  285.944
                                                                                                                                              1448.027
395
                                                                                                      461
                                                                                                                         20
                                                                                                                                  294.405
                                                                                                                                              1453.356
396
                 Point
                            X-Surf
                                       Y-Surf
                                                                                                      462
                                                                                                                         21
                                                                                                                                  302.717
                                                                                                                                              1458.916
397
                  No.
                             (ft)
                                        (ft)
                                                                                                      463
                                                                                                                         22
                                                                                                                                  310.874
                                                                                                                                              1464.702
                                                                                                      464
                                                                                                                         23
                                                                                                                                  318.868
                                                                                                                                              1470.710
398
399
                            113.158
                                       1393.971
                                                                                                      465
                                                                                                                         24
                                                                                                                                   326.694
                                                                                                                                              1476.934
400
                  2
                           123.156
                                       1394.181
                                                                                                      466
                                                                                                                         25
                                                                                                                                  334.347
                                                                                                                                              1483.372
401
                   3
                           133.143
                                       1394.688
                                                                                                      467
                                                                                                                         26
                                                                                                                                  337.303
                                                                                                                                              1486.000
402
                   4
                           143.110
                                       1395.492
                                                                                                      468
                            153.050
                                        1396.592
                                                                                                      469
403
                   5
                                                                                                                      Circle Center At X = 96.130 ; Y = 1758.581 ; and Radius = 363.957
                           162.952
                                       1397.986
404
                   6
                                                                                                      470
                           172.809
405
                                       1399.675
                                                                                                      471
406
                   8
                           182.611
                                       1401.655
                                                                                                      472
                                                                                                                            Factor of Safety
407
                  9
                            192.349
                                       1403.926
                                                                                                      473
                                                                                                                            *** 1.873 ***
408
                  10
                            202.016
                                       1406.485
                                                                                                      474
409
                  11
                           211.603
                                       1409.330
                                                                                                      475
410
                  12
                            221.101
                                       1412.459
                                                                                                      476
                            230.501
                                       1415.869
411
                  13
                                                                                                      477 1
412
                  14
                            239.797
                                       1419.557
                                                                                                      478
                            248.978
                                       1423.519
                                                                                                      479
                                                                                                                      Failure Surface Specified By 27 Coordinate Points
413
                  15
414
                  16
                            258.038
                                       1427.753
                                                                                                      480
415
                  17
                            266.968
                                       1432.253
                                                                                                      481
                  18
                            275.760
                                       1437.017
                                                                                                                                  X-Surf
                                                                                                                                              Y-Surf
416
                                                                                                      482
                                                                                                                        Point
                            284.407
417
                  19
                                       1442.041
                                                                                                      483
                                                                                                                         No.
                                                                                                                                   (ft)
                                                                                                                                               (ft)
                            292.900
                                       1447.319
418
                  20
                                                                                                      484
419
                  21
                            301.233
                                       1452.847
                                                                                                      485
                                                                                                                         -1
                                                                                                                                  113.158
                                                                                                                                              1393.971
420
                  22
                            309.398
                                       1458.620
                                                                                                      486
                                                                                                                         2
                                                                                                                                  123.153
                                                                                                                                              1394.296
421
                  23
                            317.388
                                       1464.634
                                                                                                      487
                                                                                                                         3
                                                                                                                                  133.134
                                                                                                                                              1394.906
422
                  24
                            325.196
                                       1470.882
                                                                                                      488
                                                                                                                                  143.094
                                                                                                                                              1395.799
423
                  25
                            332.814
                                        1477.360
                                                                                                      489
                                                                                                                                  153.025
                                                                                                                                              1396.976
                                                                                                                                              1398.435
                            340.237
                                        1484.061
                                                                                                      490
                                                                                                                         6
                                                                                                                                  162.918
424
                  26
425
                  27
                            342.261
                                       1486.000
                                                                                                      491
                                                                                                                         7
                                                                                                                                  172.765
                                                                                                                                              1400.175
                                                                                                                                  182 559
                                                                                                                                              1402 194
426
                                                                                                      492
                                                                                                                         8
427
               Circle Center At X = 111.085; Y = 1730.427; and Radius = 336.462
                                                                                                      493
                                                                                                                                  192.291
                                                                                                                                              1404.492
428
                                                                                                      494
                                                                                                                         10
                                                                                                                                  201.955
                                                                                                                                              1407.066
429
                                                                                                      495
                                                                                                                         11
                                                                                                                                  211.540
                                                                                                                                              1409.913
430
                      Factor of Safety
                                                                                                      496
                                                                                                                         12
                                                                                                                                  221.041
                                                                                                                                              1413.033
431
                     *** 1.872 ***
                                                                                                      497
                                                                                                                         13
                                                                                                                                  230.450
                                                                                                                                              1416.422
432
                                                                                                      498
                                                                                                                         14
                                                                                                                                  239.758
                                                                                                                                              1420.077
433
                                                                                                      499
                                                                                                                         15
                                                                                                                                  248.958
                                                                                                                                              1423.996
434
                                                                                                      500
                                                                                                                         16
                                                                                                                                  258.043
                                                                                                                                              1428.175
                                                                                                      501
                                                                                                                         17
                                                                                                                                  267.005
                                                                                                                                              1432.611
435
436
               Failure Surface Specified By 26 Coordinate Points
                                                                                                      502
                                                                                                                         18
                                                                                                                                  275.837
                                                                                                                                              1437.301
                                                                                                                                              1442.240
437
                                                                                                      503
                                                                                                                         19
                                                                                                                                  284 532
438
                                                                                                      504
                                                                                                                         20
                                                                                                                                  293.083
                                                                                                                                              1447.424
                                        Y-Surf
                                                                                                      505
                                                                                                                                  301.483
                                                                                                                                              1452.850
439
                 Point
                            X-Surf
                                                                                                                         21
440
                  No.
                             (ft)
                                        (ft)
                                                                                                      506
                                                                                                                         22
                                                                                                                                   309.725
                                                                                                                                              1458.513
441
                                                                                                      507
                                                                                                                         2.3
                                                                                                                                  317.803
                                                                                                                                              1464.409
442
                   1
                            115.789
                                        1395.155
                                                                                                      508
                                                                                                                         24
                                                                                                                                   325.709
                                                                                                                                              1470.532
443
                   2
                            125.766
                                       1395.834
                                                                                                      509
                                                                                                                         25
                                                                                                                                  333.438
                                                                                                                                              1476.877
```

```
510
                  26
                           340.983
                                       1483 440
                                                                                                    576
                                                                                                                                165.632
                                                                                                                                            1398.411
                                                                                                                       6
511
                  27
                           343.762
                                      1486.000
                                                                                                     577
                                                                                                                                175.503
                                                                                                                                            1400.014
512
                                                                                                     578
                                                                                                                       8
                                                                                                                                185.317
                                                                                                                                            1401.932
513
               Circle Center At X = 106.739; Y = 1745.118; and Radius = 351.205
                                                                                                     579
                                                                                                                       9
                                                                                                                                195.066
                                                                                                                                            1404.162
                                                                                                                                204.738
514
                                                                                                     580
                                                                                                                       10
                                                                                                                                            1406.701
                                                                                                     581
                                                                                                                                214.324
                                                                                                                                            1409.549
515
                                                                                                                       11
516
                     Factor of Safety
                                                                                                     582
                                                                                                                       12
                                                                                                                                223.814
                                                                                                                                            1412.700
                     *** 1.874 ***
                                                                                                     583
517
                                                                                                                       13
                                                                                                                                233.199
                                                                                                                                            1416.153
518
                                                                                                     584
                                                                                                                       14
                                                                                                                                242.469
                                                                                                                                            1419.904
519
                                                                                                     585
                                                                                                                       15
                                                                                                                                251.614
                                                                                                                                            1423.949
520
                                                                                                     586
                                                                                                                       16
                                                                                                                                260.626
                                                                                                                                            1428.284
521
                                                                                                     587
                                                                                                                       17
                                                                                                                                269 495
                                                                                                                                            1432 904
               Failure Surface Specified By 26 Coordinate Points
                                                                                                     588
                                                                                                                       18
                                                                                                                                278.212
                                                                                                                                            1437.805
522
                                                                                                     589
                                                                                                                                286.767
                                                                                                                                            1442.981
523
                                                                                                                       19
524
                                                                                                     590
                                                                                                                       20
                                                                                                                                295.154
                                                                                                                                            1448.428
                Point
                           X-Surf
525
                                       Y-Surf
                                                                                                     591
                                                                                                                       21
                                                                                                                                303.362
                                                                                                                                            1454.141
526
                  No.
                            (ft)
                                        (ft)
                                                                                                     592
                                                                                                                       22
                                                                                                                                311.383
                                                                                                                                            1460.112
527
                                                                                                     593
                                                                                                                       23
                                                                                                                                319.210
                                                                                                                                            1466.336
                           115.789
                                       1395,155
                                                                                                     594
                                                                                                                                326.835
                                                                                                                                            1472.807
528
                  1
                                                                                                                       2.4
529
                  2
                           125.787
                                       1395.385
                                                                                                     595
                                                                                                                       25
                                                                                                                                334.248
                                                                                                                                            1479.517
                           135.773
                                       1395.917
                                                                                                     596
                                                                                                                       26
                                                                                                                                340.966
530
                  3
                                                                                                                                            1486.000
                           145.738
                                       1396.749
                                                                                                     597
531
                   4
532
                           155.674
                                       1397 881
                                                                                                     598
                                                                                                                    Circle Center At X = 120.367; Y = 1708.303; and Radius = 313.181
                  5
533
                   6
                           165.571
                                       1399.312
                                                                                                     599
534
                  7
                           175.420
                                       1401.042
                                                                                                     600
                           185.213
                                       1403.067
535
                  8
                                                                                                     601
                                                                                                                          Factor of Safety
                           194.940
                                       1405.387
                                                                                                                          *** 1.877 ***
536
                  9
                                                                                                     602
                                       1407.999
537
                  10
                           204.593
                                                                                                     603
538
                  11
                           214.163
                                       1410.900
                                                                                                     604
                  12
                           223.641
                                       1414.089
                                                                                                     605
539
540
                  13
                           233.018
                                       1417.562
                                                                                                     606
541
                  14
                           242.286
                                       1421.317
                                                                                                     607
                                                                                                                    Failure Surface Specified By 26 Coordinate Points
542
                  15
                           251.437
                                       1425.349
                                                                                                     608
                           260.463
543
                  16
                                       1429 656
                                                                                                     609
544
                  17
                           269.354
                                       1434.232
                                                                                                     610
                                                                                                                      Point
                                                                                                                                X-Surf
                                                                                                                                            Y-Surf
                           278.103
                                       1439 075
                                                                                                                                            (ft)
545
                  18
                                                                                                     611
                                                                                                                      No.
                                                                                                                                 (ft)
546
                  19
                           286.703
                                       1444.179
                                                                                                     612
547
                  20
                           295.144
                                       1449.540
                                                                                                     613
                                                                                                                                113.158
                                                                                                                                            1393.971
                  21
                           303.420
                                       1455.153
                                                                                                                                123.111
                                                                                                                                            1394.939
548
                                                                                                     614
                                                                                                                       2
                                                                                                                                            1396.147
549
                  22
                           311.523
                                       1461.013
                                                                                                     615
                                                                                                                       3
                                                                                                                                133.038
                  23
                           319.446
                                                                                                                                            1397.594
550
                                       1467.115
                                                                                                    616
                                                                                                                                142.932
551
                  24
                           327.181
                                       1473.453
                                                                                                    617
                                                                                                                       5
                                                                                                                                152.789
                                                                                                                                            1399.281
552
                  25
                           334.721
                                       1480.021
                                                                                                    618
                                                                                                                       6
                                                                                                                                162.602
                                                                                                                                            1401.205
553
                  26
                           341.181
                                       1486.000
                                                                                                    619
                                                                                                                       7
                                                                                                                                172.366
                                                                                                                                            1403.367
554
                                                                                                    620
                                                                                                                       8
                                                                                                                                182.074
                                                                                                                                            1405.763
555
               Circle Center At X = 113.183; Y = 1726.650; and Radius = 331.505
                                                                                                     621
                                                                                                                       9
                                                                                                                                191.722
                                                                                                                                            1408.394
                                                                                                     622
                                                                                                                       1.0
                                                                                                                                201.304
                                                                                                                                            1411 257
556
557
                                                                                                     623
                                                                                                                       11
                                                                                                                                210.813
                                                                                                                                            1414.351
558
                     Factor of Safety
                                                                                                                                220 245
                                                                                                                                            1417 674
                                                                                                    624
                                                                                                                       12
559
                     *** 1.875 ***
                                                                                                     625
                                                                                                                       13
                                                                                                                                229.593
                                                                                                                                            1421.224
560
                                                                                                     626
                                                                                                                       14
                                                                                                                                238.853
                                                                                                                                            1424.999
561
                                                                                                     627
                                                                                                                       15
                                                                                                                                248.019
                                                                                                                                            1428.997
                                                                                                                                257.086
562
                                                                                                     628
                                                                                                                       16
                                                                                                                                            1433.215
563 1
                                                                                                     629
                                                                                                                       17
                                                                                                                                266.048
                                                                                                                                            1437.652
564
                                                                                                     630
                                                                                                                       18
                                                                                                                                274.900
                                                                                                                                            1442.304
565
               Failure Surface Specified By 26 Coordinate Points
                                                                                                     631
                                                                                                                       19
                                                                                                                                283.637
                                                                                                                                            1447.168
566
                                                                                                     632
                                                                                                                       20
                                                                                                                                292.254
                                                                                                                                            1452.243
567
                                                                                                                       21
                                                                                                                                300.746
                                                                                                                                            1457.524
                                                                                                    633
568
                 Point
                           X-Surf
                                       Y-Surf
                                                                                                     634
                                                                                                                       22
                                                                                                                                309.107
                                                                                                                                            1463.009
                            (ft)
                                                                                                                                            1468.694
569
                  No.
                                        (ft)
                                                                                                     635
                                                                                                                       23
                                                                                                                                317 334
570
                                                                                                     636
                                                                                                                       24
                                                                                                                                325.420
                                                                                                                                            1474.577
571
                           115.789
                                       1395.155
                                                                                                                                333.362
                                                                                                     637
                                                                                                                       25
                                                                                                                                            1480.654
572
                           125.789
                                       1395.169
                                                                                                                                340.010
                                                                                                                                            1486.000
573
                  3
                           135.784
                                       1395.502
                                                                                                     639
574
                  4
                           145.763
                                       1396.154
                                                                                                     640
                                                                                                                    Circle Center At X =
                                                                                                                                          78.160 ; Y = 1805.853 ; and Radius = 413.366
575
                  5
                           155.715
                                       1397.124
                                                                                                     641
```

```
642
                   Factor of Safety
*** 1.877 ***
643
644
645
646
647
648
649
650
                        **** END OF GSTABL7 OUTPUT ****
651
```

Bouquet Canyon/21095-01/Section W-W'/ Seismic



| 1 | | *** GSTABL7 *** | 48 | 1 | 0.00 | 1390.00 | 21.00 | 1389.00 | 1 |
|----|-------------------------|---|------------|--------------|--------------|------------|-------------|-----------|---------------|
| 2 | | | 49 | 2 | 21.00 | 1389.00 | 26.00 | 1393.00 | 1 |
| 3 | ** GSTABL | 7 by Dr. Garry H. Gregory, Ph.D., P.E., D.GE ** | 50 | 3 | 26.00 | 1393.00 | 111.00 | 1393.00 | 1 |
| 4 | | | 51 | 4 | 111.00 | 1393.00 | 131.00 | 1402.00 | 1 |
| 5 | | 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 ** | 52 | 5 | 131.00 | 1402.00 | 144.00 | 1403.00 | 1 |
| 6 | (All Rig | ghts Reserved-Unauthorized Use Prohibited) | 53 | 6 | 144.00 | 1403.00 | 144.10 | 1407.00 | 1 |
| 7 | | | 54 | 7 | 144.10 | 1407.00 | 151.00 | 1410.00 | 1 |
| 8 | | | 55 | 8 | 151.00 | 1410.00 | 191.00 | 1430.00 | 1 |
| 9 | | | 56 | 9 | 191.00 | 1430.00 | 196.00 | 1435.00 | 1 |
| | ******* | **************** | 57 | 10 | 196.00 | 1435.00 | 211.00 | 1435.00 | 1 |
| | ** | | 58 | 11 | 211.00 | 1435.00 | 262.00 | 1460.00 | 1 |
| 10 | SLO | DPE STABILITY ANALYSIS SYSTEM | 59 | 12 | 262.00 | 1460.00 | 272.00 | 1460.00 | 1 |
| 11 | Modified Bishop | , Simplified Janbu, or GLE Method of Slices. | 60 | 13 | 272.00 | 1460.00 | 319.00 | 1484.00 | 1 |
| 12 | (Includes Spence | er & Morgenstern-Price Type Analysis) | 61 | 14 | 319.00 | 1484.00 | 320.00 | 1486.00 | 1 |
| 13 | Including Pier/ | Pile, Reinforcement, Soil Nail, Tieback, | 62 | 15 | 320.00 | 1486.00 | 372.00 | 1486.00 | 1 |
| 14 | Nonlinear Undra: | ined Shear Strength, Curved Phi Envelope, | 63 | 16 | 372.00 | 1486.00 | 407.00 | 1469.00 | 1 |
| 15 | Anisotropic Soil | l, Fiber-Reinforced Soil, Boundary Loads, Water | 64 | 17 | 407.00 | 1469.00 | 419.00 | 1469.00 | 1 |
| 16 | Surfaces, Pseudo | o-Static & Newmark Earthquake, and Applied Forces. | 65 | 18 | 419.00 | 1469.00 | 437.00 | 1460.00 | 1 |
| 17 | | | 66 | 19 | 437.00 | 1460.00 | 440.00 | 1460.00 | 1 |
| | ********** | *************** | 67 | 20 | 0.00 | 1386.00 | 21.00 | 1384.00 | 2 |
| | ** | | 68 | 21 | 21.00 | 1384.00 | 26.00 | 1388.00 | 2 |
| 18 | | | 69 | 22 | 26.00 | 1388.00 | 146.00 | 1388.00 | 2 |
| 19 | | | 70 | 23 | 146.00 | 1388.00 | 326.00 | 1480.00 | 2 |
| 20 | Analysis Run Date: | 4/8/2022 | 71 | 24 | 326.00 | 1480.00 | 351.00 | 1483.00 | 2 |
| 21 | Time of Run: | 10:13AM | 72 | 25 | 351.00 | 1483.00 | 365.00 | 1483.00 | 2 |
| 22 | Run By: | LGC Geotechnical, | 73 | 26 | 365.00 | 1483.00 | 440.00 | 1445.00 | 2 |
| | Inc. | | 74 | | | | | | |
| | | | 75 | User Specif | fied Y-Origi | in = | 1320.00(ft) | | |
| | | | 76 | | | | | | |
| 23 | Input Data Filename: | Z:\2021\21095-01 Integral - Bouquet | 77 | Default X-I | Plus Value = | = 0.00(ft) | | | |
| | Canyon\Engineering\slop | | 78 | | | | | | |
| | W-W'\2022_04_08\xwce.in | 1 | 79 | Default Y-I | Plus Value = | = 0.00(ft) | | | |
| | | | 80 1 | | | | | | |
| | | | 81 | | | | | | |
| 24 | Output Filename: | Z:\2021\21095-01 Integral - Bouquet | 82 | | | | | | |
| | Canyon\Engineering\slop | | 83 | ISOTROPIC SO | DIL PARAMETE | ERS | | | |
| | W-W'\2022_04_08\xwce.Ot | J.L. | 84 | | | | | | |
| | | | 85 86 | 0 = () | | | | | |
| 25 | The it Count and | Provide Art | 87 | 2 Type(s) | OI SOII | | | | |
| 26 | Unit System: | English | 88 | | | | | | |
| 27 | Platted Output Filonome | e: Z:\2021\21095-01 Integral - Bouquet | 89 | Coil Total | l Saturated | Cobosio | n Eriation | Pore Pres | sure Piez. |
| 21 | Canyon\Engineering\slop | | 90 | | Vt. Unit Wt. | | | | stant Surface |
| | W-W'\2022 04 08\xwce.Pl | | 91 | No. (pcf) | | (psf) | (deg) | | osf) No. |
| | W W \2022_01_00\AWCC*11 | <u></u> | 92 | No. (pcr | (PCL) | (PDI) | (deg) | raram. (r | ,51, 110. |
| | | | 93 | 1 120.0 | 120.0 | 250.0 | 28.0 | 0.00 | 0.0 |
| 28 | | | 94 | 2 120.0 | | 250.0 | 32.0 | | 0.0 |
| 29 | | | 95 | | | | | | |
| 30 | | | 96 | | | | | | |
| 31 | | | 97 | | | | | | |
| 32 | | | 98 | ANISOTROPIC | STRENGTH PA | ARAMETERS | | | |
| 33 | PROBLEM DESCRIPTION: 1 | Bouquet Canyon/21095-01/Section W-W'/ | 99 | 1 soil | type(s) | | | | |
| 34 | \$ | Seismic | 100 | | | | | | |
| 35 | | | 101 | | | | | | |
| 36 | | | 102 | Soil Type | 2 Is Anisot | ropic | | | |
| 37 | | | 103 | | | | | | |
| 38 | | | 104 | Number Of I | Direction Ra | anges Spec | ified = 3 | | |
| 39 | BOUNDARY COORDINATES | | 105 | | | | | | |
| 40 | | | 106 | | | | | | |
| 41 | 19 Top Boundaries | | 107 | Direction | Countercl | | Cohesion | Friction | 1 |
| 42 | 26 Total Boundaries | | 108 | Range | Directio | | Intercept | Angle | |
| 43 | | | 109 | No. | (deg | 3) | (psf) | (deg) | |
| 44 | P | write which which out a | 110 | | _ | 0 | 050.00 | 20 | 10 |
| 45 | Boundary X-Left | Y-Left X-Right Y-Right Soil Type | 111 | 1 | 9. | | 250.00 | 32.0 | |
| 46 | No. (ft) | (ft) (ft) Below Bnd | 112 113 | 2 3 | 15. | | 150.00 | 25.0 | |
| 47 | | | 113 | 3 | 90. | . 0 | 250.00 | 32.0 | 10 |
| | | | | | | | | | |

```
114
               ANISOTROPIC SOIL NOTES:
115
                  (1) An input value of 0.01 for C and/or Phi will cause Aniso
116
                      C and/or Phi to be ignored in that range.
117
                  (2) An input value of 0.02 for Phi will set both Phi and
118
119
                      C equal to zero, with no water weight in the tension crack.
120
                  (3) An input value of 0.03 for Phi will set both Phi and
                      C equal to zero, with water weight in the tension crack.
122
123
124
125
126
                ANISOTROPIC STRENGTH DATA HAS BEEN SUPPRESSED
127
128
                Specified Peak Ground Acceleration Coefficient (A) = 0.150(q)
129
                Specified Horizontal Earthquake Coefficient (kh) = 0.150(g)
130
                Specified Vertical Earthquake Coefficient (kv) = 0.000(g)
131
132
                Specified Seismic Pore-Pressure Factor = 0.000
133 1
134
135
136
               A Critical Failure Surface Searching Method, Using A Random
137
               Technique For Generating Circular Surfaces, Has Been Specified.
138
139
                4980 Trial Surfaces Have Been Generated.
140
141
142
143
                249 Surface(s) Initiate(s) From Each Of 20 Points Equally Spaced
144
                Along The Ground Surface Between X = 100.00(ft)
145
                                            and X = 150.00(ft)
146
147
148
                Each Surface Terminates Between X = 300.00(ft)
                                           and X = 350.00(ft)
149
150
151
                Unless Further Limitations Were Imposed, The Minimum Elevation
152
153
               At Which A Surface Extends Is Y =
                                                       0.00(ft)
154
155
                10.00(ft) Line Segments Define Each Trial Failure Surface.
156
157
158
159
160
161
                Following Are Displayed The Ten Most Critical Of The Trial
162
               Failure Surfaces Evaluated. They Are
163
               Ordered - Most Critical First.
164
165
166
                * * Safety Factors Are Calculated By The Modified Bishop Method * *
167
168
169
170
                Total Number of Trial Surfaces Attempted = 4980
171
172
                Number of Trial Surfaces With Valid FS = 4980
174
175
               Statistical Data On All Valid FS Values:
176
                  FS Max = 2.315 FS Min = 1.314 FS Ave = 1.777
177
                  Standard Deviation = 0.296 Coefficient of Variation = 16.68 %
178
179
```

| 180 | | Fail | ure Surfac | e Speci | fied By 2 | 26 Coordi | nate Poi | nts | | |
|---|---------------------------------------|---|---|---|---|---|---|--|---|--|
| 181 | | | | | | | | | | |
| 182 | | | | | | | | | | |
| 183 | | Po | int X | -Surf | Y-Sur | -f | | | | |
| | | | | | | | | | | |
| 184 | | N | 0. | (ft) | (ft) |) | | | | |
| 185 | | | | | | | | | | |
| 186 | | | 1 1 | 13.158 | 1393. | . 971 | | | | |
| 187 | | | 2 1 | 23.150 | 1394. | 366 | | | | |
| 188 | | | | | | | | | | |
| | | | | 33.127 | 1395. | | | | | |
| 189 | | | | 43.079 | 1396. | . 027 | | | | |
| 190 | | | 5 1 | 52.999 | 1397. | . 290 | | | | |
| 191 | | | 6 1 | 62.878 | 1398. | 841 | | | | |
| 192 | | | | 72.708 | | | | | | |
| 193 | | | | 82.480 | 1402. | | | | | |
| | | | | | | | | | | |
| 194 | | | | 92.186 | | | | | | |
| 195 | | 1 | 0 2 | 01.819 | 1407. | . 890 | | | | |
| 196 | | 1 | 1 2 | 11.370 | 1410. | . 855 | | | | |
| 197 | | 1 | | 20.830 | 1414 | 095 | | | | |
| | | | | | 1417 | 600 | | | | |
| 198 | | 1 | | 30.193 | | . 009 | | | | |
| 199 | | 1 | | 39.449 | 1421. | . 393 | | | | |
| 200 | | 1 | 5 2 | 48.592 | 1425. | . 444 | | | | |
| 201 | | 1 | 6 2 | 57.613 | 1429. | . 759 | | | | |
| 202 | | 1 | | 66.505 | 1434. | | | | | |
| 203 | | 1 | | 75.260 | | | | | | |
| | | | | | | | | | | |
| 204 | | 1 | | 83.871 | | | | | | |
| 205 | | 2 | 0 2 | 92.332 | 1449. | . 581 | | | | |
| 206 | | 2 | 1 3 | 00.633 | 1455. | . 156 | | | | |
| 207 | | 2 | 2 3 | 08.770 | 1460. | .970 | | | | |
| 208 | | 2 | | 16.734 | | | | | | |
| 209 | | 2 | | 24.519 | | | | | | |
| | | | | | | | | | | |
| 210 | | 2 | 5 3 | 32.118 | 1479. | | | | | |
| | | | | | | | | | | |
| 211 | | 2 | 6 3 | 38.962 | 1486. | .000 | | | | |
| | | 2 | 6 3 | 38.962 | 1486. | .000 | | | | |
| 211 | | | | | | | 1738.110 | ; and Ra | adius = | 344.246 |
| 211 212 213 | | | 6 3 le Center | | | | 1738.110 | ; and Ra | adius = | 344.246 |
| 211 212 213 214 | | | | | | | 1738.110 | ; and Ra | adius = | 344.246 |
| 211 212 213 214 215 | | | le Center | At X = | 104.557 | | 1738.110 | ; and Ra | adius = | 344.246 |
| 211 212 213 214 215 216 | | | le Center | At X = of Safe | 104.557 ty | | 1738.110 | ; and Ra | adius = | 344.246 |
| 211 212 213 214 215 216 217 | | | le Center | At X = of Safe | 104.557 ty | | 1738.110 | ; and Ra | adius = | 344.246 |
| 211 212 213 214 215 216 | | | le Center | At X = of Safe | 104.557 ty | | 1738.110 | ; and Ra | adius = | 344.246 |
| 211 212 213 214 215 216 217 | | | le Center | At X = of Safe | 104.557 ty | | 1738.110 | ; and Ra | adius = | 344.246 |
| 211 212 213 214 215 216 217 218 219 | | | le Center | At X = of Safe | 104.557 ty | | 1738.110 | ; and Ra | adius = | 344.246 |
| 211 212 213 214 215 216 217 218 219 220 | | | le Center | At X = of Safe | 104.557 ty | | 1738.110 | ; and Ra | adius = | 344.246 |
| 211 212 213 214 215 216 217 218 219 220 221 | | | le Center Factor *** 1 | At X = of Safe | 104.557 ty *** | 7 ; Y = | | ; and Ra | adius = | 344.246 |
| 211 212 213 214 215 216 217 218 219 220 221 222 | | | le Center | At X = of Safe | 104.557 ty *** | 7 ; Y = | | ; and Ra | adius = | 344.246 |
| 211 212 213 214 215 216 217 218 219 220 221 222 223 | | | le Center Factor *** 1 | At X = of Safe | 104.557 ty *** | 7 ; Y = | | ; and Ra | adius = | 344.246 |
| 211 212 213 214 215 216 217 218 219 220 221 222 223 224 | | | le Center Factor *** 1 | At X = of Safe314 | 104.557 ty *** on the | 7 ; Y = | ces | | | 344.246 |
| 211 212 213 214 215 216 217 218 219 220 221 222 223 | | | le Center Factor *** 1 | At X = of Safe314 | 104.557 ty *** | 7 ; Y = | ces | ; and Ra | | 344.246 |
| 211 212 213 214 215 216 217 218 219 220 221 222 223 224 | | | le Center Factor *** 1 | At X = of Safe314 | 104.557 ty *** on the | 7 ; Y = | ces Tie | Earthq | | |
| 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 | Slice | Circ | le Center Factor *** 1 | At X = of Safe314 al data Water Force | 104.557 ty *** on the Water Force | 7; Y = 39 sli Tie Force | ces Tie Force | Earthq For | uake ce Surc | charge |
| 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 | | Circ | le Center Factor *** 1 Individua | At X = of Safe .314 al data Water Force Top | 104.557 ty *** on the Water Force Bot | 7; Y = 39 sli Tie Force Norm | ces Tie Force Tan | Earthq For Hor | uake ce Surc Ver | charge Load |
| 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 | Slice No. | Circ | le Center Factor *** 1 Individua | At X = of Safe .314 al data Water Force Top | 104.557 ty *** on the Water Force Bot | 7; Y = 39 sli Tie Force | ces Tie Force Tan | Earthq For Hor | uake ce Surc | charge |
| 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 | No. | Circ | le Center Factor *** 1 Individua | At X = of Safe .314 al data Water Force Top | 104.557 ty *** on the Water Force Bot | 7; Y = 39 sli Tie Force Norm (lbs) | Tie Force Tan (lbs) | Earthque Fore Hor (lbs) | uake ce Surc Ver (1bs) | charge Load (1bs) |
| 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 | No. | Circ | le Center Factor *** 1 Individua | At X = of Safe .314 al data Water Force Top | 104.557 ty *** on the Water Force Bot | 39 sli Tie Force Norm (lbs) | Tie Force Tan (lbs) | Earthq For Hor (1bs) | uake ce Surc Ver (1bs) | charge Load (1bs) |
| 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 | No. 1 2 | Circ | le Center Factor *** 1 Individua | At X = of Safe .314 al data Water Force Top | 104.557 ty *** on the Water Force Bot | 39 sli Tie Force Norm (lbs) 0. | Tie Force Tan (lbs) 0. | Earthqu For Hor (1bs) 368.8 790.9 | uake ce Surc Ver (1bs) 0.0 | charge Load (1bs) |
| 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 | No. | Circ | le Center Factor *** 1 Individua | At X = of Safe .314 al data Water Force Top | 104.557 ty *** on the Water Force Bot | 39 sli Tie Force Norm (lbs) 0. | Tie Force Tan (lbs) 0. | Earthqu For Hor (1bs) 368.8 790.9 | uake ce Surc Ver (1bs) 0.0 0.0 | Charge Load (1bs) 0.0 0.0 |
| 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 | No. 1 2 | Circ | le Center Factor *** 1 Individua | At X = of Safe .314 al data Water Force Top | 104.557 ty *** on the Water Force Bot | 7; Y = 39 sli Tie Force Norm (1bs) 0. 0. | Tie Force Tan (lbs) | Earthq Forc (1bs) 368.8 790.9 271.9 | uake ce Surc Ver (1bs) 0.0 0.0 | Charge Load (1bs) 0.0 0.0 |
| 211 212 213 214 215 216 217 218 220 221 222 223 224 225 226 227 228 229 230 231 232 233 233 | No. 1 2 3 4 | Circ | le Center Factor *** 1 Individua | At X = of Safe .314 al data Water Force Top | 104.557 ty *** on the Water Force Bot | 39 sli Tie Force Norm (lbs) 0. 0. | Tie Force Tan (lbs) 0. 0. 0. | Earthq For Hor (1bs) 368.8 790.9 271.9 1255.3 | uake ce Surc Ver (1bs) 0.0 0.0 0.0 | Charge Load (1bs) 0.0 0.0 0.0 |
| 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 | No. 1 2 3 4 5 | Width (ft) 10.0 7.8 2.1 10.0 0.9 | Factor *** 1 Individua Weight (lbs) 2458.6 5273.0 1812.6 8368.5 760.4 | At X = of Safe .314 al data Water Force Top (lbs) 0.0 0.0 0.0 0.0 0.0 | 104.557 ty *** on the Water Force Bot (1bs) 0.0 0.0 0.0 0.0 0.0 | 39 sli Tie Force Norm (lbs) 0. 0. 0. | Tie Force Tan (lbs) 0. 0. 0. | Earthque For (1bs) 368.8 790.9 271.9 1255.3 114.1 | uake ce Surc Ver (1bs) 0.0 0.0 0.0 | Charge Load (1bs) 0.0 0.0 0.0 |
| 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 233 234 235 | No. 1 2 3 4 5 | Width (ft) 10.0 7.8 2.1 10.0 0.9 | Factor *** 1 Individua Weight (lbs) 2458.6 5273.0 1812.6 8368.5 760.4 | At X = of Safe .314 al data Water Force Top (lbs) 0.0 0.0 0.0 0.0 0.0 | 104.557 ty *** on the Water Force Bot (1bs) 0.0 0.0 0.0 0.0 0.0 | 39 sli Tie Force Norm (lbs) 0. 0. 0. | Tie Force Tan (lbs) 0. 0. 0. | Earthque For (1bs) 368.8 790.9 271.9 1255.3 114.1 | uake ce Surc Ver (1bs) 0.0 0.0 0.0 | Charge Load (1bs) 0.0 0.0 0.0 |
| 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 233 234 235 236 | No. 1 2 3 4 5 6 7 | Width (ft) 10.0 7.8 2.1 10.0 0.9 | Factor *** 1 Individua Weight (lbs) 2458.6 5273.0 1812.6 8368.5 760.4 | At X = of Safe .314 al data Water Force Top (lbs) 0.0 0.0 0.0 0.0 0.0 | 104.557 ty *** on the Water Force Bot (1bs) 0.0 0.0 0.0 0.0 0.0 | 39 sli Tie Force Norm (lbs) 0. 0. 0. | Tie Force Tan (lbs) 0. 0. 0. | Earthque For (1bs) 368.8 790.9 271.9 1255.3 114.1 | uake ce Surc Ver (1bs) 0.0 0.0 0.0 | Charge Load (1bs) 0.0 0.0 0.0 |
| 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 233 234 235 | No. 1 2 3 4 5 | Width (ft) 10.0 7.8 2.1 10.0 0.9 | Factor *** 1 Individua Weight (lbs) 2458.6 5273.0 1812.6 8368.5 760.4 | At X = of Safe .314 al data Water Force Top (lbs) 0.0 0.0 0.0 0.0 0.0 | 104.557 ty *** on the Water Force Bot (1bs) 0.0 0.0 0.0 0.0 0.0 | 39 sli Tie Force Norm (lbs) 0. 0. 0. | Tie Force Tan (lbs) 0. 0. 0. | Earthque For (1bs) 368.8 790.9 271.9 1255.3 114.1 | uake ce Surc Ver (1bs) 0.0 0.0 0.0 | Charge Load (1bs) 0.0 0.0 0.0 |
| 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 233 234 235 236 | No. 1 2 3 4 5 6 7 8 | Width (ft) 10.0 7.8 2.1 10.0 0.9 | Factor *** 1 Individua Weight (lbs) 2458.6 5273.0 1812.6 8368.5 760.4 | At X = of Safe .314 al data Water Force Top (lbs) 0.0 0.0 0.0 0.0 0.0 | 104.557 ty *** on the Water Force Bot (1bs) 0.0 0.0 0.0 0.0 0.0 | 39 sli Tie Force Norm (lbs) 0. 0. 0. | Tie Force Tan (lbs) 0. 0. 0. | Earthque For (1bs) 368.8 790.9 271.9 1255.3 114.1 | uake ce Surc Ver (1bs) 0.0 0.0 0.0 | Charge Load (1bs) 0.0 0.0 0.0 |
| 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 | No. 1 2 3 4 5 6 7 8 9 | Width (ft) 10.0 7.8 2.1 10.0 0.9 | Factor *** 1 Individua Weight (lbs) 2458.6 5273.0 1812.6 8368.5 760.4 | At X = of Safe .314 al data Water Force Top (lbs) 0.0 0.0 0.0 0.0 0.0 | 104.557 ty *** on the Water Force Bot (1bs) 0.0 0.0 0.0 0.0 0.0 | 39 sli Tie Force Norm (lbs) 0. 0. 0. | Tie Force Tan (lbs) 0. 0. 0. | Earthque For (1bs) 368.8 790.9 271.9 1255.3 114.1 | uake ce Surc Ver (1bs) 0.0 0.0 0.0 | Charge Load (1bs) 0.0 0.0 0.0 |
| 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 238 | No. 1 2 3 4 5 6 7 8 9 10 | Width (ft) 10.0 7.8 2.1 10.0 0.9 | Factor *** 1 Individua Weight (lbs) 2458.6 5273.0 1812.6 8368.5 760.4 | At X = of Safe .314 al data Water Force Top (lbs) 0.0 0.0 0.0 0.0 0.0 | 104.557 ty *** on the Water Force Bot (1bs) 0.0 0.0 0.0 0.0 0.0 | 39 sli Tie Force Norm (lbs) 0. 0. 0. | Tie Force Tan (lbs) 0. 0. 0. | Earthque For (1bs) 368.8 790.9 271.9 1255.3 114.1 | uake ce Surc Ver (1bs) 0.0 0.0 0.0 | Charge Load (1bs) 0.0 0.0 0.0 |
| 211 212 213 214 215 216 217 218 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 237 238 239 231 232 242 253 264 277 288 289 289 289 289 289 289 289 289 289 | No. 1 2 3 4 5 6 7 8 9 10 11 | Width (ft) 10.0 7.8 2.1 10.0 0.9 | Factor *** 1 Individua Weight (lbs) 2458.6 5273.0 1812.6 8368.5 760.4 | At X = of Safe .314 al data Water Force Top (lbs) 0.0 0.0 0.0 0.0 0.0 | 104.557 ty *** on the Water Force Bot (1bs) 0.0 0.0 0.0 0.0 0.0 | 39 sli Tie Force Norm (lbs) 0. 0. 0. | Tie Force Tan (lbs) 0. 0. 0. | Earthque For (1bs) 368.8 790.9 271.9 1255.3 114.1 | uake ce Surc Ver (1bs) 0.0 0.0 0.0 | Charge Load (1bs) 0.0 0.0 0.0 |
| 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 231 232 233 234 235 236 237 238 237 238 239 240 241 251 251 251 251 251 251 251 251 251 25 | No. 1 2 3 4 5 6 7 8 9 10 11 12 | Width (ft) 10.0 7.8 2.1 10.0 0.9 | Factor *** 1 Individua Weight (lbs) 2458.6 5273.0 1812.6 8368.5 760.4 | At X = of Safe .314 al data Water Force Top (lbs) 0.0 0.0 0.0 0.0 0.0 | 104.557 ty *** on the Water Force Bot (1bs) 0.0 0.0 0.0 0.0 0.0 | 39 sli Tie Force Norm (lbs) 0. 0. 0. | Tie Force Tan (lbs) 0. 0. 0. | Earthque For (1bs) 368.8 790.9 271.9 1255.3 114.1 | uake ce Surc Ver (1bs) 0.0 0.0 0.0 | Charge Load (1bs) 0.0 0.0 0.0 |
| 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 249 249 259 269 279 279 279 279 279 279 279 279 279 27 | No. 1 2 3 4 5 6 7 8 9 10 11 12 13 | Width (ft) 10.0 7.8 2.1 10.0 0.9 | Factor *** 1 Individua Weight (lbs) 2458.6 5273.0 1812.6 8368.5 760.4 | At X = of Safe .314 al data Water Force Top (lbs) 0.0 0.0 0.0 0.0 0.0 | 104.557 ty *** on the Water Force Bot (1bs) 0.0 0.0 0.0 0.0 0.0 | 39 sli Tie Force Norm (lbs) 0. 0. 0. | Tie Force Tan (lbs) 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0 | Earthqm For (1bs) 368.8 790.9 271.9 1255.3 114.1 15.9 1478.5 479.8 2739.1 2233.7 1063.8 3792.0 3682.9 | uake ce Surc Ver (lbs) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 | Charge Load (1bs) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 |
| 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 231 232 233 234 235 236 237 238 239 231 232 233 244 245 256 267 277 288 289 290 290 290 290 290 290 290 290 290 29 | No. 1 2 3 4 5 6 7 8 9 10 11 12 | Width (ft) 10.0 7.8 2.1 10.0 0.9 | Factor *** 1 Individua Weight (lbs) 2458.6 5273.0 1812.6 8368.5 760.4 106.2 9856.3 3198.9 18260.5 14891.6 7091.8 25280.2 24552.8 | At X = of Safe .314 al data Water Force Top (lbs) 0.0 0.0 0.0 0.0 0.0 | 104.557 ty *** on the Water Force Bot (1bs) 0.0 0.0 0.0 0.0 0.0 | 39 sli Tie Force Norm (lbs) 0. 0. 0. | Tie Force Tan (lbs) 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. | Earthque Ford (1bs) 368.8 790.9 271.9 1255.3 114.1 15.9 1478.5 479.8 2739.1 2233.7 1063.8 3792.0 3682.9 545.3 | uake ce Surc Ver (1bs) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 | Charge Load (1bs) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 |
| 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 249 249 259 269 279 279 279 279 279 279 279 279 279 27 | No. 1 2 3 4 5 6 7 8 9 10 11 12 13 | Width (ft) 10.0 7.8 2.1 10.0 0.9 | Factor *** 1 Individua Weight (lbs) 2458.6 5273.0 1812.6 8368.5 760.4 106.2 9856.3 3198.9 18260.5 14891.6 7091.8 25280.2 24552.8 3635.5 12510.2 | At X = of Safe314 al data Water Force Top (lbs) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 | 104.557 ty *** on the Water Force Bot (lbs) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 | 39 sli Tie Force Norm (lbs) 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. | Tie Force Tan (lbs) 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. | Earthque Ford (1bs) 368.8 790.9 271.9 1255.3 114.1 15.9 1478.5 479.8 2739.1 2233.7 1063.8 3792.0 3682.9 545.3 | uake ce Surc Ver (1bs) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 | Charge Load (1bs) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 |
| 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 242 252 263 273 274 275 275 276 276 277 277 277 277 277 277 277 277 | 1 2 3 4 5 6 7 7 8 9 10 11 12 13 14 15 | Width (ft) 10.0 7.8 2.1 10.0 0.9 0.1 6.9 2.0 9.9 6.8 3.0 9.8 8.5 1.2 3.8 | Factor *** 1 Individua Weight (lbs) 2458.6 5273.0 1812.6 8368.5 760.4 106.2 9856.3 3198.9 18260.5 14891.6 7091.8 25280.2 24552.8 3635.5 12510.2 | At X = of Safe314 al data Water Force Top (lbs) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 | 104.557 ty *** on the Water Force Bot (lbs) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 | 39 sli Tie Force Norm (lbs) 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. | Tie Force Tan (lbs) 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. | Earthqu Ford Hor (lbs) 368.8 790.9 271.9 125.3 114.1 15.9 1478.5 479.8 2739.1 2233.7 1063.8 3792.0 3682.9 545.3 1877.9 | uake ce Surce (1bs) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 | charge Load (1bs) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0. |
| 211 212 213 214 215 216 217 218 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 240 240 240 240 240 240 240 240 240 | No. 1 2 3 4 5 6 7 8 9 10 11 12 13 14 | Width (ft) 10.0 7.8 2.1 10.0 0.9 0.1 6.9 2.0 9.9 6.8 3.0 9.8 8.5 1.2 | Factor *** 1 Individua Weight (lbs) 2458.6 5273.0 1812.6 8368.5 760.4 106.2 9856.3 3198.9 18260.5 14891.6 7091.8 25280.2 24552.8 3635.5 | At X = of Safe314 al data Water Force Top (lbs) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 | 104.557 ty *** on the Water Force Bot (lbs) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 | 39 sli Tie Force Norm (lbs) 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. | Tie Force Tan (lbs) 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. | Earthque Ford (1bs) 368.8 790.9 271.9 1255.3 114.1 15.9 1478.5 479.8 2739.1 2233.7 1063.8 3792.0 3682.9 545.3 | uake ce Surce (1bs) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 | charge Load (1bs) 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0. |

Failure Surface Specified By 26 Coordinate Points

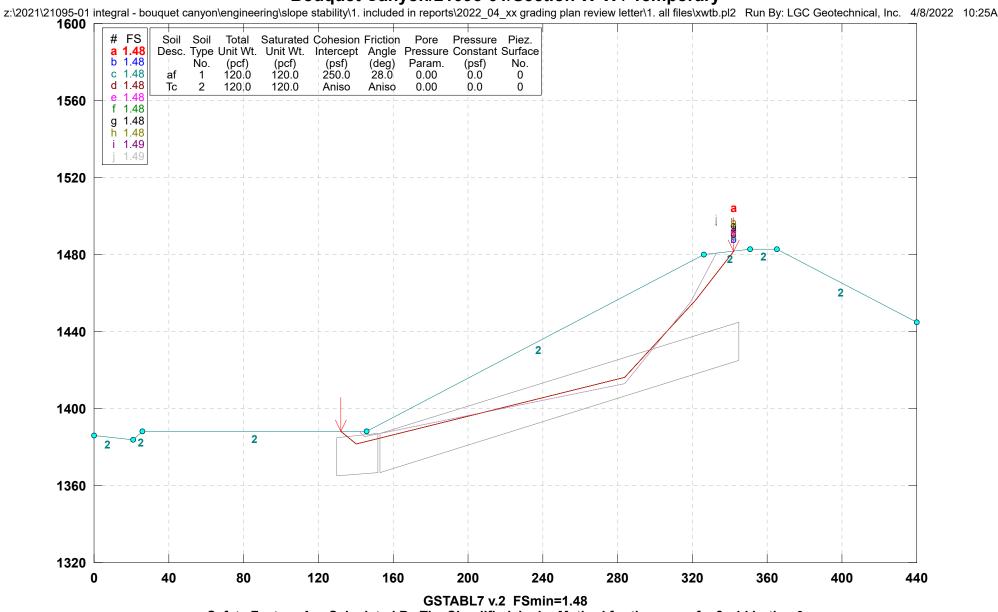
```
246
       17
                     28297 3
                                 0 0
                                         0 0
                                                   0
                                                            0 4244 6
                                                                          0 0
                                                                                    0 0
                                                                                                         312 1
               9 2
247
       18
               0.4
                      1077.6
                                 0.0
                                         0.0
                                                   0.
                                                            0. 161.6
                                                                          0.0
                                                                                    0.0
                                                                                                         313
248
       19
                9.5
                     28410.1
                                  0.0
                                         0.0
                                                    0.
                                                            0. 4261.5
                                                                          0.0
                                                                                    0.0
                                                                                                         314
                                                                                                                         Failure Surface Specified By 27 Coordinate Points
249
       20
                9.4
                      29504.7
                                 0.0
                                         0.0
                                                   0.
                                                            0.
                                                                4425.7
                                                                          0.0
                                                                                    0.0
                                                                                                         315
250
       21
               9.3
                     30186.7
                                 0.0
                                         0.0
                                                   0.
                                                            0.
                                                               4528.0
                                                                          0.0
                                                                                    0.0
                                                                                                         316
                                                                                                                                                  Y-Surf
251
                     30464.9
                                                               4569.7
                                                                                                         317
                                                                                                                          Point
       2.2
               9.1
                                 0.0
                                         0.0
                                                   0.
                                                            0.
                                                                          0.0
                                                                                    0.0
                                                                                                                                      X-Surf
252
       23
                      30351.0
                                 0.0
                                         0.0
                                                            0.
                                                               4552.6
                                                                                    0.0
                                                                                                         318
                                                                                                                            No.
                                                                                                                                       (ft)
                                                                                                                                                   (ft)
                                                   0.
                                                               2214.1
                                                                                                         319
       2.4
               4.4
                     14761.0
                                 0.0
                                         0.0
                                                   0.
                                                            0.
                                                                          0.0
                                                                                    0.0
254
       25
                4.5
                     14500.4
                                 0.0
                                         0.0
                                                   0.
                                                            0.
                                                               2175.1
                                                                          0.0
                                                                                    0.0
                                                                                                         320
                                                                                                                                      113.158
                                                                                                                                                  1393.971
255
       26
                     15925.2
                                 0 0
                                         0 0
                                                            0. 2388.8
                                                                          0 0
                                                                                    0 0
                                                                                                         321
                                                                                                                            2
                                                                                                                                      123.156
                                                                                                                                                  1394 181
               5 5
                                                   0
256
       27
                3.3
                      8828.2
                                  0.0
                                         0.0
                                                   0.
                                                            0. 1324.2
                                                                          0.0
                                                                                    0.0
                                                                                                                            3
                                                                                                                                      133.143
                                                                                                                                                  1394.688
       28
                8 6
                     22895.3
                                 0 0
                                         0 0
                                                   0
                                                            0
                                                               3434 3
                                                                          0 0
                                                                                    0 0
                                                                                                         323
                                                                                                                            4
                                                                                                                                      143.110
                                                                                                                                                  1395 492
258
       29
                      21631.2
                                                            0.
                                                                3244.7
                                                                                                         324
                                                                                                                            5
                                                                                                                                      153.050
                                                                                                                                                  1396.592
                8.5
                                 0.0
                                         0.0
                                                   0.
                                                                          0.0
                                                                                    0.0
                     20057.0
                                                               3008.6
                                                                                                                                      162.952
                                                                                                                                                  1397.986
259
       3.0
               8.3
                                 0.0
                                         0.0
                                                   0.
                                                            0.
                                                                          0.0
                                                                                    0.0
                                                                                                                            6
                                                               2729.3
260
       31
                     18195.2
                                 0.0
                                         0.0
                                                            0.
                                                                          0.0
                                                                                    0.0
                                                                                                         326
                                                                                                                                      172.809
                                                                                                                                                  1399.675
               8.1
                                                   0.
                                                                                                         327
261
       32
               8.0
                     16070.8
                                 0.0
                                         0.0
                                                   0.
                                                            0.
                                                               2410.6
                                                                          0.0
                                                                                    0.0
                                                                                                                            8
                                                                                                                                      182.611
                                                                                                                                                  1401.655
262
       33
                2.3
                      4212.6
                                 0.0
                                         0.0
                                                   0.
                                                            0.
                                                                631.9
                                                                          0.0
                                                                                    0.0
                                                                                                         328
                                                                                                                            9
                                                                                                                                      192.349
                                                                                                                                                  1403.926
263
       34
               1.0
                      1890.3
                                 0.0
                                         0.0
                                                   0.
                                                            0.
                                                                283.5
                                                                          0.0
                                                                                    0.0
                                                                                                         329
                                                                                                                            10
                                                                                                                                      202.016
                                                                                                                                                  1406.485
                      7878.0
                                                               1181.7
                                                                                                         330
                                                                                                                            11
                                                                                                                                      211.603
                                                                                                                                                  1409.330
264
       35
               4.5
                                 0.0
                                         0.0
                                                   0.
                                                            0.
                                                                          0.0
                                                                                    0.0
265
       36
                      2145.8
                                 0.0
                                         0.0
                                                   0.
                                                            0.
                                                                 321.9
                                                                          0.0
                                                                                    0.0
                                                                                                         331
                                                                                                                            12
                                                                                                                                      221.101
                                                                                                                                                  1412.459
                1.5
       37
                      6478.0
                                                                971.7
                                                                                                         332
                                                                                                                            13
                                                                                                                                      230.501
                                                                                                                                                  1415.869
266
                6.1
                                 0.0
                                         0.0
                                                   0.
                                                            0.
                                                                          0.0
                                                                                   0.0
267
       38
                       812.7
                                  0.0
                                         0.0
                                                                 121.9
                                                                                    0.0
                                                                                                         333
                                                                                                                            14
                                                                                                                                      239.797
                                                                                                                                                  1419.557
                1.2
                                                    0.
                                                            0.
                                                                          0.0
268
       39
                      1736.0
                                 0.0
                                                                 260.4
                                                                          0.0
                                                                                    0.0
                                                                                                         334
                                                                                                                            15
                                                                                                                                      248.978
                                                                                                                                                  1423 519
               5.6
                                         0.0
                                                   0.
                                                            0.
269
                                                                                                         335
                                                                                                                            16
                                                                                                                                      258.038
                                                                                                                                                  1427.753
270
                Failure Surface Specified By 27 Coordinate Points
                                                                                                         336
                                                                                                                            17
                                                                                                                                      266,968
                                                                                                                                                  1432 253
                                                                                                         337
                                                                                                                                      275.760
                                                                                                                                                  1437.017
271
                                                                                                                            18
                                                                                                                                      284.407
                                                                                                                                                  1442.041
                                                                                                         338
                                                                                                                            19
                            X-Surf
                                         Y-Surf
                                                                                                                                      292,900
273
                 Point
                                                                                                         339
                                                                                                                            20
                                                                                                                                                  1447.319
274
                  No.
                             (ft)
                                         (ft)
                                                                                                         340
                                                                                                                            21
                                                                                                                                      301.233
                                                                                                                                                  1452.847
275
                                                                                                         341
                                                                                                                            22
                                                                                                                                      309.398
                                                                                                                                                  1458.620
276
                            113.158
                                         1393.971
                                                                                                         342
                                                                                                                            23
                                                                                                                                      317.388
                                                                                                                                                  1464.634
277
                            123.141
                                        1394.545
                                                                                                         343
                                                                                                                            24
                                                                                                                                      325.196
                                                                                                                                                  1470.882
                   2.
278
                   3
                            133.106
                                         1395.388
                                                                                                         344
                                                                                                                            25
                                                                                                                                      332.814
                                                                                                                                                  1477.360
                            143.044
                                         1396.500
                                                                                                                                      340.237
                                                                                                                                                  1484.061
279
                   4
                                                                                                         345
                                                                                                                            26
280
                   5
                            152.948
                                         1397.881
                                                                                                         346
                                                                                                                            27
                                                                                                                                      342.261
                                                                                                                                                  1486.000
                            162.811
                                         1399 528
                                                                                                         347
281
                   6
282
                            172.627
                                         1401.442
                                                                                                         348
                                                                                                                         Circle Center At X = 111.085; Y = 1730.427; and Radius = 336.462
283
                   8
                            182.386
                                         1403.620
                                                                                                         349
                            192.084
                                         1406.061
284
                   9
                                                                                                         350
                                        1408.764
285
                  10
                            201.712
                                                                                                         351
                                                                                                                               Factor of Safety
                            211.263
                                         1411.725
286
                  11
                                                                                                         352
                                                                                                                               *** 1.315 ***
287
                  12
                            220.731
                                         1414 944
                                                                                                         353
288
                  13
                            230.109
                                         1418.417
                                                                                                         354
289
                  14
                            239.389
                                        1422 142
                                                                                                         355
290
                  15
                            248.565
                                        1426.117
                                                                                                         356
291
                  16
                            257.630
                                         1430.339
                                                                                                         357
                                                                                                                         Failure Surface Specified By 27 Coordinate Points
                  17
                            266 578
                                         1434 804
                                                                                                         358
292
293
                  18
                            275.402
                                         1439.509
                                                                                                         359
                  19
                            284 095
                                        1444 451
                                                                                                         360
                                                                                                                           Point
                                                                                                                                      X-Surf
                                                                                                                                                  Y-Surf
294
295
                   20
                            292.652
                                         1449.626
                                                                                                         361
                                                                                                                            No.
                                                                                                                                       (ft)
                                                                                                                                                  (ft)
296
                  21
                            301.066
                                         1455.030
                                                                                                         362
297
                  22
                             309.331
                                         1460.660
                                                                                                         363
                                                                                                                                      113.158
                                                                                                                                                  1393.971
298
                  23
                            317.440
                                         1466.511
                                                                                                         364
                                                                                                                            2
                                                                                                                                      123.153
                                                                                                                                                  1394.296
299
                  24
                            325.389
                                         1472.580
                                                                                                         365
                                                                                                                                      133.134
                                                                                                                                                  1394.906
                                                                                                                            3
300
                  25
                             333.170
                                         1478.860
                                                                                                         366
                                                                                                                            4
                                                                                                                                      143.094
                                                                                                                                                  1395.799
301
                  26
                             340.779
                                         1485.349
                                                                                                         367
                                                                                                                            5
                                                                                                                                      153.025
                                                                                                                                                  1396.976
302
                  27
                            341.501
                                         1486.000
                                                                                                         368
                                                                                                                            6
                                                                                                                                      162.918
                                                                                                                                                  1398.435
                                                                                                         369
                                                                                                                                      172.765
                                                                                                                                                  1400.175
303
                                                                                                                            7
304
                Circle Center At X =
                                       96.928 ; Y = 1763.588 ; and Radius = 369.973
                                                                                                         370
                                                                                                                                      182.559
                                                                                                                                                  1402.194
                                                                                                                                                  1404.492
305
                                                                                                         371
                                                                                                                            9
                                                                                                                                      192 291
306
                                                                                                         372
                                                                                                                            10
                                                                                                                                      201.955
                                                                                                                                                  1407.066
                                                                                                         373
                                                                                                                                                  1409.913
307
                      Factor of Safety
                                                                                                                            11
                                                                                                                                      211.540
308
                      *** 1.315 ***
                                                                                                         374
                                                                                                                            12
                                                                                                                                      221.041
                                                                                                                                                  1413.033
309
                                                                                                         375
                                                                                                                            13
                                                                                                                                      230.450
                                                                                                                                                  1416.422
310
                                                                                                         376
                                                                                                                            14
                                                                                                                                      239.758
                                                                                                                                                  1420.077
                                                                                                                                                  1423.996
311
                                                                                                         377
                                                                                                                            15
                                                                                                                                      248.958
```

```
378
                  16
                            258.043
                                       1428.175
                                                                                                       444
                                                                                                                       Failure Surface Specified By 26 Coordinate Points
                            267.005
                                        1432.611
379
                  17
                                                                                                       445
380
                  18
                            275.837
                                        1437.301
                                                                                                       446
                                        1442.240
381
                  19
                            284.532
                                                                                                       447
                                                                                                                         Point
                                                                                                                                   X-Surf
                                                                                                                                               Y-Surf
                            293.083
                                        1447.424
382
                  20
                                                                                                       448
                                                                                                                         No.
                                                                                                                                    (ft)
                                                                                                                                                (ft)
383
                  21
                            301.483
                                        1452.850
                                                                                                       449
384
                  22
                            309.725
                                        1458.513
                                                                                                       450
                                                                                                                                   115.789
                                                                                                                                               1395.155
385
                  23
                            317.803
                                        1464.409
                                                                                                       451
                                                                                                                                   125.787
                                                                                                                                               1395.385
                                                                                                                          2
386
                  24
                            325.709
                                        1470.532
                                                                                                       452
                                                                                                                          3
                                                                                                                                   135.773
                                                                                                                                               1395.917
387
                  25
                            333.438
                                        1476.877
                                                                                                       453
                                                                                                                          4
                                                                                                                                   145.738
                                                                                                                                               1396.749
388
                  26
                            340.983
                                        1483.440
                                                                                                       454
                                                                                                                                   155.674
                                                                                                                                               1397.881
389
                  27
                            343.762
                                        1486 000
                                                                                                       455
                                                                                                                          6
                                                                                                                                   165.571
                                                                                                                                               1399.312
390
                                                                                                       456
                                                                                                                                   175.420
                                                                                                                                               1401.042
391
               Circle Center At X = 106.739; Y = 1745.118; and Radius = 351.205
                                                                                                       457
                                                                                                                                   185.213
                                                                                                                                               1403.067
                                                                                                                          8
                                                                                                                                   194.940
                                                                                                                                               1405.387
392
                                                                                                       458
                                                                                                       459
                                                                                                                                   204.593
                                                                                                                                               1407.999
393
                                                                                                                         10
                                                                                                       460
                                                                                                                                   214.163
394
                      Factor of Safety
                                                                                                                         11
                                                                                                                                               1410.900
                                                                                                                                               1414.089
395
                     *** 1.315 ***
                                                                                                       461
                                                                                                                         12
                                                                                                                                   223.641
396
                                                                                                       462
                                                                                                                         13
                                                                                                                                   233.018
                                                                                                                                               1417.562
397
                                                                                                       463
                                                                                                                         14
                                                                                                                                   242.286
                                                                                                                                               1421.317
                                                                                                       464
                                                                                                                         15
                                                                                                                                   251.437
                                                                                                                                               1425.349
398
399
                                                                                                       465
                                                                                                                         16
                                                                                                                                   260.463
                                                                                                                                               1429.656
400
                                                                                                       466
                                                                                                                         17
                                                                                                                                   269.354
                                                                                                                                               1434.232
401
               Failure Surface Specified By 27 Coordinate Points
                                                                                                       467
                                                                                                                         18
                                                                                                                                   278.103
                                                                                                                                               1439.075
402
                                                                                                       468
                                                                                                                         19
                                                                                                                                   286.703
                                                                                                                                               1444 179
403
                                                                                                       469
                                                                                                                          20
                                                                                                                                   295.144
                                                                                                                                               1449.540
                 Point
                            X-Surf
                                        Y-Surf
                                                                                                       470
                                                                                                                                   303.420
                                                                                                                                               1455.153
404
                                                                                                                         21
                                                                                                                                   311.523
405
                  No.
                             (ft)
                                         (ft)
                                                                                                       471
                                                                                                                          22
                                                                                                                                               1461.013
406
                                                                                                       472
                                                                                                                         2.3
                                                                                                                                   319.446
                                                                                                                                               1467.115
407
                            113.158
                                        1393.971
                                                                                                       473
                                                                                                                         24
                                                                                                                                   327.181
                                                                                                                                               1473.453
                   1
408
                   2
                            123.148
                                        1394.415
                                                                                                       474
                                                                                                                         25
                                                                                                                                   334.721
                                                                                                                                               1480.021
409
                            133.122
                                        1395.130
                                                                                                       475
                                                                                                                         26
                                                                                                                                   341.181
                                                                                                                                               1486.000
                   3
410
                   4
                            143.074
                                        1396.115
                                                                                                       476
                            152.995
                                        1397.369
                                                                                                       477
                                                                                                                       Circle Center At X = 113.183; Y = 1726.650; and Radius = 331.505
411
                   5
412
                            162.878
                                        1398.891
                                                                                                       478
                            172 717
                                        1400.681
                                                                                                       479
413
414
                            182.503
                                        1402.737
                                                                                                       480
                                                                                                                             Factor of Safety
415
                   9
                            192.230
                                        1405.057
                                                                                                       481
                                                                                                                             *** 1.318 ***
                  10
                            201.891
                                        1407.639
                                                                                                       482
416
                            211.478
                                        1410.483
417
                  11
                                                                                                       483
                  12
                            220.985
                                        1413.585
                                                                                                       484
418
419
                  13
                            230.404
                                        1416.944
                                                                                                       485 1
                            239.729
420
                  14
                                        1420.557
                                                                                                       486
421
                  15
                            248.952
                                       1424 421
                                                                                                       487
                                                                                                                       Failure Surface Specified By 26 Coordinate Points
422
                  16
                            258.067
                                        1428.534
                                                                                                       488
423
                  17
                            267.067
                                        1432.892
                                                                                                       489
                            275.946
                                        1437.492
                                                                                                       490
                                                                                                                        Point
                                                                                                                                   X-Surf
                                                                                                                                               Y-Surf
                  18
424
425
                  19
                            284.697
                                        1442.332
                                                                                                       491
                                                                                                                         No.
                                                                                                                                    (ft)
                                                                                                                                                (ft)
426
                  20
                            293.314
                                       1447.406
                                                                                                       492
427
                  21
                            301.790
                                        1452.713
                                                                                                       493
                                                                                                                                   113.158
                                                                                                                                               1393.971
428
                  2.2
                            310.119
                                        1458.247
                                                                                                       494
                                                                                                                          2
                                                                                                                                   123.150
                                                                                                                                               1394.375
429
                  23
                            318.295
                                        1464.004
                                                                                                       495
                                                                                                                          3
                                                                                                                                   133.124
                                                                                                                                               1395.086
                                        1469.982
                                                                                                                                   143.073
                                                                                                                                               1396.102
430
                  24
                            326.312
                                                                                                       496
                                                                                                                          4
431
                  25
                            334.165
                                        1476.174
                                                                                                       497
                                                                                                                                   152.985
                                                                                                                                               1397.423
432
                  26
                            341.846
                                        1482.576
                                                                                                       498
                                                                                                                          6
                                                                                                                                   162.852
                                                                                                                                               1399.047
433
                  27
                            345.734
                                        1486.000
                                                                                                       499
                                                                                                                          7
                                                                                                                                   172.665
                                                                                                                                               1400.974
434
                                                                                                       500
                                                                                                                          8
                                                                                                                                   182.414
                                                                                                                                               1403.200
435
               Circle Center At X = 101.763; Y = 1762.802; and Radius = 369.007
                                                                                                       501
                                                                                                                          9
                                                                                                                                   192.090
                                                                                                                                               1405.724
436
                                                                                                       502
                                                                                                                         10
                                                                                                                                   201.684
                                                                                                                                               1408.544
                                                                                                       503
                                                                                                                                               1411.657
437
                                                                                                                         1.1
                                                                                                                                   211 187
438
                      Factor of Safety
                                                                                                       504
                                                                                                                         12
                                                                                                                                   220.591
                                                                                                                                               1415.060
                     *** 1.316 ***
                                                                                                       505
                                                                                                                                   229.885
                                                                                                                                               1418.750
439
                                                                                                                         13
440
                                                                                                       506
                                                                                                                         14
                                                                                                                                   239.062
                                                                                                                                               1422.723
441
                                                                                                       507
                                                                                                                         15
                                                                                                                                   248.112
                                                                                                                                               1426.976
442
                                                                                                       508
                                                                                                                         16
                                                                                                                                   257.028
                                                                                                                                               1431.504
443
                                                                                                       509
                                                                                                                         17
                                                                                                                                   265.801
                                                                                                                                               1436.304
```

```
576
510
                  18
                           274.423
                                       1441.371
                                                                                                                                  (ft)
                                                                                                                                             (ft)
                                                                                                                       No.
                                       1446.699
511
                  19
                           282.885
                                                                                                     577
                                       1452.285
512
                  20
                           291.179
                                                                                                     578
                                                                                                                                 113.158
                                                                                                                                            1393.971
                                                                                                                                             1394.287
513
                  21
                            299.299
                                       1458.123
                                                                                                     579
                                                                                                                        2
                                                                                                                                 123.153
                           307.235
                                                                                                                                 133.135
                                                                                                                                            1394.877
514
                  22
                                       1464.206
                                                                                                     580
                                                                                                                        3
515
                           314.981
                                       1470.531
                                                                                                     581
                                                                                                                                 143.098
                                                                                                                                            1395.741
                  2.3
516
                  24
                            322.529
                                       1477.090
                                                                                                     582
                                                                                                                                 153.033
                                                                                                                                            1396.879
                  25
                           329.873
                                       1483.877
                                                                                                     583
                                                                                                                                            1398.289
517
                                                                                                                        6
                                                                                                                                 162.933
518
                  26
                           332.033
                                       1486.000
                                                                                                     584
                                                                                                                        7
                                                                                                                                 172.791
                                                                                                                                            1399.970
519
                                                                                                     585
                                                                                                                        8
                                                                                                                                 182.599
                                                                                                                                            1401.922
520
               Circle Center At X = 105.026; Y = 1719.603; and Radius = 325.733
                                                                                                     586
                                                                                                                                 192.349
                                                                                                                                            1404.142
                                                                                                                                 202.035
521
                                                                                                     587
                                                                                                                       1.0
                                                                                                                                            1406 629
                                                                                                     588
                                                                                                                       11
                                                                                                                                 211.648
                                                                                                                                            1409.382
522
                                                                                                     589
                                                                                                                                 221.183
                                                                                                                                            1412.397
523
                     Factor of Safety
                                                                                                                       12
                     *** 1.318 ***
524
                                                                                                     590
                                                                                                                       13
                                                                                                                                 230.631
                                                                                                                                            1415.673
                                                                                                                                 239.986
525
                                                                                                     591
                                                                                                                       14
                                                                                                                                            1419.208
                                                                                                                                 249.240
526
                                                                                                     592
                                                                                                                       15
                                                                                                                                            1422.998
527
                                                                                                     593
                                                                                                                       16
                                                                                                                                 258.386
                                                                                                                                            1427.041
                                                                                                     594
                                                                                                                       17
                                                                                                                                 267.418
                                                                                                                                            1431.333
528
529
               Failure Surface Specified By 26 Coordinate Points
                                                                                                     595
                                                                                                                       18
                                                                                                                                 276.328
                                                                                                                                            1435.873
                                                                                                     596
                                                                                                                       19
                                                                                                                                 285.111
                                                                                                                                            1440.655
530
531
                                                                                                     597
                                                                                                                       20
                                                                                                                                 293.758
                                                                                                                                            1445.676
532
                 Point
                           X-Surf
                                       Y-Surf
                                                                                                     598
                                                                                                                       21
                                                                                                                                 302 265
                                                                                                                                            1450 933
533
                 No.
                            (ft)
                                        (ft)
                                                                                                     599
                                                                                                                       22
                                                                                                                                 310.624
                                                                                                                                            1456.422
                                                                                                                                 318.829
534
                                                                                                     600
                                                                                                                       23
                                                                                                                                            1462 139
                           115.789
                                       1395.155
                                                                                                     601
                                                                                                                       24
                                                                                                                                 326.874
                                                                                                                                            1468.078
535
                  1
                           125.766
                                       1395.834
                                                                                                                                 334.752
                                                                                                                                            1474.237
536
                  2
                                                                                                     602
                                                                                                                       25
                           135.721
                                       1396.786
                                                                                                                                 342.459
537
                                                                                                     603
                                                                                                                       26
                                                                                                                                            1480.609
                  3
538
                   4
                           145.646
                                       1398.011
                                                                                                     604
                                                                                                                       2.7
                                                                                                                                 348.625
                                                                                                                                            1486.000
                  5
                           155.533
                                       1399.508
                                                                                                     605
539
540
                           165.375
                                       1401.276
                                                                                                     606
                                                                                                                    Circle Center At X = 106.662; Y = 1757.920; and Radius = 364.007
541
                   7
                           175.166
                                       1403.313
                                                                                                     607
542
                  8
                           184.896
                                       1405.619
                                                                                                     608
                  9
                           194.560
                                       1408.190
543
                                                                                                     609
                                                                                                                           Factor of Safety
544
                  10
                           204.149
                                       1411.026
                                                                                                     610
                                                                                                                          *** 1.319 ***
                  1.1
                           213.657
                                       1414.124
                                                                                                     611
545
546
                  12
                           223.077
                                       1417.482
                                                                                                     612
547
                  13
                           232.400
                                       1421.098
                                                                                                     613
                  14
                            241.621
                                       1424.967
548
                                                                                                     614
                                       1429.089
                           250.732
                                                                                                                    Failure Surface Specified By 27 Coordinate Points
549
                  15
                                                                                                     615
                           259.727
                                       1433.459
550
                  16
                                                                                                     616
551
                  17
                           268.598
                                       1438.074
                                                                                                     617
552
                  18
                           277.339
                                       1442.932
                                                                                                     618
                                                                                                                      Point
                                                                                                                                 X-Surf
                                                                                                                                            Y-Surf
553
                  19
                           285.944
                                       1448.027
                                                                                                     619
                                                                                                                       No.
                                                                                                                                  (ft)
                                                                                                                                             (ft)
554
                  20
                           294.405
                                       1453.356
                                                                                                     620
555
                  21
                           302.717
                                       1458.916
                                                                                                     621
                                                                                                                                 113.158
                                                                                                                                            1393.971
                            310.874
                                                                                                                                            1394.803
                  22
                                       1464 702
                                                                                                     622
                                                                                                                                 123 123
556
                                                                                                                        2
557
                  23
                            318.868
                                       1470.710
                                                                                                     623
                                                                                                                                 133.066
                                                                                                                                            1395.872
558
                  24
                           326.694
                                       1476.934
                                                                                                     624
                                                                                                                                 142.980
                                                                                                                                            1397.179
                                                                                                                        4
559
                  25
                           334.347
                                       1483.372
                                                                                                     625
                                                                                                                                 152.860
                                                                                                                                            1398.721
560
                  26
                           337.303
                                       1486.000
                                                                                                     626
                                                                                                                        6
                                                                                                                                 162.701
                                                                                                                                            1400.499
561
                                                                                                     627
                                                                                                                                 172.497
                                                                                                                                            1402.511
562
               Circle Center At X = 96.130; Y = 1758.581; and Radius = 363.957
                                                                                                     628
                                                                                                                        8
                                                                                                                                 182.241
                                                                                                                                            1404.757
563
                                                                                                     629
                                                                                                                                 191.930
                                                                                                                                            1407.234
564
                                                                                                     630
                                                                                                                       10
                                                                                                                                 201.556
                                                                                                                                            1409.942
565
                     Factor of Safety
                                                                                                     631
                                                                                                                       11
                                                                                                                                 211.115
                                                                                                                                            1412.879
566
                     *** 1.319 ***
                                                                                                     632
                                                                                                                       12
                                                                                                                                 220.601
                                                                                                                                            1416.042
567
                                                                                                     633
                                                                                                                                 230.009
                                                                                                                                            1419.432
                                                                                                                       13
568
                                                                                                     634
                                                                                                                       14
                                                                                                                                 239.334
                                                                                                                                            1423.045
                                                                                                                                 248.570
                                                                                                                                            1426.879
569
                                                                                                     635
                                                                                                                       15
570
                                                                                                     636
                                                                                                                       16
                                                                                                                                 257.711
                                                                                                                                            1430.933
571
                                                                                                     637
                                                                                                                                 266.753
                                                                                                                                            1435.204
                                                                                                                       17
572
               Failure Surface Specified By 27 Coordinate Points
                                                                                                     638
                                                                                                                       18
                                                                                                                                 275.691
                                                                                                                                            1439.689
573
                                                                                                     639
                                                                                                                       19
                                                                                                                                 284.519
                                                                                                                                            1444.386
574
                                                                                                     640
                                                                                                                       20
                                                                                                                                 293.232
                                                                                                                                             1449.293
575
                 Point
                           X-Surf
                                       Y-Surf
                                                                                                     641
                                                                                                                       21
                                                                                                                                 301.826
                                                                                                                                            1454.406
```

```
642
                22
                         310.296
                                   1459.723
                                   1465.240
1470.955
643
                 23
                         318.636
644
                 24
                          326.842
                                     1476.864
1482.964
645
                 25
                          334.910
                          342.834
646
                 26
647
                 27
                          346.589
                                    1486.000
648
649
              Circle Center At X = 83.286; Y = 1811.941; and Radius = 419.036
650
651
                   Factor of Safety
*** 1.319 ***
652
653
654
655
656
657
658
659
                       **** END OF GSTABL7 OUTPUT ****
660
```

Bouquet Canyon/21095-01/Section W-W'/ Temporary



Safety Factors Are Calculated By The Simplified Janbu Method for the case of c & phi both > 0

| 1 | *** GSTABL7 *** |
|--|--|
| 2 | ** GSTABL7 by Dr. Garry H. Gregory, Ph.D., P.E., D.GE ** |
| 4 | GOIABLI DY DI. GALLY R. GIEGOLY, FH.D.,F.E.,D.GE |
| 5 | ** Original Version 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 ** |
| 6 | (All Rights Reserved-Unauthorized Use Prohibited) |
| 7 | (|
| 8 | |
| 9 | |
| | ***************** |
| | ** |
| 10 | SLOPE STABILITY ANALYSIS SYSTEM |
| 11 12 | Modified Bishop, Simplified Janbu, or GLE Method of Slices. |
| 13 | (Includes Spencer & Morgenstern-Price Type Analysis) Including Pier/Pile, Reinforcement, Soil Nail, Tieback, |
| 14 | Nonlinear Undrained Shear Strength, Curved Phi Envelope, |
| 15 | Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water |
| 16 | Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces. |
| 17 | sallades, reduce beauto a nonmark barenquare, and apprica refees. |
| | ******************* |
| | ** |
| 18 | |
| 19 | Analysis Run Date: 4/8/2022 |
| 20 21 | Analysis Run Date: 4/8/2022 Time of Run: 10:25AM |
| 22 | Run By: LGC Geotechnical, |
| 22 | Inc. |
| | |
| | |
| 23 | Input Data Filename: Z:\2021\21095-01 Integral - Bouquet |
| | Canyon\Engineering\slope stability\Sec |
| | W-W'\2022_04_08\xwtb.in |
| | |
| 24 | Output Filename: Z:\2021\21095-01 Integral - Bouquet |
| | Canyon\Engineering\slope stability\Sec |
| | W-W'\2022_04_08\xwtb.OUT |
| | |
| 25 | Unit System: English |
| 26 | |
| 27 | Plotted Output Filename: Z:\2021\21095-01 Integral - Bouquet |
| | Canyon\Engineering\slope stability\Sec |
| | W-W'\2022_04_08\xwtb.PLT |
| | |
| 28 | |
| 29 | |
| 30 | |
| 31 | |
| | |
| | |
| 32 | PROBLEM DESCRIPTION: Bouquet Canvon/21095-01/Section W-W'/ |
| 32 33 | PROBLEM DESCRIPTION: Bouquet Canyon/21095-01/Section W-W'/ Temporary |
| 32 33 34 | PROBLEM DESCRIPTION: Bouquet Canyon/21095-01/Section W-W'/ Temporary |
| 32 33 34 35 | |
| 32 33 34 35 36 | |
| 32 33 34 35 36 37 | |
| 32 33 34 35 36 37 38 | |
| 32 33 34 35 36 37 38 39 | Temporary |
| 32 33 34 35 36 37 38 39 | Temporary |
| 32 33 34 35 36 37 38 39 40 41 | Temporary BOUNDARY COORDINATES |
| 32 33 34 35 36 37 38 39 40 41 | Temporary BOUNDARY COORDINATES 7 Top Boundaries |
| 32 33 34 35 36 37 38 39 40 41 42 43 | Temporary BOUNDARY COORDINATES 7 Top Boundaries 7 Total Boundaries |
| 32 33 34 35 36 37 38 39 40 41 42 42 43 44 | Temporary BOUNDARY COORDINATES 7 Top Boundaries 7 Total Boundaries Boundary X-Left Y-Left X-Right Y-Right Soil Type |
| 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 | Temporary BOUNDARY COORDINATES 7 Top Boundaries 7 Total Boundaries |

| 48 | 1 | 0.00 | 1386.00 | 21.00 | 1384.00 | |
|----|---|--------|---------|--------|---------|--|
| 49 | 2 | 21.00 | 1384.00 | 26.00 | 1388.00 | |
| 50 | 3 | 26.00 | 1388.00 | 146.00 | 1388.00 | |
| 51 | 4 | 146.00 | 1388.00 | 326.00 | 1480.00 | |
| 52 | 5 | 326.00 | 1480.00 | 351.00 | 1483.00 | |
| 53 | 6 | 351.00 | 1483.00 | 365.00 | 1483.00 | |
| 54 | 7 | 365.00 | 1483.00 | 440.00 | 1445.00 | |
| | | | | | | |

User Specified Y-Origin = 1320.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS

2 Type(s) of Soil

| Soll | Total | Saturated | Cohesion | Friction | Pore | Pressure | Piez. |
|------|----------|-----------|-----------|----------|----------|----------|---------|
| Type | Unit Wt. | Unit Wt. | Intercept | Angle | Pressure | Constant | Surface |
| No. | (pcf) | (pcf) | (psf) | (deg) | Param. | (psf) | No. |
| | | | | | | | |
| 1 | 120.0 | 120.0 | 250.0 | 28.0 | 0.00 | 0.0 | 0 |
| 2 | 120.0 | 120.0 | 250.0 | 32.0 | 0.00 | 0.0 | 0 |

ANISOTROPIC STRENGTH PARAMETERS

1 soil type(s)

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

| Counterclockwise Direction Limit (deg) | Cohesion Intercept (psf) | Friction Angle (deg) |
|--|---------------------------------|---|
| 9.0 | 250.00 | 32.00 |
| 15.0 | 150.00 | 25.00 |
| 90.0 | 250.00 | 32.00 |
| | Direction Limit (deg) 9.0 15.0 | Direction Limit Intercept (deg) (psf) 9.0 250.00 15.0 150.00 |

ANISOTROPIC SOIL NOTES:

- (1) An input value of 0.01 for C and/or Phi will cause Aniso C and/or Phi to be ignored in that range.
- (2) An input value of 0.02 for Phi will set both Phi and C equal to zero, with no water weight in the tension crack.
- (3) An input value of 0.03 for Phi will set both Phi and C equal to zero, with water weight in the tension crack.

Janbus Empirical Coef is being used for the case of $\ c$ & phi both > 0

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.

106 1

| 2 Boxes S | 2 Boxes Specified For Generation Of Central Block Base | | | | |
|---|--|---|---|--|-------------------------------------|
| _ 201100 0 | 2 Sound Specification of Contral Brook Base | | | | |
| | | | | | |
| | : Line Segme Block Is 55 | | tive And Pa | ssive Portic | ns Of |
| SITUING E | SIOCK IS 55 | .0 | | | |
| | | | | | |
| Box No. | X-Left (ft) | Y-Left (ft) | X-Right (ft) | Y-Right (ft) | Height (ft) |
| NO. | (10) | (IL) | (IL) | (IL) | (IL) |
| 1 | 130.00 | 1375.00 | 152.00 | 1377.00 | 20.00 |
| 2 | 153.00 | 1377.00 | 345.00 | 1435.00 | 20.00 |
| | | | | | |
| WARNING! | The factor | of safety | calculation | did not con | verge in 20 itera |
| | | | | | |
| | | | | | |
| The Trial | . Failure Su | rface In C | mestion Ts | Defined | |
| | ollowing 4 | | | Delined | |
| - | | | | | |
| | | | | | |
| Point No. | X-Surf (ft) | Y-Sur (ft) | | | |
| 110 • | (10) | (10) | | | |
| 1 | 145.17 | 1388.0 | | | |
| 2 | 149.05 | 1384.4 | | | |
| 3 | 235.16 235.41 | 1392.8 1433.7 | | | |
| 7 | 233.41 | 1433.7 | 0 | | |
| | | | | | |
| | | | | | |
| Factor of | Safety for | the Prece | ding Surfac | e is Between | 10.308 and10.279 |
| Factor of | Safety for | the Prece | ding Surfac | e is Between | 10.308 and10.279 |
| | | | | | 10.308 and10.279 verge in 20 itera |
| | | | | | |
| | | | | | |
| WARNING! | The factor | of safety | calculation | did not con | |
| WARNING! The Trial | | of safety rface In Q | calculation | did not con | |
| WARNING! The Trial | The factor | of safety rface In Q | calculation | did not con | |
| WARNING! The Trial By The Fo | The factor Failure Supplies the | of safety rface In Q Coordinate | calculation question Is | did not con | |
| WARNING! The Trial | The factor | of safety rface In Q Coordinate | calculation question Is Points | did not con | |
| WARNING! The Trial By The Fo Point No. | The factor Failure Sullowing 4 X-Surf (ft) | of safety rface In C Coordinate Y-Sur (ft) | calculation question Is Points | did not con | |
| WARNING! The Trial By The Fo Point No. | The factor Failure Sublowing 4 X-Surf (ft) 135.57 | of safety rface In C Coordinate Y-Sur (ft) 1388.0 | calculation question Is Points | did not con | |
| WARNING! The Trial By The Fo Point No. 1 2 | The factor Failure Sublowing 4 X-Surf (ft) 135.57 148.14 | of safety rface In C Coordinate Y-Sur (ft) 1388.0 1376.0 | calculation question Is Points f | did not con | |
| WARNING! The Trial By The Fo Point No. | The factor Failure Sublowing 4 X-Surf (ft) 135.57 | of safety rface In C Coordinate Y-Sur (ft) 1388.0 | calculation question Is Points f | did not con | |
| WARNING! The Trial By The Fo Point No. 1 2 3 | The factor Failure Su sllowing 4 X-Surf (ft) 135.57 148.14 201.36 | of safety rface In C Coordinate Y-Sur (ft) 1388.0 1376.0 1383.0 | calculation question Is Points f | did not con | |
| WARNING! The Trial By The Fo Point No. 1 2 3 4 | The factor Failure Sublowing 4 X-Surf (ft) 135.57 148.14 201.36 201.64 | of safety rface In C Coordinate Y-Sur (ft) 1388.0 1376.0 1383.0 1416.4 | calculation cuestion Is Points f | did not con | verge in 20 itera |
| WARNING! The Trial By The Fo Point No. 1 2 3 4 | The factor Failure Sublowing 4 X-Surf (ft) 135.57 148.14 201.36 201.64 | of safety rface In C Coordinate Y-Sur (ft) 1388.0 1376.0 1383.0 1416.4 | calculation cuestion Is Points f | did not con | |
| WARNING! The Trial By The Fo Point No. 1 2 3 4 | The factor Failure Sublowing 4 X-Surf (ft) 135.57 148.14 201.36 201.64 | of safety rface In C Coordinate Y-Sur (ft) 1388.0 1376.0 1383.0 1416.4 | calculation cuestion Is Points f | did not con | verge in 20 itera |
| WARNING! The Trial By The Fo Point No. 1 2 3 4 Factor of | The factor Failure Sublowing 4 X-Surf (ft) 135.57 148.14 201.36 201.64 | of safety rface In C Coordinate Y-Sur (ft) 1388.0 1376.0 1383.0 1416.4 the Prece | calculation question Is Points f 0 2 0 4 ding Surface | n did not con Defined | verge in 20 itera |
| WARNING! The Trial By The Fo Point No. 1 2 3 4 Factor of | The factor Failure Sublowing 4 X-Surf (ft) 135.57 148.14 201.36 201.64 | of safety rface In C Coordinate Y-Sur (ft) 1388.0 1376.0 1383.0 1416.4 the Prece | calculation question Is Points f 0 2 0 4 ding Surface | n did not con Defined | verge in 20 itera |
| WARNING! The Trial By The Fo Point No. 1 2 3 4 Factor of | The factor Failure Sublowing 4 X-Surf (ft) 135.57 148.14 201.36 201.64 | of safety rface In C Coordinate Y-Sur (ft) 1388.0 1376.0 1383.0 1416.4 the Prece | calculation question Is Points f 0 2 0 4 ding Surface | n did not con Defined | verge in 20 itera |
| WARNING! The Trial By The Formula Point No. 1 2 3 4 Factor of WARNING! | The factor Failure Sublowing 4 X-Surf (ft) 135.57 148.14 201.36 201.64 Safety for | of safety rface In C Coordinate Y-Sur (ft) 1388.0 1376.0 1383.0 1416.4 the Prece | calculation question Is Points f 0 2 0 4 ding Surfac | Defined The second sec | verge in 20 itera |
| WARNING! The Trial By The Formula Point No. 1 2 3 4 Factor of WARNING! | The factor Failure Sublowing 4 X-Surf (ft) 135.57 148.14 201.36 201.64 | of safety rface In C Coordinate Y-Sur (ft) 1388.0 1376.0 1383.0 1416.4 the Prece of safety | calculation question Is Points f 2 2 0 4 dding Surfac calculation | Defined The second sec | verge in 20 itera |
| WARNING! The Trial By The Formula Point No. 1 2 3 4 Factor of WARNING! | The factor Failure Sublowing 4 X-Surf (ft) 135.57 148.14 201.36 201.64 Safety for The factor | of safety rface In C Coordinate Y-Sur (ft) 1388.0 1376.0 1383.0 1416.4 the Prece of safety | calculation question Is Points f 2 2 0 4 dding Surfac calculation | Defined The second sec | verge in 20 itera |
| WARNING! The Trial By The Formula Point No. 1 2 3 4 Factor of WARNING! | The factor Failure Sublowing 4 X-Surf (ft) 135.57 148.14 201.36 201.64 Safety for The factor | of safety rface In C Coordinate Y-Sur (ft) 1388.0 1376.0 1383.0 1416.4 the Prece of safety rface In C Coordinate | calculation question Is Points f 2 2 0 4 ding Surfac calculation question Is | Defined The second sec | verge in 20 itera |

```
(ft)
                                       (ft)
180
                  No.
181
                                      1388.00
                           145.17
182
183
                           149.05
                                      1384.48
                  2
                  3
                           235.16
                                      1392.88
184
                           235.41
185
                  4
                                      1433.70
186
187
188
               Factor of Safety for the Preceding Surface is Between10.308 and10.279
189
190
               WARNING! The factor of safety calculation did not converge in 20 iterations.
191
192
193
194
195
               The Trial Failure Surface In Question Is Defined
196
               By The Following 4 Coordinate Points
197
198
                 Point
                           X-Surf
                                       Y-Surf
199
200
                 No.
                            (ft)
                                       (ft)
201
202
                           135.57
                                      1388.00
203
                  2
                           148.14
                                      1376.02
                                      1383.00
204
                  3
                           201.36
205
                  4
                           201.64
                                      1416.44
206
207
208
               Factor of Safety for the Preceding Surface is Between13.400 and13.374
209
210
211
               WARNING! The factor of safety calculation did not converge in 20 iterations.
212
213
214
215
               The Trial Failure Surface In Question Is Defined
216
               By The Following 4 Coordinate Points
217
218
219
                                       Y-Surf
                 Point
                           X-Surf
220
                            (ft)
                                       (ft)
                 No.
221
222
                           145.17
                                      1388.00
                  1
223
                  2
                           149.05
                                      1384.48
224
                  3
                           235.16
                                      1392.88
225
                  4
                           235.41
                                      1433.70
226
227
228
               Factor of Safety for the Preceding Surface is Between10.308 and10.279
229
230
231
               WARNING! The factor of safety calculation did not converge in 20 iterations.
232
233
234
235
               The Trial Failure Surface In Question Is Defined
236
               By The Following 4 Coordinate Points
237
238
239
                 Point
                           X-Surf
                                       Y-Surf
240
                 No.
                            (ft)
                                       (ft)
241
242
                           135.57
                                      1388.00
243
                  2
                           148.14
                                      1376.02
244
                  3
                           201.36
                                      1383.00
                           201.64
245
                  4
                                      1416.44
```

Factor of Safety for the Preceding Surface is Between13.400 and13.374

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 4 Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|--------------|----------------|----------------|
| 1 | 145.17 | 1388.00 |
| 2 | 149.05 | 1384.48 |
| 3 | 235.16 | 1392.88 |
| 4 | 235.41 | 1433.70 |

Factor of Safety for the Preceding Surface is Between10.308 and10.279

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following $\ 4$ Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|--------------|----------------|----------------|
| 1 | 135.57 | 1388.00 |
| 2 | 148.14 | 1376.02 |
| 3 | 201.36 | 1383.00 |
| 4 | 201.64 | 1416.44 |

Factor of Safety for the Preceding Surface is Between13.400 and13.374

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following $\ 4$ Coordinate Points

| Point No. | X-Surf (ft) | Y-Suri (ft) |
|--------------|----------------|----------------|
| 1 | 145.17 | 1388.00 |
| 2 | 149.05 | 1384.48 |
| 3 | 235.16 | 1392.88 |
| 4 | 235.41 | 1433.70 |
| | | |

Factor of Safety for the Preceding Surface is Between10.308 and10.279

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 4 Coordinate Points

| oint No. | X-Surf (ft) | Y-Surf (ft) |
|-------------|----------------|----------------|
| 1 | 135.57 | 1388.00 |
| 2 | 148.14 | 1376.02 |
| 3 | 201.36 | 1383.00 |
| 4 | 201.64 | 1416.44 |

Factor of Safety for the Preceding Surface is Between13.400 and13.374

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following $\ 4$ Coordinate Points

| Point No. | X-Surf (ft) | Y-Surf (ft) |
|--------------|----------------|----------------|
| 1 | 145.17 | 1388.00 |
| 2 | 149.05 | 1384.48 |
| 3 | 235.16 | 1392.88 |
| 4 | 235.41 | 1433.70 |

Factor of Safety for the Preceding Surface is Between10.308 and10.279

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 4 Coordinate Points

| X-Surf (ft) | Y-Surf (ft) |
|----------------|------------------------------------|
| 135.57 | 1388.00 |
| 148.14 | 1376.02 |
| 201.36 | 1383.00 |
| 201.64 | 1416.44 |
| | (ft) 135.57 148.14 201.36 |

Factor of Safety for the Preceding Surface is Between13.400 and13.374

WARNING! The factor of safety calculation did not converge in 20 iterations.

The Trial Failure Surface In Question Is Defined By The Following 4 Coordinate Points

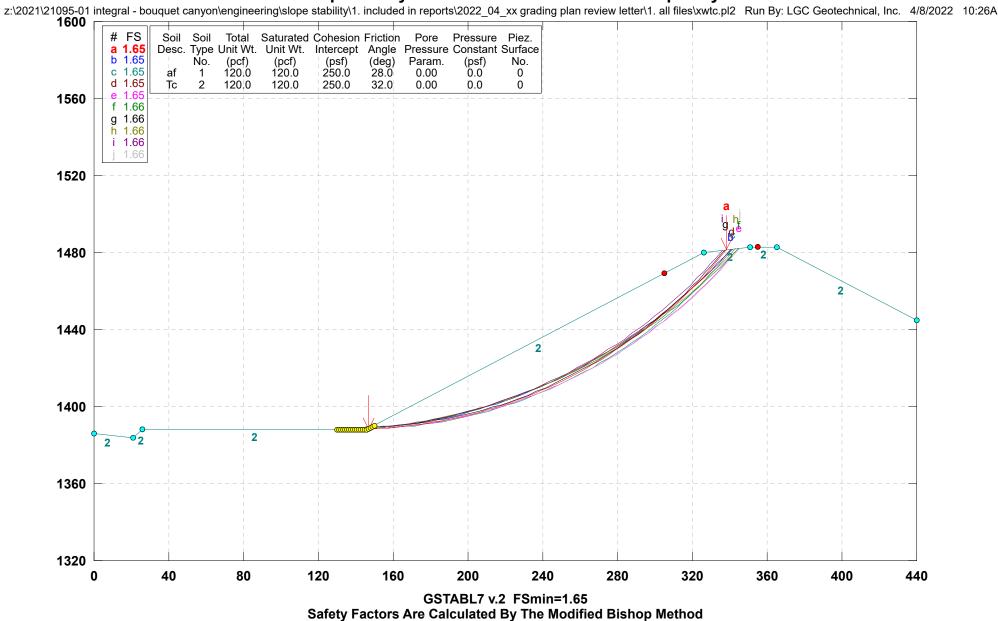
```
378
379
                  Point
                            X-Surf
                                         Y-Surf
380
                   No.
                             (ft)
                                          (ft)
381
382
                             145.17
                                        1388.00
                            149.05
                                        1384.48
383
                   2
384
                             235.16
                                        1392.88
385
                    4
                             235.41
                                        1433.70
386
387
388
                Factor of Safety for the Preceding Surface is Between10.308 and10.279
389
390
391
                WARNING! The factor of safety calculation did not converge in 20 iterations.
392
393
394
                The Trial Failure Surface In Question Is Defined
395
396
                By The Following 4 Coordinate Points
397
398
399
                  Point
                             X-Surf
                                         Y-Surf
400
                             (ft)
                                          (ft)
                  No.
401
402
                   1
                            135 57
                                        1388 00
                             148.14
                                        1376.02
403
                                        1383.00
404
                   3
                             201.36
405
                             201.64
                                        1416.44
406
407
408
                Factor of Safety for the Preceding Surface is Between13.400 and13.374
409
410
411
                WARNING! The factor of safety calculation did not converge in 20 iterations.
412
413
414
415
                The Trial Failure Surface In Question Is Defined
416
                By The Following 4 Coordinate Points
417
418
419
                  Point
                             X-Surf
                                         Y-Surf
                             (ft)
                                          (ft)
420
                  No.
421
422
                   1
                            145.17
                                        1388.00
                   2
                             149.05
                                        1384.48
423
424
                   3
                             235 16
                                        1392 88
425
                             235.41
                                        1433.70
                    4
426
427
428
                Factor of Safety for the Preceding Surface is Between10.308 and10.279
429
430
431
                WARNING! The factor of safety calculation did not converge in 20 iterations.
432
433
434
                The Trial Failure Surface In Ouestion Is Defined
435
436
                By The Following 4 Coordinate Points
437
438
                            X-Surf
                                         Y-Surf
439
                  Point
440
                   No.
                             (ft)
                                          (ft)
441
442
                   1
                             135.57
                                        1388.00
443
                   2
                            148.14
                                        1376.02
```

```
444
                            201.36
                                       1383 00
                   3
445
                            201.64
                                       1416.44
446
447
448
               Factor of Safety for the Preceding Surface is Between13.400 and13.374
449
450
451
               Following Are Displayed The Ten Most Critical Of The Trial
452
               Failure Surfaces Evaluated. They Are
453
               Ordered - Most Critical First.
454
455
456
                * * Safety Factors Are Calculated By The Simplified Janbu Method * *
457
458
459
460
               Total Number of Trial Surfaces Attempted = 4999
461
462
               WARNING! The Factor of Safety Calculation for one or More Trial Surfaces
463
               Did Not Converge in 20 Iterations.
464
465
466
               Number of Trial Surfaces with Non-Converged FS = 16
467
468
               Number of Trial Surfaces With Valid FS = 4983
469
470
               Percentage of Trial Surfaces With Non-Valid FS Solutions
471
472
               of the Total Attempted = 0.3 %
473
474
               Statistical Data On All Valid FS Values:
475
                  FS Max = 58.784 FS Min = 1.482 FS Ave = 2.720
476
                  Standard Deviation = 2.711 Coefficient of Variation = 99.68 %
477
478
479
               Failure Surface Specified By 5 Coordinate Points
480
481
                            X-Surf
                                        Y-Surf
482
                 Point
483
                  No.
                             (ft.)
                                         (ft)
484
485
                   -1
                            131.779
                                        1388 000
486
                            140.198
                                        1381.570
                   2
487
                   3
                            283 910
                                        1416 125
488
                            321.521
                                        1456.254
489
                   5
                            342.145
                                       1481.937
490
491
                      Factor of Safety
492
493
                     *** 1.482 ***
494
495
496
497
498
                    Individual data on the
                                               6 slices
499
500
501
                                                      Tie
                              Water Water
                                              Tie
                                                               Earthquake
502
                              Force Force
                                              Force
                                                     Force
                                                                 Force Surcharge
      Slice Width
503
                     Weight
                               goT
                                                                      Ver
                                     Rot
                                              Norm
                                                      Tan
                                                              Hor
                                                                             Load
504
       No.
              (ft)
                      (lbs)
                              (lbs) (lbs)
                                              (lbs)
                                                     (lbs)
                                                              (lbs) (lbs)
                                                                             (lbs)
505
506
               8.4
                      3247.9
                                 0.0
                                         0.0
                                                   0.
                                                           0.
                                                                  0.0
                                                                         0.0
                                                                                  0.0
507
        2.
               5.8
                      3990.6
                                 0.0
                                         0.0
                                                  0.
                                                          0.
                                                                 0.0
                                                                         0.0
                                                                                  0.0
508
        3
             137.9 392193.5
                                 0.0
                                         0.0
                                                  0.
                                                          0.
                                                                  0.0
                                                                         0.0
                                                                                  0.0
509
        4
              37.6 144018.7
                                 0.0
                                         0.0
                                                   0.
                                                          0.
                                                                  0.0
                                                                         0.0
                                                                                  0.0
```

```
510
       5
              4.5 10647.9 0.0
                                    0.0
                                               0.
                                                       0.0
                                                                     0.0
                                                                              0.0
                                                                                                 576
                                                                                                                   No.
                                                                                                                             (ft)
                                                                                                                                        (ft)
             16.1 17598.8 0.0
511
                                    0.0
                                                0.
                                                       0.
                                                            0.0
                                                                     0.0
                                                                              0.0
                                                                                                 578
                                                                                                                            131.779
                                                                                                                                       1388.000
512
               Failure Surface Specified By 5 Coordinate Points
                                                                                                 579
                                                                                                                            140.198
                                                                                                                                        1381.570
513
                                                                                                                    2
514
                                                                                                 580
                                                                                                                            283.910
                                                                                                                                       1416.125
                                                                                                                    3
515
                                                                                                 581
                                                                                                                            321.521
                                                                                                                                       1456.254
                                                                                                                    4
                          X-Surf
516
                Point
                                      Y-Surf
                                                                                                 582
                                                                                                                            342.145
                                                                                                                                       1481.937
517
                           (ft)
                                      (ft)
                                                                                                 583
                 No.
518
                                                                                                 584
519
                          131.779
                                      1388.000
                                                                                                 585
                                                                                                                      Factor of Safety
520
                          140.198
                                      1381.570
                                                                                                                      *** 1.482 ***
521
                  3
                          283.910
                                      1416.125
                                                                                                 587
522
                  4
                           321.521
                                      1456.254
                                                                                                 588
523
                          342.145
                                     1481.937
                                                                                                 589
                  5
                                                                                                 590
524
                                                                                                 591
                                                                                                                Failure Surface Specified By 5 Coordinate Points
525
526
                    Factor of Safety
                                                                                                 592
                    *** 1.482 ***
                                                                                                 593
527
528
                                                                                                 594
                                                                                                                  Point.
                                                                                                                            X-Surf
                                                                                                                                       Y-Surf
529
                                                                                                 595
                                                                                                                   No.
                                                                                                                             (ft)
                                                                                                                                        (ft)
                                                                                                 596
530
531
                                                                                                 597
                                                                                                                            131.779
                                                                                                                                       1388.000
532
                                                                                                 598
                                                                                                                    2
                                                                                                                            140.198
                                                                                                                                       1381.570
533
               Failure Surface Specified By 5 Coordinate Points
                                                                                                 599
                                                                                                                            283.910
                                                                                                                                       1416.125
534
                                                                                                 600
                                                                                                                    4
                                                                                                                            321.521
                                                                                                                                       1456 254
535
                                                                                                 601
                                                                                                                            342.145
                                                                                                                                       1481.937
536
                Point
                          X-Surf
                                      Y-Surf
                                                                                                 602
537
                           (ft)
                                      (ft)
                 No.
                                                                                                 603
538
                                                                                                 604
                                                                                                                      Factor of Safety
                                                                                                                      *** 1.482 ***
539
                          131.779
                                      1388.000
                                                                                                 605
                  1
540
                  2
                          140.198
                                      1381.570
                                                                                                 606
                          283.910
                                      1416.125
541
                                                                                                 607
                  3
542
                  4
                          321.521
                                      1456.254
                                                                                                 608
543
                          342.145
                                     1481.937
                                                                                                 609 1
                  5
544
                                                                                                 610
545
                                                                                                 611
                                                                                                                Failure Surface Specified By 5 Coordinate Points
                    Factor of Safety
                                                                                                 612
                    *** 1.482 ***
547
                                                                                                 613
548
                                                                                                 614
                                                                                                                  Point
                                                                                                                            X-Surf
                                                                                                                                       Y-Surf
549
                                                                                                 615
                                                                                                                   No.
                                                                                                                             (ft)
                                                                                                                                        (ft)
550
                                                                                                 616
551
                                                                                                 617
                                                                                                                    1
                                                                                                                            131.779
                                                                                                                                       1388.000
               Failure Surface Specified By 5 Coordinate Points
                                                                                                                                        1381.570
552
                                                                                                 618
                                                                                                                    2
                                                                                                                            140.198
553
                                                                                                 619
                                                                                                                    3
                                                                                                                            283.910
                                                                                                                                       1416.125
554
                                                                                                 620
                                                                                                                            321.521
                                                                                                                                       1456.254
555
                Point
                          X-Surf
                                      Y-Surf
                                                                                                 621
                                                                                                                            342.145
                                                                                                                                       1481.937
                           (ft)
                                      (ft)
                                                                                                 622
556
                 No.
557
                                                                                                 623
558
                  1
                          131.779
                                     1388.000
                                                                                                 624
                                                                                                                      Factor of Safety
                          140.198
                                      1381.570
                                                                                                                      *** 1.482 ***
560
                  3
                          283.910
                                      1416.125
                                                                                                 626
561
                          321.521
                                      1456.254
                                                                                                 627
                          342.145
                                     1481.937
                                                                                                 628
562
                  5
563
                                                                                                 629
564
                                                                                                 630
                                                                                                                Failure Surface Specified By 5 Coordinate Points
565
                    Factor of Safety
                                                                                                 631
                    *** 1.482 ***
566
                                                                                                 632
567
                                                                                                 633
                                                                                                                  Point
                                                                                                                            X-Surf
                                                                                                                                       Y-Surf
568
                                                                                                 634
                                                                                                                             (ft)
                                                                                                                                        (ft)
569
                                                                                                 635
                                                                                                                            131.779
570
                                                                                                 636
                                                                                                                                       1388.000
571
                                                                                                 637
                                                                                                                            140.198
                                                                                                                                       1381.570
                                                                                                                    2
572
               Failure Surface Specified By 5 Coordinate Points
                                                                                                 638
                                                                                                                    3
                                                                                                                            283.910
                                                                                                                                        1416.125
573
                                                                                                 639
                                                                                                                    4
                                                                                                                            321.521
                                                                                                                                        1456.254
574
                                                                                                 640
                                                                                                                            342.145
                                                                                                                                       1481.937
575
                Point
                          X-Surf
                                      Y-Surf
                                                                                                 641
```

```
642
                   Factor of Safety
*** 1.482 ***
643
644
645
646
647
648 1
649
650
              Failure Surface Specified By 5 Coordinate Points
651
652
                Point
                          X-Surf
                                     Y-Surf
653
654
                 No.
                          (ft)
                                      (ft)
655
656
                          141.988
                                     1388.000
657
                 2
                          144.742
                                     1385.372
658
                 3
                          283.816
                                     1413.157
659
                          319.167
                                     1455.291
                 4
                          332.758
                                     1480.811
660
                 5
661
662
663
                    Factor of Safety
                   *** 1.494 ***
664
665
666
667
668
669
              Failure Surface Specified By 5 Coordinate Points
670
671
672
                Point
                          X-Surf
                                     Y-Surf
673
                          (ft)
                                      (ft)
                 No.
674
675
                 1
                          141.988
                                     1388.000
676
                          144.742
                                     1385.372
                                     1413.157
677
                          283.816
                 3
678
                          319.167
                                     1455.291
679
                 5
                          332.758
                                     1480.811
680
681
682
                   Factor of Safety
                   *** 1.494 ***
683
684
685
686
687
688
689
                       **** END OF GSTABL7 OUTPUT ****
690
```

Bouquet Canyon/21095-01/Section W-W'/ Temporary



| 1 | *** GSTABL7 *** |
|--|--|
| 2 3 | ** GSTABL7 by Dr. Garry H. Gregory, Ph.D.,P.E.,D.GE ** |
| 4 5 6 7 8 | ** Original Version 1.0, January 1996; Current Ver. 2.005.3, Feb. 2013 ** (All Rights Reserved-Unauthorized Use Prohibited) |
| 9 | ************************* |
| 10 11 12 13 14 15 16 | ** SLOPE STABILITY ANALYSIS SYSTEM Modified Bishop, Simplified Janbu, or GLE Method of Slices. (Includes Spencer & Morgenstern-Price Type Analysis) Including Pier/Pile, Reinforcement, Soil Nail, Tieback, Nonlinear Undrained Shear Strength, Curved Phi Envelope, Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces. |
| | ** |
| 18 19 20 21 22 | Analysis Run Date: 4/8/2022 Time of Run: 10:26AM Run By: LGC Geotechnical, Inc. |
| 23 | Input Data Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec W-W'\2022_04_08\xwtc.in |
| 24 | Output Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec W-W'\2022_04_08\xwtc.OUT |
| 25 26 | Unit System: English |
| 27 | Plotted Output Filename: Z:\2021\21095-01 Integral - Bouquet Canyon\Engineering\slope stability\Sec W-W'\2022_04_08\xwtc.PLT |
| 28 29 30 31 32 | |
| 33 34 35 36 37 38 | PROBLEM DESCRIPTION: Bouquet Canyon/21095-01/Section W-W'/ Temporary |
| 39 40 | BOUNDARY COORDINATES |
| 41 42 43 44 | 7 Top Boundaries 7 Total Boundaries |
| 45 46 47 | Boundary X-Left Y-Left X-Right Y-Right Soil Type No. (ft) (ft) (ft) Below Bnd |

| 48 | 1 | 0.00 | 1386.00 | 21.00 | 1384.00 | 2 |
|----|---|--------|---------|--------|---------|---|
| 49 | 2 | 21.00 | 1384.00 | 26.00 | 1388.00 | 2 |
| 50 | 3 | 26.00 | 1388.00 | 146.00 | 1388.00 | 2 |
| 51 | 4 | 146.00 | 1388.00 | 326.00 | 1480.00 | 2 |
| 52 | 5 | 326.00 | 1480.00 | 351.00 | 1483.00 | 2 |
| 53 | 6 | 351.00 | 1483.00 | 365.00 | 1483.00 | 2 |
| 54 | 7 | 365.00 | 1483.00 | 440.00 | 1445.00 | 2 |
| 55 | | | | | | |
| | | | | | | |

User Specified Y-Origin = 1320.00(ft)

Default X-Plus Value = 0.00(ft)

Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS

2 Type(s) of Soil

| Soil | Total | Saturated | Cohesion | Friction | Pore | Pressure | Piez. |
|------|----------|-----------|-----------|----------|----------|----------|---------|
| Type | Unit Wt. | Unit Wt. | Intercept | Angle | Pressure | Constant | Surface |
| No. | (pcf) | (pcf) | (psf) | (deg) | Param. | (psf) | No. |
| | | | | | | | |
| 1 | 120.0 | 120.0 | 250.0 | 28.0 | 0.00 | 0.0 | 0 |
| 2 | 120.0 | 120.0 | 250.0 | 32.0 | 0.00 | 0.0 | 0 |

ANISOTROPIC STRENGTH PARAMETERS

1 soil type(s)

Soil Type 2 Is Anisotropic

Number Of Direction Ranges Specified = 3

| Direction Limit (deg) | Cohesion Intercept (psf) | Friction Angle (deg) |
|-----------------------|--------------------------------|---|
| 9.0 | 250.00 | 32.00 |
| 15.0 | 150.00 | 25.00 |
| 90.0 | 250.00 | 32.00 |
| | (deg) 9.0 15.0 | Direction Limit Intercept (deg) (psf) 9.0 250.00 15.0 150.00 |

ANISOTROPIC SOIL NOTES:

- (1) An input value of 0.01 for C and/or Phi will cause Aniso C and/or Phi to be ignored in that range.
- (2) An input value of 0.02 for Phi will set both Phi and C equal to zero, with no water weight in the tension crack.
- (3) An input value of 0.03 for Phi will set both Phi and C equal to zero, with water weight in the tension crack.

ANISOTROPIC STRENGTH DATA HAS BEEN SUPPRESSED

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.

```
114
115
                4980 Trial Surfaces Have Been Generated.
116
117
118
                249 Surface(s) Initiate(s) From Each Of 20 Points Equally Spaced
119
                Along The Ground Surface Between X = 130.00(ft)
120
                                            and X = 150.00(ft)
122
                Each Surface Terminates Between X = 305.00(ft)
124
                                           and X = 355.00(ft)
125
126
                Unless Further Limitations Were Imposed, The Minimum Elevation
128
               At Which A Surface Extends Is Y =
                                                       0.00(ft)
129
130
131
                5.00(ft) Line Segments Define Each Trial Failure Surface.
133
134
135
136
                Following Are Displayed The Ten Most Critical Of The Trial
                Failure Surfaces Evaluated. They Are
               Ordered - Most Critical First.
138
139
140
                * * Safety Factors Are Calculated By The Modified Bishop Method * *
141
142
143
144
               Total Number of Trial Surfaces Attempted = 4980
145
146
147
               Number of Trial Surfaces With Valid FS = 4980
148
149
150
                Statistical Data On All Valid FS Values:
151
                  FS Max = 2.634 FS Min = 1.652 FS Ave = 2.144
                  Standard Deviation = 0.290 Coefficient of Variation = 13.51 %
152
153
154
155
               Failure Surface Specified By 45 Coordinate Points
156
157
158
                 Point
                            X-Surf
                                        Y-Surf
159
                  No.
                             (ft)
                                         (ft)
160
161
                            146.842
                                        1388.430
                   2
                            151.838
                                        1388.632
162
163
                   3
                            156.829
                                        1388.930
164
                            161.814
                                         1389.324
165
                   5
                            166.790
                                         1389.813
166
                   6
                            171.755
                                        1390.398
167
                            176.709
                                        1391.078
168
                   8
                            181.648
                                        1391.854
169
                   9
                            186.572
                                         1392.724
170
                  10
                            191.478
                                        1393 688
171
                  11
                            196.365
                                        1394.746
172
                  12
                            201.230
                                        1395.899
                            206.073
                  13
                                         1397 144
174
                  14
                            210.890
                                        1398.482
175
                            215.681
                                        1399.913
                  15
176
                            220.444
                                        1401.436
                  17
                            225.176
                                        1403.049
178
                  18
                            229.877
                                         1404.753
179
                  19
                            234.544
                                        1406.548
```

```
180
                  20
                            239 175
                                        1408 431
181
                   21
                            243.770
                                        1410.404
182
                            248.326
                                        1412.464
183
                   23
                            252.841
                                        1414.611
                            257.314
184
                   2.4
                                        1416.845
185
                   25
                            261.744
                                        1419.164
186
                   26
                            266.128
                                        1421.568
187
                   2.7
                            270.465
                                        1424.056
188
                   28
                            274.754
                                        1426.626
189
                  29
                            278 992
                                        1429 279
190
                   30
                            283.179
                                        1432.012
191
                   31
                            287 312
                                        1434 826
192
                   32
                            291.391
                                        1437.718
                            295.413
                  33
                                        1440 688
193
194
                   34
                            299.378
                                        1443.735
195
                   35
                            303.283
                                        1446.857
                            307.127
196
                   36
                                        1450.054
197
                  37
                            310.910
                                        1453.324
                            314.628
                                        1456.667
198
                  38
199
                   39
                            318.282
                                        1460.080
                   40
                            321.870
                                        1463.562
201
                   41
                            325.390
                                        1467.114
                   42
                            328 841
                                        1470 731
203
                   43
                            332.222
                                        1474.415
204
                   44
                            335 531
                                        1478 163
                   45
                            338.351
                                        1481.482
205
206
               Circle Center At X = 138.834; Y = 1648.523; and Radius = 260.216
207
208
209
210
                      Factor of Safety
211
                      *** 1.652 ***
212
213
214
215
216
                    Individual data on the
                                              45 slices
217
218
219
                              Water Water
                                               Tie
                                                       Tie
                                                               Earthquake
                              Force Force
                                              Force
                                                      Force
                                                               Force Surcharge
       Slice Width
                     Weight
                               Top
                                      Bot
                                              Norm
                                                       Tan
                                                               Hor
                                                                      Ver
                                                                              Load
222
       No.
              (ft)
                      (lbs)
                              (lbs) (lbs)
                                              (lbs)
                                                     (lbs)
                                                              (lbs) (lbs)
                                                                             (lbs)
224
               5.0
                       704.9
                                                                  0.0
                                                                          0.0
                                                                                   0.0
                                 0.0
                                         0.0
                                                   0.
                                                           0.
        2
               5.0
                       2083.2
                                 0.0
                                         0.0
                                                                  0.0
                                                                          0.0
                                                                                   0.0
                                                   0.
                                                           0.
226
        3
               5 0
                       3398 5
                                                                  0 0
                                 0 0
                                         0 0
                                                   Ω
                                                           Ω
                                                                          0 0
                                                                                   0 0
227
        4
                5.0
                       4648.9
                                 0.0
                                         0.0
                                                                  0.0
                                                                          0.0
                                                                                   0.0
                                                   0.
                                                           0.
228
                      5833.1
                                                                  0 0
        5
               5 0
                                 0 0
                                         0 0
                                                   Ω
                                                           Ω
                                                                          0 0
                                                                                   0 0
229
        6
               5.0
                       6949.7
                                 0.0
                                         0.0
                                                   0.
                                                           0.
                                                                  0.0
                                                                          0.0
                                                                                   0.0
230
               4.9
                       7997.3
                                 0.0
                                         0.0
                                                   0.
                                                           0.
                                                                  0.0
                                                                          0.0
                                                                                   0.0
231
                4 9
                       8975.0
                                 0 0
                                         0.0
                                                   0.
                                                           0.
                                                                  0.0
                                                                          0.0
                                                                                   0.0
        9
               4.9
                      9881.7
                                 0.0
                                         0.0
                                                   0.
                                                           0.
                                                                  0.0
                                                                          0.0
                                                                                   0.0
233
       10
               4.9
                     10717.1
                                 0.0
                                         0.0
                                                           0.
                                                                  0.0
                                                                          0.0
                                                                                   0.0
                                                   0.
234
       11
               4.9
                     11480.1
                                 0.0
                                         0.0
                                                   0.
                                                           0.
                                                                  0.0
                                                                          0.0
                                                                                   0.0
235
        12
               4.8
                     12170.8
                                 0.0
                                         0.0
                                                           0.
                                                                  0.0
                                                                          0.0
                                                                                   0.0
                                                   0.
236
       13
               4.8
                     12788 7
                                 0.0
                                         0.0
                                                   0.
                                                           0.
                                                                  0.0
                                                                          0.0
                                                                                   0.0
237
               4.8
                     13333.8
       14
                                 0 0
                                         0 0
                                                           Ω
                                                                  0 0
                                                                          0 0
                                                                                  0 0
                                                   0
238
        15
               4.8
                     13806.3
                                 0.0
                                         0.0
                                                           0.
                                                                  0.0
                                                                          0.0
                                                                                   0.0
                     14206.4
239
               4 7
                                                                  0 0
                                                                          0 0
                                                                                  0 0
       16
                                 0 0
                                         0 0
                                                   0
                                                           Ω
240
       17
               4.7
                     14534.8
                                 0.0
                                         0.0
                                                   0.
                                                           0.
                                                                  0.0
                                                                          0.0
                                                                                   0.0
                     14791.9
2.41
       18
               4.7
                                 0.0
                                         0.0
                                                   0.
                                                           0.
                                                                  0.0
                                                                          0.0
                                                                                   0.0
242
        19
                4 6
                     14978.6
                                 0.0
                                         0.0
                                                   0.
                                                                  0.0
                                                                          0.0
                                                                                   0.0
243
       2.0
               4.6
                     15095.8
                                 0.0
                                         0.0
                                                   0.
                                                           0.
                                                                  0.0
                                                                          0.0
                                                                                   0.0
244
        21
                4 6
                     15144.6
                                 0.0
                                         0.0
                                                   0.
                                                           0.
                                                                  0.0
                                                                          0.0
                                                                                   0.0
245
       22
               4.5
                     15126.3
                                 0.0
                                         0.0
                                                   0.
                                                           0.
                                                                  0.0
                                                                          0.0
                                                                                   0.0
```

```
246
       23
              4.5 15042.6
                             0 0
                                     0.0
                                             0.
                                                     0.
                                                           0.0
                                                                  0.0
                                                                          0 0
              4.4 14894.9
247
       24
                             0.0
                                     0.0
                                              0.
                                                     0.
                                                           0.0
                                                                  0.0
                                                                          0.0
                   14684.8
248
       25
                              0.0
                                     0.0
                                              0.
                                                     0.
                                                           0.0
                                                                  0.0
                                                                          0.0
249
       26
              4.3
                   14414.4
                              0.0
                                     0.0
                                              0.
                                                     0.
                                                           0.0
                                                                  0.0
                                                                          0.0
250
       27
              4.3
                   14085.9
                              0.0
                                     0.0
                                              0.
                                                     0.
                                                           0.0
                                                                  0.0
                                                                          0.0
251
              4.2
                   13701.1
       28
                              0.0
                                     0.0
                                              0.
                                                     0.
                                                           0.0
                                                                  0.0
                                                                          0.0
252
              4.2
                   13262.6
                              0.0
                                     0.0
                                                           0.0
                                                                          0.0
                   12772.6
                             0.0
253
       30
              4.1
                                    0.0
                                             0.
                                                     0.
                                                           0.0
                                                                  0.0
                                                                          0.0
254
       31
              4.1
                   12234.2
                              0.0
                                     0.0
                                                     0.
                                                           0.0
                                                                  0.0
                                                                          0.0
255
      32
              4.0
                   11649.6
                             0 0
                                     0.0
                                                     0.
                                                           0.0
                                                                  0.0
                                                                          0 0
                                              0.
256
       33
              4.0
                   11021.9
                              0.0
                                     0.0
                                              0.
                                                     0.
                                                           0.0
                                                                  0.0
                                                                          0.0
257
       34
              3 9
                   10354.0
                             0 0
                                    0.0
                                             0.
                                                     0.
                                                           0.0
                                                                  0.0
                                                                          0 0
258
       35
                    9649.0
                              0.0
                                                     0.
              3.8
                                     0.0
                                             0.
                                                           0.0
                                                                  0.0
                                                                          0.0
                    8910.1
259
       36
              3.8
                              0.0
                                     0.0
                                              0.
                                                     0.
                                                           0.0
                                                                  0.0
                                                                          0.0
260
      37
              3.7
                    8140.4
                             0.0
                                    0.0
                                                           0.0
                                                                  0.0
                                                                          0.0
                                             0.
                                                     0.
261
      38
              3.7
                    7343.5
                             0.0
                                    0.0
                                            0.
                                                     0.
                                                           0.0
                                                                 0.0
                                                                          0.0
262
      39
                    6522.7
                             0.0
                                    0.0
                                             0.
                                                    0.
                                                           0.0
                                                                  0.0
                                                                          0.0
              3.6
263
      40
              3.5
                    5681.5
                             0.0
                                     0.0
                                             0.
                                                     0.
                                                           0.0
                                                                  0.0
                                                                          0.0
      41
                    908.9
264
              0.6
                             0.0
                                    0.0
                                             0.
                                                     0.
                                                           0.0
                                                                 0.0
                                                                          0.0
265
       42
                    3725.4
                              0.0
                                     0.0
                                              0.
                                                           0.0
                                                                 0.0
                                                                          0.0
      43
                    3233.8
                             0.0
266
              3.4
                                     0.0
                                              0.
                                                     0.
                                                           0.0
                                                                  0.0
                                                                          0.0
267
       44
                    1849.2
                              0.0
                                     0.0
                                                     0.
                                                           0.0
                                                                  0.0
                                                                          0.0
              3.3
                                              0.
268
      45
                     504.3
                              0.0
                                                           0.0
                                                                  0.0
                                                                          0.0
              2.8
                                     0.0
                                              0.
                                                     0.
269
```

Failure Surface Specified By 46 Coordinate Points

37 C-----

V C.....

| 274 No. (ft) (ft) 275 1 146.842 1388.430 277 2 151.827 1388.813 278 3 156.805 1389.282 280 5 166.733 1390.477 281 6 171.680 1391.204 282 7 176.614 1392.016 283 8 181.533 1392.913 284 9 186.435 1393.896 285 10 191.320 1394.963 286 11 196.186 1396.114 287 12 201.030 1397.350 288 13 205.853 1398.669 289 14 210.653 1400.072 290 15 215.427 1401.557 291 16 220.175 1403.125 292 17 224.895 1404.775 293 18 229.585 1406.506 294 19 <t< th=""><th>273</th><th>Point</th><th>X-Surf</th><th>Y-Surf</th></t<> | 273 | Point | X-Surf | Y-Surf |
|---|-----|-------|---------|----------|
| 276 1 146.842 1388.430 277 2 151.827 1388.813 278 3 156.805 1389.282 279 4 161.774 1389.836 280 5 166.733 1390.477 281 6 171.680 1391.204 282 7 176.614 1392.016 283 8 181.533 1392.913 284 9 186.435 1393.896 285 10 191.320 1394.963 286 11 196.186 1396.114 287 12 201.030 1397.350 288 13 205.853 1398.669 289 14 210.653 1400.072 290 15 215.427 1401.557 291 16 220.175 1403.125 292 17 224.895 1404.775 293 18 229.585 1406.506 294 19 | 274 | No. | (ft) | (ft) |
| 277 2 151.827 1388.813 278 3 156.805 1389.282 279 4 161.774 1389.836 280 5 166.733 1390.477 281 6 171.680 1391.204 282 7 176.614 1392.016 283 8 181.533 1392.913 284 9 186.435 1393.896 285 10 191.320 1394.963 286 11 196.186 1396.114 287 12 201.030 1397.350 288 13 205.853 1398.669 289 14 210.653 1400.072 290 15 215.427 1401.557 291 16 220.175 1403.125 292 17 224.895 1404.775 292 17 224.895 1406.506 294 19 234.245 1408.318 295 20 | | | | |
| 278 3 156.805 1389.282 279 4 161.774 1389.836 280 5 166.733 1390.477 281 6 171.680 1391.204 282 7 176.614 1392.016 283 8 181.533 1392.913 284 9 186.435 1393.896 285 10 191.320 1394.963 286 11 196.186 1396.114 287 12 201.030 1397.350 288 13 205.853 1398.669 289 14 210.653 1400.072 290 15 215.427 1401.557 291 16 220.175 1403.125 292 17 224.895 1406.506 294 19 234.245 1408.318 295 20 238.873 1410.211 296 21 243.468 1412.184 297 22 | 276 | | 146.842 | 1388.430 |
| 279 4 161.774 1389.836 280 5 166.733 1390.477 281 6 171.680 1391.204 282 7 176.614 1392.016 283 8 181.533 1392.913 284 9 186.435 1393.896 285 10 191.320 1394.963 286 11 196.186 1396.114 287 12 201.030 1397.350 288 13 205.853 1398.669 289 14 210.653 1400.072 290 15 215.427 1401.557 291 16 220.175 1403.125 292 17 224.895 1404.775 293 18 229.585 1406.506 294 19 234.245 1408.318 295 20 238.873 1410.211 296 21 243.468 1412.184 297 22 | 277 | | 151.827 | 1388.813 |
| 280 5 166.733 1390.477 281 6 171.680 1391.204 282 7 176.614 1392.016 283 8 181.533 1392.913 284 9 186.435 1393.896 285 10 191.320 1394.963 286 11 196.186 1396.114 287 12 201.030 1397.350 288 13 205.853 1398.669 289 14 210.653 1400.072 290 15 215.427 1401.557 291 16 220.175 1403.125 292 17 224.895 1404.775 293 18 229.585 1406.506 294 19 234.245 1408.318 295 20 238.873 1410.211 296 21 243.468 1412.184 297 22 248.027 1414.235 298 23 | 278 | 3 | 156.805 | 1389.282 |
| 281 6 171.680 1391.204 282 7 176.614 1392.016 283 8 181.533 1392.913 284 9 186.435 1393.896 285 10 191.320 1394.963 286 11 196.186 1396.114 287 12 201.030 1397.350 288 13 205.853 1398.669 289 14 210.653 1400.072 290 15 215.427 1401.557 291 16 220.175 1403.125 292 17 224.895 1404.575 293 18 229.585 1406.506 294 19 234.245 1408.318 295 20 238.873 1410.211 296 21 243.468 1412.184 297 22 248.027 1414.235 298 23 252.551 1416.366 300 25 | 279 | | 161.774 | 1389.836 |
| 2882 7 176.614 1392.016 283 8 181.533 1392.913 284 9 186.435 1393.896 285 10 191.320 1394.963 286 11 196.186 1396.114 287 12 201.030 1397.350 288 13 205.853 1398.669 289 14 210.653 1400.072 290 15 215.427 1401.557 291 16 220.175 1403.125 292 17 224.895 1404.775 293 18 229.585 1406.506 294 19 234.245 1408.318 295 20 238.873 1410.211 296 21 243.468 1412.184 297 22 248.027 1414.235 298 23 252.551 1416.366 299 24 257.037 1418.574 300 25 <td>280</td> <td></td> <td>166.733</td> <td>1390.477</td> | 280 | | 166.733 | 1390.477 |
| 283 8 181.533 1392.913 284 9 186.435 1393.896 285 10 191.320 1394.963 286 11 196.186 1396.114 287 12 201.030 1397.350 288 13 205.853 1398.669 289 14 210.653 1400.072 290 15 215.427 1401.557 291 16 220.175 1403.125 292 17 224.895 1404.775 293 18 229.585 1406.506 294 19 234.245 1408.318 295 20 238.873 1410.211 296 21 243.468 1412.184 297 22 248.027 1414.235 298 23 255.551 1416.366 301 26 265.890 1423.222 302 27 270.255 1425.661 303 28 <td>281</td> <td></td> <td></td> <td>1391.204</td> | 281 | | | 1391.204 |
| 284 9 186.435 1393.896 285 10 191.320 1394.963 286 11 196.186 1396.114 287 12 201.030 1397.350 288 13 205.853 1398.669 289 14 210.653 1400.072 290 15 215.427 1401.557 291 16 220.175 1403.125 292 17 224.895 1404.775 293 18 229.585 1406.506 294 19 234.245 1408.318 295 20 238.873 1410.211 296 21 243.468 1412.184 297 22 248.027 1414.235 298 23 252.551 1416.366 299 24 257.037 1418.574 300 25 261.484 1420.860 301 26 265.890 1423.222 303 28 <td>282</td> <td>7</td> <td></td> <td>1392.016</td> | 282 | 7 | | 1392.016 |
| 285 10 191.320 1394.963 286 11 196.186 1396.114 287 12 201.030 1397.350 288 13 205.853 1398.669 289 14 210.653 1400.072 290 15 215.427 1401.557 291 16 220.175 1403.125 292 17 224.895 1404.775 293 18 229.585 1406.506 294 19 234.245 1408.318 295 20 238.873 1410.211 296 21 243.468 1412.184 297 22 248.027 1414.235 298 23 255.551 1416.366 299 24 257.037 1418.574 300 25 261.484 1420.860 301 26 265.890 1423.222 303 28 274.578 1428.174 304 29 </td <td>283</td> <td>8</td> <td>181.533</td> <td>1392.913</td> | 283 | 8 | 181.533 | 1392.913 |
| 286 11 196.186 1396.114 287 12 201.030 1397.350 288 13 205.853 1398.669 289 14 210.653 1400.072 290 15 215.427 1401.557 291 16 220.175 1403.125 292 17 224.895 1404.775 293 18 229.585 1406.506 294 19 234.245 1408.318 295 20 238.873 1410.211 296 21 243.468 1412.184 297 22 248.027 1414.235 298 23 252.551 1416.366 299 24 257.037 1418.574 300 25 261.484 1420.860 301 26 265.890 1423.222 302 27 270.255 1425.661 303 28 274.578 1428.174 304 29 </td <td>284</td> <td>9</td> <td>186.435</td> <td>1393.896</td> | 284 | 9 | 186.435 | 1393.896 |
| 287 12 201.030 1397.350 288 13 205.853 1398.669 289 14 210.653 1400.072 290 15 215.427 1401.557 291 16 220.175 1403.125 292 17 224.895 1404.775 293 18 229.585 1406.506 294 19 234.245 1408.318 295 20 238.873 1410.211 296 21 243.468 1412.184 297 22 248.027 1414.235 298 23 252.551 1416.366 301 26 265.890 1423.222 302 27 270.255 1425.661 301 26 265.890 1423.222 302 27 270.255 1425.661 303 28 274.578 1428.174 304 29 278.856 1430.762 305 30 </td <td>285</td> <td>10</td> <td>191.320</td> <td>1394.963</td> | 285 | 10 | 191.320 | 1394.963 |
| 288 13 205.853 1398.669 289 14 210.653 1400.072 290 15 215.427 1401.557 291 16 220.175 1403.125 292 17 224.895 1404.775 293 18 229.585 1406.506 294 19 234.245 1408.318 295 20 238.873 1410.211 296 21 243.468 1412.184 297 22 248.027 1414.235 298 23 252.551 1416.366 299 24 257.037 1418.574 300 25 261.484 1420.860 301 26 265.890 1423.222 302 27 270.255 1425.661 303 28 274.578 1428.174 304 29 278.856 1430.762 305 30 283.089 1433.424 306 31 287.275 1436.158 307 32 291.413 <t< td=""><td>286</td><td>11</td><td>196.186</td><td>1396.114</td></t<> | 286 | 11 | 196.186 | 1396.114 |
| 289 14 210.653 1400.072 290 15 215.427 1401.557 291 16 220.175 1403.125 292 17 224.895 1404.775 293 18 229.585 1406.506 294 19 234.245 1408.318 295 20 238.873 1410.211 296 21 243.468 1412.184 297 22 248.027 1414.335 299 24 257.037 1418.574 300 25 261.484 1420.860 301 26 265.890 1423.222 302 27 270.255 1425.661 303 28 274.578 1428.174 304 29 278.856 1430.762 305 30 283.089 1433.424 306 31 287.275 1436.158 307 32 291.413 1438.965 308 33 295.501 1441.843 309 34 299.540 1444.780 310 35 303.526 1447.809 | 287 | 12 | 201.030 | 1397.350 |
| 290 15 215.427 1401.557 291 16 220.175 1403.125 292 17 224.895 1404.775 293 18 229.585 1406.506 294 19 234.245 1408.318 295 20 238.873 1410.211 296 21 243.468 1412.184 297 22 248.027 1414.235 298 23 252.551 1416.366 300 25 261.484 1420.860 301 26 265.890 1423.222 302 27 270.255 1425.661 303 28 274.578 1428.174 304 29 278.856 1430.762 305 30 283.089 1433.424 306 31 287.275 1436.158 307 32 291.413 1438.965 308 33 295.501 1441.783 309 34 </td <td>288</td> <td>13</td> <td>205.853</td> <td>1398.669</td> | 288 | 13 | 205.853 | 1398.669 |
| 291 16 220.175 1403.125 292 17 224.895 1404.775 293 18 229.585 1406.506 294 19 234.245 1408.318 295 20 238.873 1410.211 296 21 243.468 1412.184 297 22 248.027 1414.235 298 23 252.551 1416.366 299 24 257.037 1418.574 300 25 261.484 1420.860 301 26 265.890 1423.222 302 27 270.255 1425.661 303 28 274.578 1428.174 304 29 278.856 1430.762 305 30 283.089 1433.424 306 31 287.275 1436.158 307 32 291.413 1438.965 308 33 295.501 1441.943 309 34 </td <td>289</td> <td>14</td> <td>210.653</td> <td>1400.072</td> | 289 | 14 | 210.653 | 1400.072 |
| 2992 17 224.895 1404.775 293 18 229.585 1406.506 294 19 234.245 1408.318 295 20 238.873 1410.211 296 21 243.468 1412.184 297 22 248.027 1414.235 298 23 252.551 1416.366 299 24 257.037 1418.574 300 25 261.484 1420.860 301 26 265.890 1423.222 302 27 270.255 1425.661 303 28 274.578 1428.174 304 29 278.856 1430.762 305 30 283.089 1433.424 306 31 287.275 1436.158 307 32 291.413 1438.965 308 33 295.501 1441.843 309 34 299.540 1444.790 310 35< | 290 | 15 | 215.427 | 1401.557 |
| 293 18 229.585 1406.506 294 19 234.245 1408.318 295 20 238.873 1410.211 296 21 243.468 1412.184 297 22 248.027 1414.235 298 23 252.551 1416.366 299 24 257.037 1418.574 300 25 261.484 1420.860 301 26 265.890 1423.222 302 27 270.255 1425.661 303 28 274.578 1428.174 304 29 278.856 1430.762 305 30 283.089 1433.424 306 31 287.275 1436.158 307 32 291.413 1438.965 308 33 295.501 1441.783 309 34 299.540 1444.791 310 35 303.526 1447.809 | 291 | 16 | 220.175 | 1403.125 |
| 294 19 234.245 1408.318 295 20 238.873 1410.211 296 21 243.468 1412.184 297 22 248.027 1414.235 298 23 252.551 1416.366 300 25 261.484 1420.860 301 26 265.890 1423.222 302 27 270.255 1425.661 303 28 274.578 1428.174 304 29 278.856 1430.762 305 30 283.089 1433.424 306 31 287.275 1436.158 307 32 291.413 1438.965 308 33 295.501 1441.843 309 34 299.540 1444.7809 310 35 303.526 1447.809 | 292 | 17 | 224.895 | 1404.775 |
| 295 20 238.873 1410.211 296 21 243.468 1412.184 297 22 248.027 1414.235 298 23 252.551 1416.366 299 24 257.037 1418.574 300 25 261.484 1420.860 301 26 265.890 1423.222 302 27 270.255 1425.661 303 28 274.578 1428.174 304 29 278.856 1430.762 305 30 283.089 1433.424 306 31 287.275 1436.158 307 32 291.413 1438.965 308 33 295.501 1441.843 309 34 299.540 1444.780 310 35 303.526 1447.809 | 293 | 18 | 229.585 | 1406.506 |
| 296 21 243.468 1412.184 297 22 248.027 1414.235 298 23 252.551 1416.366 299 24 257.037 1418.574 300 25 261.484 1420.860 301 26 265.890 1423.222 302 27 270.255 1425.661 303 28 274.578 1428.174 304 29 278.856 1430.762 305 30 283.089 1433.424 306 31 287.275 1436.158 307 32 291.413 1438.965 308 33 295.501 1441.843 309 34 299.540 1444.780 310 35 303.526 1447.809 | 294 | 19 | 234.245 | 1408.318 |
| 297 22 248.027 1414.235 298 23 252.551 1416.366 299 24 257.037 1418.574 300 25 261.484 1420.860 301 26 265.890 1423.222 302 27 270.255 1425.661 303 28 274.578 1428.174 304 29 278.856 1430.762 305 30 283.089 1433.424 306 31 287.275 1436.158 307 32 291.413 1438.965 308 33 295.501 1441.843 309 34 299.540 1444.7809 310 35 303.526 1447.809 | 295 | 20 | 238.873 | 1410.211 |
| 298 23 252.551 1416.366 299 24 257.037 1418.574 300 25 261.484 1420.860 301 26 265.890 1423.222 302 27 270.255 1425.661 303 28 274.578 1428.174 304 29 278.856 1430.762 305 30 283.089 1433.424 306 31 287.275 1436.158 307 32 291.413 1438.965 308 33 295.501 1441.843 309 34 299.540 1444.780 310 35 303.526 1447.809 | 296 | 21 | 243.468 | 1412.184 |
| 299 24 257.037 1418.574 300 25 261.484 1420.860 301 26 265.890 1423.222 302 27 270.255 1425.661 303 28 274.578 1428.174 304 29 278.856 1430.762 305 30 283.089 1433.424 306 31 287.275 1436.158 307 32 291.413 1438.965 308 33 295.501 1441.843 309 34 299.540 1444.791 310 35 303.526 1447.809 | 297 | 22 | 248.027 | 1414.235 |
| 300 25 261.484 1420.860 301 26 265.890 1423.222 302 27 270.255 1425.661 303 28 274.578 1428.174 304 29 278.856 1430.762 305 30 283.089 1433.424 306 31 287.275 1436.158 307 32 291.413 1438.965 308 33 295.501 1441.843 309 34 299.540 1444.791 310 35 303.526 1447.809 | 298 | 23 | 252.551 | 1416.366 |
| 301 26 265.890 1423.222 302 27 270.255 1425.661 303 28 274.578 1428.174 304 29 278.856 1430.762 305 30 283.089 1433.424 306 31 287.275 1436.158 307 32 291.413 1438.965 308 33 295.501 1441.843 309 34 299.540 1444.791 310 35 303.526 1447.809 | 299 | 24 | 257.037 | 1418.574 |
| 302 27 270.255 1425.661 303 28 274.578 1428.174 304 29 278.856 1430.762 305 30 283.089 1433.424 306 31 287.275 1436.158 307 32 291.413 1438.965 308 33 295.501 1441.843 309 34 299.540 1444.780 310 35 303.526 1447.809 | 300 | 25 | 261.484 | 1420.860 |
| 303 28 274.578 1428.174 304 29 278.856 1430.762 305 30 283.089 1433.424 306 31 287.275 1436.158 307 32 291.413 1438.965 308 33 295.501 1441.843 309 34 299.540 1444.791 310 35 303.526 1447.809 | 301 | 26 | 265.890 | 1423.222 |
| 304 29 278.856 1430.762 305 30 283.089 1433.424 306 31 287.275 1436.158 307 32 291.413 1438.965 308 33 295.501 1441.843 309 34 299.540 1444.791 310 35 303.526 1447.809 | 302 | 27 | 270.255 | 1425.661 |
| 305 30 283.089 1433.424 306 31 287.275 1436.158 307 32 291.413 1438.965 308 33 295.501 1441.843 309 34 299.540 1444.791 310 35 303.526 1447.809 | 303 | 28 | 274.578 | 1428.174 |
| 306 31 287.275 1436.158 307 32 291.413 1438.965 308 33 295.501 1441.843 309 34 299.540 1444.791 310 35 303.526 1447.809 | 304 | 29 | 278.856 | 1430.762 |
| 307 32 291.413 1438.965 308 33 295.501 1441.843 309 34 299.540 1444.791 310 35 303.526 1447.809 | 305 | 30 | 283.089 | 1433.424 |
| 308 33 295.501 1441.843 309 34 299.540 1444.791 310 35 303.526 1447.809 | 306 | 31 | 287.275 | 1436.158 |
| 309 34 299.540 1444.791 310 35 303.526 1447.809 | 307 | 32 | 291.413 | 1438.965 |
| 310 35 303.526 1447.809 | 308 | 33 | 295.501 | 1441.843 |
| | 309 | 34 | 299.540 | 1444.791 |
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| | 311 | 36 | 307.460 | 1450.895 |

Daine

270

271

272

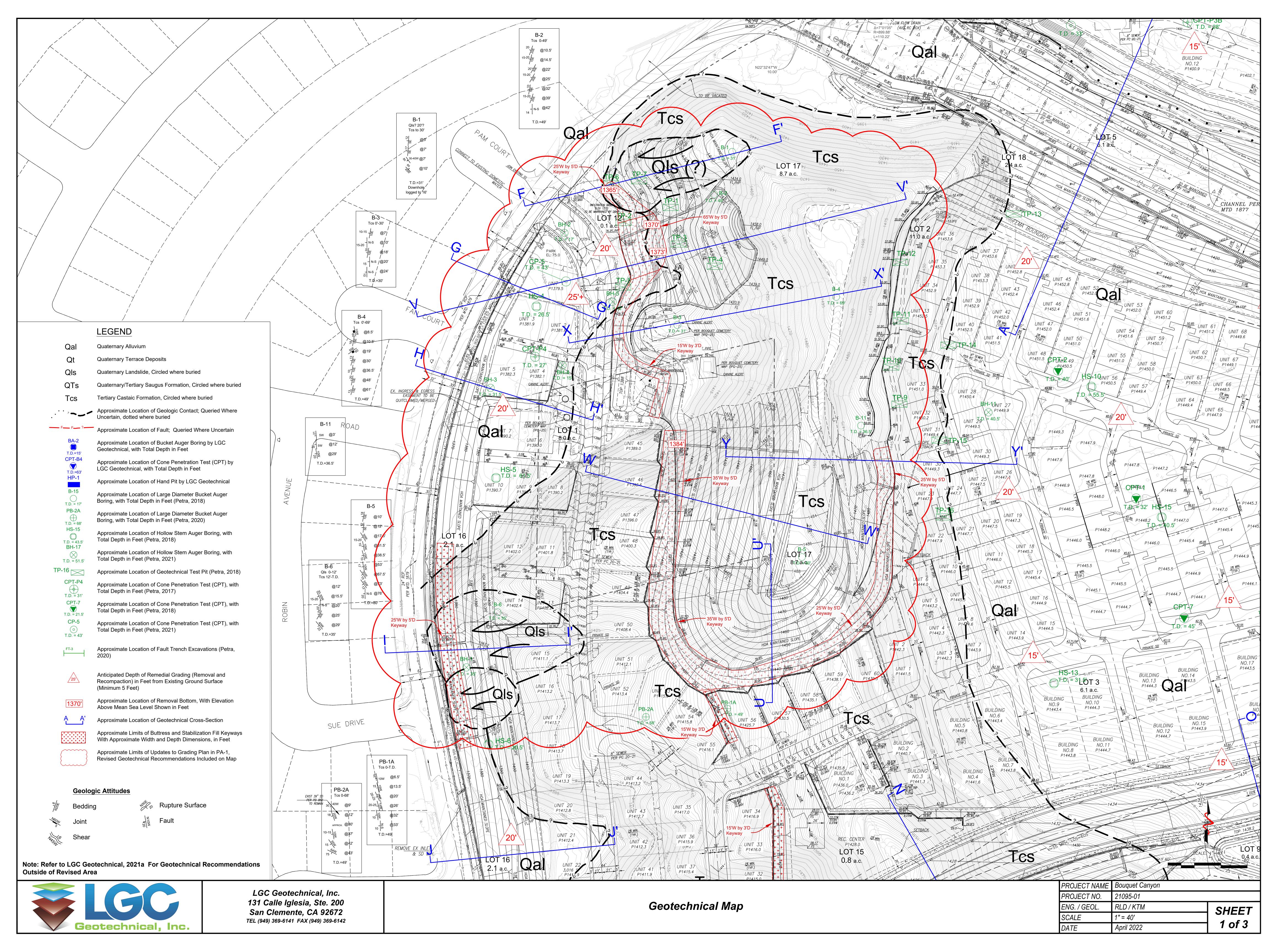
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319
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                                       1477.938
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                                       1481.598
321
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                           340.417
                                       1481.730
322
323
               Circle Center At X = 127.248; Y = 1676.544; and Radius = 288.779
324
325
326
                     Factor of Safety
327
                     *** 1.653 ***
328
329
330
331 1
332
333
               Failure Surface Specified By 46 Coordinate Points
334
335
                                       Y-Surf
336
                 Point
                           X-Surf
337
                 No.
                            (ft)
                                       (ft)
338
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339
340
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341
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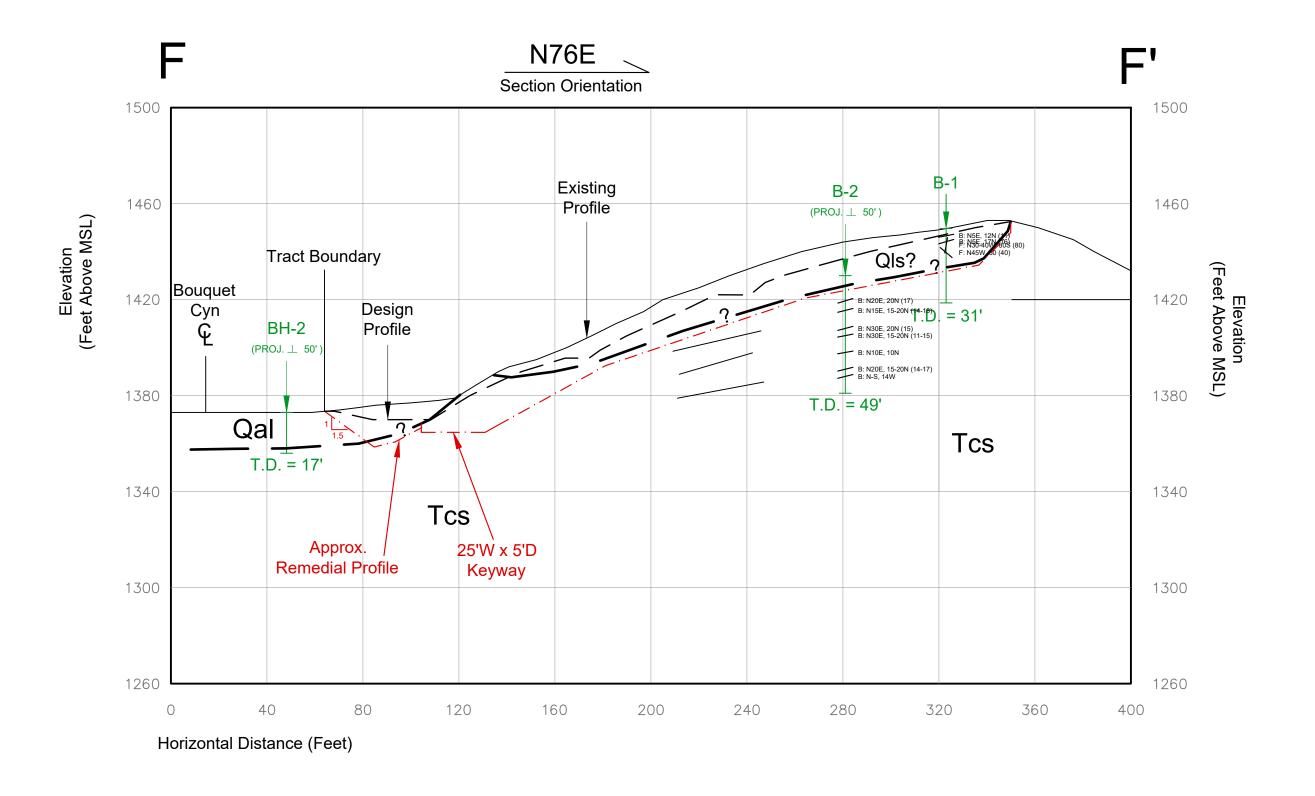
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379
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380
                  42
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                                                                                                      446
                                                                                                                        46
                                                                                                                                             1481.815
381
                  43
                            333.095
                                       1472.430
                            336.439
                                       1476.146
                                                                                                                     Circle Center At X = 124.229; Y = 1684.264; and Radius = 296.697
382
                  44
                                                                                                     448
383
                  45
                           339.712
                                       1479.927
                                                                                                     449
384
                  46
                            341.302
                                        1481.836
                                                                                                     450
                                                                                                      451
385
                                                                                                                            Factor of Safety
386
               Circle Center At X = 141.926; Y = 1647.789; and Radius = 259.405
                                                                                                      452
                                                                                                                           *** 1.654 ***
387
                                                                                                      453
388
                                                                                                      454
389
                     Factor of Safety
                                                                                                      455
390
                     *** 1.653 ***
                                                                                                      456
391
                                                                                                      457
392
                                                                                                      458
                                                                                                                     Failure Surface Specified By 47 Coordinate Points
                                                                                                      459
393
394
                                                                                                      460
                                                                                                                                              Y-Surf
395
               Failure Surface Specified By 46 Coordinate Points
                                                                                                      461
                                                                                                                       Point
                                                                                                                                  X-Surf
396
                                                                                                      462
                                                                                                                                              (ft)
                                                                                                                        No.
                                                                                                                                  (ft)
397
                                                                                                      463
                 Point
                           X-Surf
                                       Y-Surf
                                                                                                      464
                                                                                                                                  146.842
                                                                                                                                              1388.430
398
                                                                                                                         - 1
399
                  No.
                            (ft)
                                        (ft)
                                                                                                      465
                                                                                                                         2
                                                                                                                                  151.838
                                                                                                                                              1388.624
400
                                                                                                     466
                                                                                                                         3
                                                                                                                                  156.830
                                                                                                                                             1388.910
401
                           146.842
                                       1388.430
                                                                                                      467
                                                                                                                                  161.816
                                                                                                                                              1389.286
                           151.824
                                       1388.854
                                                                                                                                             1389.754
402
                  2
                                                                                                      468
                                                                                                                         5
                                                                                                                                  166.794
                           156.798
                                       1389.361
                                                                                                      469
                                                                                                                                  171.763
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403
                  3
                                                                                                                         6
                           161.763
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                                                                                                      470
                                                                                                                         7
                                                                                                                                  176.720
                                                                                                                                             1390.963
404
                  4
                           166.718
                                       1390.626
                                                                                                                                  181.665
405
                  5
                                                                                                      471
                                                                                                                                             1391.704
                                       1391.384
406
                  6
                           171.660
                                                                                                      472
                                                                                                                         9
                                                                                                                                  186.596
                                                                                                                                             1392.534
407
                  7
                           176.589
                                       1392.225
                                                                                                      473
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411
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412
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                                                                                                                        38
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436
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443
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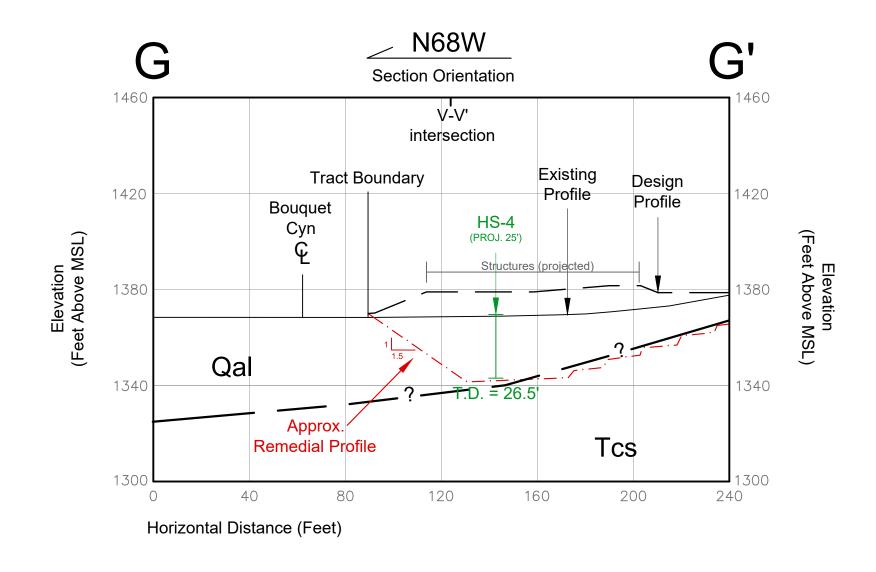
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                                       1482.268
                                                                                                      576
511
                                                                                                      577
                                                                                                                            Factor of Safety
                                                                                                                            *** 1.655 ***
512
               Circle Center At X = 138.743; Y = 1661.463; and Radius = 273.152
                                                                                                      578
513
                                                                                                      579
514
                                                                                                      580
515
                                                                                                      581
                     Factor of Safety
516
                     *** 1.654 ***
                                                                                                      582 1
                                                                                                      583
517
518
                                                                                                      584
                                                                                                                      Failure Surface Specified By 45 Coordinate Points
519
                                                                                                      585
520
                                                                                                      586
521
               Failure Surface Specified By 46 Coordinate Points
                                                                                                      587
                                                                                                                        Point
                                                                                                                                  X-Surf
                                                                                                                                              Y-Surf
522
                                                                                                      588
                                                                                                                                   (ft)
                                                                                                                                               (ft)
                                                                                                                        No.
                                                                                                      589
523
                 Point
                            X-Surf
                                        Y-Surf
                                                                                                                                  148.947
                                                                                                                                              1389.506
524
                                                                                                      590
                             (ft)
                                                                                                                                  153.943
                                                                                                                                              1389.704
525
                  No.
                                         (ft)
                                                                                                      591
                                                                                                                         2
                                                                                                                                  158.935
                                                                                                                                              1390.000
526
                                                                                                      592
                                                                                                                         3
                                        1388.430
                                                                                                                                              1390.393
527
                            146.842
                                                                                                      593
                                                                                                                         4
                                                                                                                                  163.919
                           151.824
                                        1388.860
                                                                                                      594
                                                                                                                                  168.895
                                                                                                                                              1390.884
528
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529
                            156.797
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                                                                                                      595
                                                                                                                                  173.860
                                                                                                                                              1391.473
                   4
                           161.762
                                        1389.963
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                                                                                                                                  178.813
                                                                                                                                              1392.159
530
531
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                                                                                                                         8
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541
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542
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                                                                                                                                  236.585
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                                                                                                      609
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543
544
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                                        1406.628
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545
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                            234.268
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                                                                                                                         22
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546
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                                                                                                      612
                                                                                                                         23
                                                                                                                                  254.827
                                                                                                                                              1416.028
547
                  21
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                                        1412.183
                                                                                                      613
                                                                                                                         24
                                                                                                                                  259.283
                                                                                                                                              1418.297
                  22
                            248.107
                                        1414.186
                                                                                                      614
                                                                                                                         25
                                                                                                                                  263.693
                                                                                                                                              1420.652
548
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549
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                                                                                                      615
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                                                                                                                                              1423.094
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                                                                                                                                              1425.620
550
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551
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553
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554
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                                                                                                                         31
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                            283.462
                                        1432.835
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556
557
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                                                                                                      623
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558
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568
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569
                                                                                                      635
570
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                                                                                                      636
                                                                                                                      Circle Center At X = 141.363; Y = 1644.391; and Radius = 254.998
571
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                                                                                                      637
572
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                                        1482.238
                                                                                                      638
573
                                                                                                      639
                                                                                                                            Factor of Safety
574
               Circle Center At X = 122.979; Y = 1694.215; and Radius = 306.715
                                                                                                      640
                                                                                                                            *** 1.655 ***
575
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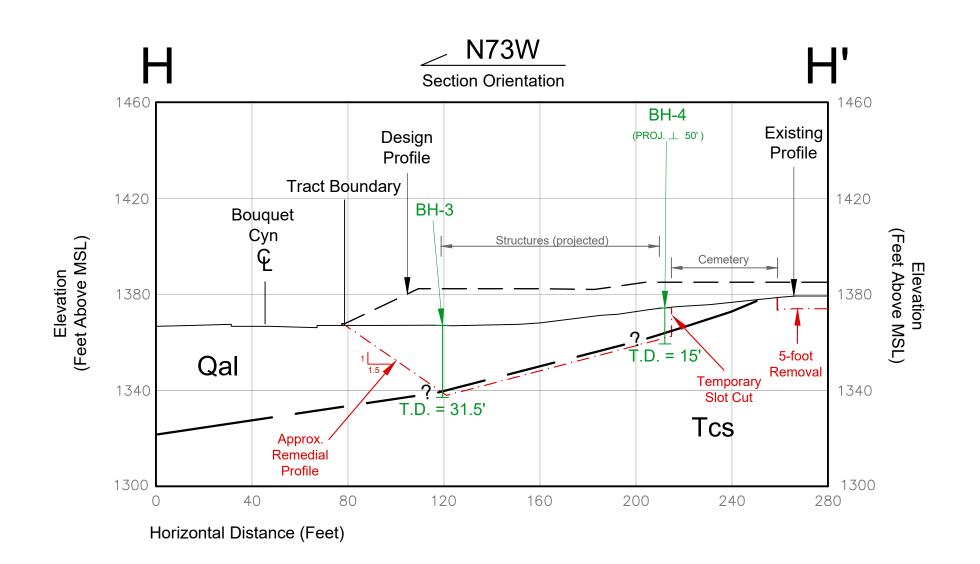
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642
                                                                                                        708
                                                                                                                         Failure Surface Specified By 45 Coordinate Points
643
                                                                                                         709
644
645
                Failure Surface Specified By 46 Coordinate Points
                                                                                                         711
                                                                                                                           Point
                                                                                                                                     X-Surf
                                                                                                                                                  Y-Surf
                                                                                                        712
646
                                                                                                                           No.
                                                                                                                                      (ft)
                                                                                                                                                  (ft)
647
                                                                                                        713
648
                 Point
                            X-Surf
                                         Y-Surf
                                                                                                        714
                                                                                                                                     147.895
                                                                                                                                                  1388.968
                             (ft)
                                         (ft)
                                                                                                        715
                                                                                                                                     152.881
                                                                                                                                                  1389.343
649
                  No.
                                                                                                                            2
650
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683
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684
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                                         1444.971
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                                                                                                        751
                                                                                                                            38
                                                                                                                                     315.068
                                                                                                                                                 1459.810
686
                  36
                            308.919
                                        1450.957
                                                                                                        752
                                                                                                                           39
                                                                                                                                     318.744
                                                                                                                                                 1463.199
687
                  37
                            312.848
                                         1454.049
                                                                                                        753
                                                                                                                            40
                                                                                                                                     322.358
                                                                                                                                                  1466.654
                            316.726
                                         1457.206
                                                                                                        754
                  38
                                                                                                                            41
                                                                                                                                      325.910
                                                                                                                                                  1470.173
688
689
                  39
                            320.550
                                         1460.427
                                                                                                        755
                                                                                                                            42
                                                                                                                                      329.396
                                                                                                                                                  1473.757
690
                  40
                            324.320
                                        1463.711
                                                                                                        756
                                                                                                                            43
                                                                                                                                     332.818
                                                                                                                                                 1477.403
691
                   41
                            328.035
                                        1467.058
                                                                                                        757
                                                                                                                            44
                                                                                                                                      336.173
                                                                                                                                                 1481.111
692
                  42
                            331.695
                                         1470.465
                                                                                                        758
                                                                                                                            45
                                                                                                                                     336.280
                                                                                                                                                 1481.234
693
                  43
                             335.296
                                         1473.933
                                                                                                        759
                                         1477.460
694
                  44
                            338.840
                                                                                                        760
                                                                                                                         Circle Center At X = 129.700; Y = 1664.575; and Radius = 276.207
695
                  45
                            342.325
                                         1481.046
                                                                                                        761
696
                  46
                            343.292
                                         1482.075
                                                                                                        762
697
                                                                                                        763
                                                                                                                               Factor of Safety
698
               Circle Center At X = 124.905; Y = 1688.802; and Radius = 300.714
                                                                                                        764
                                                                                                                                    1.656 ***
699
                                                                                                        765
700
                                                                                                        766
                                                                                                        767
                      Factor of Safety
                      *** 1.656 ***
                                                                                                        768
703
                                                                                                        769
                                                                                                                         Failure Surface Specified By 46 Coordinate Points
704
                                                                                                         770
705
706
                                                                                                         772
                                                                                                                           Point
                                                                                                                                     X-Surf
                                                                                                                                                  Y-Surf
                                                                                                        773
                                                                                                                           No.
                                                                                                                                       (ft)
                                                                                                                                                   (ft)
```

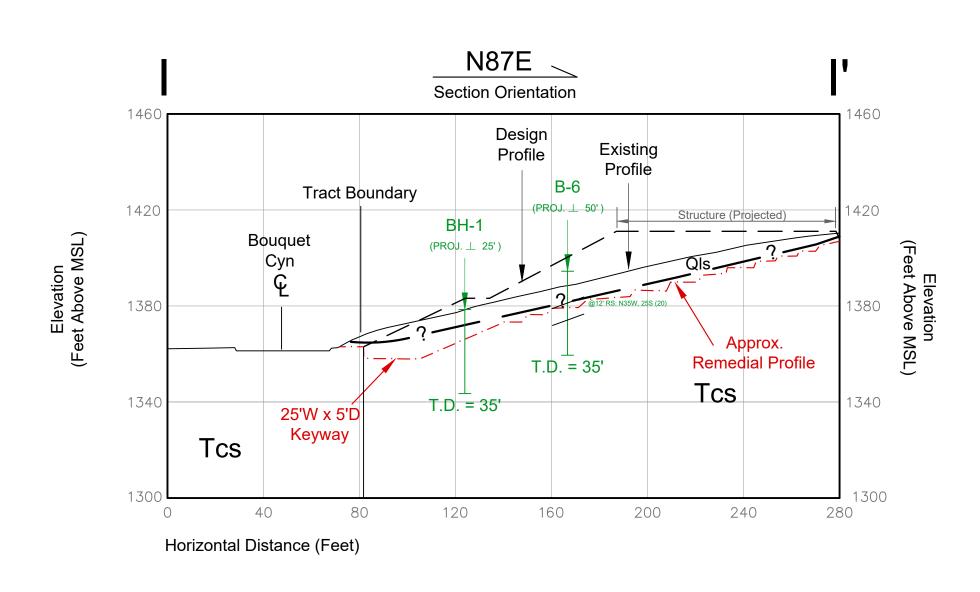
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774
775
                  1
                          147.895
                                     1388.968
776
                  2
                          152.891
                                      1389.159
                          157.883
                                      1389.442
777
                  3
778
                          162.869
                                      1389.815
779
                          167.847
                                      1390.281
780
                          172.816
                                      1390.837
781
                  7
                          177.774
                                     1391.484
782
                  8
                          182.719
                                      1392.222
783
                  9
                          187.650
                                     1393.051
784
                 10
                          192.565
                                      1393.969
785
                 11
                          197.462
                                      1394.978
786
                 12
                          202.340
                                      1396.076
                          207.197
787
                 13
                                      1397.263
788
                 14
                          212.032
                                     1398.540
789
                 15
                          216.842
                                     1399.904
790
                 16
                          221.626
                                      1401.357
791
                 17
                          226.383
                                     1402.897
792
                 18
                          231.111
                                     1404.524
793
                 19
                          235.809
                                      1406.237
794
                 20
                          240.474
                                      1408.036
795
                 21
                          245.105
                                      1409.920
796
                 22
                          249.701
                                      1411.889
797
                 23
                          254.260
                                     1413.941
798
                 24
                          258.781
                                     1416.077
799
                 25
                          263.262
                                      1418.295
800
                 26
                          267.702
                                      1420.595
801
                 27
                          272.099
                                      1422.976
802
                 28
                          276.451
                                      1425.438
                 29
                                      1427.978
803
                          280.757
804
                 30
                          285.017
                                      1430.597
                          289.227
805
                 31
                                     1433.294
806
                 32
                          293.387
                                      1436.067
807
                 33
                          297.496
                                     1438.916
808
                 34
                          301.552
                                      1441.840
809
                 35
                          305.554
                                     1444.838
810
                 36
                          309.500
                                     1447.908
811
                 37
                          313.389
                                      1451.051
812
                 38
                          317.220
                                      1454.264
                                      1457.547
                 39
                          320.991
813
814
                 40
                          324.702
                                     1460.898
815
                 41
                          328.351
                                      1464.317
                 42
                          331.936
                                      1467.802
816
817
                 43
                          335.457
                                      1471.352
818
                 44
                          338.912
                                      1474.966
819
                 45
                          342.300
                                      1478.643
                          345.594
                                      1482.351
                 46
820
821
822
              Circle Center At X = 139.978; Y = 1661.692; and Radius = 272.839
823
824
825
                    Factor of Safety
                    *** 1.657 ***
826
827
828
829
830
831
832
                        **** END OF GSTABL7 OUTPUT ****
833
```

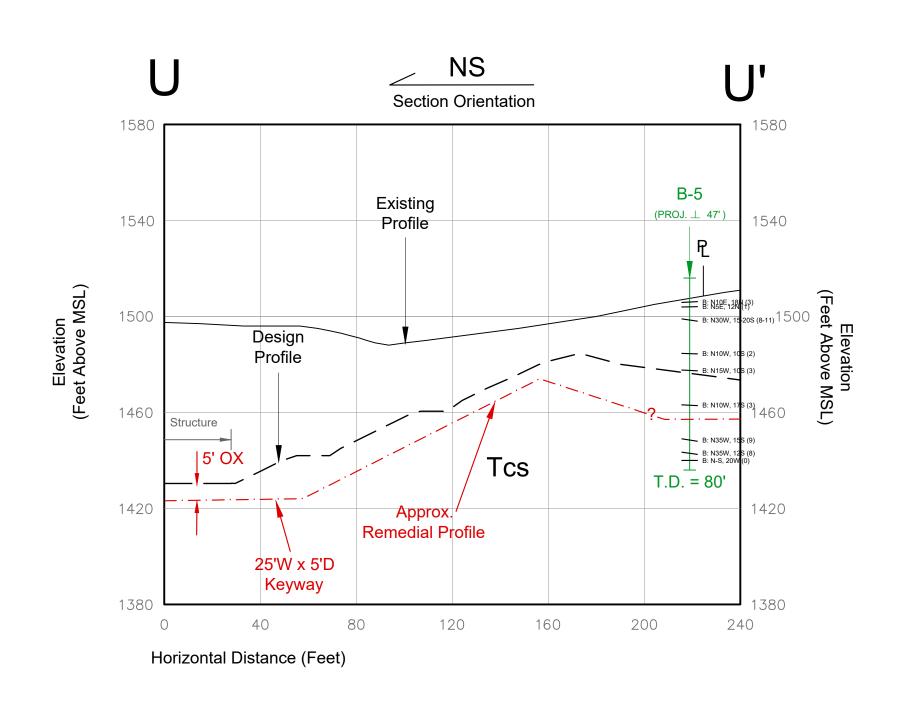


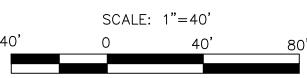










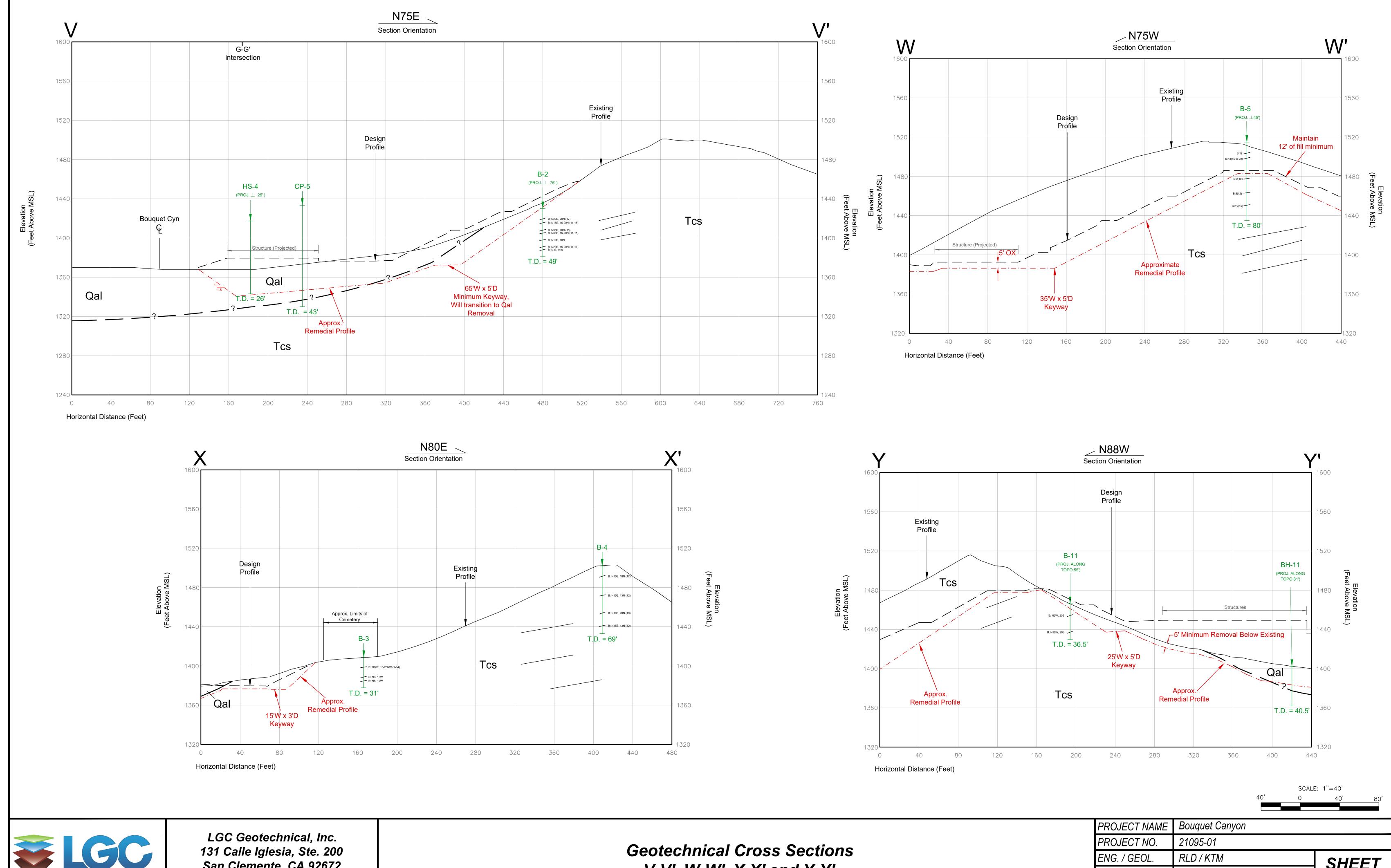




LGC Geotechnical, Inc. 131 Calle Iglesia, Ste. 200 San Clemente, CA 92672 TEL (949) 369-6141 FAX (949) 369-6142

Geotechnical Cross Sections F-F', G-G', H-H', I-I' and U-U'

| PROJECT NAME | Bouquet Canyon | |
|--------------|----------------|--------|
| PROJECT NO. | 21095-01 | |
| ENG. / GEOL. | RLD / KTM | SHEET |
| SCALE | 1" = 40' | |
| DATE | April 2022 | 2 of 3 |



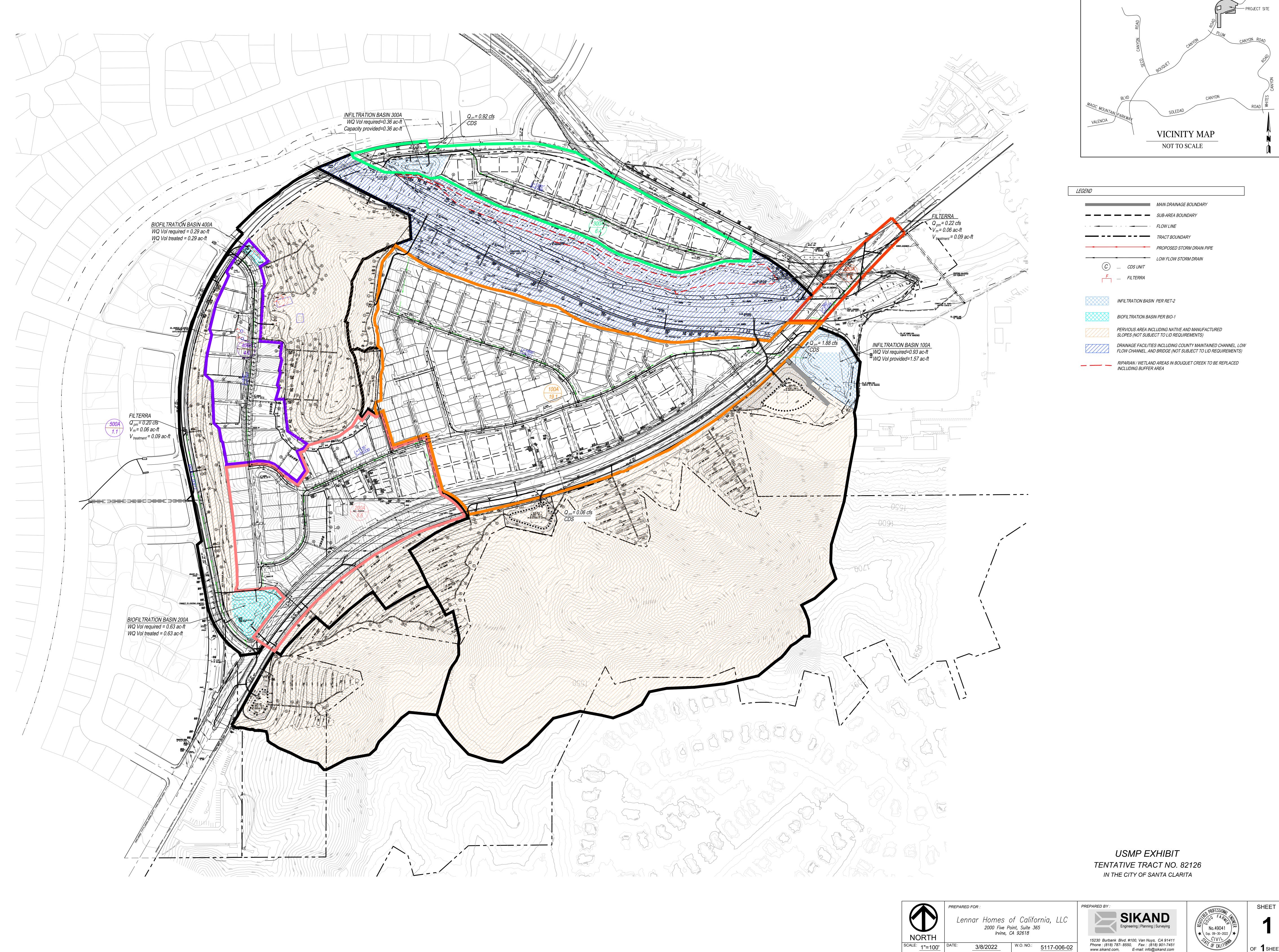
San Clemente, CA 92672 TEL (949) 369-6141 FAX (949) 369-6142

V-V', W-W', X-X' and Y-Y'

| ROJECT NAME | Bouquet Canyon | |
|-------------|----------------|--------|
| ROJECT NO. | 21095-01 | |
| NG. / GEOL. | RLD / KTM | SHEET |
| CALE | 1" = 40' | |
| ATE | April 2022 | 3 of 3 |

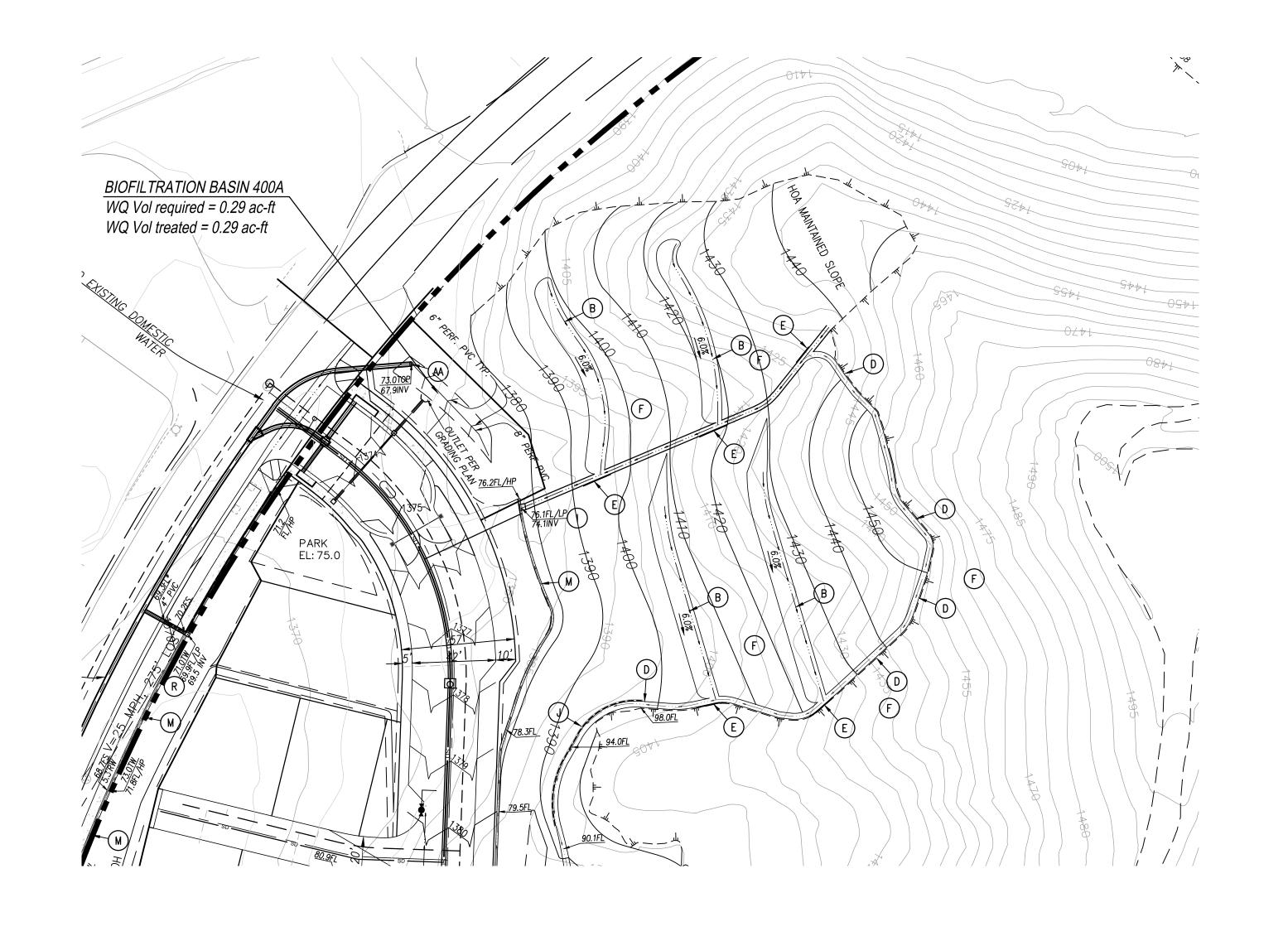
Appendix D

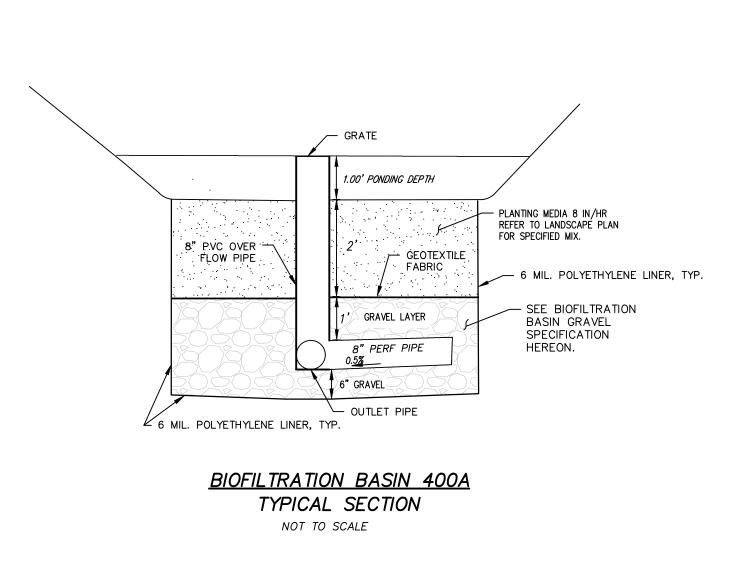
Urban Stormwater Mitigation Plan

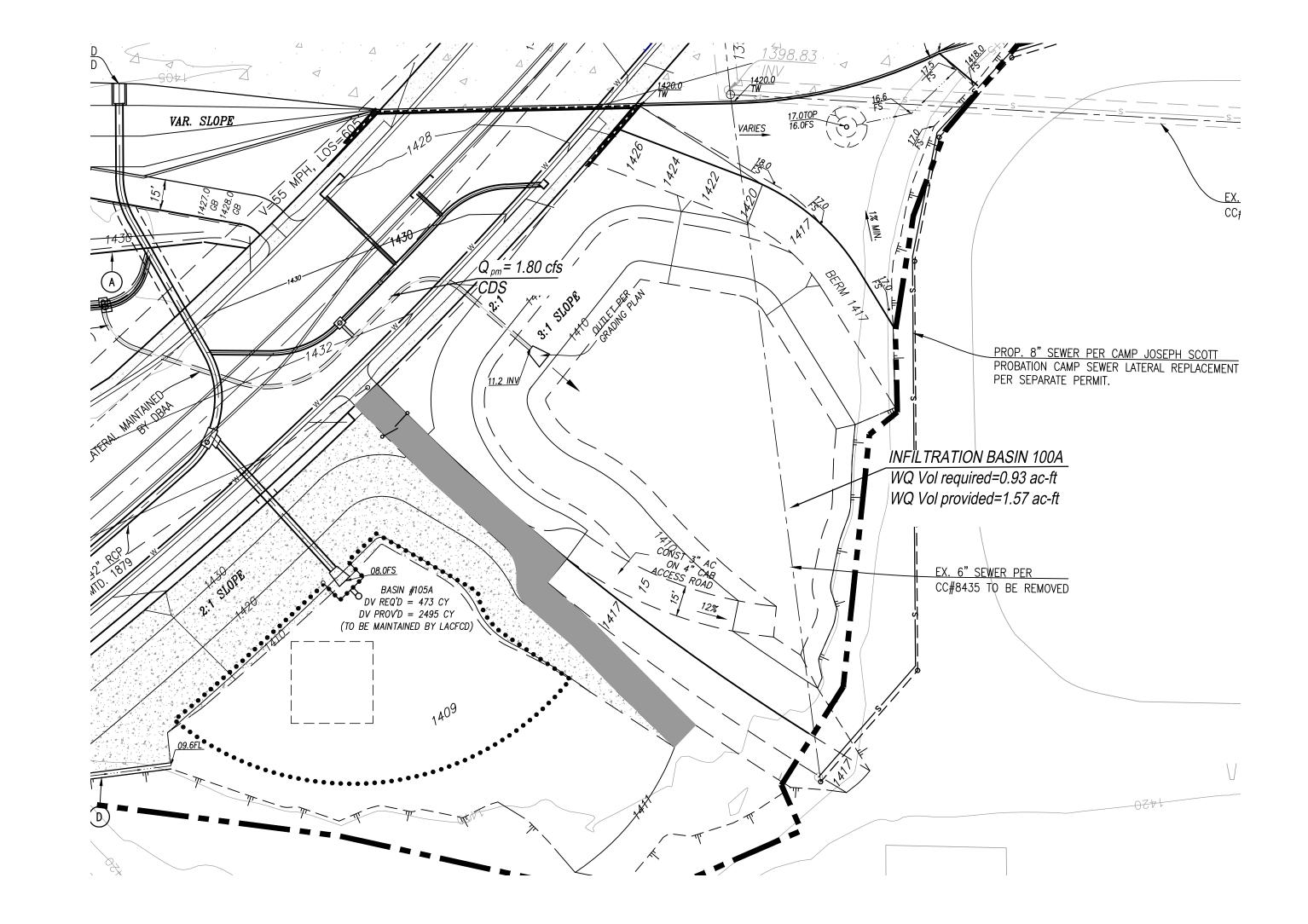


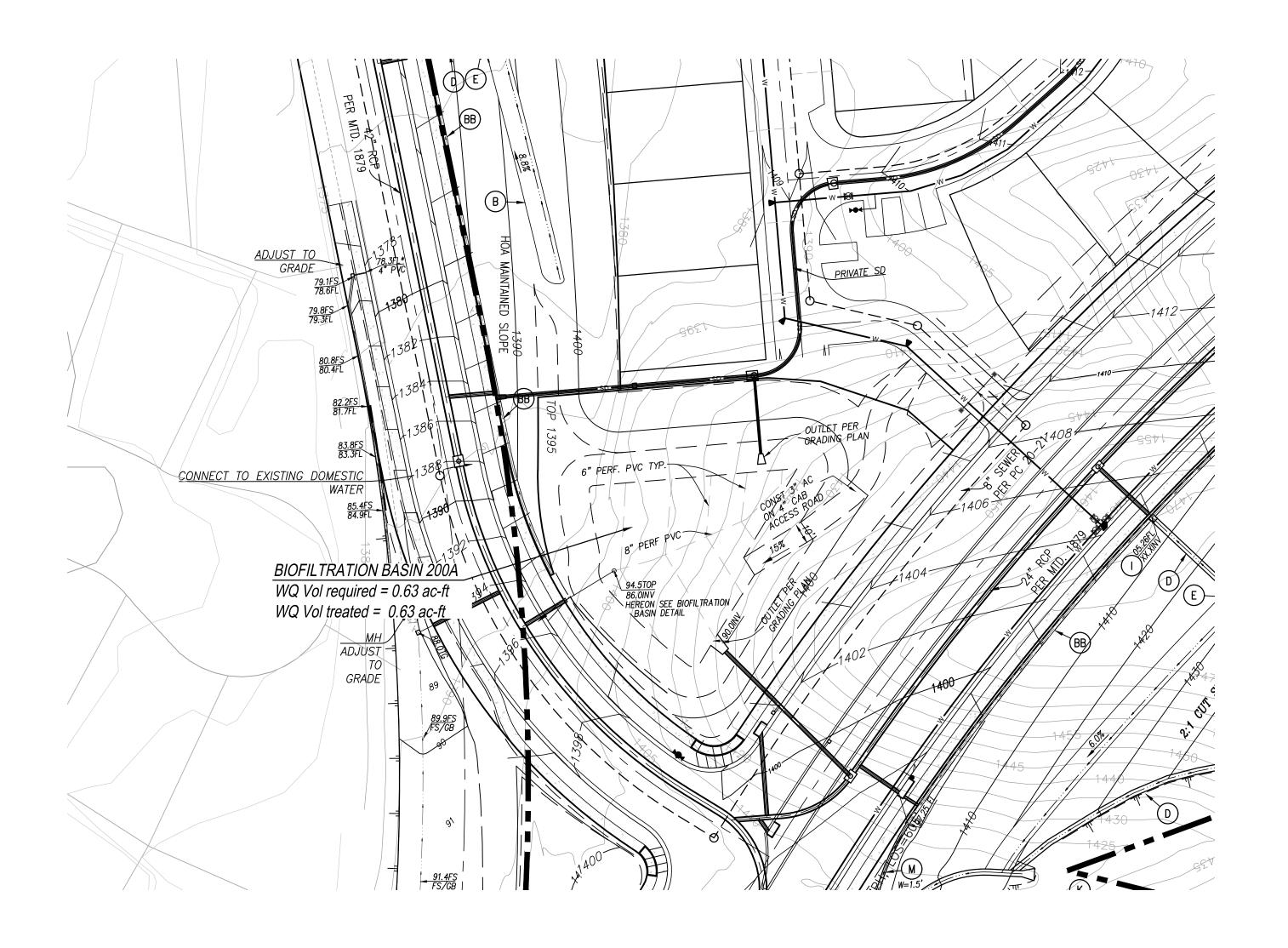
15230 Burbank Blvd. #100, Van Nuys, CA 91411 Phone : (818) 787- 8550, Fax : (818) 901-7451 www.sikand.com, E-mail: info@sikand.com

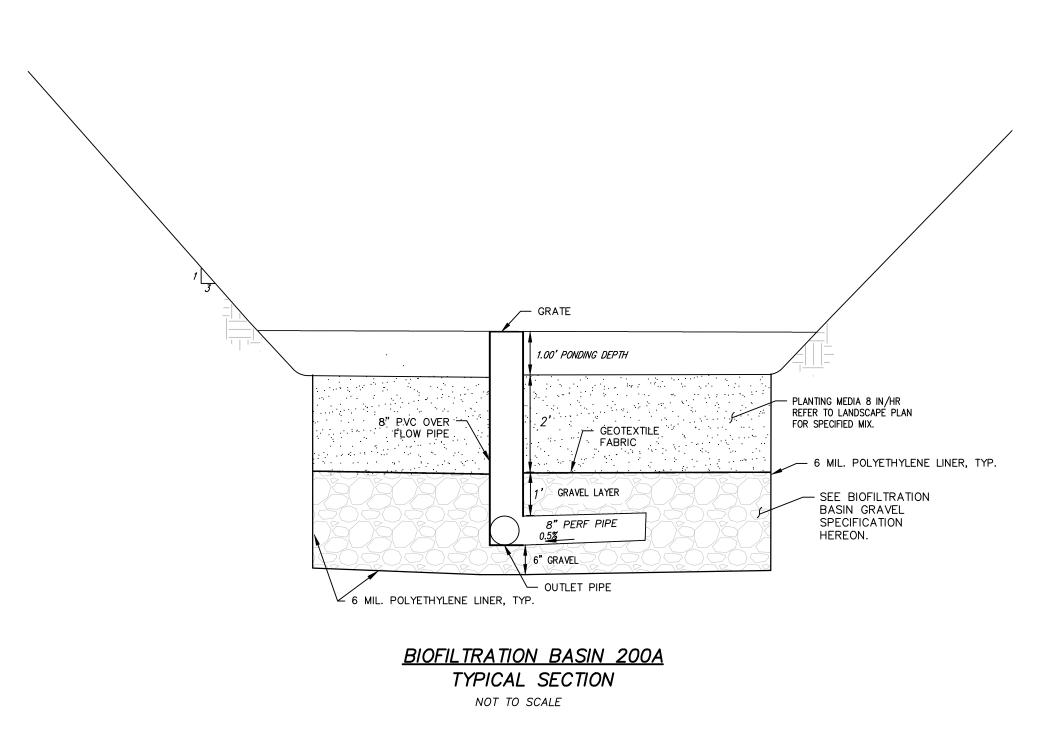
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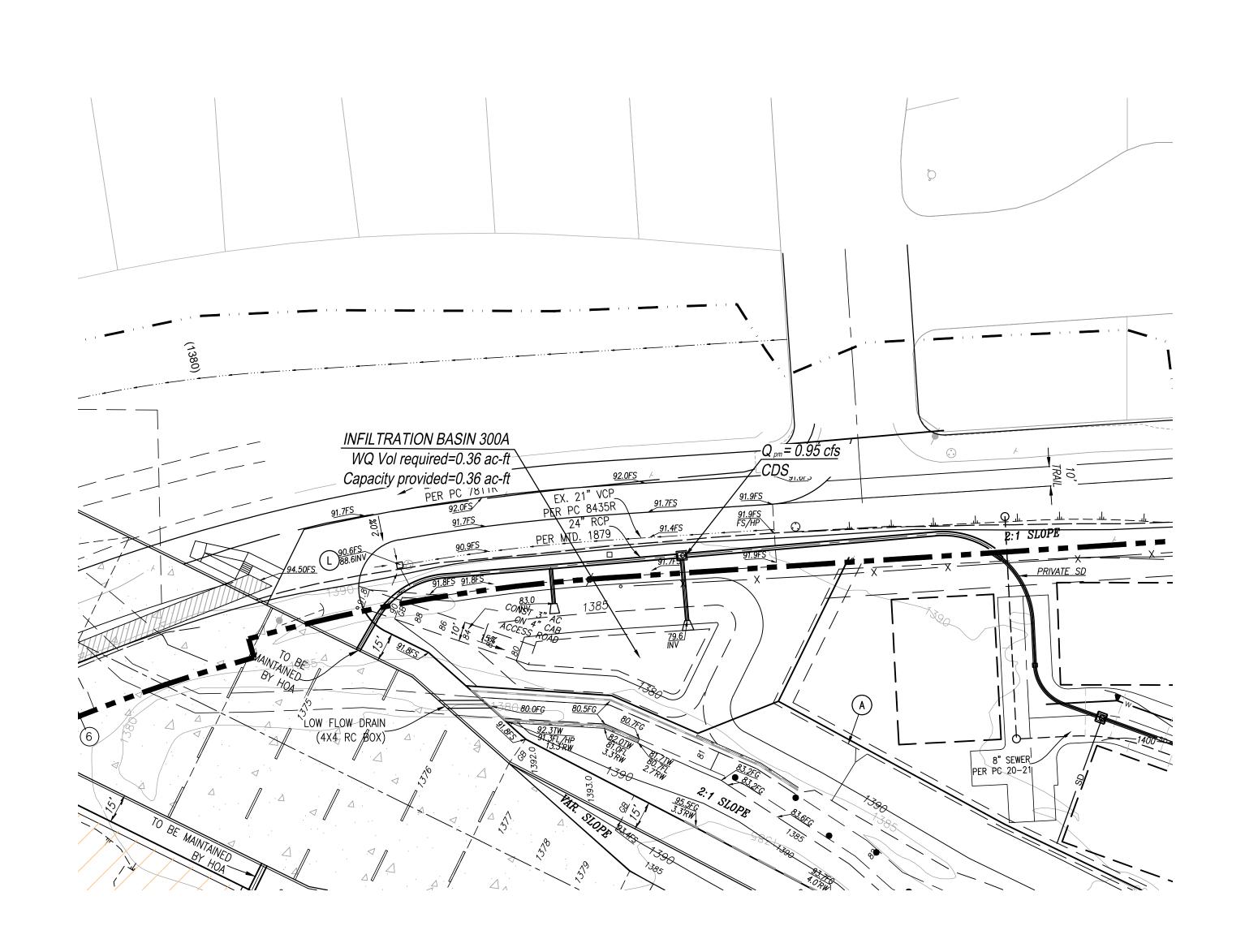












USMP EXHIBIT
TENTATIVE TRACT NO. 82126
IN THE CITY OF SANTA CLARITA



PARED FOR:

NTEGRAL PARTNERS FUNDING, L

888 SAN CLEMENTE DRIVE, SUITE 100

NEWPORT BEACH, CA 92660

8/6/2021

W.O. NO.:





SHEET

OF 1 SHEE