Preliminary Geotechnical Investigation Report for Entitlement/EIR,
Proposed Legacy Club,
California Grand Villages,
Coto de Caza, County of Orange, California

Prepared For
CGV Coto, LLC.

JUNE 2020

January 7, 2020

GMU Project No. 18-213-00

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TRANSMITTAL

CGV COTO, LLC.
1209 Santiago Drive
Newport Beach, CA 92660

DATE: January 9, 2020

PROJECT: 18-213-00

SUBJECT: Preliminary Geotechnical Investigation Report for Entitlement/EIR, Proposed Legacy Club, California Grand Villages, Coto de Caza, County of Orange, California, dated January 7, 2020

DISTRIBUTION:

Addressee: 1 electronic copy

VCS Environmental
Attn: Mr. Dan Bott (1 electronic copy)

Huitt-Zollars
Attn: Mr. Jeff Okamoto (1 electronic copy)

JUNE 2020

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INTRODUCTION

PURPOSE

This report presents the findings of our Preliminary Geotechnical Investigation Report (PGIR) for entitlement/EIR, limited subsurface investigation, and site evaluation for the proposed Coto de Caza Luxury Senior Village within the previous Vic Braden Tennis Club property in Coto de Caza, California. The site boundary is presented on Plate 1, Site Location Map. The purposes of this PGIR are to geotechnically characterize the site, identify and discuss potential geotechnical-related development constraints and/or issues, and provide anticipated Geotechnical design considerations. ***Design-specific geotechnical investigation reports containing additional subsurface information will be provided at a later date for final design of the project.***

SCOPE

The scope of our services for the purpose of this PGIR is as follows:

- Background Research and Data Compilation: GMU compiled in-house geologic maps, publications, historic aerial photographs, and other available geotechnical and geological data pertaining to the site.

- Site Reconnaissance: GMU conducted a site reconnaissance to observe existing conditions within the site.

- Limited Subsurface Investigation: GMU performed one day of subsurface investigation in order to observe subsurface conditions and obtain samples for laboratory testing.

- Limited Laboratory Testing: Limited laboratory testing was completed to obtain preliminary engineering properties of the site soils.

- Analyze Data: GMU analyzed the data obtained from our subsurface investigation, laboratory testing, and report review and performed preliminary geotechnical assessment of site conditions and potential geotechnical hazards.

- Preliminary Geotechnical Investigation Report: Prepared this PGIR report pertaining to the existing geotechnical conditions at the site. This report is an update to a previously prepared report dated November 15, 2018.

SITE LOCATION AND DESCRIPTION

The subject site is located on Avenida La Caza in the Coto de Caza Community, California. The site is bordered to the northwest by Via Alondra, to the southeast by Avenida La Caza, to the east by the existing Coto Valley Country Club , and to the west by existing residential homes and tennis courts (Latitude: 33.623; Longitude: -117.5773) see Plate 1 – Location Map. Topographically, the site has flatter areas with rolling slopes that descend to existing drainages. The site was previously the Vic Braden Tennis College and the site still contains several tennis courts, office space structures, walls, fences, and associated improvements.

The proposed development will consist of a two story luxury senior residential village with approximately 110 units. The proposed village will include parking lots, subterranean parking, restaurants and cafes, a pool, porte cochere, patios, common areas, landscaped areas, retaining walls, and other associated improvements. The preliminary grading design consists of 2:1 or flatter perimeter slopes up to approximately 14 feet, cuts of up to approximately 18 feet and fills of up to approximately 14 feet.

SUBSURFACE INVESTIGATION AND LABORATORY TESTING

A limited subsurface investigation was performed consisting of two hollow stem auger drill holes and four hand auger drill holes in order to observe subsurface conditions and collect samples for limited laboratory testing. The locations of the drill holes are shown on Plate 2- Geotechnical Map. The drill holes were logged by an Engineering Geologist and the logs are included in the attached Appendix A. It should be noted that the subsurface investigation was limited due to the presence of existing buildings and improvements.

Limited laboratory testing was performed on samples collected during our subsurface investigation in order to determine preliminary engineering properties of the site soils. The results of laboratory testing are included in the attached Appendix B.

PRELIMINARY GEOTECHNICAL FINDINGS

REGIONAL GEOLOGY

The site is situated in the coastal section of the Peninsular Range Province, a California geomorphic province with a long and active geologic history, including deep marine sedimentation followed by uplift, fluvial and marine erosion, and deposition. The area proposed for development primarily lies

within the upper portion of a tributary canyon which feeds into Gobernadora Canyon which ultimately drains south to the San Juan Creek watershed; see Plate 4 – Regional Geologic Maps.

SUBSURFACE CONDITIONS

Based on our review of available publications and maps, our experience with similar sites in the area, and our limited subsurface investigation, the site is underlain by artificial fill materials, slopewash materials (i.e., alluvium/colluvium/slopewash), and bedrock of the Santiago Formation. The soil and rock materials underlying the site are shown on Plate 2 - Geotechnical Map and the predominant materials are described below.

Artificial Fill (Qaf)

Artificial fill of various depths was likely placed within the site when it was graded for the tennis center in the late 1970's. Grading of the site likely consisted of cuts and fills to create flat pads for the tennis courts and structures. Based on available online historic aerial photographs from 1938 to 2018, the main active creeks within the site are about in the same location as they were prior to site development.

Artificial fill was encountered within five of our drill holes to a depth of four feet. However, it is expected that deeper fills are likely present within the site. Where encountered, the artificial fill consists of silty clay and sandy clay with some clayey sand. It was observed to be damp to moist and soft to stiff/moderately dense. The undocumented artificial fill is not considered suitable for support of the proposed improvements and should be removed during remedial grading.

Slopewash (Qsw)

Slopewash materials (i.e., alluvium/colluvium/slopewash) are present within the site and were encountered in one of our hand auger drill holes to a depth of up to at least 15 feet. Where encountered, the slopewash materials consist of moist to wet clayey sand and sandy clay. Based on observations during the site reconnaissance, the slopewash materials may contain few oversized materials (i.e., greater than 6-inches in diameter). The depth and extent of slopewash/alluvial materials within the subject site will be explored in more detail following a future design level subsurface investigation.

Santiago Formation (Tsa)

Bedrock of the Santiago Formation underlies the artificial fill and slopewash materials within the subject site and was encountered within three of our drill holes. Where encountered, the bedrock consists of moderately hard to hard sandstone and silty sandstone with lesser amounts of clayey sandstone.

GEOLOGIC STRUCTURE

Regional geologic structure near the site is characterized by a mostly homoclinal sequence of moderately dipping strata in a generally westerly direction. The Santiago Formation is mostly massive, with localized and poorly defined bedding planes. Because the bedding is most often poorly defined, non-fissile, and discontinuous, slope stability is generally good as compared to other Tertiary sedimentary formations in the area. A regional geologic map showing the site location is included on the attached Plate 4 – Regional Geology.

GROUNDWATER

Groundwater was not encountered during our subsurface investigation. However, based on the saturation of the slopewash materials encountered, perched water may be present at the slopewash/bedrock contact and may be encountered during grading.

Based on the CGS Seismic Hazard Zone Report for the Canada Gobernadora 7.5-minute quadrangle, historic high groundwater levels are mapped as 5 to 10 feet below ground surface within the subject site as shown on the attached Plate 5 – Historic High Groundwater. However, based on our experience in the general area, groundwater is expected to be deeper. Following remedial grading of the subject site, groundwater should not impact the proposed development if care is taken to design for future groundwater fluctuations.

SEISMICITY AND FAULT RUPTURE

The site is not within an Alquist-Priolo Earthquake Fault Zone, and no known active faults cross the site as shown on reviewed geologic maps. The site is located approximately 5.9 miles from the San Joaquin Hills fault, which is capable of generating a maximum earthquake magnitude (Mw) of 7.1. The site is also located about 10.62 miles from the Elsinore fault which is capable of generating a maximum earthquake magnitude (Mw) of 7.9. Given the proximity of the site to these and numerous other active and potentially active faults as shown on the attached Plate 6 – Regional Fault Map, the site will likely be subject to significant earthquake ground motions in the future.

SEISMIC HAZARDS (LIQUEFACTION, SEISMIC SETTLEMENT, LATERAL SPREADING)

Review of the seismic Hazard Zone Maps for the Canada Gobernadora quadrangle indicates that the site is not located within a liquefaction hazard zone and is not located within a zone susceptible to earthquake-induced landslides, as shown on the attached Plate 7 – Seismic Hazard Map. In addition, following remedial grading, the site is expected to be underlain by bedrock of the Santiago

Formation and compacted Certified Engineered Fill, and due to the lack of shallow ground, it is our professional opinion that the potential for liquefaction, seismic settlement, and lateral spreading to impact the proposed development is considered very low.

SLOPE STABILITY

The preliminary site design includes minor cut and fill slopes along the perimeter of the site. These slopes are anticipated to be grossly stable, provided that proper remedial grading is performed. The remedial grading will primarily consist of removal of unsuitable materials to expose competent materials suitable for support of the proposed slopes.

STATIC SETTLEMENT/COMPRESSIBILITY

Following remedial grading, the site will be underlain by engineered fill over bedrock. Given this, the site settlement will be controlled by settlement of new engineered fill. Settlement of Engineered fill will be relatively minor based on the mostly granular composition of the onsite soils and the relatively shallow fills following corrective grading (i.e., <15 feet in depth). Based on prior experience with similar fill conditions, primary and long-term settlement at the site is not expected to exceed the industry standard of practice tolerance of approximately 1 inch total and ½ inch differential over a horizontal distance of about 40 feet.

INFILTRATION

Infiltration testing has not been performed on the site. Following remedial grading of the site, the proposed improvements are expected to be underlain by engineered fill overlying the Santiago Formation bedrock or competent slopewash materials. Due to the planned corrective grading and the presence shallow bedrock, we anticipate that infiltration of stormwater into the site soils may not be feasible, however, once the type, location and depth of infiltration system is selected, this office should be notified to evaluate the feasibility of infiltrating into the site soil.

EXPANSION POTENTIAL

Limited laboratory was performed on samples collected during our subsurface investigation. Based on the results of our testing and our experience with similar site conditions in the area, the onsite soils should be expected to possess a low expansion potential.

CORROSIVE SOILS

Limited laboratory testing has was performed on samples collected during our subsurface investigation. Based on the results of our testing and our experience with similar site conditions in the area, the site is expected to have a negligible sulfate exposure to concrete and corrosive conditions to ferrous metals.

EXCAVATION CHARACTERISTIC

The surficial soils and bedrock formation are expected to require the use of conventional grading and trenching equipment. However, the bedrock formation is moderately hard to hard and is therefore expected to require medium to heavy ripping effort in deeper cuts. Some oversize materials (i.e., greater than 6 inches in diameter) may be encountered. Special handling and placement criteria will be required for all over-sized materials.

CONCLUSIONS

Based on our preliminary and limited evaluation, we conclude that the site is physically suitable for the development and the grading is feasible and practical from a geotechnical standpoint if accomplished in accordance with the California Building Code (CBC), County of Orange requirements, and the preliminary recommendations presented in this preliminary report and future design report(s). A summary of conclusions is as follows:

1. The project area is underlain by artificial fill, slope wash, and bedrock of the Santiago Formation. Shallow corrective grading will be required to support the proposed grading and future improvements. Following this shallow corrective grading, the proposed development will consist of a stable site that is not expected to be affected by landsliding, lateral spreading, subsidence, or collapse.

2. The project area is not underlain by any known active faults.

3. Groundwater is not expected to be encountered or to have a significant impact on site development. However, perched groundwater may be encountered at the bedrock contact.

4. Liquefaction and lateral spreading potential at the site is anticipated to be very low.

5. Site soils within the foundation influence zone are anticipated to have a low expansion potential based on our recent laboratory test results and local experience. Future site improvements can be designed assuming a low expansive condition.

6. A potential for negligible sulfate exposure to concrete (i.e., as defined by the ACI 318) exists at the site. However, supplemental soluble sulfate testing is recommended below proposed improvements upon completion of site corrective grading and precise grading to confirm the preliminary results provided herein.

7. Based on our understanding that the planned structure is anticipated to contain a one-level of subterranean parking, and based on the planned corrective grading and presence of shallow bedrock, we anticipate that the building may be supported on conventional shallow foundation system. However, the type of building foundation will need to be evaluated in a future report once the structure is finalized and actual building loads become available.

8. Preliminary corrosion testing indicates that the on-site soils are corrosive to buried ferrous metals and reinforcing steel. Consequently, any metal exposed to the soil will need protection. In addition, due to high levels of chlorides, steel reinforcement will require proper concrete cover. However, supplemental corrosivity testing is recommended below proposed improvements upon completion of site corrective grading and precise grading and prior to construction to confirm the preliminary results provided herein.

9. Based on the planned corrective grading and presence of shallow bedrock, we anticipate that infiltration of stormwater into the site soils may not be feasible. However, infiltration testing should be performed once the type, location, and depth of infiltration facility is selected.

PRELIMINARY RECOMMENDATIONS/CONSIDERATIONS

PRELIMINARY REMEDIAL GRADING RECOMMENDATIONS

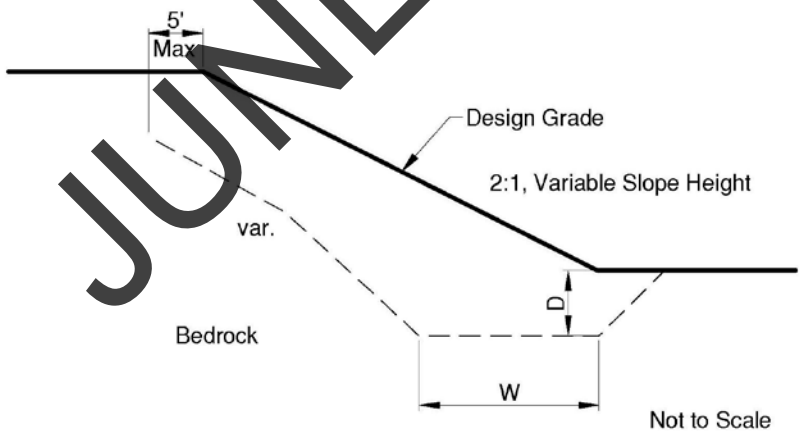
Remedial grading of variable depth will need to be performed to remove any unsuitable undocumented artificial fill and alluvial materials to expose dense, moist, competent alluvial materials or bedrock of the Santiago Formation so that acceptable bearing support for the proposed improvements can be provided. Detailed grading recommendations will be provided in a future Grading Plan Review Report. However, preliminary remedial grading recommendations are outlined below.

General Fill Areas: All topsoil, slopewash materials, and undocumented artificial fill are considered unsuitable for fill support and should be removed below fill areas in order to expose competent in-place bedrock.

Benching should be performed as additional fill is placed against slopes that are 5:1 or steeper. See Plate 8 – Typical Benching and Keyway, for a general detail of toe-of-slope keyway and subsequent benching.

Removals should be completed in a manner which limits the steepness of removal bottoms and therefore limits the differential fill thickness. The recommended criteria for steepness of removal bottoms is 1½:1 or flatter.

2:1 Cut Slopes: Based on the geotechnical conditions present and our experience with similar grading conditions, the proposed 2:1 cut slopes are relatively stable but will require keyways and stabilization fills to improve surficial stability and facilitate landscaping. Keyway locations and dimensions will be discussed in more detail in a future Grading Plan Review Report based on the final grading plan design. However, it is expected that keyways will likely be a minimum of 3 feet deep and 15 feet wide from the toe of slope. The typical keyway and backcut configuration should be as shown below.



TYPICAL KEYWAY BACKCUT IN BEDROCK

2:1 Fill Slopes: Remedial grading should be performed below fill slopes to provide a minimum shear key to support the slope. Fill slope shear key should be a minimum of 3 feet deep from a 1:1 projection out from the toe of the slope and a minimum of 15 feet wide.

Building Pad Over-Excavations: An over-excavation should be performed below the building pads in order to provide uniform engineered fill for support of the proposed

building. For planning purposes, the over-excavation criteria will be a minimum depth shall be three feet below the bottom of the footing.

Street and Landscape Over-Excavations: Streets and landscape areas should be over-excavated to a depth of two feet below finish grade when in a cut condition. At the owner's discretion, additional over-excavation may be performed in order to facilitate underground utility trench excavation, or to improve landscape conditions.

It should be noted that the preliminary recommendations provided herein are approximations based on our reconnaissance study, review of previous geotechnical reports for the site and surrounding areas, and on a limited subsurface exploration. Actual removals may vary depending on the results of future subsurface explorations or based on observations of geologic materials encountered during grading.

PRELIMINARY FOUNDATION DESIGN CONSIDERATION AND SEISMIC PARAMETERS

Structure Seismic Design

Given the lack of subsurface data, the upper 100 feet of subsurface soils within the subject site is estimated to be a "very dense soil and soft rock" profile and designated as a Site Class C (i.e., conservative assumption). The seismic design coefficients based on ASCE 7-16 and 2019 CBC are listed in the following table 1.

Table 1. 2019 CBC Site Categorization and Site Coefficients

Categorization/Coefficient	Design Value
Site Class based on Soil Profile (ASCE 7, Table 20.3-1)	C
Short Period Spectral Acceleration S_s **	1.282
1-sec. Period Spectral Acceleration S_1 **	0.456
Site Coefficient F_a (Table 11.4-1)**	1.200
Site Coefficient F_v (Table 11.4-2)**	1.500
Short Period MCE* Spectral Acceleration S_{MS} **	1.538
1-sec. Period MCE Spectral Acceleration S_{M1} **	0.684
Short Period Design Spectral Acceleration S_{DS} **	1.025
1-sec. Period Design Spectral Acceleration S_{D1} **	0.456
MCE Peak Ground Acceleration (PGA) *	0.531
Site Coefficient F_{PGA} (Table 11.8-1)**	1.200
MCE Peak Ground Acceleration (PGA_M) *	0.637

* *MCE: Maximum Considered Earthquake*
** *Values Obtained from USGS Earthquake Hazards Program website are based on the ASCE7-16 and 2019 CBC and site*

coordinates of N33.623° and W117.5773°.

It should be recognized that much of southern California is subject to some level of damaging ground shaking as a result of movement along the major active (and potentially active) fault zones that characterize this region. Design utilizing the 2019 CBC is not meant to completely protect against damage or loss of function. Therefore, the preceding parameters should be considered as minimum design criteria.

Foundation Design Considerations

The following preliminary foundation design considerations and parameters may be used to preliminarily size and cost foundation systems. ***These recommendations should not be construed as final design recommendations which will be developed following additional subsurface investigations, laboratory testing, and plan review.***

- Foundation System Type: Based on preliminary lab testing indicating EI's <50, a slab-on-grade with conventional foundations appears adequate. A structural stiffened slab may be required if higher EI's are found.
- Bearing Material: Engineered Fill
- Minimum Dimensions: Width: 24 inches
  Depth: 24 inches
- Bearing Capacity: 3,000 psf for minimum size
  May be increased 20% for each additional foot of width or depth. Maximum: 5000 psf
- Load Resistance: Loads may be resisted by both passive and friction.
  Passive resistance: 300 psf/ft
  Friction coefficient: 0.35
- Settlement: Static: 1 inch total and ½ inch over 40 feet differential.

CONCRETE

Due to low soil resistivity and high chloride levels, the potential for on-site corrosion to ferrous metals and hence reinforcing steel are very severe. In addition, moderate sulfate levels have been encountered throughout Irvine in the vicinity of the site. Consequently, we recommend using the following:

Structural Elements (i.e., foundations, walls, etc.):

- Cement Type: Type II/V
- Maximum Water Cement Ratio: 0.50

Utilization of ACI 318 moderate sulfate level requirements will also serve to reduce the permeability of the concrete and help minimize the potential of water and/or vapor transmission through the concrete. Wet curing of the concrete per ACI Publication 308 is also recommended.

Non-structural Elements (i.e., flatwork, pavement, etc.)
Concrete mix design shall be selected by the concrete designer such that sulfate and chloride attack mitigations are balanced with shrinkage crack control. Concrete mix design is outside the geotechnical engineer's purview.

The aforementioned recommendations in regards to all concrete (i.e., structural and non-structural) are made from a soils perspective only. Final concrete mix design is beyond our purview. All applicable codes, ordinances, regulations, and guidelines should be followed in regard to designing a durable concrete with respect to the

CORROSION PROTECTION OF METAL STRUCTURES

Metal structures which will be in direct contact with the soil (i.e., underground metal conduits, pipelines, metal sign posts, etc.) and/or in close proximity to the soil (wrought iron fencing, etc.) may be subject to corrosion. The use of special coatings or cathodic protection around buried metal structures has been shown to be beneficial in reducing corrosion potential. Corrosion of ferrous metal reinforcing elements in structural concrete may be reduced by the use of the recommended maximum water/cement ratio for concrete, but may not be eliminated.

The laboratory testing program performed for this project does not address the potential for corrosion to copper piping. In this regard, a corrosion engineer should be consulted to perform more detailed testing and develop appropriate mitigation measures (if necessary).

The above discussion is provided for general guidance in regards to the corrosiveness of the on-site soils to typical metal structures used for construction. Detailed corrosion testing and recommendations for protecting buried ferrous metal and/or copper elements are beyond our purview. If detailed testing is required, a corrosion engineer should be consulted to perform the testing and develop appropriate mitigation measures.

SITE RETAINING WALLS

It is expected that retaining walls may be constructed within the site. Design of these walls will need to account for surcharges from adjacent walls and other structures. Final design of retaining walls will need to be based on future site-specific plans, geotechnical investigation, and analyses. Final recommendations should also be based on the selected wall types and geometry.

FUTURE GEOTECHNICAL STUDIES

Given the preliminary nature of this report, additional geotechnical studies will be needed in the future to support final project design. The future geotechnical studies will need to include supplemental subsurface exploration, laboratory testing, and geotechnical analyses. Detailed and site-specific geotechnical recommendations will need to be provided for all grading, building foundations, walls, both on- and off-site pavements and street improvements, and miscellaneous appurtenant structures. Based on these studies, final geotechnical design recommendations should be provided in a future report.

LIMITATIONS

All parties reviewing or utilizing this report should recognize that the findings, conclusions, and recommendations presented represent the results of our professional geological and geotechnical engineering efforts and judgments based on information obtained from available maps, documents, and publications, and a limited subsurface investigation. Additional fieldwork and laboratory testing would be required to provide Geotechnical grading recommendations and preliminary foundation, retaining wall, and pavement design criteria.

Due to the inexact nature of the state of the art of these professions and the possible occurrence of undetected variables in subsurface conditions, we cannot guarantee that the conditions actually encountered during grading and site construction will be identical to those observed, sampled, and interpreted during our study, or that there are no unknown subsurface conditions which could have an adverse effect on the use of the property. We have exercised a degree of care comparable to the standard of practice presently maintained by other professionals in the fields of geotechnical engineering and engineering geology, and believe that our findings present a reasonably representative description of geotechnical conditions and their probable influence on the grading and use of the property.

This report has not been prepared for the use by other parties or projects other than those named or described herein. This report may not contain sufficient information for other parties or other purposes. In addition, the scope of our services did not include a study or evaluation pertaining to the presence of hazardous materials at the site.

CLOSURE

GMU appreciates the opportunity that was provided to perform these services. Should you have any questions, please feel free to contact the undersigned.

Respectfully submitted,

GMU GEOTECHNICAL, INC.

Katie Farrington, M.Sc., PG, CEG 2611
Senior Engineering Geologist

Nadim Sunna, M.Sc., QSP, PE 84197
Senior Engineer

JUNE 2020

/kmf/18-213-00R_Prelim Investigation (1-7-20)

REFERENCES

(1) Huitt-Zollars, "California Grand Villages Conceptual Grading, Coto de Caza, CA," dated December 19, 2019.

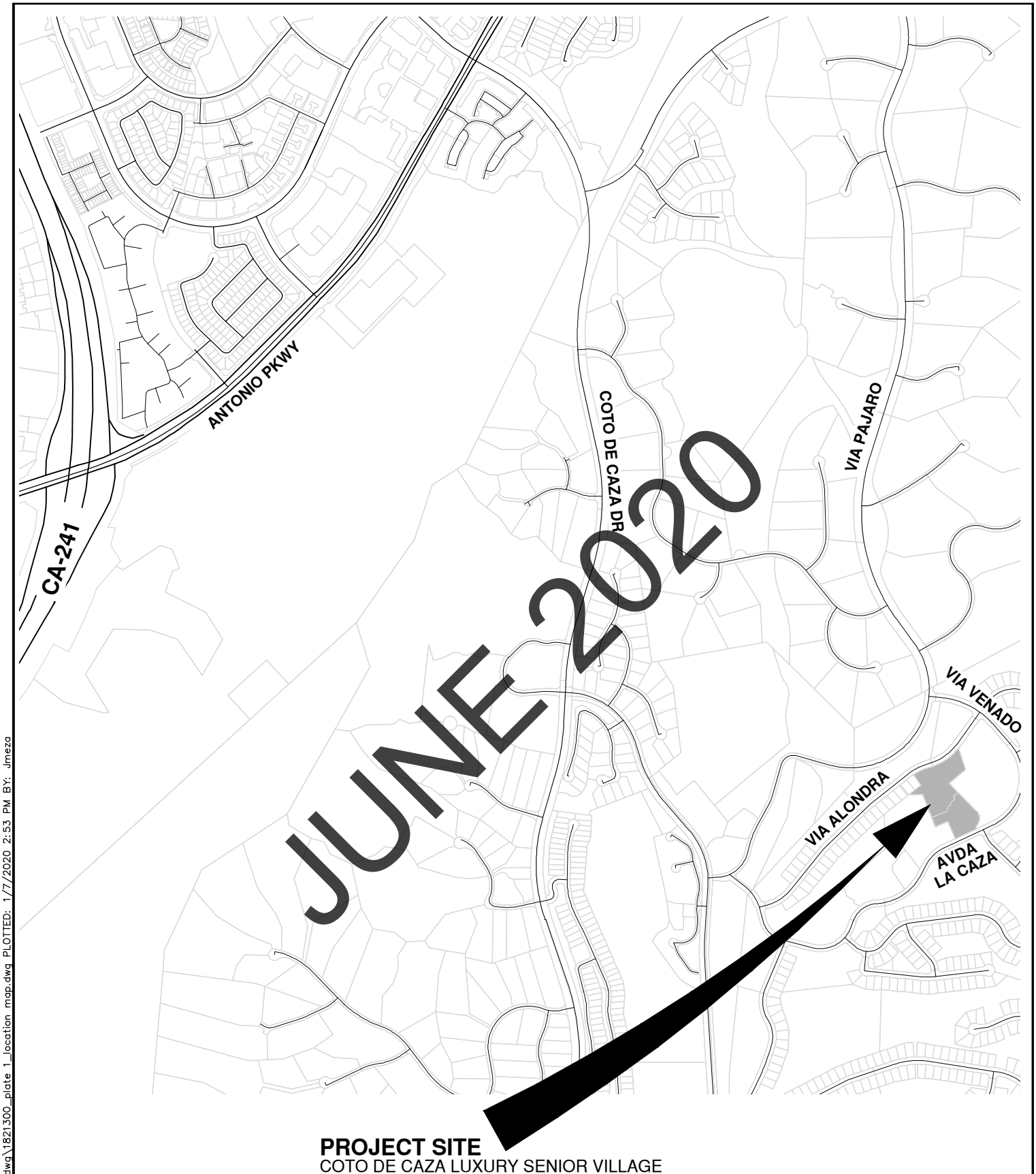
(2) Irwin Partners Architects, *The Legacy Club, California Grand Village, Preliminary Plan* dated December 20, 2019.

(3) State of California Division of Mines and Geology, Seismic Hazards Zone Map of the Canada Gobernadora Quadrangle, dated September 23, 2002.

(4) California Department of Conservation, Division of Mines and Geology, Seismic Hazard Zone Report 063 for the Cañada Gobernadora 7.5-minute Quadrangle, Orange County, California, dated 2002.

(5) United States Geological Survey, Preliminary Geologic Map of the Santa Ana 30x60 Quadrangle, Southern California, Version 2.0, dated 1999.

(6) California Department of Conservation, Division of Mines and Geology, NW ¼ Cañada Gobernadora Quadrangle, Preliminary Report 10, Plate 1, dated 1970.



PROJECT SITE
COTO DE CAZA LUXURY SENIOR VILLAGE

0 1000'

Location Map

GMU	Date: January 7, 2020	Plate 1
	Project No.: 18-213-00	

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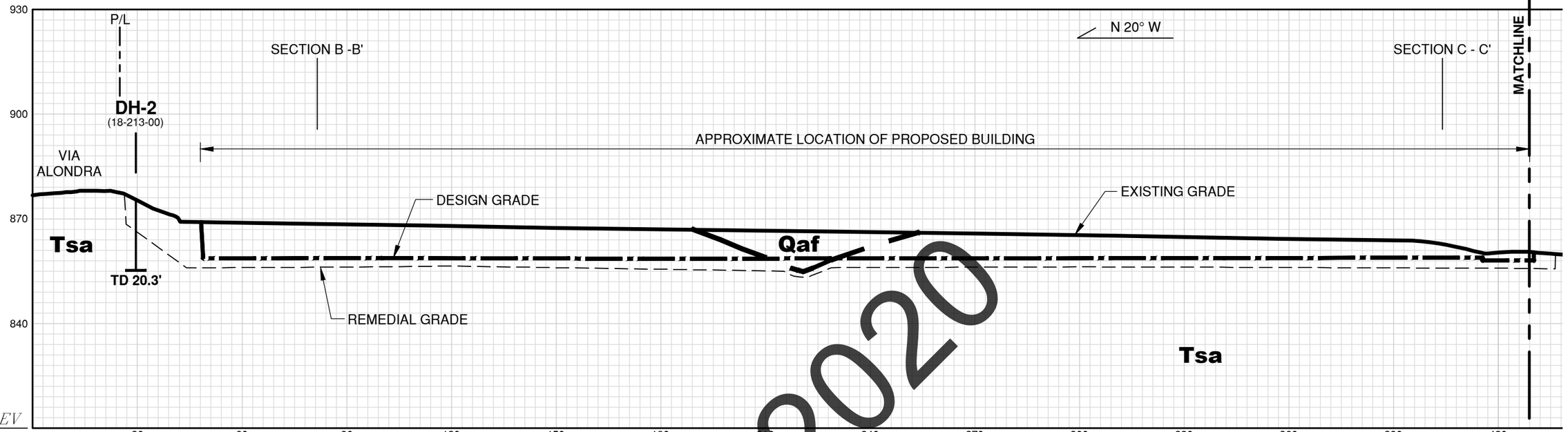
GEOTECHNICAL LEGEND

Qaf	ARTIFICIAL FILL
Qsw	SLOPE WASH, CIRCLED WHERE BURIED
Tsa	SANTIAGO FORMATION
DH-2 (18-213-00)	APPROXIMATE LOCATION OF HOLLOW STEM AUGER DRILL HOLE
HA-4 (18-213-00)	APPROXIMATE LOCATION OF HAND AUGER DRILL HOLE
	GEOLOGIC CONTACT
C — C'	GEOTECHNICAL SECTION

Geotechnical Map

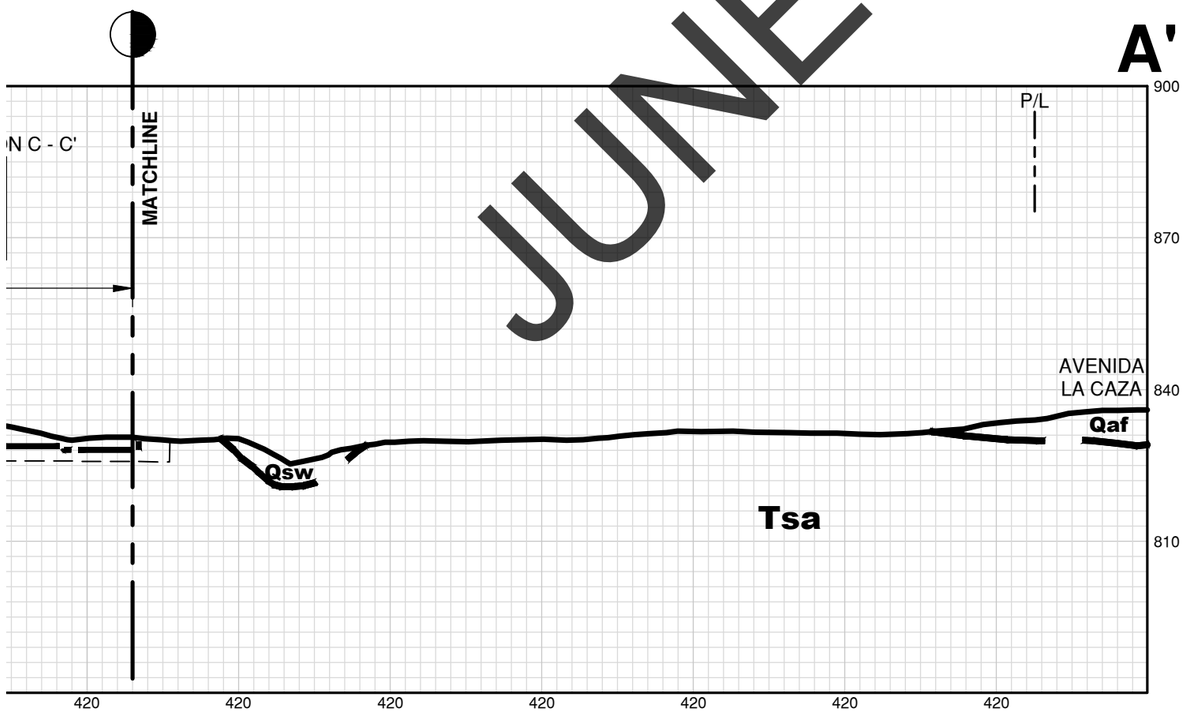
GMU	Date: January 7, 2020	Plate 2
	Project No.: 18-213-00	

A



DATUM ELEV
810.0'

GROUP Project Number 18-213-00
SECTION A - A'
SCALE: 1" = 30'



0 30'

Geotechnical Section A - A'

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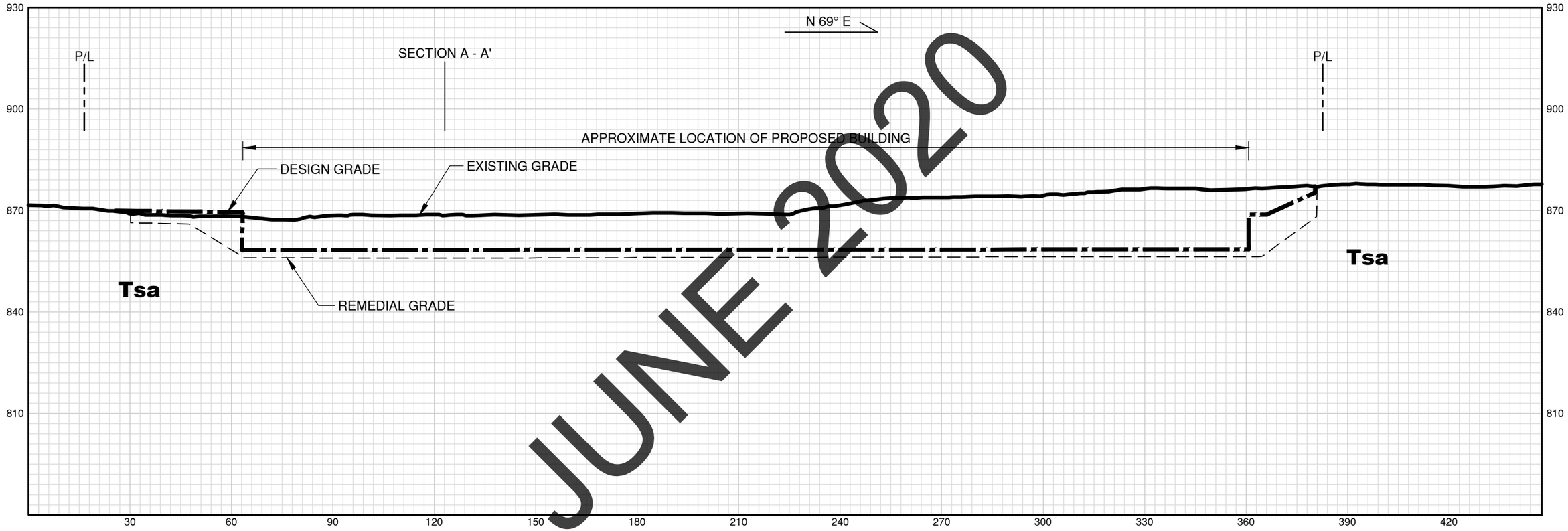
Plate 3.1

B

B'



DATUM ELEV
780.0'

GROUP Project Number 18-213-00
SECTION B - B'
SCALE: 1" = 30'

0 30'

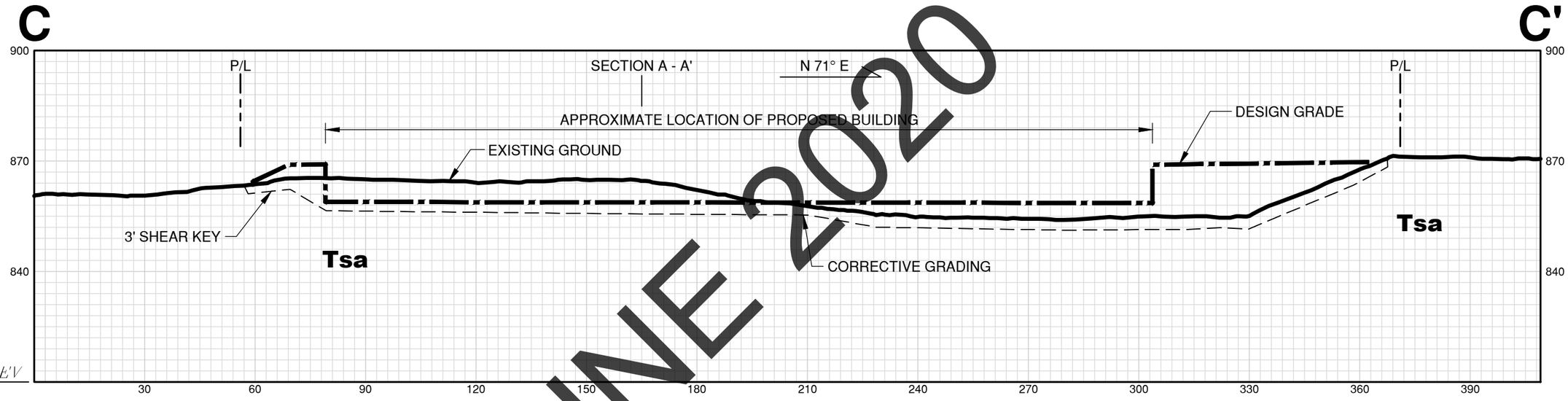
Geotechnical Section B - B'

GMU

Date: January 7, 2020

Project No.: 18-213-00

Plate 3.2



GROUP Project Number 18-213-00
SECTION C - C'
SCALE: 1" = 30'

0 30'

Geotechnical Section C - C'

GMU

Date: January 7, 2020

Project No.: 18-213-00

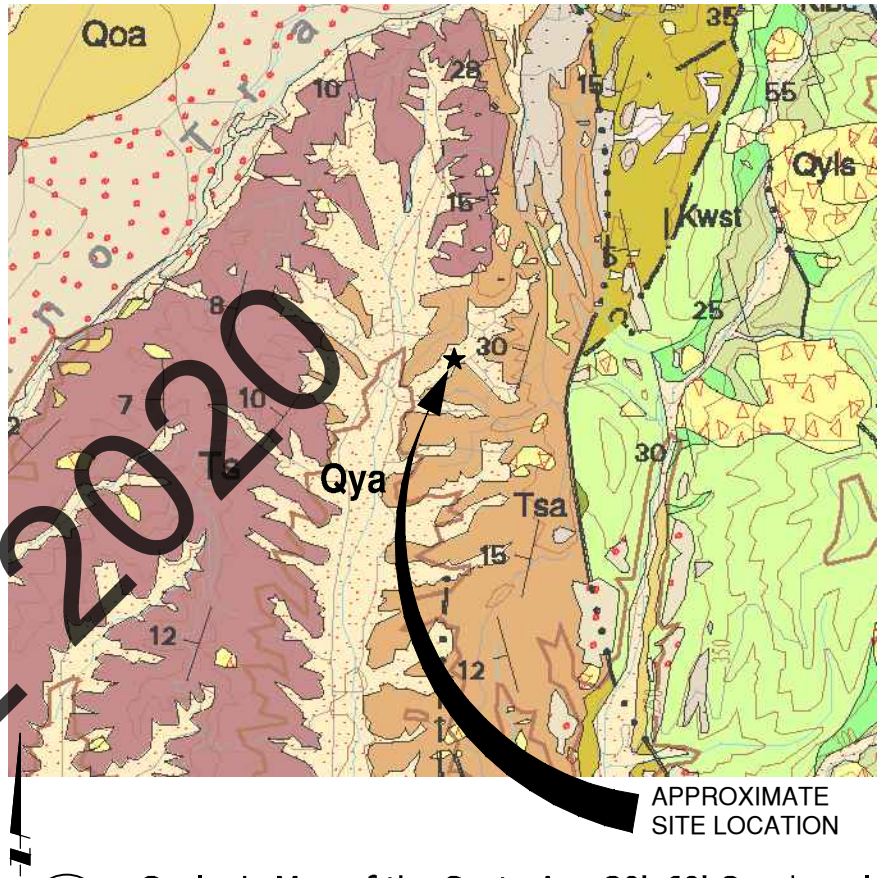
Plate 3.3

1 NW 1/4 Canada Gobernadora Quadrangle

Scale: 1" = 10,000

LEGEND

Qal	ALLUVIUM
Qsw	SLOPEWASH
Tsau	SANTIAGO FORMATION, UPPER MEMBER



2 Geologic Map of the Santa Ana 30'x60' Quadrangle

Scale: 1:200,000

LEGEND

Qya	YOUNG ALLUVIUM DEPOSITS
Tsa	SANTIAGO FORMATION

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Regional Geologic Map

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Project No.: 18-213-00

Plate 4

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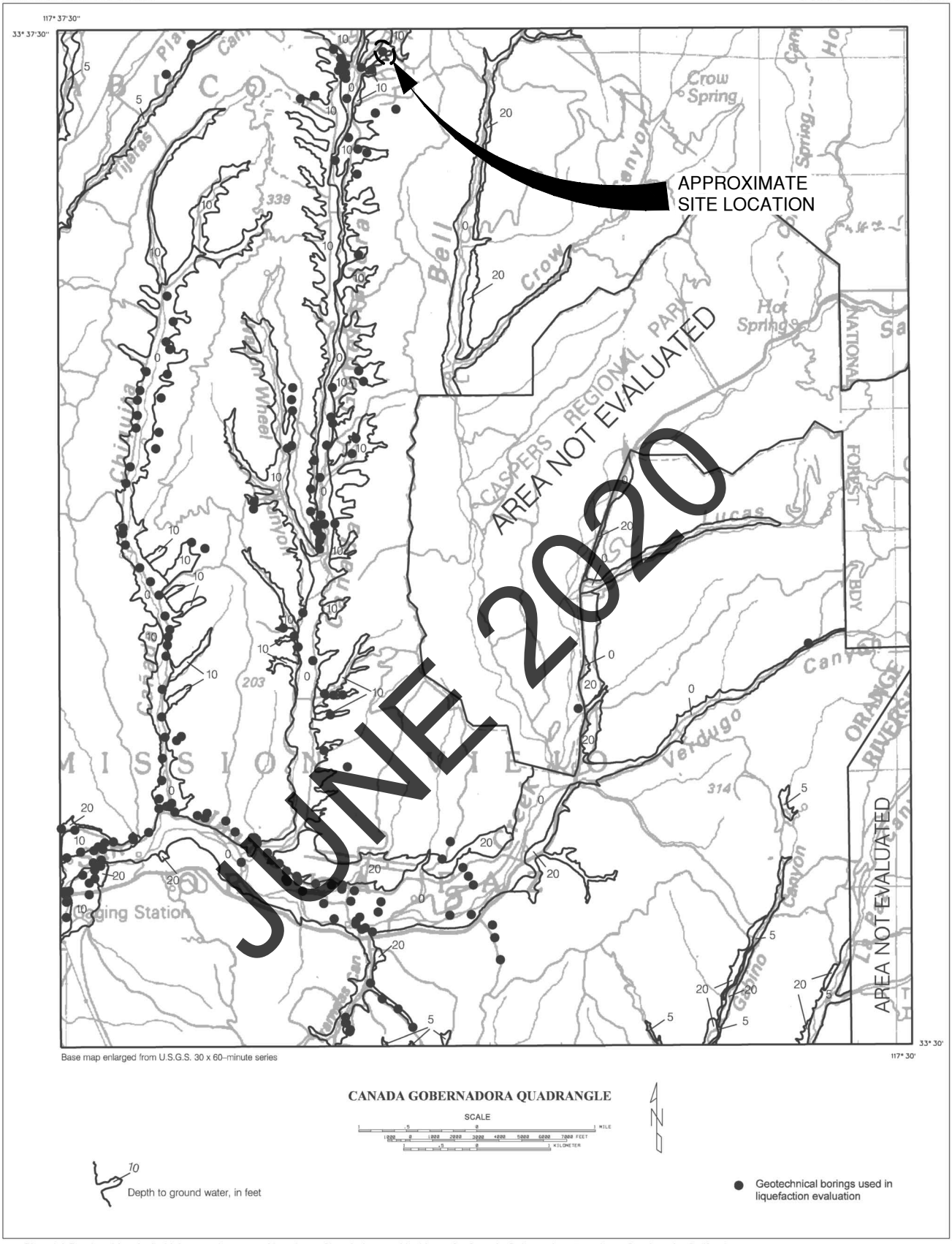
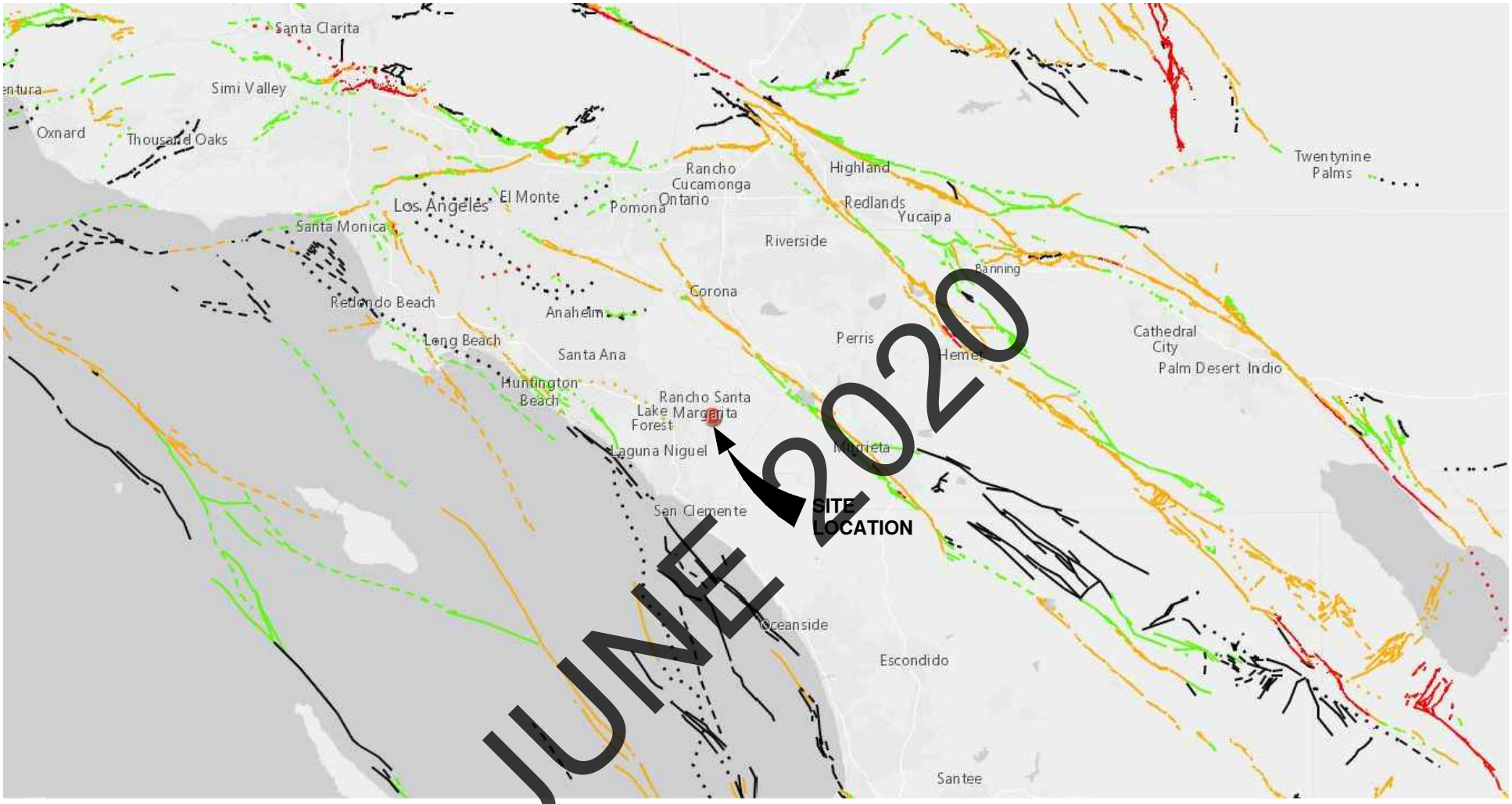


Plate 1.2 Depth to historically high ground water and locations of boreholes used in this study, Canada Gobernadora 7.5-minute Quadrangle, California

Historic High Groundwater

GMU	Date: January 7, 2020	Plate 5
	Project No.: 18-213-00	



NOT TO SCALE

Regional Fault Map

GMU	Date: January 7, 2020	Plate 6
	Project No.: 18-213-00	

DRAWING: q:\2018\18-213-00\dwg\1821300_plate 6_regional fault map.dwg PLOTTED: 1/7/2020 3:38 PM BY: Jmeza

MAP EXPLANATION

Zones of Required Investigation:

Liquefaction

Areas where historic occurrence of liquefaction, or local geological, geotechnical and groundwater conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

Earthquake-Induced Landslides

Areas where previous occurrence of landslide movement, or local topographic, geological, geotechnical and subsurface water conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

NOTE: Seismic Hazard Zones identified on this map may include developed land where delineated hazards have already been mitigated to city or county standards. Check with your local building/planning department for information regarding the location of such mitigated areas.

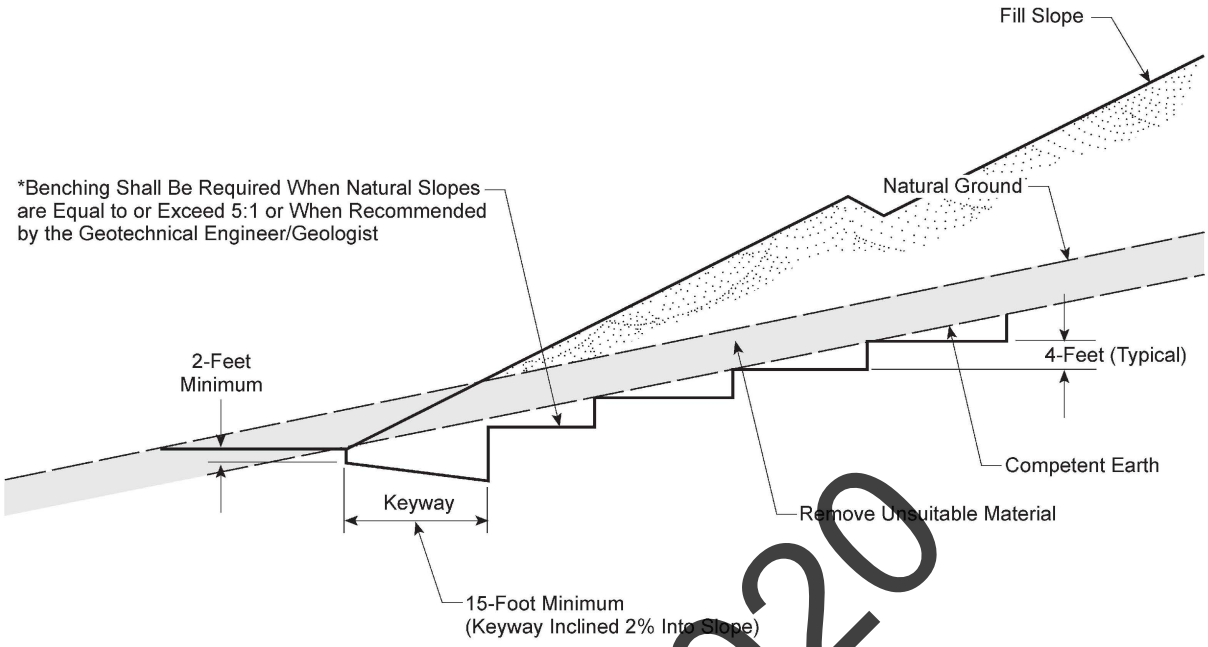
NOT TO SCALE

Seismic Hazard Zone Map

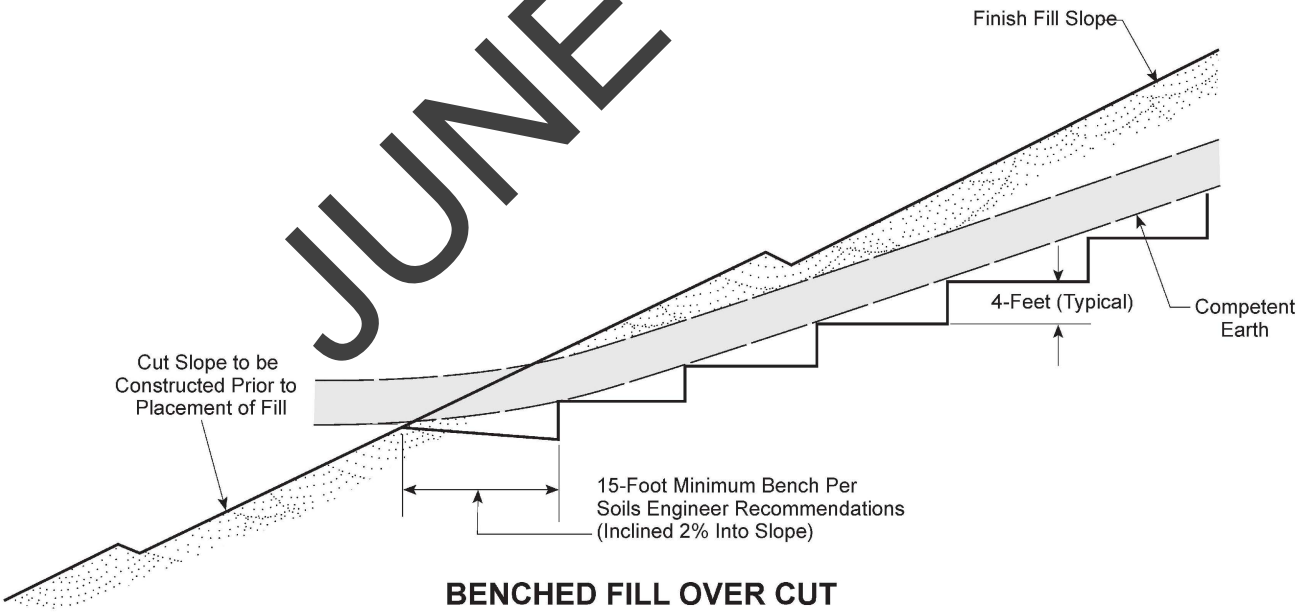
GMU

Date:	January 7, 2020
Project No.:	18-213-00

Plate 7



BENCHED FILL OVER NATURAL



BENCHED FILL OVER CUT

GMU

TYPICAL BENCHING AND KEYWAY

Plate
8

APPENDIX A

Geotechnical Exploration Procedures and Logs

JUNE 2020

APPENDIX A

GMU GEOTECHNICAL EXPLORATION PROCEDURES AND LOGS

Our exploration at the subject site consisted of two hollow stem auger drill holes and four hand auger drill holes. The estimated locations of the explorations are shown on Plate 2- – Geotechnical Map. Our drill holes were logged by a Certified Engineering Geologist and drive and bulk samples of the excavated soils were collected. "Undisturbed" samples were taken using a 3.0-inch outside-diameter drive sampler which contains a 2.416-inch-diameter brass sample sleeve 6 inches in length. Blow counts recorded during sampling from the drive samples are shown on the drill hole logs. The logs of each drill hole are contained in this Appendix A, and the Legend to Logs is presented as Plates A-1 and A-2.

The geologic and engineering field descriptions and classifications that appear on these logs are prepared according to Corps of Engineers and Bureau of Reclamation standards. Major soil classifications are prepared according to the Unified Soil Classification System as modified by ASTM Standard No. 2487. Since the descriptions and classifications that appear on the Log of Borings and Test Pits are intended to be that which most accurately describe a given interval of a boring or test pit (frequently an interval of several feet), discrepancies do occur in the Unified Soil Classification System nomenclature between that interval and a particular sample in that interval. For example, an 8-foot-thick interval in a log may be identified as silty sand (SM) while one sample taken within the interval may have individually been identified as sandy silt (ML). This discrepancy is frequently allowed to remain to emphasize the occurrence of local textural variations in the interval.

MAJOR DIVISIONS			Group Letter	Symbol	TYPICAL NAMES
COARSE-GRAINED SOILS More Than 50% Retained On No.200 Sieve Based on The Material Passing The 3-Inch (75mm) Sieve. Reference: ASTM Standard D2487	GRAVELS 50% or More of Coarse Fraction Retained on No.4 Sieve	Clean Gravels	GW		Well Graded Gravels and Gravel-Sand Mixtures, Little or No Fines.
			GP		Poorly Graded Gravels and Gravel-Sand Mixtures Little or No Fines.
		Gravels With Fines	GM		Silty Gravels, Gravel-Sand-Silt Mixtures.
			GC		Clayey Gravels, Gravel-Sand-Clay Mixtures.
	SANDS More Than 50% of Coarse Fraction Passes No.4 Sieve	Clean Sands	SW		Well Graded Sands and Gravelly Sands, Little or No Fines.
			SP		Poorly Graded Sands and Gravelly Sands, Little or No Fines.
		Sands With Fines	SM		Silty Sands, Sand-Silt Mixtures.
			SC		Clayey Sands, Sand-Clay Mixtures.
FINE-GRAINED SOILS 50% or More Passe The No.200 Sieve Based on The Material Passing The 3-Inch (75mm) Sieve. Reference: ASTM Standard D2487	SILTS AND CLAYS Liquid Limit Less Than 50%		ML		Inorganic Silts, Very Fine Sands, Rock Flour, Silty or Clayey Fine Sands or Clayey Silts With Slight Plasticity.
			CL		Inorganic Clays of Low To Medium Plasticity, Gravelly Clays, Sandy Clays, Silty Clays, Lean Clays.
			OL		Organic Silts and Organic Silty Clays of Low Plasticity
	SILTS AND CLAYS Liquid Limit 50% or Greater		MH		Inorganic Silts, Micaceous or Diatomaceous Fine Sandy or Silty Soils, Elastic Silts.
			CH		Inorganic Clays of High Plasticity, Fat Clays.
			OH		Organic Clays of Medium To High Plasticity, Organic Silts.
HIGHLY ORGANIC SOILS			PT		Peat and Other Highly Organic Soils.

The descriptive terminology of the logs is modified from current ASTM Standards to suit the purposes of this study

ADDITIONAL TESTS

- DS = Direct Shear
- HY = Hydrometer Test
- TC = Triaxial Compression Test
- UC = Unconfined Compression
- CN = Consolidation Test
- (T) = Time Rate
- EX = Expansion Test
- CP = Compaction Test
- PS = Particle Size Distribution
- EI = Expansion Index
- SE = Sand Equivalent Test
- AL = Atterberg Limits
- FC = Chemical Tests
- RV = Resistance Value
- SG = Specific Gravity
- SU = Sulfates
- CH = Chlorides
- MR = Minimum Resistivity
- pH
- (N) = Natural Undisturbed Sample
- (R) = Remolded Sample
- CS = Collapse Test/Swell-Settlement

GEOLOGIC NOMENCLATURE

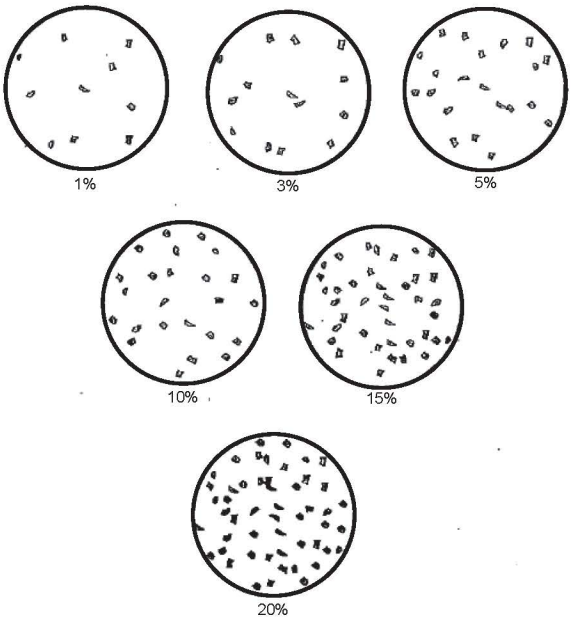
B = Bedding C = Contact J = Joint
F = Fracture Flt = Fault S = Shear
RS = Rupture Surface = Seepage
= Groundwater

SAMPLE SYMBOLS

- Undisturbed Sample (California Sample)
- Undisturbed Sample (Shelby Tube)
- Bulk Sample
- Unsuccessful Sampling Attempt
- SPT Sample

5
10 Blows per 6-Inches Penetration
15

10: 10 Blows for 12-Inches Penetration
6/4": 6 Blows for 4-Inches Penetration
P: Push
(13): Uncorrected Blow Counts ("N" Values) for 12-Inches Penetration- Standard Penetration Test (SPT)



GMU

LEGEND TO LOGS

ASTM Designation: D 2487
(Based on Unified Soil Classification System)

Plate
A-1

SOIL DENSITY/CONSISTENCY

FINE GRAINED

Consistency	Field Test	SPT (#blows/foot)	Mod (#blows/foot)
Very Soft	Easily penetrated by thumb, exudes between fingers	<2	<3
Soft	Easily penetrated one inch by thumb, molded by fingers	2-4	3-6
Firm	Penetrated over 1/2 inch by thumb with moderate effort	4-8	6-12
Stiff	Penetrated about 1/2 inch by thumb with great effort	8-15	12-25
Very Stiff	Readily indented by thumbnail	15-30	25-50
Hard	Indented with difficulty by thumbnail	>30	>50

COARSE GRAINED

Density	Field Test	SPT (#blows/foot)	Mod (#blows/foot)
Very Loose	Easily penetrated with 0.5" rod pushed by hand	<4	<5
Loose	Easily penetrated with 0.5" rod pushed by hand	4-10	5-12
Medium Dense	Easily penetrated 1' with 0.5" rod driven by 5lb hammer	10-30	12-35
Dense	Dificult to penetrat 1' with 0.5" rod driven by 5lb hammer	31-50	35-60
Very Dense	Penetrated few inches with 0.5" rod driven by 5lb hammer	>50	>60

BEDROCK HARDNESS

Density	Field Test	SPT (#blows/foot)
Soft	Can be crushed by hand, soil like and structureless	1-30
Moderately Hard	Can be grooved with fingernails, crumbles with hammer	30-50
Hard	Can't break by hand, can be grooved with knife	50-100
Very Hard	Scratches with knife, chips with hammer blows	>100

MODIFIERS

Trace	1%
Few	1-5%
Some	5-12%
Numerous	12-20%
Abundant	>20%

GRAIN SIZE

Description		Sieve Size	Grain Size	Approximate Size
Boulders		>12"	>12"	Larger than a basketball
Cobbles		3-12"	3-12"	Fist-sized to basketball-sized
Gravel	Coarse	3/4-3"	3/4-3"	Thumb-sized to fist-sized
	Fine	#4-3/4"	0.19-0.75"	Pea-sized to thumb-sized
Sand	Coarse	#10-#4	0.079-0.19"	Rock-salt-sized to pea-sized
	Medium	#40-#10	0.017-0.079"	Sugar-sized to rock salt-sized
	Fine	#200-#40	0.0029-0.017"	Flour-sized to sugar-sized
Fines		passing #200	<0.0029"	Flour-sized and smaller

MOISTURE CONTENT

Dry- Very little or no moisture
Damp- Some moisture but less than optimum
Moist- Near optimum
Very Moist- Above optimum
Wet/Saturated- Contains free moisture

GMU

LEGEND TO LOGS

ASTM Designation: D 2487
(Based on Unified Soil Classification System)

Plate
A-2

Project: Coto Legacy Club
Project Location: 23333 & 23335 Ave. La Caza, Coto de Caza
Project Number: 18-213-00

Log of Drill Hole DH-1

Date(s) Drilled	12/10/19	Logged By	WD	Checked By	KF
Drilling Method	Hollow Stem Auger	Drilling Contractor	2R Drilling	Total Depth of Drill Hole	20.5 feet
Drill Rig Type	CME 75	Diameter(s) of Hole, inches	8	Approx. Surface Elevation, ft MSL	867.0
Groundwater Depth [Elevation], feet		Sampling Method(s)	Open drive sampler with 8-inch sleeve, Bulk	Drill Hole Backfill	Native
Remarks				Driving Method and Drop	140 lb donut hammer

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
865	0		**ARTIFICIAL FILL (Qaf)** abundant organics and rock fragments		SILTY CLAY (CL-ML); brown and grayish brown, damp, moderately stiff						
			SANTIAGO FORMATION (Tsa)		SILTY SANDSTONE (SM); brown, damp, hard, fine grained sand, moderately cemented		11 28 43	140	8	128	
	5		Rare roots		SILTY SANDSTONE (SM); brown, damp, hard, fine grained sand, trace clay		30 50/6"	140	7	128	
860											
	10				CLAYEY SANDSTONE (CL); pale brown, damp, hard, fine grained sand, trace medium grained sand		21 21 22	140	13	120	
855											
	15				POORLY GRADED SANDSTONE (SP); pale yellowish gray, damp, hard, fine grained sand, weakly cemented		50/6"	140	4	108	
850											

Project: Coto Legacy Club
Project Location: 23333 & 23335 Ave. La Caza, Coto de Caza
Project Number: 18-213-00

Log of Drill Hole DH-1

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA			TEST DATA		
						SAMPLE	NUMBER OF BLOWS / 6"	DRIVING WEIGHT, lbs	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS
			cont. to be **SANTIAGO FORMATION (Tsa)**		cont. to be POORLY GRADED SANDSTONE (SP); pale yellowish brown, damp, hard, fine to medium grained sand, weakly cemented		50/4"	140	5	108	
					Total Depth = 20.5 No Groundwater No Caving						

Project: Coto Legacy Club
Project Location: 23333 & 23335 Ave. La Caza, Coto de Caza
Project Number: 18-213-00

Log of Drill Hole DH-2

Date(s) Drilled	12/10/19	Logged By	WD	Checked By	KF
Drilling Method	Hollow Stem Auger	Drilling Contractor	2R Drilling	Total Depth of Drill Hole	20.3 feet
Drill Rig Type	CME 75	Diameter(s) of Hole, inches	8	Approx. Surface Elevation, ft MSL	867.0
Groundwater Depth [Elevation], feet		Sampling Method(s)	Open drive sampler with 8-inch sleeve, Bulk	Drill Hole Backfill	Native
Remarks				Driving Method and Drop	140 lb donut hammer

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
865	0		**ARTIFICIAL FILL (Qaf)**		SANDY CLAY (CL); brown and yellowish brown, moist, dense, medium grained sand						
			SANTIAGO FORMATION (Tsa)		SILTY SANDSTONE (SM); grayish brown, damp, hard, fine to medium grained sand, moderately well cemented		28 50/6"	140	5	124	
	5				SILTY SANDSTONE (SM); mottled brown, pale brown, and gray, damp, hard, fine grained sand moderately well cemented		28 50/6"	140	5	120	
860											
	10				POORLY GRADED SANDSTONE (SP); pale gray with orange, some brown mottles, hard, fine to medium grained sand, moderately cemented		45 50/3"	140	8	124	
855											
	15				POORLY GRADED SANDSTONE (SP); pale grayish yellow, damp, hard, fine to medium grained sand, moderately cemented		50/5"	140	9	125	
850											

Project: Coto Legacy Club
Project Location: 23333 & 23335 Ave. La Caza, Coto de Caza
Project Number: 18-213-00

Log of Drill Hole DH-2

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA			TEST DATA		
						SAMPLE	NUMBER OF BLOWS / 6"	DRIVING WEIGHT, lbs	MOISTURE CONTENT, %	DRY UNIT WEIGHT, pcf	ADDITIONAL TESTS
					cont. to be POORLY GRADED SANDSTONE (SP); pale gray, damp, hard, weakly cemented, fine grained sand Total Depth = 20.25' No Groundwater No Caving	■	50/3"	140	6	108	

Project: Coto Legacy Club
Project Location: 23333 & 23335 Ave. La Caza, Coto de Caza
Project Number: 18-213-00

Log of Drill Hole HA-1

Sheet 1 of 1

Date(s) Drilled	**12/10/19**	Logged By	**WD**	Checked By	**KF**
Drilling Method	**Hand Auger**	Drilling Contractor	**GMU**	Total Depth of Drill Hole	**6.0 feet**
Drill Rig Type		Diameter(s) of Hole, inches	**3.25**	Approx. Surface Elevation, ft MSL	**868.0**
Groundwater Depth [Elevation], feet		Sampling Method(s)		Drill Hole Backfill	**Native**
Remarks				Driving Method and Drop	

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
865			**ARTIFICIAL FILL (Qaf)**								
	5		**SLOPEWASH (Qsw)**		SILTY SAND (SM); pale brown, moist, medium grained sand, trace gravel						
					Total Depth = 6.0' Refusal on Cobbles and Gravel No Groundwater No Caving						

Project: Coto Legacy Club
Project Location: 23333 & 23335 Ave. La Caza, Coto de Caza
Project Number: 18-213-00

Log of Drill Hole HA-2

Sheet 1 of 1

Date(s) Drilled: **12/10/19**	Logged By: **WD**	Checked By: **KF**
Drilling Method: **Hand Auger**	Drilling Contractor: **GMU**	Total Depth of Drill Hole: **2.0 feet**
Drill Rig Type:	Diameter(s) of Hole, inches: **3.25**	Approx. Surface Elevation, ft MSL: **866.0**
Groundwater Depth [Elevation], feet:	Sampling Method(s):	Drill Hole Backfill: **Native**
Remarks:		Driving Method and Drop:

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
865			**ARTIFICIAL FILL (Qaf)** organic matter		SILTY CLAY (CL); grayish brown, moist, moderately stiff, scattered gravel						
					Total Depth = 2.0' Practical Refusal No Groundwater No Caving						

Project: Coto Legacy Club
Project Location: 23333 & 23335 Ave. La Caza, Coto de Caza
Project Number: 18-213-00

Log of Drill Hole HA-3

Sheet 1 of 1

Date(s) Drilled: **12/10/19**	Logged By: **WD**	Checked By: **KF**
Drilling Method: **Hand Auger**	Drilling Contractor: **GMU**	Total Depth of Drill Hole: **6.0 feet**
Drill Rig Type:	Diameter(s) of Hole, inches: **3.25**	Approx. Surface Elevation, ft MSL: **864.0**
Groundwater Depth [Elevation], feet:	Sampling Method(s):	Drill Hole Backfill: **Native**
Remarks:		Driving Method and Drop:

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			ARTIFICIAL FILL (Qaf) rare organic matter		CLAYEY SAND (SC); brown, moist, moderately soft, fine to medium grained sand, scattered gravel						EI, FC
860	5		**SANTIAGO FORMATION (Tsa)**		SILTY SANDSTONE (SM); pale yellowish brown, moist, fine grained sand, trace medium and coarse grained sand						
					Total Depth = 6.0' No Groundwater No Caving						

Project: Coto Legacy Club
Project Location: 23333 & 23335 Ave. La Caza, Coto de Caza
Project Number: 18-213-00

Log of Drill Hole HA-4

Sheet 1 of 1

Date(s) Drilled: **12/10/19**	Logged By: **WD**	Checked By: **KF**
Drilling Method: **Hand Auger**	Drilling Contractor: **GMU**	Total Depth of Drill Hole: **15.5 feet**
Drill Rig Type:	Diameter(s) of Hole, inches: **3.25**	Approx. Surface Elevation, ft MSL: **865.0**
Groundwater Depth [Elevation], feet:	Sampling Method(s):	Drill Hole Backfill: **Native**
Remarks:		Driving Method and Drop:

ELEVATION, feet	DEPTH, feet	GRAPHIC LOG	GEOLOGICAL CLASSIFICATION AND DESCRIPTION	ORIENTATION DATA	ENGINEERING CLASSIFICATION AND DESCRIPTION	SAMPLE DATA: SAMPLE	SAMPLE DATA: NUMBER OF BLOWS / 6"	SAMPLE DATA: DRIVING WEIGHT, lbs	TEST DATA: MOISTURE CONTENT, %	TEST DATA: DRY UNIT WEIGHT, pcf	TEST DATA: ADDITIONAL TESTS
			SLOPEWASH (Qsw)		CLAYEY SAND (SC); brownish gray with orangish brown staining, very moist, stiff, fine to medium grained sand						
					Becomes dark gray, more clayey						
					SANDY CLAY (CL); minor white and orangish brown mottles, moist, very stiff						
860	5				CLAYEY SAND (SC); brown, moist, stiff						
					Becomes paler with depth						EI, FC
					Becomes paler brown, rare gravel						
855	10				Becomes very moist to wet						
					Becomes less clayey, fine grained sand						
					CLAYEY SAND (SC); brown, very moist, stiff, fine grained sand						
850	15										
					Total Depth = 15.5' No Groundwater No Caving						

APPENDIX B

Geotechnical Laboratory Procedures and Test Results

JUNE 2020

APPENDIX B-1

GMU GEOTECHNICAL LABORATORY PROCEDURES AND TEST RESULTS

MOISTURE AND DENSITY

Field moisture content and in-place density were determined for select 6-inch sample sleeve of undisturbed soil material obtained from the drill holes. The field moisture content was determined in general accordance with ASTM Test Method D 2216 by obtaining one-half the moisture sample from each end of the 6-inch sleeve. The in-place dry density of the sample was determined by using the wet weight of the entire sample.

At the same time the field moisture content and in-place density were determined, the soil material at each end of the sleeve was classified according to the Unified Soil Classification System. The results of the field moisture content and in-place density determinations are presented on the right-hand column of the Log of Drill Hole and are summarized on Tables B-1 and B-2. The results of the visual classifications were used for general reference.

EXPANSION TESTS

To provide a standard definition of one-dimensional expansion, a test was performed on typical on-site materials in general accordance with ASTM Test Method D 4829. The result from this test procedure is reported as an "expansion index". The results of this test are contained in Appendix B and also Tables B-1 and B-2.

CHEMICAL TESTS

The corrosion potential of typical on-site materials under long-term contact with both metal and concrete was determined by chemical and electrical resistance tests. The soluble sulfate test for potential concrete corrosion was performed in general accordance with California Test Method 417, the minimum resistivity test for potential metal corrosion was performed in general accordance with California Test Method 643, and the concentration of soluble chlorides was determined in general accordance with California Test Method 422. The results of these tests are contained in Appendix B and also Tables B-1 and B-2.

TABLE B
SUMMARY OF SOIL LABORATORY DATA

Sample Information			Geologic Unit	USCS Group Symbol	In Situ Water Content, %	In Situ Dry Unit Weight, pcf	In Situ Satur-ation, %	Sieve/Hydrometer				Atterberg Limits			Compaction		Expansion Index	R-Value	Chemical Test Results			
Boring Number	Depth, feet	Elevation, feet						Gravel, %	Sand, %	<#200, %	<2μ, %	LL	PL	PI	Maximum Dry Unit Weight, pcf	Optimum Water Content, %			pH	Sulfate (ppm)	Chloride (ppm)	Min. Resistivity (ohm/cm)
DH-1	2.5	864.5	Tsa	SC	7.9	128	72															
DH-1	5	862.0	Tsa	SC	6.6	128	60															
DH-1	10	857.0	Tsa	SC	12.9	120	91															
DH-1	15	852.0	Tsa	SM	3.7	108	18															
DH-1	20	847.0	Tsa	SM	5.2	108	26															
DH-2	2.5	864.5	Tsa	SC	4.6	124	36															
DH-2	5	862.0	Tsa	SC	5.0	120	35															
DH-2	10	857.0	Tsa	SM	7.7	124	61															
DH-2	15	852.0	Tsa	ML	9.1	125	74															
DH-2	20	847.0	Tsa	SM	5.5	108	27															
HA-3	0	864.0	Qaf	SC													6		7.5	94	696	1100
HA-4	8	857.0	Qsw	SC													33		6.9	130	624	1368

Project: Coto Legacy Club
Project No. 18-213-00