SUPPLEMENTAL GEOTECHNICAL INVESTIGATION AND SLOPE STABILITY ANALYSIS

SOUTHWEST VILLAGE VTM-1
SAN DIEGO, CALIFORNIA

GEOCON
INCORPORATED

GEOTECHNICAL
ENVIRONMENTAL
MATERIALS

PREPARED FOR

TRI POINTE HOMES
SAN DIEGO, CALIFORNIA

JUNE 25, 2021
PROJECT NO. 06847-42-04

Project No. 06847-42-04
June 25, 2021

Tri Pointe Homes
13400 Sabre Springs Parkway, Suite 200
San Diego, California 92128

Attention: Ms. April Tornillo

Subject: SUPPLEMENTAL GEOTECHNICAL INVESTIGATION AND SLOPE STABILITY ANALYSIS
SOUTHWEST VILLAGE VTM-1
SAN DIEGO, CALIFORNIA

Reference: *Preliminary Geotechnical Investigation, Southwest Village, Vesting Tentative Map, San Diego, California,* prepared by Geocon Incorporated, dated March 28, 2019 (Project No. 06847-42-03).

Dear Ms. Tornillo:

In accordance with your authorization, we have performed a supplemental geotechnical investigation and slope stability analysis for VTM-1 of the proposed Southwest Village project in the San Ysidro area of San Diego, California. The intent of the study was to further evaluate slope stability as it relates to the San Ysidro landslide that borders the southwest margin of the proposed project. The information provided herein supplements the referenced geotechnical report.

Based on previous geotechnical studies and the results of this investigation, it is our opinion that the proposed project can be developed as planned provided the recommendations presented in this report, and the referenced preliminary report are implemented during design and construction.

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

Very truly yours,

GEOCON INCORPORATED

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SUPPLEMENTAL GEOTECHNICAL INVESTIGATION AND SLOPE STABILITY ANALYSIS

1. PURPOSE AND SCOPE

This report presents the findings of a supplemental geotechnical study for the Southwest Village Vesting Tentative Map 1 (VTM-1) project located in South Otay Mesa, San Diego, California (see Vicinity Map, Figure 1). Two other phases of the overall project which consist of the eastward extension of Beyer Boulevard into VTM-1, and a borrow/fill site south of VTM-1 will be addressed in future geotechnical studies. These phases are also shown on Figure 1.

The purpose of this study was to evaluate the soil and geologic conditions in an accessible portion of the San Ysidro landslide complex that borders the southwest margin of VTM-1 and perform a supplemental slope stability analysis of this area as it relates to the adjacent proposed development. In conjunction with this investigation, we identified the groundwater conditions within the landslide mass and beneath the mesa top, and evaluated the potential impacts to slope stability of future storm water runoff and irrigation.

Since this report is a supplement to previous studies, we did not attempt to re-present information contained in the referenced study but rather provide the salient information which focuses on the potential impact of the proposed development, if any, on the current landslide stability. In this regard, a discussion of faulting, stratigraphy and other geologic information can be found in the referenced geotechnical report.

The scope of the supplemental investigation included a review of previous geotechnical reports and published geologic literature with respect to the landslide complex (see list of references), performing exploratory borings in the landslide mass and evaluating the stability of the hillside adjacent to the VTM-1 project site. We also performed infiltration testing at several proposed storm water outfall discharge locations as well as on the mesa top. It should be noted that the boring locations were selected based on property ownership constraints.

The supplemental investigation was performed between November 30, 2020, and February 5, 2021, and included drilling four continuous core borings through the landslide mass along the southwestern flank of VTM-1 (see Figures 9 and 13). The borings ranged in depth from 218.5 feet to 397 feet below the ground surface. Boring No. 3 encountered drilling difficulty at an intermediate depth and was re-drilled (Boring No. 3A) at an adjacent location. The core logs presented on Figures A-17 through A-22, Appendix A, represent a combined sequence between Boring No. 3 and 3A. The cores were initially logged in the field and then later logged and photographed in our laboratory.

A generalized geologic description of the cores is presented as Figures A1 through A3, Appendix A. A detailed log of the cores using the Unified Soil Classification System is also presented in Appendix A on Figures A-4 through A-7. Laboratory test results from selected samples obtained from the borings are provided in Appendix B. The infiltration test results are provided in Appendix C. Slope stability figures are provided in Appendix D. Geologic cross sections, which were the basis for our slope stability analysis, are presented on Figures 12 and 13. The letter designation (AA-AA', BB-BB') was selected to differentiate the current cross sections from those presented in previous reports.

As part of this study, Dudek & Associates was retained to perform a groundwater evaluation in the landslide and surrounding area. Their study was based on a site reconnaissance, our bore-hole and infiltration data and published documents. The intent of their study was to assess the current groundwater elevations in the area and comment on the potential impacts project development may have on the regional groundwater system, specifically the landslide area. The Dudek report is contained in Appendix E.

Rick Engineering Company also performed a hydrology analysis of the Southwest Village VTM-1 project and surrounding landslide areas (Reference No. 12). They studied the pre-project and post-project conditions with respect to infiltration of storm water and irrigation. The Rick Engineering report is contained in Appendix F.

In addition to Dudek and Rick Engineering's study, the groundwater elevation in each boring was measured by Geovision Geophysical Services using bore-hole geophysical techniques. A description of the various techniques performed during the study is contained in their report presented in Appendix G. The information contained in the Geovision report, as well as direct measurements taken by Dudek & Associates in Boring No. 3A, was the basis for the existing groundwater elevations used in our slope stability analysis. In addition, a groundwater level recorded in an agricultural well located on the top of the mesa was also used for the area behind the slide.

2. BACKGROUND

The overall proposed Southwest Village development is located adjacent to the San Ysidro Landslide complex which is one of the largest landslide features in San Diego County (See Figures 1 through 6). Although studied relatively extensively by prominent geologists and geotechnical firms, to our knowledge, prior to this study, the base of the landslide has only been identified once during an investigation by Geocon Incorporated for the Intermodal Transportation Center located southwest of the mesa (see Reference No 6).

A primary focus of previous geotechnical studies performed by Geocon Incorporated was to define the headscarp of the landslide adjacent to the proposed development to establish the building setback limit along the edge of the mesa. Large-diameter borings were advanced along the proposed development limits to demonstrate that beyond the landslide headscarp, intact sedimentary bedrock units exist (i.e. stable conditions). In addition, during the previous field investigation, the headscarp was mapped in detail and surveyed to record its location. A 50-foot setback from the surveyed location of the headscarp was established. A copy of the VTM grading sheet showing this setback is contained in Appendix H. The previous studies did not have an opportunity to perform a field investigation within the limits of the landslide complex in the vicinity of the VTM-1 project site.

3. GEOLOGIC CONDITIONS AND GEOMORPHIC FEATURES

The following discussion presents general observations made during this study based on an interpretation of our boring logs, stereographic photographs (anaglyphs; Figures 4 and 8, note: color anaglyphic glasses needed for viewing), color/reflectance terrain models generated from Lidar information (Figures 5, 6, 10 and 11), geomorphic features and our experience with similar mass movements. Future studies will be required to further evaluate the geologic conditions on the portions of the mesa and surrounding landslide areas where the other two associated development phases are proposed. Specifically, the eastern extension of Beyer Boulevard into the project and development of the borrow/fill site area (VTM-2).

The results of this study indicate that the San Ysidro Landslide Complex is approximately 350 to 400-feet-thick near its head scarp southwest of VTM-1. Characteristic landslide morphology of steep back-scarps and bulging, hummocky topography, as well as deflected drainages and closed surface depressions are evident within the hillsides that surround the entire mesa. Based on surface topography, we have separated the landslide complex into three components based on observed geomorphological differences between areas (Landslides A, B and C, see Figures 2, 3, 5, 6 and 9).

Landslide A, the focus of this study, appears to be the most developed feature with respect to past horizontal displacement as evidenced by its more subdued/relaxed topography, especially along its distal portion (see Figures 5 through 11). It is postulated/hypothesized that the landslide mass has moved down dip along its slip surface in "glacier-like" fashion with progressive failure occurring northeastward. The upper, steeper part of this slide appears to be comprised of detached blocks of cemented sandstone/siltstone and terrace-derived conglomerate suspended in a matrix of clay and silt. The stereoscopic image (See Figure 8) suggests that the blocks align in a northwest/southeast linear fashion along the upper hillside and have a southwestward direction of movement. The head scarp of this feature is well expressed and is curvilinear.

In contrast, Landslide B expresses robust topography and appears to be less developed with respect to horizontal displacement. Its apparent limited detachment from the mesa top suggests that portions of this slide are incipient consisting of a relatively minor block-glide type movement with less horizontal displacement as Landslide A. The maximum head scarp differential elevation of this feature is approximately 50 feet below the mesa compared to Landslide A which is approximately 100 feet below the mesa. The topography within the slide mass consists of elevated promontories and prominent lobate-shaped ridges.

With respect to geomorphic expression, it appears that the Landslide C area is intermediate between Landslide A and B. The terrain exhibits a robust profile with some similar morphologies as Landslide A suggesting that a series of detached blocks have relaxed in a progressive fashion sliding southward from the mesa top. The amount of horizontal displacement also appears to be intermediate between Landslide A and B and the westernmost feature exhibits a well expressed curvilinear head scarp (see Figures 5 and 6). Down-cutting of the natural slopes by the Spring Canyon drainage along the toe of the hillside appears to be the likely mechanism which triggered landsliding on both sides of the canyon.

With respect to the composition of the slide mass, Figures A-8 through A-22, Appendix A, present photographs of the cores obtained from Landslide A during our study. The photographs have been annotated with the approximate depth (in feet) below the existing ground surface. The numeric designation represents one-foot intervals beginning at the line above the number. The red numbers located to the left of each core box on each page is for reference as described below.

Inspection of the core samples reveal that the main body of the slide mass of Landslide A consists of a mixture of sandstone (e.g. Boring No. 3A, Photos 5 and 24), siltstone (e.g. Boring No. 1, Photos 5 and 13), claystone (e.g. Boring No. 3A, Photo 10, Boring No. 2, Photos 7 and 11) and gravel/cobble conglomerate (e.g. Boring No. 3A, Photos 1, 2, 29 and 32) derived from the Otay and San Diego Formations, and overlying Terrace Deposits. Sheared bentonitic claystone (Boring No. 1, Photos 8, 15 and 20) and sections of disturbed Otay gritstone (Boring No. 2, Photos 13 through 15) were noted in several of the borings. Abundant highly fractured and blocky textures were also observed (e.g. Boring No. 1, Photos 3 and 14).

The cores revealed that the basal shear zone consists of features ranging from sheared bentonite and remolded clay planes (Boring No. 1), to disturbed mixtures of sand, clay and gravel (Boring No. 2). The base of the slide in Boring No. 3 exhibited a thick zone of viscous deformation with a mélange of remolded clay and fine grained sand (e.g. Boring No. 3A, Photo Nos. 40 through 55). A chaotic, marbled and twisted appearance suggests that the plastic/viscous deformation may have occurred in a saturated environment. The underlying Otay Formation consists of thinly bedded micaceous sandstone (e.g. Boring No. 3A, Photo No. 58). The bedding orientation appeared relatively low angle.

The landside geometry and basal slip surface modeled in our geologic cross sections was interpreted based on geomorphology and piercing points from our borings that penetrated the base of the slide. The surface elevation of each boring was surveyed for horizontal and vertical accuracy after drilling was completed. The dip of the basal surface after connecting the piercing points is approximately 1 degree along section. This inclination may be slightly apparent to the true dip based on the various directions of movement suggested in the stereo photographs. The source for the ground surface topography was a combination of relatively recent flown topo for the project and 1999 SANGIS. Since the slide mass is heterogeneous, we did not attempt to model separate geologic/soil materials on the cross sections and in our slope stability analysis.

4. SLOPE STABILITY EVALUATION

4.1 General

Two cross sections were analyzed to evaluate the stability of the landslide (Sections AA-AA' and BB-BB'). The locations of the cross sections are considered worst-case locations. The geology and basal slide surface were determined from the exploratory borings. Groundwater elevations used in the analysis are based on the exploratory borings, a monitoring well installed in Boring No. B-3A during the recent drilling, the groundwater elevation measured in the agricultural well located on the mesa, and information contained in the groundwater analysis performed by Dudek and Associates (Appendix E) and GeoVision (Appendix G).

The computer program SLOPE/W distributed by Geo-Slope International was utilized to perform the slope stability analyses. This program uses conventional slope stability equations and a two-dimensional limit-equilibrium method to calculate the factor of safety against deep-seated failure. For our analysis, Spencer's Method with a block failure mode was used for failure along landslide basal surface. Spencer's Method satisfies both moment and force equilibrium.

The computer program searches for the critical failure surface based on parameters inputted, including the location of the "left" and "right" sliding blocks. The output files and calculated factor of safety for the cross-sections analyzed are presented in Appendix D, Figures D-1 through D-15. The critical failure surface for each analysis is shown on computer-generated output. The factor of safety is shown on each figure directly above the failure surface.

4.2 Shear Strength Parameters

The shear strength parameters used in the analyses are based on laboratory direct shear testing performed on samples obtained from borings on the property and our experience with similar soil conditions. Where direct shear tests were not performed in a soil or geologic unit, assumed strength values were used. Table 4.2.1 summarizes the shear strength tests performed by Geocon Incorporated during this and previous geotechnical investigations on the property. Table 4.2.2 summarize residual shear strength values. The residual shear strength values were determined following the procedure presented in the *Journal of Geotechnical and Geoenvironmental Engineering, Drained Shear Strength Parameters for Analysis of Landslides (Stark, Choi, McCone, 2005).* However, for conservatism, we used a friction angle of 8 degrees for the basal slip surface, which is less than the values determined using the Stark, Choi, McCone (2005) procedure. Shear strength values used in our analyses are shown on Table 4.2.3.

TABLE 4.2.1
SUMMARY OF DIRECT SHEAR STRENGTH TEST RESULTS

Soil/Geologic Unit	Sample No.	Angle of Shear Resistance (degrees)	Unit Cohesion (psf)
Landslide Debris	LB1-3**	31	135
Otay Formation	*LB3-3†	32	500
	B1@215 feet	45 (peak) 39 (ultimate)	3,260 (peak) 960 (ultimate)
	B2@289 feet	38 (peak) 29 (ultimate)	1,720 (peak) 600 (ultimate)
	B3@394 feet	49 (peak) 37 (ultimate)	1,550 (peak) 1,000 (ultimate)
Remolded Shear Plane	LB4-9**	27	180
Basel Shear Plane (Residual)	B3 @ 328 – 330 feet	20	160

*Sample remolded to approximately 90 percent of maximum dry density near optimum moisture content.
†From Geocon October 2004
**From Geocon May 2006

TABLE 4.2.2
RESIDUAL SHEAR STRENGTH VALUES FOR BASAL SLIDE PLANE
BASED ON STARK, CHOI, MCCONE (2005)

Sample No.	Liquid Limit	Percent Clay	Angle of Internal Friction (degrees)	Cohesion (psf)
B1@161 – 164 feet	66	27	11	50
B2@263 feet	40	10	24	20
B3@324 feet	51	22	15	60
B3@328-330 feet	35	14	22	60

TABLE 4.2.3
SHEAR STRENGTH USED IN SLOPE STABILITY ANALYSES

Soil Type	Angle of Internal Friction (degrees)	Cohesion (psf)
Qcf (Compacted Fill)	30	300
Qal (Alluvium)	28	100
Qls (Landslide Debris)	31	135
To (Otay Formation)	34	450
Basal Slide Plane	8	50

4.3 Slope Stability Analysis

We analyzed three failure locations. The first location was along the basal slide plane and up the assumed landslide headscarp. The strength parameters used for the basal surface was also used along the landslide headscarp. The results of this analysis are shown on Figures D-1 and D-2 and indicate a factor of safety of 1.26 and 1.34 for Sections AA and BB, respectively. For the second location we allowed the computer to search for the failure surface with the lowest factor of safety assuming that a bedding plane shear with the same strength parameters as the basal shear zone extends behind the landslide headscarp and beneath the mesa. The results of this analysis are shown on Figures D-3 and D-4 and indicate a factor of safety greater than 1.5. The third failure location was set at the development limits (see Figures D-5 and D-6). The factor of safety at the development limits is greater than 1.5.

We also analyzed each section assuming a groundwater rise of 10 feet from the existing groundwater elevation. For this analysis, we allowed the computer to search for the minimum factor of safety assuming a bedding plane shear extends beneath the mesa. The results are shown on Figures D-7 and D-8 and indicate a factor of safety of 1.5 and greater.

We also analyzed each section assuming landslide movement causes the ground surface in front of the landslide headscarp to drop thereby creating a higher exposed headscarp slope. Assuming a 50-foot elevation change in front of the headscarp, a factor of safety of at least 1.5 exists at or in front of the edge of the development (see Figures D-9 and D-10).

4.4 Seismic Slope Stability

In accordance with Special Publication 117 guidelines, site-specific seismic slope stability analyses are required for sites located within mapped hazard zones. Seismic Hazard Zone maps published by CDMG, including landslide hazard zones, have not been published for San Diego County due to the relatively low seismic risk compared with other jurisdictions in Southern California. Therefore, it is our opinion that seismic slope stability analyses are not required in San Diego County. However, we performed a seismic slope stability analysis in accordance with *Recommended Procedures for Implementation of DMG Special Publication 117A: Guidelines for Analyzing and Mitigating Landslide Hazards in California*, prepared by the Southern California Earthquake Center (SCEC), dated 2008.

The seismic slope stability analysis was performed for the headscarp slope at Section AA-AA' (critical section) using an unweighted acceleration of 0.21g, corresponding to a 10 percent probability of exceedance in 50 years. In addition, a deaggregation analysis was performed on the 0.21g value for the site. A modal magnitude and modal distance of 6.12 and 11.5 kilometers, was determined from the deaggregation analysis. A printout of the deaggregation analysis is provided in Appendix D.

Using the parameters discussed herein, an equivalent site acceleration, k_{EQ}, of 0.101g was calculated to perform the screening analysis, as shown on Figure D-11. This equivalent site acceleration resulted in a factor of safety less than 1.0 (see Figure D-12). A slope is considered acceptable by the screening analysis if the calculated factor of safety is greater than 1.0 using k_{EQ}; therefore, the section analyzed did not pass the screening analysis for seismic slope stability. We then performed a deformation analysis utilizing procedures outlined in Special Publication 117A.

The yield acceleration used in the deformation analysis was determined by establishing the horizontal seismic coefficient necessary to achieve a factor of safety of 1.0 (see Figure D-13). Using a yield acceleration of 0.05, an estimated slope deformation of 0 centimeters is calculated for the overall landslide slope (see Figure D-14). When we use the height of the headscarp slope (approximately 80 feet), the estimated deformation is 12 cm (see Figure D-15). Using the headscarp slope height rather than the overall slope height is conservative. According to Special Publication 117A, displacements up to 15 centimeters are unlikely to correspond to serious landside movement and damage. Additionally, the 12 centimeters deformation would occur over the length of the slide area (3,000 lineal feet) resulting in negligible deformations throughout the slide area.

4.5 Summary

The results of our analyses indicate that the existing slope southwest of the property has a factor of safety of 1.5 or greater under static conditions assuming a bedding plane shear extends behind the landslide headscarp and beneath the mesa for both current groundwater conditions and an assumed 10 foot rise in the groundwater elevation. With respect to seismic slope stability, our analyses indicates that the expected deformation under seismic loading is not likely to cause serious landslide movement. Table 4.5 summarizes the results of the slope stability analyses. Based on our analysis, the existing slopes along the southwest perimeter of the project have an acceptable factor of safety and deformation with respect to both static and seismic conditions.

TABLE 4.5
SUMMARY OF STABILITY ANALYSES

Condition Analyzed	Cross Section	Factor-of-Safety	Estimated Deformation Under Seismic Loading
Along Headscarp	AA-AA’	1.26	--
	BB-BB’	1.34	--
Extended Bedding Plane Shear	AA-AA’	1.53	--
	BB-BB’	1.66	--
At Edge of Development	AA-AA’	1.63	--
	BB-BB’	1.70	--
Groundwater Rise	AA-AA’	1.50	--
	BB-BB’	1.62	--
Higher Exposed Headscarp	AA-AA’	1.53 (at development edge)	--
	BB-BB’	1.50 (at 300 feet from development edge)	--
Seismic Analysis	AA-AA’	--	0 to 12 cm

5. CONCLUSIONS

5.1 The recent geotechnical investigation penetrated the basal slip surface of Landslide A at three locations. Based on this information, two cross sections were developed for use in geologic characterization and performing a slope stability analysis (Cross Sections AA-AA', BB-BB'). The Landslide A geometry was modeled based on this information as well as a geomorphic analysis of various sources (i.e. Lidar terrain, anaglyphic stereo, etc.).

5.2 The results of our stability analysis indicates that the existing static factor of safety of Landslide A is 1.26 and 1.34 for sections AA and BB. The factor of safety at the development margin closest to the headscarp is 1.63 and 1.70 for Sections AA and BB, respectively, confirming the recommended setback of 50 feet. The factor of safety along the most critical surface is 1.53 and 1.66 for sections AA and BB, respectively, assuming a bedding plane shear extends beneath the mesa behind the landslide basal shear surface. The minimum factor of safety occurs approximately 235 feet and 310 feet (sections AA and BB, respectively) northeastward into the development from the landslide margin. A graphic representation of the factors of safety described above is presented on Figure 14.

5.3 With respect to seismic slope stability, the section analyzed (AA-AA') did not pass the screening evaluation, therefore, we performed a deformation analysis utilizing procedures in Special Publication 117A. Using the overall landslide slope height (445 feet), our analysis indicates 0 cm deformation. If we use the landslide headscarp slope height, our analysis indicates a deformation of 12 cm. According to Special Publication 117A, displacements up to 15 centimeters are unlikely to correspond to serious landside movement and damage. Using the steeper landslide headscarp slope height in the seismic analysis rather than the overall gentler landslide slope is a conservative approach. Additionally, the 12 centimeters deformation would occur over the length of the slide area (3,000 lineal feet) resulting in negligible deformations throughout the slide area.

5.4 The following is a list of conservative assumptions used during our slope stability analysis:

1. We used a lower phi angle for the basal slide zone than the laboratory testing yielded (8 degrees versus an average of 18 degrees based on Stark, Choi, Mccone, 2005);
2. We used a lower shear strength for the Otay Formation than the laboratory testing indicated (34 degrees and 450 psf versus an average ultimate value of 35 degrees and 800 psf and average peak value of 43 degrees and 2,200 psf);
3. We assumed that a sheared bentonite bed projects behind the slide and beneath the mesa at the elevation of the basal shear zone;

4. We assumed the basal slip surface is uniformly sloping and not undulatory which is likely the actual geometry. The actual condition, if undulatory, would increase the sliding friction; and

5. We assumed the slide is saturated below the first occurrence of seepage. The groundwater observed is likely a perched condition rather than full saturation of the landslide mass and bedrock unit.

5.5 To address a “what if” scenario, we performed a hypothetical analysis along Cross Section AA-AA’ to evaluate the potential impact on the proposed development assuming that a significant seismically triggered horizontal displacement of the slide mass had occurred. In this exercise we lowered the elevation of the headscarp region adjacent to the development to simulate a smaller resisting landslide mass out in front of the bedrock block that is present beneath the development. Our analysis revealed that the slide mass southwest of the development margin would have to drop at least 50 vertical feet before lowering the factor of safety within the development area below 1.5.

5.6 Groundwater measurements from our borings and a nearby agricultural well on the mesa was the basis for the phreatic surface used in our slope stability analysis. We retained Dudek & Associates to evaluate this information and comment on the potential for seasonal fluctuations, and any future impacts that the proposed development may have on the regional groundwater system. Specifically, they studied the existing storm water infiltration into the undeveloped mesa and surrounding area and compared it to the condition that would be present post-development considering irrigation and storm water infiltration.

5.7 Dudek concluded that the post-development vertical infiltration of storm water into the substrate would be less than the existing condition which is already relatively low as evidenced by our permeability testing, a review of existing soil survey maps and the presence of vernal pools on the mesa. This opinion is supported by the fact that the development will result in a net increase in impervious surface area due to the construction of structures, pavements, etc., and the collection and conveyance of storm water into the project storm drain system that would normally soak into the exposed soils on the mesa.

5.8 Dudek also concluded that the groundwater levels measured/assumed during our study are reasonable for use in our analysis, however, additional groundwater wells would improve characterization of the phreatic surface immediately outside and within the slide mass, and would facilitate recording of the groundwater level in response to seasonal rainfall. A supplemental groundwater monitoring program is currently planned to confirm the measurements obtained during our study. This future study includes the area in the vicinity of Landslide C.

5.9 Rick Engineering Company also performed a hydrology analysis of the project area and concluded that "considering both the infiltration of storm water, and the application of irrigation, the average infiltration volume has decreased in the post-project condition compared to the pre-project condition".

5.10 To address a "what if" scenario, we performed a hypothetical analysis along Cross Section AA-AA' to evaluate the potential impact on the existing landslide mass in the event that the regional water table were to rise. The results of our analysis indicates that groundwater would have to raise 10 feet above the existing level to lower the factor of safety below 1.5 within the development area.

5.11 Several storm water outfall locations were contemplated during the original project design. These features were proposed to discharge storm runoff collected from the project into pronounced drainages within the landslide complex. Although the infiltration data collected from the discharge locations supported a short-term discharge without adverse effects, the potential for scour and injection of storm water into the slide mass during extreme storm events resulted in a requirement to redesign the storm drain system to discharge outside landslide areas.

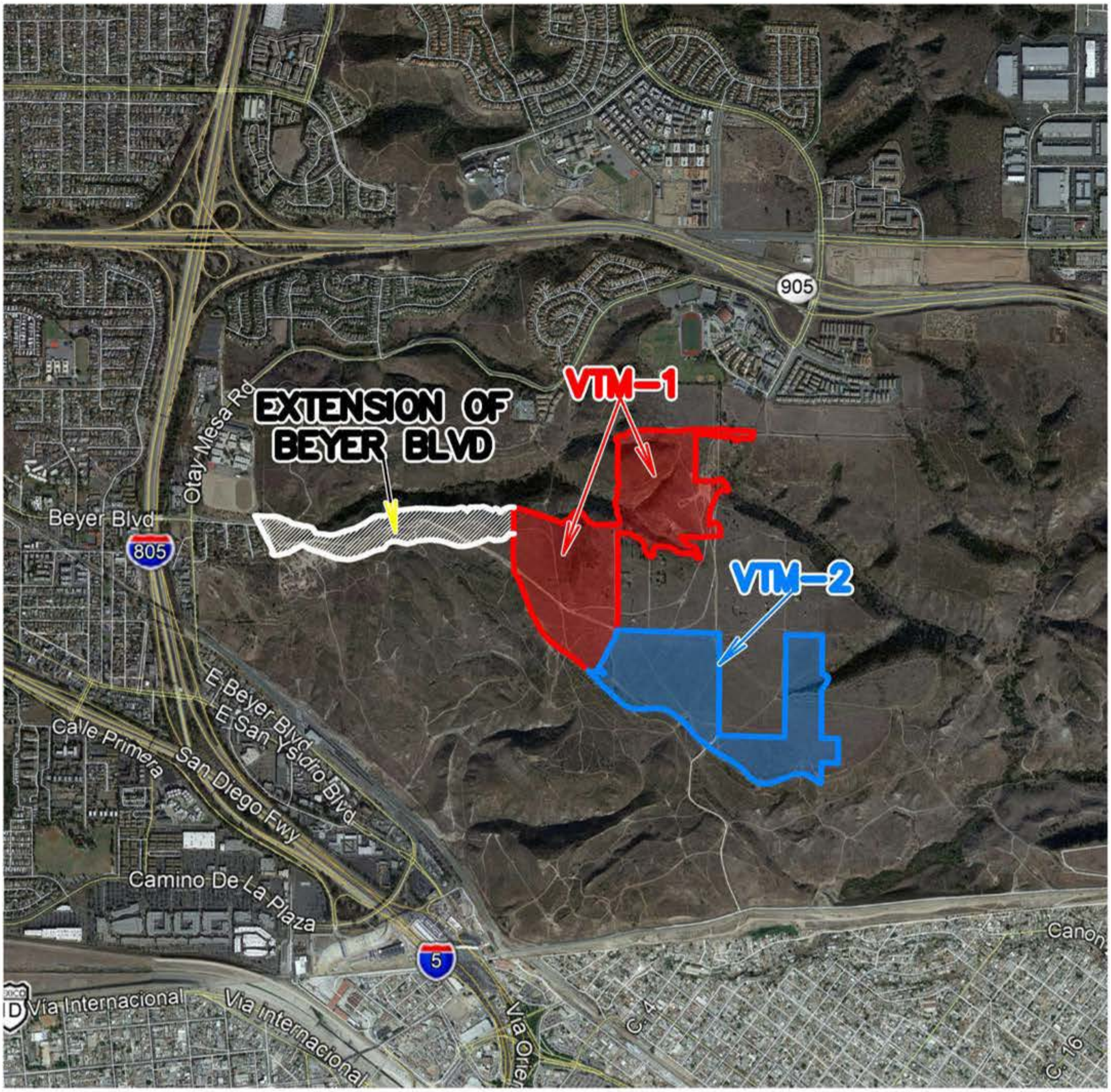
LIMITATIONS AND UNIFORMITY OF CONDITIONS

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

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

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

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



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NO SCALE

VICINITY MAP

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SOUTHWEST VILLAGE
VESTING TENTATIVE MAP 1 AND 2,
BEYER BOULEVARD
SAN DIEGO, CALIFORNIA

DE / RA		DSK/GTYPD	DATE 06 - 25 - 2021	PROJECT NO. 06847 - 42 - 04	FIG. 1

Plotted:06/29/2021 10:23AM | By:RUBEN AGUILAR | File Location:Y:\PROJECTS\06847-42-04 Southwest Village and Burrow Site\DETAILS\06847-42-04 VicinityMap.dwg

OBLIQUE VIEW OF THE SAN YSIDRO LANDSLIDE COMPLEX

SOUTHWEST VILLAGE
VESTING TENTATIVE MAP 1
SAN DIEGO, CALIFORNIA

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SCALE 1" = NTS	DATE 08 - 25 - 2021	FIGURE 2
PROJECT NO. 06847 - 42 - 04		
SHEET 1 OF 1		

MAP VIEW OF THE SAN YSIDRO LANDSLIDE COMPLEX

SOUTHWEST VILLAGE
VESTING TENTATIVE MAP 1
SAN DIEGO, CALIFORNIA

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SCALE 1" = NTS	DATE 06 - 25 - 2021
PROJECT NO. 06847 - 42 - 04	FIGURE 3
SHEET 1 OF 1	

ANAGLYPHIC STEREOSCOPIC IMAGE
OF THE SAN YSIDRO LANDSLIDE COMPLEX

SOUTHWEST VILLAGE
VESTING TENTATIVE MAP 1
SAN DIEGO, CALIFORNIA

GEOCON INCORPORATED
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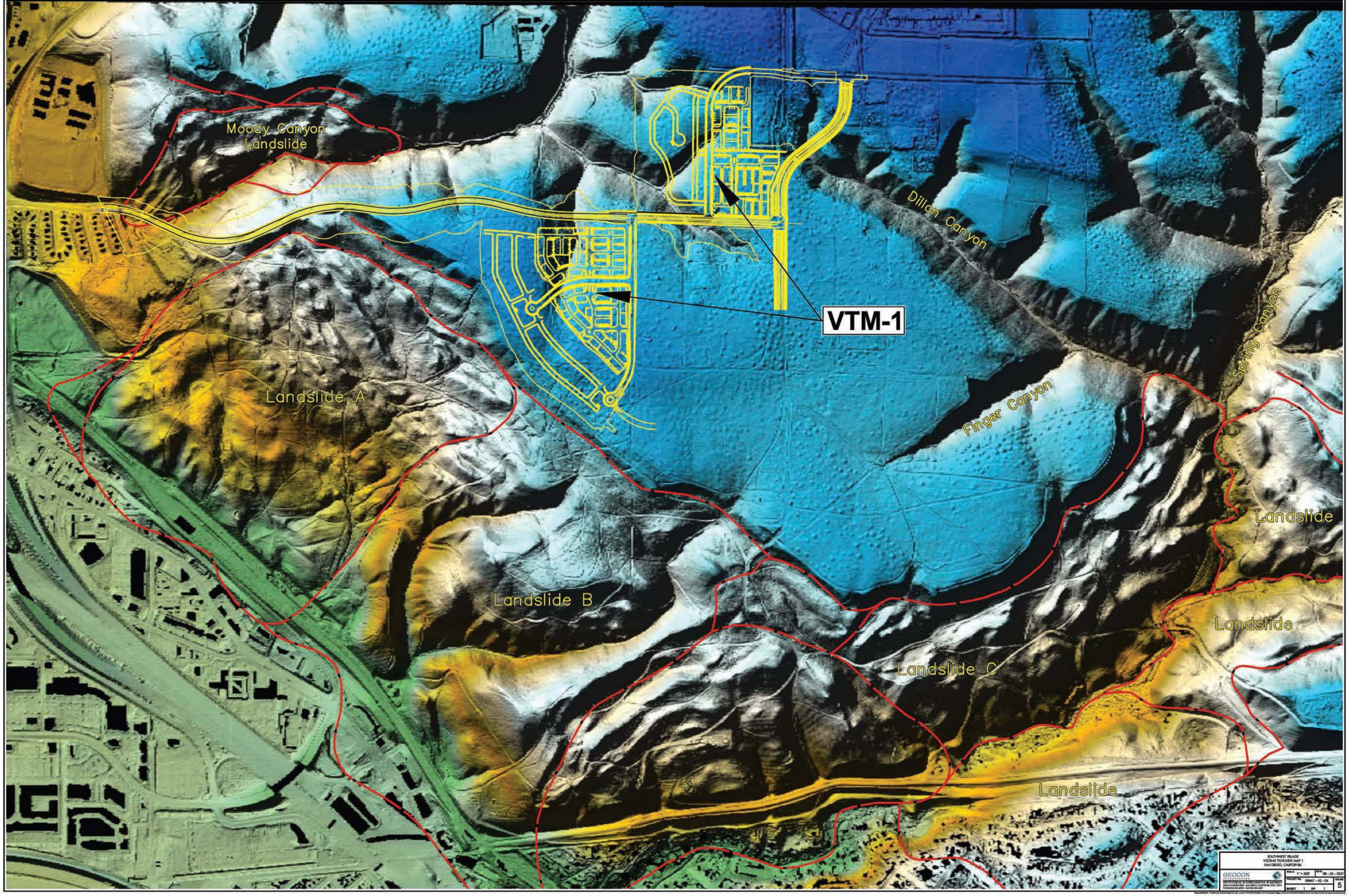
SCALE 1" = NTS	DATE 08 - 25 - 2021	
PROJECT NO. 06847 - 42 - 04		FIGURE 4
SHEET 1 OF 1		

VTM-1 DEVELOPMENT FOOTPRINT; COLOR TERRAIN MAP



SOUTHWEST VILLAGE
VESTING TENTATIVE MAP 1
SAN DIEGO, CALIFORNIA

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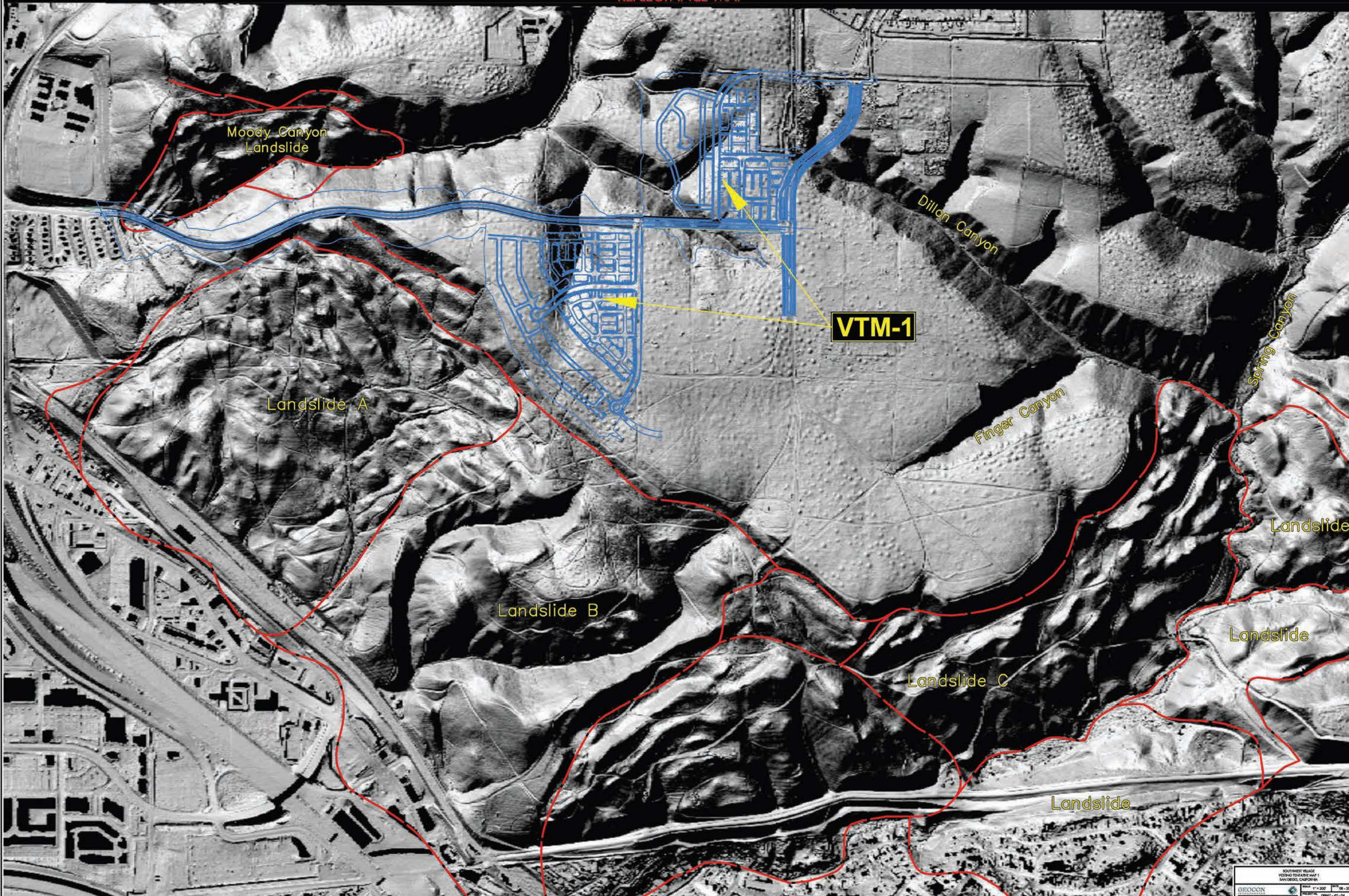
SCALE 1" = 200' | DATE 08 - 25 - 2021
PROJECT NO. 06847 - 42 - 04 | FIGURE 5
SHEET 1 OF 1

VTM-1 DEVELOPMENT FOOTPRINT; TERRAIN
REFLECTANCE MAP



SOUTHWEST VILLAGE
VESTING TENTATIVE MAP 1
SAN DIEGO, CALIFORNIA

GEOCON INCORPORATED
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SCALE 1" = 200'	DATE 08 - 25 - 2021	FIGURE 6
PROJECT NO. 06847 - 42 - 04		
SHEET 1 OF 1		

OBLIQUE IMAGE OF LANDSLIDE A

SOUTHWEST VILLAGE
VESTING TENTATIVE MAP 1
SAN DIEGO, CALIFORNIA

GEOCON INCORPORATED
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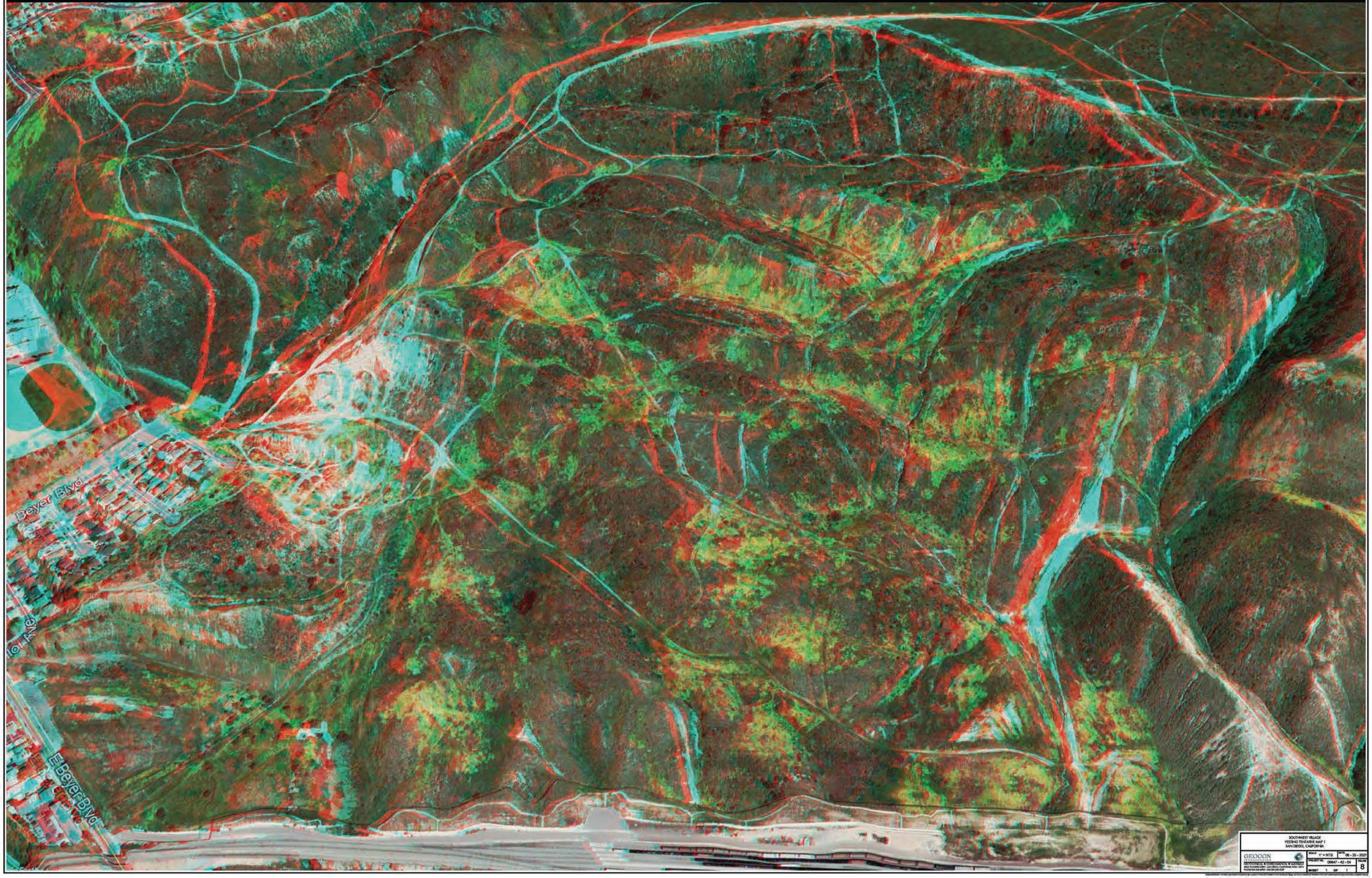
SCALE 1" = NTS	DATE 06 - 25 - 2021	
PROJECT NO. 06847 - 42 - 04		FIGURE 7
SHEET 1 OF 1		

ANAGLYPHIC STEREOSCOPIC IMAGE OF LANDSLIDE A



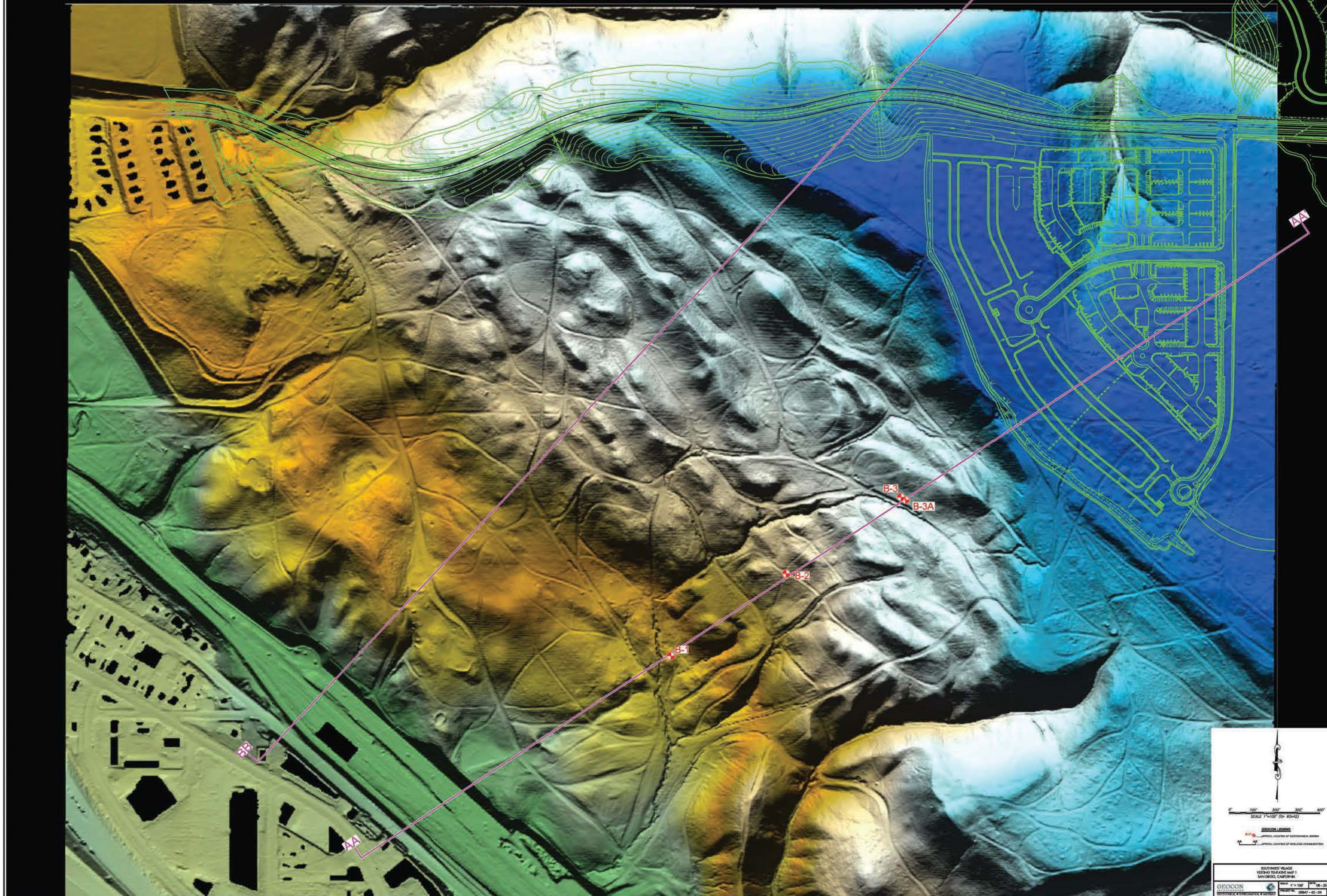
SOUTHWEST VILLAGE
VESTING TENTATIVE MAP 1
SAN DIEGO, CALIFORNIA

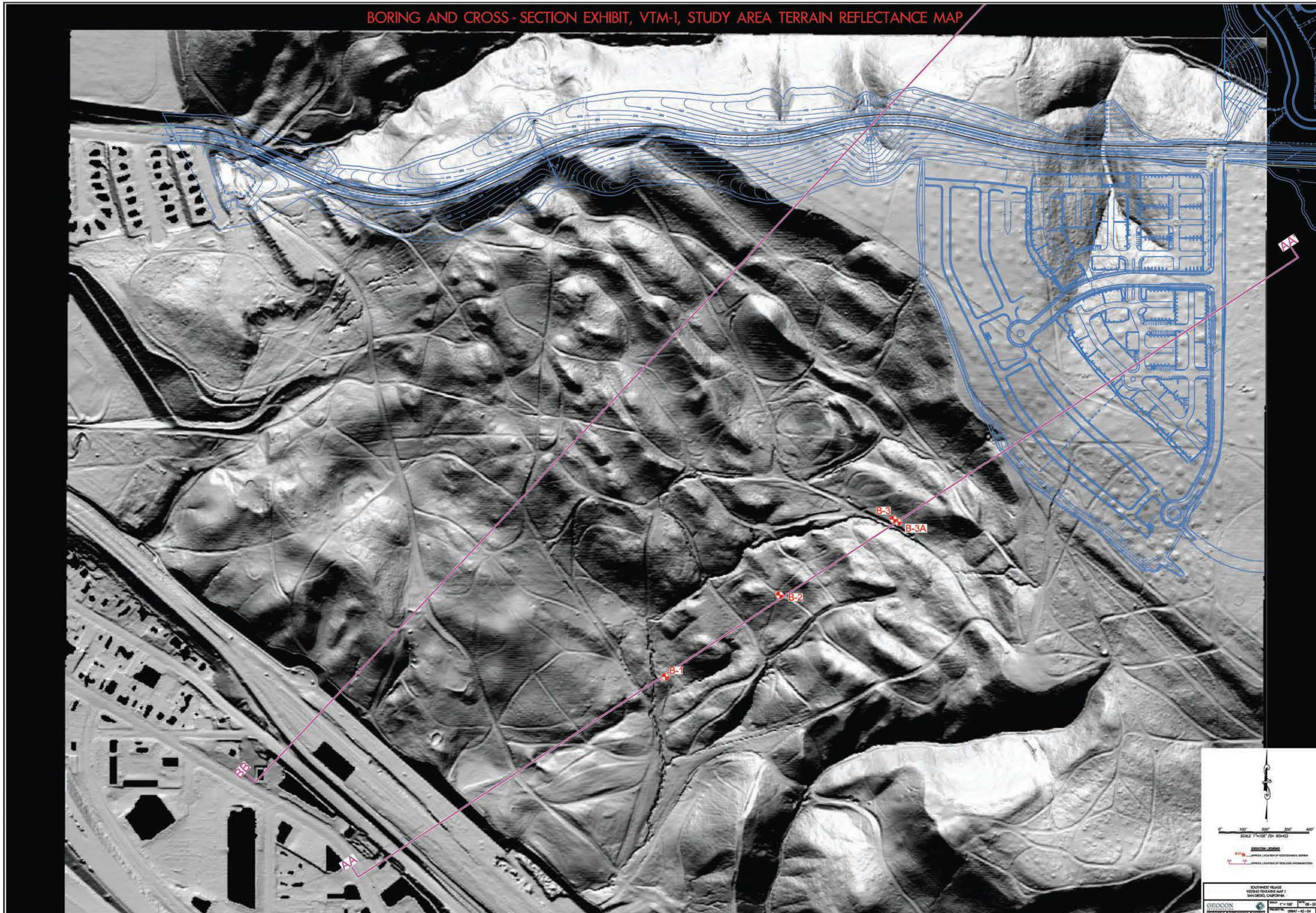
GEOCON INCORPORATED
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS

SCALE 1" = NTS	DATE 06 - 25 - 2021
PROJECT NO. 06847 - 42 - 04	FIGURE 8
SHEET 1 OF 1	

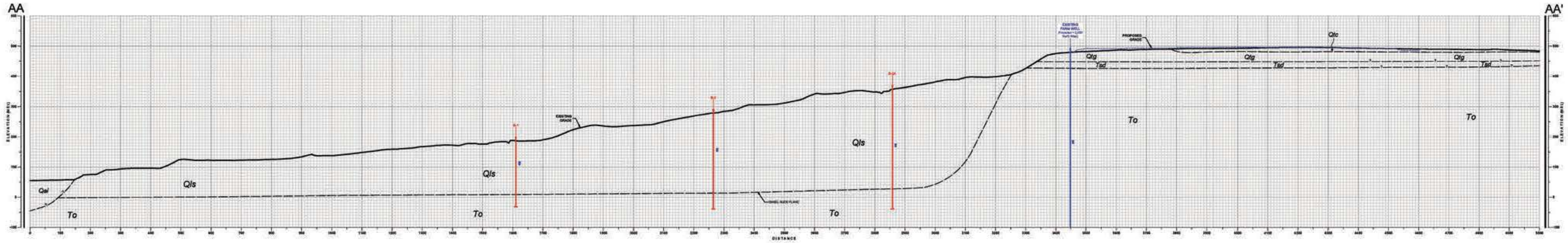
BORING AND CROSS-SECTION EXHIBIT; LANDSLIDE A

BORING AND CROSS - SECTION EXHIBIT - VTM-1 STUDY AREA, COLOR TERRAIN




BORING AND CROSS - SECTION EXHIBIT, VTM-1, STUDY AREA TERRAIN REFLECTANCE MAP
AA
BB
B-1
B-2
B-3
B-3A
0'
100'
200'
300'
400'
SCALE 1"=100' (On 60x42)
GEOCON LEGEND
APPROX. LOCATION OF GEOTECHNICAL BORING
APPROX. LOCATION OF GEOLOGIC CROSS-SECTION
SOUTHWEST VILLAGE
VESTING TENTATIVE MAP 1
SAN DIEGO, CALIFORNIA
GEOCON
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS
SCALE 1" = 100'
DATE 08 - 25 - 2021
PROJECT NO. 06847 - 42 - 04
FIGURE 11
SHEET 1 OF 1

GEOLOGIC CROSS - SECTION AA-AA'



GEOLOGIC CROSS-SECTION AA-AA'

SCALE: 1" = 100' (Vert. = Horiz.)

0' 100' 200' 300' 400'

SCALE 1"=100' (On 60x42)

GEOCON LEGEND

B-2 ....APPROX. LOCATION OF GEOTECHNICAL BORING

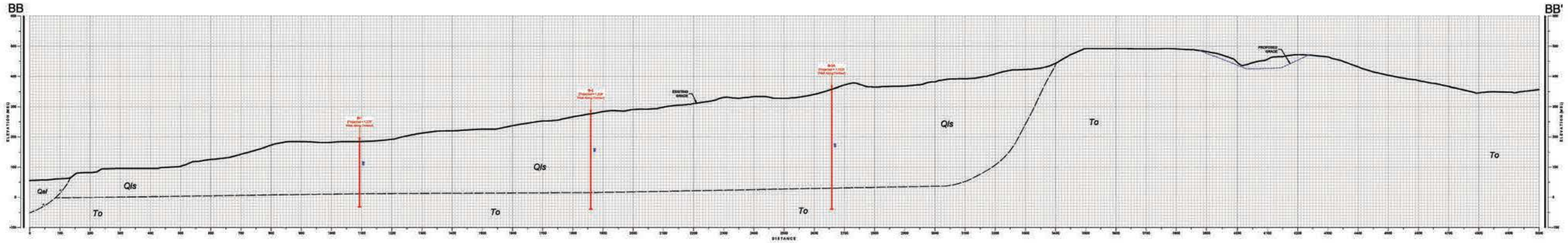
AA AA' ....APPROX. LOCATION OF GEOLOGIC CROSS-SECTION

SOUTHWEST VILLAGE
VESTING TENTATIVE MAP 1
SAN DIEGO, CALIFORNIA

GEOCON INCORPORATED
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS

SCALE 1" = 100'	DATE 06 - 25 - 2021	
PROJECT NO. 06847 - 42 - 04		FIGURE 12
SHEET 1 OF 1		

GEOLOGIC CROSS - SECTION BB-BB'



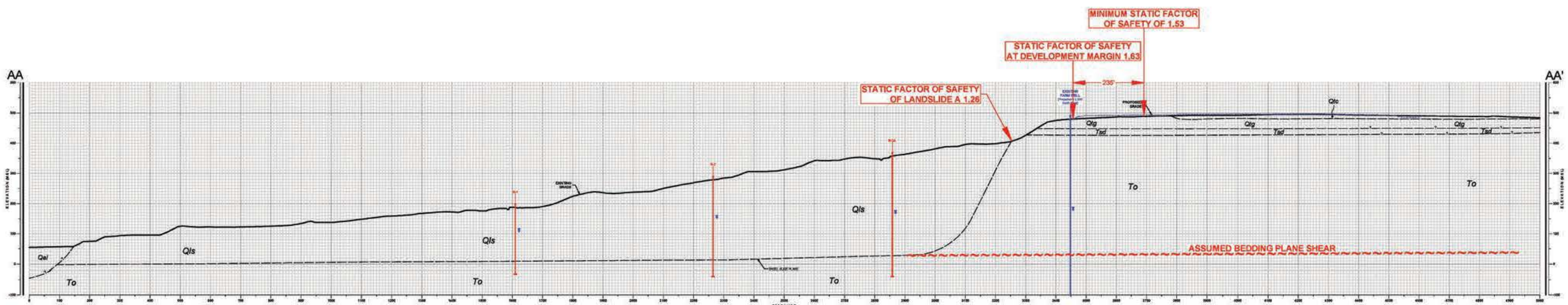
GEOLOGIC CROSS-SECTION BB-BB'
SCALE: 1" = 100' (Vert. = Horiz.)

SOUTHWEST VILLAGE
VESTING TENTATIVE MAP 1
SAN DIEGO, CALIFORNIA

GEOCON INCORPORATED
GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS

SCALE 1" = 100'	DATE 06 - 25 - 2021		FIGURE
PROJECT NO. 06847 - 42 - 04			13
SHEET 1 OF 1			

SLOPE STABILITY SUMMARY



GEOLOGIC CROSS-SECTION AA-AA'

SCALE: 1" = 100' (Vert. = Horiz.)

SOUTHWEST VILLAGE
VESTING TENTATIVE MAP 1
SAN DIEGO, CALIFORNIA

GEOCON	SCALE 1" = 100'	DATE 06 - 26 - 2021
	PROJECT NO. 06847 - 42 - 04	FIGURE 14
	SHEET 1 OF 1	

APPENDIX A

APPENDIX A

FIELD INVESTIGATION

Our field investigation was performed between November 30, 2020 and February 5, 2021, and consisted of a site reconnaissance and the excavation of 4 mud-rotary, continuous core borings (Boring Nos. B1 through 3A). In addition, infiltration tests were performed at several outfall locations and along the mesa top in order to provide information for Dudek's analysis. The approximate locations of the subsurface excavations are shown on Figures 9 through 13, and Figure C-1.

The 4 borings were performed by Cascade Drilling to a maximum depth of 397 feet below existing grade using a CME 85 truck-mounted drill rig equipped with a HQ coring system. The initial attempt for Boring No. 3 was unsuccessful due to drilling difficulties and the hole was abandoned and re-drilled (Boring No. 3A) in close proximity to the original boring. The log of Boring No. 3A presented herein is the second attempt to advance the boring which was successful. A generalized/summary Geologic description of Core Samples are presented on Figures A1 - A3. A Unified Soil Classification System description Core Samples are presenting on Figures A4 - A7. The upper portion of Boring No. 3A was not described to a depth of 142 feet since this sequence was covered by the log for Boring No. 3.

Figures A-8 through A-22 present photographs of the cores. The photographs have been annotated with the approximate depth (in feet) below the ground surface. The numeric designation represents one-foot intervals beginning at the line above the number. The red numbers located to the left of each core box on each page is for descriptive reference. Each core was shaved to expose the geologic features and soil attributes. The cores were examined in a dry condition and then sprayed with water to further evaluate their texture. In some instances photographs of both dry and wet versions of the cores are presented herein.

SOUTHWEST VILLAGE GENERALIZED GEOLOGIC DESCRIPTION

BORING NO. 1

Landslide debris from 0 to 175 feet;

Mixture of cemented sandstone, siltstone and claystone, highly fractured and blocky with disturbed/mottled appearance, brittle appearance, fractures generally range from horizontal to approximately 60 degrees.

- Example of conjugate fractures at 43.5 feet.
- Sheared bentonite/claystone from 54 to 56 feet.
- Sheared bentonite/claystone from 66 to 67.5 feet.
- Perched water surface based on geophysical measurement at 70 feet.
- Sheared bentonite/claystone from 76 to 85 feet; abundant high angle fracturing, marbling and contortion features.
- Sheared bentonite/claystone from 92 through 95 feet.
- Highly fractured from 112 to 122.5 feet.
- Zone of intensely sheared bentonite/claystone from 130 to 157 feet; brecciated, flow banding/webbing.

Basal Shear Zone from 157 to 165.5 feet; Zone of ramp-effected bedrock/slide debris. Multiple repetitive near horizontal fractures with up to ½-inch-thick reddish-brown remolded clay along planar surfaces, possible mechanical disturbance along naturally sheared planes, blocky, 9-foot-thick zone of disturbed bedrock to 175 feet.

- Possible water table based on geophysical measurement at 175.5 feet.

Otay Formation from 175 to 219 feet;

Dense, silty to clayey fine to coarse sandstone (gritstone), cemented/fractured.

BORING TERMINATED AT 219 FEET

Figure A-1

BORING NO. 2

Landslide debris from 0 to 264 feet;

Mixture of cemented sandstone, siltstone and claystone, highly fractured and blocky with disturbed/mottled appearance, brittle appearance, fractures generally range from horizontal to approximately 60 degrees.

- Zone of high angle fracturing in sandstone from 51 to 54 feet.
- Sheared bentonite/claystone from 53.5 to 55.5 feet.
- Highly fractured sandstone from 79 to 85.5 feet.
- Highly fractured claystone from 111 to 115 feet.
- Possible water table based on geophysical measurement at 124 feet.
- Gritstone derived slide material from 131 to 162 feet plus.
- Intermittently coarse grained with gravels beginning at 167 feet.
- Clay/sand/gravel mixtures below 204 feet.
- Coarse grained material becomes marbled with light green clay from 218 to 241 feet, disturbed appearance.

Basal Shear Zone at 264 feet; 5-inch-thick zone of multiple remolded clay planes up to ½-inch-thick, disturbed appearance with gravel sand and clay marbling from 258 through 264 feet, disturbed appearance and mottling to 264.9 feet.

Otay Formation from 264.9 to 318 feet;

Dense silty fine sandstone, cemented.

- Becomes micaceous silty sandstone at 284 feet.
- Becomes thinly bedded with low angle bedding at 309.

BORING TERMINATED AT 318 FEET

Figure A-2

BORING NO. 3A

Landslide debris from 0 to 332 feet;

Mixture of cemented sandstone, siltstone and claystone, highly fractured and blocky with disturbed/mottled appearance, brittle appearance, fractures generally range from horizontal to approximately 45 degrees.

- Zone of clayey gravel/cobble from 35.5 to 58 feet, disturbed appearance.
- Sheared bentonite/claystone from 83.9 to 87.5 feet.
- Zone of high angle fracturing in sandstone from 107 to 117 feet, contorted bentonite bed from 115 to 117 feet.
- Possible water table based on geophysical measurement at 175.3 feet.
- Gritstone derived slide material at 175 to 192 plus.
- Becomes intermittently coarse grained with some gravels at 193 feet.
- Very coarse grained between 212 and 242 feet.
- Green clay marbling at 268 feet.
- Cobbly zone from 304 to 316.5 feet.
- Becomes reddish brown and light green mottled claystone/siltstone at 316.5 feet.
- 10-inch-thick stiff clay zone at 323 feet with several well developed remolded planes, light green clay marbling appears to be twisted/sheared and truncated, stiff with a disturbed appearance below.

Basal Shear Zone from 328 to 332; 4-foot-thick zone of viscous/plastic deformation, mélange of reddish-brown slightly to moderately remolded clay and olive-grey clayey fine sand, chaotic/marbled/disturbed/twisted appearance.

Otay Formation from 332 to 397 feet;

Dense silty F-M sandstone, micaceous

- Thin horizontal to slightly dipping bedding from 355 to 396.

BORING TERMINATED AT 397 FEET

Figure A-3

CORE B 1

ELEV. (MSL.) 184.76' DATE COMPLETED 12-01-2020

EQUIPMENT CME 75 WITH HQ Core BY: RSA/GWC

DEPTH IN FEET	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	RUN (Feet)	RECOVERY (Feet)	BOX
15			**LANDSLIDE DEBRIS**			
16–21		CL	(Boring cased to 15 feet; not logged) Hard, damp, dark gray, Silty CLAYSTONE; brecciated with several high angle polished parting surfaces/fractures ±45°	5'	5'	1
21–26		ML	Hard, damp, dark gray, very fragmented, Sandy SILTSTONE with silty claystone interbeds; few fractures; massive	5'	4.8'	1
26–31			-Few high angle parting surfaces -6-inch thick, loose, very fine grained sandstone bed at 28 feet	5'	5'	2
31–36				5'	5'	2
36–41			-Becomes clayey siltstone with trace oxidation and mottling; massive; few high angle planar fractures	5'	5'	3
41–46		CL	Hard, damp, gray to dark gray, Silty CLAYSTONE; brecciated zones with clay filled fractures -Conjugate fractures at 43.5 feet	5'	4.5'	3
46–		SM & CL	Medium dense to dense, damp to moist, gray to dark gray, interbedded very fine grained, Silty SANDSTONE and hard, Sandy CLAYSTONE; brecciated; fractured with few high angle (±30 feet) parting surfaces and near vertical bedding	5'	5'	4

Depth scale: 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45

Y:\PROJECTS\06847-42-04 Southwest Village and Burrow Site\Core Logs\06847-42-04 CoreLog-B1.dwg

Figure A-4,
Log of Core B 1, Page 1 of 7

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

GEOCON

CORE B 1

ELEV. (MSL.) 184.76' DATE COMPLETED 12-01-2020

EQUIPMENT CME 75 WITH HQ Core BY: RSA/GWC

DEPTH IN FEET	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	RUN (Feet)	RECOVERY (Feet)	BOX
47		SM & CL				
49				5'	5'	
51		CL	Very stiff, dark gray, Silty CLAYSTONE with few sandy siltstone interbeds/zones; brecciated			4
53				5'	4.5'	
			-Sheared bentonite/claystone from 54 to 56 feet			
55						
57		ML/CL	Very stiff, damp to moist, dark gray, Silty CLAYSTONE/Clayey SILTSTONE; brecciated with numerous chunks of claystone set in matrix; slight oxidation and mottling			
59				5'	5'	
61						5
63				5'	5'	
65						
			-Sheared bentonite/claystone from 66 to 67.5 feet			
67						
69				5'	4.5'	
	▽		-Perched groundwater surface at 70 feet based on geophysical measurement			
71						6
73				5'	3'	
75			Hard, moist, light olive, fine, Sandy CLAYSTONE/dense, Clayey SANDSTONE, intraformational clasts			
			-Sheared bentonite/claystone from 76 to 85 feet; abundant high angle fracturing, marbling and contortion features			
77		CL/SC	-High angle fractures; pinkish tint	5'	4'	7

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Figure A-4,
Log of Core B 1, Page 2 of 7

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

GEOCON

CORE B 1

ELEV. (MSL.) 184.76' DATE COMPLETED 12-01-2020

EQUIPMENT CME 75 WITH HQ Core BY: RSA/GWC

DEPTH IN FEET	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	RUN (Feet)	RECOVERY (Feet)	BOX
79						
80		CL/SC	-High angle fractures	5'	4'	7
82			-Poor recovery			
83			-High angle fractures	5'	1.5'	
88			-Poor recovery	5'	2.5'	
92			-Sheared bentonite/claystone from 92 to 95 feet	5'	5'	8
96		SC	Light olive, massive, Clayey, fine SANDSTONE			
98		SC/CL	Light olive, massive with intraformational clasts, Sandy CLAYSTONE/Clayey SANDSTONE	5'	4'	
104				5'	5'	9
105			-Indurated layer 10-12 inches thick with high angle fractures			
106		ML	-Light olive, fine, Sandy SILTSTONE; massive; brecciated			
109		SC	Light olive, massive, Clayey, fine SANDSTONE	5'	3.5'	

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Figure A-4,
Log of Core B 1, Page 3 of 7

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

GEOCON

CORE B 1

ELEV. (MSL.) 184.76' DATE COMPLETED 12-01-2020

EQUIPMENT CME 75 WITH HQ Core BY: RSA/GWC

DEPTH IN FEET	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	RUN (Feet)	RECOVERY (Feet)	BOX
111		SC		5'	3.5'	9
112–113			-Highly fractured from 112 to 122.5 feet; with abundant mica present			
115				5'	1.5'	
117		SM	Light olive, massive, Silty, fine SANDSTONE; numerous high angle fractures			10
119				5'	4'	
121						
122		SC	Light olive, massive, Clayey SANDSTONE; micaceous			
123						
125				5'	5'	
127			-Increasing clay with pinkish tint			
129				5'	5'	11
130–131		SC/CL & CH	Light olive Sandy CLAY/Clayey SAND; zone of intensely sheared bentonite/claystone from 130 to 157 feet; brecciated with flow banding/webbing			
133						
135				5'	5'	
137						
139				5'	2.5'	12
141						
				5'	5'	

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Figure A-4,
Log of Core B 1, Page 4 of 7

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

GEOCON

CORE B 1

ELEV. (MSL.) 184.76' DATE COMPLETED 12-01-2020

EQUIPMENT CME 75 WITH HQ Core BY: RSA/GWC

DEPTH IN FEET	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	RUN (Feet)	RECOVERY (Feet)	BOX
143						
145				5'	5'	12
147		SC/CL				
149				5'	5'	
151						
153						13
155				5'	5'	
157		SM & CL & ML	**BASAL SHEAR ZONE** from 157 to 165.5 feet; zone of ramp-effected bedrock/slide debris (SANDSTONE, CLAYSTONE AND SILTSTONE); multiple repetitive near horizontal fractures with up to 1/2-inch thick, reddish brown remolded clay along planar surfaces; possible mechanical disturbance along naturally sheared planes; blocky; 9-foot thick zone of disturbed bedrock to 175 feet			
159				5'	5'	
161						
163						14
165				5'	5'	
167						
169				5'	5'	
171						15
173				5'	5'	

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Figure A-4,
Log of Core B 1, Page 5 of 7

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

GEOCON

CORE B 1

ELEV. (MSL.) 184.76' DATE COMPLETED 12-01-2020

EQUIPMENT CME 75 WITH HQ Core BY: RSA/GWC

DEPTH IN FEET	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	RUN (Feet)	RECOVERY (Feet)	BOX
175	▼	SM	**OTAY FORMATION** Dense, moist, orange brown, fine to coarse, Silty SANDSTONE; massive gritstone; cemented/fractured -Possible water table at 175.5 feet based on geophysical measurement	5'	5'	15
177						
179			-4-inch thick cemented zones between 179 feet and 181.5 feet	5'	5'	
181						16
183						
185				5'	5'	
187						
189				5'	5'	17
191			-Becomes very coarse and gravelly in areas below 190 feet			
193						
195				5'	5'	18
197						
199			-Some carbonate filled fractures present	5'	5'	
201						
203						
205				5'	4.5'	
						19

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Figure A-4,
Log of Core B 1, Page 6 of 7

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

GEOCON

DEPTH IN FEET	GROUNDWATER	SOIL CLASS (USCS)	**CORE B 1** ELEV. (MSL.) 184.76' DATE COMPLETED 12-01-2020 EQUIPMENT CME 75 WITH HQ Core BY: RSA/GWC	RUN (Feet)	RECOVERY (Feet)	BOX
			MATERIAL DESCRIPTION			
207						
209				5'	5'	
211						19
213		SM				
215				5'	4.5'	
217						20
				2'	1.8'	
219			**BORING TERMINATED AT 218.5 FEET BELOW GROUND SURFACE** **Backfilled 12/04/2020**			
221						
223						
225						
227						
229						
231						
233						
235						
237						

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Figure A-4,
Log of Core B 1, Page 7 of 7

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

GEOCON

CORE B 2

ELEV. (MSL.) 278.81' DATE COMPLETED 12-07-2020

EQUIPMENT CME 75 WITH HQ Core BY: G. CANNON

DEPTH IN FEET	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	RUN (Feet)	RECOVERY (Feet)	BOX
26		CL	**LANDSLIDE DEBRIS** (Boring cased to 26 feet; not logged) Hard, moist, olive, Silty CLAYSTONE; blocky	1'	1'	1
28 - 32			-Highly cemented, vigorous reaction to HCl -Becomes very hard with intraformational clasts	5'	5'	1
32 - 37				5'	5'	1
37 - 42				5'	5'	2
43		SC	Dense, moist, Clayey SANDSTONE; massive	5'	2.5'	2
49		SC/CL	Dense, light olive, Clayey SANDSTONE/ hard, Sandy CLAYSTONE; high and low angle filled fractures, becomes pinkish gray with depth -Zone of high angle fracturing in sandstone from 51 to 54 feet	5'	5'	2 / 3
53.5		CH & CL	Hard, moist, olive and pink, Silty CLAYSTONE; with sheared bentonite/claystone from 53.5 to 55.5 feet	5'	5'	3
56		ML	Very stiff, moist to wet, olive, fine, Sandy SILTSTONE; massive	5'	5'	3

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Figure A-5,
Log of Core B 2, Page 1 of 10

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

GEOCON

CORE B 2

ELEV. (MSL.) 278.81' DATE COMPLETED 12-07-2020

EQUIPMENT CME 75 WITH HQ Core BY: G. CANNON

DEPTH IN FEET	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	RUN (Feet)	RECOVERY (Feet)	BOX
58		ML				
						3
60				5'	5'	
62		CL	Hard, moist, olive, CLAYSTONE; with trace gravel			
64		ML	Dense, moist, light olive, Sandy SILTSTONE with clay, massive	5'	5'	4
66		CL	Hard, moist, olive CLAYSTONE			
68		ML	Hard, moist, olive, Sandy SILTSTONE			
70				5'	5'	
			-High angle fracture			
72			-Highly cemented SANDSTONE bed at 72.5 feet			
74		CL	Very stiff, moist, wet, Silty CLAY with white calcium carbonate pods	5'	4'	
76						5
78						
80		SM	Dense, moist, light olive, Silty, fine SANDSTONE; highly fractured from 79 to 85.5 feet	5'	5'	
82						
84				5'	5'	
86						6
88		CL	Hard, moist, olive, CLAYSTONE	5'	5'	

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Figure A-5,
Log of Core B 2, Page 2 of 10

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

GEOCON

CORE B 2

ELEV. (MSL.) 278.81' DATE COMPLETED 12-07-2020

EQUIPMENT CME 75 WITH HQ Core BY: G. CANNON

DEPTH IN FEET	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	RUN (Feet)	RECOVERY (Feet)	BOX
90				5'	5'	6
92		CL	-High angle shear	5'	5'	7
94						
96						
98				5'	5'	8
100						
102		ML	Hard, moist, light gray, fine ,Sandy SILTSTONE	5'	5'	
104						
105		SM	Dense, damp, gray, Silty SANDSTONE			
106						
108				5'	5'	
109.5		CL	Hard, light olive, Silty CLAYSTONE; highly fractured from 111 to 115 feet			
110						
112				5'	5'	9
114			-Becomes Sandy CLAYSTONE below 115 feet			
116		SC	Dense, light olive, Clayey SANDSTONE			
118				5'	5'	
120						10

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Figure A-5,
Log of Core B 2, Page 3 of 10

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

GEOCON

CORE B 2

ELEV. (MSL.) 278.81' DATE COMPLETED 12-07-2020

EQUIPMENT CME 75 WITH HQ Core BY: G. CANNON

DEPTH IN FEET	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	RUN (Feet)	RECOVERY (Feet)	BOX
122		SM	Dense, light gray, Silty, fine to very coarse SANDSTONE			
124	▼		-Possible water table at 124 feet based on geophysical measurement	4'	3.5'	10
126				1'	1'	
128–130				5'	5'	
131			-Becomes coarser grained below 131 feet (Gritstone)			
132–136				5'	5'	11
137–141				5'	5'	
142–146				5'	5'	12
147–151				5'	5'	
152				5'	5'	13

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Figure A-5,
Log of Core B 2, Page 4 of 10

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

GEOCON

CORE B 2

ELEV. (MSL.) 278.81' DATE COMPLETED 12-07-2020

EQUIPMENT CME 75 WITH HQ Core BY: G. CANNON

DEPTH IN FEET	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	RUN (Feet)	RECOVERY (Feet)	BOX
154		SM				13
156				5'	5'	
158						
160				5'	5'	
162						14
164				5'	5'	
166						
168			-Becomes intermittently coarse grained with clay and gravels below 167 feet			
170				5'	5'	
172						
174				5'	5'	
176						15
178						
180				5'	5'	
182						
184				5'	5'	16

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Figure A-5,
Log of Core B 2, Page 5 of 10

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

GEOCON

CORE B 2

ELEV. (MSL.) 278.81' DATE COMPLETED 12-07-2020

EQUIPMENT CME 75 WITH HQ Core BY: G. CANNON

DEPTH IN FEET	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	RUN (Feet)	RECOVERY (Feet)	BOX
186		SM		5'	5'	16
188–192				5'	5'	
192		CL	Light brown with occasional light green mottling, fine, Sandy CLAYSTONE	5'	4½'	17
198				1½'	1½'	
200			-Numerous coarse subangular quartz grains present	3'	3'	
204		SC & SM	Dense, light olive, Silty to Clayey, fine to very coarse SANDSTONE with some gravels	5'	4'	18
212					MISSING	
214				5'	4½'	19
217			-Gravel content increases below 217 feet	3'	3'	

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Figure A-5,
Log of Core B 2, Page 6 of 10

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

GEOCON

CORE B 2

ELEV. (MSL.) 278.81' DATE COMPLETED 12-07-2020

EQUIPMENT CME 75 WITH HQ Core BY: G. CANNON

DEPTH IN FEET	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	RUN (Feet)	RECOVERY (Feet)	BOX
218		SC & SM	-Coarse grained material becomes marbled with light green clay from 218 to 241 feet	3'	3'	19
220				3'	3'	
222–226				5'	5'	20
227–231				5'	5'	
232–236			-Cobble size rock fragments present below 236.5 feet	5'	5'	21
237–240				4'	4'	
241–248			-No return from 241 to 248 feet due to problems with drill rig		MISSING	
248		CL	Hard, medium brown, fine to coarse, Sandy CLAYSTONE	5'	4½'	22

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Figure A-5,
Log of Core B 2, Page 7 of 10

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

GEOCON

CORE B 2

ELEV. (MSL.) 278.81' DATE COMPLETED 12-07-2020

EQUIPMENT CME 75 WITH HQ Core BY: G. CANNON

DEPTH IN FEET	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	RUN (Feet)	RECOVERY (Feet)	BOX
250		CL				
252				5'	4½'	
254			-Occasional gravel present			22
256				5'	5'	
258			-Becomes disturbed with sand, clay and gravel marbling from 258 to 264 feet; disturbed appearance			
260				4'	2½'	
262				1'	1'	
264			**BASAL SHEAR ZONE** at 264 feet; 5-inch thick zone of multiple remolded clay planes up to 1/2-inch thick; disturbed appearance and mottling to 264.9 feet			23
266		SM	**OTAY FORMATION** Dense, moist, Silty, fine SANDSTONE; cemented	5'	5'	
268						
270				5'	5'	
272						
274						24
276				5'	5'	
278						
280				5'	5'	25

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Figure A-5,
Log of Core B 2, Page 8 of 10

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

GEOCON

CORE B 2

ELEV. (MSL.) 278.81' DATE COMPLETED 12-07-2020

EQUIPMENT CME 75 WITH HQ Core BY: G. CANNON

DEPTH IN FEET	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	RUN (Feet)	RECOVERY (Feet)	BOX
282		SM		5'	5'	
284			-Becomes micaceous at 284 feet	5'	5'	25
286						
288						
290				5'	5'	
292						26
294						
296				5'	5'	
298						
300				5'	5'	
302						27
304						
306				5'	5'	
308						
			-Becomes thinly bedded with low angle bedding at 309 feet			
310						
312				5'	5'	28
				5'	5'	

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Figure A-5,
Log of Core B 2, Page 9 of 10

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

GEOCON

CORE B 2

ELEV. (MSL.) 278.81' DATE COMPLETED 12-07-2020

EQUIPMENT CME 75 WITH HQ Core BY: G. CANNON

DEPTH IN FEET	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	RUN (Feet)	RECOVERY (Feet)	BOX
314		SM				
316				5'	5'	28
318			BORING TERMINATED AT 318 FEET			
320						
322						
324						
326						
328						
330						
332						
334						
336						
338						
340						
342						
344						

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Figure A-5,
Log of Core B 2, Page 10 of 10

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

GEOCON

CORE B 3

ELEV. (MSL.) 359.93' DATE COMPLETED 12-18-2020

EQUIPMENT CME 75 WITH HQ Core BY: G. CANNON

DEPTH IN FEET	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	RUN (Feet)	RECOVERY (Feet)	BOX
30			**LANDSLIDE DEBRIS** (Boring cased to 30 feet; not logged)			
32		CL	Very stiff, olive, Sandy CLAYSTONE	1'	1'	1
34				5'	5'	
36		GC	Light gray, Clayey GRAVEL/CONGLOMERATE; gravel and cobble size rock fragments; disturbed appearance from 35.5 to 58 feet			
38–40				5'	1'	
42–44				4'	3'	
46				1'	1'	2
48				1'	1'	
48–50				2'	2'	
50				1'	1'	
52				2'	1.75'	
54				MISSING		
56				3'	0.5'	
58–60		SM	Dense, olive, Silty SANDSTONE; vigorous reaction to HCL	5'	4'	3

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Figure A-6,
Log of Core B 3A, Page 1 of 4

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

GEOCON

CORE B 3

ELEV. (MSL.) 359.93' DATE COMPLETED 12-18-2020

EQUIPMENT CME 75 WITH HQ Core BY: G. CANNON

DEPTH IN FEET	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	RUN (Feet)	RECOVERY (Feet)	BOX
62						
64				5'	1'	
66						
67		CL	Hard, olive brown, CLAYSTONE			
68						3
70				5'	1.5'	
72						
74			-Becomes waxy	3'	3'	
76				2'	2'	
78						
80				5'	4½'	4
82		SM	Light olive, Silty, fine SANDSTONE			
			-Sharp contact			
84		CL	Hard, olive, CLAYSTONE; sheared bentonite/claystone present from 83.9 to 87.5 feet	4½'	4½'	
86						
				1/2'	1/2'	
88						
90				5'	4'	5
92		SM	Dense, olive, Silty, fine SANDSTONE			
			-Horizontally laminated; abundant mica	5'	5'	

Figure A-6,
Log of Core B 3A, Page 2 of 4

GEOCON

CORE B 3

ELEV. (MSL.) 359.93' DATE COMPLETED 12-18-2020

EQUIPMENT CME 75 WITH HQ Core BY: G. CANNON

DEPTH IN FEET	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	RUN (Feet)	RECOVERY (Feet)	BOX
94		SM				
				5'	5'	5
96		CL	Hard, olive CLAYSTONE			
		SC	Olive, Clayey SANDSTONE			
98						
				5'	5'	
100						
102						6
104				5'	5'	
106						
			-Zone of high angle fracturing from 107 to 117 feet			
108						
110				5'	5'	
112						7
114				3½'	3½'	
			-Sharp horizontal contact			
		CH	Hard, pink, waxy CLAYSTONE; bentonitic; contorted from 115 to 117 feet			
116				1½'	1½'	
		CL	Hard, olive, CLAYSTONE			
118						
				5'	5'	
120						
		SC & SM	Olive, Silty to Clayey SANDSTONE			
122						8
124				5'	5'	
			-Caliche, vigorous reaction to HCL			

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Figure A-6,
Log of Core B 3A, Page 3 of 4

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

GEOCON

CORE B 3

ELEV. (MSL.) 359.93' DATE COMPLETED 12-18-2020

EQUIPMENT CME 75 WITH HQ Core BY: G. CANNON

DEPTH IN FEET	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	RUN (Feet)	RECOVERY (Feet)	BOX
126		SC & SM		5'	5'	8
128						
130				5'	5'	9
132			-Gravels present			
132		SM	Olive, fine SANDSTONE; micaceous			
134				5'	3'	
136						
138			-Becomes clayier and micaceous			10
140		CL	Light olive, CLAYSTONE	5'	4½'	
142						
144		SM	Gray, fine SANDSTONE	5'	5'	
146						
148						11
150			-Sharp contact	5'	5'	
150		CL	-Hard, CLAYSTONE			
152		SM	Medium gray, fine SANDSTONE			
154		CL	Hard, light olive, Silty CLAYSTONE	5'	4½'	12
156						
			BORING ABANDONED AT 157 FEET			

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Figure A-6,
Log of Core B 3A, Page 4 of 4

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

GEOCON

CORE B 3A

ELEV. (MSL.) 359.61' DATE COMPLETED 01-15-2021

EQUIPMENT CME 75 WITH HQ Core BY: G. CANNON

DEPTH IN FEET	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	RUN (Feet)	RECOVERY (Feet)	BOX
142		CL	**LANDSLIDE DEBRIS (Cont.)** **(See Core Log for B3 for description above 142 feet)**			
		SM	Hard, light olive, CLAYSTONE			
144			Dense, light olive, fine SANDSTONE; horizontal bedding	5'	5'	
146						
148						1
		CL	Hard, CLAYSTONE, vigorous reaction to HCl; with interbeds of sandstone	5'	4'	
150						
152						
154						
156						
				5'	5'	
158						
						2
160						
162		SM/SC	Dense, damp, gray, Silty/Clayey SANDSTONE			
164				5'	5'	
		CL	Hard, olive CLAYSTONE, waxy			
166						
168						
170			-Becomes sandier			
		SM	Dense, fine to medium SANDSTONE	5'	5'	3
172						

Y:\PROJECTS\06847-42-04 Southwest Village and Burrow Site\Core Logs\06847-42-04 CoreLog-B3A.dwg

Figure A-7,
Log of Core B 3B, Page 1 of 8

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

GEOCON

CORE B 3A

ELEV. (MSL.) 359.61' DATE COMPLETED 01-15-2021

EQUIPMENT CME 75 WITH HQ Core BY: G. CANNON

DEPTH IN FEET	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	RUN (Feet)	RECOVERY (Feet)	BOX
174		SM	-Becomes coarser grained below 175 feet (Gritstone) -Possible water table at 175.3 feet based on geophysical measurement	5'	5'	4
176			-Cobble fragment -Becomes fine to coarse SANDSTONE			
178						
180				5'	5'	
182			-1-foot thick, hard, light yellow brown, fine to coarse, Sandy CLAYSTONE bed at 182			
		SC	Very dense, Clayey, fine to coarse SANDSTONE with gravel			
184				5'	4½'	5
186						
188						
190				5'	5'	
192			-Becomes intermittently coarse grained with some gravels at 193 feet			
194				5'	5'	6
196						
198						
200				...'	...'	
202						
204			-6-inch thick claystone bed at 204 feet	5'	4'	7

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Figure A-7,
Log of Core B 3B, Page 2 of 8

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

GEOCON

CORE B 3A

ELEV. (MSL.) 359.61' DATE COMPLETED 01-15-2021

EQUIPMENT CME 75 WITH HQ Core BY: G. CANNON

DEPTH IN FEET	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	RUN (Feet)	RECOVERY (Feet)	BOX
206		SC		5'	4'	
208–212				5'	5'	7
212			-Becomes very coarse grained between 212 and 242 feet			
212–222				5'	5'	8
222–227				5'	5'	9
228			-Some gravel up to 3 inches			
227–232				5'	5'	
232			-Gravel and cobble size rock fragments up to 3-4 inches			
232–237				5'	5'	10
237				5'	3'	

Figure A-7,
Log of Core B 3B, Page 3 of 8

GEOCON

CORE B 3A

ELEV. (MSL.) 359.61' DATE COMPLETED 01-15-2021

EQUIPMENT CME 75 WITH HQ Core BY: G. CANNON

DEPTH IN FEET	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	RUN (Feet)	RECOVERY (Feet)	BOX
238		SC				
240				5'	3'	10
242						
244				5'	4'	
246		CL	Very hard, CLAYSTONE			
248		SC	Dense, Clayey, fine to coarse SANDSTONE; some gravel			11
250				5'	4½'	
252						
254				5'	5'	
256						12
258						
260				5'	5'	
262						
264				5'	5'	
266						13
268			-Some green clay marbling at 268 feet with increase in cobble size rock fragments below	5'	5'	

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Figure A-7,
Log of Core B 3B, Page 4 of 8

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

CORE B 3A

ELEV. (MSL.) 359.61' DATE COMPLETED 01-15-2021

EQUIPMENT CME 75 WITH HQ Core BY: G. CANNON

DEPTH IN FEET	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	RUN (Feet)	RECOVERY (Feet)	BOX
270		SC		5'	5'	13
272 – 274				3'	3'	14
276				2'	2'	
277 – 282		CL	Hard, dark brown, CLAYSTONE	5'	3¾'	
282 – 287			-Becomes fine to coarse, Sandy CLAYSTONE	5'	5'	15
287 – 292			-No return	5'	0'	
292 – 297				5'	5'	
297 – 302				5'	5'	16

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Figure A-7,
Log of Core B 3B, Page 5 of 8

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

GEOCON

CORE B 3A

ELEV. (MSL.) 359.61' DATE COMPLETED 01-15-2021

EQUIPMENT CME 75 WITH HQ Core BY: G. CANNON

DEPTH IN FEET	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	RUN (Feet)	RECOVERY (Feet)	BOX
302		CL				
304		GC/GM	Reddish brown, Sandy/Clayey GRAVEL/CONGLOMERATE	5'	5'	16
306						
308				2½'	2½'	
310				2'	2'	17
312				0.5'	0.5'	
314				5'	5'	
316						
		ML/CL	Hard, reddish brown with light green mottling, Silty CLAYSTONE/Clayey SILTSTONE			
318						
320				5'	5'	18
322						
			-10-inch thick zone of stiff clay at 323 feet with several well developed remolded planes; light green marbling appears to be twisted/sheared and truncated; becomes stiff with disturbed appearance below			
324				5'	5'	
326						
328			**-BASAL SHEAR ZONE from 328 to 332 feet; 4-foot-thick zone of viscous/plastic deformation consisting of a melange of reddish-brown slightly to moderately remolded clay and olive-gray, clayey fine sand; chaotic/marbled/disturbed/twisted appearance**			19
330				5'	5'	
332		SM	**OTAY FORMATION** Dense, light brown, Silty, fine to medium SANDSTONE; micaceous	5'	5'	20

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Figure A-7,
Log of Core B 3B, Page 6 of 8

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

GEOCON

CORE B 3A

ELEV. (MSL.) 359.61' DATE COMPLETED 01-15-2021

EQUIPMENT CME 75 WITH HQ Core BY: G. CANNON

DEPTH IN FEET	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	RUN (Feet)	RECOVERY (Feet)	BOX
334		SM				
336						
338			-Becomes light olive gray below	5'	5'	20
340						
342						
344				5'	5'	
346						
348						21
350						
352				5'	5'	
354						
356			-Thin horizontal to slightly dipping bedding from 355 to 396 feet			
358						22
360				5'	5'	
362						
364				5'	5'	23

Figure A-7,
Log of Core B 3B, Page 7 of 8

GEOCON

CORE B 3A

ELEV. (MSL.) 359.61' DATE COMPLETED 01-15-2021

EQUIPMENT CME 75 WITH HQ Core BY: G. CANNON

DEPTH IN FEET	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	RUN (Feet)	RECOVERY (Feet)	BOX
366		SM		5'	5'	23
368				3'	3'	
370				2'	2'	
372–376				5'	5'	24
378–380				5'	5'	
382–386				5'	5'	25
388–390				5'	5'	
392–396				5'	5'	26
			BORING TERMINATED AT 397 FEET			

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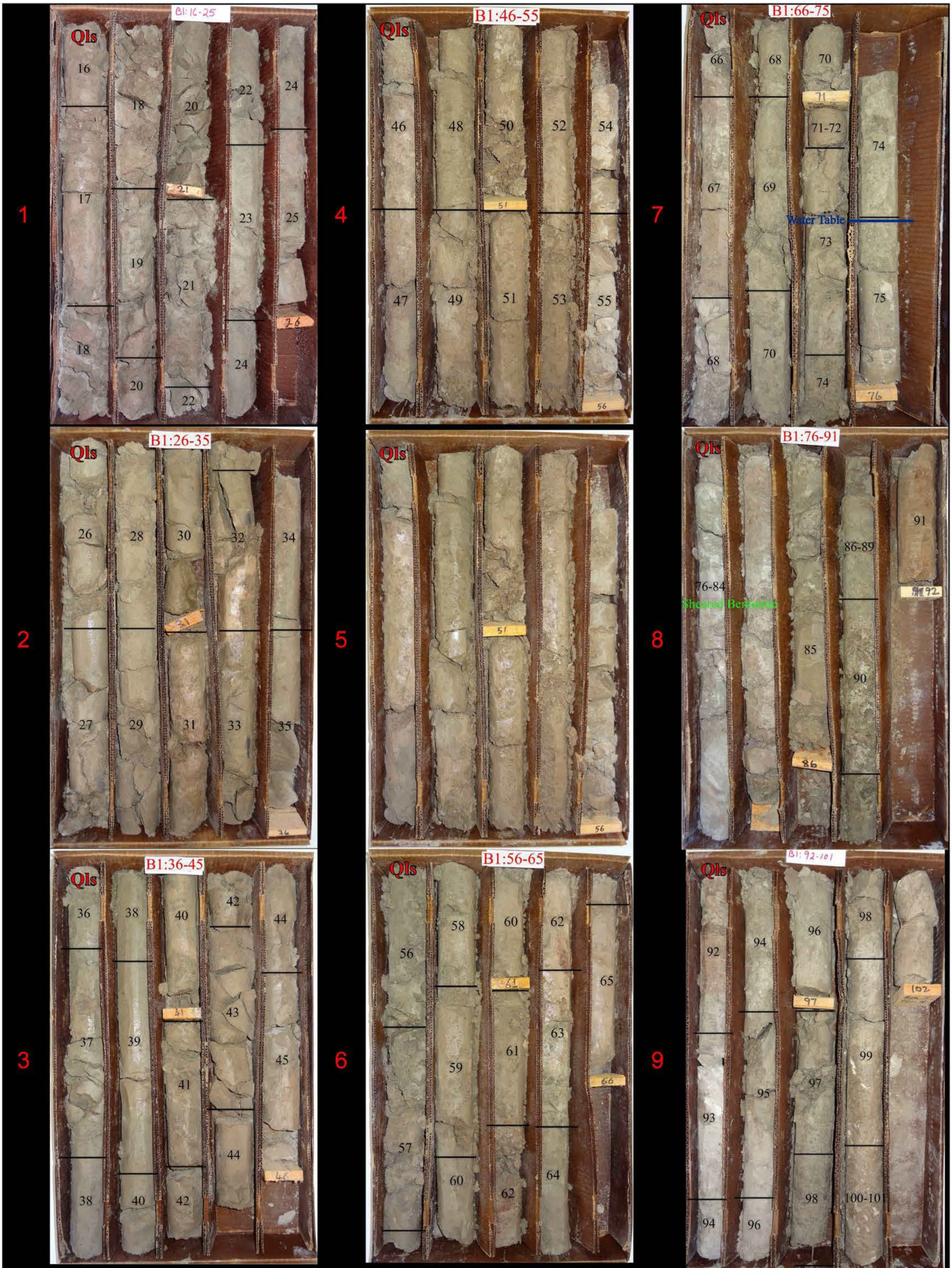
Figure A-7,
Log of Core B 3B, Page 8 of 8

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

GEOCON



BORING 1

SEQUENTIAL PHOTOGRAPHS OF CORE SAMPLES

SOUTHWEST VILLAGE
VESTING TENTATIVE MAP 1
SAN DIEGO, CALIFORNIA

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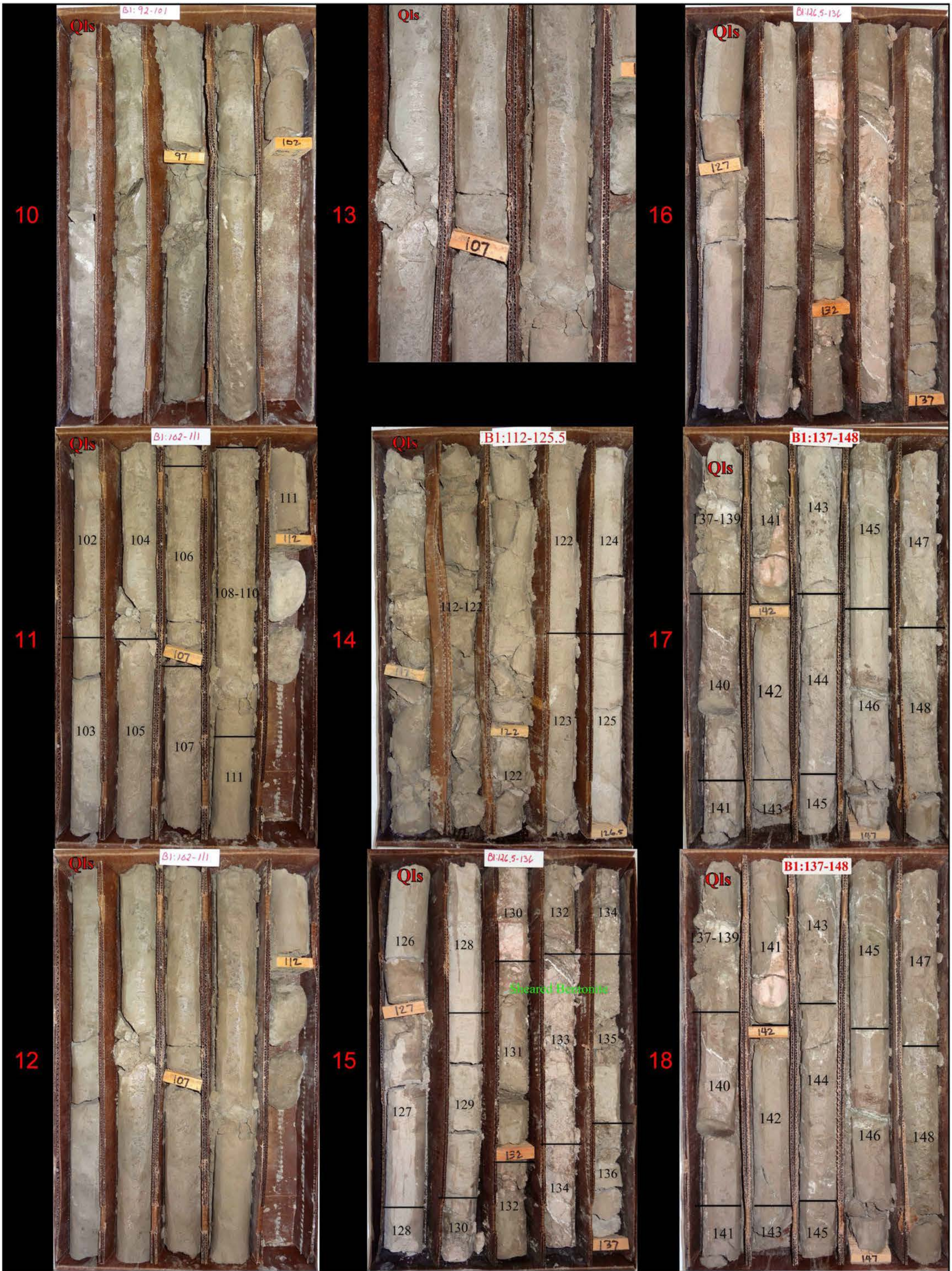
SCALE NOT TO SCALE	DATE 06 - 25 - 2021	
PROJECT NO. 06847 - 42 - 04		FIGURE A-8
SHEET 1 OF 5		



BORING 1
SEQUENTIAL PHOTOGRAPHS OF CORE SAMPLES
SOUTHWEST VILLAGE
VESTING TENTATIVE MAP 1
SAN DIEGO, CALIFORNIA

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	PROJECT NO. 06847 - 42 - 04		FIGURE A-9
	SHEET 2 OF 5		

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BORING 1

SEQUENTIAL PHOTOGRAPHS OF CORE SAMPLES

SOUTHWEST VILLAGE
VESTING TENTATIVE MAP 1
SAN DIEGO, CALIFORNIA

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SCALE NOT TO SCALE	DATE 06 - 25 - 2021
PROJECT NO. 06847 - 42 - 04	FIGURE A-10
SHEET 3 OF 5	

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SEQUENTIAL PHOTOGRAPHS OF CORE SAMPLES
SOUTHWEST VILLAGE
VESTING TENTATIVE MAP 1
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SCALE NOT TO SCALE	DATE 06 - 25 - 2021	
PROJECT NO. 06847 - 42 - 04		FIGURE A-11
SHEET 4 OF 5		

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BORING 1
SEQUENTIAL PHOTOGRAPHS OF CORE SAMPLES
SOUTHWEST VILLAGE
VESTING TENTATIVE MAP 1
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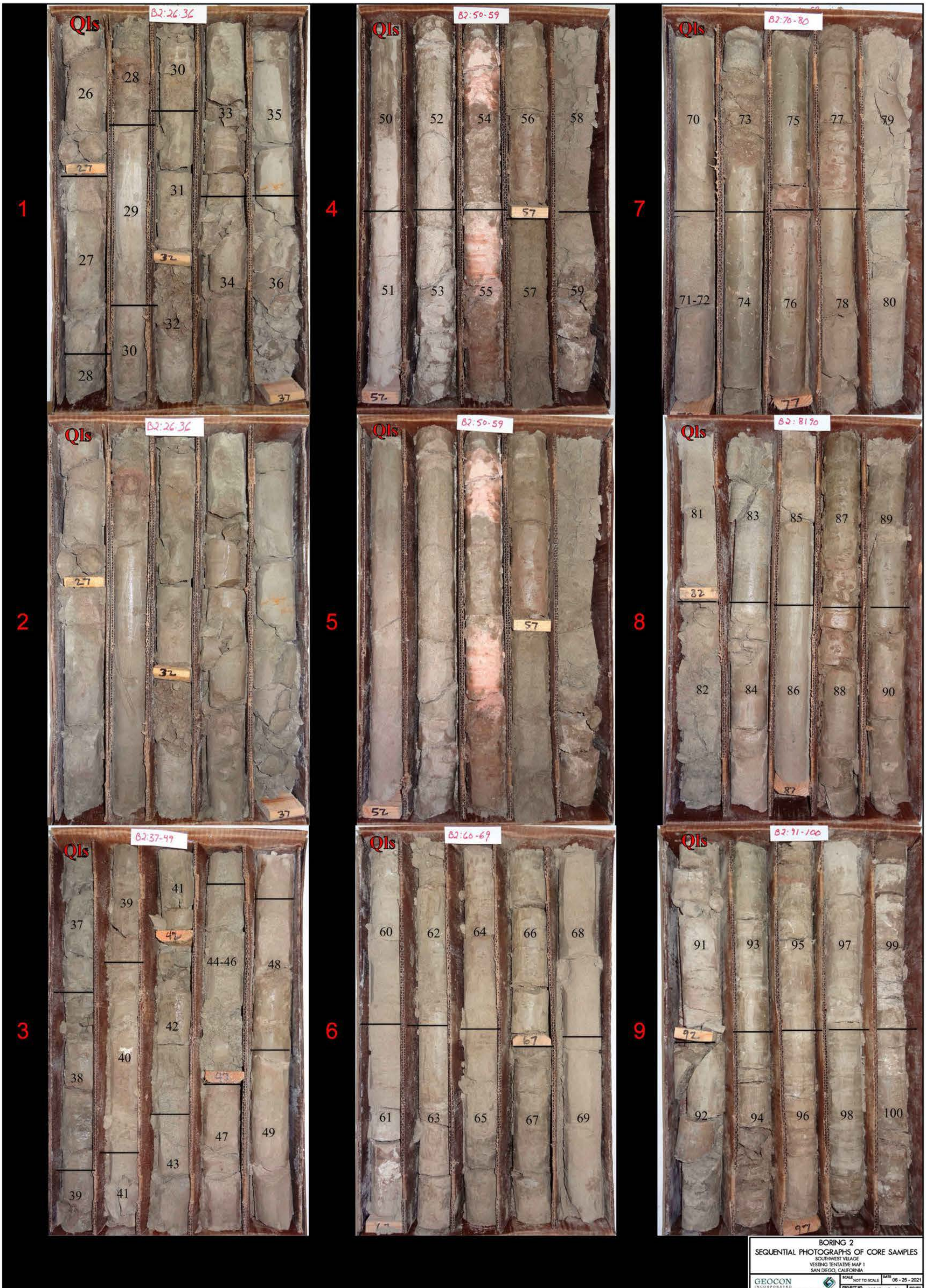
SCALE NOT TO SCALE	DATE 06 - 25 - 2021	
PROJECT NO. 06847 - 42 - 04		FIGURE A-12
SHEET 5 OF 5		



BORING 2

SEQUENTIAL PHOTOGRAPHS OF CORE SAMPLES

SOUTHWEST VILLAGE
VESTING TENTATIVE MAP 1
SAN DIEGO, CALIFORNIA

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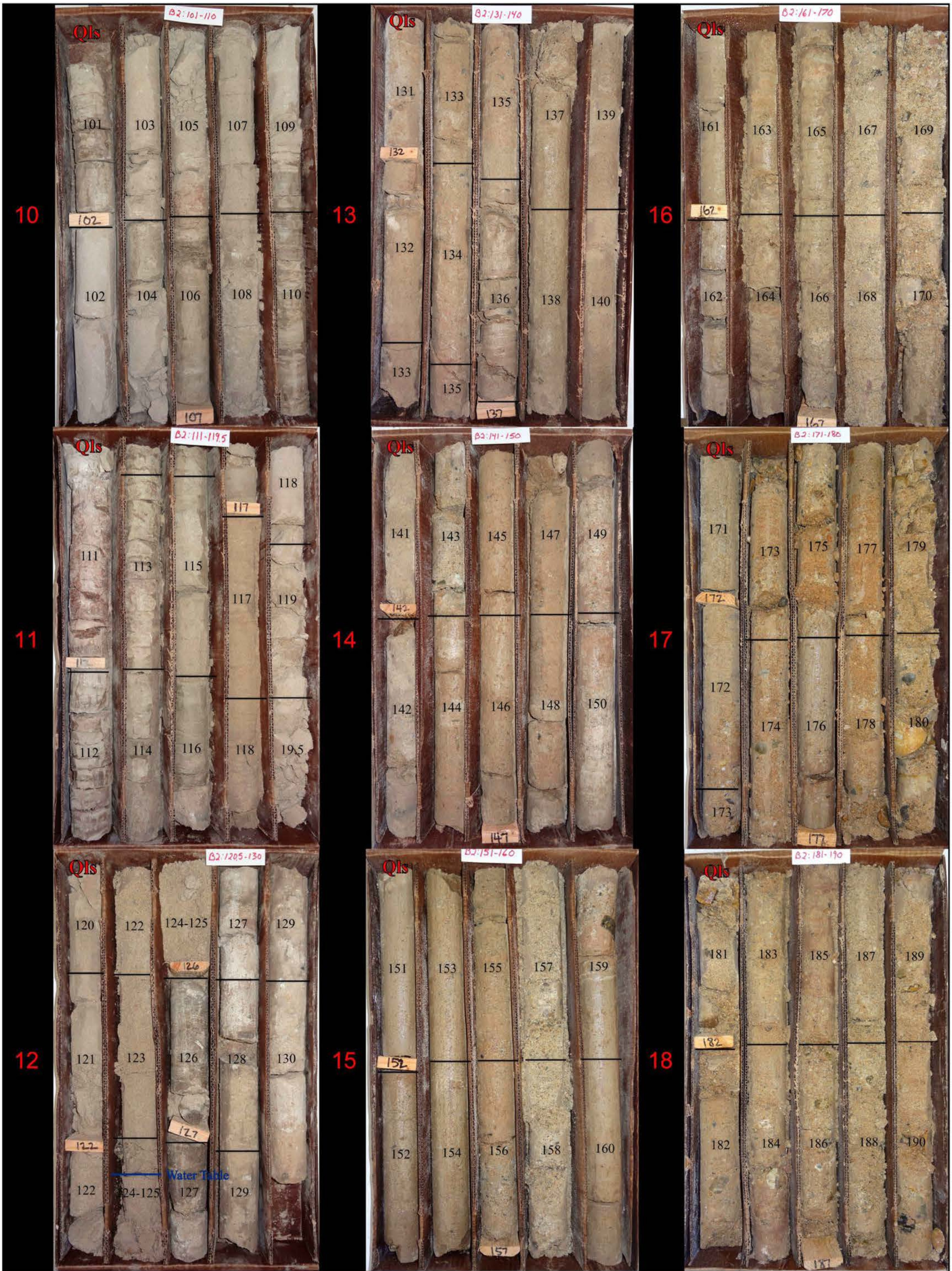
SCALE NOT TO SCALE	DATE 06 - 25 - 2021	
PROJECT NO. 06847 - 42 - 04		FIGURE A-13
SHEET 1 OF 4		



BORING 2

SEQUENTIAL PHOTOGRAPHS OF CORE SAMPLES

SOUTHWEST VILLAGE
VESTING TENTATIVE MAP 1
SAN DIEGO, CALIFORNIA

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SCALE NOT TO SCALE	DATE 06 - 25 - 2021	FIGURE
PROJECT NO. 06847 - 42 - 04		A-14
SHEET 2 OF 4		

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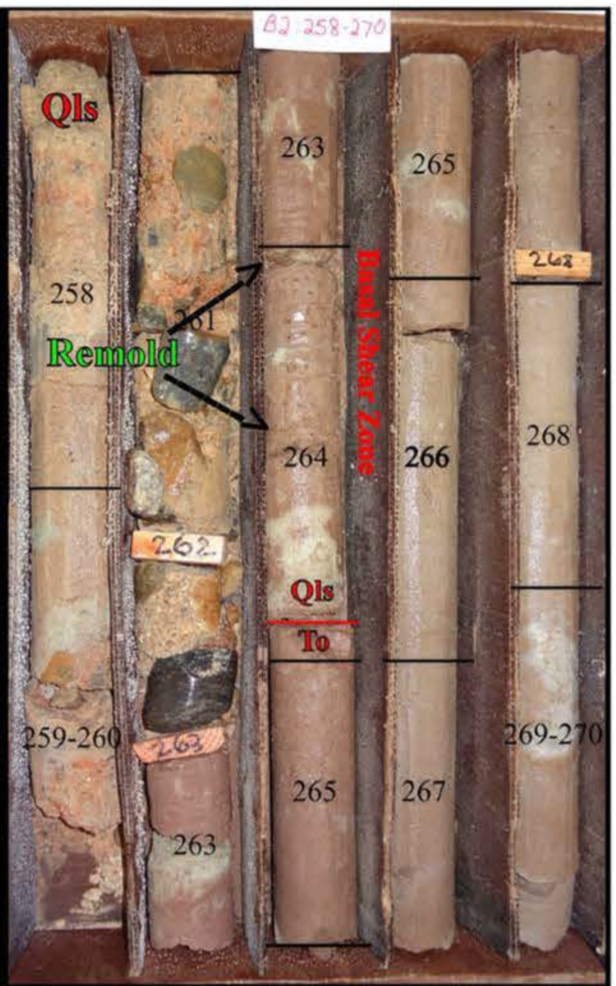

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SEQUENTIAL PHOTOGRAPHS OF CORE SAMPLES
SOUTHWEST VILLAGE
VESTING TENTATIVE MAP 1
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SCALE	NOT TO SCALE	DATE	06 - 25 - 2021
PROJECT NO.	06847 - 42 - 04	FIGURE	A-15
SHEET	3 OF 4		

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BORING 2
SEQUENTIAL PHOTOGRAPHS OF CORE SAMPLES
SOUTHWEST VILLAGE
VESTING TENTATIVE MAP 1
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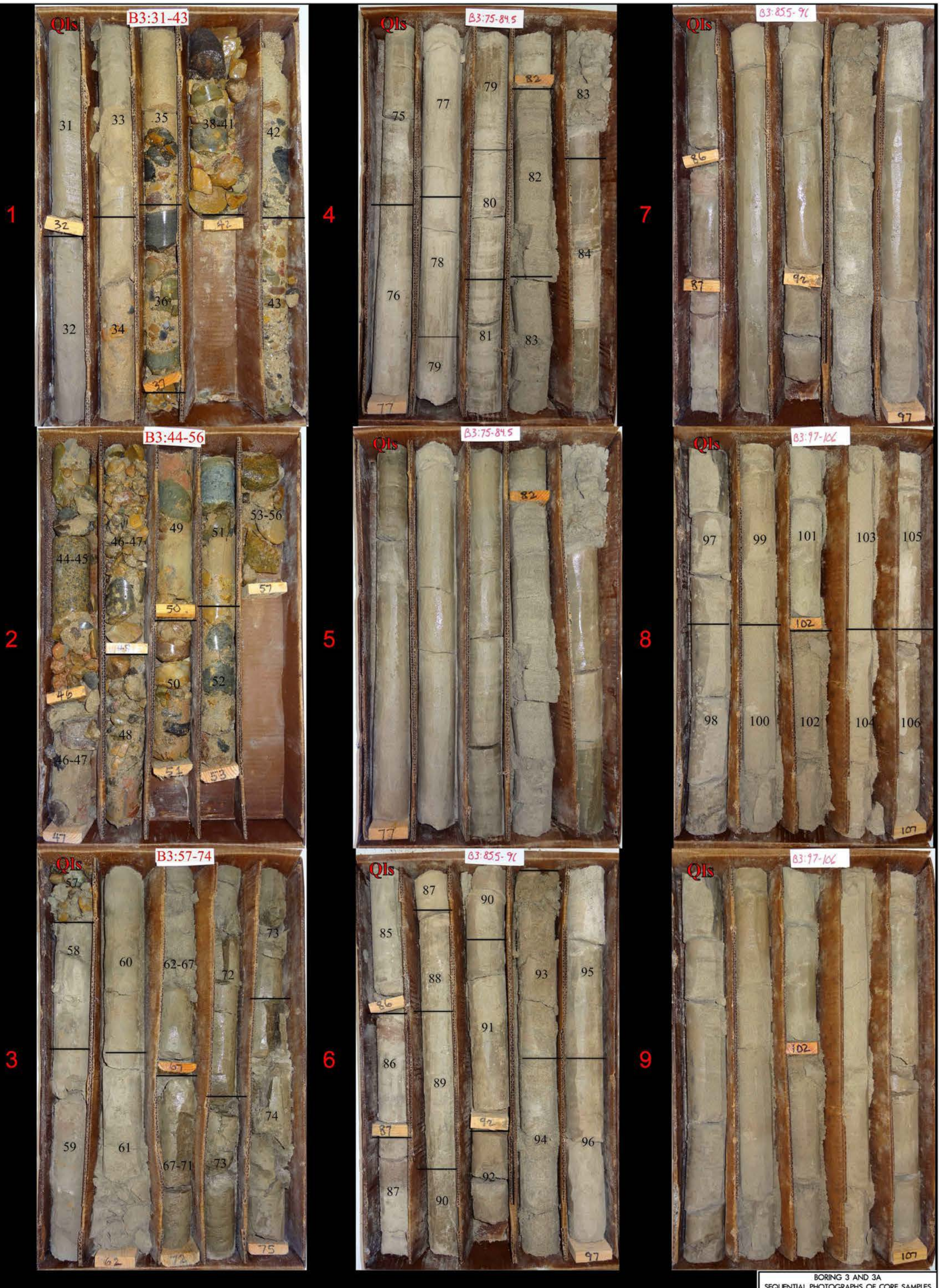
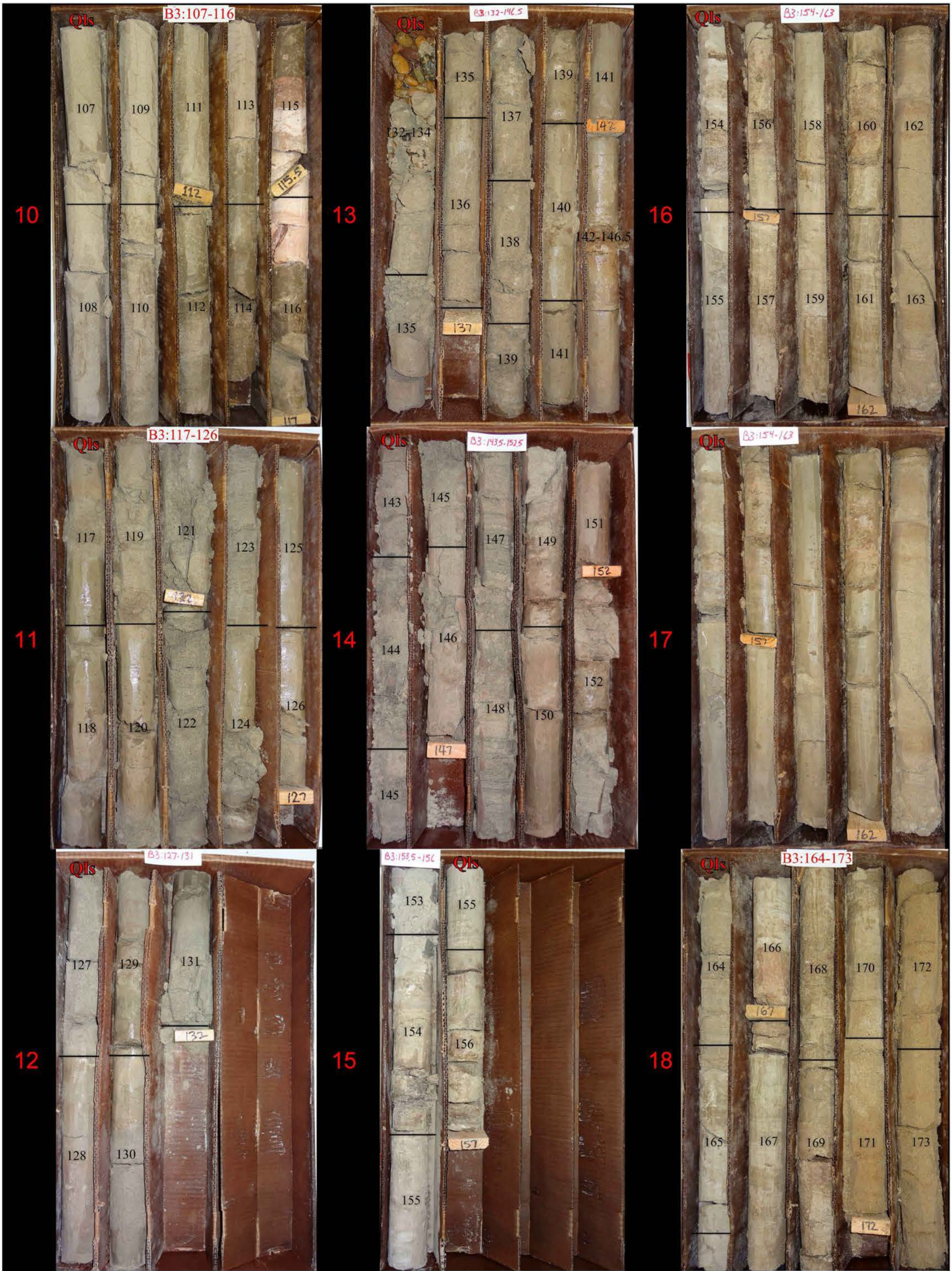
SCALE NOT TO SCALE	DATE 06 - 25 - 2021	FIGURE
PROJECT NO. 06847 - 42 - 04		A-16
SHEET 4 OF 4		

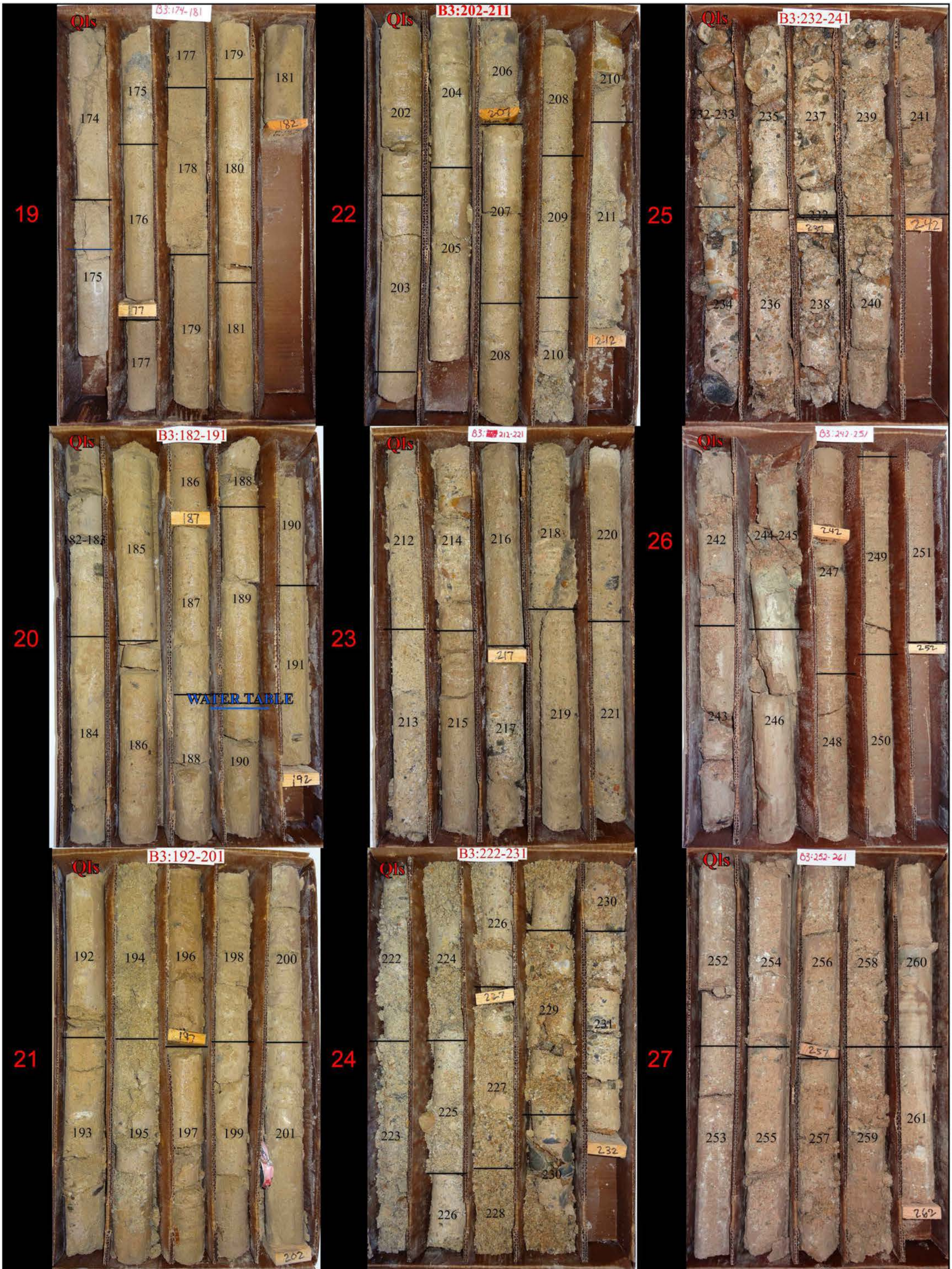


BORING 3 AND 3A SEQUENTIAL PHOTOGRAPHS OF CORE SAMPLES SOUTHWEST VILLAGE VESTING TENTATIVE MAP 1 SAN DIEGO, CALIFORNIA	
GEOCON INCORPORATED GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS 6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121-2974 PHONE 858 558-6900 - FAX 858 558-6159	SCALE: NOT TO SCALE DATE: 06 - 25 - 2021 PROJECT NO. 06847 - 42 - 04 FIGURE A-17 SHEET 1 OF 6



BORING 3 AND 3A
SEQUENTIAL PHOTOGRAPHS OF CORE SAMPLES
SOUTHWEST VILLAGE
VESTING TENTATIVE MAP 1
SAN DIEGO, CALIFORNIA

GEOCON INCORPORATED GEOTECHNICAL ■ ENVIRONMENTAL ■ MATERIALS 6960 FLANDERS DRIVE - SAN DIEGO, CALIFORNIA 92121-2974 PHONE 858 558-6900 - FAX 858 558-6159	SCALE NOT TO SCALE	DATE 06 - 25 - 2021
	PROJECT NO. 06847 - 42 - 04	FIGURE A-18
	SHEET 2 OF 6	



BORING 3 AND 3A
SEQUENTIAL PHOTOGRAPHS OF CORE SAMPLES
SOUTHWEST VILLAGE
VESTING TENTATIVE MAP 1
SAN DIEGO, CALIFORNIA

GEOCON INCORPORATED	SCALE: NOT TO SCALE	DATE: 06 - 25 - 2021
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	SHEET 3 OF 6	

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BORING 3 AND 3A SEQUENTIAL PHOTOGRAPHS OF CORE SAMPLES SOUTHWEST VILLAGE VESTING TENTATIVE MAP 1 SAN DIEGO, CALIFORNIA		
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	PROJECT NO. 06847 - 42 - 04	FIGURE A-20
	SHEET 4 OF 6	

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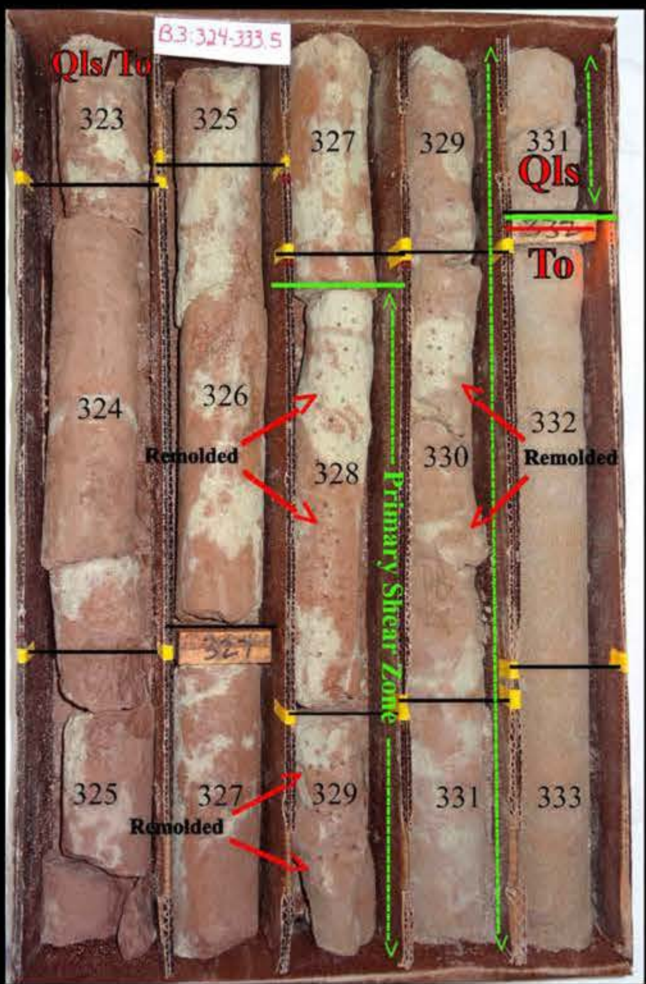

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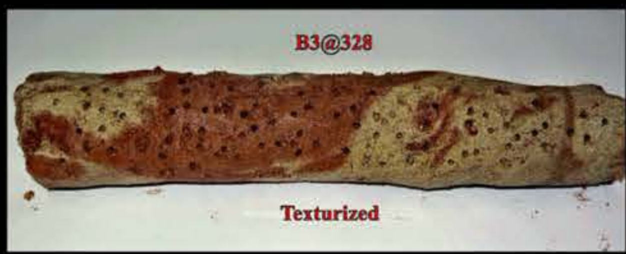

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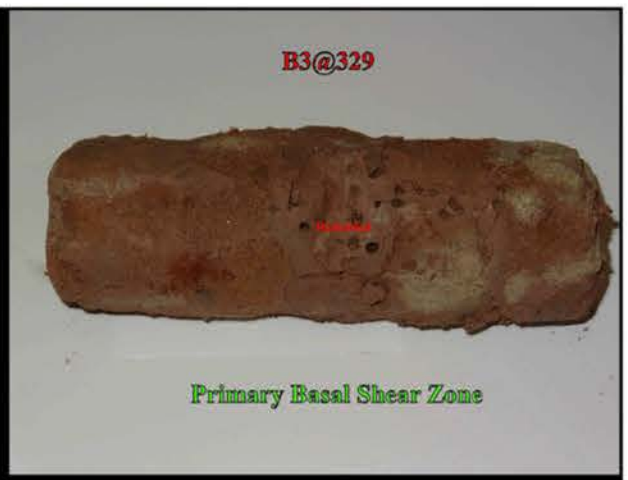

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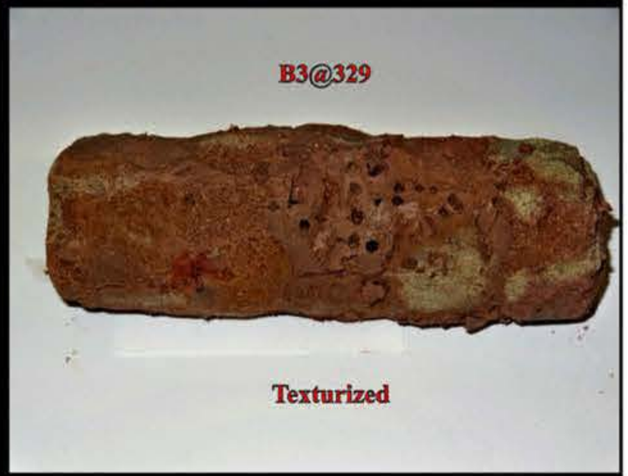

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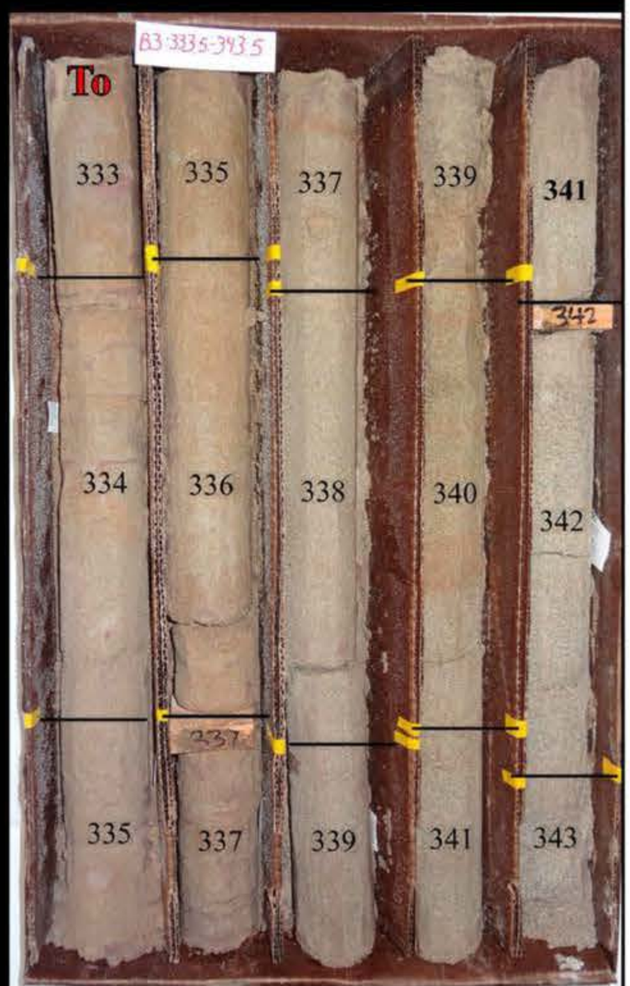

BORING 3 AND 3A
SEQUENTIAL PHOTOGRAPHS OF CORE SAMPLES
SOUTHWEST VILLAGE
VESTING TENTATIVE MAP 1
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PROJECT NO.	06847 - 42 - 04	FIGURE	A-21
SHEET	5 OF 6		

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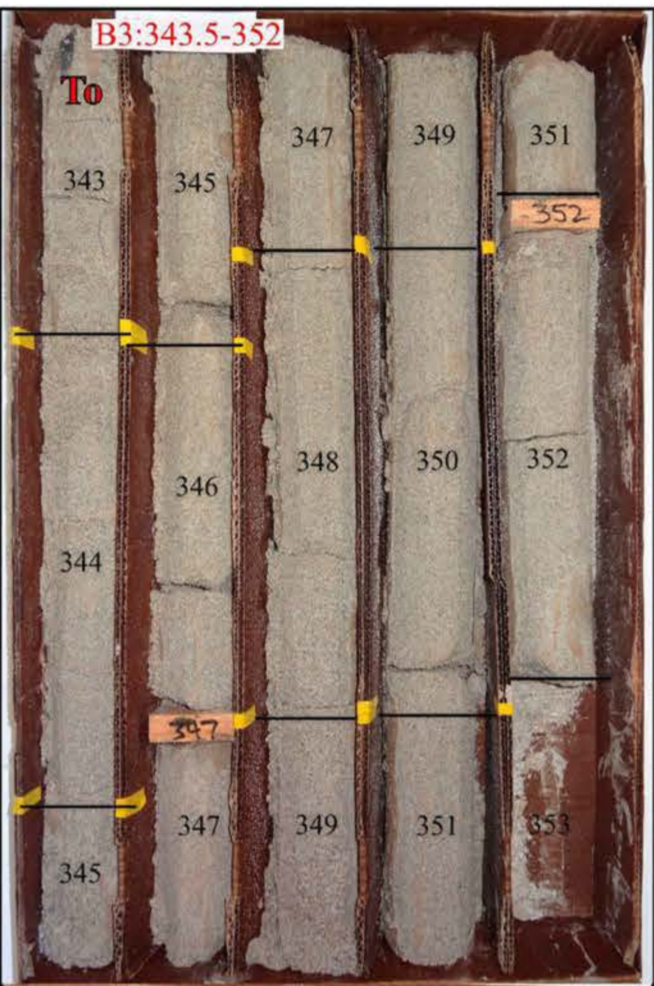

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BORING 3 AND 3A
SEQUENTIAL PHOTOGRAPHS OF CORE SAMPLES
SOUTHWEST VILLAGE
VESTING TENTATIVE MAP 1
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DATE	06 - 25 - 2021
PROJECT NO.	06847 - 42 - 04
FIGURE	A-22
SHEET	6 OF 6

APPENDIX B

APPENDIX B

LABORATORY TESTING

We performed laboratory tests in general accordance with the test methods of the American Society for Testing and Materials (ASTM) or other suggested procedures. We tested selected samples to evaluate in-place dry density and moisture content, direct shear strength, Atterberg limits, maximum dry density and optimum moisture content, gradation, and permeability. The results of the laboratory tests are presented in the following tables and graphs.

TABLE B-I
SUMMARY OF DIRECT SHEAR TEST RESULTS
(ASTM D 3080)

Sample No.	Geologic Unit	Dry Density (pcf)	Moisture Content (%)	Angle of Shear Resistance (degrees)	Unit Cohesion (psf)
LB3-3†*	Otay Formation	93.4	19.0	32	500
LB1-3**	Landslide Debris	101.0	25.9	31	135
LB4-9†**	Remolded Shear Plane	--	--	27	180
B1@215 ft	Otay Formation	121.2	6.1	45 (peak) 39 (ultimate)	3,260 (peak) 960 (ultimate)
B2@289 ft	Otay Formation	116.4	6.4	38 (peak) 29 (ultimate)	1,720 (peak) 600 (ultimate)
B3@394 ft	Otay Formation	113.5	8.9	49 (peak) 37 (ultimate)	1,550 (peak) 1,000 (ultimate)
B3@328–330 ft	Basal Shear Zone (Remolded)	107.4	18.3	21 (peak) 20 (ultimate)	150 (peak) 160 (ultimate)

†Sample remolded to approximately 90 percent of relative compaction near optimum moisture content.
*From Geocon October 2004
**From Geocon May 2006

TABLE B-II
SUMMARY OF LABORATORY ATTERBERG LIMITS TEST RESULTS
ASTM D 4318

Sample No.	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index
B1@161-164 ft	66	27	39
B2@263 ft	40	21	19
B3@324 ft	51	23	28
B3@328-330 ft	35	18	17

TABLE B-III
RESIDUAL SHEAR STRENGTH VALUES FOR BASAL SLIDE PLANE
BASED ON STARK, CHOI, MCCONE (2005)

Sample No.	Liquid Limit	Percent Clay	Angle of Internal Friction (degrees)	Cohesion (psf)
B1@161 – 164 feet	66	27	11	50
B2@263 feet	40	10	24	20
B3@324 feet	51	22	15	60
B3@328-330 feet	35	14	22	60

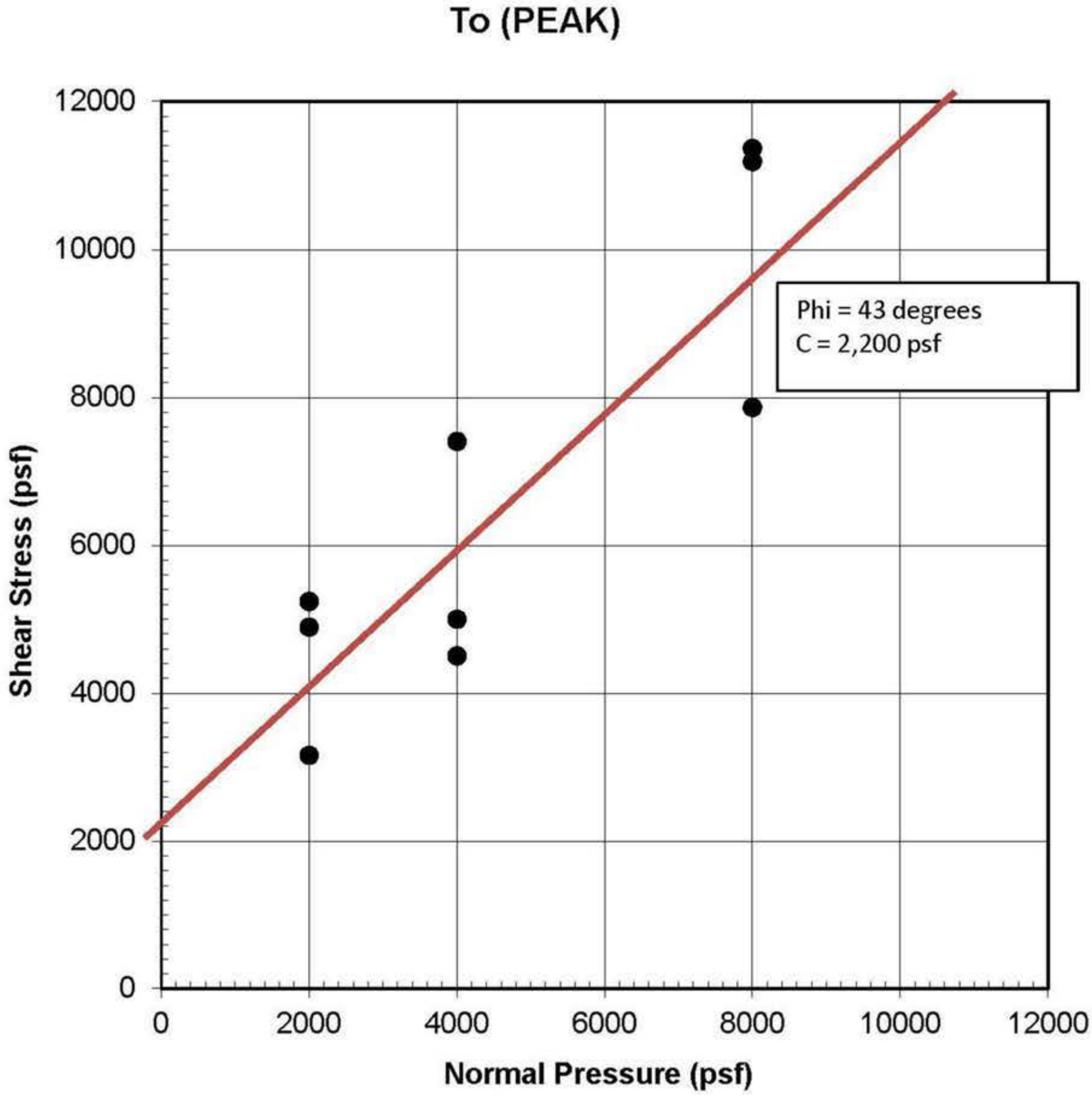
TABLE B-IV
SUMMARY OF LABORATORY MAXIMUM DRY DENSITY
AND OPTIMUM MOISTURE CONTENT TEST RESULTS
(ASTM D 1557)

Sample No.	Description	Maximum Dry Density (pcf)	Optimum Moisture Content (% dry wt.)
Perm - 1	Reddish brown, Silty, fine to coarse SAND with trace gravel	126.9	9.9

TABLE B-V
SUMMARY OF LABORATORY REMOLDED PERMEABILITY TEST
(ASTM D5084)

Sample No.	Moisture Content (%)		Dry Density (pcf)	Permeability (cm/s)
	Before Test	After Test		
*Perm - 1	10.3	17.6	111.9	6.38×10^{-4}

*Sample remolded to approximately 90 percent relative compaction near optimum moisture content



SHEAR PLOTS - PEAK

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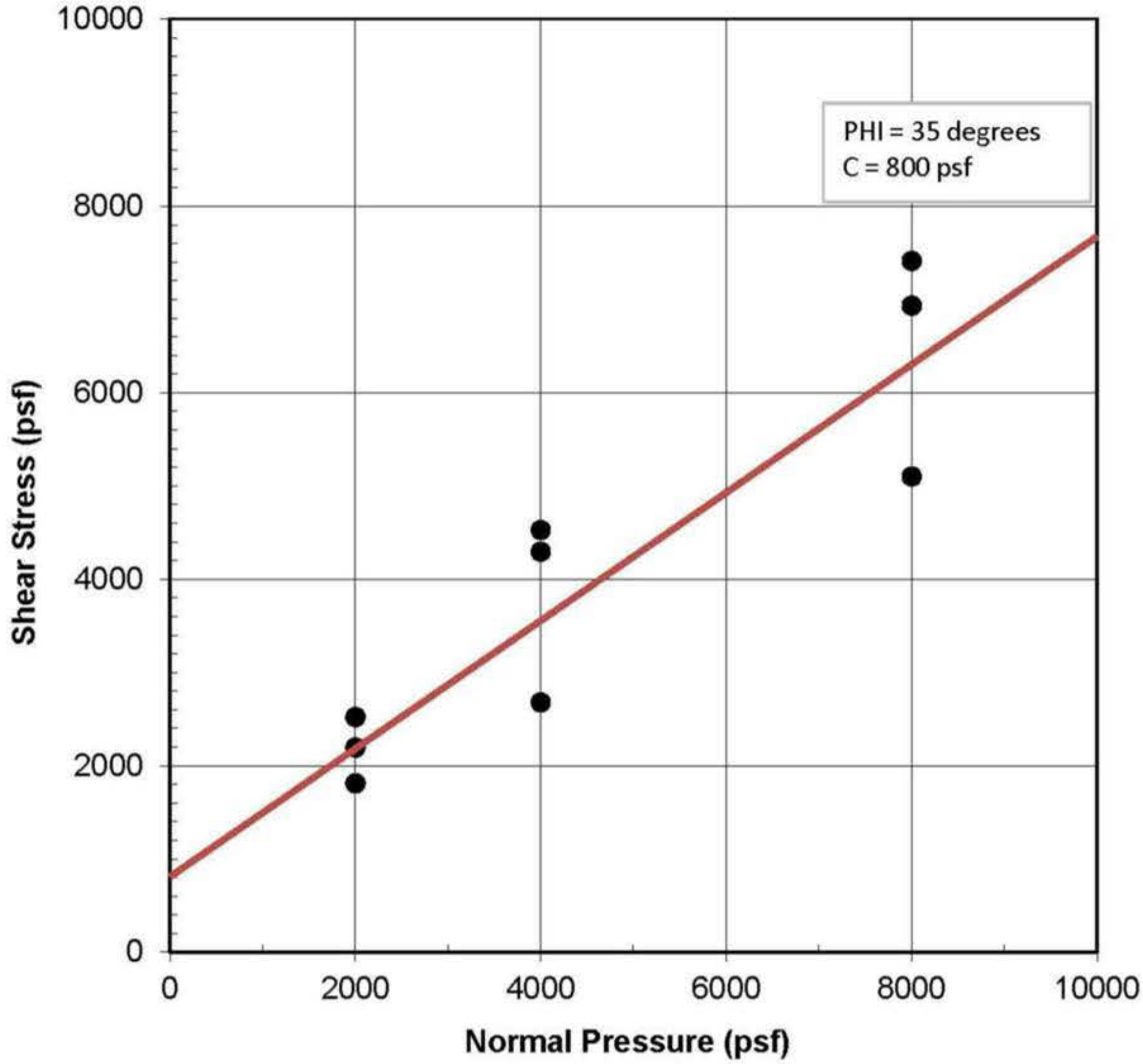
SOUTHWEST VILLAGE
SAN DIEGO, CALIFORNIA

RM / AML		DSK/GTYPD	DATE 06 - 21 - 2021	PROJECT NO. 06847 - 42 - 04	FIG.

Plotted:06/21/2021 8:32AM | By:ALVIN LADRILLONO | File Location:W:\1_GEOTECH\06000\06800\06847-42-04\2021-06-21\Shear Plots\06847-42-04 Shear.dwg

To (ULTIMATE)



SHEAR PLOTS - ULTIMATE

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SOUTHWEST VILLAGE
SAN DIEGO, CALIFORNIA

RM / AML		DSK/GTYPD	DATE 06 - 21 - 2021	PROJECT NO. 06847 - 42 - 04	FIG.

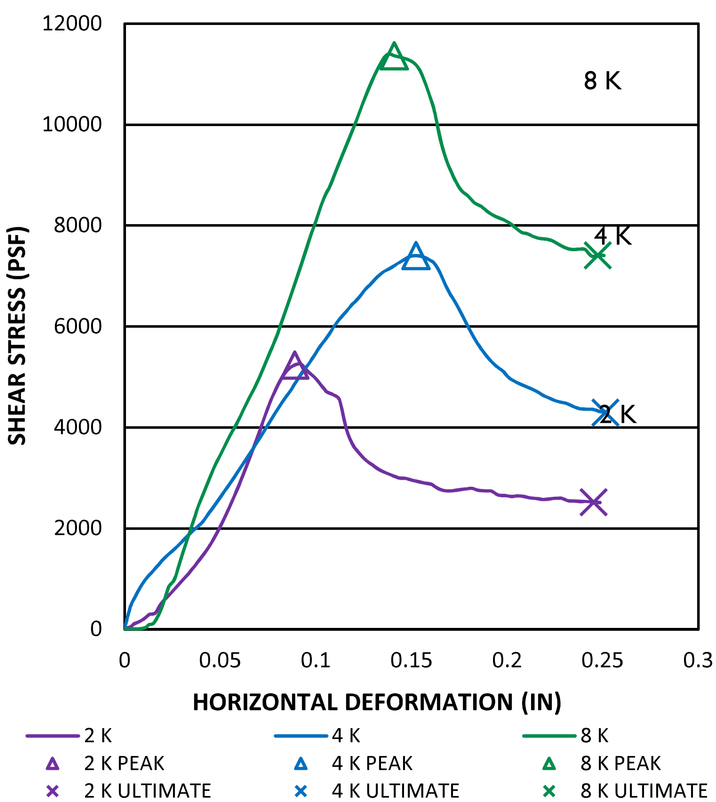
Plotted:06/21/2021 8:31AM | By:ALVIN LADRILLONO | File Location:W:\1_GEOTECH\06000\06800\06847-42-04\2021-06-21\Shear Plots\06847-42-04 Shear.dwg

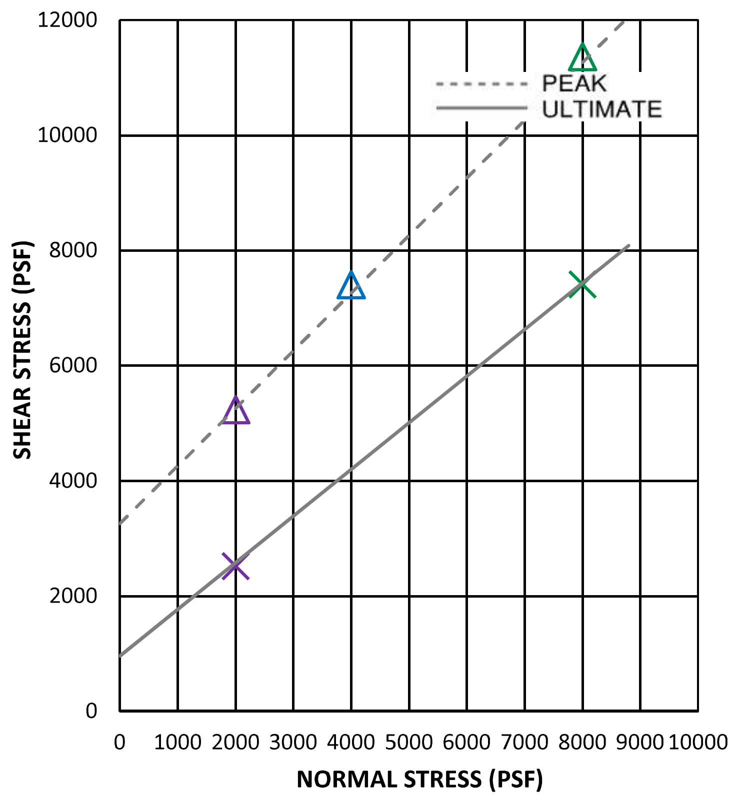
SAMPLE NO.:	B-1	GEOLOGIC UNIT:	Otay Formation
SAMPLE DEPTH (FT):	215'	NATURAL/REMOLDED:	N

INITIAL CONDITIONS				
NORMAL STRESS TEST LOAD	2 K	4 K	8 K	AVERAGE
ACTUAL NORMAL STRESS (PSF):	2000	4000	8000	--
WATER CONTENT (%):	6.1	6.5	5.7	6.1
DRY DENSITY (PCF):	121.2	119.4	123.0	121.2

AFTER TEST CONDITIONS				
NORMAL STRESS TEST LOAD	2 K	4 K	8 K	AVERAGE
WATER CONTENT (%):	12.6	13.5	12.2	12.8
PEAK SHEAR STRESS (PSF):	5236	7406	11365	--
ULT.-E.O.T. SHEAR STRESS (PSF):	2522	4294	7412	--

RESULTS		
PEAK	COHESION, C (PSF)	3260
	FRICTION ANGLE (DEGREES)	45
ULTIMATE	COHESION, C (PSF)	960
	FRICTION ANGLE (DEGREES)	39





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DIRECT SHEAR ASTM D 3080

SOUTHWEST VILLAGE

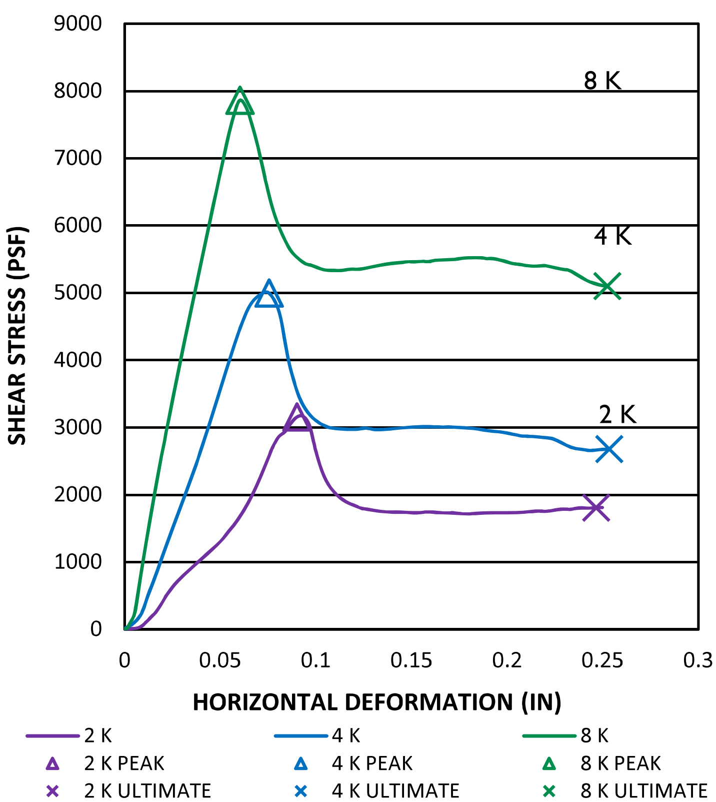
PROJECT NO.: 06847-42-04

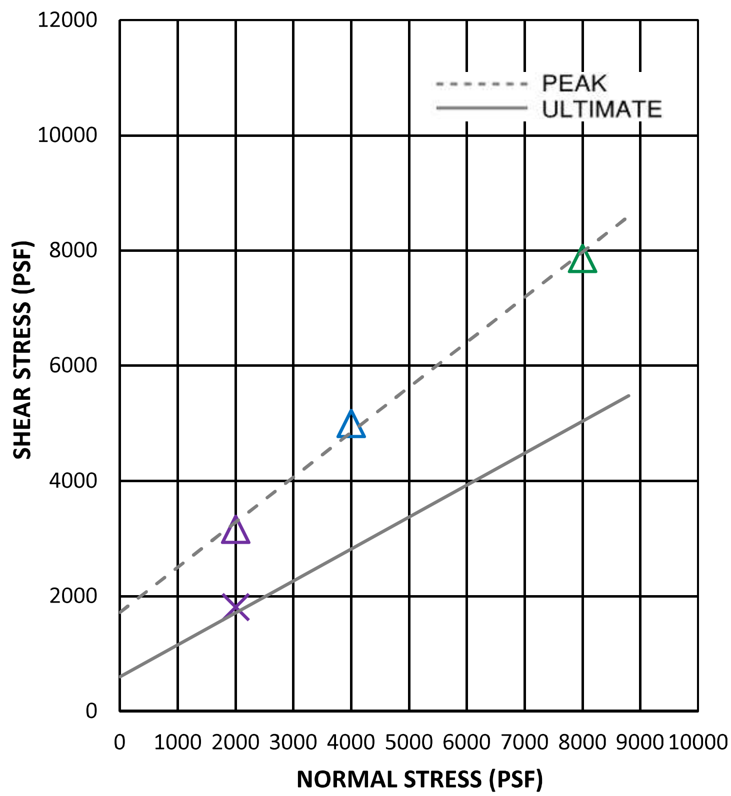
SAMPLE NO.:	B-2	GEOLOGIC UNIT:	Otay Formation
SAMPLE DEPTH (FT):	289'	NATURAL/REMOLDED:	N

INITIAL CONDITIONS				
NORMAL STRESS TEST LOAD	2 K	4 K	8 K	AVERAGE
ACTUAL NORMAL STRESS (PSF):	2000	4000	8000	--
WATER CONTENT (%):	6.2	6.4	6.5	6.4
DRY DENSITY (PCF):	116.5	115.6	117.0	116.4

AFTER TEST CONDITIONS				
NORMAL STRESS TEST LOAD	2 K	4 K	8 K	AVERAGE
WATER CONTENT (%):	13.4	13.8	13.5	13.6
PEAK SHEAR STRESS (PSF):	3156	4996	7863	--
ULT.-E.O.T. SHEAR STRESS (PSF):	1811	2678	5100	--

RESULTS		
PEAK	COHESION, C (PSF)	1720
	FRICTION ANGLE (DEGREES)	38
ULTIMATE	COHESION, C (PSF)	600
	FRICTION ANGLE (DEGREES)	29





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DIRECT SHEAR ASTM D 3080

SOUTHWEST VILLAGE

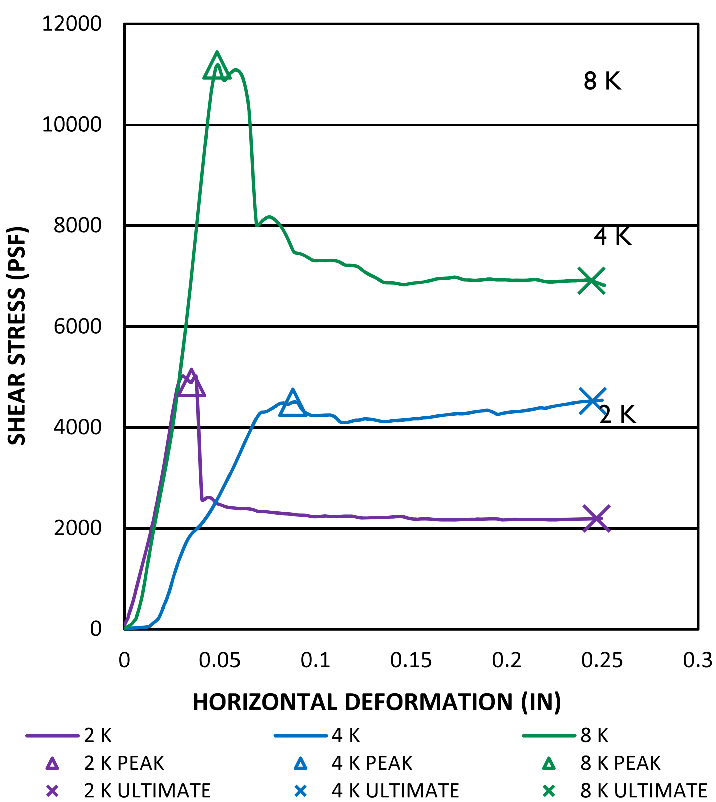
PROJECT NO.: 06847-42-04

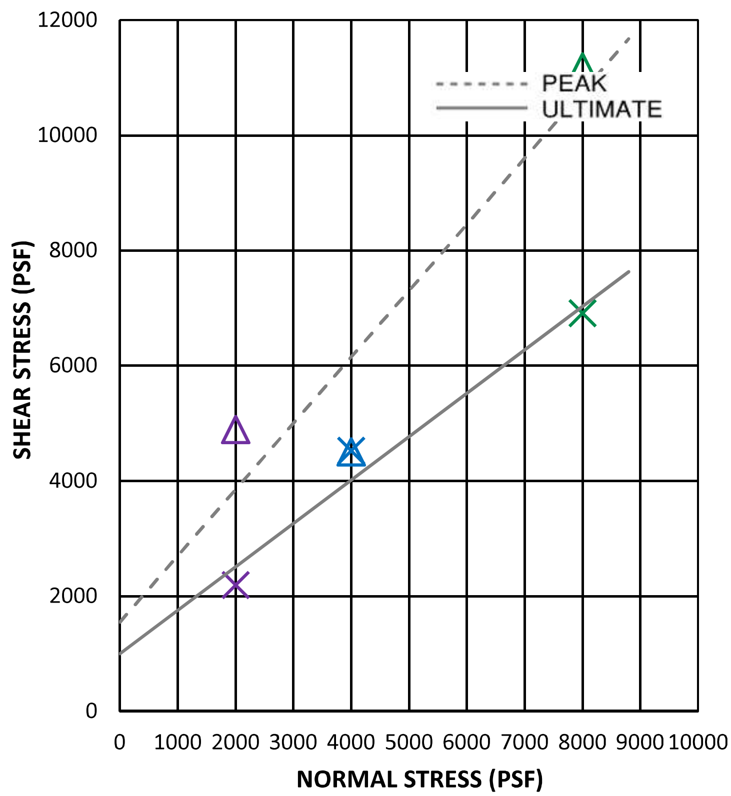
SAMPLE NO.:	B-3	GEOLOGIC UNIT:	Otay Formation
SAMPLE DEPTH (FT):	394'	NATURAL/REMOLDED:	N

INITIAL CONDITIONS				
NORMAL STRESS TEST LOAD	2 K	4 K	8 K	AVERAGE
ACTUAL NORMAL STRESS (PSF):	2000	4000	8000	--
WATER CONTENT (%):	8.0	9.7	9.1	8.9
DRY DENSITY (PCF):	113.4	113.2	113.9	113.5

AFTER TEST CONDITIONS				
NORMAL STRESS TEST LOAD	2 K	4 K	8 K	AVERAGE
WATER CONTENT (%):	15.5	16.0	15.5	15.7
PEAK SHEAR STRESS (PSF):	4892	4502	11186	--
ULT.-E.O.T. SHEAR STRESS (PSF):	2194	4525	6913	--

RESULTS		
PEAK	COHESION, C (PSF)	1550
	FRICTION ANGLE (DEGREES)	49
ULTIMATE	COHESION, C (PSF)	1000
	FRICTION ANGLE (DEGREES)	37





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DIRECT SHEAR ASTM D 3080

SOUTHWEST VILLAGE

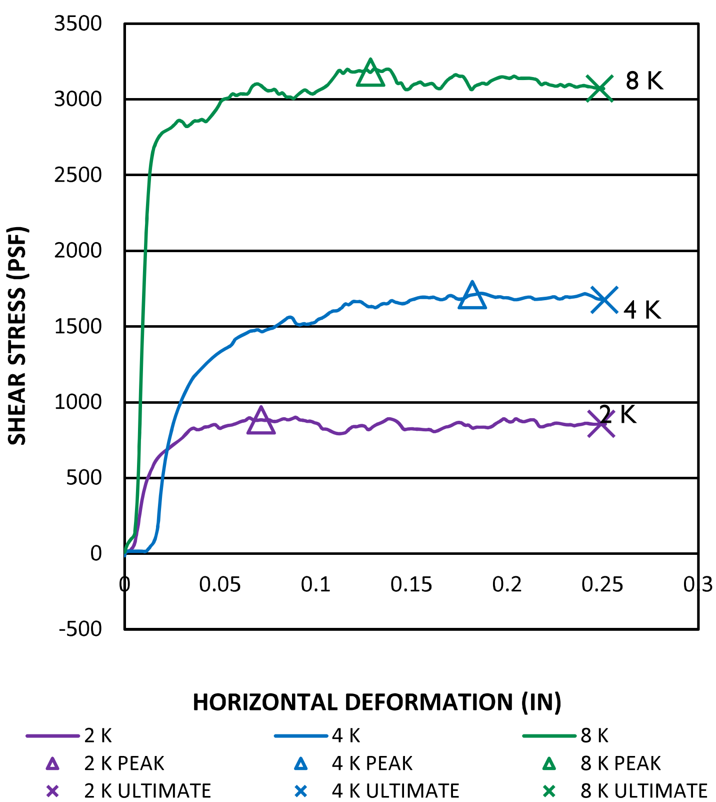
PROJECT NO.: 06847-42-04

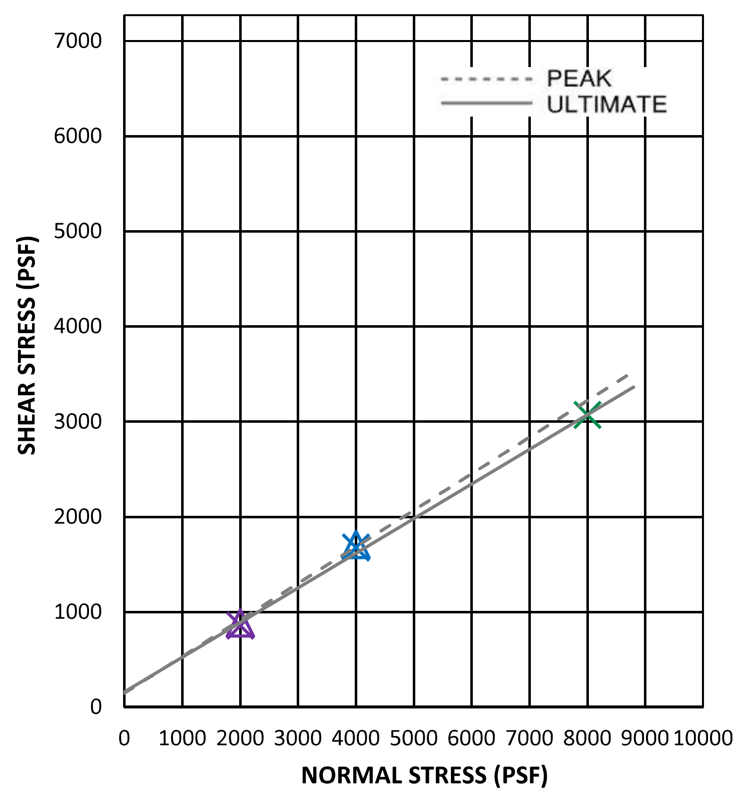
SAMPLE NO.:	B3 @ 328-330	GEOLOGIC UNIT:	Shear Zone
SAMPLE DEPTH (FT):		NATURAL/REMOLDED:	N

INITIAL CONDITIONS				
NORMAL STRESS TEST LOAD	2 K	4 K	8 K	AVERAGE
ACTUAL NORMAL STRESS (PSF):	2000	4000	8000	--
WATER CONTENT (%):	18.3	18.3	18.3	18.3
DRY DENSITY (PCF):	107.4	107.4	107.4	107.4

AFTER TEST CONDITIONS				
NORMAL STRESS TEST LOAD	2 K	4 K	8 K	AVERAGE
WATER CONTENT (%):	23.3	23.3	23.3	23.3
PEAK SHEAR STRESS (PSF):	884	1710	3179	--
ULT.-E.O.T. SHEAR STRESS (PSF):	858	1677	3072	--

RESULTS		
PEAK	COHESION, C (PSF)	150
	FRICTION ANGLE (DEGREES)	21
ULTIMATE	COHESION, C (PSF)	160
	FRICTION ANGLE (DEGREES)	20





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RESIDUAL SHEAR ASTM D 3080

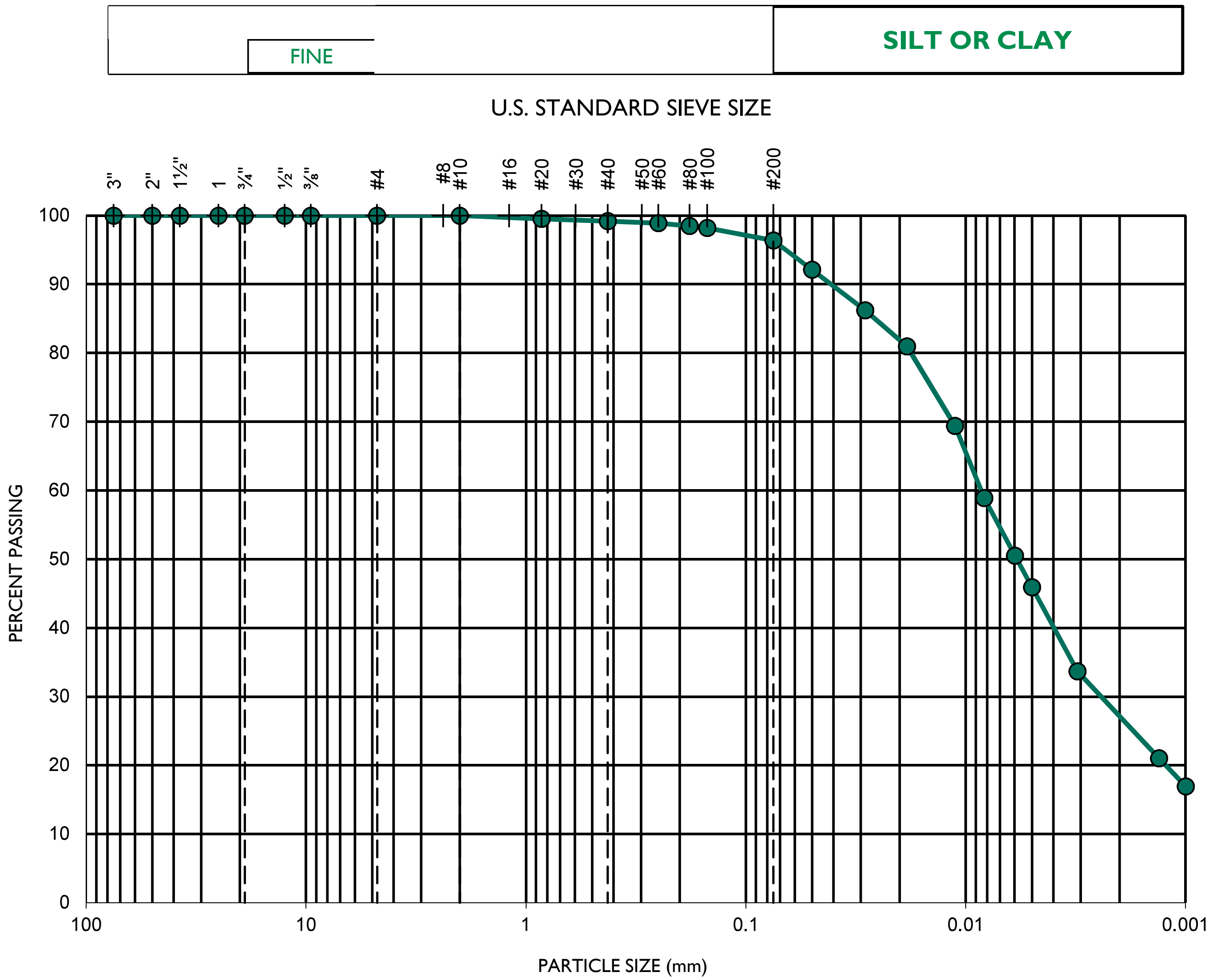
SOUTHWEST VILLAGE

PROJECT NO.: 06847-42-04

SAMPLE NO.: **B1 @ 161-164**

SAMPLE DEPTH (FT.): **161-164**

GEOLOGIC UNIT: **Shear Zone**



TEST DATA					
D_{10} (mm)	D_{30} (mm)	D_{60} (mm)	C_c	C_u	SOIL DESCRIPTION
0.00046	0.00259	0.00854	1.7	18.6	Silty CLAY

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SIEVE ANALYSES ASTM D 135 & D 422

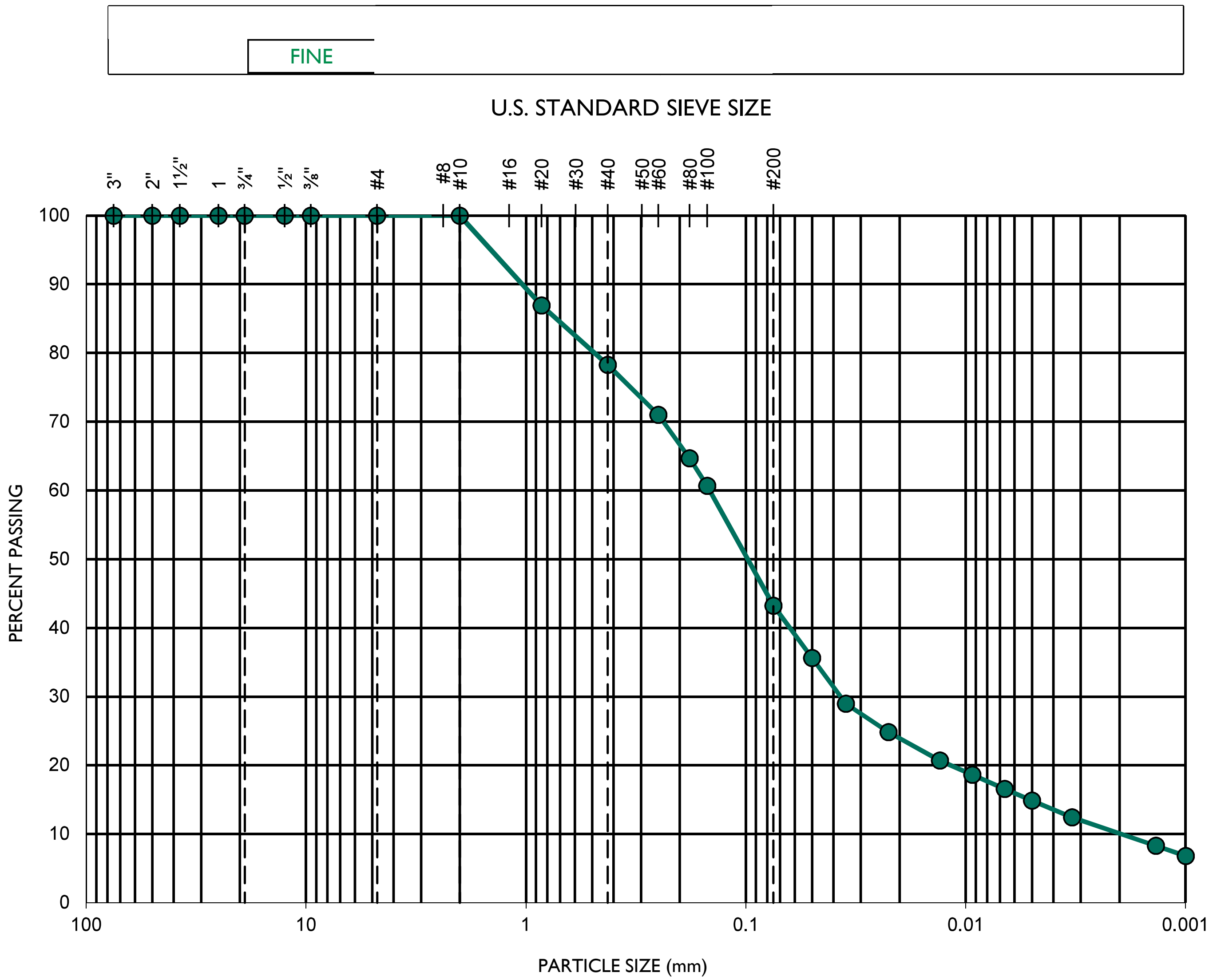
SOUTHWEST VILLAGE

PROJECT NO.: 06847-42-04

SAMPLE NO.: **B2 @ 263**

SAMPLE DEPTH (FT.): **263**

GEOLOGIC UNIT: **Shear Zone**



TEST DATA					
D_{10} (mm)	D_{30} (mm)	D_{60} (mm)	C_c	C_u	SOIL DESCRIPTION
0.00217	0.03745	0.14714	4.4	67.8	Silty SAND

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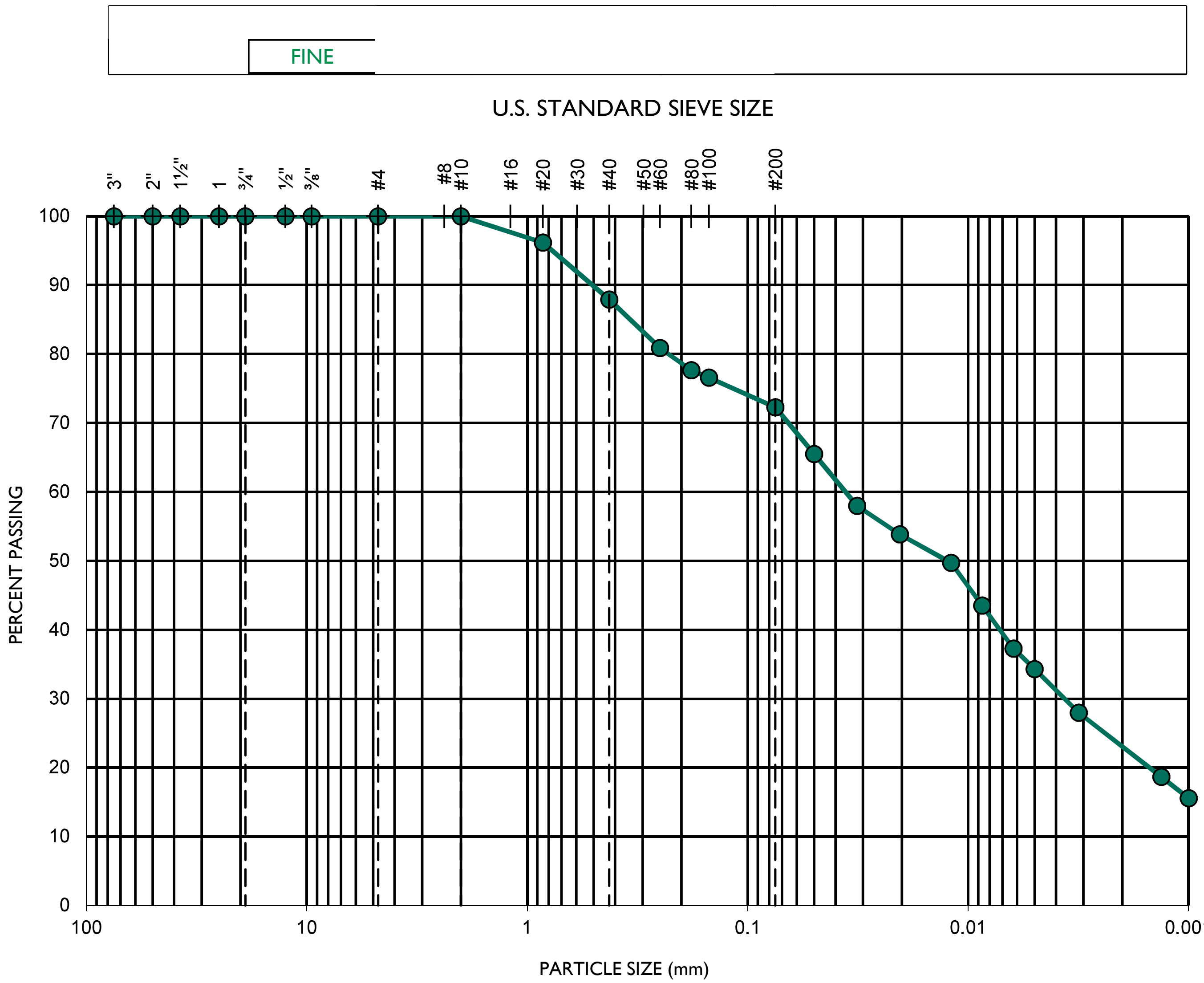
SOUTHWEST VILLAGE

PROJECT NO.: 06847-42-04

SAMPLE NO.: **B3 @ 324**

SAMPLE DEPTH (FT.): **324**

GEOLOGIC UNIT: **Shear Zone**



TEST DATA					
D_{10} (mm)	D_{30} (mm)	D_{60} (mm)	C_c	C_u	SOIL DESCRIPTION
0.00040	0.00375	0.03673	0.9	90.8	Silty CLAY with sand

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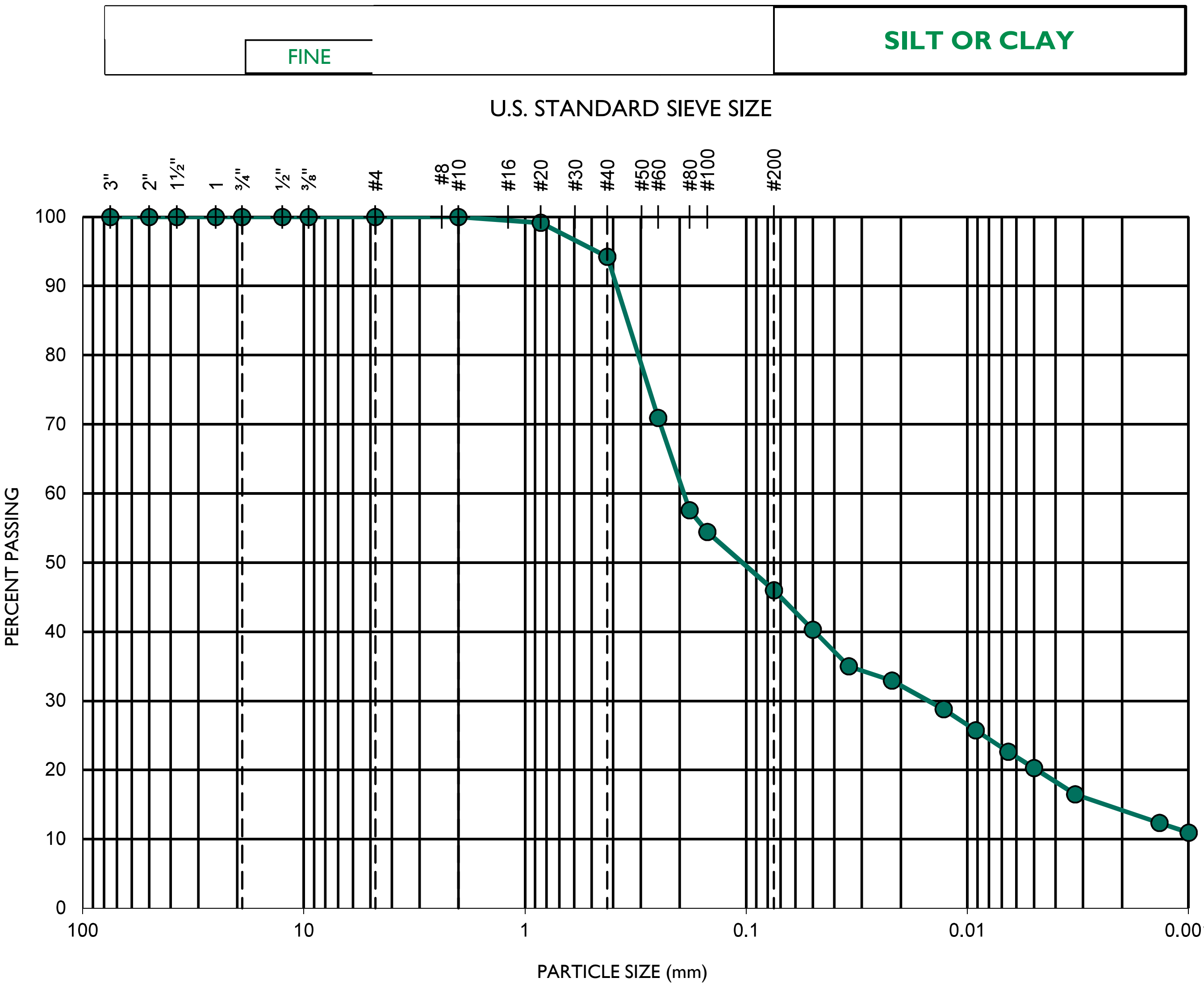
S0UTHWEST VILLAGE

PROJECT NO.: 06847-42-04

SAMPLE NO.: **B3 @ 328-330**

SAMPLE DEPTH (FT.): **328-330**

GEOLOGIC UNIT: **Shear Zone**



TEST DATA					
D_{10} (mm)	D_{30} (mm)	D_{60} (mm)	C_c	C_u	SOIL DESCRIPTION
0.00077	0.01546	0.19277	1.6	250.6	Silty Clayey SAND

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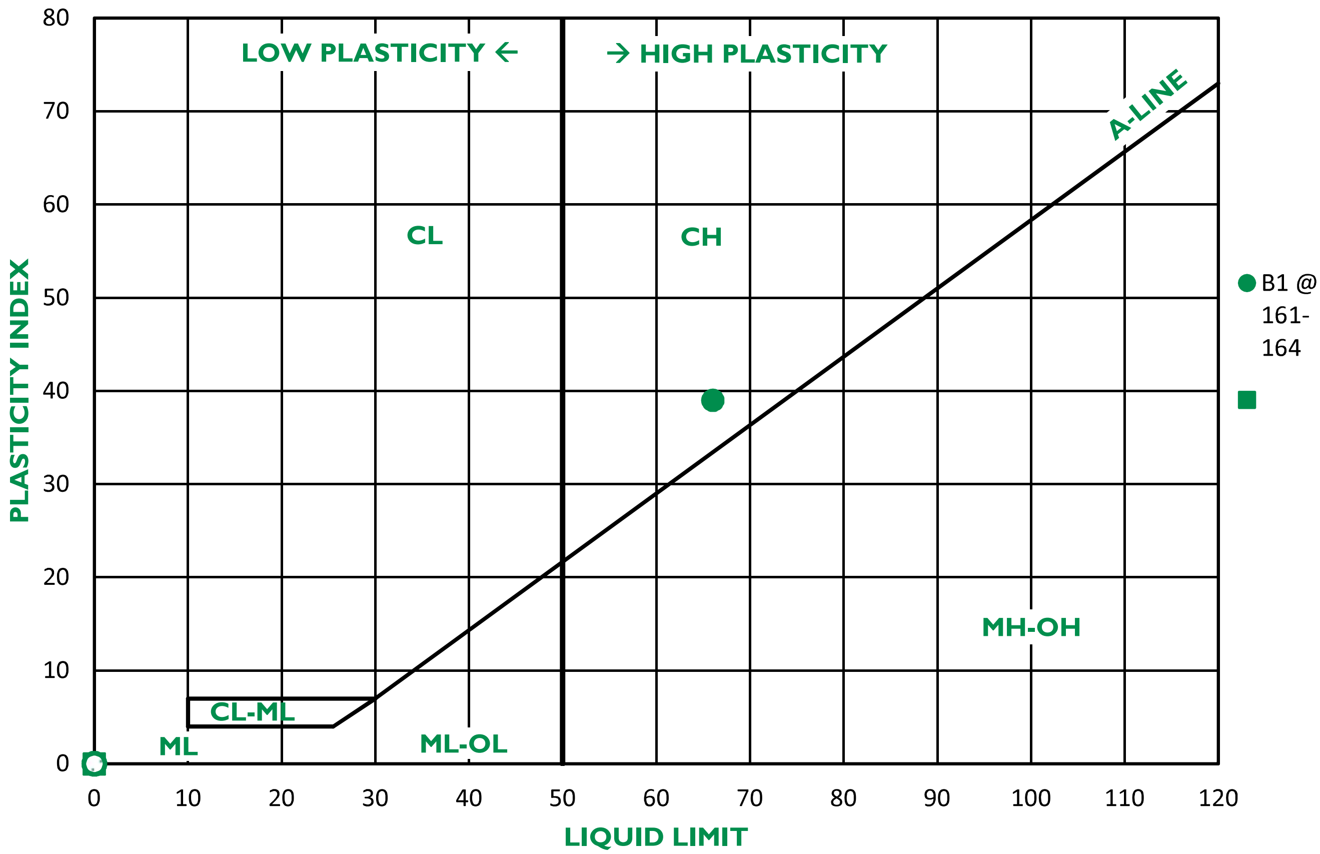
SIEVE ANALYSES ASTM D 135 & D 422

SOUTHWEST VILLAGE

PROJECT NO.: 06847-42-04

TEST RESULTS					
SAMPLE NO.	GEOLOGIC UNIT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
B1 @ 161-164	Shear Zone	66	27	39	CH



SOIL TYPE DESCRIPTION	
CH	High-Plasticity Clay
CL	Low-Plasticity Clay
ML	Low-Plasticity Silt
CL-ML	Low-Plasticity Clay to Low-Plasticity Silt
MH-OH	High-Plasticity Silt to High-Plasticity, Organic Silt
ML-OL	Low-Plasticity Silt to Low-Plasticity, Organic Silt

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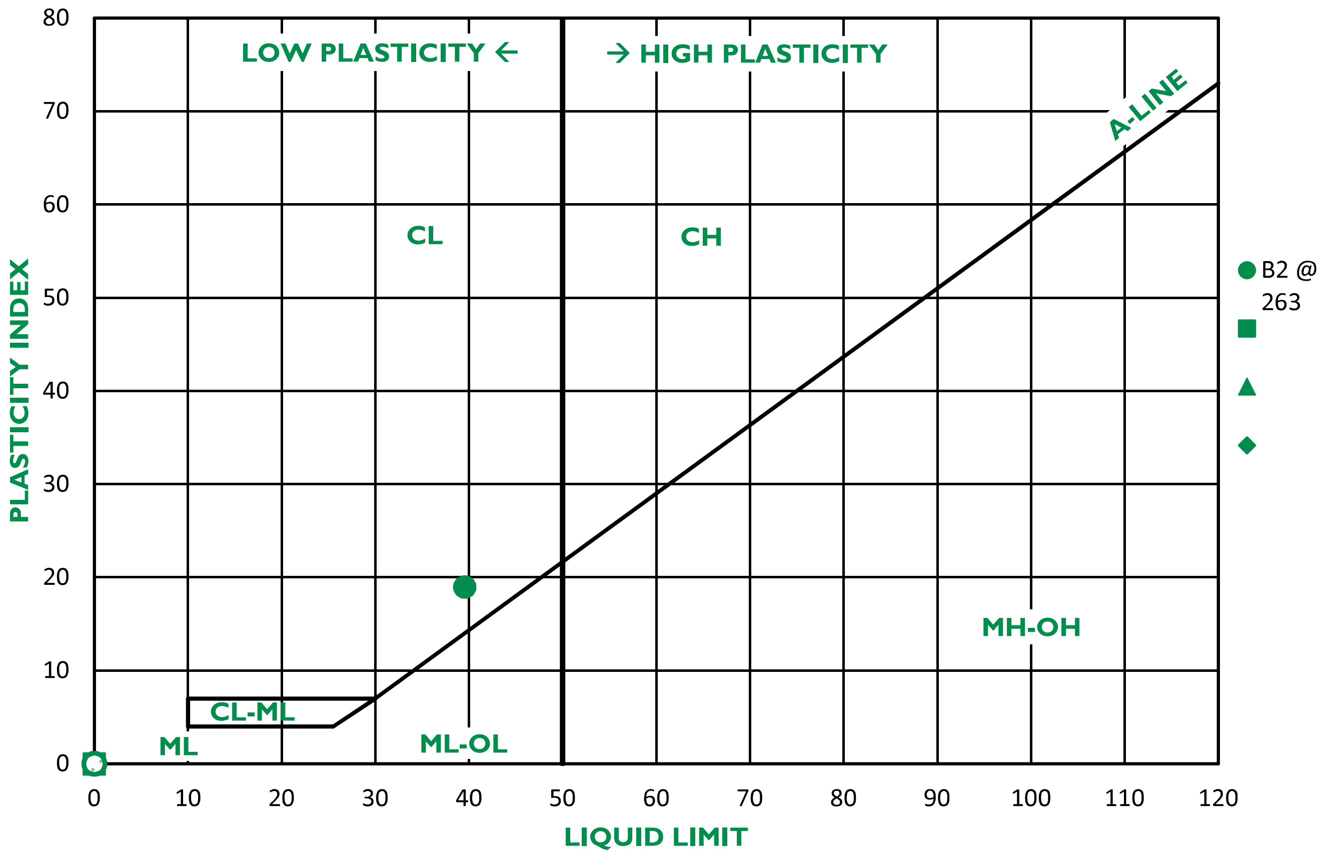
PLASTICITY INDEX - ASTM D 4318

Southwest Village

PROJECT NO.: 06847-42-04

TEST RESULTS					
SAMPLE NO.	GEOLOGIC UNIT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
B2 @ 263	Shear Zone	40	21	19	CL



SOIL TYPE DESCRIPTION	
CH	High-Plasticity Clay
CL	Low-Plasticity Clay
ML	Low-Plasticity Silt
CL-ML	Low-Plasticity Clay to Low-Plasticity Silt
MH-OH	High-Plasticity Silt to High-Plasticity, Organic Silt
ML-OL	Low-Plasticity Silt to Low-Plasticity, Organic Silt

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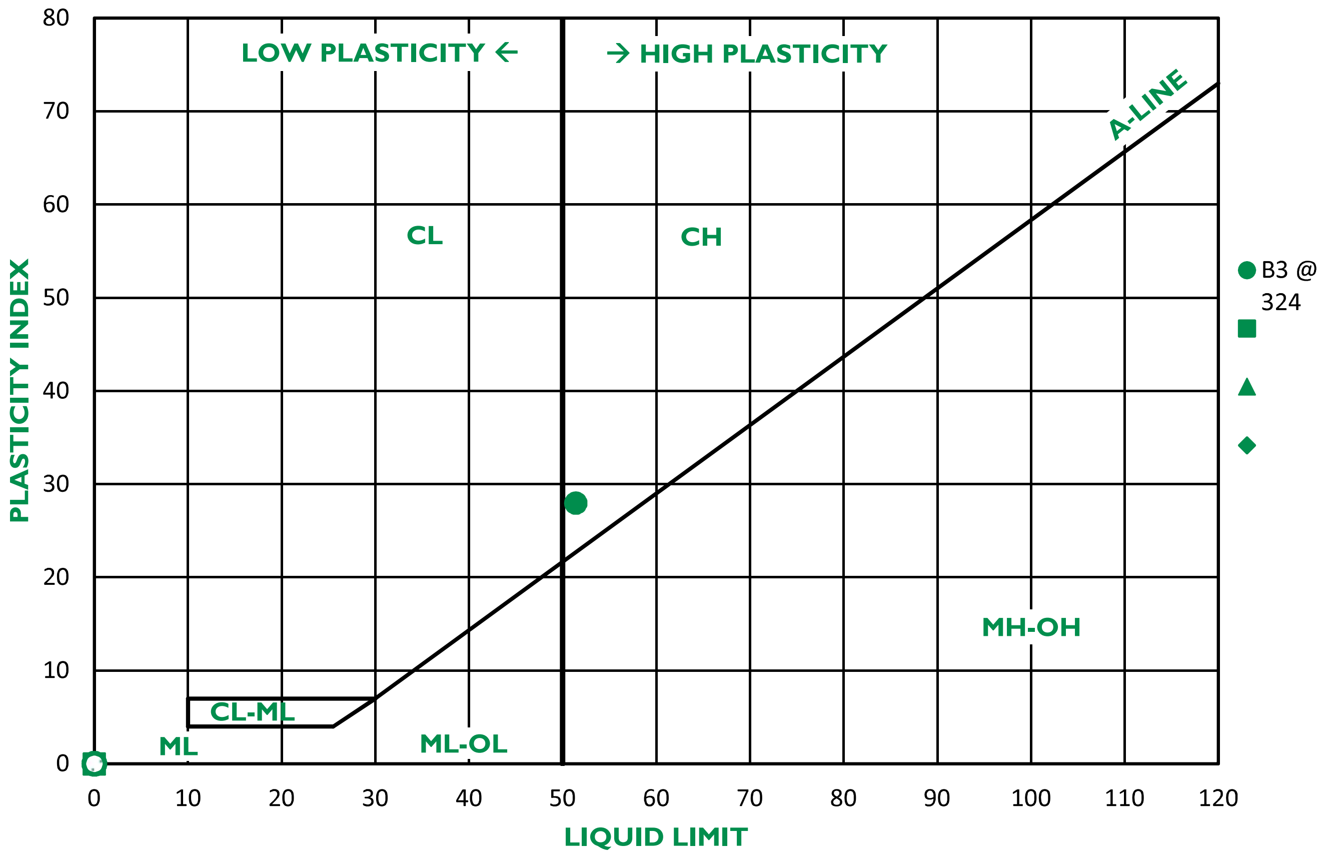
PLASTICITY INDEX - ASTM D 4318

SOUTHWEST VILLAGE

PROJECT NO.: 06847-42-04

TEST RESULTS					
SAMPLE NO.	GEOLOGIC UNIT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
B3 @ 324	SHEAR ZONE	51	23	28	CH



SOIL TYPE DESCRIPTION	
CH	High-Plasticity Clay
CL	Low-Plasticity Clay
ML	Low-Plasticity Silt
CL-ML	Low-Plasticity Clay to Low-Plasticity Silt
MH-OH	High-Plasticity Silt to High-Plasticity, Organic Silt
ML-OL	Low-Plasticity Silt to Low-Plasticity, Organic Silt

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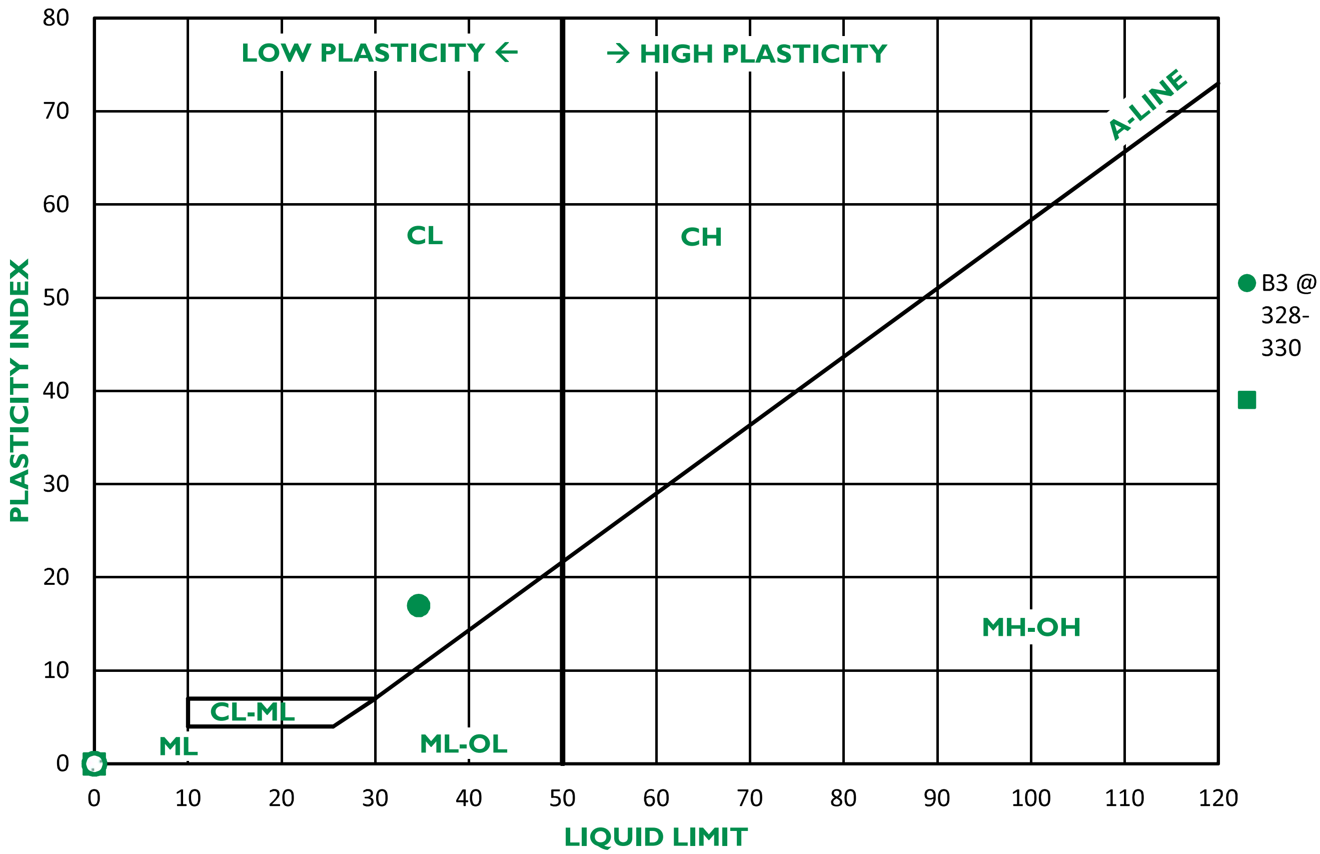
PLASTICITY INDEX - ASTM D 4318

SOUTHWEST VILLAGE

PROJECT NO.: 06847-42-04

TEST RESULTS					
SAMPLE NO.	GEOLOGIC UNIT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	SOIL TYPE
B3 @ 328-330	Shear Zone	35	18	17	CL



SOIL TYPE DESCRIPTION	
CH	High-Plasticity Clay
CL	Low-Plasticity Clay
ML	Low-Plasticity Silt
CL-ML	Low-Plasticity Clay to Low-Plasticity Silt
MH-OH	High-Plasticity Silt to High-Plasticity, Organic Silt
ML-OL	Low-Plasticity Silt to Low-Plasticity, Organic Silt

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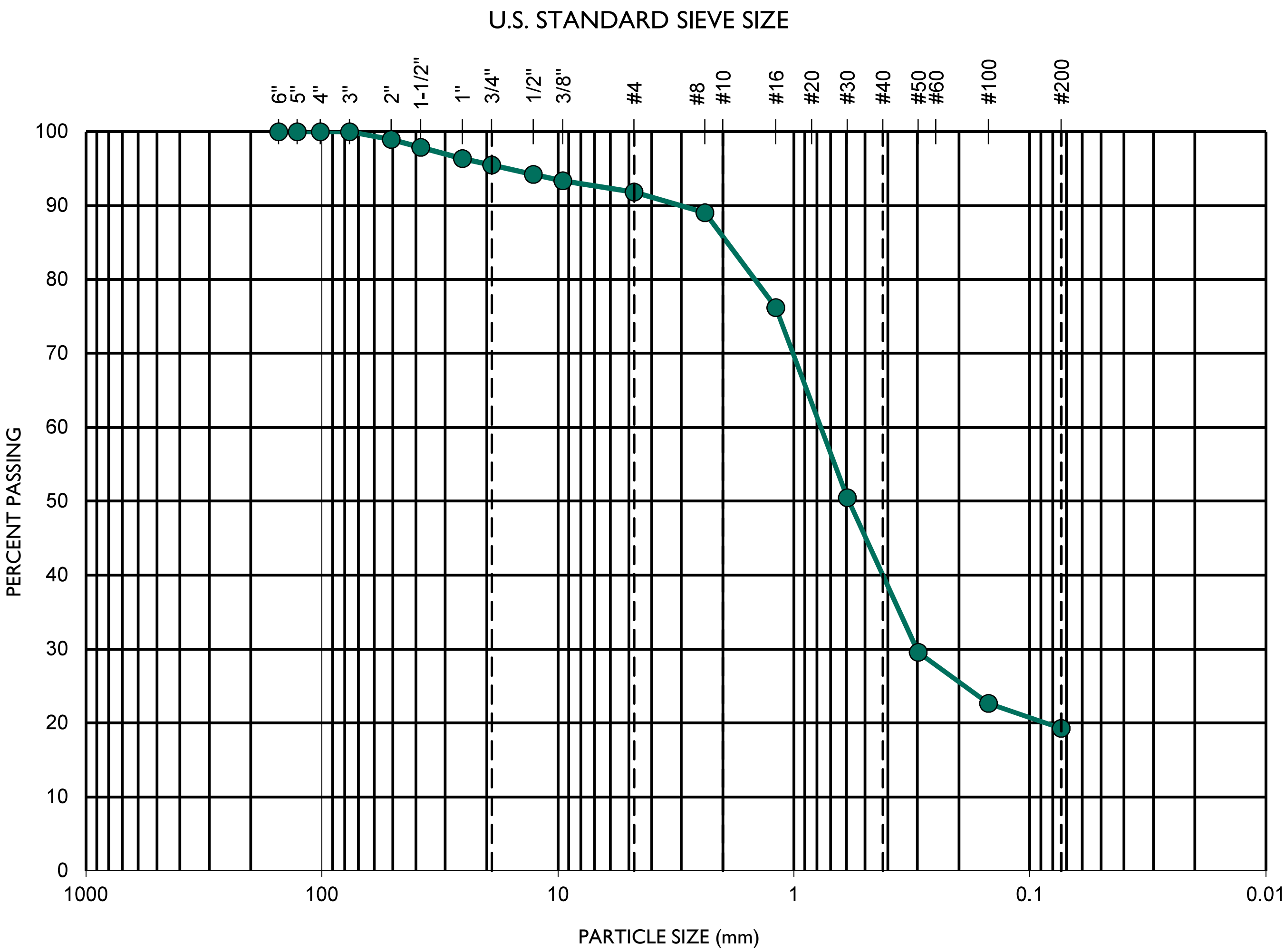
PLASTICITY INDEX - ASTM D 4318

SOUTHWEST VILLAGE

PROJECT NO.: 06847-42-04

SAMPLE NO.: **Perm-1** GEOLOGIC UNIT: **Qt**

SAMPLE DEPTH (FT.): **0**



TEST DATA					
D_{10} (mm)	D_{30} (mm)	D_{60} (mm)	C_c	C_u	SOIL DESCRIPTION
0.038	0.303	0.816	2.9	21.3	SM - Silty SAND

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SIEVE ANALYSES ASTM D 135

SOUTHWEST VILLAGE

PROJECT NO.: 06847-42-04

APPENDIX C

APPENDIX C

HYDRAULIC CONDUCTIVITY TESTING

We performed hydraulic conductivity testing on the mesa in the development area and at each of the proposed storm water outfalls. The tests were performed in 4- and 6-inch-diameter, drilled boreholes. We also performed a laboratory permeability test on a remolded sample of soil obtained from the mesa. Tables C-1 and C-2 presents the results of the testing. Figure C-1 shows the locations of the tests.

TABLE C-1
HYDRAULIC CONDUCTIVITY TEST RESULTS PERFORMED ON THE MESA

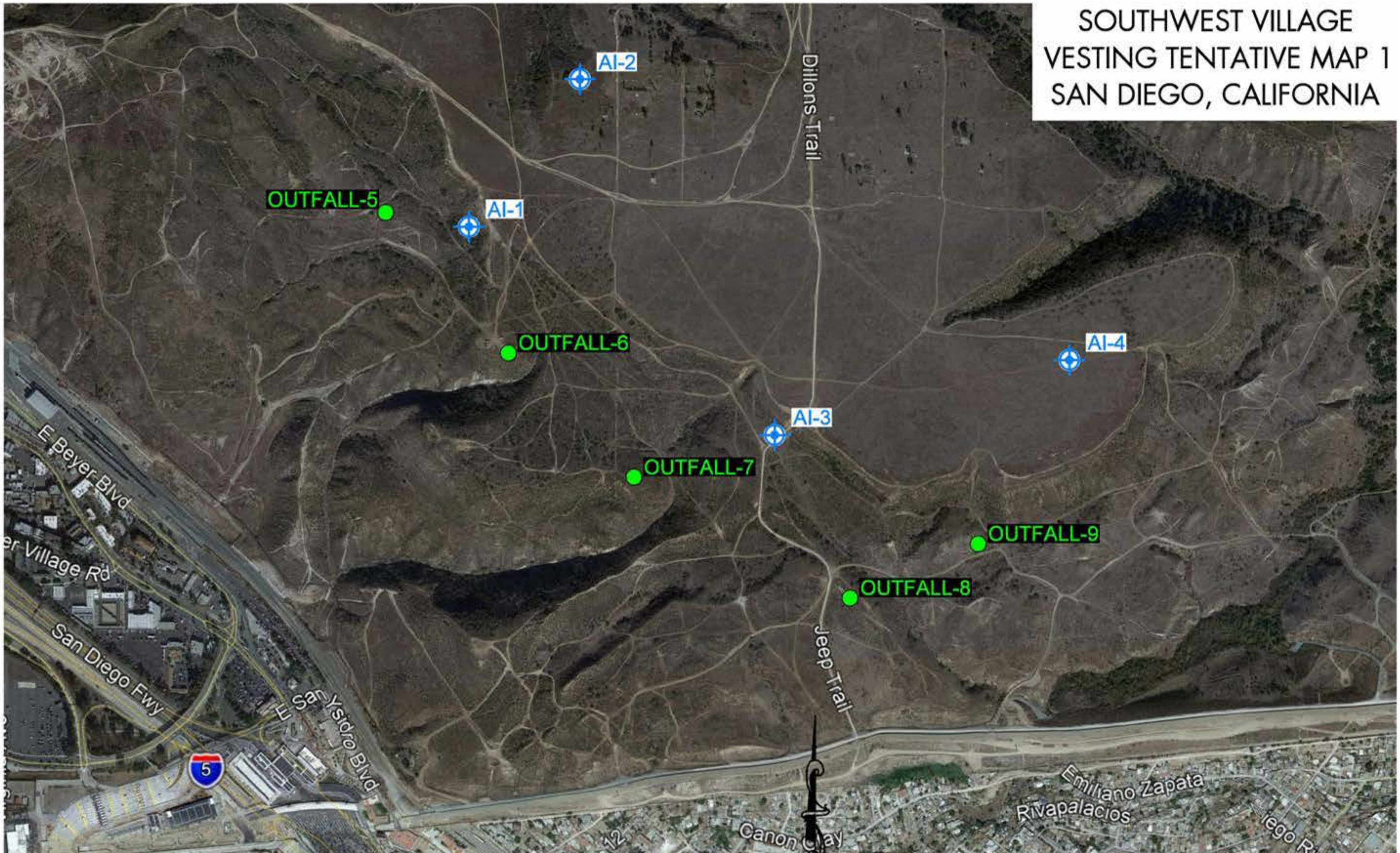
Location	Depth (feet)	Geologic Unit	Hydraulic Conductivity k (in/hr)
A-1	5	Topsoil/Qt	0.007
A-2	5	Qt	0.049
A-3	5	Qt	0.018
A-4	5	Qt	0.004
Lab Permeability	--	Remolded Sample	0.86

TABLE C-2
HYDRAULIC CONDUCTIVITY TEST RESULTS PERFORMED AT OUTFALLS

Location	Depth (feet)	Geologic Unit	Hydraulic Conductivity k (in/hr)
Outfall 5	5	Qls	0.011
Outfall 6	5	Qls	0.0009
Outfall 7*	3.3	Qls	0.0004
Outfall 8	4	Qls	0.008
Outfall 9	4.5	Qls	0.004

* Actual Location Slightly West of Outfall 7

SOUTHWEST VILLAGE
VESTING TENTATIVE MAP 1
SAN DIEGO, CALIFORNIA



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0' 1,000' 2,000'

SCALE 1"= 1,000' (On 8.5x11)

GEOCON LEGEND

AI-4 ....APPROX. LOCATION OF INFILTRATION TEST

INFILTRATION TEST LOCATION MAP

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PROJECT NO. 06847 - 42 - 04

FIGURE C-1

DATE 06 - 25 - 2021

Plotted:06/24/2021 3:32PM | By:RUBEN AGUILAR | File Location:Y:\PROJECTS\06847-42-04 Southwest Village and Burrow Site\SHEETS\06847-42-04 InfiltrationTestLocationMap.dwg

APPENDIX D

APPENDIX D

SLOPE STABILITY ANALYSIS

FOR

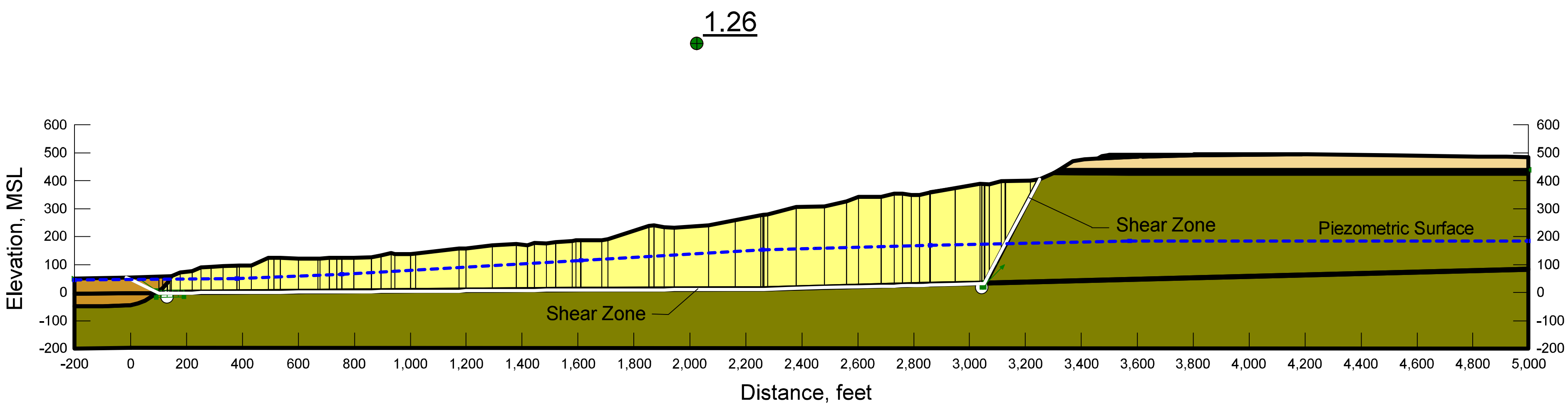
SOUTHWEST VILLAGE VTM-1
SAN DIEGO, CALIFORNIA

PROJECT NO. 06847-42-04

Southwest Village
Project No. 06847-42-04
Cross Section: AA-AA'

Color	Name	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Piezometric Line
	Qal	125	100	28	1
	Qal (2)				1
	Qcf	130	300	30	1
	Qls	130	300	30	1
	Qt	130	100	33	1
	Shear Zone	120	50	8	1
	To	130	450	34	1
	To (2)				1
	Tsd	130	450	34	1

Analysis:
-- Failure Along Slip Surface and Up Backscarp
-- Water at Existing Elevation



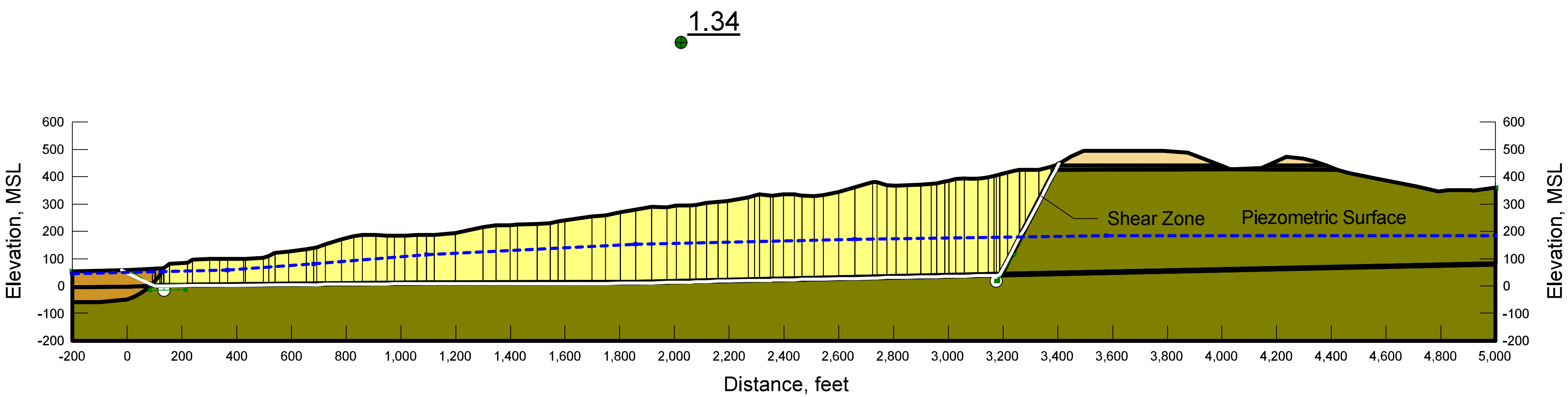
File Name: AA-AA' (at backscarp).gsz

Figure D-1

Southwest Village
Project No. 06847-42-04
Cross Section: BB-BB'

Analysis:
-- Failure Along Slip Surface at up Backscarp
-- Water at Existing Elevation

Color	Name	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Piezometric Line
	Qal	125	100	28	1
	Qal (2)				1
	Qls	130	300	30	1
	Qt	130	100	33	1
	Shear Zone	120	50	8	1
	To	130	450	34	1
	To (2)				1
	Tsd	130	450	34	1



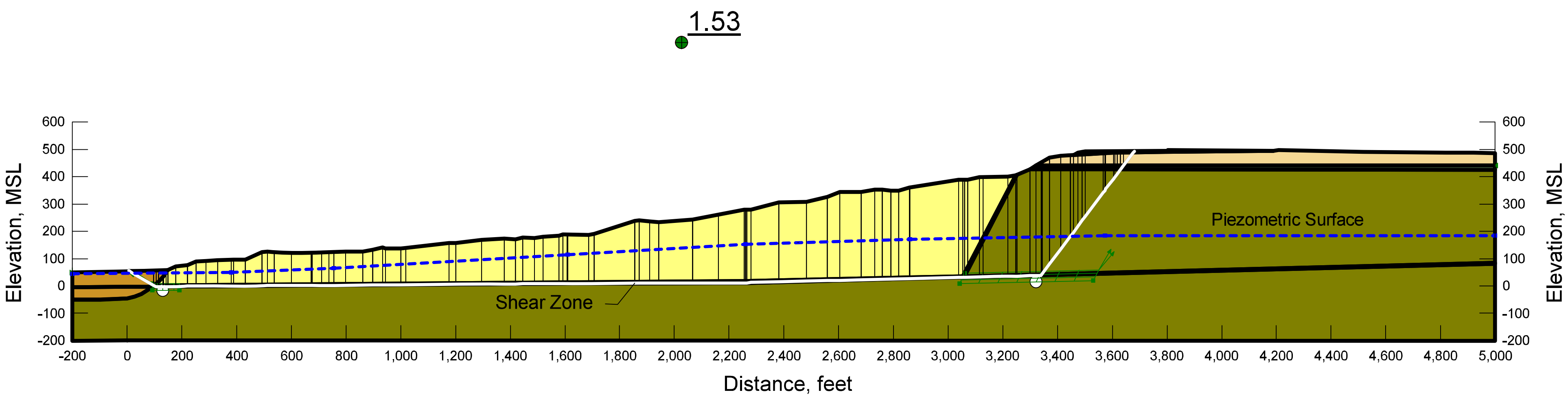
File Name: BB-BB' (at backscarp).gsz

Figure D-2

Southwest Village
Project No. 06847-42-04
Cross Section: AA-AA'

Analysis:
-- Failure Along Slip Surface
-- Slip Surface Extended
-- Water at Existing Elevation

Color	Name	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Piezometric Line
	Qal	125	100	28	1
	Qal (2)				1
	Qcf	130	300	30	1
	Qls	130	300	30	1
	Qt	130	100	33	1
	Shear Zone	120	50	8	1
	To	130	450	34	1
	To (2)				1
	Tsd	130	450	34	1



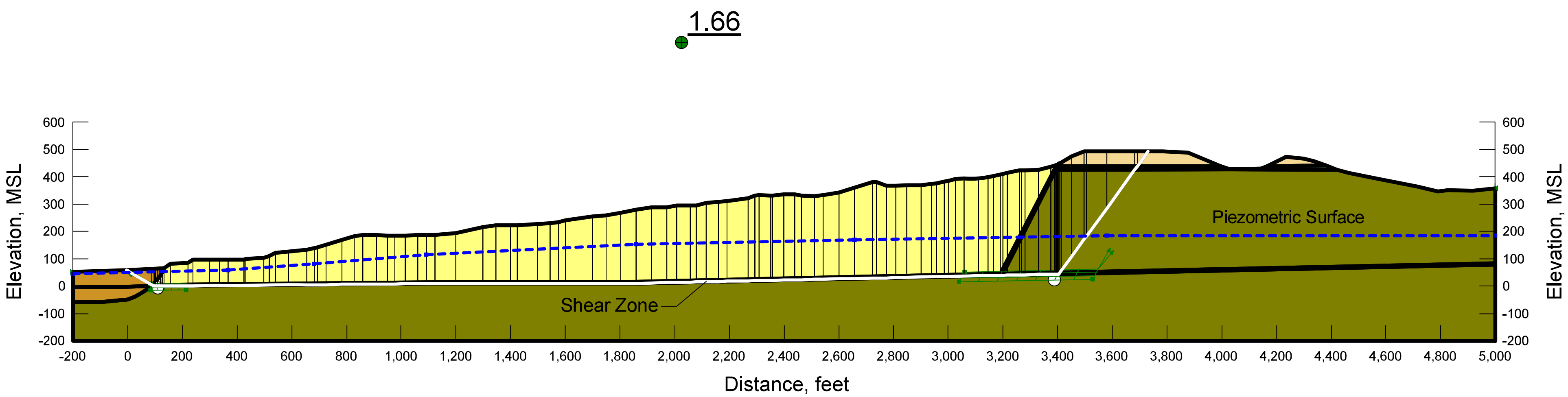
File Name: AA-AA'.gsz

Figure D-3

Southwest Village
Project No. 06847-42-04
Cross Section: BB-BB'

Analysis:
-- Failure Along Slip Surface
-- Slip Surface Extended
-- Water at Existing Elevation

Color	Name	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Piezometric Line
	Qal	125	100	28	1
	Qal (2)				1
	Qls	130	300	30	1
	Qt	130	100	33	1
	Shear Zone	120	50	8	1
	To	130	450	34	1
	To (2)				1
	Tsd	130	450	34	1



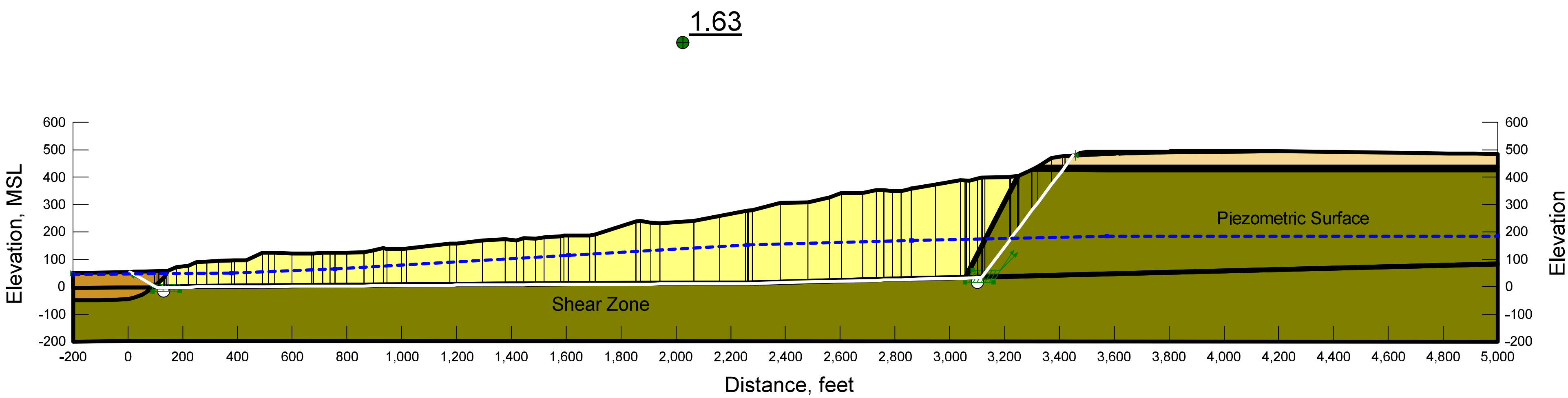
File Name: BB-BB'.gsz

Figure D-4

Southwest Village
Project No. 06847-42-04
Cross Section: AA-AA'

Analysis:
-- Failure Along Slip Surface
-- Slip Surface Extended
-- Failure at Edge of Develoopment
-- Water at Existing Elevation

Color	Name	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Piezometric Line
	Qal	125	100	28	1
	Qal (2)				1
	Qcf	130	300	30	1
	Qls	130	300	30	1
	Qt	130	100	33	1
	Shear Zone	120	50	8	1
	To	130	450	34	1
	To (2)				1
	Tsd	130	450	34	1



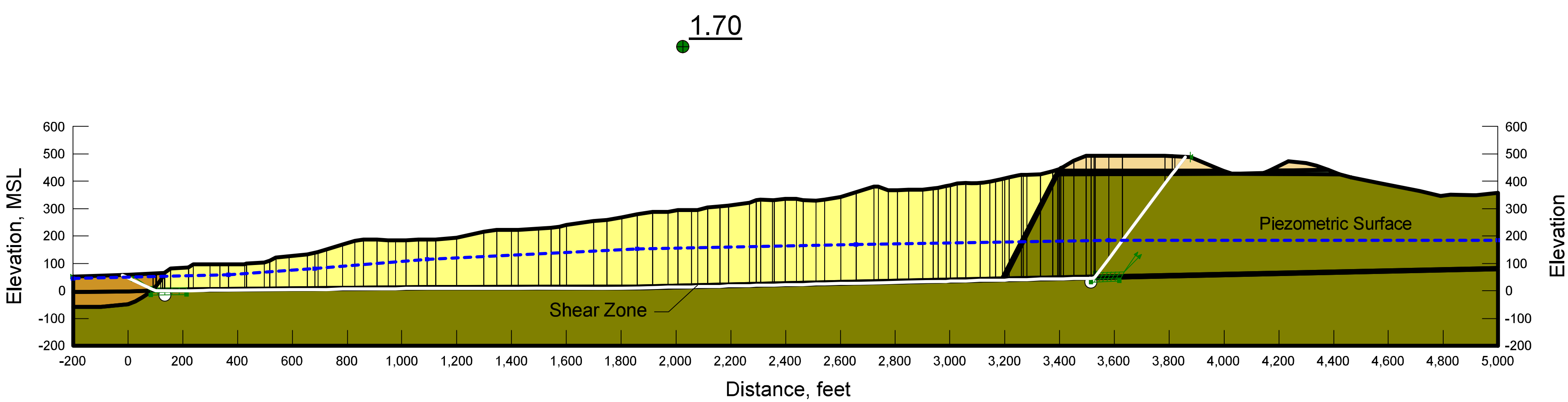
File Name: AA-AA' (at edge of development).gsz

Figure D-5

Southwest Village
Project No. 06847-42-04
Cross Section: BB-BB'

Analysis:
-- Failure Along Slip Surface
-- Slip Surface Extended
-- Failure at Edge of Development
-- Water at Existing Elevation

Color	Name	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Piezometric Line
	Qal	125	100	28	1
	Qal (2)				1
	Qls	130	300	30	1
	Qt	130	100	33	1
	Shear Zone	120	50	8	1
	To	130	450	34	1
	To (2)				1
	Tsd	130	450	34	1



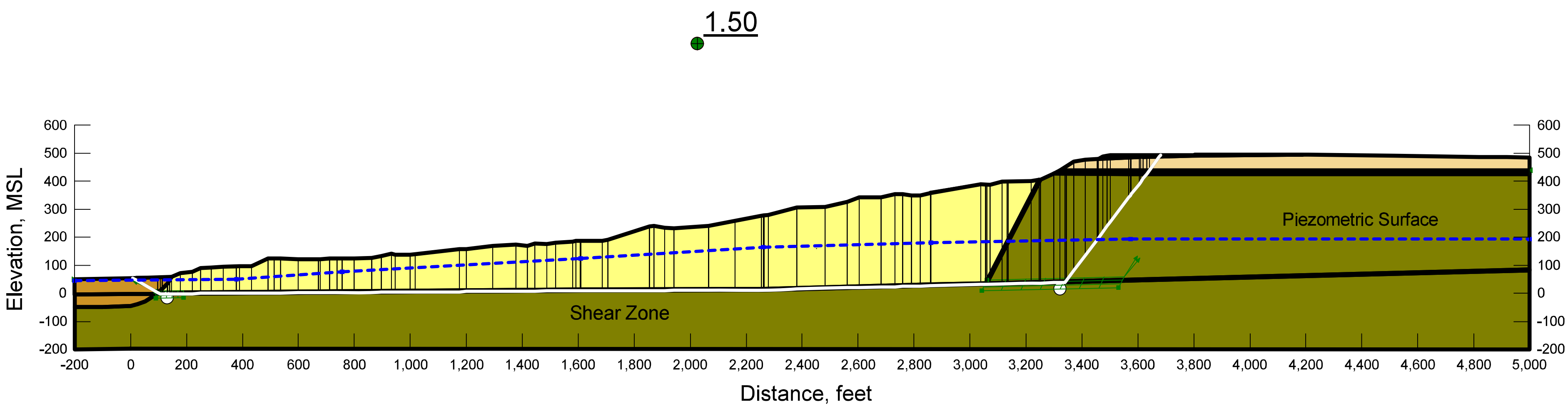
File Name: BB-BB' (at edge of development).gsz

Figure D-6

Southwest Village
Project No. 06847-42-04
Cross Section: AA-AA'

Analysis:
-- Failure Along Slip Surface
-- Slip Surface Extended
-- Groundwater Rise 10 feet

Color	Name	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Piezometric Line
	Qal	125	100	28	1
	Qal (2)				1
	Qcf	130	300	30	1
	Qls	130	300	30	1
	Qt	130	100	33	1
	Shear Zone	120	50	8	1
	To	130	450	34	1
	To (2)				1
	Tsd	130	450	34	1



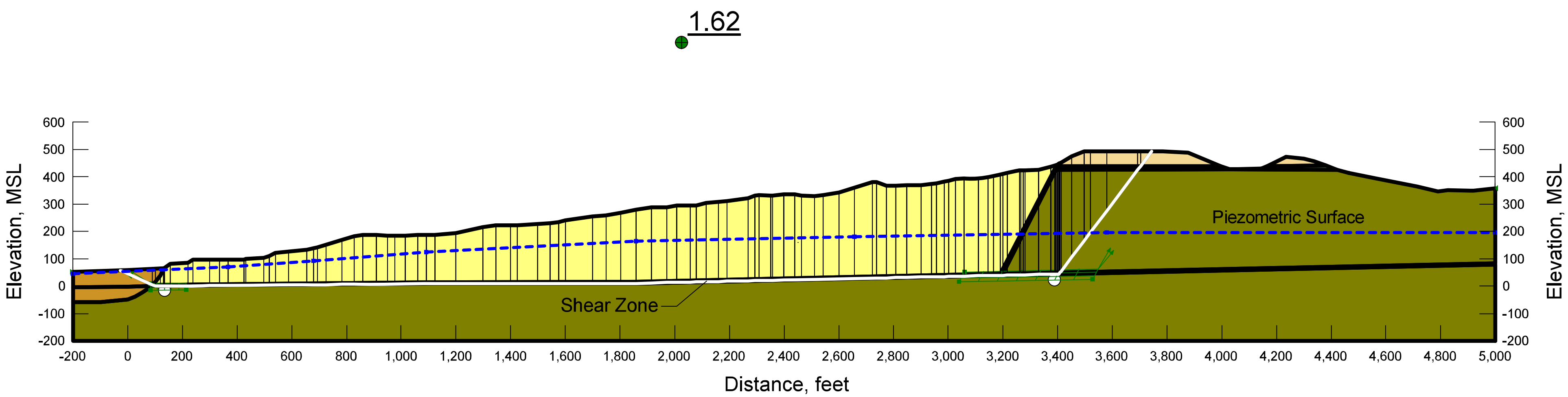
File Name: AA-AA' (GW Rise 10 feet).gsz

Figure D-7

Southwest Village
Project No. 06847-42-04
Cross Section: BB-BB'

Analysis:
-- Failure Along Slip Surface
-- Slip Surface Extended
-- Groundwater Rise 10 feet

Color	Name	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Piezometric Line
	Qal	125	100	28	1
	Qal (2)				1
	Qls	130	300	30	1
	Qt	130	100	33	1
	Shear Zone	120	50	8	1
	To	130	450	34	1
	To (2)				1
	Tsd	130	450	34	1



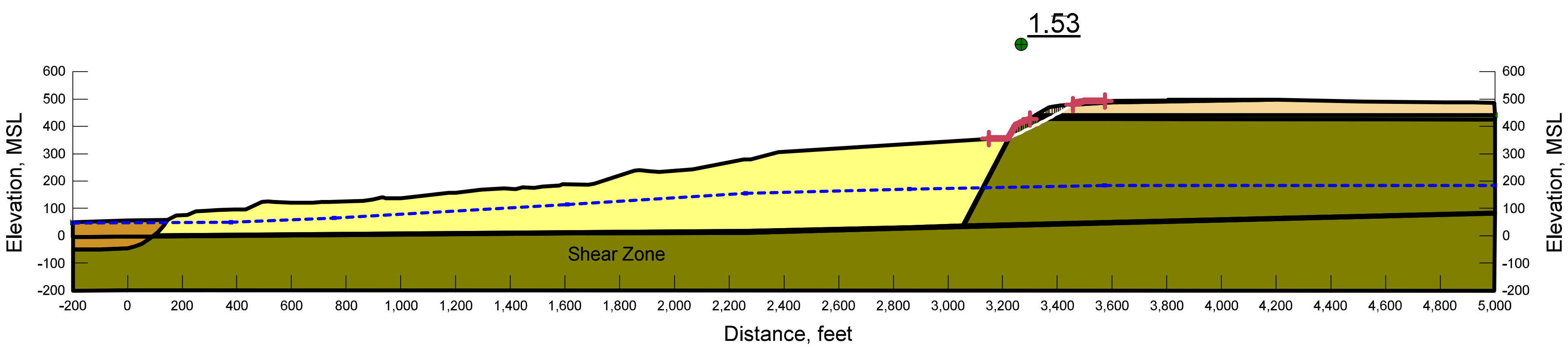
File Name: BB-BB' (GW Rise 10 feet).gsz

Figure D-8

Southwest Village
Project No. 06847-42-04
Cross Section: AA-AA'

Color	Name	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Piezometric Line
	Qal	125	100	28	1
	Qal (2)				1
	Qcf	130	300	30	1
	Qls	130	300	30	1
	Qt	130	100	33	1
	Shear Zone	120	50	8	1
	To	130	450	34	1
	To (2)				1
	Tsd	130	450	34	1

Analysis:
-- 50 foot Increase in Exposed Headscarp



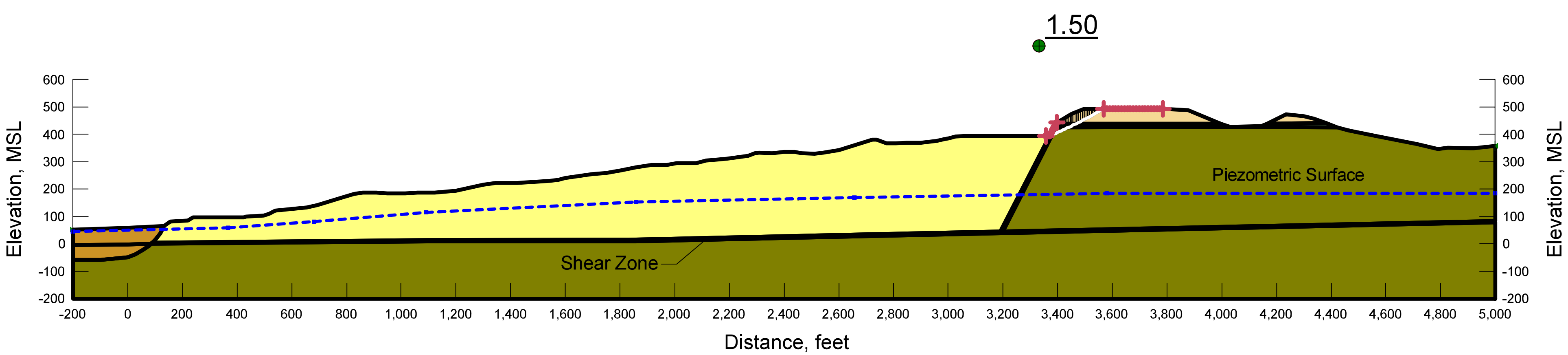
File Name: AA-AA' (50 foot drop of lanslide - Circular).gsz

Figure D-9

Southwest Village
Project No. 06847-42-04
Cross Section: BB-BB'

Analysis:
-- 50 foot Increase in Exposed Headscarp

Color	Name	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Piezometric Line
	Qal	125	100	28	1
	Qal (2)				1
	Qls	130	300	30	1
	Qt	130	100	33	1
	Shear Zone	120	50	8	1
	To	130	450	34	1
	To (2)				1
	Tsd	130	450	34	1



File Name: BB-BB' (50 foot drop of lanslide - Circular).gsz

Figure D-10

GEOCON

Seismic Slope Stability Evaluation

Input Data in Shaded Areas

Project	Southwest Village	**Computed By**	RCM
Project Number	06847-42-04		
Date	06/18/21		

Peak Ground Acceleration (Firm Rock), MHA_r, g	0.21	10% in 50 years
Modal Magnitude, M	6.12	
Modal Distance, r, km	11.5	
Site Condition, S (0 for rock, 1 for soil)	0	
Yield Acceleration, k_y/g	NA	<-- Enter Value or NA for Screening Analysis
Shear Wave Velocity, V_s (ft/sec)	1500	<--
Max Vertical Distance, H (Feet)	80	<--
Is Slide X-Area > 25,000ft^2 (Y/N)	Y	<-- Use "N" for Buttress Fills
Correction for horizontal incoherence	0.8	
Duration, $D_{5\text{-}95}\|_{med}$, sec	6.730	
Coefficient, C_1	0.4110	
Coefficient, C_2	0.0837	
Coefficient, C_3	0.0021	
Standard Error, ε_T	0.437	
Mean Square Period, T_m, sec	0.445	

Initial Screening with MHEA = MHA = k_{max}g		**Approximation of Seismic Demand**	
k_y/MHA	NA	Period of Sliding Mass, $T_s = 4H/V_s$, sec	0.213
f_{EQ}(u=5cm) = (NRF/3.477)*(1.87-log(u/((MHA$_r$/g)*NRF*D$_{5\text{-}95}$)))	0.4811	T_s/T_m	0.48
k_{EQ} = feq(MHA$_r$)/g	0.101	MHEA/(MHA*NRF)	0.762
Factor of Safety in Slope Analysis Using k_{EQ}	0.77	NRF = 0.6225+0.9196EXP(-2.25*MHA$_r$/g)	1.20
Fails Initial Screening Analysis		MHEA/g	0.19
		k_y/MHEA = k_y/k_{max}	NA
		Normalized Displacement, Normu	NA
		Estimated Displacement, u (cm)	**NA**

FIGURE D-11

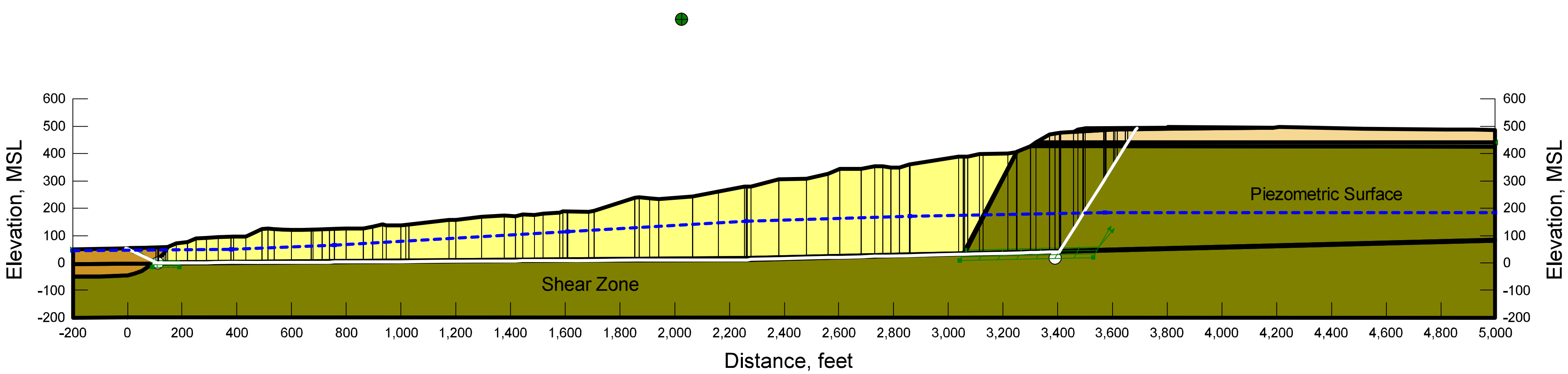
Southwest Village
Project No. 06847-42-04
Cross Section: AA-AA'

Seismic Analysis

Horz Seismic Coef.: 0.101

Color	Name	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Piezometric Line
	Qal	125	100	28	1
	Qal (2)				1
	Qcf	130	300	30	1
	Qls	130	300	30	1
	Qt	130	100	33	1
	Shear Zone	120	50	8	1
	To	130	450	34	1
	To (2)				1
	Tsd	130	450	34	1

Analysis:
-- Seismic Analysis using calculated Keq



File Name: AA-AA' (Seismic).gsz

Figure D-12

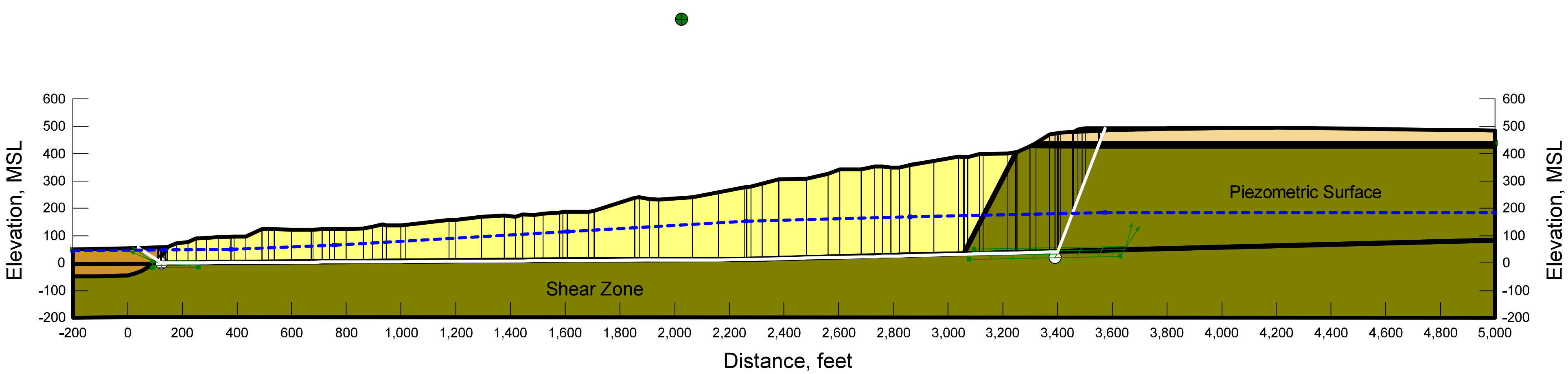
Southwest Village
Project No. 06847-42-04
Cross Section: AA-AA'

Seismic Analysis

Horz Seismic Coef.: 0.05

Analysis:
--Yield Acceleration Determination

Color	Name	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)	Piezometric Line
	Qal	125	100	28	1
	Qal (2)				1
	Qcf	130	300	30	1
	Qls	130	300	30	1
	Qt	130	100	33	1
	Shear Zone	120	50	8	1
	To	130	450	34	1
	To (2)				1
	Tsd	130	450	34	1



File Name: AA-AA' (Seismic) 2.gsz

Figure D-13

GEOCON

Seismic Slope Stability Evaluation

Input Data in Shaded Areas

Project	Southwest Village	**Computed By**	RCM
Project Number	06847-42-04		
Date	05/24/21		
Filename	Seismic		

Peak Ground Acceleration (Firm Rock), MHA_r, g	0.21	10% in 50 years
Modal Magnitude, M	6.12	
Modal Distance, r, km	11.5	
Site Condition, S (0 for rock, 1 for soil)	0	
Yield Acceleration, k_y/g	0.05	<-- Enter Value or NA for Screening Analysis
Shear Wave Velocity, V_s (ft/sec)	1500	<--
Max Vertical Distance, H (Feet)	445	<--
Is Slide X-Area > 25,000ft^2 (Y/N)	Y	<-- Use "N" for Buttress Fills
Correction for horizontal incoherence	0.8	
Duration, $D_{5\text{-}95}\|_{med}$, sec	6.730	
Coefficient, C_1	0.4110	
Coefficient, C_2	0.0837	
Coefficient, C_3	0.0021	
Standard Error, ε_T	0.437	
Mean Square Period, T_m, sec	0.445	

Initial Screening with MHEA = MHA = k_{max}g	
k_y/MHA	0.2381
f_{EQ}(u=5cm) = (NRF/3.477)*(1.87-log(u/((MHA_r/g)*NRF*$D_{5\text{-}95}$)))	0.4811
k_{EQ} = feq(MHA_r)/g	0.101
Factor of Safety in Slope Analysis Using k_{EQ}	0.77

Fails Initial Screening Analysis

Approximation of Seismic Demand	
Period of Sliding Mass, T_s = 4H/V_s, sec	1.187
T_s/T_m	2.67
MHEA/(MHA*NRF)	0.199
NRF = 0.6225+0.9196EXP(-2.25*MHA_r/g)	1.20
MHEA/g	0.05
k_y/MHEA = k_y/k_{max}	1.00
Normalized Displacement, Normu	0.0
Estimated Displacement, u (cm)	**0**

FIGURE D-14

GEOCON

Seismic Slope Stability Evaluation

Input Data in Shaded Areas

Project	Southwest Village	**Computed By**	RCM
Project Number	06847-42-04		
Date	05/24/21		
Filename	Seismic		

Peak Ground Acceleration (Firm Rock), MHA_r, g	0.21	10% in 50 years
Modal Magnitude, M	6.12	
Modal Distance, r, km	11.5	
Site Condition, S (0 for rock, 1 for soil)	0	
Yield Acceleration, k_y/g	0.05	<-- Enter Value or NA for Screening Analysis
Shear Wave Velocity, V_s (ft/sec)	1500	<--
Max Vertical Distance, H (Feet)	80	<--
Is Slide X-Area > 25,000ft^2 (Y/N)	Y	<-- Use "N" for Buttress Fills
Correction for horizontal incoherence	0.8	
Duration, $D_{5\text{-}95}\vert_{med}$, sec	6.730	
Coefficient, C_1	0.4110	
Coefficient, C_2	0.0837	
Coefficient, C_3	0.0021	
Standard Error, ε_T	0.437	
Mean Square Period, T_m, sec	0.445	

Initial Screening with MHEA = MHA = k_{max}g

k_y/MHA	0.2381
f_{EQ}(u=5cm) = (NRF/3.477)*(1.87-log(u/((MHA_r/g)*NRF*$D_{5\text{-}95}$)))	0.4811
k_{EQ} = feq(MHA_r)/g	0.101
Factor of Safety in Slope Analysis Using k_{EQ}	0.77

Fails Initial Screening Analysis

Approximation of Seismic Demand

Period of Sliding Mass, T_s = 4H/V_s, sec	0.213
T_s/T_m	0.48
MHEA/(MHA*NRF)	0.762
NRF = 0.6225+0.9196EXP(-2.25*MHA_r/g)	1.20
MHEA/g	0.19
k_y/MHEA = k_y/k_{max}	0.26
Normalized Displacement, Normu	9.2
Estimated Displacement, u (cm)	**12**

FIGURE D-15

U.S. Geological Survey - Earthquake Hazards Program

Unified Hazard Tool

Please do not use this tool to obtain ground motion parameter values for the design code reference documents covered by the U.S. Seismic Design Maps web tools (e.g., the International Building Code and the ASCE 7 or 41 Standard). The values returned by the two applications are not identical.

Input

Edition

Dynamic: Conterminous U.S. 2014 (u…

Latitude

Decimal degrees

32.5545

Longitude

Decimal degrees, negative values for western longitudes

-117.0258

Site Class

537 m/s (Site class C)

Spectral Period

Peak Ground Acceleration

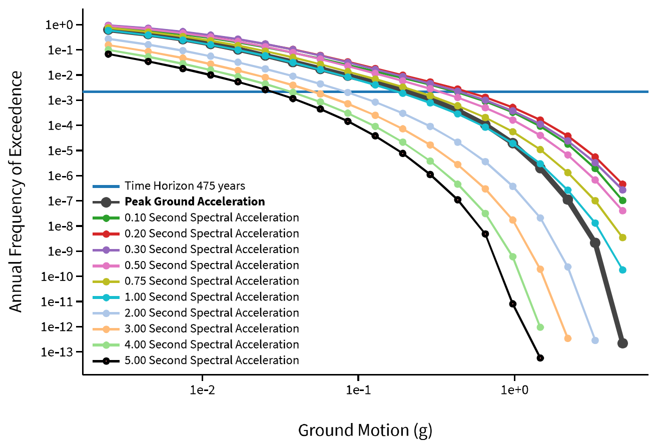
Time Horizon

Return period in years

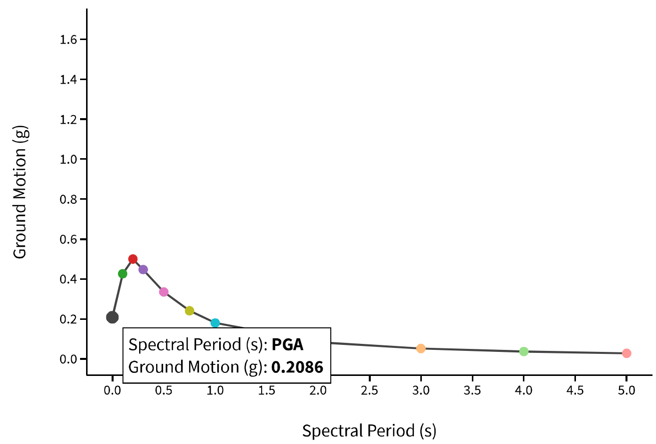
475

Hazard Curve

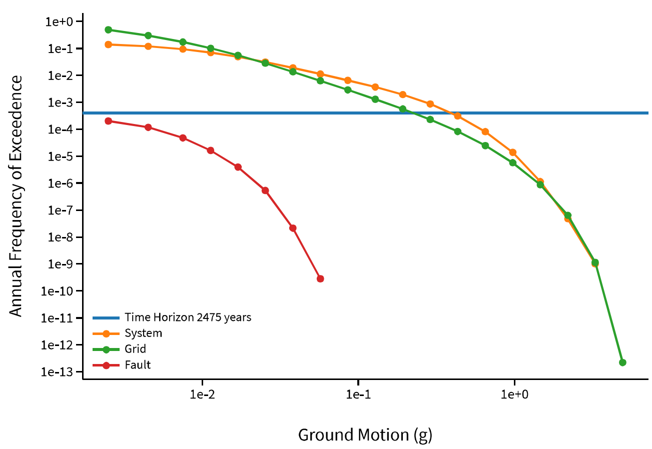
Hazard Curves



Uniform Hazard Response Spectrum



Component Curves for Peak Ground Acceleration

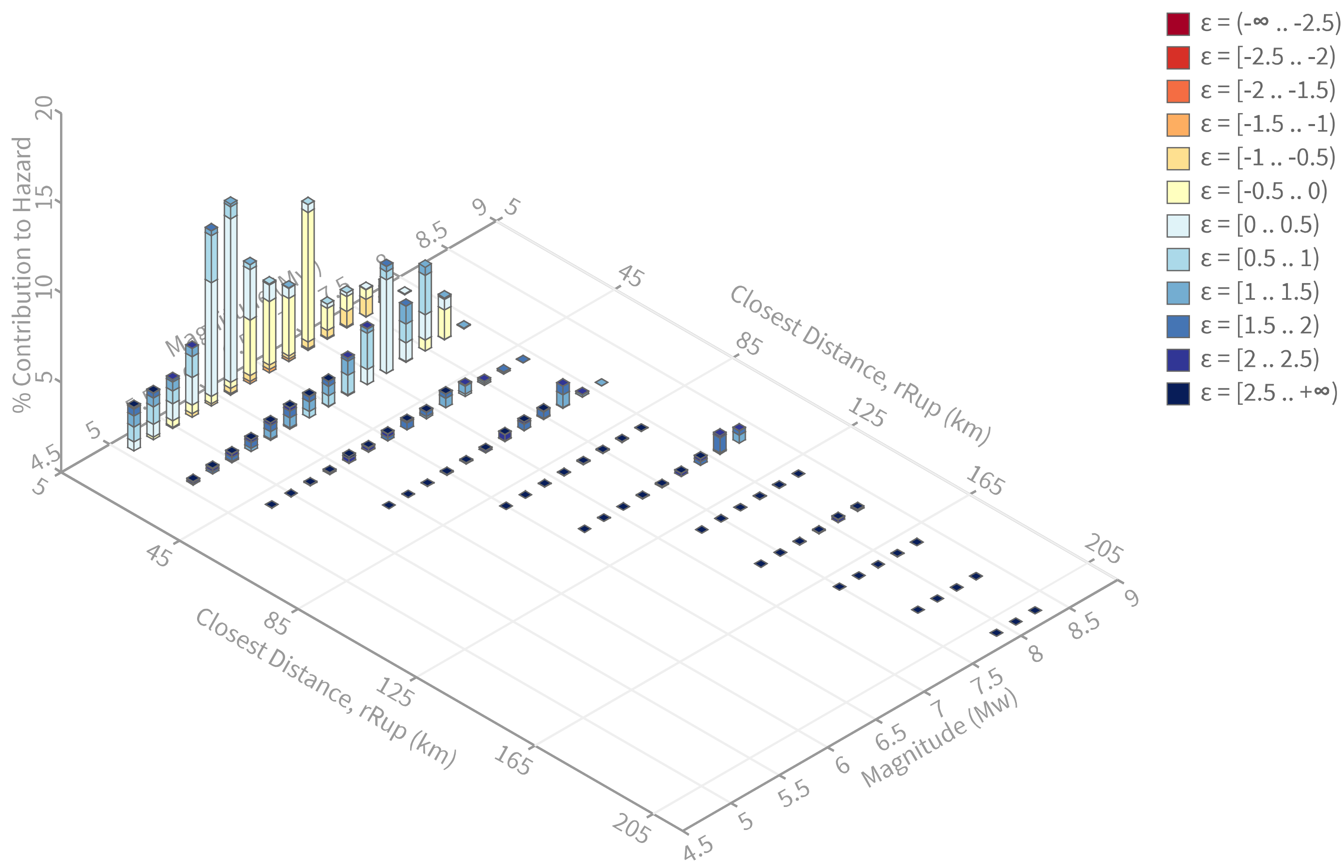


View Raw Data

Deaggregation

Component

Total



Summary statistics for, Deaggregation: Total

Deaggregation targets

Return period: 475 yrs
Exceedance rate: 0.0021052632 yr^{-1}
PGA ground motion: 0.20861892 g

Recovered targets

Return period: 487.51271 yrs
Exceedance rate: 0.0020512286 yr^{-1}

Totals

Binned: 100 %
Residual: 0 %
Trace: 0.23 %

Mean (over all sources)

m: 6.58
r: 22.27 km
ε_0: 0.43 σ

Mode (largest m-r bin)

m: 6.12
r: 11.76 km
ε_0: 0.2 σ
Contribution: 10.64 %

Mode (largest m-r-ε_0 bin)

m: 6.12
r: 11.53 km
ε_0: 0.2 σ
Contribution: 9.11 %

Discretization

r: min = 0.0, max = 1000.0, Δ = 20.0 km
m: min = 4.4, max = 9.4, Δ = 0.2
ε: min = -3.0, max = 3.0, Δ = 0.5 σ

Epsilon keys

ε0: [-∞ .. -2.5)
ε1: [-2.5 .. -2.0)
ε2: [-2.0 .. -1.5)
ε3: [-1.5 .. -1.0)
ε4: [-1.0 .. -0.5)
ε5: [-0.5 .. 0.0)
ε6: [0.0 .. 0.5)
ε7: [0.5 .. 1.0)
ε8: [1.0 .. 1.5)
ε9: [1.5 .. 2.0)
ε10: [2.0 .. 2.5)
ε11: [2.5 .. +∞]

Deaggregation Contributors

Source Set ↳ Source	Type	r	m	ε_0	lon	lat	az	%
UC33brAvg_FM31	System							39.80
Rose Canyon [0]		11.42	6.36	0.01	117.147°W	32.551°N	267.92	18.70
Coronado Bank alt1 [13]		22.75	7.08	0.41	117.234°W	32.450°N	239.35	6.39
San Diego Trough south [1]		39.15	7.33	0.99	117.397°W	32.395°N	243.08	2.37
Rose Canyon [3]		15.45	6.50	0.33	117.161°W	32.634°N	304.97	1.34
Rose Canyon [1]		11.60	6.97	-0.41	117.148°W	32.568°N	277.27	1.21
Rose Canyon [2]		12.81	6.85	-0.19	117.150°W	32.601°N	294.08	1.01
UC33brAvg_FM32	System							38.23
Rose Canyon [0]		11.42	6.39	-0.02	117.147°W	32.551°N	267.92	17.62
Coronado Bank alt2 [25]		22.75	7.39	0.18	117.233°W	32.448°N	238.72	5.03
San Diego Trough south [1]		39.15	7.33	1.00	117.397°W	32.395°N	243.08	2.33
Oceanside alt2 [0]		19.58	7.39	-0.21	117.357°W	32.560°N	271.13	1.66
Rose Canyon [1]		11.60	6.91	-0.36	117.148°W	32.568°N	277.27	1.25
Rose Canyon [3]		15.45	6.58	0.27	117.161°W	32.634°N	304.97	1.10
UC33brAvg_FM32 (opt)	Grid							10.89
PointSourceFinite: -117.026, 32.604		7.42	5.63	-0.12	117.026°W	32.604°N	0.00	1.15
PointSourceFinite: -117.026, 32.604		7.42	5.63	-0.12	117.026°W	32.604°N	0.00	1.13
UC33brAvg_FM31 (opt)	Grid							10.76
PointSourceFinite: -117.026, 32.604		7.43	5.63	-0.12	117.026°W	32.604°N	0.00	1.16
PointSourceFinite: -117.026, 32.604		7.43	5.63	-0.12	117.026°W	32.604°N	0.00	1.14

APPENDIX E

APPENDIX E

GROUNDWATER EVALUATION BY DUDEK & ASSOCIATES

FOR

SOUTHWEST VILLAGE VTM-1
SAN DIEGO, CALIFORNIA

PROJECT NO. 06847-42-04

June 22, 2021 13330

David Evans
Vice President/Senior Geologist
Geocon Incorporated
6990 Flanders Drive
San Diego, CA 92127

Subject: ***Initial Assessment of Groundwater Conditions at the Southwest Village Site, Otay Mesa and Surrounding Areas, San Diego County***

Dear Mr. Evans:

This report is prepared at Geocon's request to address groundwater conditions that relate to slope stability calculations and evaluation of landslide topography for the purposed Southwest Village Project (Project, or VTM-1). The Project site occupies a large mesa situated east of highway 805, south of highway 905, and north of the US-Mexico border (Figure 1). The study area includes the Project site and adjacent slopes southwest, south, and southeast of the mesa. These slopes include a known complex of landslides.

Geocon has conducted, and continues geotechnical investigation including mapping, drilling, trenching, soil sampling, permeameter testing, groundwater measurements, and laboratory soils testing for the project. This includes geotechnical characterization and slope stability assessment for the landslides adjacent to the Project. Figure 1 shows Geocon's delineation of three landslide complex groups adjacent to the proposed development site. These are Landslides A, B, and C. The principal area addressed to date by Geocon's work is Landslide A. The findings of this initial groundwater assessment are summarized as follows:

- Few data points exist at present to characterize Otay Mesa groundwater conditions. The groundwater observations found for this report are summarized in Table 1. These data include a wide time span of observations from 1955 to present, and include some wells which no longer exist. An area with more groundwater level detail is Landslide A, due to Geocon's geotechnical investigations in 2001 and current work of 2020 and 2021.
- Groundwater is present under the Mesa, and as expected is present at shallow depths at the base of slope at the west edge of the Mesa, where the older rocks that form the Mesa contact more porous alluvial deposits of the Tijuana River valley which extend west to the ocean. A profile of three core borings drilled in Landslide A by Geocon documents the groundwater slope in the Otay Formation rising from approximately 40 feet below terrain (elev 52', NAVD88) near base of slope gradually to 193 feet below terrain (elev 170') west of the Landslide A headscarp. Depth to groundwater under the Mesa surface in the Project area is not clearly delineated, but may occur at approximately 300 foot depth (elev 184 ft) based on "first water" encountered when a agricultural well was drilled in the Project area in 1961. This well is presently filled with debris, and because of its 1245 foot depth may blend groundwater pressures from several depth zones.

- The undisturbed sedimentary strata east and north of the landslide masses identified in Figure 1 consist of generally horizontal rocks lying beneath marine terrace deposits and associated well developed soil horizons that cap the Mesa. Beneath the terrace deposits and associated soils are San Diego formation and Otay formation (oldest). The Otay formation rocks, as encountered within Landslide A in Geocon coreholes 1, 2, and 3 are predominantly fractured sandstone, siltstone, and claystone. Where undisturbed outside of the slide complexes, it is expected that the strong horizontal layering inhibits vertical infiltration of groundwater. Such layering can cause development of pockets of groundwater perched above the regional water table.
- At present, there are insufficient monitoring points within and bordering the landslide complexes surrounding the Project to create a groundwater elevation contour map to accurately determine flow directions and groundwater slope, or to determine vertical groundwater pressure gradients which may be important to assessing landslide mass stability.
- A groundwater monitoring well (Corehole 3) which was constructed within Landslide A terminates above the basal shear zone which occurs at Elevation 29-33 (NAVD88). Because of the thickness and apparent continuity of the basal shear as found in Coreholes 1, 2, and 3, and at the Intermodal Transportation Center (Geocon, 2001) it should not be assumed that Corehole 3 is in close continuity with groundwater levels and pressures beneath and upslope of the well, which may respond somewhat differently to seasonal rain than groundwater levels within the landslide masses.
- We recommend additional groundwater monitoring wells to improve characterization and monitoring of groundwater levels within, outside, and under the slide masses adjacent to the proposed development. Determination of the groundwater level response of the landslide affected hillside areas to heavy seasonal rainfall events is recommended as part of the geotechnical assessment. The rate and magnitude of hillside groundwater level changes to seasonal rainfall is of primary importance to causation and/or re-activation of landslide movements.
- Use of the bare soil and rock gullies to conduct stormwater from outfalls 5 through 9 to the base of the slope is not recommended, especially for outfalls 5 and 7. Permeameter tests on the soil in the gully bottoms indicates infiltration through the intact soil of the gully bottoms into the subsurface during moderate storm flow events will not be sufficient to affect stability. However, elevated storm flow velocities such as may occur below outfall 7 during extreme storms within the natural channels could pose the risk of severe soil erosion and expose landslide tension cracks between landslide blocks in the channel bottoms, which could cause rapid stormwater infiltration into deeper levels of the slide masses. Outfall 5 discharges immediately into a closed depression near the headscarp created by previous landslide movements, and is not recommended for direct stormwater disposal.
- The stormwater routing design by Rick Engineering incorporates sufficient retention basin capacity to largely mitigate peak flows and velocities from the proposed Project development areas of the Mesa to pre-project levels or less.
- The process of grading and construction for the Project will reduce vertical infiltration of storm and irrigation water into the subsurface from the Mesa mostly due to the creation of impervious surfaces and to some degree the compaction required to create finished the finished grade and lot pads.

Sincerely,

Steve Dickey
CEG 1070, CHG 386
Senior Hydrogeologist

1 Scope of Work

Dudek has provided the following services under this project:

1. Review of existing geotechnical reports and documents
2. Assist with casing installation, well development, and monitoring of Corehole 3, which was drilled into Landslide A, along with Coreholes 2 and 3.
3. Review of borehole seismic data and report prepared by Geovision, Inc. in the three Geocon coreholes.
4. Review historic documents and air photos to provide groundwater data additional to that developed directly for geotechnical reports for the Southwest Village and Intermodal Transfer Station projects. The largest source of this data is the CA Department of Water Resources Well Driller's Completion Reports, which have recently become publicly available.
5. Review April 21, 2021 Rick Engineering Report, Landslide Hydrology Analysis for Southwest Village, Rick Engineering Job Number 15013-C.
6. Provide field staff to assist Geocon in conducting near surface permeameter measurements of soils at several proposed stormwater outfall sites located within the landslide complex area.
7. Assemble the historic and the recently acquired groundwater information into this assessment of groundwater conditions beneath the mesa and the landslide complexes.

2 Geologic Setting and History

The mesa top is a relatively flat, ancient marine terrace at an elevation of approximately 500 feet. Long term, uniform and continuous uplift of approximately 14-16 cm/1000 years has placed the Mesa at its present elevation (Kern and Rockwell, 1992). The Mesa surface at the Southwest Village site consists of well developed terrace clay surficial soils which overly a thick layer of terrace gravel, cobbles, and boulders. Beneath the Terrace deposits are San Diego formation which overlies Otay formation. Geocon's borings at the mesa top demonstrated erosional contacts between the terrace gravels, San Diego formation, and Otay formation. The Quaternary terrace clay soil and gravel, the San Diego formation and Otay formation rocks are involved in the Landslide A head scarp at the west and beyond to the west of the Mesa.

The appearance of the landslide slope below the Mesa indicates a complex and progressive series of deep seated downslope block movements, which include components of block rotation. A major landslide feature evident in the three deep coreholes drilled by Geocon in the landslide complex west of the mesa top are thick, apparently continuous zones of sheared and deformed bentonite, lying almost horizontal slightly at elevation 29-33 ft (NAVD88) in Corehole 3. The bentonite units occur intermittently and may be an important feature restricting vertical groundwater movement, and could locally cause "perched" conditions, affecting groundwater elevation heads above and/or below the bentonite units.

The deformed bentonite beds found in the Geocon Otay Mesa Landslide A coreholes and in the Intermodal Transportation Center geotechnical borings may be the same or similar as described by Vanderhurst, Hart, and Owen, 2011. Development of the present terrain was influenced by a different Pleistocene climate for extended time with greater precipitation on the order of 30-40 inches annual compared to present day 10 inches average annual for San Ysidro, and a Pleistocene sea level as much as 345 feet below present level starting 20,000 years BP.

The greater precipitation and lower sea levels during the Pleistocene epoch deepened incision of the ravines that are present at the Mesa, and may also have caused larger and more frequent storm flows, resulting in possible meanders of the Tijuana River which undercut the west and southwest edges of Otay Mesa. The greater Pleistocene precipitation during the Younger Dryas period also contributed to the deeply weathered, well-developed soil profiles that cap the Mesa.

Figure 2 provides a cross section constructed from the Mesa and Carvajal driller's logs, along with Geocon boring and corehole logs. The Carvajal well log indicates "pinkish gray mud" from depth 435-460 ft, at elevation slightly higher than the basal shear bentonite bed encountered on the Project side of the Mesa in Geocon Corehole 3.

Figure 3 provides an estimated sea level curve from 20,000 years BP to present, along with a summary graph of ocean core pollen analyses indicating a prolonged wet climate interval during the Pleistocene epoch from 12,000 to 20,000 years BP for the California Borderland at latitude 32.3 degrees north.

3 Groundwater Elevation Data

Plate 1 is a map summarizing the groundwater depth/elevation information that was found for the proposed project the surrounding area. The data are from CA DWR Well Drillers Completion Reports, the CA DWR groundwater information GIS system, wells constructed for groundwater regulatory cleanup investigations such as gas stations, USGS groundwater multi-port monitoring wells, and geotechnical reports generated by Geocon, Inc. This data is summarized in Table 1. The data also includes groundwater levels from three core holes drilled into Landslide A for the current Southwest Village geotechnical investigation. Figure 1 is a map showing Geocon's designation of the landslide areas at the Mesa edges as Landslides "A", "B", and "C", as well as a conceptual footprint of the initial phase of the proposed development.

Because of the scarcity of water well data available for the Mesa area, the Plate 1 includes groundwater observations date from 1955 (Carvajal agricultural well) to the present (depth to groundwater measured in Geocon Corehole 3 and in Mesa agricultural well). Because the available data is very widely spaced and taken over a 66 year time span, Plate 1 should be regarded as reconnaissance level information, especially for the Mesa itself. Several of the groundwater elevations shown in Plate 1 are previous reported levels for wells that no longer exist.

Two deep agricultural wells are located on the Mesa, constructed in 1955 and 1961, which are no longer in service; Attempts to sound the Mesa well, located immediately uphill of the Landslide A complex headscarp were not repeatable because of debris in the well. However, the logs of these wells are included because they were drilled with cable tool equipment, which allows construction of somewhat detailed drilling logs, as well as detailed observations regarding occurrence of first water or perched groundwater.

Plate 2 is a cropped portion of Plate 1, which enlarges the proposed Southwest Village development area. A cross section line through Landslide A is presented in Figure 4. The groundwater depth/elevation cross section shows depth to water and elevation from the three Geocon core holes, the Mesa irrigation well (depth to "first water" in 1960), and Boring SB-3 drilled at the Intermodal Tranportation Center in 2001. Groundwater levels for the Mesa Well and the SB-3 exploration boring have been projected northwest into the Figure 4 cross section.

As part of this investigation, Corehole 3 was equipped with a PVC casing and well screen extending to 270 foot depth, and equipped with a water level recording pressure transducer. The groundwater levels shown in Figure 4 for Coreholes 1 and 2 were measured very shortly after drilling with a borehole seismic survey conducted by Geovision, and the borings have since been abandoned. Boring SB-3 was abandoned in 2001 shortly after logging.

It should not be assumed that the groundwater conditions shown in Figure 4 and Plate 2 are static and invariant with respect to seasonal storms or unusual series of precipitation events, should they occur. Because the core borings indicate the bulk of the Otay formation slide mass is composed of claystone, siltstone, and sandstone, a conservative assumption would be that groundwater flow within Landslide A occurs primarily via fracture flow, and a much lesser degree porous media flow. Therefore groundwater level response of the slope to heavy rainfall could be greater and also more rapid than would occur in more porous, unconsolidated basin aquifer sediments such as sand.

Additional monitor wells with water level recording capability are needed to measure water level and fluctuations uphill of the Landslide A headscarp, and also within the slide mass to measure the groundwater level response to heavy rainfall events. In addition, an observation well should be constructed with a screen isolated beneath the basal shear zone bentonite bed to assess the degree it may function to restrict vertical groundwater flow, and measure the hydraulic pressure acting beneath the basal shear layer.

4 Assessment of Groundwater Conditions

4.1 Groundwater Conditions at Base of Slope, Landslides A and B

Groundwater levels in Geocon boreholes near the base of slope (Plates 1 and 2) in the Landslide A and B area indicate that there is very likely continuous saturation above and beneath the basal slide surface and that these levels are slightly above but on a downwards slope consistent with gas station monitor well groundwater elevations measured recently west of the slide area near the Tijuana River, and northwards adjacent/west of Otay Mesa and northwards to the Otay River area. The groundwater levels within the toe area of Landslides A and B were determined in 2001 by exploration borings advanced for the Intermodal Transfer project area, at the west downhill portion of Landslide A, and adjacent to Landslide B, as shown in the Figure 4 cross section. If property access allows, one or more monitor wells should be re-established at the base of slope, and equipped with a recording groundwater level transducer to determine the groundwater level response, if any of the landslide mass in this area to significant rainfall events.

4.2 Surfacing Groundwater, South Edge of Otay Mesa

Surfacing Groundwater is present in Spring Canyon, at the south edge of Otay Mesa, at the US-Mexico international border. Examination of a multi year sequence of aerial photos as early as November 1981 indicates persistent presence of riparian trees, surface water flow, and riparian vegetation that begins approximately 2800 feet east-northeast and upstream of a newly constructed concrete culvert structure at the International Border that takes the water under the border into Tijuana. The 1981 air photo pre-dates the extensive bulk grading and road construction conducted along this section of the border, which included the construction of a concrete culvert and other works to convey the Spring Canyon surface flow across the border.

Plate 1 and Plate 2 show this location, with a 2014 surface water elevation of 164 feet at the border, located at the southwest corner of Landslide C. This elevation is roughly comparable with nearby groundwater elevations measured in CH-2, CH-3, and the Mesa Well. This location is interpreted as discharging groundwater that has been exposed and released by downcutting of Spring Canyon. The source of the surface water is from older rocks assumed to be Otay Formation, with the groundwater source within the adjacent Otay Mesa hillside, and assumed to be higher than the surface flow at Elevation 164, in order to sustain the flow. A short distance upstream of this location, the canyon bottom surface water ends and the vegetation transitions from riparian to upland species, as visible in aerial mapping photos. Although the relationship of the Spring Canyon perennial surface water to the regionally extensive bentonite bed at the base of Landslides A, B, and C is unknown, the landslide area core boring logs suggest that this water is perched above the basal shear bentonite bed .

4.3 Groundwater Beneath Top of Mesa, Project Area

The Mesa Well, shown near the west edge of the Mesa in Plates 1 and 2 provides the only data available for groundwater level beneath the Project area, outside of the landslide areas. In 1960 the driller noted “first water” at 298 feet below ground surface (DWR drillers log and completion report provided in Appendix A). The borehole was continued by casing advance to a total depth of 1245 feet. When deep perforations were cut at the completion of the well, the final water level is listed in the report as 565 feet.

While the final water level noted may not have reached equilibrium when measured, it suggests a final water level near or below sea level (ground surface elevation at the Mesa well is 482 feet). This deep level after casing perforation is interpreted to indicate a downwards hydraulic pressure gradient within the Otay Formation with depth.

Although not current or the most reliable data, we regard the “first water” notation on the Mesa Well driller’s log as the best available indication of groundwater depth beneath the Project area, subject to verification. The Mesa Well driller’s log is presented in the Figure 2 cross section.

5.0 Influence of Proposed Stormwater Outfalls on Groundwater

5.1 Landslide Surface

The project as proposed in includes five outfalls to manage the Project stormwater flows. Figure 5 shows the location of proposed stormwater outlet structures which are intended to convey project stormwater and excess irrigation water to existing bare earth drainages which will then convey the stormwater to the base of the slope and existing San Ysidro stormwater infrastructure. The outfalls are numbered 5, 6, 7, and 8 as indicated in Figure 4.

The existing drainage pathways that traverse from the proposed outfalls through the slide areas are shown in Figure 5 as yellow lines. The drainage pathways were digitized and are graphed as profiles in Figure 6. The cross sections for these bare earth drainages have been unfolded from their curved path routes into the flat plane of Figure6. Thus the true drainage path lengths and slopes are retained in the figure.

The downhill drainage pathway for outfall 5 traverses downslope through Landslide A, while the pathways issuing from outfalls 6 and 7 traverse the slope of Landslide B. The drainage pathways from outfalls 8 and 9 traverse more steeply downhill over the Landslide C slope.

The Figure 6 outfall drainage profiles indicate the channel downhill from Outfall 9 is steepest at 20%, while the drainage gully from Outfall 7 has the least downhill slope at 10%. Outfalls 5, 6, and 8 drop downhill at slopes of 14, 16, and 17% respectively.

None of the current drainage profiles exhibit sharp concave nicks in their profiles indicating excessive "nick point" erosion, such as would indicate wallowing out of a structural weak spots such as tension cracks or soft sedimentary beds. The drainages flowing down from Outfalls 6 and 7 are the most deeply incised into what appears to be a soft, erodible portion the composite landslide slope.

Based on peak stormwater flows calculated by Rick Engineering, the post development flow velocities could be especially elevated in the bare earth channel of Outfall 7, which Rick proposes to substantially mitigate to pre-project levels with retention of stormwater at the Mesa.

The drainage dropping out of Outfall 5 begins almost immediately in a shallow closed depression that occupies a sag immediately beneath the Landslide A headscarp, and is recommended for re-routing or modification to prevent infiltration of stormwater into the Landslide A headscarp.

Based on the stormflow durations calculated by Rick Engineering, and soil permeameter infiltration measurements at each outfall location measured by Geocon, it is calculated that infiltration through the soil bottoms of the existing channels into the slide mass during moderate rainfall events will not be excessive, as it is expected that the soil layer covering the channels will remain intact. After such events it is expected that the infiltrated stormwater will be held in the soils at shallow depth by capillary forces and will come back out as evapotranspiration. Only during extended series of multiple closely spaced rainstorms would infiltration to groundwater be expected to occur, and it would occur at very slow rates, with of the stormwater continuing downhill as surface flow . The outfall infiltration test results are displayed in Table 2 below.

TABLE 2

Location Name	Latitude	Longitude	Kfs (iph)
Outfall 5	32.55425	-117.027	1.09E-2
Outfall 6	32.55183	-117.0243	9.05E-4
Outfall 7A	32.55078	-117.0229	4.13E-4
Outfall 8	32.54762	-117.0173	8.22E-3
Outfall 9	32.548613	-117.01489	3.92E-3

Notes: Data and calculations for K values provided by Geocon.

However, it is possible that periods of sustained high flow in these drainages, such as might occur during an "atmospheric river" type series of rains could generate erosive stormflows that remove enough soil to expose landslide-generated tension cracks in the channels beneath the soil layer, leading to significant injection of stormwater directly into the subsurface through the cracks in rock, and tension fracture zones between the landslide blocks. Rapid introduction of significant volume stormwater into fractures between slide blocks could raise the water table within portions of the composite slide mass rapidly and sufficiently above the basal shear zone clay surface to affect local slide mass stability.

Analysis of aerial photos and shaded relief topographic images of the landslide complex indicates that such cracks are very likely present. Groups of native palm trees present in catchments within Landslide Component A also suggest that significant trapping of stormwater within the composite landslide surface has occurred in previous rainfall events.

Without detailed knowledge of the slide mass groundwater surface in Landslide A, B, and C, and knowledge of the response of slide mass groundwater levels to significant rain events, it is suggested that routing of stormwater from the proposed development onto the bare earth existing channels on the landslides be avoided.

Draft stormwater calculations by Rick Engineering for proposed flows to Outfalls 1 through 5 indicate that any increase in total volume of stormwater created by development of Southwest Village will be mitigated to pre-project levels by stormwater retention to reduce peak flows leaving the project area through the proposed outfalls 1 through 5. Therefore it can be said that the project, as currently proposed will not cause a change the overall landslide stability situation of the slopes surrounding it to the west, southwest, and south, due to stormwater flows. This is not the same as stating that with the present level of knowledge that Landslide A, B, and C slopes are known to be stable under all future rainfall event sequences.

5.2 Groundwater Infiltration Impact of Developing the Mesa Surface

The existing natural surface of the Mesa is characterized by relatively low infiltration of rainfall, as evidenced by presence of vernal pools. The uppermost natural terrace deposts are predominantly clay soils., classified by USDA as Huerhuero loam (HrC). Compared to the existing natural Mesa surface, the proposed development will reduce the areas open to stormwater infiltration due to the construction of impervious surfaces consisting of streets, sidewalks, roofs, and driveway pavement.

The infiltration capacity of the soil horizons capping the Mesa is limited by the presence of low vertical conductivity layers that restrict downwards water flow. The soil profile of the Mesa top is characterized by USDA as being in runoff class "Very High", and with the infiltration capacity of the limiting soil profile layers as very low to moderately low, with Ksat of 0.00 to .06 inches per hour.

Geocon conducted permeater testing of undisturbed surface soils in the proposed development area of the Mesa, with resulting vertical conductivities as follows:

TABLE 3

GEOCON HYDRAULIC CONDUCTIVITY TEST RESULTS, DEVELOPMENT AREA, MESA SURFACE

Location	Depth, ft	Geologic Unit	Hydraulic Conductivity K (in/hr)
A-1	5	Qt, Topsoil	.007
A-2	5	Qt	.049
A-3	5	Qt	.018
A-4	5	Qt	.004

These results are consistent with the USDA published soil map for the Mesa. Therefore, given the strong layering of horizontal strata under the Mesa surface, the low hydraulic conductivity of the site surface, and the replacement of exposed soil surface with impervious areas by the proposed development plan, we believe the net impact will be a reduction of stormwater infiltration into the Mesa surface. Therefore, the net long term impact of the proposed development of the Mesa surface will be to reduce infiltration of rainwater to groundwater, resulting in a long term, net decrease in groundwater levels beneath the development.

6.0 Conclusions

A thorough search for historic groundwater data was conducted to support this assessment, which is summarized on Table 1 and Plates 1 and 2. The data spans dates from 1955 to the present. In addition measurements of present groundwater levels within Landslide A were conducted. Conclusions are as follows:

1. There is solid evidence that the groundwater surface within the project portion of Otay Mesa rises above the surrounding areas at the flanks and base of the Mesa. The maximum groundwater elevation under the Southwest Village project area of the Mesa could not be determined with available data.

2. The driller's logs from the deep Carvajal and Mesa wells, although very old are detailed and generally meaningful for this initial assessment. They indicate that due to the persistent layering of clay and silt bearing strata, there was perched water within the sedimentary stack, above the main water table when drilled. The perched water occurrences started at approximately 300 foot depth below the Mesa surface when drilled in 1961. It is reasonable to assume that this condition may persist in general today, although exact details may differ.

3. The groundwater depths indicated by Landslide A Coreholes CH-1, CH-2, and CH-3 are considered to be generally representative of groundwater levels for the adjacent portions of the hillside, but specific groundwater depths and elevations in adjacent areas should be confirmed by drilling.

4 Geocon Coreholes 1, 2, and 3 indicate that the aquifer in the landslide area, above the basal shear zone is characterized by fracture flow in claystone, siltstone, and sandstone which probably dominants compared to porous media groundwater flow. The practical impact of this aquifer characteristic is groundwater fluctuations within the slope are likely to be greater and more sudden/abrupt than for a system dominated by porous flow, such as groundwater flow in sand.

5. Given #4 above, we recommend additional monitor wells be installed in the Southwest Village project area, and downslope landslide areas with recording transducers to determine the sensitivity of landslide mass groundwater levels in several locations to seasonal precipitation. Corehole 3 is presently equipped with such a transducer/datalogger.

6. The assumed groundwater elevation above 164 feet that sustains the surface water flow at the south edge of Otay Mesa at the International border (Landslide C area) is generally consistent with the level found in corehole CH-3 to the northwest, and is likely to be approximately representative of groundwater level in the Otay Formation beneath the Mesa north of the scarp above Landslide A. Due to the lack of sufficient wells, the exact shape and elevation contours of the groundwater surface beneath the Mesa is unknown.

7. It is our opinion that a significant cause for development of the extensive landslide apron surrounding the southwest, south, and southeast slopes of Otay Mesa was significantly wetter climate conditions in the late Pleistocene (Younger Dryas event), and also the significantly lower of sea level to minus 345 feet MSL, thus increasing the topographic relief of the Mesa.

8 We recommend the routing of stormwater from the Project outfalls over the bare earth drainages to bottom of slope be re-considered and avoided. Piping the water with storm drains across or around the slide mass is our recommendation.

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TABLE 1 Well Data

FEATURE	Feature, Short Name	Grd Surf Elev	GW Depth, Ft	GW Elev, Ft	Dec Latitude	Dec Longitude	SP N, US ft	SP E, US ft
				NAVD88			CA Zone 6	CA Zone 6
Corehole 1 Surveyed	CH1	**184**	70	114	32.5515527	-117.0307686	1781361.4	6321066.9
Corehole 2 Surveyed	CH2	**279**	125	154	32.5525594	-117.0291278	1781723.9	6321575.3
Corehole 3 Surveyed	**CH 3**	**360**	189.87	170	32.5534973	-117.0274925	1782061.4	6322081.7
Mesa Well, 1245', 1961	**Mesa**	**482**	385 , 298	97, 184	32.5507160	-117.0187320	1781029.4	6324773.8
Carvajal Well, 1215', 1955	**Carvajal**	507	347	160	32.5655240	-117.0057070	1,786,387.80	6,328,826.54
Spring Canyon Surface Flow At Border	**Spr Cyn Surf**			164	32.5448820	-117.0131950	1,778,894.22	6,326,464.49
Geocon SB-7, Transfer Station	**SB-7**	**101**	54.5	47	32.5444880	-117.0280300	1,778,784.66	6,321,891.64
Geocon SB-3, Transfer Station	**SB-3**	**98**	46	52	32.5460550	-117.0295270	1,779,358.24	6,321,434.56
Geocon SB-1, Transfer Station	SB-1	89	54	35	32.5454390	-117.0293270	1,779,133.65	6,321,494.52
Geocon SB-2, Transfer Station	SB-2	78	47.5	31	32.5442580	-117.0285470	1,778,702.16	6,321,731.69
Otay River Surface Water 1	**OT Riv Surf1**			115	32.5904380	-117.0132720	1,795,469.48	6,326,562.10
Otay Rock Quarry Pit Lake	**OT Pit Lake**			184	32.5925350	-116.9872470	1,796,174.77	6,334,583.63
Mon Well	**Mon Well**			45	32.5854460	-117.0350820	1,793,703.08	6,319,830.59
Otay River Surface Water 2	**OT Riv Surf2**			36	32.5886940	-117.0568320	1,794,935.97	6,313,140.01
Mon Well 314 E San Ysidro	**Mon Well 314 ESY**			40	32.5513010	-117.0397970	1,781,290.76	6,318,284.10
USGS Boundary Waters Mon Well	**USGS Mon Well**			27	32.5536320	-117.0616060	1,782,190.48	6,311,570.21
2004 Dairy Mart Road Mon Well	**2004 Dairy Mart**			31	32.5615550	-117.0627450	1,785,075.91	6,311,241.71
USGS Otay River Mon Well	**SDOR**			45	32.5912140	-117.0539560	1,795,846.00	6,314,032.95
Section 33 Ag Well Deep	**33S1W33 73**	512	440	72	32.5601530	-116.9880660	1,784,394.68	6,334,247.97
SD County Park Well	**SD County**	32	11	21	32.5567410	-117.0757790	1,783,355.95	6,307,211.85
Note: Applied Dave Evans edits to GW Elev, Coreholes 1,2,3.								

APPENDIX A

CA DWR WELL COMPLETION REPORTS

DUPLICATE
File Original, Duplicate and Triplicate with the
REGIONAL WATER POLLUTION
CONTROL BOARD No.________
(Insert appropriate number)

WATER WELL DRILLERS REPORT

(Sections 7076, 7077, 7078, Water Code)

STATE OF CALIFORNIA

Do Not Fill In
Nº 12996
State Well No.
Other Well No.
PLOTTED

(1) OWNER:
Name
Address

(2) LOCATION OF WELL: 16645
County San Diego Owner's number, if any—
R. F. D. or Street No. Otay Mesa

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(3) TYPE OF WORK (*check*):
New well ☒ Deepening ☐ Reconditioning ☐ Abandon ☐
If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (*check*):
Domestic ☐ Industrial ☐ Municipal ☐
Irrigation ☒ Test Well ☐ Other ☐

(5) EQUIPMENT:
Rotary ☐
Cable ☒
Dug Well ☐

(6) CASING INSTALLED:
SINGLE ☐ DOUBLE ☐

From ft.	to ft.	Diam.	Gage or Wall
0	849	12-3/4	.250
849	1103	10-3/4	.250

If gravel packed

Diameter of Bore	from ft.	to ft.

Type and size of shoe or well ring 10" & 12" Baker Size of gravel:
Describe joint Welded

(7) PERFORATIONS:
Type of perforator used Mills
Size of perforations 3 in., length, by 3/8 in.

From ft.	to ft.	Perf. per row	Rows per ft.
540	615	8	1
760	840	8	1

(8) CONSTRUCTION:
Was a surface sanitary seal provided? ☐ Yes ☒ No To what depth ft.
Were any strata sealed against pollution? ☐ Yes ☒ No If yes, note depth of strata
From ft. to ft.
Method of Sealing

(9) WATER LEVELS:
Depth at which water was first found 347 ft.
Standing level before perforating 472 ft.
Standing level after perforating 470 ft.

(10) WELL TESTS:
Was a pump test made? ☐ Yes ☒ No If yes, by whom?
Yield: gal./min. with ft. draw down after hrs.
Temperature of water Was a chemical analysis made? ☒ Yes ☐ No
Was electric log made of well? ☐ Yes ☐ No

(11) WELL LOG:
Total depth 1210 ft. Depth of completed well 1210 ft.
Formation: *Describe by color, character, size of material, and structure.*

ft.	to ft.	Formation
0	2	Surface formation
2	7	Hard Pan
7	9	Clay & sand
9	65	Clay & large boulders
65	135	Yellow sandy silt
135	210	Yellow sandy clay
210	250	Gray " "
250	255	Hard sandstone ledge
255	280	Gray sandy clay
280	285	Hard sandstone ledge
285	290	Gray sandy clay
290	295	Yellow sandy clay
295	300	Yellow sandstone clay
300	304	Sandstone ledge
304	305	Hard rock ledge
305	310	Yellow sandy clay
310	315	Hard sandy ledge
315	320	Gray sandstone & clay
320	330	Dry hard sand
330	332	Yellow clay & sand
332	337	Yellow sandstone & sand
337	345	Yellow clay & hard sand
345	347	Soft yellow clay & water
347	350	Hard rocky ledge
350	355	Gray sandy clay & water
355	365	Gray sandy clay
365	375	Soft muddy clay
375	405	Fine sand
405	420	Gray clay & boulders
420	430	Hard sand, rock & clay
430	435	Yellow sandy clay
435	460	Pinkish gray mud
460	490	Yellow sandy clay
490	492	Hard rocky ledge
492	500	Fine sand & clay
500	510	Sandstone
510	517	Fine gray sand & clay
517	525	Gray clay & sand
525	543	Yellow mud, some clay
543	544	Black sandy silt
544	547	Brown sandy silt
547	553	Black sandy silt
553	563	Gray sandstone

Work started 1/28/55 19 , Completed 6/2/55 19

WELL DRILLER'S STATEMENT: MICROFILMED
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME San diego Pump & Well Drillers
(Person, firm, or corporation) (Typed or printed)
Address P.O. Box 432 Chula Vista, Calif.

[SIGNED] [signature]
Well Driller

License No. 08465 Dated 6/29, 1955

QUINTUPLICATE
Retain This Copy
DIVISION OF WATER RESOURCES
P. O. BOX 1079
SACRAMENTO , CALIFORNIA

SUPPLEMENTAL SHEET

Do Not Fill In
State Well No.
Other Well No.
Region

WATER WELL DRILLERS REPORT

(Sections 7076, 7077, 7078, Water Code)

(5) **Well log** (continued):
Total depth of well ft.

Depth From Ground Surface

Give details of formations penetrated, such as silt, peat, muck, sand, gravel, clay, shale, sandstone, hardpan, rock. Include size of gravel (diameter) and sand (fine, medium, coarse), color of material, structure (loose, packed, cemented, soft, hard, brittle).

Depth From (ft.)	to (ft.)	Formation
[illegible]	[illegible]	[illegible]

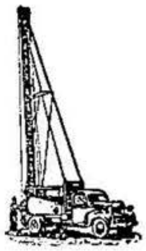
CONFIDENTIAL - NOT FOR PUBLIC RELEASE

MICROFILMED

If additional space is required continue on DWR Form No. 246—Supplement, and attach to respective report copies.

D.W.R. FORM NO. 246—SUPPLEMENT

23973 3-50 20M QUIN SPO



TELEPHONE:
GArfield 2-3778

SAN DIEGO PUMP & WELL DRILLERS

STATE LICENSED DRILLING CONTRACTORS

PUMP SALES AND SERVICE

POST OFFICE BOX 438

CHULA VISTA, CALIFORNIA

Water test on Ray Carvajal well Otay Mesa

505'	865	PPM
597	650	"
660	1058	"
710	935	"
771	605	"
830	715	"
875	1255	"
1014	1320	"
1085	1640	"
1180	1380	"
1200	1010	"

FIELD CHECK OF WELL LOCATION

DRILLER San [illegible] Well Drillers CHECKED BY [illegible].

OWNER ___. DATE 5-5, 1958.

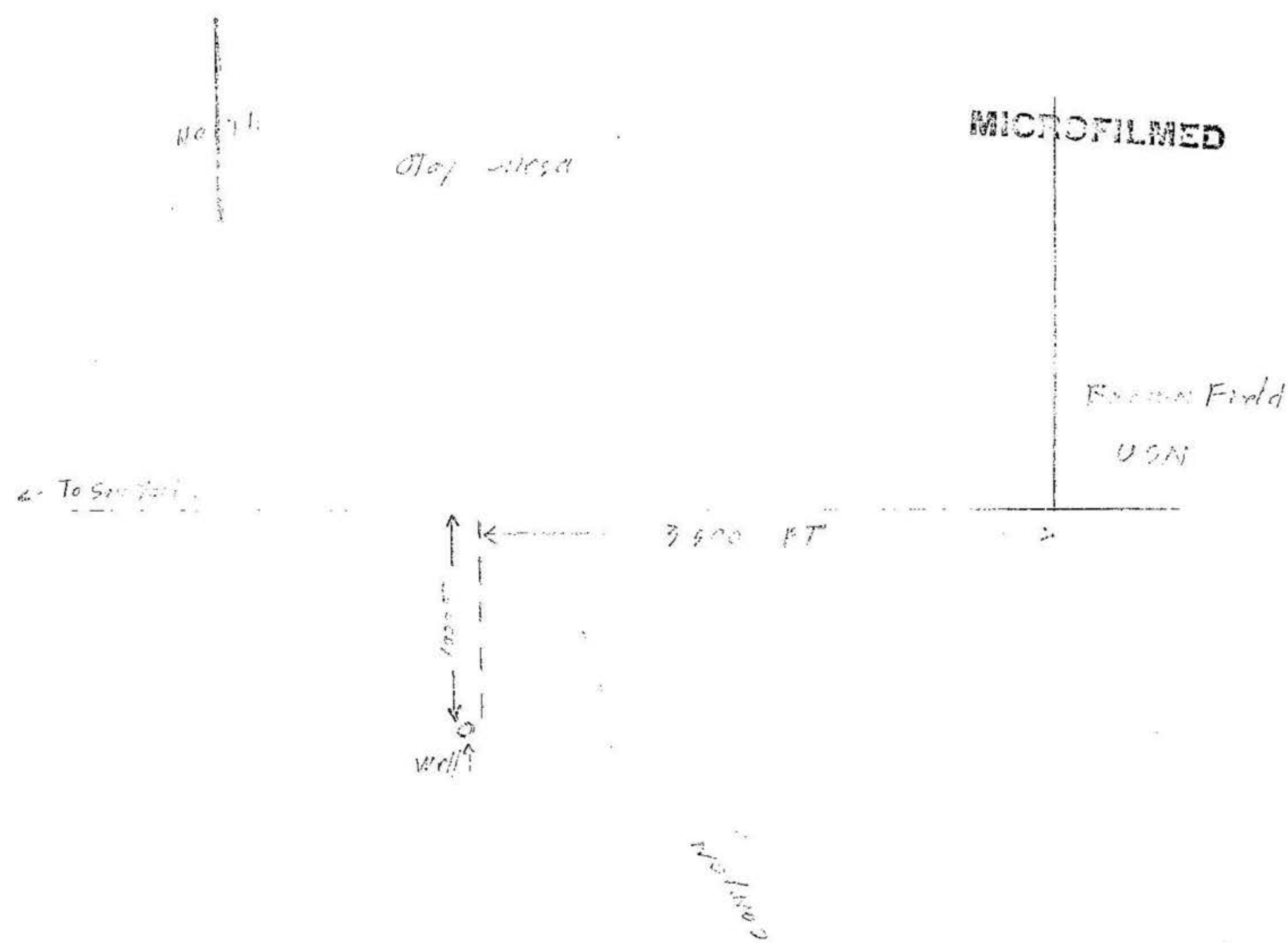
PUMP: MAKE Byron Jackson; SERIAL NO. 312312

MOTOR: MAKE Byron Jackson; NO. Submersible HP 75

METER NO. 222931.

STATE WELL NO. 18S/1W-[illegible].

LOCATE WELL WITH REFERENCE TO ROADS AND ROAD INTERSECTIONS: ALSO INDICATE DISTANCES AND DIRECTIONS TO NEARBY CITIES OR TOWNS.



32 32 58.322, -117 1 16.439

MVR 12/23/11

DUPLICATE
File Original, Duplicate and Triplicate with the
REGIONAL WATER POLLUTION
CONTROL BOARD No.______
(Insert appropriate number)

WATER WELL DRILLERS REPORT

(Sections 7076, 7077, 7078, Water Code)

STATE OF CALIFORNIA

Do Not Fill In
No. 28842
State Well No. 19S/1W-6G001S
Other Well No.______

[redacted]

(2) LOCATION OF WELL:

County ______ Owner's number, if any—

R. F. D. or Street No.

SE cor. W1/2, NE1/4, Sec 6, T 19S/1W

(3) TYPE OF WORK (check):

New well ☒ Deepening ☐ Reconditioning ☐ Abandon ☐

If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (check):

Domestic ☐ Industrial ☐ Municipal ☐
Irrigation ☒ Test Well ☐ Other ☐

(5) EQUIPMENT:

Rotary ☐
Cable ☒
Dug Well ☐

(6) CASING INSTALLED:

SINGLE ☒ DOUBLE ☐

From ft.	to ft.	Diam.	Gage or Wall
0	1245	12	1/4

If gravel packed

Diameter of Bore	from ft.	to ft.

Type and size of shoe or well ring ______ Size of gravel:

Describe joint

(7) PERFORATIONS:

Type of perforator used Mill

Size of perforations ______ in., length, by ______ in.

From ft.	to ft.	Perf. per row	Rows per ft.
820	830	6	2
885	900	6	1 3"
980	124	6	1 3"

(8) CONSTRUCTION:

Was a surface sanitary seal provided? ☐ Yes ☒ No To what depth ______ ft.

Were any strata sealed against pollution? ☐ Yes ☒ No If yes, note depth of strata

From ______ ft. to ______ ft.

Method of Sealing

(9) WATER LEVELS:

Depth at which water was first found 298 ft.

Standing level before perforating 565 ft.

Standing level after perforating 565 ft.

(10) WELL TESTS:

Was a pump test made? ☐ Yes ☒ No If yes, by whom?

Yield: ______ gal./min. with ______ ft. draw down after ______ hrs.

Temperature of water ______ Was a chemical analysis made? ☐ Yes ☐ No

Was electric log made of well? ☐ Yes ☐ No

(11) WELL LOG:

Total depth 1245 ft. Depth of completed well 1245 ft.

Formation: Describe by color, character, size of material, and structure.

ft.	to ft.	Formation
0	11	Grey sticky clay & rocks
11	32	Brown sandy clay & lg. rocks
32	49	Grey sandy clay & " "
49	105	Grey sticky sandy clay
105	252	Grey sandstone
252	257	Sandstone & bentonite
257	295	Grey sandstone
295	298	Sand & gravel
298	351	Brown sandstone
351	400	Hard brown sandstone
400	452	Brown clay & rocks
452	470	Brown clay
470	481	Brown clay & rocks
481	490	Soft brown sandstone
490	494	Brown sticky clay
494	567	Brown sandstone
567	701	Grey sandstone
701	727	Brown shale
727	798	Brown sandstone
798	810	Brown shale
810	825	Grey sandstone
825	830	Grey sandstone & small gravel
830	880	Light grey sandstone
880	898	Dark grey sandstone (soft)
898	1042	Dark grey sandstone (hard)
1042	1141	Dark grey shale
1141	1164	Grey sandstone (hard)
1164	1245	Black shale
		Allisitos Fm??
		Rosario Fm??

MICROFILMED

CONFIDENTIAL - NOT FOR PUBLIC RELEASE

Work started 5/23/60 19__ . Completed 1/25 19 61

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME San Diego Pump & Well Drillers (Person, firm, or corporation) (Typed or printed)

Address 1410 Hwy 101 Alt., Imperial Beach, Calif.

[SIGNED] Jack Hamilton (Well Driller)

License No. 160313 Dated 4/13

95683 3-54 50M QUIN SPO

DWR FORM NO. 246

ORIGINAL
File with DWR
Page 1 of 6

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet

No. 447315

DWR USE ONLY — DO NOT FILL IN
STATE WELL NO./STATION NO.
LATITUDE | LONGITUDE
APN/TRS/OTHER

Owner's Well No. ______
Date Work Began 13 July 95, Ended 5 August 95
Local Permit Agency County of San Diego, Dept. of Health Services
Permit No. ______ Permit Date ______

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)

DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION Describe material, grain size, color, etc.
0	20	Sand, fine to medium
20	60	Sand, fine to very coarse,
		poorly sorted shell fragments
60	150	Sandy gravel, medium to very
150	190	Sand, fine
190	310	Silty sand, very fine sand to
		medium
310	650	Clayey sand with very fine to
		fine sand
650	670	Sandy clay
670	710	Sandy silt, very fine sand to
		medium
710	770	Clayey silt, some fine sands
770	830	Sandy clay
830	950	Clayey silt, some very fine to
		fine sands
950	970	Sandy silt
970	990	Silty sand
990	1030	Sand very fine to very coarse
1030	1050	Silty sand
1050	1430	Sand, very fine sand to medium
		sand

Geologic log for well 1 through 5
(completed in the same hole)

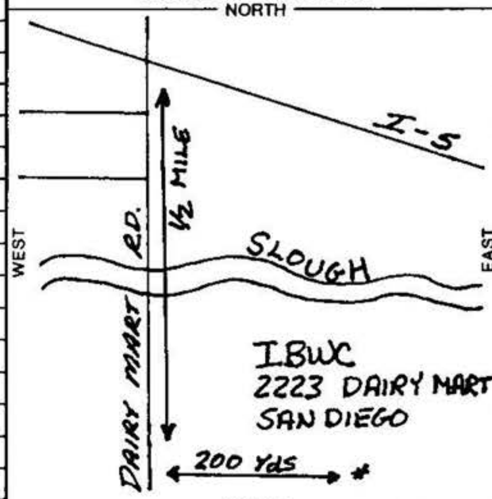
TOTAL DEPTH OF BORING 1430 (Feet)
TOTAL DEPTH OF COMPLETED WELL 1360 (Feet)

WELL OWNER

WELL LOCATION

Address 2223 Dairy Mart Rd
City San Diego
County San Diego
APN Book 760 Page 107 Parcel 60
Township 19S Range 2W Section 2C
Latitude 32 33 13 NORTH (DEG. MIN. SEC.) Longitude 117 03 39 WEST (DEG. MIN. SEC.)

LOCATION SKETCH



Illustrate or Describe Distance of Well from Landmarks such as Roads, Buildings, Fences, Rivers, etc.
PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

X NEW WELL

MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)

___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USE(S) (✓)

X MONITORING

WATER SUPPLY
___ Domestic
___ Public
___ Irrigation
___ Industrial
___ "TEST WELL"
___ CATHODIC PROTECTION
___ OTHER (Specify)

DRILLING METHOD Hydraulic Rotary FLUID Bentonite Mud

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH OF STATIC WATER LEVEL 50.56 (Ft.) & DATE MEASURED 7/25/95
ESTIMATED YIELD* ___ (GPM) & TEST TYPE ___
TEST LENGTH ___ (Hrs.) TOTAL DRAWDOWN ___ (Ft.)
* *May not be representative of a well's long-term yield.*

CASING(S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL/GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	5				X		Steel	10		
	1340		X				Sch 80 pvc	2		
1340	1360			X			Sch 80 pvc	2		0.020

Well construction for well 1

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	CEMENT (✓)	BENTONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	25	X			
25	225		X		
225	283			X	#3 sand
283	532		X		
532	613			X	#3 sand
613	898		X		

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
X Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other ___

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

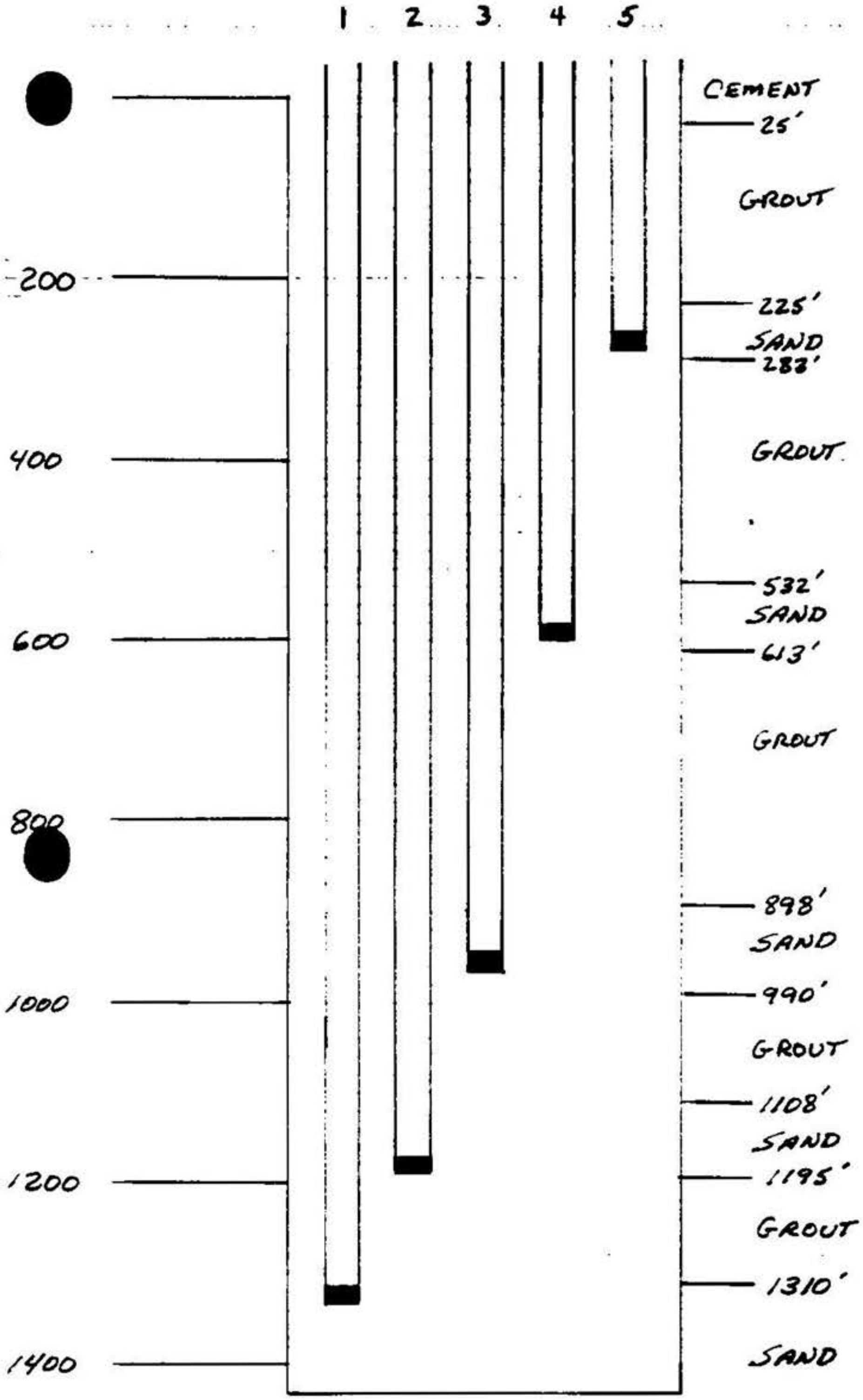
NAME JOHN IZBICKI U.S. GEOLOGICAL SURVEY
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)

5735 KEARNY VILLA RD, STE O San Diego, CA 92123-1135
ADDRESS CITY STATE ZIP

Signed ______ 9/8/95 NA
WELL DRILLER/AUTHORIZED REPRESENTATIVE DATE SIGNED C-57 LICENSE NUMBER

DWR 188 REV 7-90 IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

447315



WELL #1	1340	- 1360
2	1170	- 1190
3	945	- 965
4	580	- 600
5	260	- 280

COUNTY OF SAN DIEGO
DEPARTMENT OF HEALTH SERVICES

WELL PERMIT APPLICATION

447315

APN 760 107 60
Control # W30485

TYPE OF WORK (Check)

- New Well [X]
- Repair or Modification [ ]
- Time Extension [ ]
- Destruction [ ]

USE (Check)

- Individual Domestic [ ]
- Agricultural [ ]
- Community [ ]
- Industrial [ ]
- Other: observation

EQUIPMENT (Check)

- Rotary [ ]
- Cable Tool [ ]
- Other [ ]

PROPOSED WELL DEPTH

Max. 1400 Min. >200 (Feet)

PROPOSED CASING

Type PVC Depth 1400' Diameter 2" Wall or Gage Sched. 80

PROPOSED SEALING ZONE(S)

From (see Attached) Feet
From ______ to ______ Feet
From ______ to ______ Feet

SEALING MATERIAL (Check)

- Neat Cement Grout [ ]
- Bentonite Clay [ ]
- Sand Cement Grout [ ]
- Concrete [X]
- Other-Specify: ______

PROPOSED PERFORATIONS OR SCREEN

From ______ to ______ Feet
From ______ to ______ Feet
From ______ to ______ Feet
From ______ to ______ Feet

DATE OF WORK

Start 6/13/95
Completion 6/22/95

NAME OF WELL OWNER

LOCATION OF WELL Inter, Bound. & Wat. Comm.
2223 Dairy Mart Rd San Diego

NAME OF WELL DRILLER
U.S. Geological Survey

COMPANY
U.S. Geological Survey

BUSINESS ADDRESS
5735 Kearny Villa Rd, Suite O
San Diego, Ca 92123

LICENSE NUMBER
NA

Cash Deposit [ ] NA
Bond Posted WAIVED

$150 (HAZMAT Fee) Fee paid on 4/26/95

DISPOSITION OF APPLICATION (FOR HEALTH OFFICERS USE ONLY)

[X] APPROVED [ ] DENIED

[ ] APPROVED WITH CONDITIONS

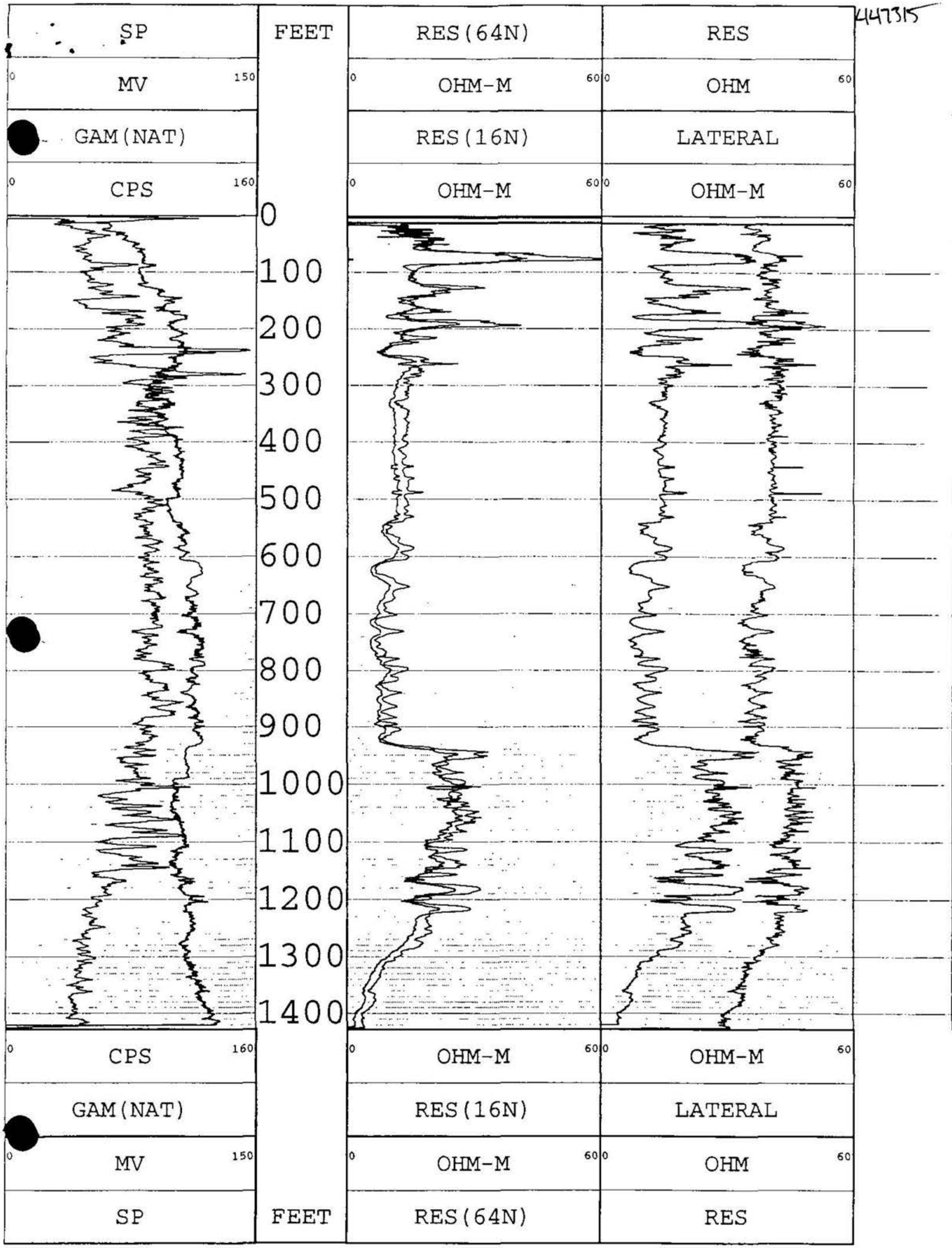
Report Reason(s) for Denial or Necessary Conditions Here:

I hereby agree to comply with all regulations of the Department of Health Services and with all ordinances and laws of the County of San Diego and of the State of California pertaining to well construction, repair, modification and destruction. Immediately upon completion of work I will furnish the Department of Health Services with a complete and accurate log of the well.

(signature)
HEALTH OFFICER
4-26-95
DATE

(signature)
APPLICANT'S SIGNATURE
4/26/95
DATE

447315


SP
MV
0
150
GAM(NAT)
CPS
0
160
FEET
RES(64N)
OHM-M
0
60
RES(16N)
OHM-M
0
60
RES
OHM
0
60
LATERAL
OHM-M
0
60
0
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
CPS
GAM(NAT)
MV
SP
FEET
OHM-M
RES(16N)
OHM-M
RES(64N)
OHM-M
LATERAL
OHM
RES

*The free Adobe Reader may be used to view and complete this form. However, software must be purchased to complete, save, and reuse a saved form.

File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0084925

DWR Use Only – Do Not Fill In

1 8 S 0 2 W 2 3 G 00 2 S

State Well Number/Site Number

Latitude N | Longitude W

APN/TRS/Other

Page 1 of 5

Owner's Well Number SDOR #1

Date Work Began 11/06/2008 Date Work Ended 12/13/2008

Local Permit Agency County of San Diego Department of Environmental Health

Permit Number LMON T106077 Permit Date 10/31/08

Geologic Log

Orientation ⦿ Vertical ○ Horizontal ○ Angle Specify

Drilling Method Direct Rotary Drilling Fluid Bentonite mud

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)
0	10	Gravelly sand; m-vc sand w/ granules-sm pebbles; olive gray (5Y 5/2)
10	20	Gravelly sand; m-vc sand w/ granules; grayish brown (2.5Y 5/2)
20	30	Gravelly sand; m-vc sand w/ granules; lt olive brown (2.5Y 5/4)
30	40	Gravelly sand; m-vc sand w/ granules; dk yellowish brown (10YR 4/6)
40	60	Gravel; granules-med pebbles; various colors
60	70	Clayey silt; silt w/ clay; olive (5Y 4/3)
70	80	Silty sandy gravel; granules-med pebbles w/ vf-vc sand and silt; olive gray (5Y 4/2)
80	200	Clayey silt; silt w/ clay and shell fragments; v dk gray (5Y 3/1)
200	240	Clayey silt; silt w/ clay and minor shell fragments; v dk gray (5Y 3/1)
240	320	Silt; silt; dk gray (5Y 4/1)
320	550	Clayey silt; silt w/ clay; v dk gray (5Y 3/1)
550	560	Sand; vf-coarse sand w/ shell fragments; dk gray (5Y 4/1)
560	570	Clayey silt; silt w/ clay; v dk gray (5Y 3/1)
570	580	Sandy clay; clay w/ med-coarse sand; greenish gray (10Y 5/1)
580	610	Clay; clay; grayish brown (2.5Y 5/2)
610	630	Clay; clay; grayish brown (10YR 5/2)
630	650	Clay; clay; lt brownish gray (2.5Y 6/2)
650	750	Clay; clay; grayish brown (2.5Y 5/2)
750	880	Sandy clayey silt; silt w/ clay & vf-med sand; grayish brown (2.5Y 5/2)
880	910	Clayey silty sand; vf-coarse sand w/ silt & clay; grayish brown (2.5Y 5/2)
910	920	Clay; clay; brown (10YR 5/3)
920	940	Gravelly sand; med-vc sand w/ granules-sm pebbles; grayish brown (2.5Y 5/2)
940	1,030	Clayey silty gravelly sand; vf-vc sand w/ granules, silt & clay; lt olive brown (2.5Y 5/3)
1030	1,120	Silty gravelly sand; vf-vc sand w/ granules & silt; grayish brown (2.5Y 5/2)
1120	1,140	Sandy clay; clay w/ med-vc sand; lt brownish gray (2.5Y 6/2)
1140	1,472	Clayey silty sand; vf-vc sand w/ silt & clay; grayish brown (2.5Y 5/2)
		SWN's 18S02W23G002S
		Through 23G006S

Total Depth of Boring 1472 Feet

Total Depth of Completed Well 1460 Feet

Well Owner

Well Location

Address 276 Mace Street

City Chula Vista, CA 91911 County San Diego

Latitude 32 Deg. 35 Min. 28.45 Sec. N Longitude 117 Deg. 03 Min. 14.06 Sec. W

Datum NAD83 Decimal Lat. Decimal Long.

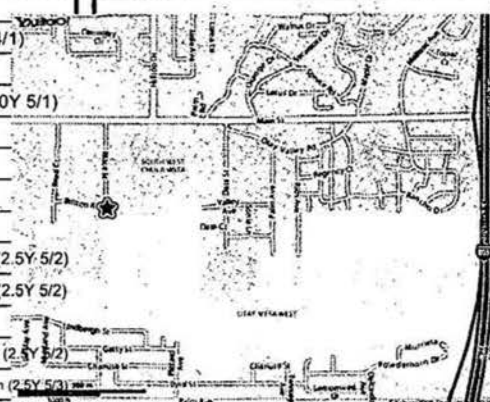
APN Book Page Parcel

Township 18S Range 02W Section 23G2

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North



South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

⦿ New Well

○ Modification/Repair

○ Deepen

○ Other

○ Destroy

Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

○ Water Supply

☐ Domestic ☐ Public

☐ Irrigation ☐ Industrial

○ Cathodic Protection

○ Dewatering

○ Heat Exchange

○ Injection

⦿ Monitoring

○ Remediation

○ Sparging

○ Test Well

○ Vapor Extraction

○ Other

Water Level and Yield of Completed Well

Depth to first water (Feet below surface)

Depth to Static Water Level (Feet) Date Measured

Estimated Yield * (GPM) Test Type

Test Length (Hours) Total Drawdown (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
0	60	22.00	Conductor	PVC Sch. 80				
60	100	13.00						
100	460	12.00						
460/1000	1000/1472	10.00/8.00						
0	1420		Blank	PVC Sch. 80	0.30	3.5		
1,420	1,460		Screen	PVC Sch. 80	0.30	3.5	Milled Slots	0.020

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
51	97	Filter Pack	RMC #3 Sand
194	266	Filter Pack	RMC #3 Sand
530	584	Filter Pack	RMC #3 Sand
926	985	Filter Pack	RMC #3 Sand
1399	1472	Filter Pack	RMC #3 Sand
		Bentonite	All other depths

Attachments

☑ Geologic Log

☑ Well Construction Diagram

☑ Geophysical Log(s)

☐ Soil/Water Chemical Analyses

☑ Other On file @ USGS- San Diego

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Anthony Brown, Hydrologic Technician, U.S. Geological Survey

Person, Firm or Corporation

4165 Spruance Road Suite 200 San Diego CA 92101

Address City State Zip

Signed

C-57 Licensed Water Well Contractor

02/10/2009 Exempt- Federal Government

Date Signed C-57 License Number

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

e0084925

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File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0084925

Owner's Well Number SDOR #2

Date Work Began 11/06/2008 Date Work Ended 12/13/2008

Local Permit Agency County of San Diego Department of Environmental Health

Permit Number LMON T106077 Permit Date 10/31/08

DWR Use Only – Do Not Fill In

18S02W23G003S

State Well Number/Site Number

Latitude N Longitude W

APN/TRS/Other

Geologic Log

Orientation ⦿ Vertical O Horizontal O Angle Specify

Drilling Method Direct Rotary Drilling Fluid Bentonite mud

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc.)
0	10	Gravelly sand; m-vc sand w/ granules-sm pebbles; olive gray (5Y 5/2)
10	20	Gravelly sand; m-vc sand w/ granules; grayish brown (2.5Y 5/2)
20	30	Gravelly sand; m-vc sand w/ granules; lt olive brown (2.5Y 5/4)
30	40	Gravelly sand; m-vc sand w/ granules; dk yellowish brown (10YR 4/6)
40	60	Gravel; granules-med pebbles; various colors
60	70	Clayey silt; silt w/ clay; olive (5Y 4/3)
70	80	Silty sandy gravel; granules-med pebbles w/ vf-vc sand and silt; olive gray (5Y 4/2)
80	200	Clayey silt; silt w/ clay and shell fragments; v dk gray (5Y 3/1)
200	240	Clayey silt; silt w/ clay and minor shell fragments; v dk gray (5Y 3/1)
240	320	Silt; silt; dk gray (5Y 4/1)
320	550	Clayey silt; silt w/ clay; v dk gray (5Y 3/1)
550	560	Sand; vf-coarse sand w/ shell fragments; dk gray (5Y 4/1)
560	570	Clayey silt; silt w/ clay; v dk gray (5Y 3/1)
570	580	Sandy clay; clay w/ med-coarse sand; greenish gray (10Y 5/1)
580	610	Clay; clay; grayish brown (2.5Y 5/2)
610	630	Clay; clay; grayish brown (10YR 5/2)
630	650	Clay; clay; lt brownish gray (2.5Y 6/2)
650	750	Clay; clay; grayish brown (2.5Y 5/2)
750	880	Sandy clayey silt; silt w/ clay & vf-med sand; grayish brown (2.5Y 5/2)
880	910	Clayey silty sand; vf-coarse sand w/ silt & clay; grayish brown (2.5Y 5/2)
910	920	Clay; clay; brown (10YR 5/3)
920	940	Gravelly sand; med-vc sand w/ granules-sm pebbles; grayish brown (2.5Y 5/2)
940	1,030	Clayey silty gravelly sand; vf-vc sand w/ granules, silt & clay; lt olive brown (2.5Y 5/3)
1030	1,120	Silty gravelly sand; vf-vc sand w/ granules & silt; grayish brown (2.5Y 5/2)
1120	1,140	Sandy clay; clay w/ med-vc sand; lt brownish gray (2.5Y 6/2)
1140	1,472	Clayey silty sand; vf-vc sand w/ silt & clay; grayish brown (2.5Y 5/2)

Total Depth of Boring 1472 Feet

Total Depth of Completed Well 970 Feet

Well Owner

Well Location

Address 276 Mace Street

City Chula Vista, CA 91911 County San Diego

Latitude 32 Deg. 35 Min. 28.45 Sec. N Longitude 117 Deg. 03 Min. 14.06 Sec. W

Datum NAD83 Decimal Lat. Decimal Long.

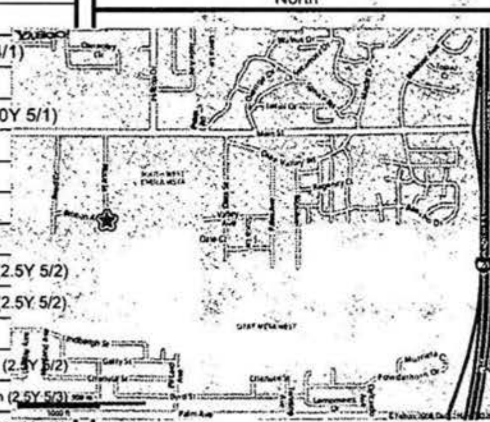
APN Book Page Parcel

Township 18S Range 02W Section 23G3

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North



South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

⦿ New Well

O Modification/Repair

O Deepen

O Other

O Destroy

Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

O Water Supply

☐ Domestic ☐ Public

☐ Irrigation ☐ Industrial

O Cathodic Protection

O Dewatering

O Heat Exchange

O Injection

⦿ Monitoring

O Remediation

O Sparging

O Test Well

O Vapor Extraction

O Other

Water Level and Yield of Completed Well

Depth to first water (Feet below surface)

Depth to Static Water Level (Feet) Date Measured

Estimated Yield * (GPM) Test Type

Test Length (Hours) Total Drawdown (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
0	60	22.00	Conductor	PVC Sch. 80				
60	100	13.00						
100	460	12.00						
460/1000	1000/1472	10.00/8.00						
0	950		Blank	PVC Sch. 80	0.218	2.375		
950	970		Screen	PVC Sch. 80	0.218	2.375	Milled Slots	0.020

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
51	97	Filter Pack	RMC #3 Sand
194	266	Filter Pack	RMC #3 Sand
530	584	Filter Pack	RMC #3 Sand
926	985	Filter Pack	RMC #3 Sand
1399	1472	Filter Pack	RMC #3 Sand
		Bentonite	All other depths

Attachments

☑ Geologic Log

☑ Well Construction Diagram

☑ Geophysical Log(s)

☐ Soil/Water Chemical Analyses

☑ Other On file @ USGS- San Diego

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Anthony Brown, Hydrologic Technician, U.S. Geological Survey

Person, Firm or Corporation

4165 Spruance Road Suite 200 San Diego CA 92101

Address City State Zip

Signed

C-57 Licensed Water Well Contractor

02/10/2009 Exempt- Federal Government

Date Signed C-57 License Number

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

e0084925

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File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0084925

Page 3 of 5

Owner's Well Number SDOR #3

Date Work Began 11/06/2008 Date Work Ended 12/13/2008

Local Permit Agency County of San Diego Department of Environmental Health

Permit Number LMON T106077 Permit Date 10/31/08

DWR Use Only – Do Not Fill In

State Well Number/Site Number: 18S02W23G004S

Latitude N | Longitude W

APN/TRS/Other

Geologic Log

Orientation ⦿ Vertical ○ Horizontal ○ Angle Specify ____

Drilling Method Direct Rotary Drilling Fluid Bentonite mud

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)
0	10	Gravelly sand; m-vc sand w/ granules-sm pebbles; olive gray (5Y 5/2)
10	20	Gravelly sand; m-vc sand w/ granules; grayish brown (2.5Y 5/2)
20	30	Gravelly sand; m-vc sand w/ granules; lt olive brown (2.5Y 5/4)
30	40	Gravelly sand; m-vc sand w/ granules; dk yellowish brown (10YR 4/6)
40	60	Gravel; granules-med pebbles; various colors
60	70	Clayey silt; silt w/ clay; olive (5Y 4/3)
70	80	Silty sandy gravel; granules-med pebbles w/ vf-vc sand and silt; olive gray (5Y 4/2)
80	200	Clayey silt; silt w/ clay and shell fragments; v dk gray (5Y 3/1)
200	240	Clayey silt; silt w/ clay and minor shell fragments; v dk gray (5Y 3/1)
240	320	Silt; silt; dk gray (5Y 4/1)
320	550	Clayey silt; silt w/ clay; v dk gray (5Y 3/1)
550	560	Sand; vf-coarse sand w/ shell fragments; dk gray (5Y 4/1)
560	570	Clayey silt; silt w/ clay; v dk gray (5Y 3/1)
570	580	Sandy clay; clay w/ med-coarse sand; greenish gray (10Y 5/1)
580	610	Clay; clay; grayish brown (2.5Y 5/2)
610	630	Clay; clay; grayish brown (10YR 5/2)
630	650	Clay; clay; lt brownish gray (2.5Y 6/2)
650	750	Clay; clay; grayish brown (2.5Y 5/2)
750	880	Sandy clayey silt; silt w/ clay & vf-med sand; grayish brown (2.5Y 5/2)
880	910	Clayey silty sand; vf-coarse sand w/ silt & clay; grayish brown (2.5Y 5/2)
910	920	Clay; clay; brown (10YR 5/3)
920	940	Gravelly sand; med-vc sand w/ granules-sm pebbles; grayish brown (2.5Y 5/2)
940	1,030	Clayey silty gravelly sand; vf-vc sand w/ granules, silt & clay; lt olive brown (2.5Y 5/3)
1030	1,120	Silty gravelly sand; vf-vc sand w/ granules & silt; grayish brown (2.5Y 5/2)
1120	1,140	Sandy clay; clay w/ med-vc sand; lt brownish gray (2.5Y 6/2)
1140	1,472	Clayey silty sand; vf-vc sand w/ silt & clay; grayish brown (2.5Y 5/2)

Total Depth of Boring 1472 Feet

Total Depth of Completed Well 570 Feet

Well Owner

Well Location

Address 276 Mace Street

City Chula Vista, CA 91911 County San Diego

Latitude 32 35 28.45 N (Deg. Min. Sec.) Longitude 117 03 14.06 W (Deg. Min. Sec.)

Datum NAD83 Decimal Lat. ____ Decimal Long. ____

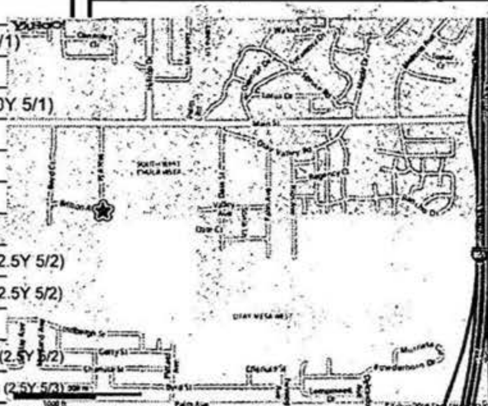
APN Book ____ Page ____ Parcel ____

Township 18S Range 02W Section 23G4

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North



South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

⦿ New Well

○ Modification/Repair

○ Deepen

○ Other ____

○ Destroy

Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

○ Water Supply

☐ Domestic ☐ Public

☐ Irrigation ☐ Industrial

○ Cathodic Protection

○ Dewatering

○ Heat Exchange

○ Injection

⦿ Monitoring

○ Remediation

○ Sparging

○ Test Well

○ Vapor Extraction

○ Other ____

Water Level and Yield of Completed Well

Depth to first water ____ (Feet below surface)

Depth to Static Water Level ____ (Feet) Date Measured ____

Estimated Yield * ____ (GPM) Test Type ____

Test Length ____ (Hours) Total Drawdown ____ (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
0	60	22.00	Conductor	PVC Sch. 80				
60	100	13.00						
100	460	12.00						
460/1000	1000/1472	10.00/8.00						
0	550		Blank	PVC Sch. 80	0.218	2.375		
550	570		Screen	PVC Sch. 80	0.218	2.375	Milled Slots	0.020

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
51	97	Filter Pack	RMC #3 Sand
194	266	Filter Pack	RMC #3 Sand
530	584	Filter Pack	RMC #3 Sand
926	985	Filter Pack	RMC #3 Sand
1399	1472	Filter Pack	RMC #3 Sand
		Bentonite	All other depths

Attachments

☑ Geologic Log

☑ Well Construction Diagram

☑ Geophysical Log(s)

☐ Soil/Water Chemical Analyses

☑ Other On file @ USGS- San Diego

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Anthony Brown, Hydrologic Technician, U.S. Geological Survey (Person, Firm or Corporation)

4165 Spruance Road Suite 200 (Address) San Diego (City) CA (State) 92101 (Zip)

Signed ____ (C-57 Licensed Water Well Contractor) 02/10/2009 (Date Signed) Exempt- Federal Government (C-57 License Number)

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

*The free Adobe Reader may be used to view and complete this form. However, software must be purchased to complete, save, and reuse a saved form.

File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0084925

Owner's Well Number SDOR #4

Date Work Began 11/06/2008 Date Work Ended 12/13/2008

Local Permit Agency County of San Diego Department of Environmental Health

Permit Number LMON T106077 Permit Date 10/31/08

DWR Use Only – Do Not Fill In

18S02W23G005S

State Well Number/Site Number

Latitude N Longitude W

APN/TRS/Other

Geologic Log

Orientation ⦿ Vertical ○ Horizontal ○ Angle Specify ____

Drilling Method Direct Rotary Drilling Fluid Bentonite mud

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)
0	10	Gravelly sand; m-vc sand w/ granules-sm pebbles; olive gray (5Y 5/2)
10	20	Gravelly sand; m-vc sand w/ granules; grayish brown (2.5Y 5/2)
20	30	Gravelly sand; m-vc sand w/ granules; lt olive brown (2.5Y 5/4)
30	40	Gravelly sand; m-vc sand w/ granules; dk yellowish brown (10YR 4/6)
40	60	Gravel; granules-med pebbles; various colors
60	70	Clayey silt; silt w/ clay; olive (5Y 4/3)
70	80	Silty sandy gravel; granules-med pebbles w/ vf-vc sand and silt; olive gray (5Y 4/2)
80	200	Clayey silt; silt w/ clay and shell fragments; v dk gray (5Y 3/1)
200	240	Clayey silt; silt w/ clay and minor shell fragments; v dk gray (5Y 3/1)
240	320	Silt; silt; dk gray (5Y 4/1)
320	550	Clayey silt; silt w/ clay; v dk gray (5Y 3/1)
550	560	Sand; vf-coarse sand w/ shell fragments; dk gray (5Y 4/1)
560	570	Clayey silt; silt w/ clay; v dk gray (5Y 3/1)
570	580	Sandy clay; clay w/ med-coarse sand; greenish gray (10Y 5/1)
580	610	Clay; clay; grayish brown (2.5Y 5/2)
610	630	Clay; clay; grayish brown (10YR 5/2)
630	650	Clay; clay; lt brownish gray (2.5Y 6/2)
650	750	Clay; clay; grayish brown (2.5Y 5/2)
750	880	Sandy clayey silt; silt w/ clay & vf-med sand; grayish brown (2.5Y 5/2)
880	910	Clayey silty sand; vf-coarse sand w/ silt & clay; grayish brown (2.5Y 5/2)
910	920	Clay; clay; brown (10YR 5/3)
920	940	Gravelly sand; med-vc sand w/ granules-sm pebbles; grayish brown (2.5Y 5/2)
940	1,030	Clayey silty gravelly sand; vf-vc sand w/ granules, silt & clay; lt olive brown (2.5Y 5/3)
1030	1,120	Silty gravelly sand; vf-vc sand w/ granules & silt; grayish brown (2.5Y 5/2)
1120	1,140	Sandy clay; clay w/ med-vc sand; lt brownish gray (2.5Y 6/2)
1140	1,472	Clayey silty sand; vf-vc sand w/ silt & clay; grayish brown (2.5Y 5/2)

Total Depth of Boring 1472 Feet

Total Depth of Completed Well 240 Feet

Well Owner

Well Location

Address 276 Mace Street

City Chula Vista, CA 91911 County San Diego

Latitude 32 35 28.45 N Longitude 117 03 14.06 W (Deg. Min. Sec.)

Datum NAD83 Decimal Lat. ____ Decimal Long. ____

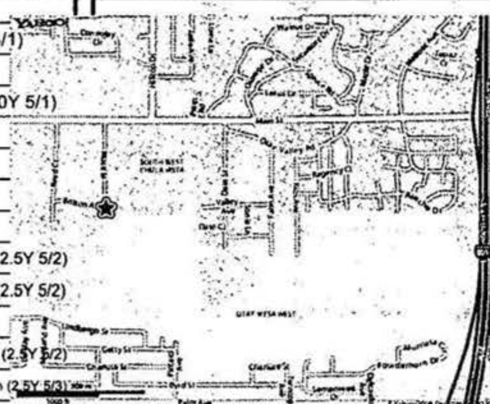
APN Book ____ Page ____ Parcel ____

Township 18S Range 02W Section 23G5

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North



South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

⦿ New Well
○ Modification/Repair
○ Deepen
○ Other ____
○ Destroy
Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

○ Water Supply
☐ Domestic ☐ Public
☐ Irrigation ☐ Industrial
○ Cathodic Protection
○ Dewatering
○ Heat Exchange
○ Injection
⦿ Monitoring
○ Remediation
○ Sparging
○ Test Well
○ Vapor Extraction
○ Other ____

Water Level and Yield of Completed Well

Depth to first water ____ (Feet below surface)

Depth to Static Water Level ____ (Feet) Date Measured ____

Estimated Yield * ____ (GPM) Test Type ____

Test Length ____ (Hours) Total Drawdown ____ (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
0	60	22.00	Conductor	PVC Sch. 80				
60	100	13.00						
100	460	12.00						
460/1000	1000/1472	10.00/8.00						
0	220		Blank	PVC Sch. 80	0.218	2.375		
220	240		Screen	PVC Sch. 80	0.218	2.375	Milled Slots	0.020

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
51	97	Filter Pack	RMC #3 Sand
194	266	Filter Pack	RMC #3 Sand
530	584	Filter Pack	RMC #3 Sand
926	985	Filter Pack	RMC #3 Sand
1399	1472	Filter Pack	RMC #3 Sand
		Bentonite	All other depths

Attachments

☑ Geologic Log
☑ Well Construction Diagram
☑ Geophysical Log(s)
☐ Soil/Water Chemical Analyses
☑ Other On file @ USGS- San Diego

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Anthony Brown, Hydrologic Technician, U.S. Geological Survey
(Person, Firm or Corporation)

4165 Spruance Road Suite 200 San Diego CA 92101
(Address, City, State, Zip)

Signed ____ (C-57 Licensed Water Well Contractor) 02/10/2009 (Date Signed) Exempt- Federal Government (C-57 License Number)

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

*The free Adobe Reader may be used to view and complete this form. However, software must be purchased to complete, save, and reuse a saved form.

File Original with DWR

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0084925

DWR Use Only – Do Not Fill In

18S02W23G006S

State Well Number/Site Number

| | N | | W |

Latitude Longitude

APN/TRS/Other

Owner's Well Number SDOR #5

Date Work Began 11/06/2008 Date Work Ended 12/13/2008

Local Permit Agency County of San Diego Department of Environmental Health

Permit Number LMON T106077 Permit Date 10/31/08

Geologic Log

Orientation ⦿ Vertical ○ Horizontal ○ Angle Specify ______

Drilling Method Direct Rotary Drilling Fluid Bentonite mud

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)
0	10	Gravelly sand; m-vc sand w/ granules-sm pebbles; olive gray (5Y 5/2)
10	20	Gravelly sand; m-vc sand w/ granules; grayish brown (2.5Y 5/2)
20	30	Gravelly sand; m-vc sand w/ granules; lt olive brown (2.5Y 5/4)
30	40	Gravelly sand; m-vc sand w/ granules; dk yellowish brown (10YR 4/6)
40	60	Gravel; granules-med pebbles; various colors
60	70	Clayey silt; silt w/ clay; olive (5Y 4/3)
70	80	Silty sandy gravel; granules-med pebbles w/ vf-vc sand and silt; olive gray (5Y 4/2)
80	200	Clayey silt; silt w/ clay and shell fragments; v dk gray (5Y 3/1)
200	240	Clayey silt; silt w/ clay and minor shell fragments; v dk gray (5Y 3/1)
240	320	Silt; silt; dk gray (5Y 4/1)
320	550	Clayey silt; silt w/ clay; v dk gray (5Y 3/1)
550	560	Sand; vf-coarse sand w/ shell fragments; dk gray (5Y 4/1)
560	570	Clayey silt; silt w/ clay; v dk gray (5Y 3/1)
570	580	Sandy clay; clay w/ med-coarse sand; greenish gray (10Y 5/1)
580	610	Clay; clay; grayish brown (2.5Y 5/2)
610	630	Clay; clay; grayish brown (10YR 5/2)
630	650	Clay; clay; lt brownish gray (2.5Y 6/2)
650	750	Clay; clay; grayish brown (2.5Y 5/2)
750	880	Sandy clayey silt; silt w/ clay & vf-med sand; grayish brown (2.5Y 5/2)
880	910	Clayey silty sand; vf-coarse sand w/ silt & clay; grayish brown (2.5Y 5/2)
910	920	Clay; clay; brown (10YR 5/3)
920	940	Gravelly sand; med-vc sand w/ granules-sm pebbles; grayish brown (2.5Y 5/2)
940	1,030	Clayey silty gravelly sand; vf-vc sand w/ granules, silt & clay; lt olive brown (2.5Y 5/3)
1030	1,120	Silty gravelly sand; vf-vc sand w/ granules & silt; grayish brown (2.5Y 5/2)
1120	1,140	Sandy clay; clay w/ med-vc sand; lt brownish gray (2.5Y 6/2)
1140	1,472	Clayey silty sand; vf-vc sand w/ silt & clay; grayish brown (2.5Y 5/2)

Total Depth of Boring 1472 Feet

Total Depth of Completed Well 90 Feet

Well Owner

Well Location

Address 276 Mace Street

City Chula Vista, CA 91911 County San Diego

Latitude 32 Deg. 35 Min. 28.45 Sec. N Longitude 117 Deg. 03 Min. 14.06 Sec. W

Datum NAD83 Decimal Lat. ______ Decimal Long. ______

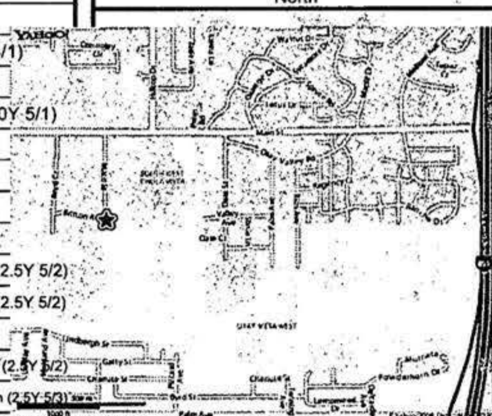
APN Book ______ Page ______ Parcel ______

Township 18S Range 02W Section 23G6

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North



South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

⦿ New Well
○ Modification/Repair
○ Deepen
○ Other ______
○ Destroy
Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

○ Water Supply
☐ Domestic ☐ Public
☐ Irrigation ☐ Industrial
○ Cathodic Protection
○ Dewatering
○ Heat Exchange
○ Injection
⦿ Monitoring
○ Remediation
○ Sparging
○ Test Well
○ Vapor Extraction
○ Other ______

Water Level and Yield of Completed Well

Depth to first water ______ (Feet below surface)

Depth to Static Water Level ______ (Feet) Date Measured ______

Estimated Yield * ______ (GPM) Test Type ______

Test Length ______ (Hours) Total Drawdown ______ (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
0	60	22.00	Conductor	PVC Sch. 80				
60	100	13.00						
100	460	12.00						
460/1000	1000/1472	10.00/8.00						
0	70		Blank	PVC Sch. 80	0.218	2.375		
70	90		Screen	PVC Sch. 80	0.218	2.375	Milled Slots	0.020

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
51	97	Filter Pack	RMC #3 Sand
194	266	Filter Pack	RMC #3 Sand
530	584	Filter Pack	RMC #3 Sand
926	985	Filter Pack	RMC #3 Sand
1399	1472	Filter Pack	RMC #3 Sand
		Bentonite	All other depths

Attachments

☑ Geologic Log
☑ Well Construction Diagram
☑ Geophysical Log(s)
☐ Soil/Water Chemical Analyses
☑ Other On file @ USGS- San Diego

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Anthony Brown, Hydrologic Technician, U.S. Geological Survey
Person, Firm or Corporation

4165 Spruance Road Suite 200 San Diego CA 92101
Address City State Zip

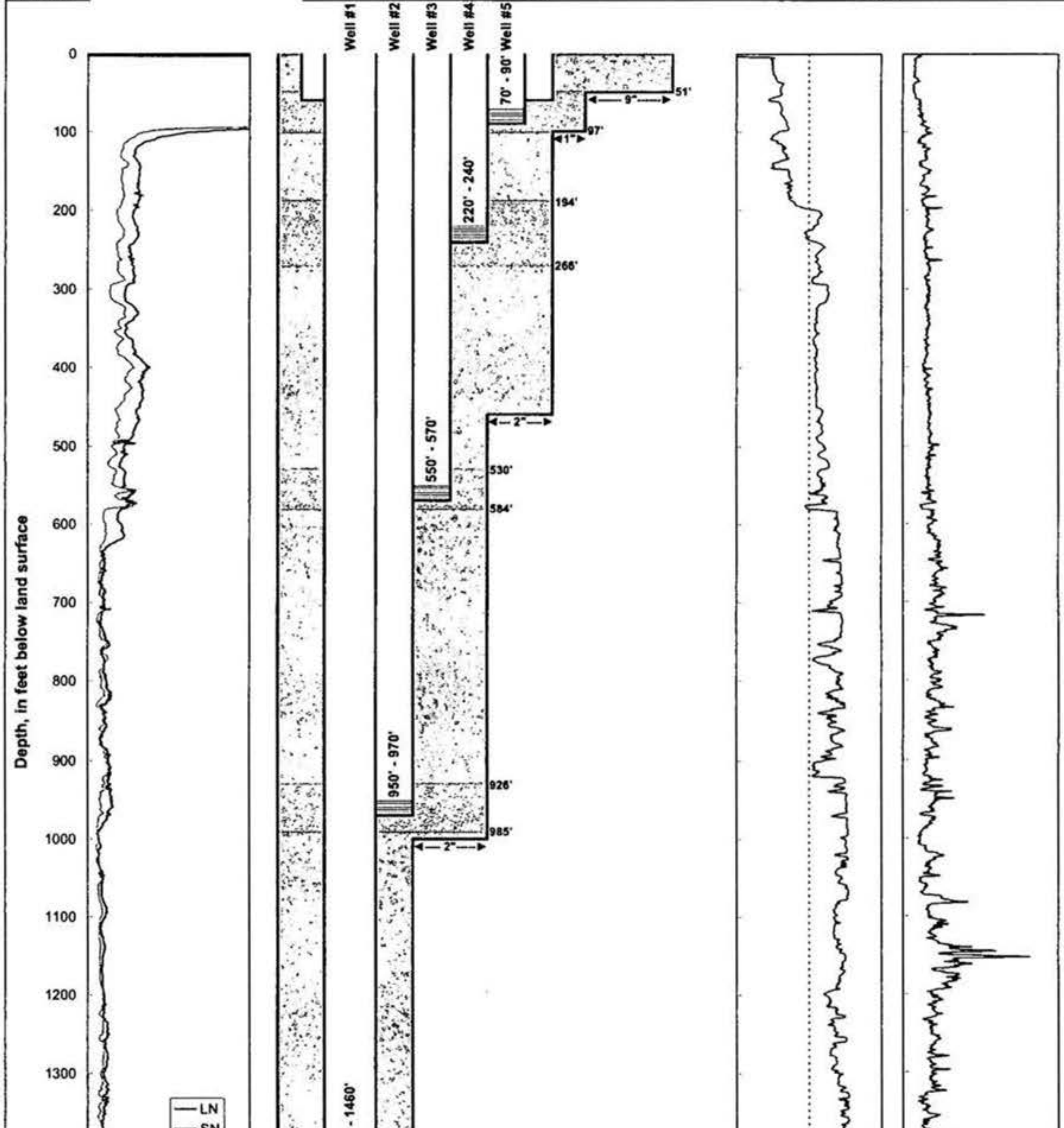
Signed ______ 02/10/2009 Exempt- Federal Government
C-57 Licensed Water Well Contractor Date Signed C-57 License Number

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

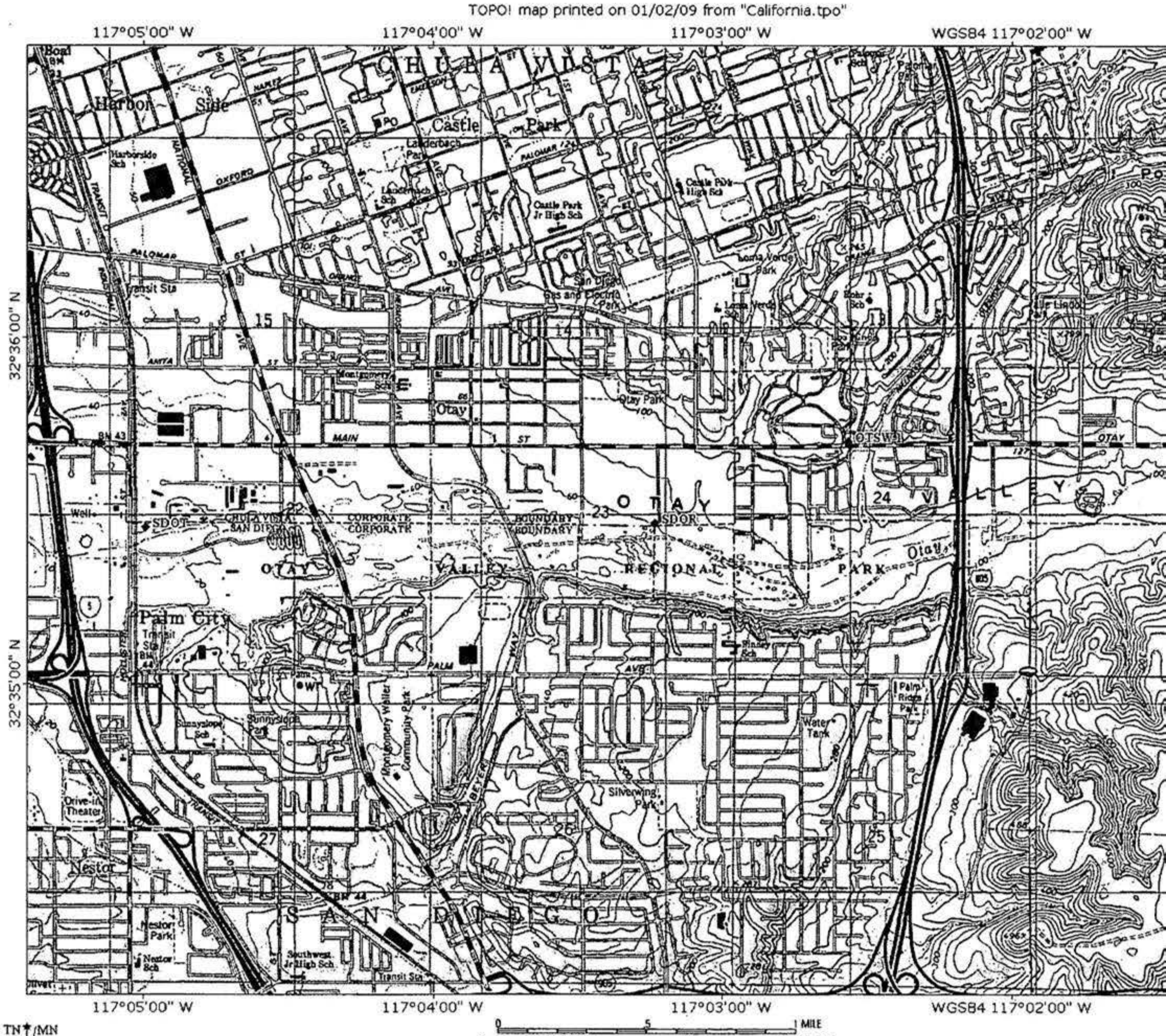
60084925

SITE I.D:	323528117031401-05		COMPLETION DATE:	12/13/2008
STATION NAME:	0018S002W32G002-06s		TOTAL DEPTH:	1472'
USGS SITE:	San Diego Otay River (SDOR)		WELL FINISH:	VAULT
OWNER:				



DRILL TYPE:	HYDRAULIC MUD ROTARY	DRILLER: USGS WESTERN REGION RESEARCH DRILLING UNIT	
CASING TYPE:	SCHD. 80 PVC 20' SEC (#1: 3", #2-5: 2")	SCREEN TYPE: SCHD. 80 1.5"x0.02" SLOTS (Except #1: 2.0"X0.02")	
GROUT:	PUREGOLD GROUT @ 30% SOLIDS	SAND:	RMC #3
BOREHOLE DIA:	22": 0' - 60'; 13": 60' - 100'; 12": 100' - 460'; 10": 460' - 1000'; 8": 1000' - 1472'		
SURFACE/CONDUCTOR CASING:	15": 0' - 60' PVC BELL-END SDR35		

TOPO! map printed on 01/02/09 from "California.tpo"



Map created with TOPO!® ©2003 National Geographic (www.nationalgeographic.com/topo)

0 25 50 75 100
Resistivity, in ohm-meters

Sand

Grout

-30 -15 0 15 30
Spontaneous Potential, in millivolts

0 200 400 600
Gamma Ray

DRILL TYPE: HYDRAULIC MUD ROTARY	DRILLER: USGS WESTERN REGION RESEARCH DRILLING UNIT
CASING TYPE: SCHD. 80 PVC 20' SEC (#1: 3", #2-5: 2")	SCREEN TYPE: SCHD. 80 1.5"x0.02" SLOTS (Except #1: 2.0"X0.02")
GROUT: PUREGOLD GROUT @ 30% SOLIDS	SAND: RMC #3
BOREHOLE DIA: 22": 0' - 60'; 13": 60' - 100'; 12": 100' - 460'; 10": 460' - 1000'; 8": 1000' - 1472'	
SURFACE/CONDUCTOR CASING: 15": 0' - 60' PVC BELL-END SDR35	

e0084925

Main St
Mace St
Britton Ave
Reed Ct
SIDOR
© USFWS
© 2008 Tele Atlas
Google
32°35'32.81" N 117°03'12.31" W
elev 80 ft
Feb 2008
Eye alt 1987 ft

DUPLICATE
File Original, Duplicate and Triplicate with the
REGIONAL WATER POLLUTION
CONTROL BOARD No.
(Insert appropriate number)

WATER WELL DRILLERS REPORT

(Sections 7076, 7077, 7078, Water Code)

STATE OF CALIFORNIA

19S,2W-00

Do Not Fill In
Nº 28827
State Well No. 19S/2W
Other Well No.

(1) OWNER:

(2) LOCATION OF WELL:
County San Diego Owner's number, if any Bay Farms
R. F. D. or Street No. 1000' South on Dairy Mart Rd.
From 101 Freeway & 1000' West

(3) TYPE OF WORK (check):
New well [X] Deepening [ ] Reconditioning [ ] Abandon [ ]
If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (check):
Domestic [ ] Industrial [ ] Municipal [ ]
Irrigation [X] Test Well [ ] Other [ ]

(5) EQUIPMENT:
Rotary [ ]
Cable [ ]
Dug Well [X]

(6) CASING INSTALLED:
SINGLE [ ] DOUBLE [ ]
From ft. to ft. Diam. Gage or Wall
0 to 88' - 6" of 12" 3/4 O.D. By 1/4" Wall.

If gravel packed
Diameter of Bore / from ft. / to ft.

Type and size of shoe or well ring 1-12"
Size of gravel:
Describe joint Welding

(7) PERFORATIONS:
Type of perforator used
Size of perforations 2½" X 1/4" in., length, by 128 in.
From ft. to ft. Perf. per row Rows per ft.
70 to 85

(8) CONSTRUCTION:
Was a surface sanitary seal provided? [ ] Yes [ ] No To what depth ft.
Were any strata sealed against pollution? [ ] Yes [ ] No If yes, note depth of strata
From ft. to ft.
Method of Sealing

(9) WATER LEVELS:
Depth at which water was first found ft.
Standing level before perforating ft.
Standing level after perforating 32' ft.

(10) WELL TESTS:
Was a pump test made? [ ] Yes [ ] No If yes, by whom?
Yield: gal./min. with ft. draw down after hrs.
Temperature of water Was a chemical analysis made? [ ] Yes [ ] No
Was electric log made of well? [ ] Yes [ ] No

(11) WELL LOG:
Total depth ft. Depth of completed well ft.
Formation: Describe by color, character, size of material, and structure.

ft.	to ft.	Formation
0	25	Sand
25	30	Sand & Sand Gravel
30	53	Sandy Mud
53	67	Sand & Gravel
67	70	Sand ,Gravel & Large Rock
70	85	Sand & Gravel

CONFIDENTIAL - NOT FOR PUBLIC RELEASE

MICROFILMED

Work started 5/5/59 19 , Completed 5/30/59 19

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME San Diego Pump & Well Drillers (Person, firm, or corporation) (Typed or printed)
Address P.O.Box 966 Chula Vista,Calif.
996

[SIGNED] J. Hamilton (Well Driller)

License No. No.160313 Dated 6/30/59, 19

95689 3-54 50M QUIN SPO DWR FORM No. 246 (REV. 3-54)

ORIGINAL
File with DWR
Page 1 of 3
Owner's Well No. B-20
Date Work Began 11-4-03, Ended 11-4-03
Local Permit Agency San Diego County
Permit No. ______ Permit Date ______

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet
No. e010426

DWR USE ONLY — DO NOT FILL IN
STATE WELL NO./STATION NO.
LATITUDE / LONGITUDE
APN/TRS/OTHER

GEOLOGIC LOG

ORIENTATION (✓) ✓ VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DRILLING METHOD HSA FLUID ______

DEPTH FROM SURFACE Ft. to Ft.	DESCRIPTION Describe material, grain size, color, etc.
	SEE ATTACHED LOG

TOTAL DEPTH OF BORING 30 (Feet)
TOTAL DEPTH OF COMPLETED WELL 30 (Feet)

WELL OWNER

WELL LOCATION
Address 314 E. San Ysidro Blvd
City San Diego
County San Diego
APN Book ____ Page ____ Parcel ____
Township 19S Range 2W Section 1
Latitude 32 33 8 NORTH (DEG. MIN. SEC.) Longitude 117 2 18 WEST (DEG. MIN. SEC.)

LOCATION SKETCH
NORTH / SOUTH / WEST / EAST

SEE ATTACHED MAP

Illustrate or Describe Distance of Well from Roads, Buildings, Fences, Rivers, etc. and attach a map. Use additional paper if necessary. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)
✓ NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
___ DESTROY (Describe Procedures and Materials Under "GEOLOGIC LOG")

PLANNED USES (✓)
WATER SUPPLY
___ Domestic ___ Public
___ Irrigation ___ Industrial
MONITORING ✓
TEST WELL ___
CATHODIC PROTECTION ___
HEAT EXCHANGE ___
DIRECT PUSH ___
INJECTION ___
VAPOR EXTRACTION ___
SPARGING ___
REMEDIATION ___
OTHER (SPECIFY) ___

WATER LEVEL & YIELD OF COMPLETED WELL
DEPTH TO FIRST WATER 15 (Ft.) BELOW SURFACE
DEPTH OF STATIC WATER LEVEL ______ (Ft.) & DATE MEASURED ______
ESTIMATED YIELD * ______ (GPM) & TEST TYPE ______
TEST LENGTH ______ (Hrs.) TOTAL DRAWDOWN ______ (Ft.)
* May not be representative of a well's long-term yield.

CASING (S)

DEPTH FROM SURFACE Ft. to Ft.	BORE-HOLE DIA. (Inches)	BLANK	SCREEN	CON-DUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0 to 10	10	✓				PVC	4	SCH 40	—
10 to 30	10		✓			PVC	4	SCH 40	.020

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft. to Ft.	CE-MENT (✓)	BEN-TONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0 to 4	✓			
4 to 7		✓		chips
7 to 30			✓	#3

ATTACHMENTS (✓)
✓ Geologic Log
✓ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
✓ Other Site Map
ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT
I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.
NAME BC² ENVIRONMENTAL CORP.
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)
1212 EAST ASH AVE., FULLERTON, CA 92831
ADDRESS CITY STATE ZIP
Signed MDeRose 2-11-04 686255
WELL DRILLER/AUTHORIZED REPRESENTATIVE DATE SIGNED C-57 LICENSE NUMBER

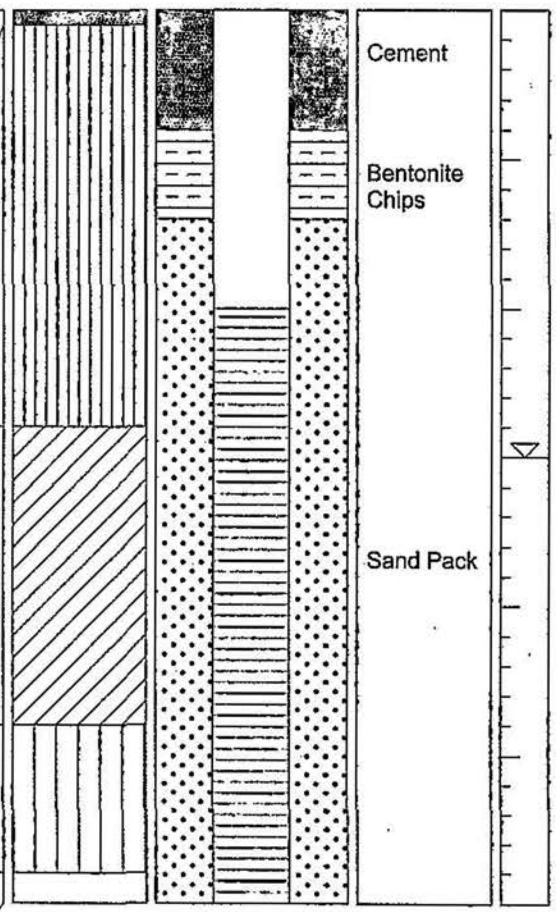
DWR 188 REV. 11-97 IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

NorthShore Engineering, Inc. e010426

Logged by: Aaron Hill	Drilling Co.: BC2	**Well No.: B-20**
Location: 314 East San Ysidro Blvd.	Drilling Method: Hollow Stem Auger	Well Casing Dimension: 10-ft of 4" SCH 40 PVC
Project No.: NS-02-1100	Depth to First Saturation: 15 feet	Well Screen: 20-ft of 4" SCH 40 Slotted PVC Casing
Date Drilled: November 4, 2003	Total Depth: 30 feet	Boring Dimension: 10" O.D.

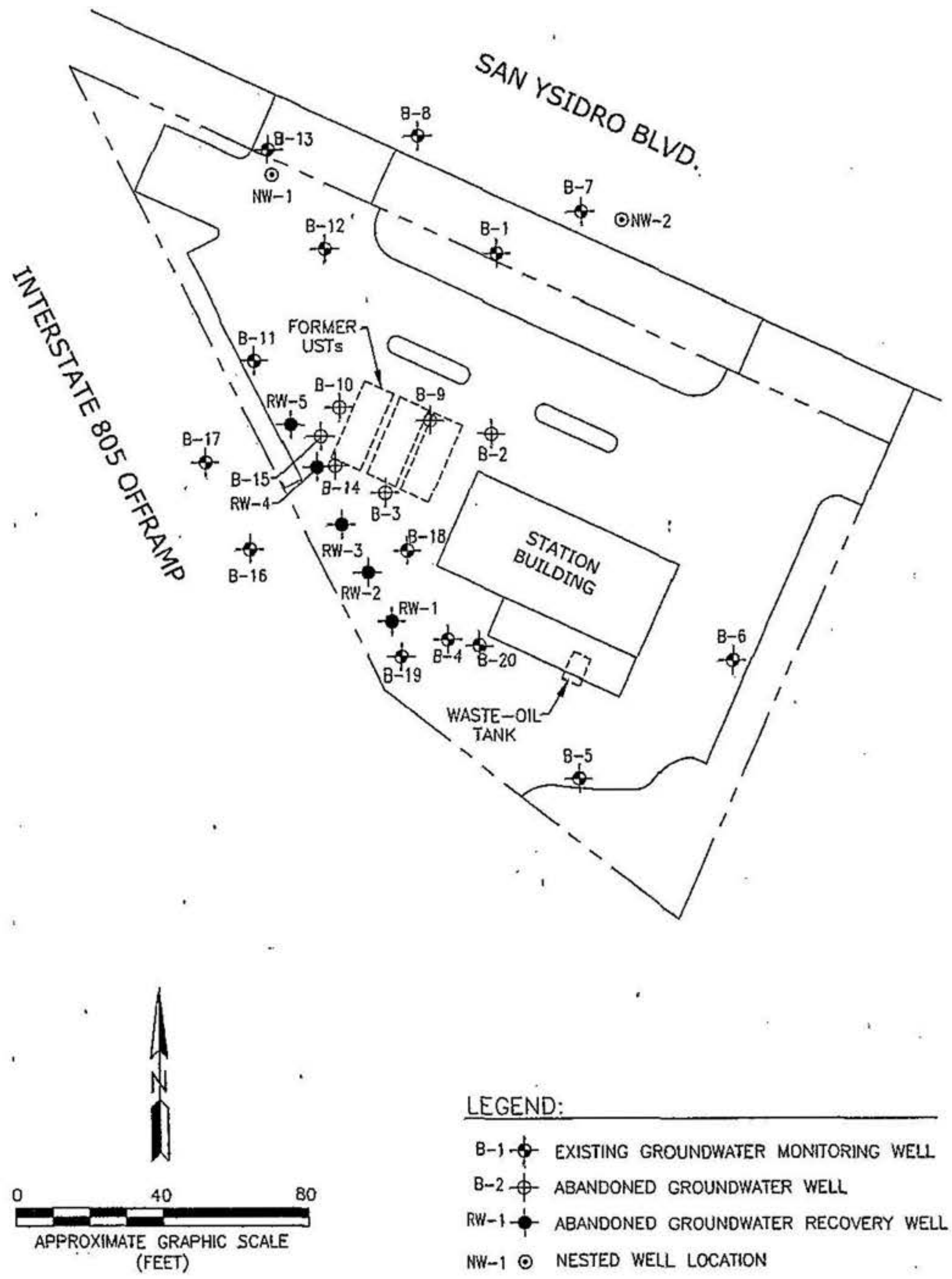
Depth (ft.)	PID (ppm)	Blow Counts	Lithologic Description
0			Asphalt
			ML - Clayey Silt, brown, very stiff, moist
-5			
	11	4-11-12	
-10			
	376	7-10-11	CL - Silty Clay, brown, very stiff, slightly moist
-15			
	0.1	5-9-12	
-20			
	61.4	11-15-20	SM - Silty Sand, light brown, dense, wet, medium-grained
-25			
-30			Refusal at 30 feet

Lithology | Well Design | Depth (ft.)



Approved by Charlie Wyatt, P.E.

e010426



NorthShore Engineering, Inc.
2551 STATE STREET, SUITE 226
CARLSBAD, CA 92008
TEL: (760) 729-9423
FAX: (760) 729-9425

SITE PLAN

CLIENT:		PROJECT MANAGER:	BILL LANTZ	PROJECT NUMBER:	NS-02-1100
LOCATION:	314 EAST SAN YSIDRO BLVD. SAN DIEGO, CALIFORNIA	DATE:	FEBRUARY 2004	FIGURE:	2

ORIGINAL
File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in

No. 336128

ice of Intent No 250338
Local Permit No or Date W91968

State Well No
Other Well No MW1

(2) LOCATION OF WELL (See instructions):
County SAN DIEGO Owner's Well Number
Well address if different from above
Township 18S Range 2W Section 24
Distance from cities, roads, railroads, fences, etc APPROXIMATELY 400 FEET EAST OF INTERSTATE 805.

SEE ATTACHED

WELL LOCATION SKETCH

(3) TYPE OF WORK
New Well [X] Deepening [ ]
Reconstruction [ ]
Reconditioning [ ]
Horizontal Well [ ]
Destruction [ ] (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE
Domestic [ ]
Irrigation [ ]
Industrial [ ]
Test Well [ ]
Municipal [ ]
Other GROUNDWATER MONITOR [X]
(Describe)

(5) EQUIPMENT
Rotary [X] Reverse [ ]
Cable [ ] Air [X]
Other [X] Bucket [ ]
AUGER

(6) GRAVEL PACK
Yes [X] No [ ] Size
Diameter of bore 8 INCH
Packed from 265 to 218 ft

(7) CASING INSTALLED
Steel [ ] Plastic [X] Concrete [ ]

(8) PERFORATIONS SLOTTED
Type of perforation or size of screen .020

From ft.	To ft.	Dia in	Gage or Wall	From ft	To ft	Slot size
0.5	250	2"		220	250	0.020"

(9) WELL SEAL:
Was surface sanitary seal provided? Yes [X] No [ ] If yes, to depth 218 ft
Were strata sealed against pollution? Yes [X] No [ ] Interval ft
Method of sealing BENTONITE/CEMENT

(10) WATER LEVELS:
Depth of first water, if known NOTKNOWN ft
Standing level after well completion 210 ft

(11) WELL TESTS:
Was well test made? Yes [ ] No [X] If yes, by whom?
Type of test Pump [ ] Bailer [ ] Air lift [ ]
Depth to water at start of test ft At end of test ft
Discharge gal/min after hours Water temperature
Chemical analysis made? Yes [X] No [ ] If yes, by whom?
Was electric log made Yes [ ] No [X] If yes, attach copy to this report

(12) WELL LOG. Total depth 265 ft Completed depth 250 ft AVE.

from ft	to ft	Formation (Describe by color, character, size or material)
0	-80	MODERATE, YELLOWISH BROWN (10YR 5/4), DRY, MEDIUM TO COARSE SAND (SP) WITH COBBLES
80	-85	BECOMES MOIST, FINE SILTY SAND (SM)
85	-110	BECOMES CLAYEY SAND (SC)
110	-237	DARK, YELLOWISH ORANGE (10YR 6/6), MOIST, FINE SAND (SP)
237	-265	GRAY, VERY MOIST, SILT (ML)

Work started 24 MAY 1991 Completed 26 JUNE 1991

WELL DRILLER'S STATEMENT

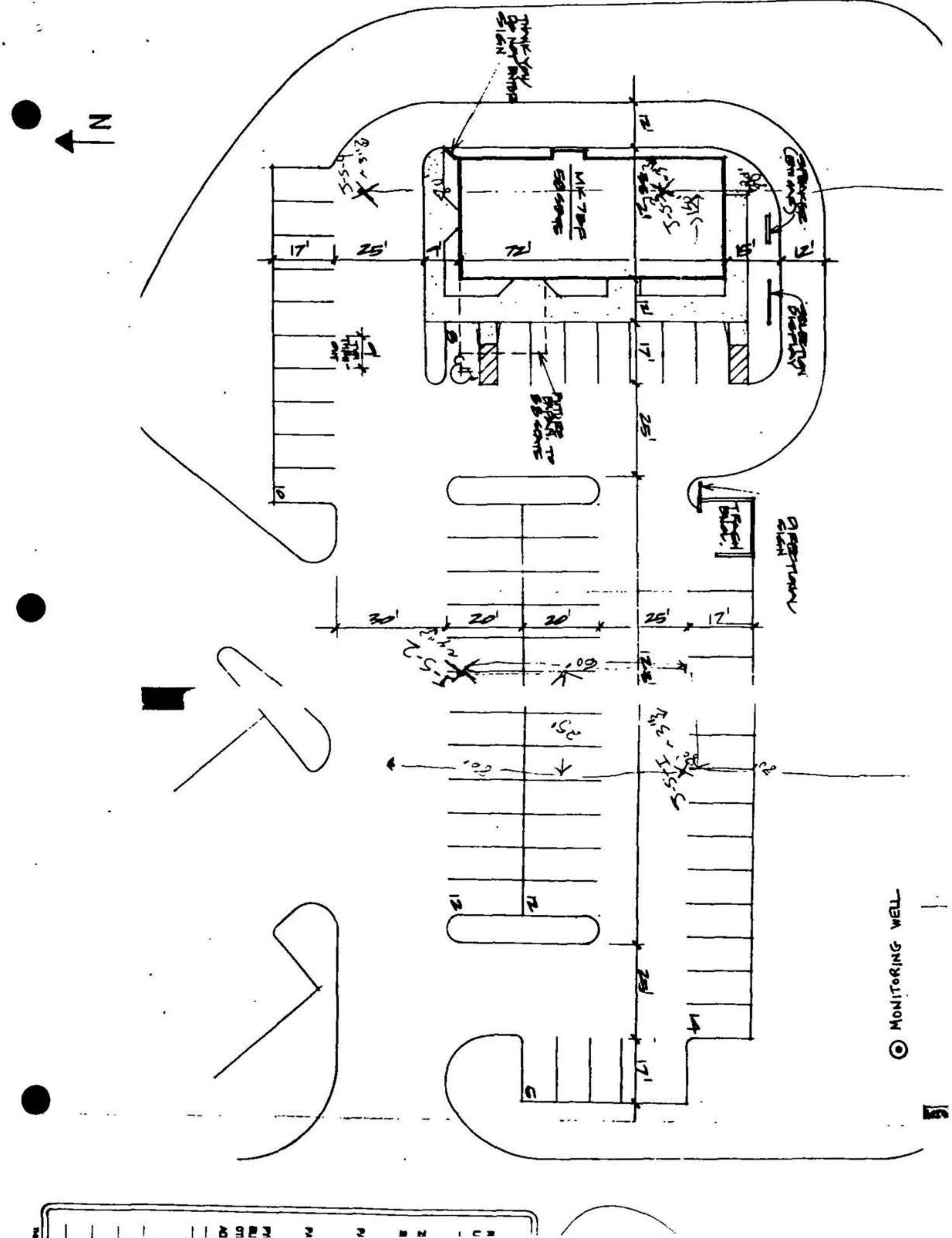
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief

Signed (Well Driller)

NAME A & R DRILLING, INC.
(Person, firm, or corporation) (Typed or printed)
Address 1210 EAST 223RD STREET, SUITE 319
City CARSON ZIP 90745
License No 492082 Date of this report 5 AUGUST 1991

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

336128



336128

PROJECT ▷ JACK 3014	PROJECT NUMBER ▷ A901924A
LOGGED BY ▷ C. HILL/P. ROBERTS	START DATE ▷ 24 May 1991
CHECKED BY ▷	COMPLETION DATE ▷ 26 June 1991

APPLIED GEOSCIENCES INC.

GROUND SURFACE ELEVATION DATUM (FT-MSL) ▷	DRILLING COMPANY ▷ LAYNE/A & R DRILLING

DRILLING EQUIPMENT ▷ FAILING F-10 W/8-INCH HOLLOW STEM AUGERS/CME 75 ROTARY RIG

BORING DEPTH (FT) ▷ 265.0	WELL DEPTH (FT) ▷ 250	WATER DEPTH (FT)-Initial: Completion: 210.0
WELL MATERIALS ▷ SCHEDULE 80 PVC W/0.02 SLOT		WELL SCREEN INTERVAL (FT) ▷ 220 TO 250
WELL CASING ELEVATION (FT-MSL) ▷ N/A		OVM/OVA ▷ N/A

BACKFILL MATERIAL ▷ #3 SAND, BENTONITE, AND CEMENT

DEPTH (FT)	LITHOLOGY DESCRIPTION	GRAPHIC	WELL	BLOW COUNT	OVM/OVA (PPM)	SAMPLE RECOVERY %	SAMPLE TYPE	SAMPLE NUMBER	COMMENTS
0	Moderate yellowish brown (10 YR 5/4), dry, medium to coarse SAND (SP) with cobbles.								
5									
10									
15									
20									
25									
30									

BORING DESIGNATION		PAGE NUMBER	FIGURE NUMBER
MW1	BORING LOG	1 OF 7	a

336129

PROJECT ▷ JACK 3014	PROJECT NUMBER ▷ A901924A

DEPTH (FT)	LITHOLOGY DESCRIPTION	GRAPHIC	WELL	BLOW COUNT	OVM/OVA (PPM)	SAMPLE RECOVERY %	SAMPLE TYPE	SAMPLE NUMBER	COMMENTS
30									
35									
40									
45									
50									
55									
60									
65									
70									

BORING DESIGNATION		PAGE NUMBER	FIGURE NUMBER
MW1	BORING LOG	2 OF 7	b

336128

PROJECT ▷ JACK 3014	PROJECT NUMBER ▷ A901924A

DEPTH (FT)	LITHOLOGY DESCRIPTION	GRAPHIC	WELL	BLOW COUNT	OVM/OVA (PPM)	SAMPLE RECOVERY %	SAMPLE TYPE	SAMPLE NUMBER	COMMENTS
70	Soil becomes moist, more clayey, fewer cobbles								
75									
80	Became moist, fine silty SAND (SM)								
85	Became clayey SAND (SC)								
90									
95									
100									
105									
110									

BORING DESIGNATION		PAGE NUMBER	FIGURE NUMBER
MW1	BORING LOG	3 OF 7	c

336828

PROJECT ▷ JACK 3014								PROJECT NUMBER ▷ A901924A	
DEPTH (FT)	LITHOLOGY		WELL	BLOW COUNT	OVM/OVA (PPM)	SAMPLE			COMMENTS
	DESCRIPTION	GRAPHIC				RECOVERY %	TYPE	NUMBER	
110	Dark yellowish orange, moist, fine SAND (SP)								
	Became cobbly								
115									
120									
125									
130									
135									
140									
145									
150									

BORING DESIGNATION		PAGE NUMBER	FIGURE NUMBER
MW1	BORING LOG	4 OF 7	d

336128

PROJECT ▷ JACK 3014	PROJECT NUMBER ▷ A901924A

DEPTH (FT)	LITHOLOGY DESCRIPTION	GRAPHIC	WELL	BLOW COUNT	OVM/OVA (PPM)	SAMPLE RECOVERY %	SAMPLE TYPE	SAMPLE NUMBER	COMMENTS
150									
155									
160									
165									
170									
175									
180									
185	Became gravelly								
190									

BORING DESIGNATION		PAGE NUMBER	FIGURE NUMBER
MW1	BORING LOG	5 OF 7	e

336128

PROJECT ▷ JACK 3014 | PROJECT NUMBER ▷ A901924A

DEPTH (FT)	LITHOLOGY: DESCRIPTION	LITHOLOGY: GRAPHIC	WELL	BLOW COUNT	OVM/OVA (PPM)	SAMPLE: RECOVERY %	SAMPLE: TYPE	SAMPLE: NUMBER	COMMENTS
190									
195									
200									
205									
210									
215									
220									
225									
230									

BORING DESIGNATION		PAGE NUMBER	FIGURE NUMBER
MW1	BORING LOG	6 OF 7	f

336128

PROJECT ▷ JACK 3014 | PROJECT NUMBER ▷ A901924A

DEPTH (FT)	LITHOLOGY DESCRIPTION	GRAPHIC	WELL	BLOW COUNT	OVM/OVA (PPM)	SAMPLE RECOVERY %	SAMPLE TYPE	SAMPLE NUMBER	COMMENTS
230									
235									
237	Gray, very moist, SILT (ML)								
240									
245									
250									
255									
260									
265	Boring terminated at approximately 265 feet								

BORING DESIGNATION		PAGE NUMBER	FIGURE NUMBER
MW1	BORING LOG	7 OF 7	g

APPLIED GEOSCIENCES INC.

5505 Morehouse Drive, Suite 230
South Sorrento Plaza
San Diego, CA 92121
(619) 558-0600
FAX (619) 558-7180

18S/2W/24

336128

8 August 1991
A901924A

Site Assessment and Mitigation
Environmental Health Services (HMMD)
P.O. Box 85261
San Diego, California 92138-5261

Attn:

SUBJECT: 30 DAY REPORT CONCERNING DRILLING AND CONSTRUCTION OF WELLS AT THE NORTHEAST CORNER OF INTERSTATE 805 AND PALM AVENUE, CHULA VISTA, CALIFORNIA

Dear :

Enclosed please find a copy of the Department of Water Resources Water Well Drillers Report. This information is requested as conditions of the well permit issued for the installation of one groundwater monitoring well at the site. Also enclosed are the boring log and site plot plan with the well location. A water sample has not been collected as of the date of this report. Laboratory results for the water sample will be forwarded at a later date.

If further information is needed, please feel free to contact me at (619) 558-0600.

Sincerely,
APPLIED GEOSCIENCES INC.

Craig L. Carlisle

Craig L. Carlisle
Senior Project Hydrogeologist

CC: File A901924A

√ *The free Adobe Reader may be used to view and complete this form. However, software must be purchased to complete, save, and reuse a saved form.

File Original with DWR 19S02W01

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0108070

Page 1 of 1

Owner's Well Number URS-MW07

Date Work Began 03/02/2010 Date Work Ended 3/3/2010

Local Permit Agency San Diego County Department of Environmental Health

Permit Number LMON106922 Permit Date 2/2/10

DWR Use Only – Do Not Fill In

State Well Number/Site Number

N Latitude W Longitude

APN/TRS/Other

Geologic Log

Orientation ◉ Vertical ○ Horizontal ○ Angle Specify ____

Drilling Method Hollow Stem Auger Drilling Fluid ____

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)
0	7	Yellowish brown, Silt with fine Sand (ML), moist
7	33	Gray, fine to coarse Sand (SW), moist

Total Depth of Boring 33 Feet

Total Depth of Completed Well 30 Feet

Well Owner

Well Location

Address 245 Calle Primera

City San Diego County San Diego

Latitude ____ Deg. ____ Min. ____ Sec. N Longitude ____ Deg. ____ Min. ____ Sec. W

Datum NAD83 Decimal Lat. 32.5514239 Decimal Long. -117.0469

APN Book ____ Page ____ Parcel 666-371-07-00

Township ____ Range ____ Section ____

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

SEE ATTACHED SITE PLAN FOR WELL LOCATIONS

West East

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

◉ New Well
○ Modification/Repair
○ Deepen
○ Other ____
○ Destroy
Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

○ Water Supply
☐ Domestic ☐ Public
☐ Irrigation ☐ Industrial
○ Cathodic Protection
○ Dewatering
○ Heat Exchange
○ Injection
◉ Monitoring
○ Remediation
○ Sparging
○ Test Well
○ Vapor Extraction
○ Other ____

Water Level and Yield of Completed Well

Depth to first water 15 (Feet below surface)

Depth to Static Water Level 15 (Feet) Date Measured 03/09/2010

Estimated Yield * ____ (GPM) Test Type ____

Test Length ____ (Hours) Total Drawdown ____ (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
0	10	10	Blank	PVC Sch. 40	0.25	4.5		
10	30	10	Screen	PVC Sch. 40	0.25	4.5	Milled Slots	0.010

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	3	Cement	Concrete
3	5	Bentonite	Cement/Bentonite
5	8	Bentonite	Chips
8	30	Filter Pack	#2/12 Sand
30	33	Fill	Native Soil

Attachments

☐ Geologic Log
☐ Well Construction Diagram
☐ Geophysical Log(s)
☐ Soil/Water Chemical Analyses
☑ Other Well Location Site Plan

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name WDC EXPLORATION & WELLS
Person, Firm or Corporation

5566 ARROW HIGHWAY MONTCLAIR CA 91763
Address City State Zip

Signed ____ 3/31/10 283326
C-57 Licensed Water Well Contractor Date Signed C-57 License Number

DWR 188 REV. 1/2006

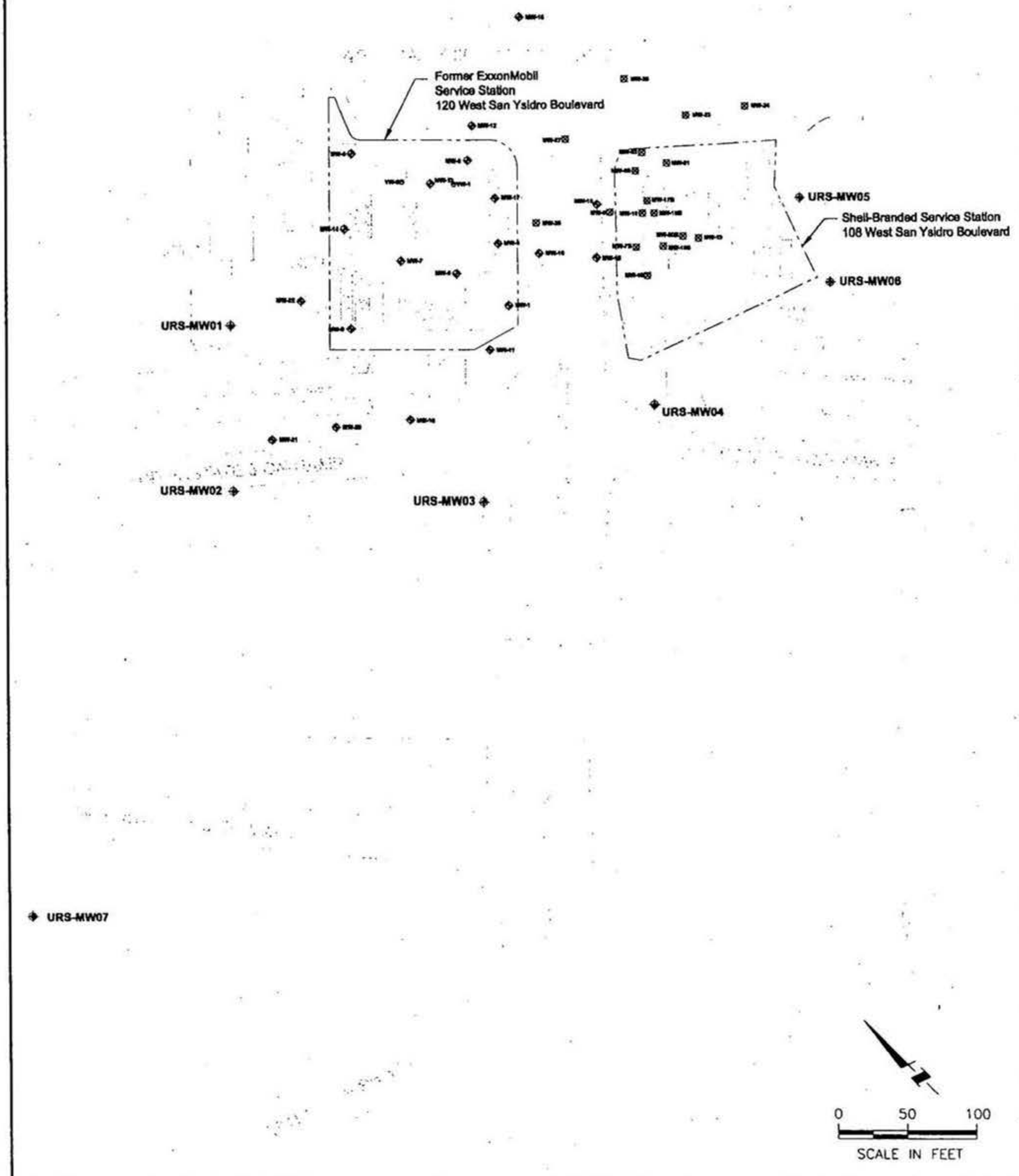
IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

04/05/10

e0108070

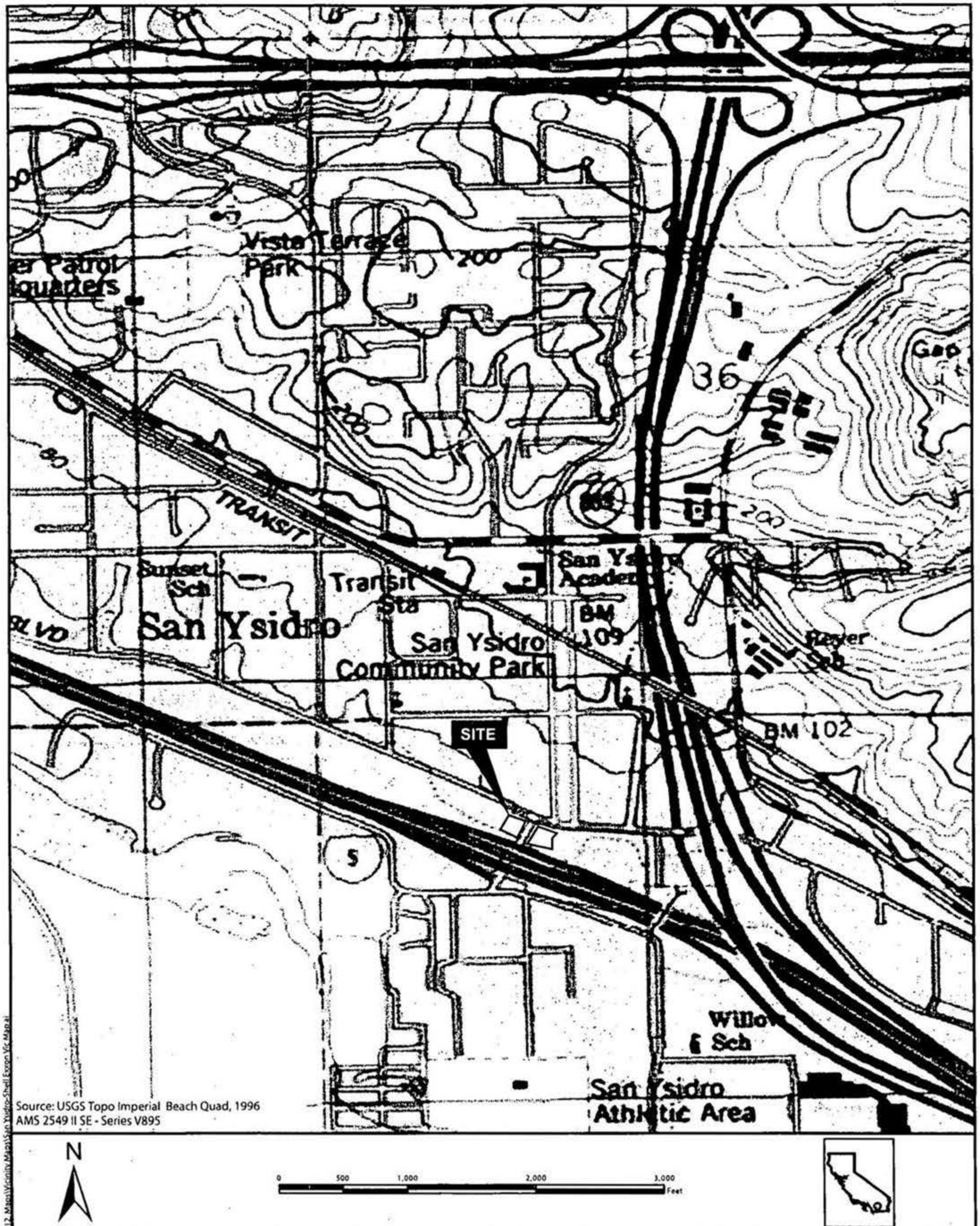
LEGEND

- Shell-Branded Service Station Groundwater Monitoring Well
- Former ExxonMobil Service Station Groundwater Monitoring Well
- Former ExxonMobil Service Station Vapor Extraction Well
- RELLC Groundwater Monitoring Well



URS	SITE PLAN Shell-Branded Service Station and Former ExxonMobil Service Station 108 and 120 West San Ysidro Boulevard San Diego, California	Figure 2

e0108070



VICINITY MAP

URS	Project No.: 15301786	Date: MAY 2009	Project: RELLC - SAN YSIDRO	Figure 1

State of California

Well Completion Report

Form DWR 188 Auto-Completed 2/25/2019
WCR2018-011811

Owner's Well Number: RC-18-001
Date Work Began: 11/27/2018
Date Work Ended: 11/28/2018
Local Permit Agency: County of San Diego DEH/LWQD Land Water and Quality Division, Monitoring Well Program
Secondary Permit Agency:
Permit Number: LMWP-003639
Permit Date: 09/20/2018

Well Owner (must remain confidential pursuant to Water Code 13752)

Name: XXXXXXXXXXXXXXXXXXXX
Mailing Address: XXXXXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXX
City: XXXXXXXXXXXXXXXXXXXX State: XX Zip: XXXXX

Planned Use and Activity

Activity: Drill and Destroy
Planned Use: Destruction

Well Location

Address:
City: Zip: County: San Diego
Latitude: 32 Deg. 33 Min. 54.5219 Sec. N
Longitude: -116 Deg. 57 Min. 1.6776 Sec. W
Dec. Lat.: 32.565145
Dec. Long.: -116.950466
Vertical Datum:
Horizontal Datum: WGS84
Location Accuracy:
Location Determination Method:
APN: 646-121-2900
Township: 18 S
Range: 01 W
Section: 35
Baseline Meridian: San Bernardino
Ground Surface Elevation:
Elevation Accuracy:
Elevation Determination Method:

Borehole Information

Orientation: Vertical
Specify:
Drilling Method: Direct Rotary
Drilling Fluid: Bentonite
Total Depth of Boring: 120.5 Feet
Total Depth of Completed Well: Feet

Water Level and Yield of Completed Well

Depth to first water: (Feet below surface)
Depth to Static Water Level: (Feet)
Date Measured:
Estimated Yield*: (GPM)
Test Type:
Test Length: (Hours)
Total Drawdown: (feet)
*May not be representative of a well's long term yield.

Geologic Log - Free Form

Depth from Surface Feet to Feet		Description
0	1	SILTY SAND (SM), brown, dry, fine
1	10	SEDIMENTARY ROCK (POORLY INDURATED CLAYSTONE), laminated, brown, slightly weathered, soft, unfractured, LEAN CLAY (CL), hard, brown, moist, medium plasticity, PP>4.0 tsf
10	17.5	SEDIMENTARY ROCK (POORLY INDURATED CLAYSTONE), fine-grained, massive, brown, soft, unfractured, SILTY SAND (SM) very dense, brown, moist, fine
17.5	28.5	SEDIMENTARY ROCK (SANDSTONE), moderately interbedded with CLAYSTONE; SANDSTONE: fine-grained, brown, moderately weathered, unfractured, CLAYSTONE: very thinly bedded, reddish brown, moderately weathered, moderately hard, slightly fractured
28.5	40	SEDIMENTARY ROCK (SANDSTONE), fine-grained, thickly bedded, brown, sightly weathered, moderately hard, unfractured, locally moderate cementation, locally thickly interbedded with moderate interbeds of CLAYSTONE, laminated, reddish brown, slightly weathered, moderately soft, unfractured.
40	45	SEDIMENTARY ROCK (CLAYSTONE), laminated, reddish brown, slightly weathered, moderately soft, unfractured
45	50	SEDIMENTARY ROCK (SILTSTONE), thickly bedded, brown, slightly weathered, moderately soft, unfractured
50	55	SEDIMENTARY ROCK (SANDSTONE), fine-grained, massive, brown, soft, slightly fractured.
55	68	SEDIMENTARY ROCK (CLAYSTONE), laminated, brown, slightly weathered, moderately hard, unfractured
68	74	SEDIMENTARY ROCK (SANDSTONE), fine-grained, very thickly bedded, reddish brown, soft, slightly fractured.
74	82	SEDIMENTARY ROCK (CLAYSTONE), laminated, reddish brown, slightly weathered, hard, slightly fractured
82	86	SEDIMENTARY ROCK (SANDSTONE), fine-grained, massive, brown, slightly weathered, soft, slightly fractured.

86	90	SEDIMENTARY ROCK (CLAYSTONE), laminated, brown, slightly weathered, moderately soft, unfractured
90	100	SEDIMENTARY ROCK (SANDSTONE), thickly interbedded with CLAYSTONE; SANDSTONE: fine-grained, brown, moderately weathered, unfractured, CLAYSTONE: very thinly bedded, reddish brown, moderately weathered, moderately soft, unfractured
100	106	SEDIMENTARY ROCK (CLAYSTONE), laminated, reddish brown, slightly weathered, hard, moderately fractured
106	111	SEDIMENTARY ROCK (SILTSTONE), moderately bedded, brown, slightly weathered, soft, unfractured
111	120.5	SEDIMENTARY ROCK (CLAYSTONE), laminated, reddish brown, slightly weathered, hard, slightly fractured

Casings

Casing #	Depth from Surface Feet to Feet		Casing Type	Material	Casings Specificatons	Wall Thickness (inches)	Outside Diameter (inches)	Screen Type	Slot Size if any (inches)	Description

Annular Material

Depth from Surface Feet to Feet		Fill	Fill Type Details	Filter Pack Size	Description

Destruction Details:
Boring backfilled using 80 gallons of grout using proportions of 6 gallons of water each #94 sack of cement.

Other Observations:

Borehole Specifications

Depth from Surface Feet to Feet		Borehole Diameter (inches)
0	120.5	4

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name FUGRO USA LAND INC
Person, Firm or Corporation

6100 HILLCROFT ST — Address
HOUSTON — City
TX — State
77081 — Zip

Signed *electronic signature received* — C-57 Licensed Water Well Contractor
12/26/2018 — Date Signed
909719 — C-57 License Number

DWR Use Only

CSG #	State Well Number	Site Code	Local Well Number

N
Latitude Deg/Min/Sec

W
Longitude Deg/Min/Sec

TRS:

APN:

DUPLICATE
File Original, Duplicate and Triplicate with the
DIVISION OF WATER RESOURCES
P. O. BOX 1079
SACRAMENTO 5, CALIFORNIA

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS

DIVISION OF WATER RESOURCES

37-2510

SHEET 1

Do Not Fill In
State Well No. 18S/1W 33K1
Other Well No.
Region 9

WATER WELL DRILLERS REPORT

(Sections 7076, 7077, 7078, Water Code)

441

(1) Driller:
Name San Diego Pump & Well Drillers
Address 145 Brightwood St.
Chula Vista, Calif.
License No. 85485 Classification C 57

16467

Owner:
Na
Ad

(2) Proposed use or uses (check):
Domestic ☐ Municipal ☐
Irrigation ☒ Industrial ☐
Domestic and Irrigation ☐ Test well ☐
Other

2

(3) Equipment used (check):
Rotary ☐
Cable ☒
Dug well ☐
Other

2

(4) Type of work (check):
New well ☒ Reconditioning of well ☐
Deepening existing well ☒

(5) Well log:
Total depth of well 870 ft.

Give details of formations penetrated, such as silt, peat, muck, sand, gravel, clay, shale, sandstone, hardpan, rock. Include size of gravel (diameter) and sand (fine, medium, coarse), color of material, structure (loose, packed, cemented, soft, hard, brittle).

Depth From Ground Surface	
660 ft. to 870 ft.	Clay, gray

CONFIDENTIAL - NOT FOR PUBLIC RELEASE

MICROFILMED

If additional space is required, continue on DWR Form No. 246—Supplement, and attach to respective report copies.

(6) Casing left in well:

LENGTH FT.	DIAMETER INCHES	SINGLE, DOUBLE, WELDED, OTHER	LBS. PER FOOT OR GAGE OF CASING	SEATING BELOW GROUND SURFACE, FT.
133	8x 6"	Welded X - K	12 lbs.	797

Type and size of shoe or well ring Welded joints—☒ Yes ☐ No
6" x 6" x 3/4"

1-75-6

D.W.R. FORM NO. 246

23971 3-50 40M QUIN SPO

DUPLICATE
File Original, Duplicate and Triplicate with the
DIVISION of WATER RESOURCES
P. O. BOX 1079
SACRAMENTO 5, CALIFORNIA

SHEET 2

WATER WELL DRILLERS REPORT

(Sections 7076, 7077, 7078, Water Code) 37-2510

Do Not Fill In
State Well No. 18S/1W 33K1
Other Well No. ....
Region 9

(7) Perforations:

Type of perforator used mills 2 38-20

Perforated 660 ft. to 780 ft. Hole size 3/8" x 2" No. of holes 180 2

CONFIDENTIAL - NOT FOR PUBLIC RELEASE

(8) Water levels:

Depth at which water first encountered .... ft.
Depth to water before perforating 440 ft.
Depth to water after perforating 440 ft.
Note any change in water level while drilling no

(9) Well pumping test:

Date of test .... By whom ....
Depth to water when test started .... ft.
G.P.M. at beginning of test ....
Drawdown from standing level .... ft.
G.P.M. at completion of test ....
Drawdown at completion of test .... ft.
Length of time tested ....
Temperature of water ....
Was gas present in water? ☐ Yes ☐ No

MICROFILMED

(10) General:

Was well gravel packed? no 2 Size of rock .... Thickness of pack ....
Was a surface sanitary seal provided? no 2
Were any strata sealed against pollution? ☐ Yes ☒ No If yes, attach detailed description. 2
Strata sealed ....
Was analysis made of water? ☐ Yes no No If yes, attach copy.
Was electric log made of well? ☐ Yes ☒ No If yes, attach copy.
If well abandoned, was it plugged and sealed? ....
Method of plugging and sealing ....

(11) Location:

North

1 MILE

Section No. 33
Township 18S
Range 1W
Base & Meridian SB
Show location of well in Section, thus (X)
Distances to section lines from well, N or S 2650 ft. and E or W 2500 ft.
Show location of nearest known well, thus (O)
Distance to nearest known well ½ Mi. East, Approx.

(12) Time of work:

Work started date 3-26-51 Completed date 6-2-51
Date of this report July 3, 1951

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

[SIGNED] San Diego Pump & Well Drillers
Well Driller

By [signature]

License No. 88485 Classification C 57

Dated July 3, 1951, 19....

23972 3-50 40M QUIN SPO

37-2510

FIELD CHECK OF WELL LOCATION

BRILLER S.D. [illegible].

CHECKED BY D. J. Levy.

OWNER ___.

DATE ________ 19___.

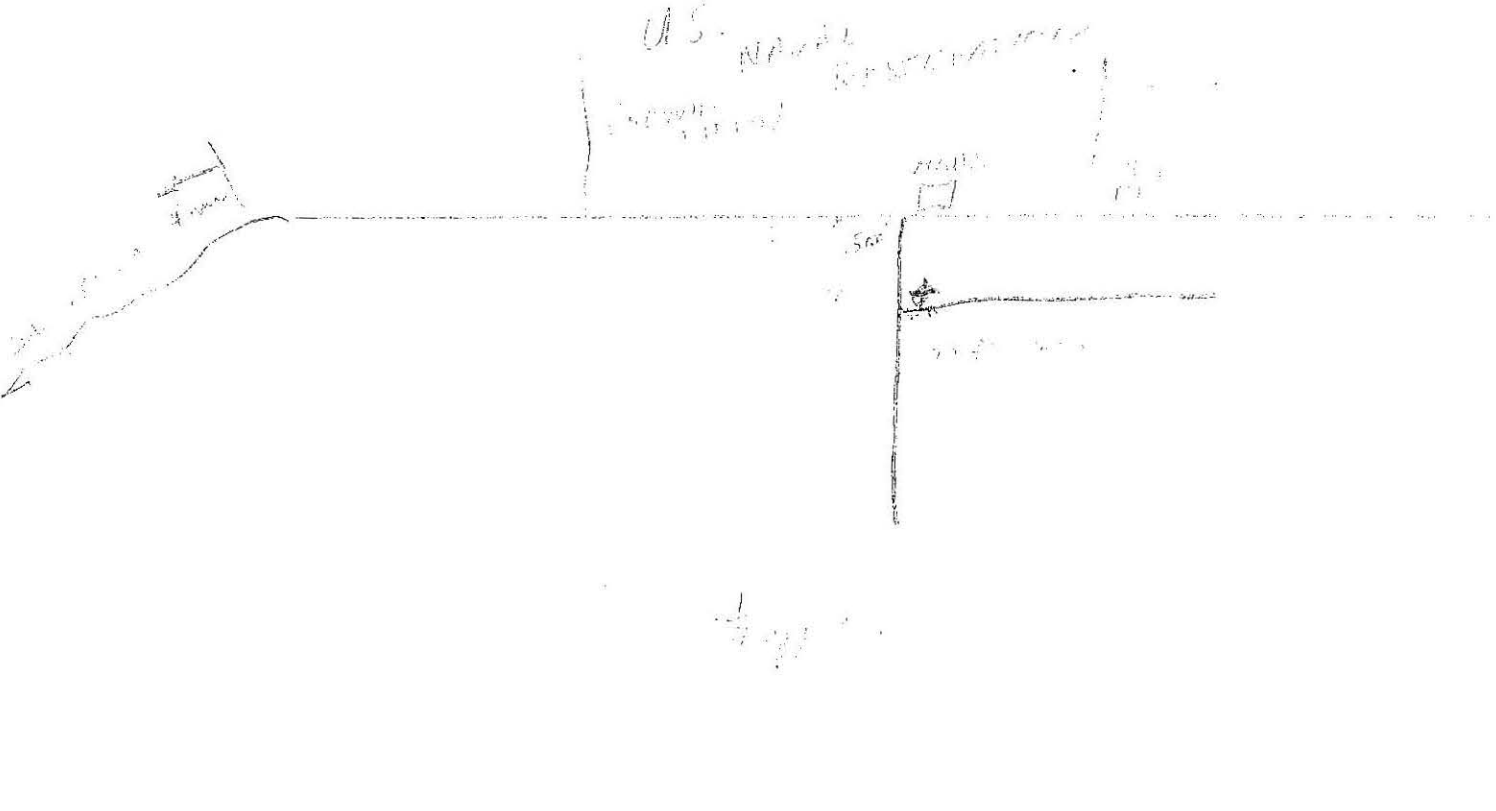
PUMP NO.____________.

METER NO.____________.

STATE WELL NO. 18S/1W.33K1

LOCATE WELL WITH REFERENCE TO ROADS AND ROAD INTERSECTIONS: ALSO INDICATE DISTANCES AND DIRECTIONS TO NEARBY CITIES OR TOWNS.

MICROFILMED



*The free Adobe Reader may be used to view and complete this form. However, software must be purchased to complete, save, and reuse a saved form.

File Original with DWR 18S 01W33

Page 1 of 1

Owner's Well Number MW-7

Date Work Began 01/13/2014 Date Work Ended 1/18/2014

Local Permit Agency County of San Diego

Permit Number LMWP 000820 Permit Date 1/6/14

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0201989

DWR Use Only – Do Not Fill In

State Well Number/Site Number

N Latitude W Longitude

APN/TRS/Other

Geologic Log

Orientation ⦿ Vertical O Horizontal O Angle Specify ____

Drilling Method Hollow Stem Auger Drilling Fluid ____

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)
		WELL DESTRUCTION
		Drill out 4" well to 31' and backfill with cement -
		bentonite grout.

Total Depth of Boring ____ Feet

Total Depth of Completed Well ____ Feet

Well Owner

Well Location

Address 1902 Cactus Road Landfill

City Otay Mesa County San Diego

Latitude ____ Deg. Min. Sec. N Longitude ____ Deg. Min. Sec. W

Datum ____ Dec. Lat. ____ Dec. Long. ____

APN Book 646 Page 100 Parcel 75-76

Township ____ Range ____ Section ____

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

West East

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

- O New Well
- O Modification/Repair
  - O Deepen
  - O Other ____
- ⦿ Destroy
  - Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

- O Water Supply
  - ☐ Domestic ☐ Public
  - ☐ Irrigation ☐ Industrial
- O Cathodic Protection
- O Dewatering
- O Heat Exchange
- O Injection
- O Monitoring
- O Remediation
- O Sparging
- O Test Well
- O Vapor Extraction
- O Other ____

Water Level and Yield of Completed Well

Depth to first water ____ (Feet below surface)

Depth to Static Water Level ____ (Feet) Date Measured ____

Estimated Yield * ____ (GPM) Test Type ____

Test Length ____ (Hours) Total Drawdown ____ (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	31	Bentonite	

Attachments

- ☐ Geologic Log
- ☐ Well Construction Diagram
- ☐ Geophysical Log(s)
- ☐ Soil/Water Chemical Analyses
- ☑ Other Site Map

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name National EWP, Inc
Person, Firm or Corporation

5566 Arrow Highway Montclair CA 91763
Address City State Zip

Signed for National EWP 2/18/14 953646
C-57 Licensed Water Well Contractor Date Signed C-57 License Number

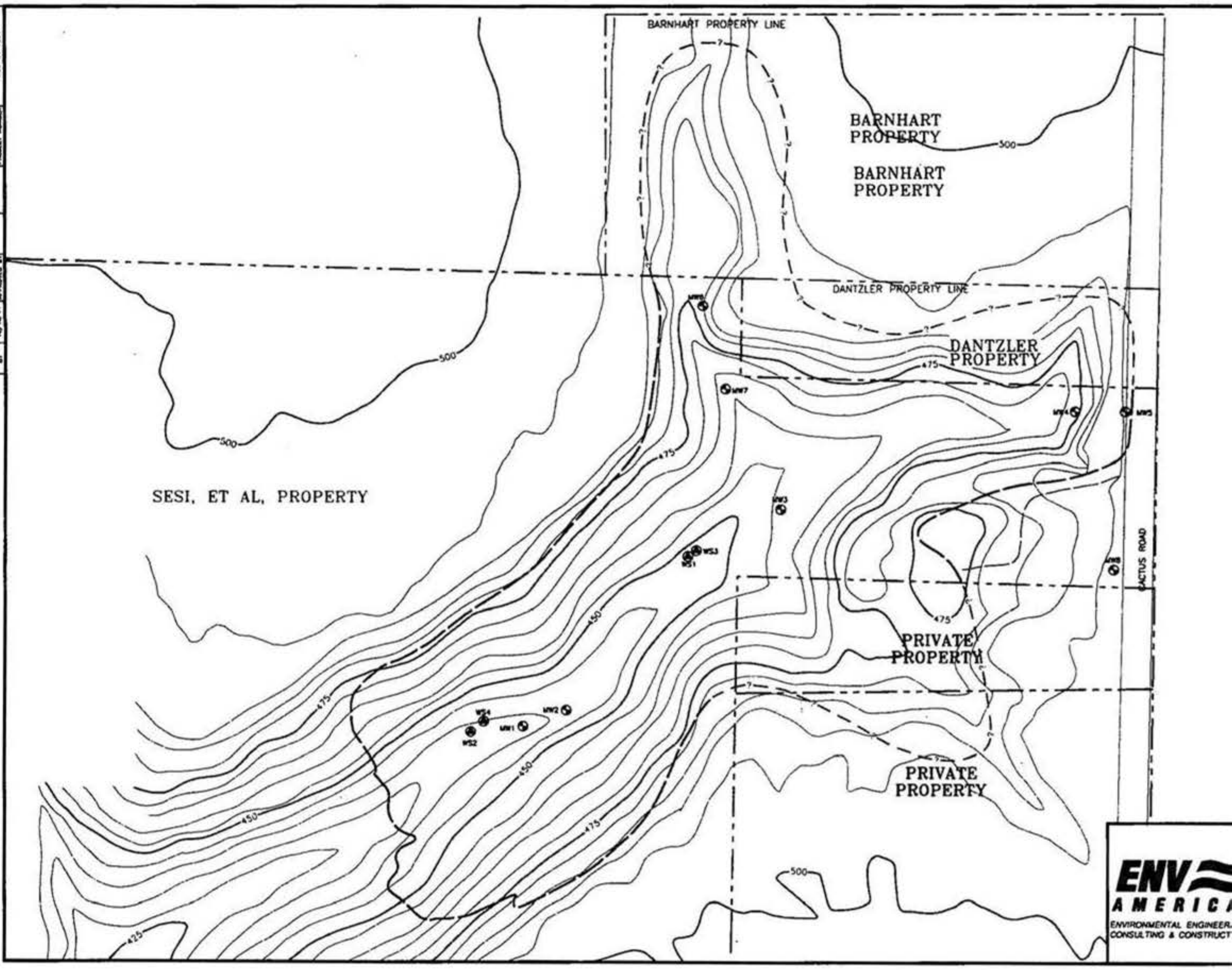
DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

RECEIVED

APR 25 2014

40003.567 OTAYMESA



Attachments

- ☐ Geologic Log
- ☐ Well Construction Diagram
- ☐ Geophysical Log(s)
- ☐ Soil/Water Chemical Analyses
- ☑ Other Site Map

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name National EWP, Inc
Person, Firm or Corporation

5566 Arrow Highway — Montclair — CA — 91763
Address — City — State — Zip

Signed Q for National EWP — 2/18/14 — 953646
C-57 Licensed Water Well Contractor — Date Signed — C-57 License Number

DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

RECEIVED

APR 25 2014

A0003.567 OTAYMESA

ORIGINAL
File with DWR

SEP 30 1977

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in
No. 00929

Notice of Intent No. ~~XXXXXX~~ 97018
Local Permit No. or Date
State Well No. 18S/2W-33N04
Other Well No.

CONFIDENTIAL
NOT FOR PUBLIC USE
WATER CODE SEC. 13752

(1) OWNER: Name [redacted]
Address
City

(2) LOCATION OF WELL (See instructions):
County San Diego Owner's Well Number
Well address if different from above San Ysidro
Township 18 Range 2W Section 33
Distance from cities, roads, railroads, fences, etc. San Ysidro, Ca.

X

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☒
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☐

(5) EQUIPMENT:
Rotary ☒ Reverse ☐
Cable ☐ Air ☒
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☐ Size #4 x #7
Diameter of bore 8-3/4"
Packed from to ft.

(7) CASING INSTALLED:
Steel ☒ Plastic ☒ Concrete ☐

(8) PERFORATIONS: 60 ft.
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	20	8-5/8od	.188			
0	150	5" liner		35	55	
				110	150	

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 20 ft.
Were strata sealed against pollution? Yes ☐ No ☒ Interval ft.
Method of sealing cement grout

(10) WATER LEVELS:
Depth of first water, if known ft.
Standing level after well completion 40 ft.

(11) WELL TESTS:
Was well test made? Yes ☒ No ☐ If yes, by whom? Rex Anderson
Type of test Pump ☐ Bailer ☐ Air lift ☒
Depth to water at start of test ft. At end of test ft
Discharge 75 gal/min after hours Water temperature unk
Chemical analysis made? Yes ☐ No ☒ If yes, by whom?
Was electric log made? Yes ☐ No ☒ If yes, attach copy to this report

(12) WELL LOG: Total depth 150 ft. Depth of completed well 150 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	14	Cobble stone
14	19	Silt and sand
19	48	Sand
48	68	Gravel
68	69	Cobble stone
69	80	Gravel
80	85	Sand
85	140	Gravel
140	150	Gravel and clay

Work started June 15, 1977 Completed June 29, 1977

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED Rex E. Anderson
(Well Driller)

NAME REX ANDERSON CORP.
(Person, firm, or corporation) (Typed or printed)
Address 10303 Channel Rd.
City Lakeside, Ca. Zip 92040
License No. A 305739 Date of this report July 19, 1977

*The free Adobe Reader may be used to view and complete this form. However, software must be purchased to complete, save, and reuse a saved form.

File Original with DWR 19S02W01

Page 1 of 1

Owner's Well Number URS-MW08

Date Work Began 05/11/2011 Date Work Ended 5/11/2011

Local Permit Agency San Diego County Department of Environmental Health

Permit Number LMON107780 Permit Date 5/3/11

State of California

Well Completion Report

Refer to Instruction Pamphlet

No. e0131746

DWR Use Only – Do Not Fill In

State Well Number/Site Number

N W

Latitude Longitude

APN/TRS/Other

Geologic Log

Orientation ⦿ Vertical ○ Horizontal ○ Angle Specify

Drilling Method Hollow Stem Auger Drilling Fluid

Depth from Surface Feet	to Feet	Description (Describe material, grain size, color, etc)
0	1	Asphalt
1	4	Brown, Silty fine SAND (SM), moist, trace gravel
		clay
4	11	Light olive brown, fine to medium SAND (SP)
		medium dense, moist, trace coarse sand, trace silt
11	15	Dark yellowish brown, SILT (ML), very stiff, moist
		trace fine sand, trace fine to coarse gravel
15	20	Becomes very dark grayish brown, hard,
		trace clay, trace mica
20	21	Becomes dark grayish brown, silt with fine sand,
		very stiff, abundant mica
21	24	Dark grayish brown, Lean CLAY (CL), very stiff,
		moist, trace silt, trace mica
24	26	Grayish brown, fine to medium SAND (SP), dense
		moist, trace coarse sand, trace silt
26	29	Light brownish gray, SAND (SW), dense, moist
		trace silt
29	31	Grayish brown, medium SAND (SP), dense, wet,
		trace fine sand, trace silt
31	38	Dark grayish brown, Fat CLAY (CH), hard, wet,
		trace mica, trace cobbles
38	40	Dark grayish brown, Silty fine SAND (SM), dense
		wet, trace medium sand, abundant mica
40	42	Light yellowish brown, SAND (SW), dense, wet
		trace silt, trace fine and coarse gravel

Total Depth of Boring 42 Feet

Total Depth of Completed Well 39 Feet

Well Owner

Well Location

Address 104 W. San Ysidro Blvd.

City San Diego County San Diego

Latitude ___ Deg. Min. Sec. N Longitude ___ Deg. Min. Sec. W

Datum NAD83 Decimal Lat. 32.5520237 Decimal Long. -117.0439

APN Book ____ Page ____ Parcel 666-380-28-00

Township ____ Range ____ Section ____

Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

SEE ATTACHED SITE PLAN FOR WELL LOCATIONS

West East

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

Activity

⦿ New Well

○ Modification/Repair

○ Deepen

○ Other

○ Destroy

Describe procedures and materials under "GEOLOGIC LOG"

Planned Uses

○ Water Supply

☐ Domestic ☐ Public

☐ Irrigation ☐ Industrial

○ Cathodic Protection

○ Dewatering

○ Heat Exchange

○ Injection

⦿ Monitoring

○ Remediation

○ Sparging

○ Test Well

○ Vapor Extraction

○ Other

Water Level and Yield of Completed Well

Depth to first water 30 (Feet below surface)

Depth to Static Water Level 26 (Feet) Date Measured 05/23/2011

Estimated Yield * ____ (GPM) Test Type ____

Test Length ____ (Hours) Total Drawdown ____ (Feet)

*May not be representative of a well's long term yield.

Casings

Depth from Surface Feet	to Feet	Borehole Diameter (Inches)	Type	Material	Wall Thickness (Inches)	Outside Diameter (Inches)	Screen Type	Slot Size if Any (Inches)
0	19	10	Blank	PVC Sch. 40	0.25	4.5		
19	39	10	Screen	PVC Sch. 40	0.25	4.5	Milled Slots	0.010

Annular Material

Depth from Surface Feet	to Feet	Fill	Description
0	3	Cement	Concrete
3	14	Bentonite	Bentonite Grout
14	17	Bentonite	Chips
17	42	Filter Pack	#2/12 Sand

Attachments

☐ Geologic Log

☐ Well Construction Diagram

☐ Geophysical Log(s)

☐ Soil/Water Chemical Analyses

☑ Other Well Location Site Plan

Attach additional information, if it exists.

Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name WDC Exploration & Wells

Person, Firm or Corporation

5566 ARROW HWY. MONTCLAIR CA 91763

Address City State Zip

Signed [signature] for WDC 6/17/11 283326

C-57 Licensed Water Well Contractor Date Signed C-57 License Number

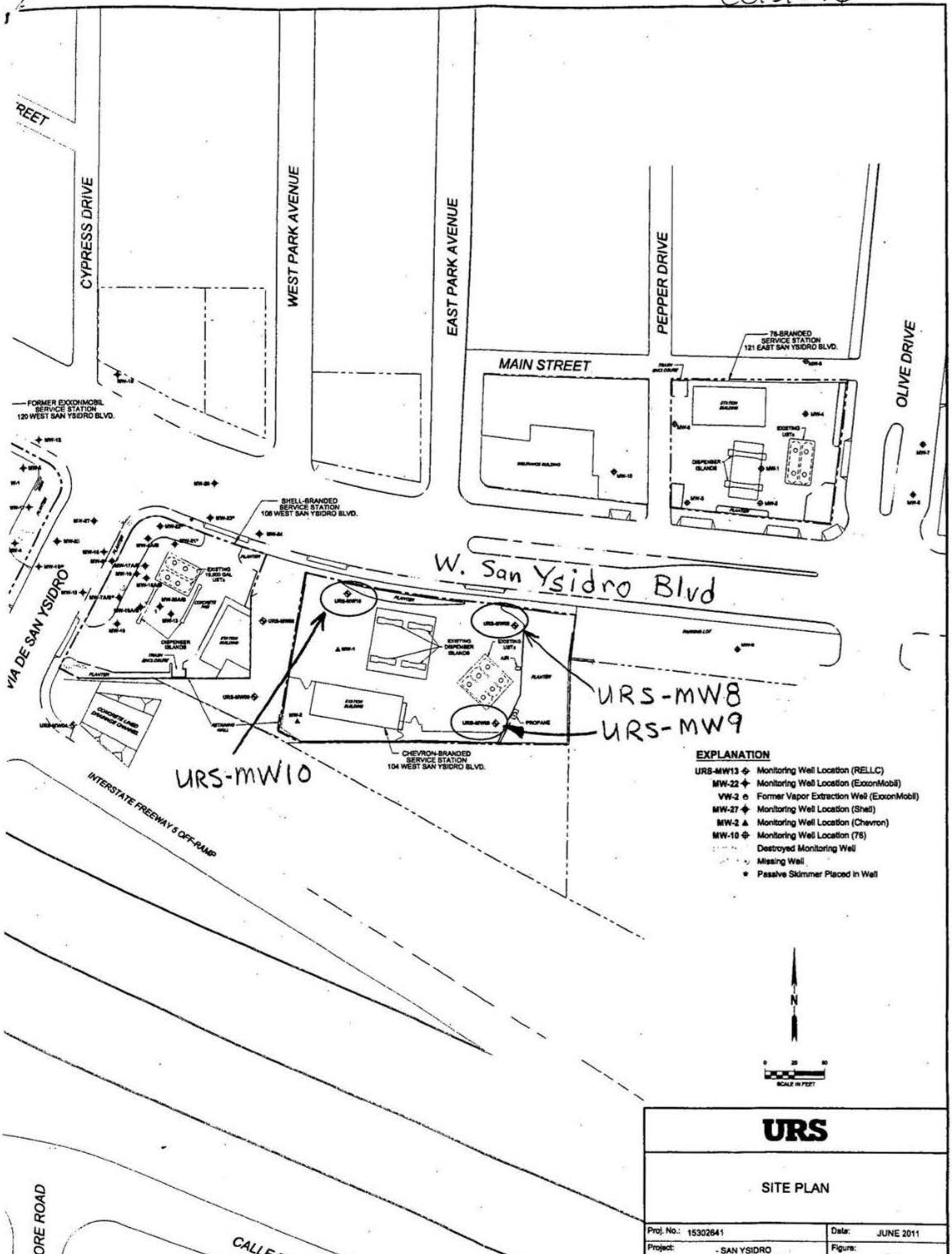
DWR 188 REV. 1/2006

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

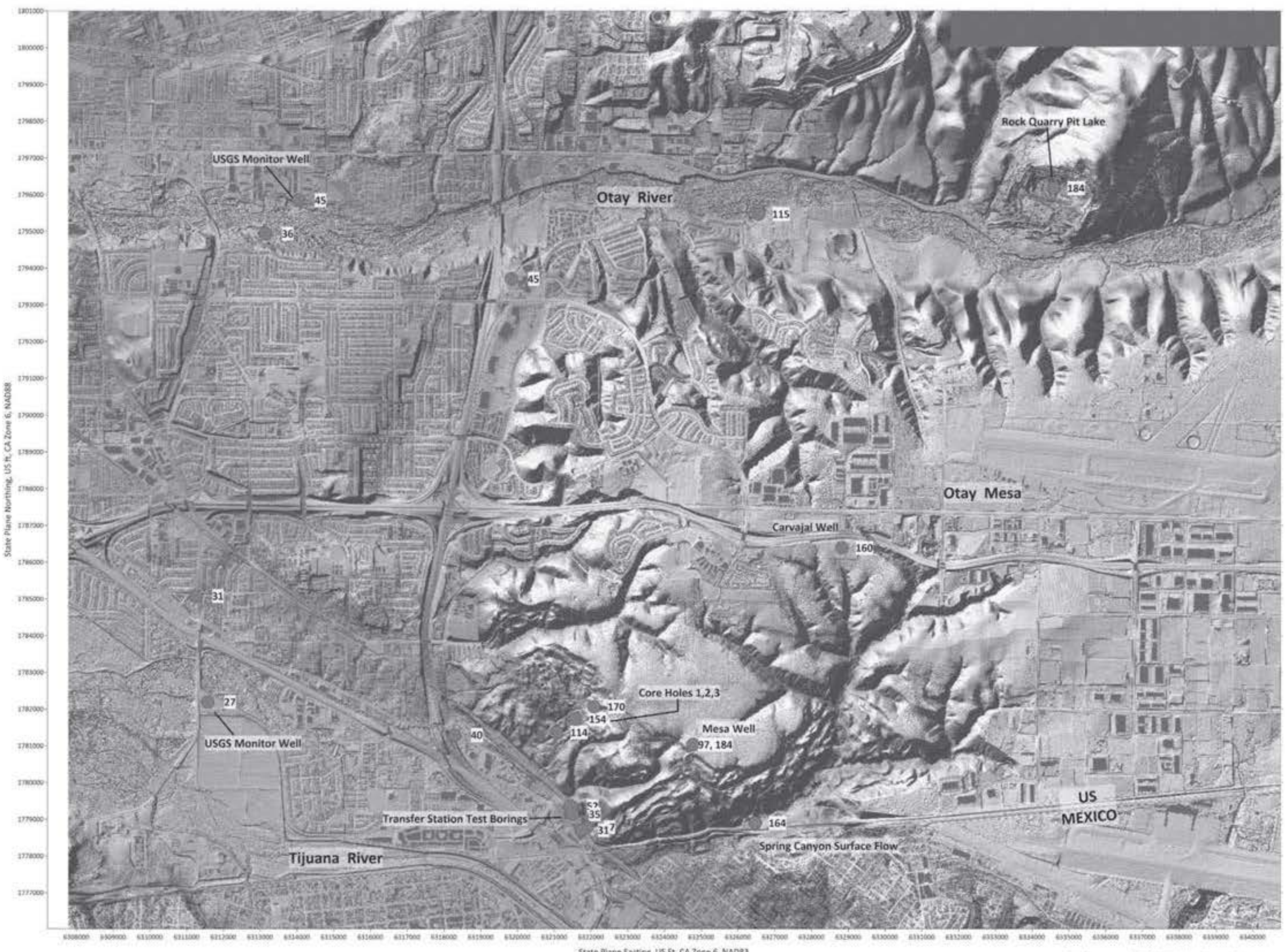
2313534 SAN YSIDRO

06/27/11

e0131746



CYPRESS DRIVE
WEST PARK AVENUE
EAST PARK AVENUE
PEPPER DRIVE
OLIVE DRIVE
MAIN STREET
78-BRANDED SERVICE STATION 121 EAST SAN YSIDRO BLVD.
FORMER EXXONMOBIL SERVICE STATION 120 WEST SAN YSIDRO BLVD.
SHELL-BRANDED SERVICE STATION 108 WEST SAN YSIDRO BLVD.
W. San Ysidro Blvd
VIA DE SAN YSIDRO
EXISTING DISPENSER ISLANDS
EXISTING USTs
PROPANE
URS-MW8
URS-MW9
URS-mW10
CHEVRON-BRANDED SERVICE STATION 104 WEST SAN YSIDRO BLVD.
INTERSTATE FREEWAY 5 OFF-RAMP
CALLE PRIMER
AMORE ROAD
EXPLANATION
URS-MW13 Monitoring Well Location (RELLC)
MW-22 Monitoring Well Location (ExxonMobil)
VW-2 Former Vapor Extraction Well (ExxonMobil)
MW-27 Monitoring Well Location (Shell)
MW-2 Monitoring Well Location (Chevron)
MW-10 Monitoring Well Location (76)
Destroyed Monitoring Well
Missing Well
Passive Skimmer Placed in Well
N
SCALE IN FEET
URS
SITE PLAN
Proj. No.: 15302641
Date: JUNE 2011
Project: - SAN YSIDRO
EGO, CALIFORNIA
Figure: 2



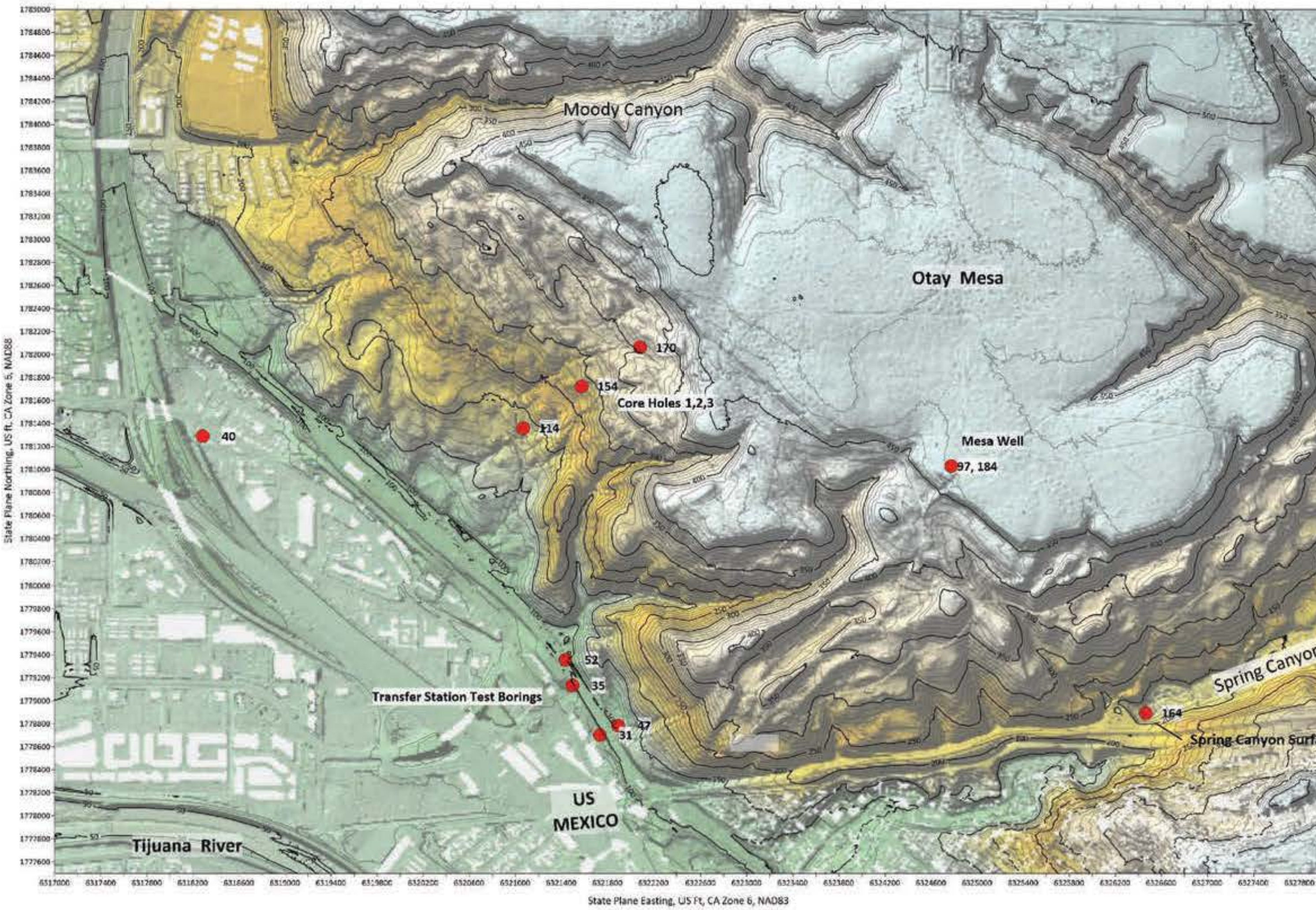
Base Map Image is USGS 2014 Lidar, Ground Return, Obtained from NOAA Digital Coast

42 Groundwater Observation Point, Consisting of Wells and Surface Water Exposures. Approximate Groundwater Elevation, NAVD88 Shown at Right.

Data Sources:

- CA DWR Well Completion Reports, 1951 - Present
- Examination of Historical and Current Aerial Photography
- USGS Multiple Completion Monitor Wells at Boundary Waters and Otay River
- Geocon, Inc. 2000 Geotechnical Report for Intermodal Transfer Station
- Geocon, Inc. Boring Logs and Test Data for Southwest Village Investigation

PLATE 1
Map Summarizing Groundwater Observation Points for Estimating Groundwater Conditions Affecting Southwest Village Area, Otay Mesa



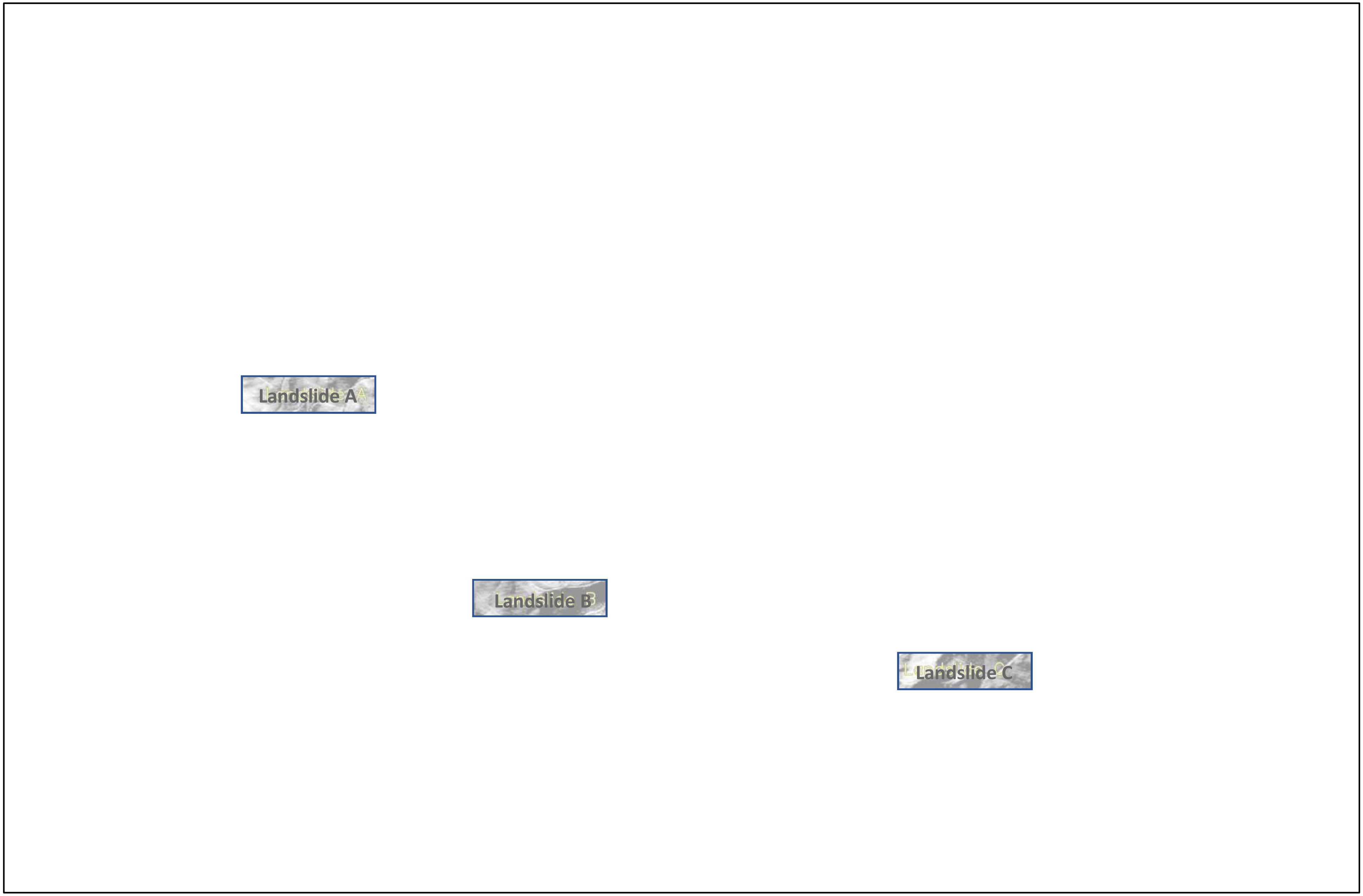
42 Groundwater Observation Point, Consisting of Wells and Surface Water Exposures. Approximate Groundwater Elevation, NAVD88 Shown at Right.

Base Map Image is USGS 2014 Lidar, Ground Return, Obtained from NOAA Digital Coast. Elevations are NAVD88

Data Sources:

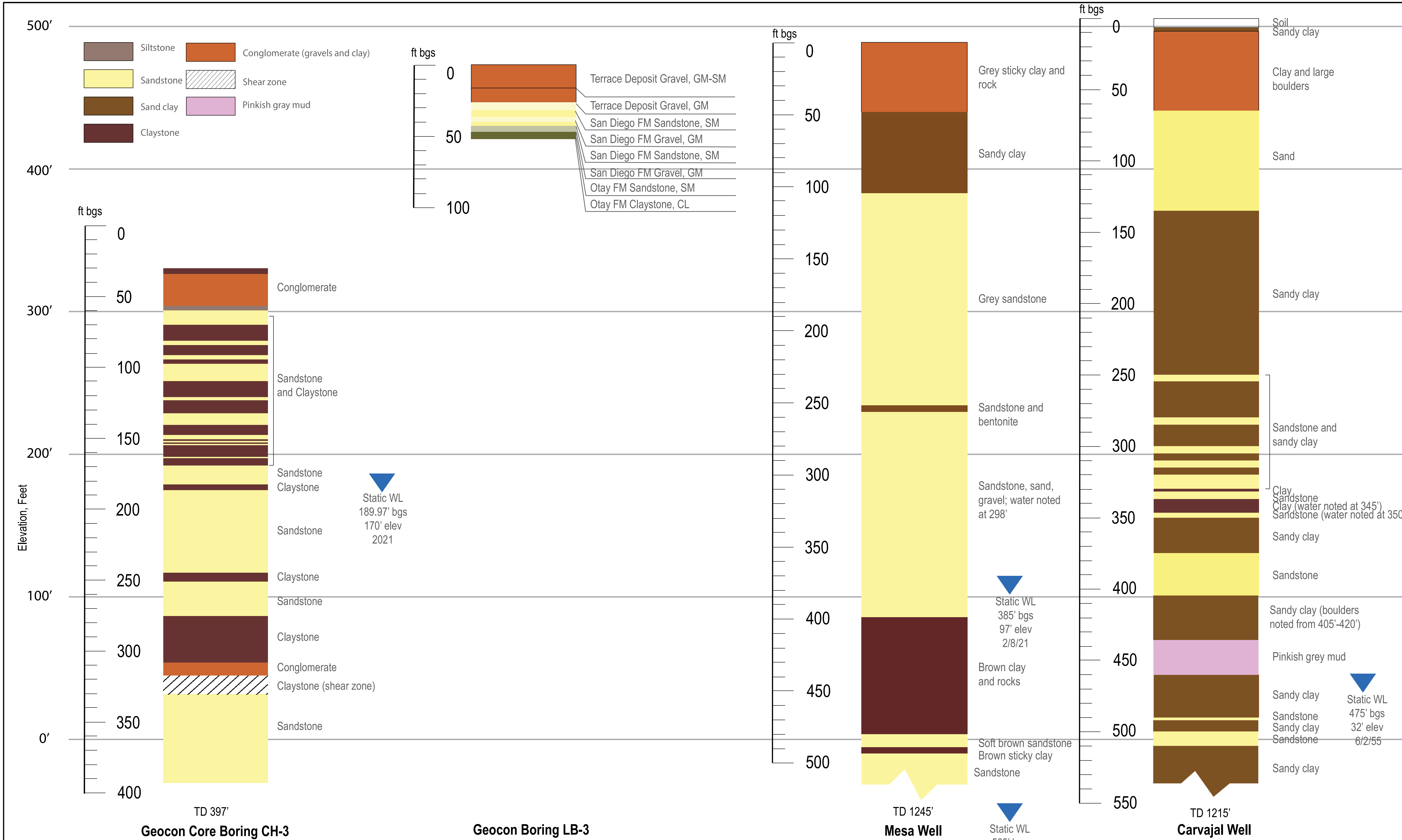
- CA DWR Well Completion Reports, 1951 - Present
- Examination of Historical and Current Aerial Photography
- USGS Multiple Completion Monitor Wells at Boundary Waters and Otay River
- Geocon, Inc. 2000 Geotechnical Report for Intermodal Transfer Station
- Geocon, Inc. Boring Logs and Test Data for Southwest Village Investigation

PLATE 2
Map Summarizing Available Groundwater Observation Points Within and Closest To Landslide Areas for Estimating Groundwater Conditions Affecting Slope Stability, Southwest Village Area, Otay Mesa



NOTE:
Figure adapted from Geocon Inc Illustration
Blue artwork is proposed village development
And access road.

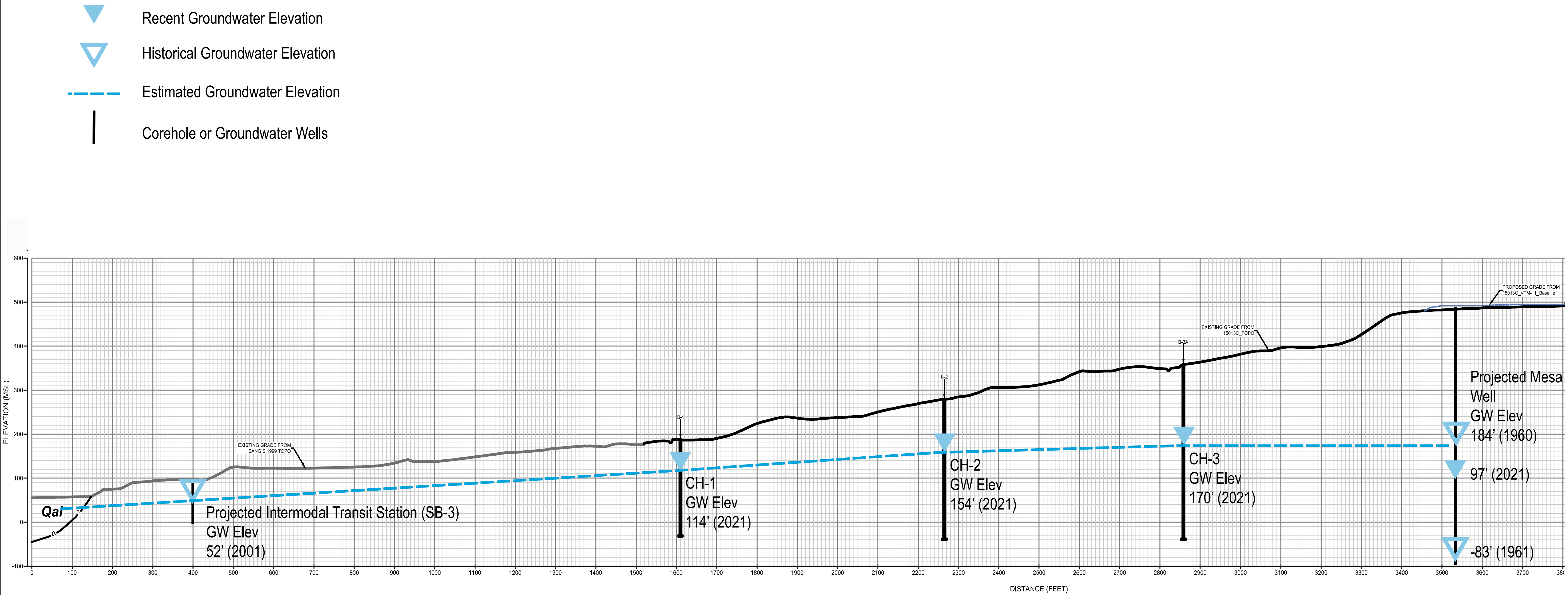
FIGURE 1
Location Map
Southwest Village



Note: Dark brown colors indicate clay bearing lithology
Figure shows generalized geology
Elevation Datum NAVD88

Figure 2
Otay Mesa Geotech Boring and Water Wells

FIGURE 3
Pleistocene Sea Level Curve
And Ocean Core Paleo
Environment Analysis



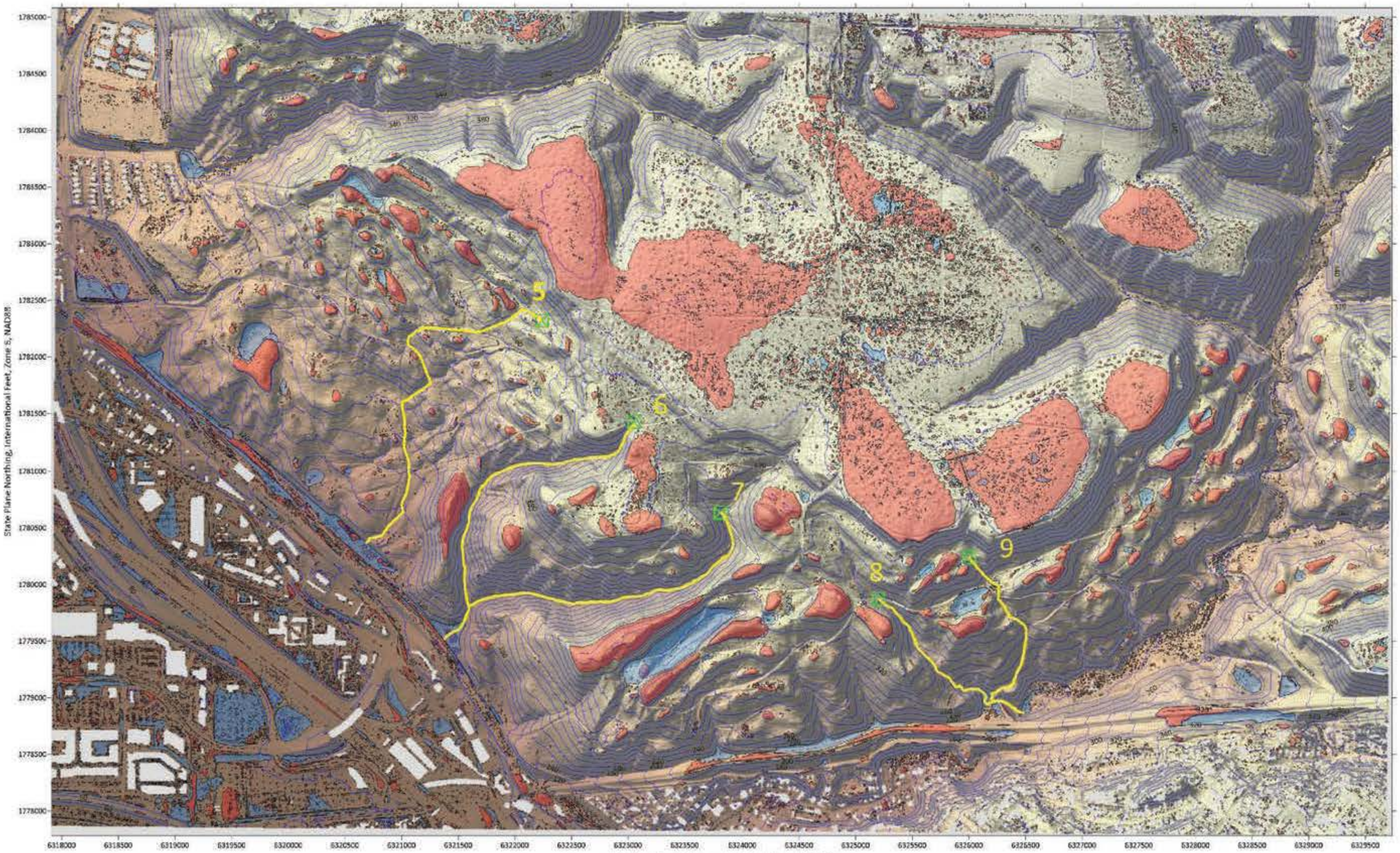
Groundwater cross section through Geocon Landslide A
Figure adapted from Draft Geocon cross section
Groundwater elevations shown for borings are NAVD88

SOURCE: Geocon

FIGURE 4

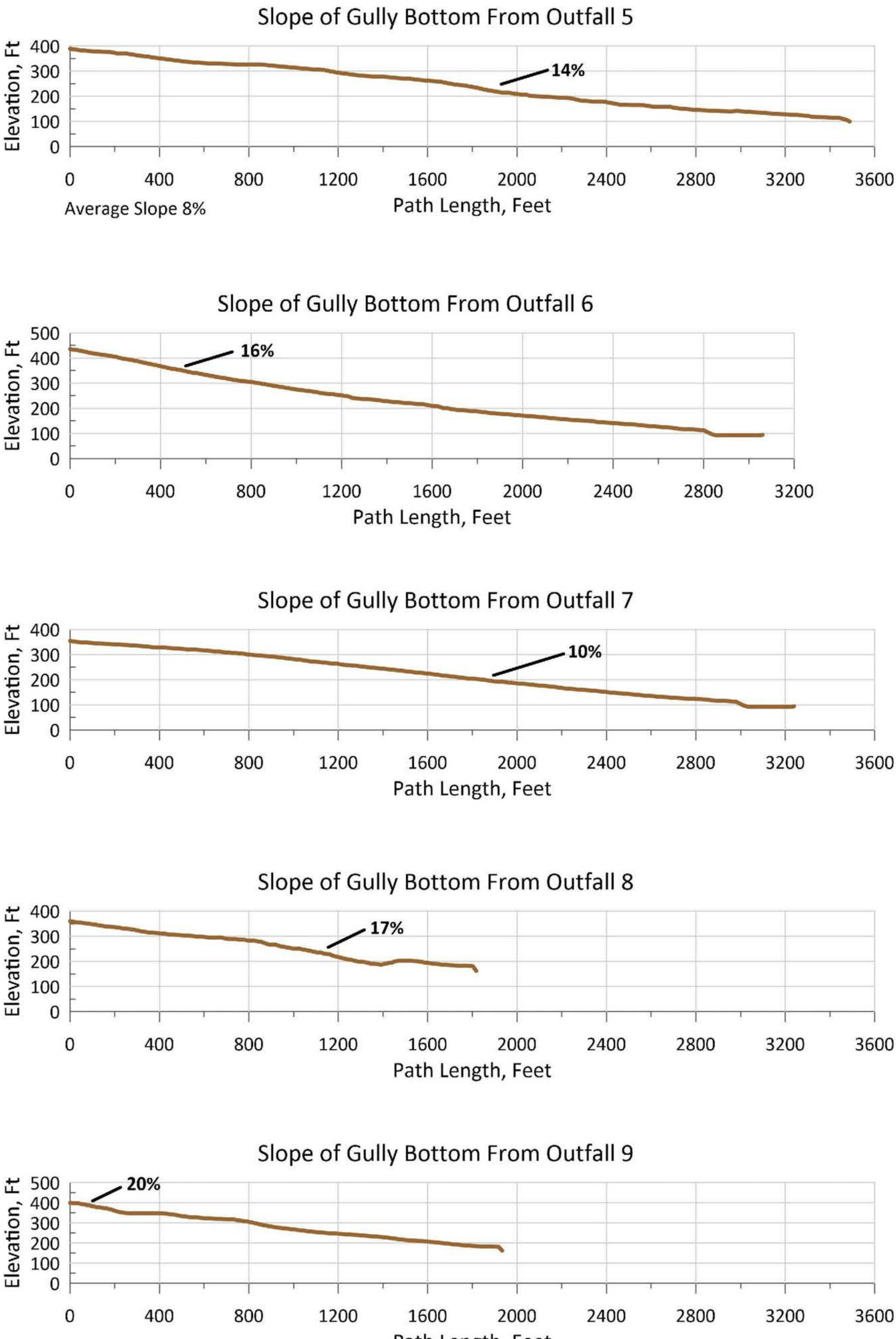
Groundwater Elevation Cross Section

USGS 2014 Lidar, 2 Foot Contours



NOTES: Blue Topo Shading Indicates Closed Contour Depression
Salmon Topo Shading Indicates Closed Contour Hilltops
Yellow Lines are Outfall Flowpaths

FIGURE 5
Stormwater Outfalls and Outfall Flow Paths

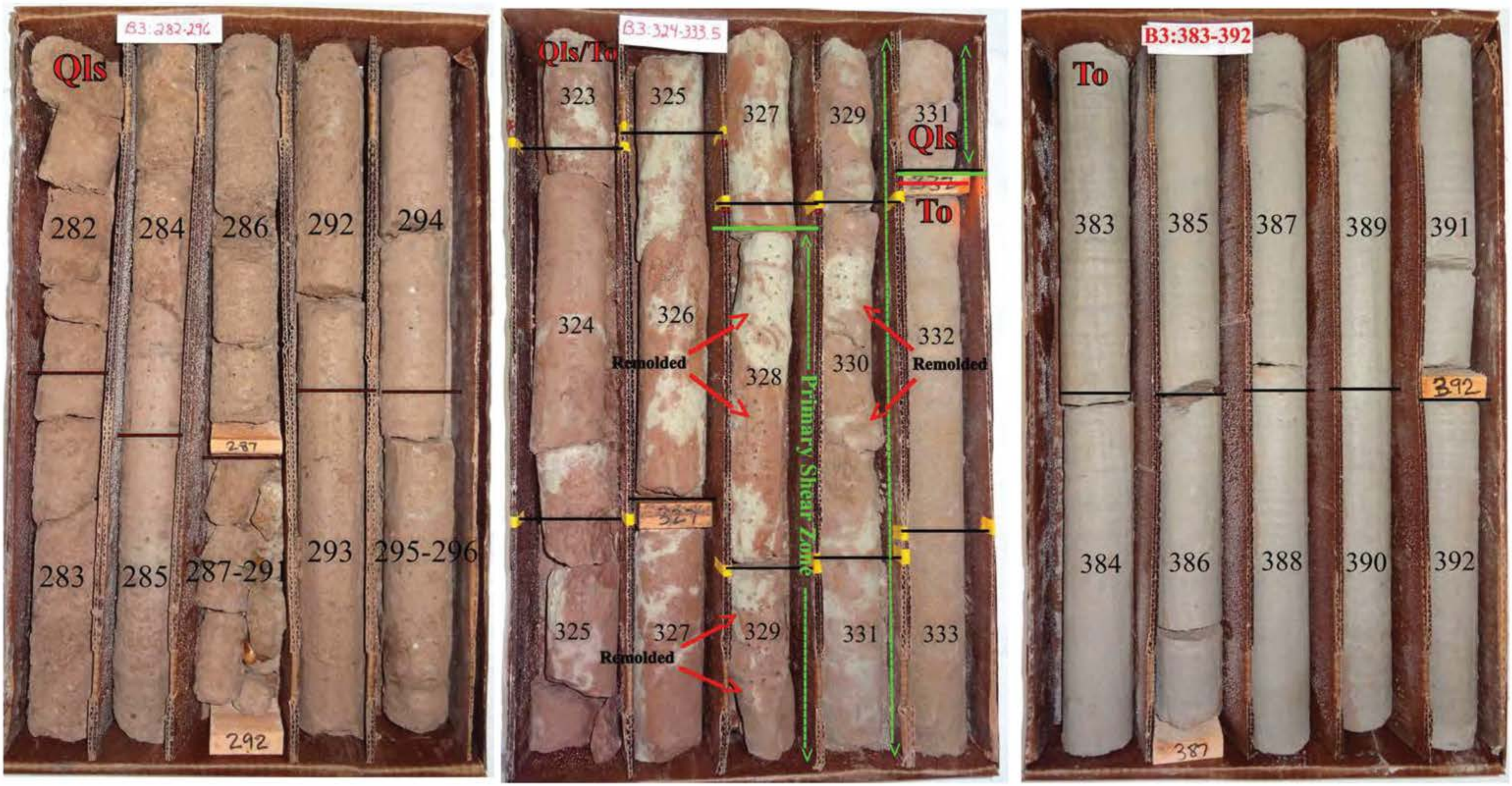


NOTES:
Elevation profiles digitized from 2 foot contour map of USGS/San Diego County 2014 Lidar data downloaded from NOAA Digital Coast access server.

Gully plan view shapes meander; section data shown is calculated path length unfolded into plane. Steepest portion of each outfall gully slope identified.

FIGURE 6
Drainage Bottom Profiles Leaving Proposed Outfalls 5,6,7,8,9 Southwest Village

Claystone (282' - 396' bgs) Sandstone (324' - 333.5' bgs) Sandstone (382' - 392' bgs)



Note: Photographs by Geocon

Figure 7
Lithology photographs of Borehole CB-3

APPENDIX F

APPENDIX F

GROUNDWATER EVALUATION BY RICK ENGINEERING

FOR

SOUTHWEST VILLAGE VTM-1
SAN DIEGO, CALIFORNIA

PROJECT NO. 06847-42-04

April 16, 2021

City of San Diego
Development Services
101 Ash Street
San Diego, California 92101

SUBJECT: LANDSLIDE HYDROLOGY ANALYSIS FOR SOUTWEST VILLAGE
(RICK ENGINEERING COMPANY JOB NUMBER 15013-C)

1. Introduction

This letter report presents the existing and proposed hydrology associated with the landslide area adjacent to the Otay Mesa Southwest Village project area. The Southwest Village project is a smaller portion of the overall community of Otay Mesa. Specifically, the project boundary is generally located south of State Route 905, east of Interstate 805, north of US-Mexico border, and immediately west of the northerly branch of Spring Canyon Creek. Refer to the Vicinity Map in Attachment 1 as well as the drainage study maps included in Map Pockets 1 and 2 for the limits of the area analyzed.

2. Drainage Characteristics

In the existing condition, Basins 400, flows in a westerly direction to a collection point east of the existing railroad. Basin 500 and 700, drain in a southwesterly direction where they confluence before flowing to a collection point along the eastern edge of the existing railroad. From these locations, runoff is conveyed in an existing storm drain system (pipes and channels) to the Tijuana River by the border line with Mexico. Runoff from Basins 800 and 900 drain to the south and confluence in Spring Canyon Creek. Runoff is conveyed south within Spring Canyon Creek towards an existing culvert at the Spring Canyon concentration point along the border with Mexico. Based upon the available information, it is assumed that the runoff is conveyed via a system of storm drain and open channels to a concrete lined reach of the Tijuana River on the Mexican side of the border.

Throughout the landslide area there are several existing sump locations where it is anticipated that storm water will collect and infiltrate into the native soil or evaporate over time. The area analyzed also includes existing shallow sump locations, notably in Basins 800 and 900, where it is anticipated that in larger storm events, storm water will weir over the edge of the low point and flow out to collection points along the border with Mexico by Spring Canyon Creek. Please refer to Map Pocket 1 for the existing condition drainage map.

The post-project drainage conditions will remain largely similar to those in the existing condition. However, drainage improvements are being proposed throughout the development area. Storm drain outfalls will be extended as far as practicable towards the bottom of mesa and located adjacent to established existing channels. Underground storage is proposed to detain peak flow rates back to existing conditions for the 50 and 100-year storm event. Additionally, the drainage area flowing into Mexico at the Spring Canyon concentration point and will need to comply with the US/Mexico International flood control detention requirements (i.e. – 5, 10, 25, 50, & 100-year storm events). Please refer to Map Pocket 2 for the proposed condition drainage map.

3. Hydrology Methodology and Results

This study considers peak flow rates in the existing and proposed project condition and a summary is provided in Table 1 below. Weighted Runoff Coefficients and Time of Concentration were calculated based on guidance from the City of San Diego Drainage Design Manual, dated January 2017. The Rational Method computer program developed by Advanced Engineering Software (AES 2014) was used for this study.

Table 1: Existing and Proposed Hydrology (AES)

Drainage Basin #	Drainage Node # at Point of Interest	Project Condition	Tributary Area, A (acres)	Time of Concentration, T_c (minutes)	100-year Flow Rates, Q_{100} (cfs [1])	Change in Area (ac)	% Change in Peak Discharge (Pre to Post Detained)
400	499	Pre-project	188.9	15.4	244.1	-8.7	-32%
	499	Post-project	180.2	14.9	243.8		
	499	Post-Detained	180.2	27.8	165.1		
500 & 700	799	Pre-project	176.3	22.9	184.5	-3.9	-1%
	799	Post-project	172.4	10.9	312.4		
	799	Post-Detained	172.4	22.2[2]	181.9[3]		
800 & 900	999	Pre-project	83.5	16.7	103.8	+1.4	-16%
	999	Post-project	84.9	12.0	141.4		
	999	Post-Detained	84.9	22.9[2]	86.8[3]		

Notes:

1. Rainfall intensities for AES Rational Method analysis were calculated using the City of San Diego's 2017 Drainage Design Manual
2. Detailed detention analysis for basins that are not a part of the Vesting Tentative Map (VTM) (Basin 700, 800, & 900) has yet to be completed. For the purpose of this analysis the Time of Concertation was approximated by using detention analysis done on the adjacent Basins within the VTM (Basin 400 & 500). Peak flow rate for detention was based on the pre-project peak flow rates for the 100-year event.
3. For basins not a part of the VTM ((Basin 700, 800, & 900) percent imperviousness was conservatively assumed to be 85% impervious based on the proposed land use in the Specific Plan.

A summary of the average annual volume at key locations throughout the landslide area has also been quantified. The locations analyzed are at the upstream edge of the landslide buffer, the proposed storm drain outfall locations, and at the collection point either adjacent to the railroad for Basins 400, 500, and 700 or adjacent to the border with Mexico for Basins 800 and 900. A continuous simulation model using EPA SWMM v5 for each of the basins has been completed to determine the average annual volume of precipitation, runoff, and infiltration. Due to potential issues with the Lower Otay Reservoir rain gauge, the Lindberg Field rain gauge was used for this analysis. The time series for the rain gauges dates from October 17, 1948 to December 31, 2005. Parameters used within the EPA SWMM models will be consistent with guidance provided in the October 2018 City of San Diego Storm Water Standards Manual Appendix G. Please refer to Table 2 for a summary of precipitation, runoff, and infiltration.

Table 2: Existing and Proposed Average Annual Volume (SWMM)

Drainage Basin #	Drainage Node # at Point of Interest	Project Condition	Precipitation (ac-ft)	Runoff (ac-ft)	Infiltration (ac-ft)	% Change in Runoff	% Change in Infiltration
400	499	Pre-project	149.9	30.7	120.5	0.4%	-7%
	499	Post-project	144.4	30.8	111.6		
500 & 700	799	Pre-project	139.9	25.6	113.7	60%	-22%
	799	Post-project	136.9	40.9	88.4		
800 & 900	999	Pre-project	66.3	13.3	53.4	30%	-14%
	999	Post-project	67.4	17.3	45.9		

Notes:

1. The average annual rain fall was calculated to be 9.53-inches based on annual averages calculated in EPA SWMM using the Lindberg Field rain gauge
2. The Lindberg Field rain gauge was used for this analysis. The time series for this rain gauges dates from October 17, 1948 to December 31, 2005.

Table 2 shows that in the post project condition, average annual runoff volumes have increased. This is due to the development associated with the Southwest Village project site and the addition of impervious area. The increased impervious area and compacted fill soils with reduced conductivity result in a high runoff volume. This increase in runoff volume makes sense as flows are conveyed through the landslide area and are collected at points adjacent to the railroad or next to the border with Mexico. Because of the increase in impervious area due to the development of the project site and the decrease in conductivity of the compacted fill, Table 2 also shows a decrease in the average annual infiltration. The increase in runoff and the decrease in infiltration overall results in less storm water being infiltrated into the landslide area.

4. Irrigation – Estimate Total Water Use

Review was limited to the estimated landscape irrigation water use (potable water systems) as they relate to portions of irrigation to be utilized by residential and common area landscapes areas within the basin area footprint(s). Evaluation utilized a standard in the industry formula associated with this type of analysis, that being the Estimated Total Water Use (ETWU) found in the City of San Diego Landscape Standards of the Development Manual (Section 2.6) and City of San Diego Municipal code, Chapter 14, Division 4: Landscape Regulations 142.0413(d)(2). Assessment will be based on typical landscape irrigation requirements associated with various plant types, Evapotranspiration (ETo), irrigation system, and component efficiency and standard irrigation scheduling practices.

Assessment of landscape area to be irrigated is based on a typical lot footprint of building architecture and layout of hardscape (driveways, patios, and walks). In the absence of typical building footprints and associated hardscape, assumptions were made as to percentage of lot coverage for non-irrigated areas.

Without a fit lot plan, architectural footprints were placed based on setback requirements. Based on this preliminary plan, a set number of each plan was determined for Basins 400 & 500. Each plan has a set area for the residence, driveway, walkway and rear patio. This area was subtracted from the overall lot area, to produce the total landscape area. Of this total landscape area, 5% was assumed to be turf. Based on the ratio of each plan found in Basin 500, a number of each plan was assumed for Basins 700, 800 & 900. Landscape areas for parks and recreational spaces were determined directly from the approved overall Conceptual Landscape Plan. For the park located in Basin 700, turf was assumed to be 85% of the landscape area.

An Estimated Total Water Use calculation was conducted for each basin footprint area and can be found below in Table 3. Turf was set at high water use, to be irrigated by rotors. Trees were to be moderate water use, irrigated by bubblers. Shrub and groundcover areas were assumed to be low water use, irrigated by drip. The results were then combined and illustrated in the summary table. Assumptions are listed below the summary.

Table 3: Average Annual Estimated Total Water Use for Irrigation

Basin ID	Average Annual Estimated Total Water Use for Irrigation (ac-ft)	Average Annual Volume Evapotranspired (ac-ft)	Average Annual Volume Infiltrated (ac-ft)
400	4.4	4.4	0.0
500	7.9	7.9	0.0
700	6.1	6.1	0.0
800	0.8	0.8	0.0
900	2.0	2.0	0.0

Notes:

1. Evaluation utilized a standard in the industry formula for Estimated Total Water Use (ETWU) found in the City of San Diego Landscape Standards of the Development Manual (Section 2.6) and City of San Diego Municipal code, Chapter 14, Division 4: Landscape Regulations 142.0413(d)(2)

5. Infiltration Summary

Table 4 below provides a summary of the change in storm water infiltration at the upstream edge of the land slide area. It is anticipated that the average annual water use for irrigation will be entirely used by the plants, stored in the top six to twelve inches of the soil, and evapotranspired. Resulting in no additional infiltration due to irrigation. However, considering the possibility that mismanagement of irrigation in the post-project condition could result in over application and increase infiltration, a factor of safety (FOS) was determined. Table 4 provides a factor of safety for over irrigation within the post-project drainage basins.

Table 4: Infiltration Summary and Factor of Safety (FOS) for Over Irrigation

Basin ID	Node #	Average Annual Volume Storm Water Infiltrated Pre-Project (ac-ft)	Average Annual Volume Storm Water Infiltrated Post-Project (ac-ft)	Change in Average Annual Volume of Storm Water Infiltration (ac-ft)	Average Annual Estimated Total Water Use for Irrigation (ac-ft)	Average Annual Volume of Irrigation Infiltrated (ac-ft)	Factor of Safety for Over Irrigation
400	417	4.6	1.7	-2.9	4.4	0.0	166%
500	545	9.1	2.4	-6.7	7.9	0.0	185%
700	780	23.6	4.7	-18.9	6.1	0.0	409%
800	860	2.7	0.4	-2.3	0.8	0.0	386%
900	980	4.3	0.7	-3.7	2.0	0.0	284%

6. Conclusion

This letter report presents the existing and proposed hydrology and proposed irrigation associated with the landslide area adjacent to the Otay Mesa Southwest Village project area. Peak flow rates for the 100-year storm event were determined using the Rational Method computer program developed by Advanced Engineering Software (AES 2014) in conformance with the City of San Diego Drainage Design Manual, dated 2017. It is anticipated that peak flow rates will be detained back to pre-project levels as shown in Table 1. Average annual volume of precipitation, runoff, and infiltration were determined through continuous simulation modeling using EPA SWMM v5. Average annual runoff volume has increased while the average annual infiltration has decreased resulting in less storm water being infiltrated into the landslide area as shown in Table 2. The average annual Estimated Total Water Use for irrigation will be entirely used by the plants and evapotranspired based on City of San Diego Landscape Standards of the Development Manual as show in Table 3. Table 4 shows the factor of safety for over irrigation in the event that the water use for irrigation is mismanaged. Considering both the infiltration of storm water and the application of irrigation, the average annual infiltration volume has decreased in the post-project condition as compared to the pre-project condition.

Reference and supporting documents are included in the Attachments of this letter. A list discussing the Attachments and Exhibits may be found below.

Please feel free to contact Eric Hengesbaugh or myself if you have any questions and/or concerns at (619) 291-0707.

Sincerely,

RICK ENGINEERING COMPANY

Brendan Hastie, P.E.
R.C.E. #65809, Exp. 9/21
Principal

BH:EGH:vs/files/Report/15013-C.016

Attachments

1. Vicinity Map
2. Landslide Hydrology Table
3. Preliminary Water Budget Summary for Landscape Areas

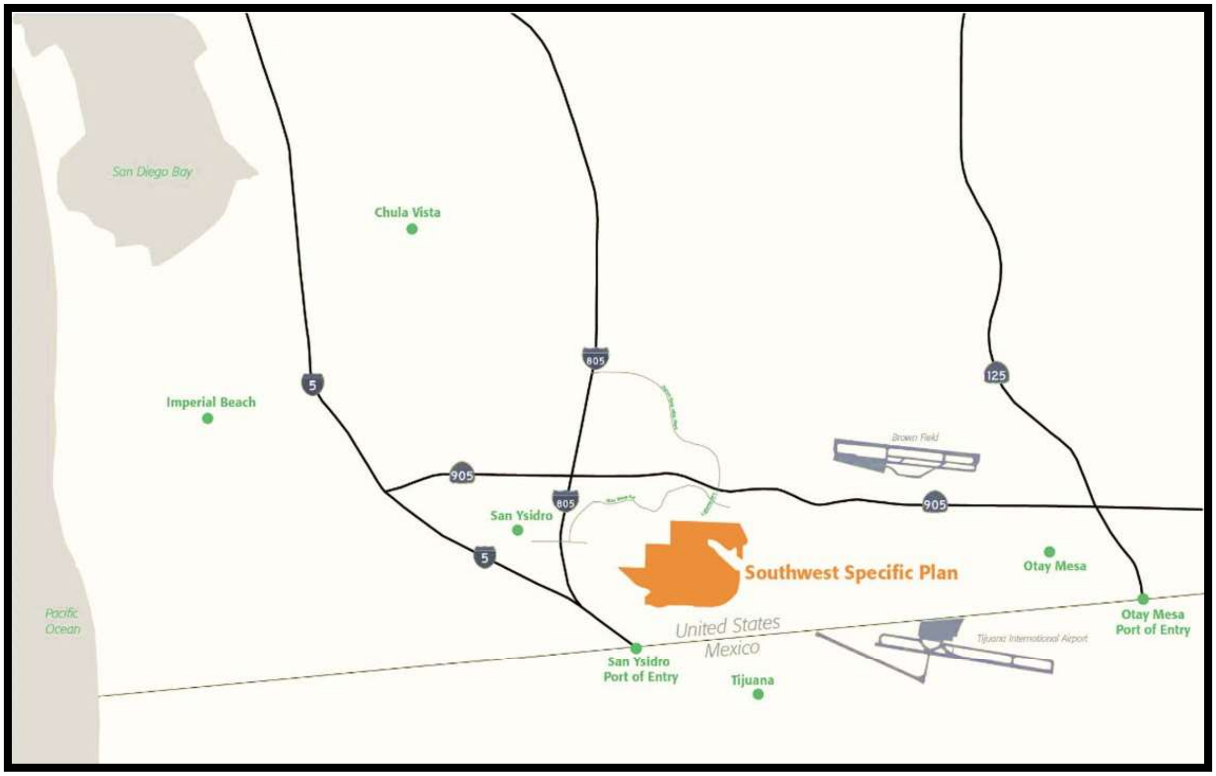
Map Pockets

1. Landslide Hydrology Pre-Project Exhibit
2. Landslide Hydrology Post-Project Exhibit

Attachments

Vicinity Map

Vicinity Map



Landslide Hydrology Table

15013C: Southwest Village Landslide Hydrology and Irrigation Summary Table

Southwest Village Landslide Hydrology Summary (AES)

Node	Description	Pre-Project Area (ac)	Pre-Project Tc (min)	Pre-Project Q100 (cfs)	Post-Project (Unmitigated) Area (ac)	Post-Project (Unmitigated) Tc (min)	Post-Project (Unmitigated) Q100 (cfs)	Post-Project (Mitigated) Area (ac)	Post-Project (Mitigated) Tc (min)	Post-Project (Mitigated) Q100 (cfs)	Change in Area (ac)	% Change Peak Discharge (Post-Project Mitigated - Pre-Project)
Westerly Drainge toward Railroad Collection Points												
417	Upstream Edge of Landslide	7.4	10.2	10.8	8.8	10.3	23.0	8.8	22.1	4.5	1.4	-58%
430	Outfall	15.2	11.5	20.7	17.0	11.2	34.6	17.0	23.5	12.9	1.8	-38%
499	Downstream Collection Point near Railroad	188.9	15.4	244.1	180.2	14.9	243.8	180.2	27.8	165.1	-8.7	-32%
545	Upstream Edge of Landslide	14.3	12.7	20.3	12.9	9.6	36.4	12.9	19.7	9.8	-1.4	-52%
550	Outfall	21.6	13.5	29.8	21.6	10.0	49.2	21.6	20.2	19.4	0.0	-35%
780	Upstream Edge of Landslide	36.4	16.1	46.1	32.5	6.0	107.9	32.5	15.0	40.0	-3.9	-13%
782	Outfall	58.8	17.4	71.6	54.9	6.5	147.0	54.9	15.6	68.0	-3.9	-5%
799	Downstream Collection Point near Railroad	176.3	22.9	184.5	172.4	10.9	312.4	172.4	22.2	181.9	-3.9	-1%
Total		365.2			352.6			352.6			-12.6	
Southerly Drainage towards Spring Canyon at Border												
860	Upstream Edge of Landslide	4.3	11.5	6.4	5.3	9.6	15.7	5.3	20.0	6.0	1.0	-6%
870	Outfall	20.6	12.2	29.8	19.8	10.0	37.8	19.8	20.6	21.0	-0.8	-30%
980	Upstream Edge of Landslide	6.9	14.1	9.3	9.1	6.9	30.9	9.1	20.0	8.0	2.2	-14%
981	Outfall	8.5	14.4	11.4	10.7	7.1	33.5	10.7	20.2	9.8	2.2	-14%
999	Downstream Collection Point near Border	83.5	16.7	103.8	84.9	12.0	141.4	84.9	22.9	86.8	1.4	-16%
Total		83.5			84.9			84.9			1.4	

9.53in = average annual precip.

Southwest Village Landslide Volume Summary (SWMM)

Node	Description	Precipitation Pre-Project Avg. Annual Precipitation Volumes (ac-ft)	Precipitation Post-Project Avg. Annual Precipitation Volumes (ac-ft)	Runoff Pre-Project Avg. Annual Runoff Volume (ac-ft)	Runoff Post-Project Volume (ac-ft)	Infiltration Pre-Project Avg. Annual Infiltration Volume (ac-ft)	Infiltration Post-Project Avg. Annual Infiltration Volume (ac-ft)	% Change Runoff	% Change Infiltration	Change in Infiltration Avg. Annual Volume (ac-ft)
Westerly Drainge toward Railroad Collection Points										
417	Upstream Edge of Landslide	6.0	7.2	1.3	4.1	4.6	1.7	220%	-64%	-2.9
430	Outfall	12.3	13.6							
499	Downstream Railroad	149.9	144.4	30.7	30.8	120.5	111.6	0.4%	-7%	-8.8
545	Upstream Edge of Landslide	11.4	10.2	2.2	6.5	9.1	2.4	202%	-74%	-6.7
550	Outfall	17.1	17.1							
780	Upstream Edge of Landslide	28.9	25.8	4.7	17.4	23.6	4.7	266%	-80%	-18.9
782	Outfall	46.7	43.6							
799	Downstream Railroad	139.9	136.9	25.6	40.9	113.7	88.4	60%	-22%	-25.4
		289.8	281.2	56.3	71.8	234.2	200.0	28%	-15%	-34.2
Southerly Drainage towards Spring Canyon at Border										
860	Upstream Edge of Landslide	3.4	4.2	0.7	3.2	2.7	0.4	329%	-85%	-2.3
870	Outfall	12.9	11.5	3.1	3.5	10.3	9.0			
980	Upstream Edge of Landslide	5.5	7.2	1.1	5.7	4.3	0.7	421%	-85%	-3.7
981	Outfall	6.7	8.5	1.4	5.8	5.3	1.6			
999	Downstream Border	66.3	67.4	13.3	17.3	53.4	45.9	30%	-14%	-7.5
		66.3	67.4	13.3	17.3	53.4	45.9	30%	-14%	-7.5

Southwest Village Landslide Irrigation Volume Summary

Node	Description	Pre-Project ft)	Post-Project Avg. Annual Volume Applied (ac-ft)	Post-Project Evapotranspired (ac-ft)	Post-Project Avg. Annual Volume Infiltrated (ac-ft)	Change in Total Avg. Annual Volume (ac-ft)	Irrigation
Westerly Drainge toward Railroad Collection Points							
417	Upstream Edge of Landslide	-	4.4	4.4	0.0	-2.9	166%
499	Downstream Railroad	-					
545	Upstream Edge of Landslide	-	7.9	7.9	0.0	-6.7	185%
550	Outfall	-					
780	Upstream Edge of Landslide	-	6.1	6.1	0.0	-18.9	409%
799	Downstream Railroad	-					
			18.4	18.4	0.0	-34.2	286%
Southerly Drainage towards Spring Canyon at Border							
860	Upstream Edge of Landslide	-	0.8	0.8	0.0	-2.3	386%
870	Outfall	-					
980	Upstream Edge of Landslide	-	2.0	2.0	0.0	-3.7	284%
999	Downstream Border	-					
			2.8	2.8	0.0	-7.5	367%

Notes:
1. Rainfall intensities for AES Rational Method analysis were calculated using the City of San Diego's 2017 Drainage Design Manual
2. Detailed detention analysis for basins that are not a part of the Vesting Tentative Map (VTM) (Basin 700, 800, & 900) has yet to be completed. For the purpose of this analysis the Time of Concertation was approximated by using detention analysis done on the adjacent Basins within the VTM (Basin 400 & 500). Peak flow rate for detention was based on the pre-project peak flow rates for the 100-year event.

3. For basins not apart of the VTM ((Basin 700, 800, & 900) percent imperviousness was conservatively assumed to be 85% impervious based on the proposed land use in the Specific Plan.
4. The average annual rain fall was calculated to be 9.53-inches based on annual averages calculated in EPA SWMM using the Lindberg Field rain gauge
5. The Lindberg Field rain gauge was used for this analysis. The time series for this rain gauges dates from October 17, 1948 to December 31, 2005.
6. Irrigation Assumptions:
    Residential lots have 5% turf
    Plan ratio (ie Plan 1, Plan 2, Plan 3..) for Basins 700, 800 and 800 follows ratios from Basin 500
    Basin 500, buildings 74, 75, 76 & 78 have no trees
    One (1) tree per residential lot
    Turf will be irrigated by rotors
    Shrub and groundcover area will be irrigated by drip

    Landscape Regulations 142.0413(d)(2)

Preliminary Water Budget Summary for Landscape Areas

SOUTHWEST VILLAGE

PRELIMINARY WATER BUDGET SUMMARY FOR LANDSCAPE AREAS

4/6/2021 - r2

OVERALL TOTALS		
1,072,837	sf	Total Area of Site (sq. ft.):
695,943	sf	Landscape Area (sq. ft.):
38,971	sf	Special Landscape Area
56,869	sf	Toal Area Landscaped in Turf (sq. ft.):
8%	sf	Turf to Landscape Area Ratio:
533,732	sf	Drip
10,892	sf	Bubbler
0	sf	Spray
87,230	sf	Rotor
631,854	TOTAL SF	
3,750,354	gpy	Drip
202,591	gpy	Bubbler
0	gpy	Spray
2,942,109	gpy	Rotor
6,895,054	TOTAL GPY	
21.16	TOTAL AC/FT	

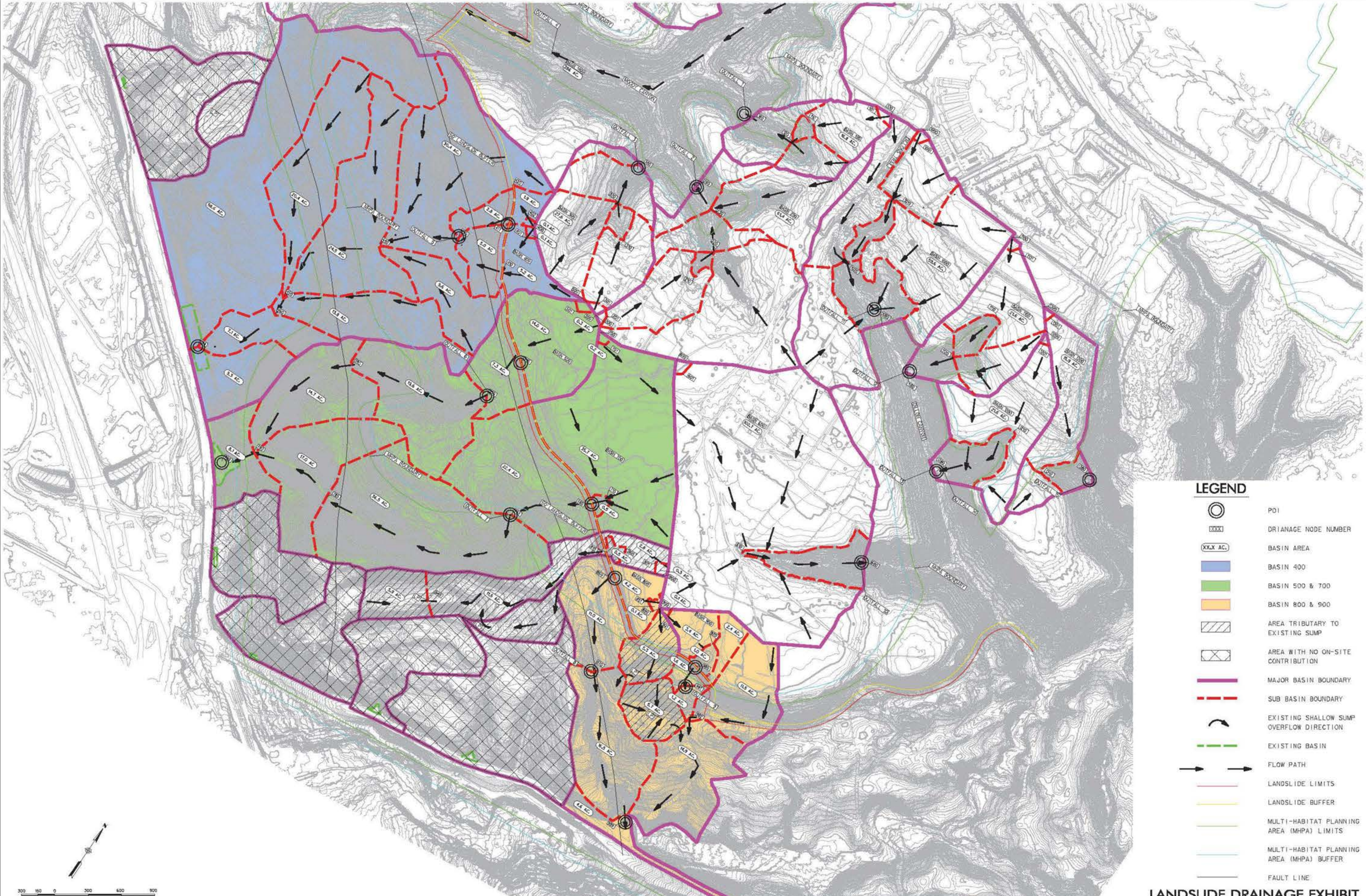
	Basin 400				Basin 500				Basin 700				Basin 800				Basin 900			
	269,714	SF			337,049	SF			181,001	SF			88,427	SF			196,645	SF		
	137,549	SF			232,646	SF			184,893	SF			52,944	SF			87,910	SF		
	11,325	SF			27,646	SF			0	SF			0	SF			0	SF		
	16,729	SF			31,088	SF			3,812	SF			1,429	SF			3,812	SF		
	12%	SF			13%	SF			2%	SF			3%	SF			4%	SF		
	118,132	SF	830,077.00	GPY	206,149	SF	1,448,541.71	GPY	112,221	SF	788,542.33	GPY	26,512	SF	186,291.83	GPY	70,717	SF	496,901.58	GPY
	2,688	SF	49,996.80	GPY	3,164	SF	58,850.40	GPY	2,688	SF	49,996.80	GPY	644	SF	11,978.40	GPY	1,708	SF	31,768.80	GPY
	0	SF	0.00	GPY	0	SF	0.00	GPY	0	SF	0.00	GPY	0	SF	0.00	GPY	0	SF	0.00	GPY
	16,729	SF	564,222	GPY	31,496	SF	1,062,290	GPY	33,765	SF	1,138,825	GPY	1,429	SF	48,206	GPY	3,812	SF	128,565	GPY
Totals	137,549	SF	1,444,296.02	GPY	240,809	SF	2,569,682.45	GPY	148,674	SF	1,977,363.97	GPY	28,585	SF	246,476.63	GPY	76,236	SF	657,235.38	GPY
			4.4	AC/FT			7.9	AC/FT			6.1	AC/FT			0.8	AC/FT			2.0	AC/FT

Assumptions:

1. Residential lots have 5% turf
2. Plan ratio (ie Plan 1, Plan 2, Plan 3..) for Basins 700, 800 and 800 follows ratios from Basin 500
3. Basin 500, buildings 74, 75, 76 & 78 have no trees
4. (1) tree per residential lot
5. Turf will be irrigated by rotors
6. Shrub and groundcover area will be irrigated by drip

Map Pocket 1

Landslide Hydrology Pre-Project Exhibit



LANDSLIDE DRAINAGE EXHIBIT FOR SOUTHWEST VILLAGE VTM (PRE-PROJECT)

J-15013-C

Date: April 16, 2021

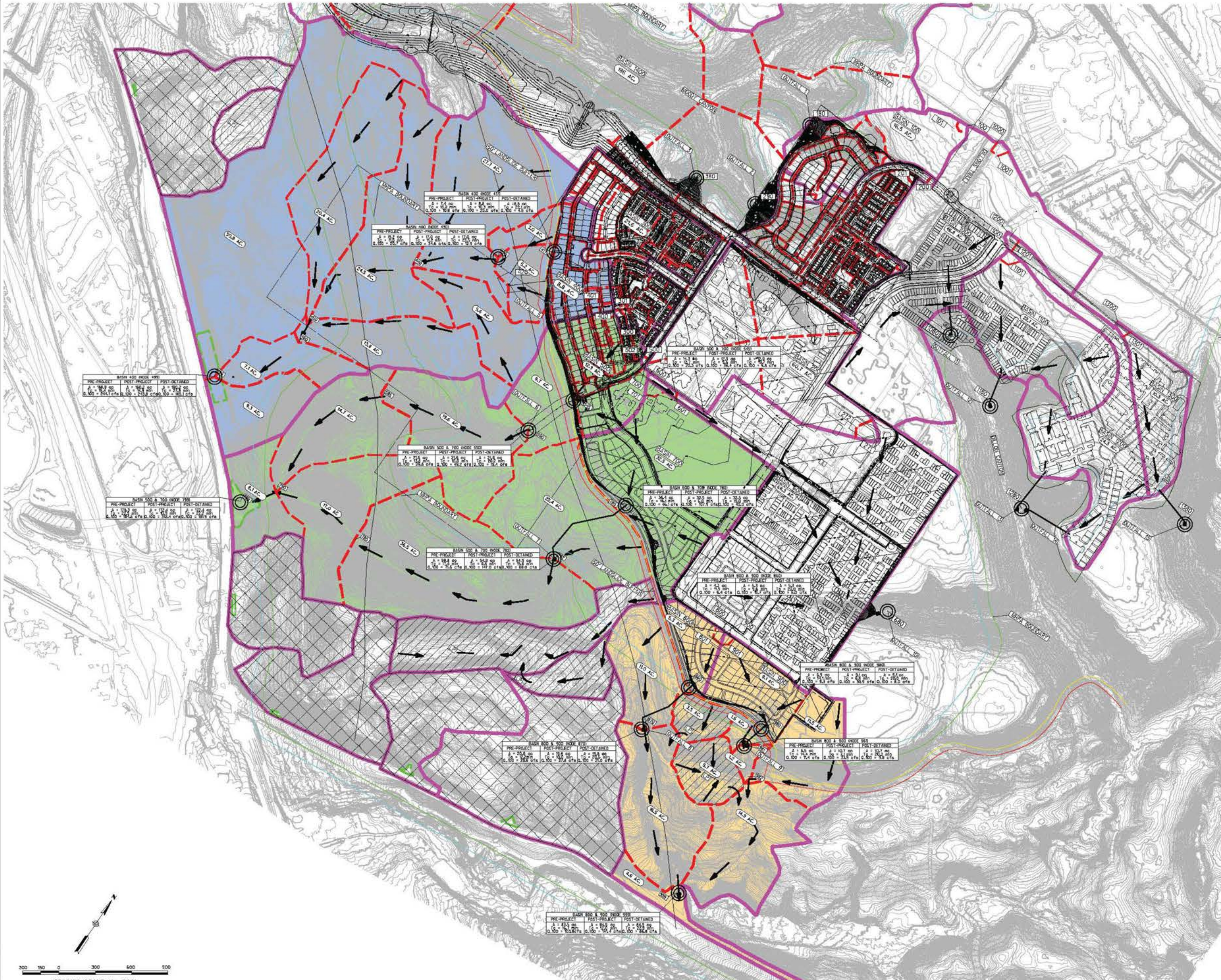
RICK ENGINEERING COMPANY
San Diego
5620 FRIARS ROAD
SAN DIEGO, CA 92110
619-291-0707
(FAX) 619-291-4165
rickengineering.com
Riverside - Orange - Sacramento - San Luis Obispo - Phoenix - Tucson - Denver

J-15013-C

NOT FOR CONSTRUCTION - EXHIBIT FOR DRAINAGE STUDY ONLY

Map Pocket 2

Landslide Hydrology Post-Project Exhibit



LEGEND

- POI
- DRAINAGE NODE NUMBER
- BASIN AREA (XX.X AC.)
- BASIN 400
- BASIN 500 & 700
- BASIN 800 & 900
- AREA TRIBUTARY TO EXISTING SUMP
- AREA WITH NO ON-SITE CONTRIBUTION
- MAJOR BASIN BOUNDARY
- SUB BASIN BOUNDARY
- EXISTING SHALLOW SUMP OVERFLOW DIRECTION
- EXISTING BASIN
- FLOW PATH
- LANDSLIDE LIMITS
- LANDSLIDE BUFFER
- MULTI-HABITAT PLANNING AREA (MHPA) LIMITS
- MULTI-HABITAT PLANNING AREA (MHPA) BUFFER
- FAULT LINE

LANDSLIDE DRAINAGE EXHIBIT FOR SOUTHWEST VILLAGE VTM (POST-PROJECT)

RICK ENGINEERING COMPANY
5620 FRIARS ROAD
SAN DIEGO, CA 92110
619-291-0707
(FAX) 619-291-4165
rickengineering.com

J-15013-C

J-15013-C

Date: April 16, 2021

NOT FOR CONSTRUCTION - EXHIBIT FOR DRAINAGE STUDY ONLY

APPENDIX G

APPENDIX G

GEOVISION REPORT

FOR

SOUTHWEST VILLAGE VTM-1
SAN DIEGO, CALIFORNIA

PROJECT NO. 06847-42-04

BOREHOLE GEOPHYSICS
SAN YSIDRO, CALIFORNIA

Prepared for

Geocon, Inc.
26960 Flanders Dr.
San Diego, CA 92121
858-558-6900

Prepared by

GEO*Vision* Geophysical Services
1124 Olympic Drive
Corona, California 92881
(951) 549-1234

February 26, 2021
Report 20395-01 rev 0

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APPENDICES

INTRODUCTION

Borehole geophysical measurements were acquired in three boreholes in San Ysidro, California (Figure 1). Borehole geophysical methods were employed to help determine depth to groundwater. Work was performed for Geocon, Inc. Data acquisition was performed between December 4, 2020 and February 5, 2021. The data analysis and report were reviewed by a **GEO***Vision* Professional Geophysicist or Engineer.

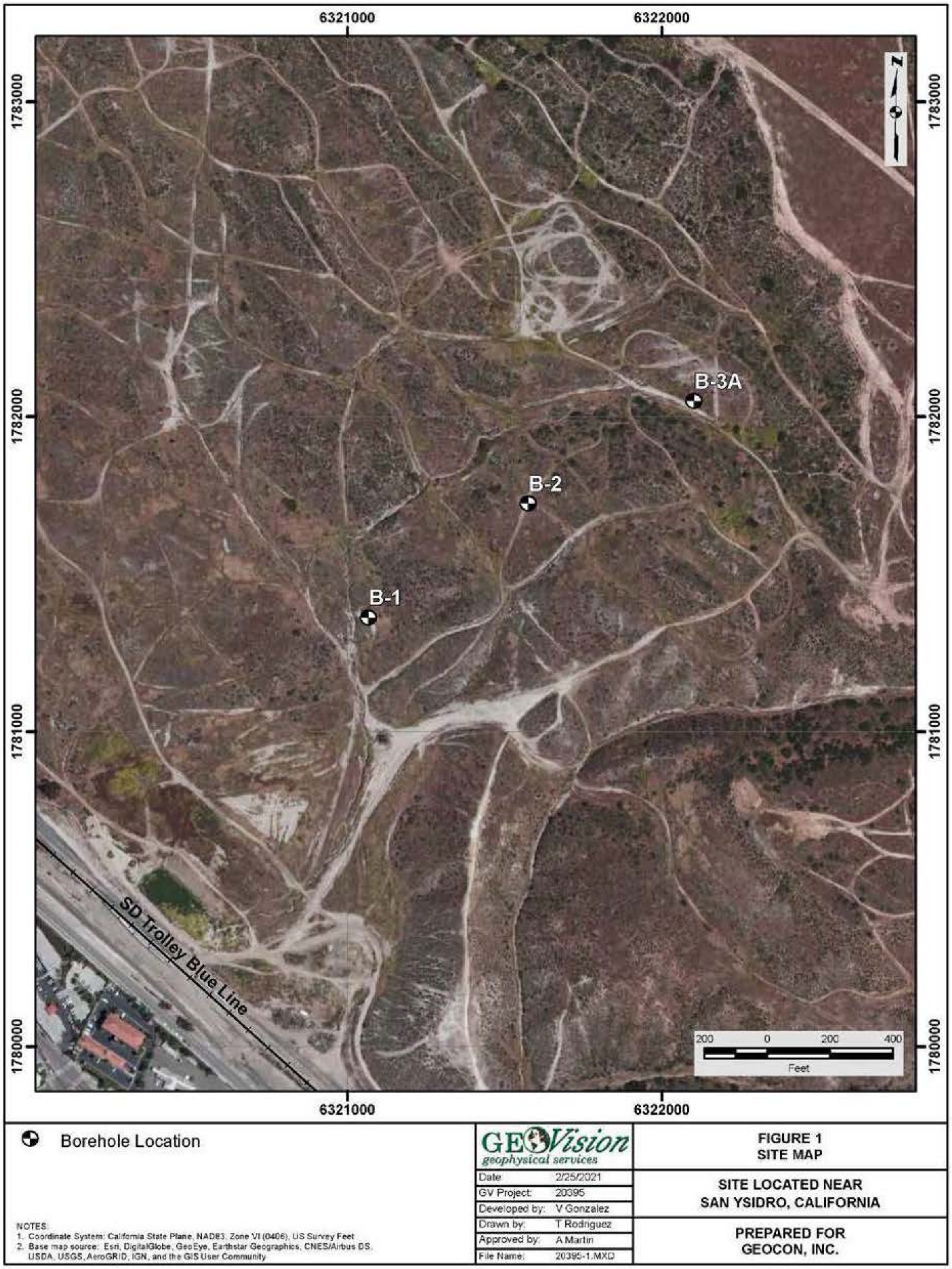


Figure 1: Site Map

SCOPE OF WORK

This report presents the results of borehole geophysical measurements collected between December 4, 2020 and February 5, 2021, as detailed in Table 1. PS Suspension velocity, dual induction (DUIN), electric log (Elog) and natural gamma (NG) data were acquired. The purpose of these measurements was to supplement borehole data obtained during the drilling investigation and to assist with determining depth to groundwater in the complex geologic setting.

The OYO Suspension PS Logging System (Suspension System) was used to obtain in-situ horizontal shear (S_H) and compressional (P) wave velocity measurements in two uncased boreholes at 1.6-foot intervals. Measurements followed **GEO***Vision* Procedure for PS Suspension Seismic Velocity Logging, revision 1.5. Acquired data were analyzed and a profile of velocity versus depth was produced for both S_H and P waves.

A detailed reference for the suspension PS velocity measurement techniques used in this study is:

> <u>Guidelines for Determining Design Basis Ground Motions</u>, Report TR-102293, Electric Power Research Institute, Palo Alto, California, November 1993, Sections 7 and 8.

A Robertson Geo (RG) DUIN probe was used to collect long and short conductivity data at 0.05-foot intervals. An RG Elog probe was used to collect long and short normal resistivity, single point resistivity, and self-potential data. Both probes also acquired NG data. The probes acquire data at up to 0.05-foot sample rate.

Measurement procedures followed these ASTM standards:

- ASTM D5753-18,“Planning and Conducting Geotechnical Borehole Geophysical Logging”
- ASTM D6726-15, “Conducting Borehole Geophysical Logging – Electromagnetic Induction”
- ASTM D6274-18, “Conducting Borehole Geophysical Logging – Gamma”

Data were processed and compiled to generate profiles of the measured parameters versus depth.

INSTRUMENTATION

Suspension Velocity

Suspension velocity measurements were performed using the suspension PS logging system, manufactured by OYO Corporation, and their subsidiary, RG. This system directly determines the average velocity of a 3.3-foot high segment of the soil column surrounding the boring of interest by measuring the elapsed time between arrivals of a wave propagating upward through the soil column. The receivers that detect the wave, and the source that generates the wave, are moved as a unit in the boring producing relatively constant amplitude signals at all depths.

The suspension system probe consists of a combined reversible polarity solenoid horizontal shear-wave source (S_H) and compressional-wave source (P), joined to two biaxial receivers by a flexible isolation cylinder, as shown in Figure 3. The separation of the two receivers is 3.3 feet, allowing average wave velocity in the region between the receivers to be determined by inversion of the wave travel time between the two receivers. The total length of the probe as used in these surveys is approximately 22 feet, with the center point of the receiver pair 12.5 feet above the bottom end of the probe.

The probe receives control signals from, and sends the digitized receiver signals to, instrumentation on the surface via an armored conductor cable. The cable is wound onto the drum of a winch and is used to support the probe. Cable travel is measured to provide probe depth data using a sheave of known circumference fitted with a digital rotary encoder.

The entire probe is suspended in the boring by the cable, therefore, source motion is not coupled directly to the boring walls; rather, the source motion creates a horizontally propagating impulsive pressure wave in the fluid filling the boring and surrounding the source. This pressure wave is converted to P and S_H-waves in the surrounding soil and rock as it passes through the casing and grout annulus and impinges upon the wall of the boring. These waves propagate through the soil and rock surrounding the boring, in turn causing a pressure wave to be generated in the fluid surrounding the receivers as the soil waves pass their location. Separation of the P and S_H-waves at the receivers is performed using the following steps:

1. Orientation of the horizontal receivers is maintained parallel to the axis of the source, maximizing the amplitude of the recorded S_H -wave signals.
2. At each depth, S_H-wave signals are recorded with the source actuated in opposite directions, producing S_H-wave signals of opposite polarity, providing a characteristic S_H-wave signature distinct from the P-wave signal.
3. The 6.3-foot separation of source and receiver 1 permits the P-wave signal to pass and damp significantly before the slower S_H-wave signal arrives at the receiver.
4. In saturated soils, the received P-wave signal is typically of much higher frequency than the received S_H-wave signal, permitting additional separation of the two signals by low pass filtering.
5. Direct arrival of the original pressure pulse in the fluid is not detected at the receivers because the wavelength of the pressure pulse in fluid is significantly greater than the dimension of the fluid annulus surrounding the probe (feet versus inches scale), preventing significant energy transmission through the fluid medium.

In operation, a distinct, repeatable pattern of impulses is generated at each depth as follows:

1. The source is fired in one direction producing dominantly horizontal shear with some vertical compression, and the signals from the horizontal receivers situated parallel to the axis of motion of the source are recorded.
2. The source is fired again in the opposite direction and the horizontal receiver signals are recorded.
3. The source is fired again, and the vertical receiver signals are recorded. The repeated source pattern facilitates the picking of the P and S_H-wave arrivals; reversal of the source changes the polarity of the S_H-wave pattern but not the P-wave pattern.

The data from each receiver during each source activation is recorded as a different channel on the recording system. The Suspension PS system has six channels (two simultaneous recording channels), each with a 1024 sample record. The recorded data are displayed as six channels with a common time scale. Data are stored on disk for further processing.

Review of the displayed data on the recorder or computer screen allows the operator to set the gains, filters, delay time, pulse length (energy), and sample rate to optimize the quality of the data before recording. Verification of the calibration of the Suspension PS digital recorder is performed every twelve months using a NIST traceable frequency source and counter, as presented in Appendix C.

Dual Induction / Natural Gamma

Formation conductivity data were collected using a DUIN probe manufactured by RG. The DUIN tool may also acquire natural gamma data, if equipped with the sensor. This tool can operate in fluid- or air-filled boreholes and works best in relatively conductive media such as sedimentary formations consisting of sands, silts and clays.

The probe receives control signals from, and sends the digitized measurement values to, an RG Micrologger II (MLII) on the surface via an armored multi-conductor cable. The cable is wound onto the drum of a winch and is used to support the probe. Cable travel is measured to provide probe depth data, using a sheave of known circumference fitted with a digital rotary encoder. The probe and depth data are transmitted by USB link from the MLII unit to a laptop computer where it is displayed and stored on hard disk.

An electromagnetic (EM) induction probe consists of transmitter and receiver coils. An alternating current is applied to the transmitter coil, causing the coil to radiate a primary EM field. This primary EM field generates eddy currents in subsurface materials, which give rise to a secondary EM field. The secondary EM field is measured as an alternating current in the receiver coils, which is proportional to formation conductivity. The probe coil spacing is optimized to achieve high vertical resolution, minimal borehole influence and large radius of investigation. The RG focused dual induction probe has effective coil spacings of 1.6 and 2.6 feet, operates at a frequency of 39 kHz, has 1 millisiemens/meter resolution, and operates over a 3 to 3000 millisiemens/meter conductivity range.

Natural gamma measurements rely upon small quantities of radioactive material contained in soil and rocks to emit gamma radiation as they decay. Trace amounts of uranium and thorium are present in a few minerals, where potassium-bearing minerals such as feldspar, mica and clays will include traces of a radioactive isotope of potassium. These isotopes have an extremely long half-life and emit gamma radiation as they decay. This radiation is detected by scintillation - the production of a tiny flash of light when gamma rays strike a crystal of sodium iodide. The light is converted into an electrical pulse by a photomultiplier tube. Pulses above a threshold value of 60 KeV are counted by the probe's microprocessor. The measurement is useful because the radioactive elements are concentrated in certain soil and rock types, e.g., clay or shale, and depleted in others, e.g., sandstone or coal.

Elog / Natural Gamma

Elog data were collected using an RG Elog probe. This probe measures single point resistance (SPR), short normal (16 inch) resistivity, long normal (64 inch) resistivity, self-potential (SP) and natural gamma, if equipped with the sensor. The addition of an insulated bridle cable makes the functional length of the tool 41 feet. This tool requires a fluid-filled borehole and works best in best in relatively resistive media such as dry limestone, well cemented sandstone, or igneous rock.

The probe receives control signals from, and sends the digitized measurement values to, an RG MLII on the surface via an armored cable. The cable is wound onto the drum of a winch and is used to support the probe. Cable travel is measured to provide probe depth using a sheave of known circumference fitted with a digital rotary encoder. The probe and depth data are transmitted by USB link from the MLII unit to a laptop computer where it is displayed and stored.

Data quality depends on good grounding at the surface. This is achieved with a metal stake driven into the ground near the borehole. The resistivity section of the probe operates by driving an alternating current into the formation from the central SPR/DRIVE electrode. The current returns via the logging cable armor. However, to ensure adequate penetration of the formation, a 10 meter (32.8 feet) insulated bridle cable is attached between the probe and cablehead, making the functional length of the probe 41 feet. The bridle is 10 meters of insulated cable with a remote, or reference, electrode located at the top. Voltages are measured between the 16-inch and 64-inch electrodes and the remote earth connection at surface. SPR is a measure of the current flowing to the cable armor along with the voltage at the SPR electrode. The voltage divided by current gives resistance. SP is the DC bias of the 16-inch electrode with respect to the voltage return at the surface (ground stake).

MEASUREMENT PROCEDURES

Suspension Velocity

Two boreholes were logged with the PS Suspension tool. Measurements followed the **GEO***Vision* Procedure for PS Suspension Seismic Velocity Logging, revision 1.5. Prior to logging, the probe was positioned with the top of the probe even with a stationary reference point, e.g., top of casing. The electronic depth counter was set to the distance between the mid-point of the receiver and the top of the probe, minus the height of the stationary reference point and recorded on the field logs. The probe was lowered to the bottom of the boring, stopping at 1.6-foot intervals to collect data, as summarized in Table 2.

At each measurement depth the measurement sequence of two opposite horizontal records and one vertical record was performed, and the gains were adjusted as required. The data from each depth were viewed on the computer display, checked, and recorded to disk before moving to the next depth.

Upon completion of the measurements, the probe zero depth indication at the depth reference point was verified prior to removal from the boring.

Dual Induction / Natural Gamma

Measurement procedures followed these ASTM standards:

- ASTM D5753-18,“Planning and Conducting Geotechnical Borehole Geophysical Logging”
- ASTM D6274-18, “Conducting Borehole Geophysical Logging – Gamma”
- ASTM D6726-15, “Conducting Borehole Geophysical Logging – Electromagnetic Induction”

The DUIN probe used to log B-1 and B-2 did not contain a natural gamma sensor. The DUIN probe used to log B-3A did have a natural gamma sensor. As such, we were able to acquire NG data to the surface in B-3A. Prior to logging, the probe was positioned with the top of the probe even with a stationary reference point, e.g., top of casing, and the electronic depth counter was set to the specified length of the probe, minus the height of the reference point. Once verified with a tape measure, these calculations were recorded on a field log. Offset distances between probe tip and measurement points are adjusted by the acquisition software. The probe was lowered to the bottom of the borehole and data were acquired on ascent. The probe was returned to the surface at approximately 15 feet/minute, collecting data continuously at 0.05-foot spacing, as summarized in Table 2.

This probe was not calibrated in the field, as it is used to provide qualitative measurements, not quantitative values, and is used only to assist in picking transitions between stratigraphic units, as described in ASTM D5753-18, "Planning and Conducting Geotechnical Borehole Geophysical Logging". A functional test was performed prior to logging by placing a coil, with an effective conductivity value, over the probe, and recording the output. Results were noted on field logs.

Natural gamma was not calibrated in the field, as it is a qualitative measurement, not a quantitative value, and is used only to assist in picking transitions between stratigraphic units, as described in ASTM D6274-18, "Conducting Borehole Geophysical Logging – Gamma".

Upon completion of the measurements, the probe zero depth indication at the depth reference point was verified prior to removal from the borehole.

Elog / Natural Gamma

Elog and natural gamma data were acquired in three boreholes. Measurement procedures followed these ASTM standards:

- ASTM D5753-18,"Planning and Conducting Geotechnical Borehole Geophysical Logging"
- ASTM D6274-18, "Conducting Borehole Geophysical Logging – Gamma"

Prior to logging, the probe was connected to the logging cable using the insulated bridle section. The probe head was insulated by wrapping all exposed metal of the cablehead and probe with self-amalgamating insulation tape. The 32.8-foot insulated bridle was checked for damage, and repaired with self-amalgamating insulation tape if needed. the probe was positioned with the top of the bridle cable even with a stationary reference point, e.g., top of casing, and the electronic depth counter was set to the specified length of the probe, 41 feet, minus the height of the reference point. Once verified with a tape measure, these calculations were recorded on a field log. Offset distances between probe tip and measurement points are adjusted by the acquisition software. The probe was lowered to the bottom of the borehole and data were acquired on ascent. The probe was returned to the surface at approximately 10 feet/minute, collecting data continuously at 0.05-foot spacing, as summarized in Table 2.

This probe was not calibrated in the field, as it is used to provide qualitative measurements, not quantitative values, and is used only to assist in picking transitions between stratigraphic units, as described in ASTM D5753-18, “Planning and Conducting Geotechnical Borehole Geophysical Logging”. A functional test was performed prior to logging. This is done by applying fixed resistance values across the probe electrodes, as well as a 100 millivolt signal across the SP electrodes, and recording the resultant output. Results were noted on field logs.

Upon completion of the measurements, the probe zero depth indication at the depth reference point was verified prior to removal from the borehole.

DATA ANALYSIS

Suspension Velocity

Recorded digital waveforms were analyzed to locate the most prominent first minima, first maxima, or the first break on the vertical axis records, indicating the arrival of P-wave energy. The difference in travel time between receiver 1 and receiver 2 (R1-R2) arrivals was used to calculate the P-wave velocity for that 1.0-meter segment of the soil column. When observable, P-wave arrivals on the horizontal axis records were used to verify the velocities determined from the vertical axis data. The time picks were then transferred into a template to complete the velocity calculations based on the arrival time picks made in PSLOG. The Microsoft Excel® analysis file accompanies this report.

P-wave velocity over the 6.3-foot interval from source to receiver 1 (S-R1) was also picked, calculated, and plotted for quality assurance of the velocity derived from the travel time between receivers. In this analysis, the depth values as recorded were increased by 4.8 feet to correspond to the mid-point of the 6.33-foot S-R1 interval. Travel times were obtained by picking the first break of the P-wave signal at receiver 1 and subtracting the calculated and experimentally verified delay, in milliseconds, from source trigger pulse (beginning of record) to source impact. This delay corresponds to the duration of the acceleration of the solenoid before the impact.

As with the P-wave records, the recorded digital waveforms were analyzed to locate clear S_H-wave pulses, as indicated by the presence of opposite polarity pulses on each pair of horizontal records. Ideally, the S_H-wave signals from the 'normal' and 'reverse' source pulses are very nearly inverted images of each other. Digital Fast Fourier Transform – Inverse Fast Fourier Transform (FFT – IFFT) lowpass filtering was used to remove the higher frequency P-wave signal from the S_H-wave signal. Different filter cutoffs were used to separate P- and S_H-waves at different depths, ranging from 600 Hz in the slowest zones to 4000 Hz in the regions of highest velocity. At each depth, the filter frequency was selected to be at least twice the fundamental frequency of the S_H-wave signal being filtered.

Generally, the first maxima were picked for the 'normal' signals and the first minima for the 'reverse' signals, although other points on the waveform were used if the first pulse was distorted. The absolute arrival time of the 'normal' and 'reverse' signals may vary by +/- 0.2 milliseconds, due to differences in the actuation time of the solenoid source caused by constant mechanical bias in the source, or by borehole inclination. This variation does not affect the R1-R2 velocity determinations, as the differential time is measured between arrivals of waves created by the same source actuation. The final velocity value is the average of the values obtained from the 'normal' and 'reverse' source actuation.

As with the P-wave data, S_H-wave velocity calculated from the travel time over the 6.33-foot interval from source to receiver 1 was calculated and plotted for verification of the velocity derived from the travel time between receivers. In this analysis, the depth values were increased by 4.8 feet to correspond to the mid-point of the 6.33-foot S-R1 interval. Travel times were obtained by picking the first break of the S_H-wave signal at the near receiver and subtracting the calculated and experimentally verified delay, in milliseconds, from the beginning of the record at the source trigger pulse to source impact.

Poisson's Ratio, **ν**, was calculated using the following formula:

$$\boldsymbol{\nu} = \frac{\left(\frac{V_s}{V_p}\right)^2 - 0.5}{\left(\frac{V_s}{V_p}\right)^2 - 1.0}$$

Figure 4 shows an example of R1 - R2 measurements on a sample filtered suspension record. In Figure 4, the time difference over the 3.3-foot interval of 1.88 milliseconds for the horizontal signals is equivalent to an S_H-wave velocity of 1745 feet/second. Whenever possible, time differences were determined from several phase points on the S_H-waveform records to verify the data obtained from the first arrival of the S_H-wave pulse. Figure 5 displays the same record before filtering the S_H-waveform record with a 1400 Hz FFT - IFFT digital lowpass filter, illustrating the presence of higher frequency P-wave energy at the beginning of the record, and distortion of the lower frequency S_H-wave by the residual P-wave signal.

Data and analyses were reviewed by a **GEO***Vision* Professional Geophysicist or Engineer as a component of the in-house data validation program.

Dual Induction / Natural Gamma

DUIN and NG data do not require analysis; however, depths to identifiable borehole log features, such as distinct natural gamma transitions, were compared with other logs to verify consistent depth readings. Long and short conductivity logs were plotted with the conductivity axis reversed to facilitate visual comparison with resistivity logs. Using WellCAD, data were exported as LAS 2.0 and logs as PDF.

Elog / Natural Gamma

Elog data do not require analysis; however, depths to identifiable borehole log features, such as distinct natural gamma transitions, were compared with other logs to verify consistent depth readings. Since the tool is effectively 41 ft long and requires a fluid filled borehole, data could only be acquired to approximately 41 ft below surface. Using WellCAD, Elog data were exported as LAS 2.0 and logs as PDF.

RESULTS

Suspension Velocity

Suspension R1-R2 P- and S_H-wave velocities for boreholes B-1, B-2 and B-3A are presented in Figures 6, 8, and 10, respectively. The suspension velocity data presented in these figures are also presented in Tables 3, 4, and 5, respectively. The Microsoft Excel® analysis files are included in the deliverables.

P- and S_H-wave velocity data from R1-R2 analysis and quality assurance analysis of S-R1 data are plotted together in Figures A-1 through A-3. Note that R1-R2 data are an average velocity over a 3.3-foot segment of the soil column; S-R1 data are an average over 6.3 feet, creating a significant smoothing relative to the R1-R2 plots. S-R1 velocity data are also presented in Tables A-1 through A-3 and included in the Microsoft Excel® analysis files which also contain Poisson's Ratio calculations, tabulated data, and plots.

Dual Induction, ELOG and Natural Gamma

Combined DUIN, ELOG and NG data for boreholes B-1, B-2 and B-3A are presented as single page log plots in Figures 7, 9, and 11, respectively, and as scaled single page logs in Appendix B. Depths on all figures are referenced to ground surface. Data exported in LAS 2.0 format and log images as PDF accompany this report.

Conductivity data, measured in mS/m, were acquired with the DUIN probe. Measured conductivity values were generally in the 2 – 2,000 mS/m range and successfully acquired from maximum depth to bottom of casing in all three boreholes. Data were plotted with conductivity data reversed, i.e., high on the left, low on the right, to facilitate visual comparison with Elog resistivity data.

Elog data were acquired in all three boreholes. The Elog probe used to log B-3A had a fluid temperature sensor. For completeness, fluid temperature was added to the log plot (Figure 11). Note the slight (~1 deg C) increase in temperature with depth. In general, conductivity, resistivity, SPR and SP logs show generally similar trends and inflections with depth, providing quality assurance validation. There are some indications of changes in lithology with depth, e.g., in B-2 slight deflections to the right in conductivity and resistivity at 220 ft, 240 ft, and 260 ft may suggest sandy interbeds. Similarly, in B-3 conductivity and resistivity deflect slightly right at 230 – 240 ft and then deflect left at about 245 ft corresponding with a rightward NG deflection. This may suggest a transition from sandy zone at 230-240 ft to a more clay-rich zone at 245 ft.

Natural Gamma data were acquired in B-1 and B-2 with the Elog probe. The DUIN probe used in these two boreholes did not have a natural gamma sensor. A different model RG DUIN probe with NG capability was used to log B-3A. As such, we were able to acquire NG data to the surface in B-3A. Overlap of NG data acquired with DUIN and Elog in B-3A indicate good general agreement, providing quality assurance validation. Depths on all figures and tables are referenced to ground surface. Data exported as LAS 2.0 format and log images as PDF accompany this report.

SUMMARY

Discussion of Suspension Velocity Results

Suspension PS velocity data are ideally collected in an uncased, fluid filled boreholes, drilled with rotary mud (rotary wash) methods, as was the case for these boreholes. Results are summarized in the table below.

Suspension PS velocity data quality is judged based upon 5 criteria.

	Criteria	B-1	B-2	B-3A
1	Consistent data between receiver to receiver (R1 – R2) and source to receiver (S – R1) data.	Yes, good match between R1-R2 and S-R1 data for both P- and S_H-waves.	Yes, good match between R1-R2 and S-R1 data for both P- and S_H-waves.	Yes, good match between R1-R2 and S-R1 data for both P- and S_H-waves.
2	Consistency between data from adjacent depth intervals.	Yes, Data is consistent, with smooth transitions between formations.	Yes, Data is consistent, with smooth transitions between formations.	Yes, Data is consistent, with smooth transitions between formations.
3	Consistent relationship between P-wave and S_H -wave (excluding transition to saturated soils)	Yes, consistent relationship above and below water table. Depth to water 70 ft.	Yes, consistent relationship above and below water table. Depth to water 125 ft.	Yes, consistent relationship above and below water table. Perched water 156 ft. Depth to water 175 ft.
4	Clarity of P-wave and S_H-wave onset, as well as damping of later oscillations.	Generally clear P-wave and S_H-wave onsets and rapid damping of later oscillations.	Generally clear P-wave and S_H-wave onsets and rapid damping of later oscillations.	Generally clear P-wave and S_H-wave onsets and rapid damping of later oscillations.
5	Consistency of profile between adjacent borings, if available.	These three profiles provide similar velocities in similar materials, but not at similar depths or elevations, suggesting dipping formations or faulting.	These three profiles provide similar velocities in similar materials, but not at similar depths or elevations, suggesting dipping formations or faulting.	These three profiles provide similar velocities in similar materials, but not at similar depths or elevations, suggesting dipping formations or faulting.

The overall objective of PS suspension logging for this project was to identify depth to groundwater. Generally, under ideal conditions P-wave velocity can provide an indication of transition to saturated formation. In sedimentary formations, when P-wave velocity reaches and maintains 'water velocity', approximately 5, 000 ft/s, the material is fully saturated. This can be complicated when unsaturated material velocity is in this range, such as transition to soft rock, or when geology is complex, e.g., containing perched water zones. In boreholes B-2 and B-3A, S_H-wave velocities rise to approximately 2000 ft/s at the depths where P-wave velocity reaches 5000 ft/s. This makes it less certain that the 5000 ft/s P-wave velocity is due to saturation rather than the relationship between P- and S_H-wave velocity in these unsaturated materials. In borehole B-1, the P-wave rise to 5000 ft/s is not accompanied by a rise in S_H-wave velocity, so this depth to water table is unequivocal. All three borehole velocity logs are superimposed in Figure 12.

Suspension Velocity Data Reliability

P- and S_H-wave velocity measurement using the Suspension Method gives average velocities over a 3.3-foot interval of depth. This high resolution results in the scatter of values shown in the graphs. Individual measurements are reliable with estimated precision of +/- 5%. Standardized field procedures and quality assurance checks contribute to the reliability of these data.

Discussion of Dual Induction, ELOG, and Natural Gamma Results

Natural gamma and electrical properties are qualitative logs, not absolute; meaning relative changes in amplitude are more informative than the absolute values. With that in mind, we can provide general guidelines.

Generally, conductivity is higher in materials in which electric and electromagnetic fields flow preferentially. For earth materials, typically hard rock, limestone, dry sands, and similar exhibit relatively low conductivity (higher resistivity); whereas metallic ores and clays, and silts exhibit relatively high conductivity (low resistivity). For near surface materials, unconsolidated sediment is typically more conductive than consolidated sediment. Water content and salinity also contribute to increased conductivity, e.g., wet soil and sand is more conductive than dry. Below is a jpg with general ranges. Note there is overlap (from http://emgeo.sdsu.edu/emrockprop.html Palacky, G. J., 1988, Resistivity characteristics of geologic targets, in Investigations in Geophysics vol. 3: Electromagnetic methods in applied geophysics-theory, vol. 1, edited by M. N. Nabighian, Soc. Expl. Geophys., 53–129.)

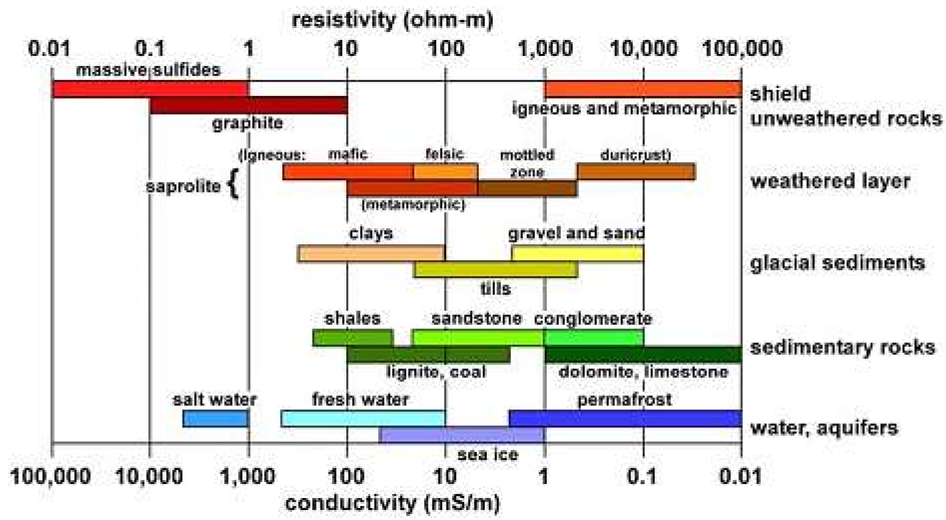


Figure 2: Interpreting Conductivity and Resistivity

Typical near surface soils and hard rock exhibits low conductivity, usually near the low, or left, axis close to (or less than) zero mS/m. In contrast, fat clays could be in the hundreds to low thousands mS/m.

NG is higher in materials that contain uranium, thorium, or potassium (or similar) bearing minerals, or soils / rocks in which these minerals are concentrated. For example, in near surface measurements NG is higher in clays or shales and lower in sandstones and coals. Typical sands or near surface unconsolidated materials are relatively low. Clay seams may spike extremely high, the higher the value the more concentrated radioactive minerals.

Typical near surface soil would exhibit around 100CPS or less, but this can vary by location. Fat clays can cause deflections to the right to several hundred CPS.

Typically, there is an expected correlation between conductivity and natural gamma. For example, a clay seam would exhibit a relatively high NG and a corresponding conductivity high, or resistivity low. A sand would have a relatively flat NG response and a corresponding low conductivity, or high resistivity. However, relative, abrupt changes in amplitude are more indicative of formational or lithologic changes, which may assist with observations in the borehole geologic logs.

Elog data are invalid if the reference electrode at the top of the bridle cable is out of (above) borehole fluid or inside steel casing. The functional length of the Elog probe and bridle is 41 feet, thus depth to fluid or steel casing prohibited data acquisition near surface in the boreholes. Data are typically truncated approximately 41 feet below fluid level or base of steel casing, whichever is deepest. In general, Elog data are less reliable than dual induction data in conductive media. At this site, measured conductivity and resistivity values were generally within the dynamic range of the DUIN and Elog probes, respectively. As such, both logs provided quality data showing comparable inflections which may help identify lithologic interfaces.

In general, at this site, conductivity, resistivity and SPR logs show generally similar trends and inflections with depth, providing quality assurance validation. There are some indications of changes in lithology with depth, e.g., in B-2 slight deflections to the right in conductivity and resistivity at 220 ft, 240 ft, and 260 ft may suggest sandy interbeds. Similarly, in B-3 conductivity and resistivity deflect slightly right at 230 – 240 ft and then deflect left at about 245 ft corresponding with a rightward NG deflection. This may suggest a transition from sandy zone at 230-240 ft to a more clay-rich zone at 245 ft.

Quality Assurance

These borehole geophysical measurements were performed using industry-standard or better methods for measurements and analyses. All work was performed under **GEO***Vision* quality assurance procedures, which include:

- Use of NIST-traceable calibrations, where applicable, for field and laboratory instrumentation
- Use of standard field data logs.
- Independent review of calculations and results by a registered professional engineer, geologist, or geophysicist.

CERTIFICATION

All geophysical data, analysis, interpretations, conclusions, and recommendations in this document have been prepared under the supervision of and reviewed by a **GEO***Vision* California Professional Geophysicist.

Prepared by:

2/26/2021

Robert Steller Date
Senior Geophysicist
GEO*Vision* Geophysical Services

Reviewed and approved by

2/26/2021

Victor M Gonzalez Date
California Professional Geophysicist, PGp 1074
GEO*Vision* Geophysical Services

* This geophysical investigation was conducted under the supervision of a California Professional Geophysicist or Engineer using industry standard methods and equipment. A high degree of professionalism was maintained during all aspects of the project from the field investigation and data acquisition, through data processing, interpretation and reporting. All original field data files, field notes and observations, and other pertinent information are maintained in the project files and are available for the client to review for a period of at least one year.

A professional geophysicist's certification of interpreted geophysical conditions comprises a declaration of his/her professional judgment. It does not constitute a warranty or guarantee, expressed or implied, nor does it relieve any other party of its responsibility to abide by contract documents, applicable codes, standards, regulations or ordinances.

Table 1. Borehole Logging Dates and Locations

BOREHOLE NUMBER	DATE LOGGED	COORDINATES [1]		
		NORTHING	EASTING	ELEVATION (FEET)
B-1	12/4/2020	1781361.3690	6321066.9020	184.76
B-2	12/16/2020	1781723.8880	6321575.2780	278.81
B-3A	2/5/2021	1782049.2590	6322101.8910	359.61

(1) Coordinates as provided by Geocon, Inc. California State Plane Zone VI (0406) US Survey Ft

Table 2. Logging Tools, Depth Ranges and Sample Intervals

BOREHOLE NUMBER	TOOL AND RUN NUMBER	DEPTH RANGE (FEET)	SAMPLE INTERVAL (FEET)
B-1	DUIN UP01	5 - 202	0.05
B-1	ELOG NG UP01	40 - 201	0.05
B-1	SUSPENSION DOWN01	59.1 – 186	1.6
B-2	DUIN UP01	10 – 315	0.05
B-2	ELOG NG UP01	40 – 314.5	0.05
B-2	SUSPENSION DOWN01	65.6 – 303.5	1.6
B-3A	DUIN NG UP01	2 – 272.8	0.05
B-3A	ELOG NG UP01	116 – 272	0.05
B-3A	SUSPENSION DOWN01	116.5 – 260.8	1.6

Note: all depths referenced to ground surface.

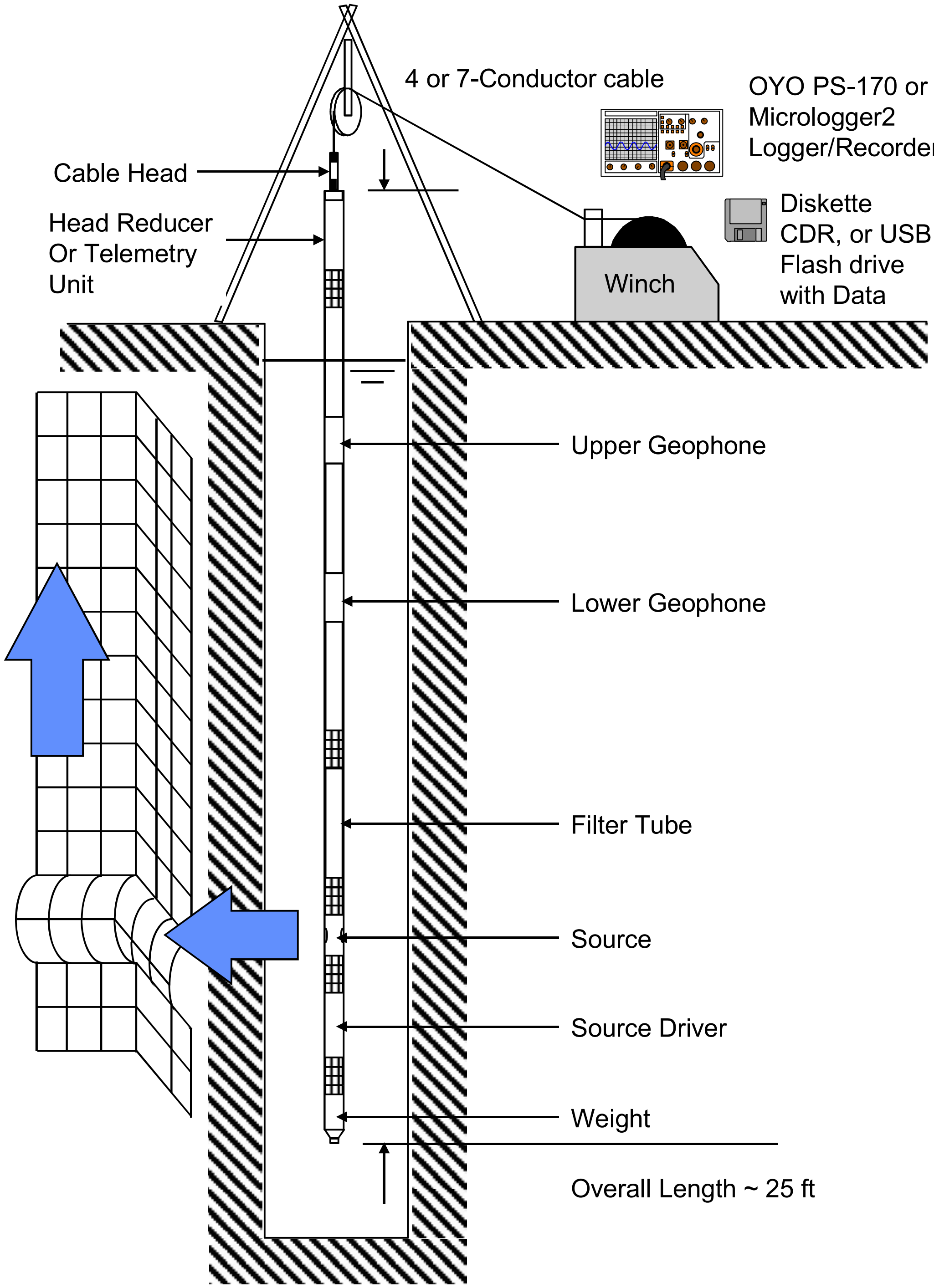


Figure 3: Concept illustration of P-S logging system

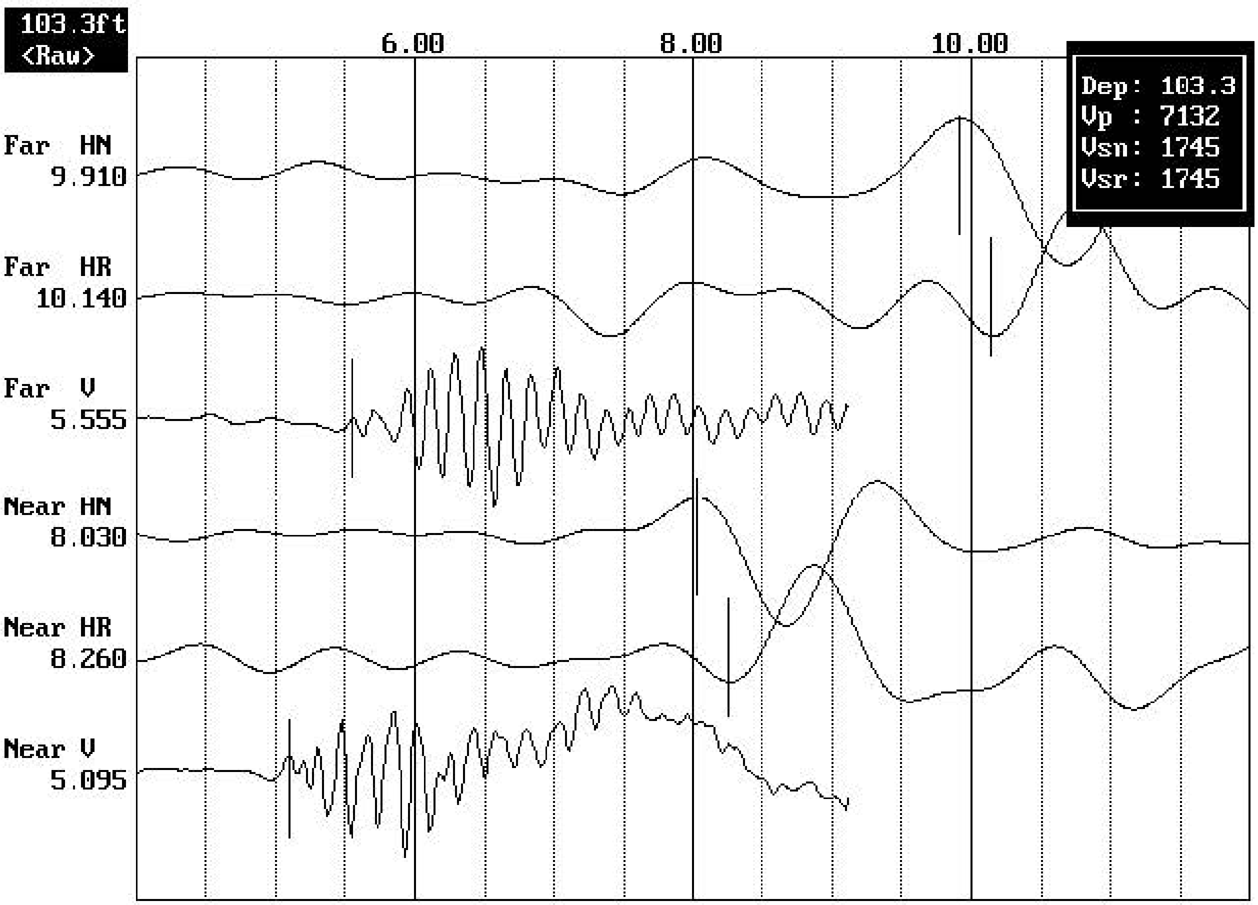


Figure 4: Example of filtered (1400 Hz lowpass) suspension record

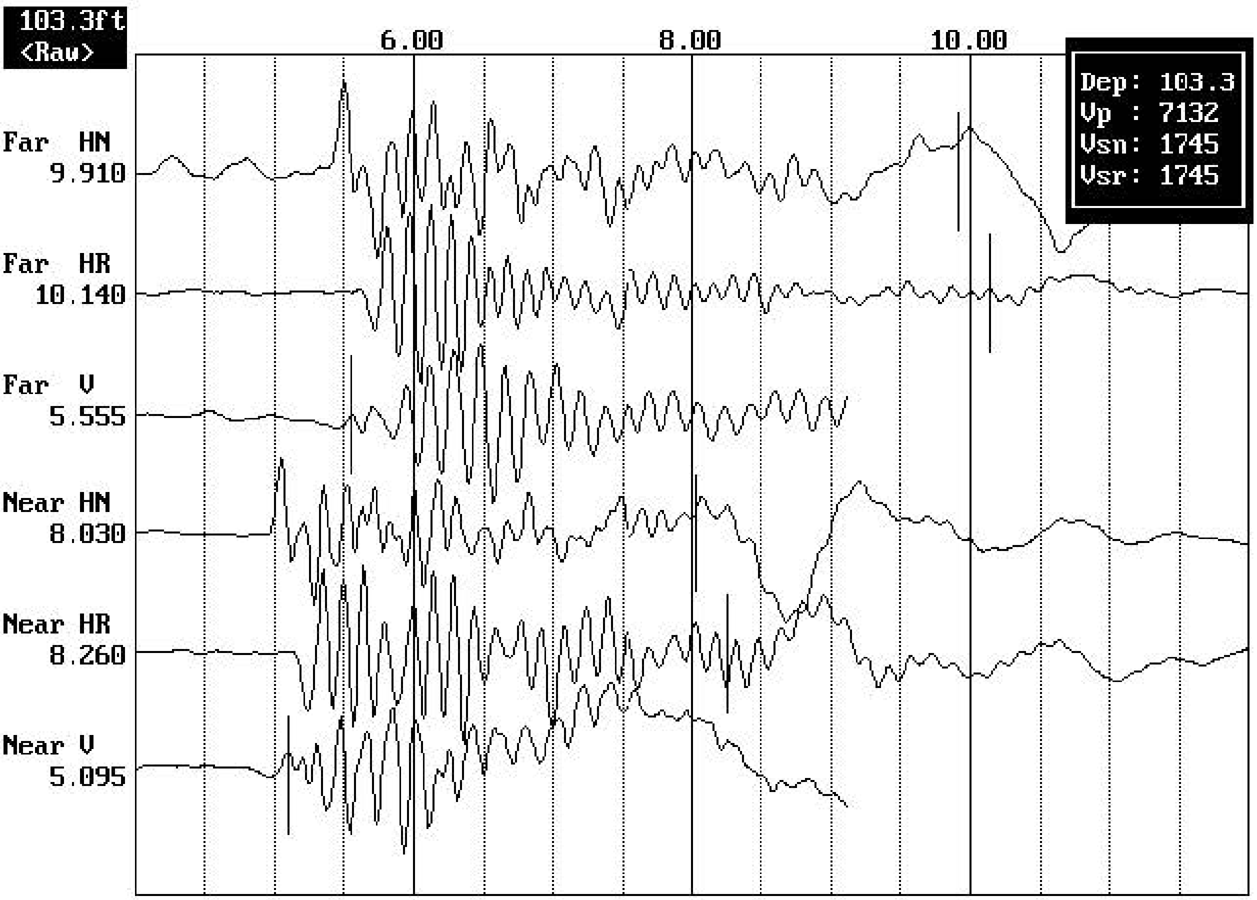


Figure 5. Example of unfiltered suspension record

SAN YSIDRO BOREHOLE B-1
Receiver to Receiver V_s and V_p Analysis

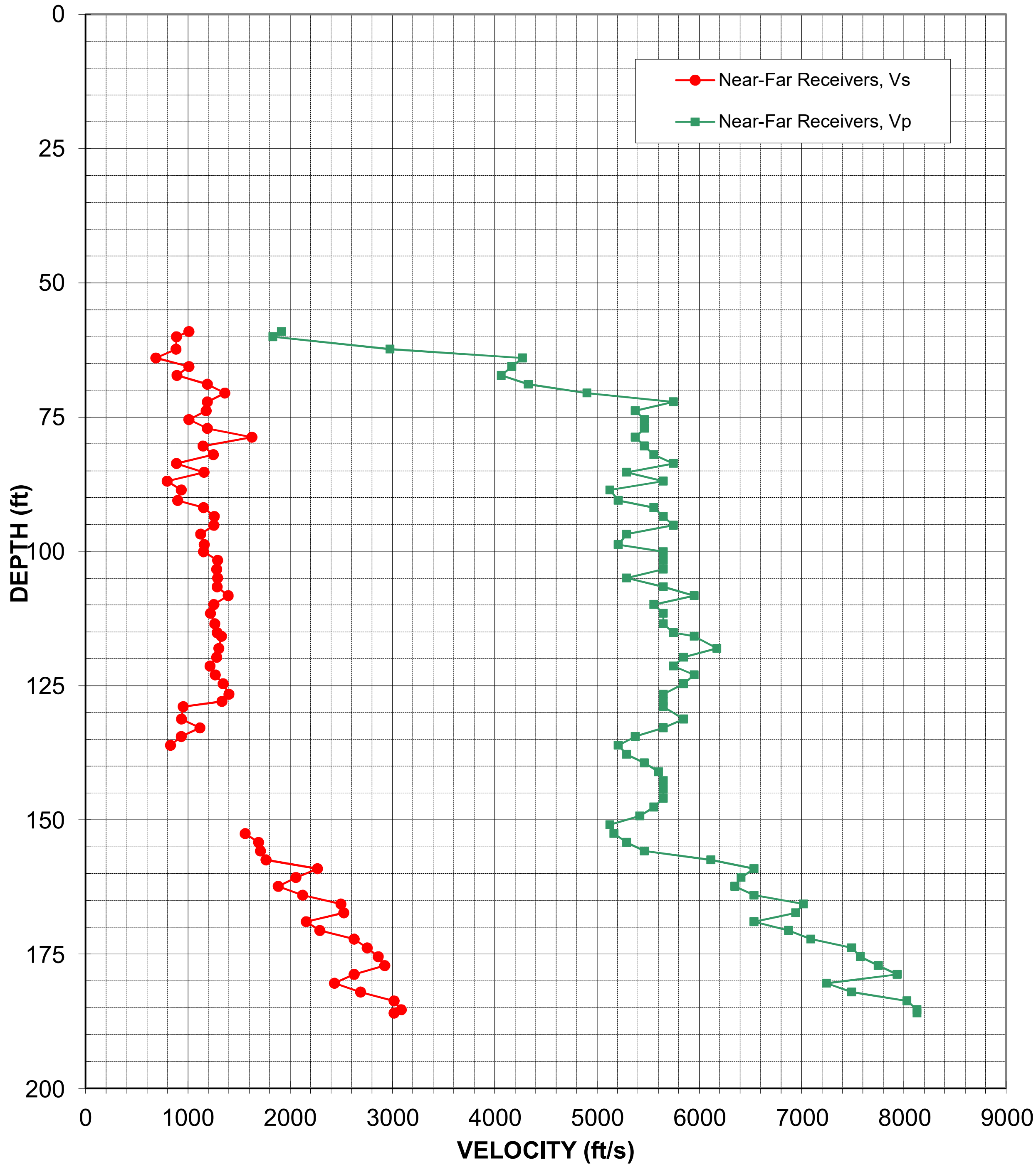


Figure 6: Borehole B-1, Suspension R1-R2 P- and S_H-wave velocities

Table 3. Borehole B-1, Suspension R1-R2 depths and P- and S_H-wave velocities

Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole B-1

American Units				Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio	Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V_s	V_p			V_s	V_p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
59.1	1010	1920	0.31	18.0	310	580	0.31
60.0	890	1830	0.35	18.3	270	560	0.35
62.3	880	2980	0.45	19.0	270	910	0.45
64.0	690	4270	0.49	19.5	210	1300	0.49
65.6	1010	4170	0.47	20.0	310	1270	0.47
67.3	890	4070	0.47	20.5	270	1240	0.47
68.9	1190	4330	0.46	21.0	360	1320	0.46
70.5	1360	4900	0.46	21.5	410	1490	0.46
72.2	1190	5750	0.48	22.0	360	1750	0.48
73.8	1180	5380	0.47	22.5	360	1640	0.47
75.5	1010	5460	0.48	23.0	310	1670	0.48
77.1	1190	5460	0.48	23.5	360	1670	0.48
78.7	1630	5380	0.45	24.0	500	1640	0.45
80.4	1150	5460	0.48	24.5	350	1670	0.48
82.0	1250	5560	0.47	25.0	380	1690	0.47
83.7	890	5750	0.49	25.5	270	1750	0.49
85.3	1160	5290	0.47	26.0	350	1610	0.47
86.9	800	5650	0.49	26.5	240	1720	0.49
88.6	940	5130	0.48	27.0	290	1560	0.48
90.6	900	5210	0.48	27.6	270	1590	0.48
91.9	1150	5560	0.48	28.0	350	1690	0.48
93.5	1260	5650	0.47	28.5	380	1720	0.47
95.1	1250	5750	0.48	29.0	380	1750	0.48
96.8	1130	5290	0.48	29.5	340	1610	0.48
98.8	1160	5210	0.47	30.1	350	1590	0.47
100.1	1150	5650	0.48	30.5	350	1720	0.48
101.7	1290	5650	0.47	31.0	390	1720	0.47
103.4	1280	5650	0.47	31.5	390	1720	0.47
105.0	1290	5290	0.47	32.0	390	1610	0.47
106.6	1290	5650	0.47	32.5	390	1720	0.47
108.3	1390	5950	0.47	33.0	430	1810	0.47
109.9	1250	5560	0.47	33.5	380	1690	0.47
111.6	1220	5650	0.48	34.0	370	1720	0.48
113.5	1260	5650	0.47	34.6	380	1720	0.47
115.2	1290	5750	0.47	35.1	390	1750	0.47
115.8	1330	5950	0.47	35.3	400	1810	0.47
118.1	1300	6170	0.48	36.0	400	1880	0.48
119.8	1280	5850	0.47	36.5	390	1780	0.47

Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole B-1

American Units				Metric Units			
Depth at Midpoint Between Receivers	Velocity V_s	Velocity V_p	Poisson's Ratio	Depth at Midpoint Between Receivers	Velocity V_s	Velocity V_p	Poisson's Ratio
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
121.4	1220	5750	0.48	37.0	370	1750	0.48
123.0	1270	5950	0.48	37.5	390	1810	0.48
124.7	1340	5850	0.47	38.0	410	1780	0.47
126.6	1400	5650	0.47	38.6	430	1720	0.47
128.0	1330	5650	0.47	39.0	410	1720	0.47
128.9	960	5650	0.49	39.3	290	1720	0.49
131.2	940	5850	0.49	40.0	290	1780	0.49
132.9	1120	5650	0.48	40.5	340	1720	0.48
134.5	940	5380	0.48	41.0	290	1640	0.48
136.2	830	5210	0.49	41.5	250	1590	0.49
137.8	-	5290	-	42.0	-	1610	-
139.4	-	5460	-	42.5	-	1670	-
141.1	-	5600	-	43.0	-	1710	-
142.7	-	5650	-	43.5	-	1720	-
144.4	-	5650	-	44.0	-	1720	-
146.0	-	5650	-	44.5	-	1720	-
147.6	-	5560	-	45.0	-	1690	-
149.3	-	5420	-	45.5	-	1650	-
150.9	-	5130	-	46.0	-	1560	-
152.6	1560	5170	0.45	46.5	480	1580	0.45
154.2	1690	5290	0.44	47.0	520	1610	0.44
155.8	1710	5460	0.45	47.5	520	1670	0.45
157.5	1760	6120	0.45	48.0	540	1860	0.45
159.1	2270	6540	0.43	48.5	690	1990	0.43
160.8	2060	6410	0.44	49.0	630	1950	0.44
162.4	1880	6350	0.45	49.5	570	1940	0.45
164.0	2120	6540	0.44	50.0	650	1990	0.44
165.7	2500	7020	0.43	50.5	760	2140	0.43
167.3	2530	6940	0.42	51.0	770	2120	0.42
169.0	2160	6540	0.44	51.5	660	1990	0.44
170.6	2290	6870	0.44	52.0	700	2090	0.44
172.2	2620	7090	0.42	52.5	800	2160	0.42
173.9	2750	7490	0.42	53.0	840	2280	0.42
175.5	2860	7580	0.42	53.5	870	2310	0.42
177.2	2920	7750	0.42	54.0	890	2360	0.42
178.8	2620	7940	0.44	54.5	800	2420	0.44
180.5	2430	7250	0.44	55.0	740	2210	0.44
182.1	2690	7490	0.43	55.5	820	2280	0.43
183.7	3020	8030	0.42	56.0	920	2450	0.42
185.4	3090	8130	0.42	56.5	940	2480	0.42

Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole B-1

American Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V_s	V_p	
(ft)	(ft/s)	(ft/s)	
186.0	3020	8130	0.42

Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V_s	V_p	
(m)	(m/s)	(m/s)	
56.7	920	2480	0.42

Notes: "-" means no data available at that depth.

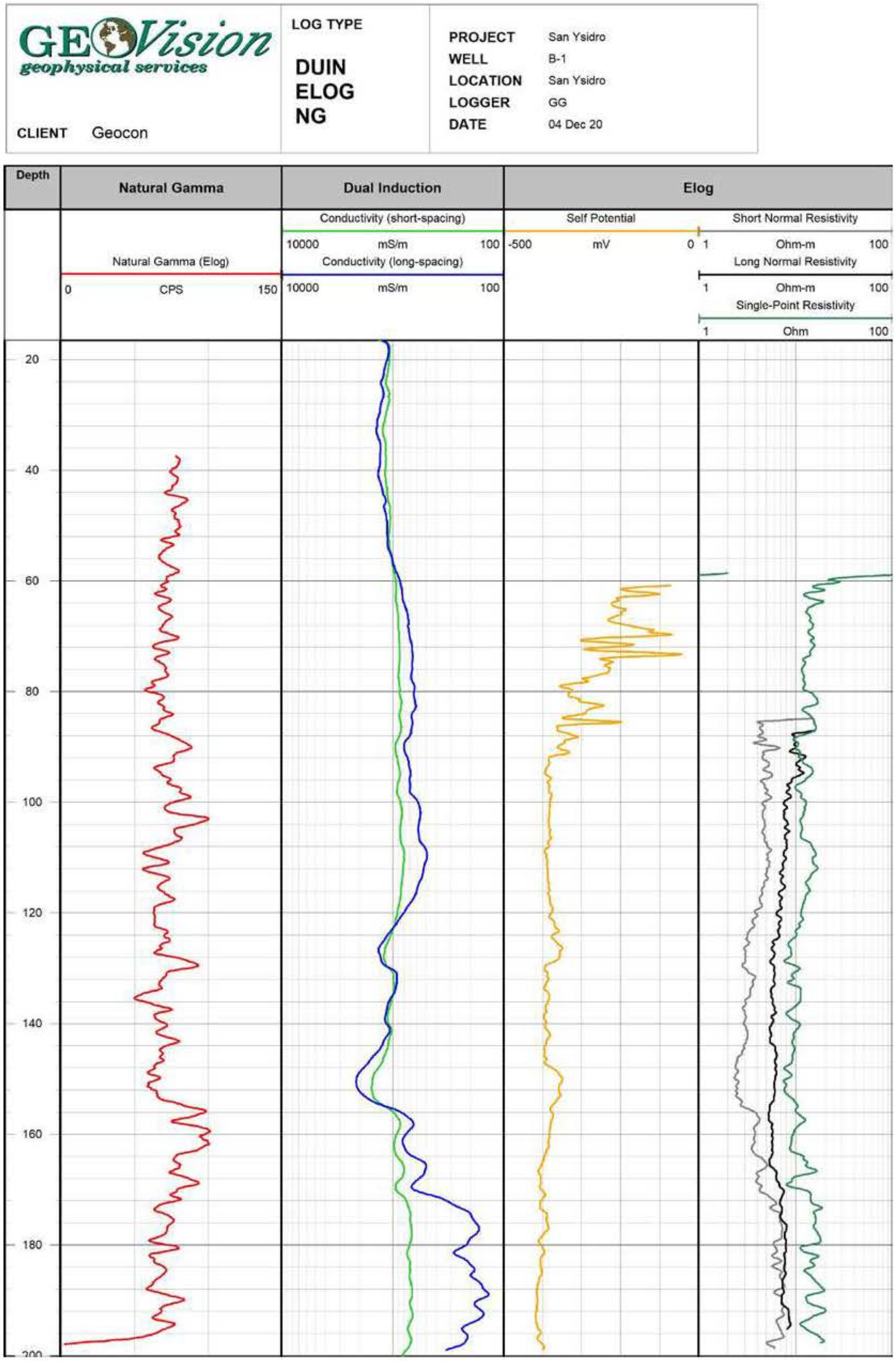


Figure 7: Borehole B-1 Dual Induction, Elog and Natural Gamma

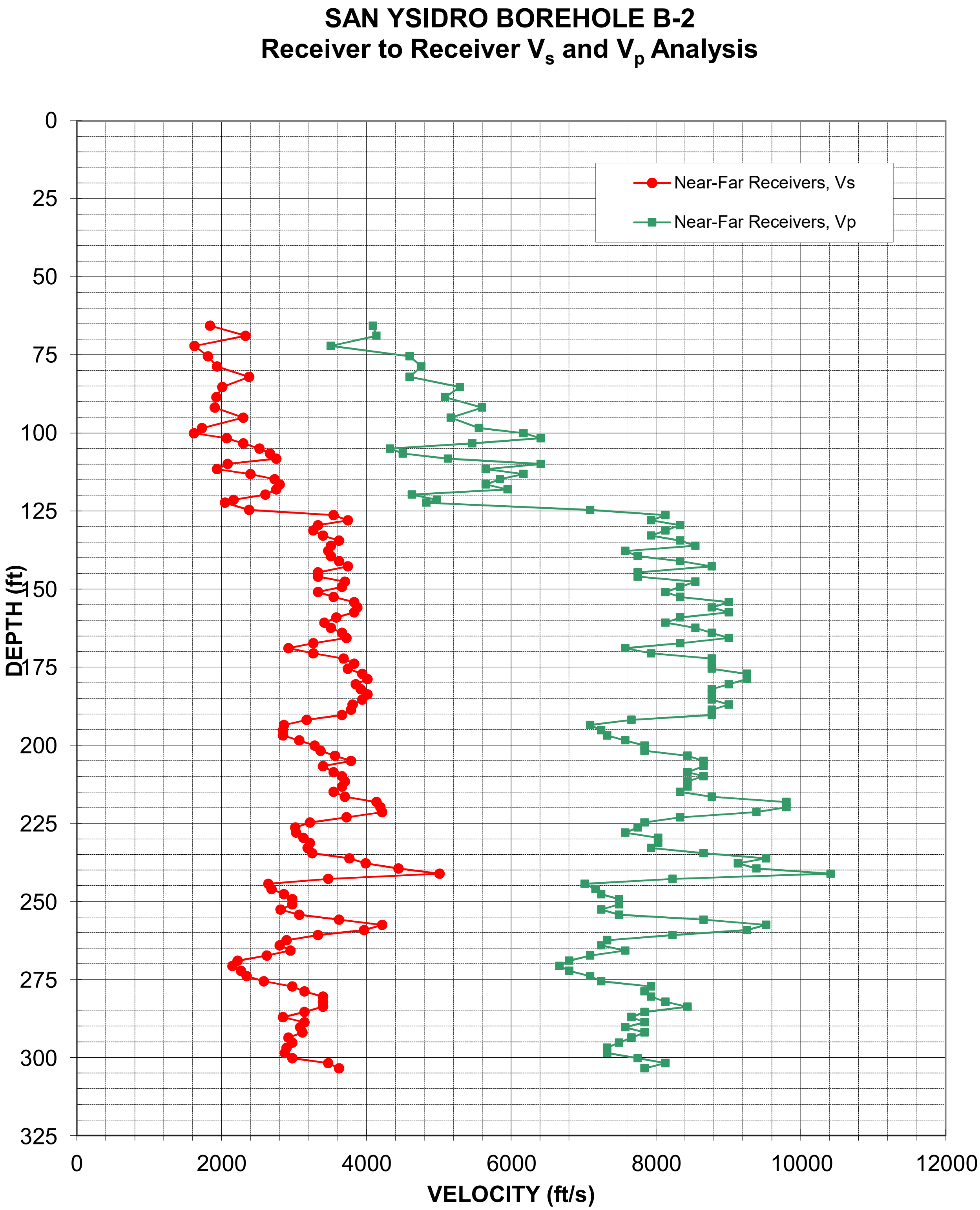


Figure 8: Borehole B-2, Suspension R1-R2 P- and S_H-wave velocities

Table 4. Borehole B-2, Suspension R1-R2 depths and P- and S_H-wave velocities

Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole B-2

American Units				Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio	Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V_s	V_p			V_s	V_p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
65.6	1840	4090	0.37	20.0	560	1250	0.37
68.9	2330	4140	0.27	21.0	710	1260	0.27
72.2	1630	3510	0.36	22.0	500	1070	0.36
75.5	1810	4600	0.41	23.0	550	1400	0.41
78.7	1940	4760	0.40	24.0	590	1450	0.40
82.0	2380	4600	0.32	25.0	730	1400	0.32
85.3	2010	5290	0.42	26.0	610	1610	0.42
88.6	1930	5090	0.42	27.0	590	1550	0.42
91.9	1900	5600	0.43	28.0	580	1710	0.43
95.1	2300	5170	0.38	29.0	700	1580	0.38
98.4	1730	5560	0.45	30.0	530	1690	0.45
100.1	1620	6170	0.46	30.5	490	1880	0.46
101.7	2070	6410	0.44	31.0	630	1950	0.44
103.4	2300	5460	0.39	31.5	700	1670	0.39
105.0	2530	4330	0.24	32.0	770	1320	0.24
106.6	2670	4500	0.23	32.5	810	1370	0.23
108.3	2750	5130	0.30	33.0	840	1560	0.30
109.9	2080	6410	0.44	33.5	640	1950	0.44
111.6	1940	5650	0.43	34.0	590	1720	0.43
113.2	2400	6170	0.41	34.5	730	1880	0.41
114.8	2730	5850	0.36	35.0	830	1780	0.36
116.5	2800	5650	0.34	35.5	850	1720	0.34
118.1	2750	5950	0.36	36.0	840	1810	0.36
119.8	2600	4630	0.27	36.5	790	1410	0.27
121.4	2160	4980	0.38	37.0	660	1520	0.38
122.4	2040	4830	0.39	37.3	620	1470	0.39
124.7	2380	7090	0.44	38.0	730	2160	0.44
126.3	3550	8130	0.38	38.5	1080	2480	0.38
128.0	3750	7940	0.36	39.0	1140	2420	0.36
129.6	3330	8330	0.40	39.5	1020	2540	0.40
131.2	3270	8130	0.40	40.0	1000	2480	0.40
132.9	3400	7940	0.39	40.5	1040	2420	0.39
134.5	3620	8330	0.38	41.0	1100	2540	0.38
136.2	3510	8550	0.40	41.5	1070	2610	0.40
137.8	3470	7580	0.37	42.0	1060	2310	0.37
139.4	3510	7750	0.37	42.5	1070	2360	0.37
141.1	3620	8330	0.38	43.0	1100	2540	0.38
142.7	3750	8770	0.39	43.5	1140	2670	0.39

Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio Based on Receiver-to-Receiver Travel Time Data - Borehole B-2

American Units				Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio	Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V_s	V_p			V_s	V_p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
144.7	3330	7750	0.39	44.1	1020	2360	0.39
146.0	3330	7750	0.39	44.5	1020	2360	0.39
147.6	3700	8550	0.38	45.0	1130	2610	0.38
149.3	3660	8330	0.38	45.5	1120	2540	0.38
150.9	3330	8130	0.40	46.0	1020	2480	0.40
152.6	3550	8330	0.39	46.5	1080	2540	0.39
154.2	3830	9010	0.39	47.0	1170	2750	0.39
155.8	3880	8770	0.38	47.5	1180	2670	0.38
157.5	3830	9010	0.39	48.0	1170	2750	0.39
159.1	3580	8330	0.39	48.5	1090	2540	0.39
160.8	3420	8130	0.39	49.0	1040	2480	0.39
162.4	3510	8550	0.40	49.5	1070	2610	0.40
164.0	3660	8770	0.39	50.0	1120	2670	0.39
165.7	3720	9010	0.40	50.5	1140	2750	0.40
167.3	3270	8330	0.41	51.0	1000	2540	0.41
169.0	2920	7580	0.41	51.5	890	2310	0.41
170.6	3270	7940	0.40	52.0	1000	2420	0.40
172.2	3680	8770	0.39	52.5	1120	2670	0.39
173.9	3830	8770	0.38	53.0	1170	2670	0.38
175.5	3750	8770	0.39	53.5	1140	2670	0.39
177.2	3940	9260	0.39	54.0	1200	2820	0.39
178.8	4020	9260	0.38	54.5	1220	2820	0.38
180.5	3850	9010	0.39	55.0	1170	2750	0.39
182.1	3920	8770	0.38	55.5	1200	2670	0.38
183.7	4020	8770	0.37	56.0	1220	2670	0.37
185.4	3940	8770	0.37	56.5	1200	2670	0.37
187.0	3810	9010	0.39	57.0	1160	2750	0.39
188.7	3790	8770	0.39	57.5	1150	2670	0.39
190.3	3660	8770	0.39	58.0	1120	2670	0.39
191.9	3170	7660	0.40	58.5	970	2340	0.40
193.6	2860	7090	0.40	59.0	870	2160	0.40
195.2	2850	7250	0.41	59.5	870	2210	0.41
196.9	2850	7330	0.41	60.0	870	2230	0.41
198.5	3070	7580	0.40	60.5	940	2310	0.40
200.1	3280	7840	0.39	61.0	1000	2390	0.39
201.8	3370	7840	0.39	61.5	1030	2390	0.39
203.4	3570	8440	0.39	62.0	1090	2570	0.39
205.1	3790	8660	0.38	62.5	1150	2640	0.38
206.7	3400	8660	0.41	63.0	1040	2640	0.41
208.7	3550	8440	0.39	63.6	1080	2570	0.39

Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Receiver-to-Receiver Travel Time Data - Borehole B-2

American Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V_s	V_p	
(ft)	(ft/s)	(ft/s)	
210.0	3660	8660	0.39
211.6	3700	8440	0.38
213.3	3660	8440	0.38
214.9	3550	8330	0.39
216.5	3700	8770	0.39
218.2	4140	9800	0.39
219.8	4190	9800	0.39
221.5	4220	9390	0.37
223.1	3720	8330	0.38
224.7	3220	7840	0.40
226.4	3020	7750	0.41
228.0	3030	7580	0.40
229.7	3130	8030	0.41
231.3	3220	8030	0.40
232.9	3190	7940	0.40
234.6	3250	8660	0.42
236.2	3770	9520	0.41
237.9	3990	9130	0.38
239.5	4440	9390	0.36
241.1	5010	10420	0.35
242.8	3470	8230	0.39
244.4	2650	7020	0.42
246.1	2690	7170	0.42
247.7	2860	7250	0.41
249.3	2980	7490	0.41
251.0	2980	7490	0.41
252.6	2810	7250	0.41
254.3	3070	7490	0.40
255.9	3620	8660	0.39
257.6	4220	9520	0.38
259.2	3970	9260	0.39
260.8	3330	8230	0.40
262.5	2900	7330	0.41
264.1	2800	7250	0.41
265.8	2950	7580	0.41
267.4	2620	7090	0.42
269.0	2220	6800	0.44
270.7	2150	6670	0.44
272.3	2270	6800	0.44
274.0	2350	7090	0.44

Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V_s	V_p	
(m)	(m/s)	(m/s)	
64.0	1120	2640	0.39
64.5	1130	2570	0.38
65.0	1120	2570	0.38
65.5	1080	2540	0.39
66.0	1130	2670	0.39
66.5	1260	2990	0.39
67.0	1280	2990	0.39
67.5	1290	2860	0.37
68.0	1140	2540	0.38
68.5	980	2390	0.40
69.0	920	2360	0.41
69.5	920	2310	0.40
70.0	950	2450	0.41
70.5	980	2450	0.40
71.0	970	2420	0.40
71.5	990	2640	0.42
72.0	1150	2900	0.41
72.5	1220	2780	0.38
73.0	1350	2860	0.36
73.5	1530	3180	0.35
74.0	1060	2510	0.39
74.5	810	2140	0.42
75.0	820	2180	0.42
75.5	870	2210	0.41
76.0	910	2280	0.41
76.5	910	2280	0.41
77.0	860	2210	0.41
77.5	940	2280	0.40
78.0	1100	2640	0.39
78.5	1290	2900	0.38
79.0	1210	2820	0.39
79.5	1020	2510	0.40
80.0	880	2230	0.41
80.5	850	2210	0.41
81.0	900	2310	0.41
81.5	800	2160	0.42
82.0	680	2070	0.44
82.5	660	2030	0.44
83.0	690	2070	0.44
83.5	720	2160	0.44

Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio Based on Receiver-to-Receiver Travel Time Data - Borehole B-2

American Units				Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio	Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V_s	V_p			V_s	V_p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
275.6	2580	7250	0.43	84.0	790	2210	0.43
277.2	2980	7940	0.42	84.5	910	2420	0.42
278.9	3140	7840	0.40	85.0	960	2390	0.40
280.5	3400	7940	0.39	85.5	1040	2420	0.39
282.2	3400	8130	0.39	86.0	1040	2480	0.39
283.8	3400	8440	0.40	86.5	1040	2570	0.40
285.4	3140	7840	0.40	87.0	960	2390	0.40
287.1	2850	7660	0.42	87.5	870	2340	0.42
288.7	3140	7840	0.40	88.0	960	2390	0.40
290.4	3090	7580	0.40	88.5	940	2310	0.40
292.0	3120	7840	0.41	89.0	950	2390	0.41
293.6	2920	7660	0.41	89.5	890	2340	0.41
295.3	2980	7490	0.41	90.0	910	2280	0.41
296.9	2900	7330	0.41	90.5	880	2230	0.41
298.6	2870	7330	0.41	91.0	880	2230	0.41
300.2	2980	7750	0.41	91.5	910	2360	0.41
301.8	3470	8130	0.39	92.0	1060	2480	0.39
303.5	3620	7840	0.36	92.5	1100	2390	0.36

Notes: "-" means no data available at that depth.

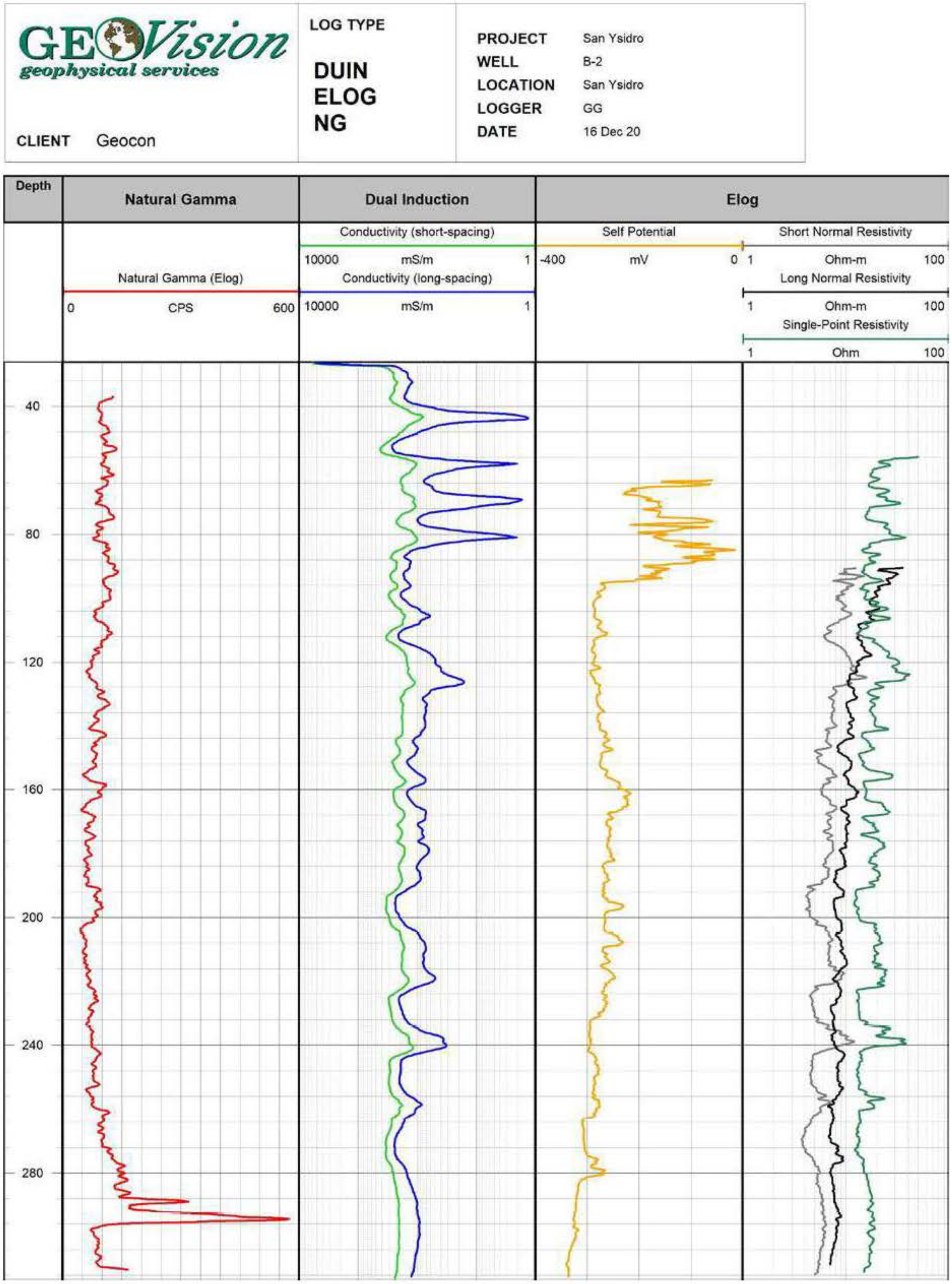


Figure 9: Borehole B-2 Dual Induction, Elog and Natural Gamma

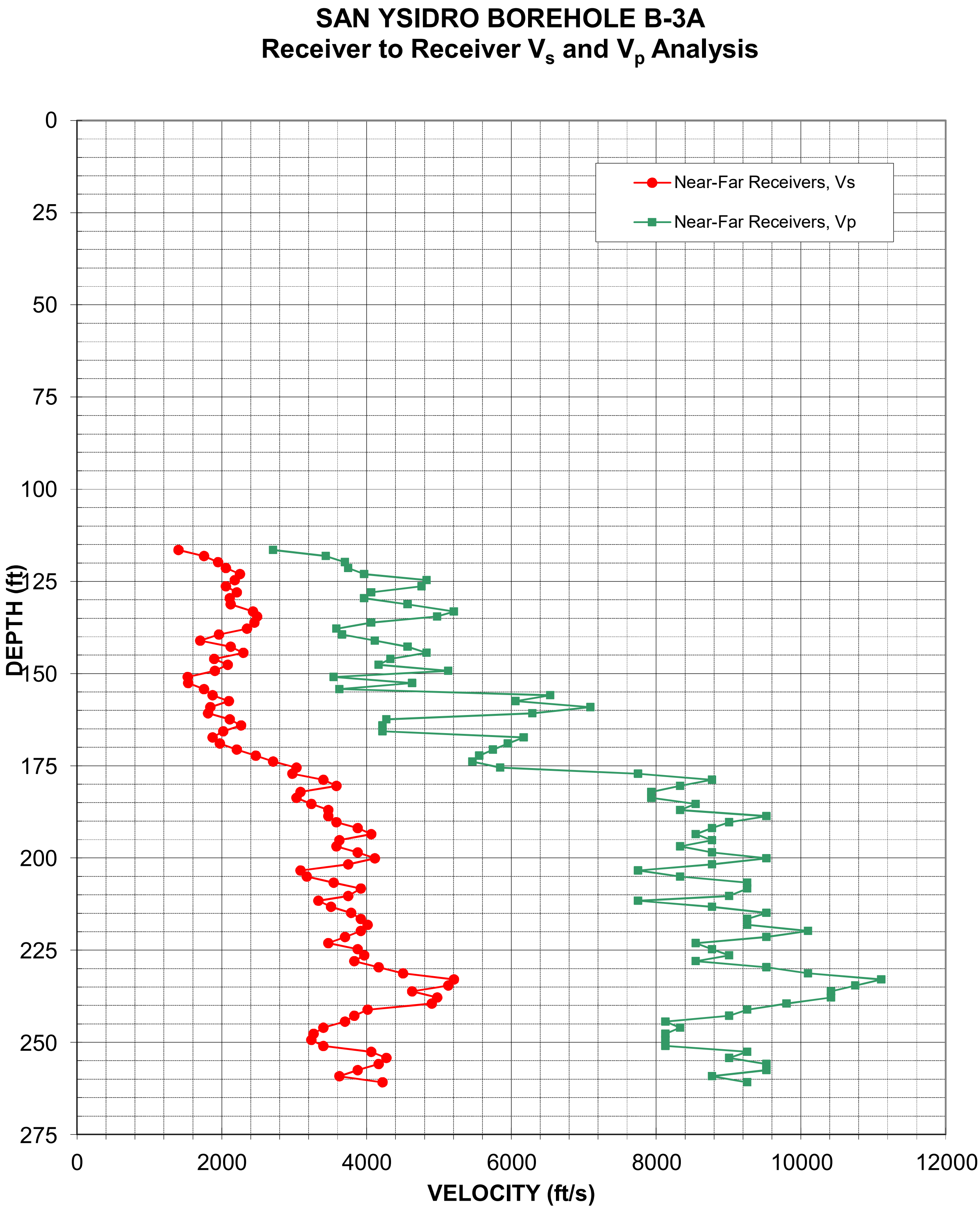


Figure 10: Borehole B-3A, Suspension R1-R2 P- and S_H-wave velocities

Table 5. Borehole B-3A, Suspension R1-R2 depths and P- and S_H-wave velocities

Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio Based on Receiver-to-Receiver Travel Time Data - Borehole B-3A

American Units				Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio	Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V_s	V_p			V_s	V_p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
116.5	1400	2710	0.32	35.5	430	830	0.32
118.1	1750	3440	0.32	36.0	530	1050	0.32
119.8	1950	3700	0.31	36.5	590	1130	0.31
121.4	2060	3750	0.28	37.0	630	1140	0.28
123.0	2250	3970	0.26	37.5	690	1210	0.26
124.7	2180	4830	0.37	38.0	660	1470	0.37
126.3	2060	4760	0.39	38.5	630	1450	0.39
128.0	2210	4070	0.29	39.0	670	1240	0.29
129.6	2110	3970	0.30	39.5	640	1210	0.30
131.2	2120	4570	0.36	40.0	650	1390	0.36
133.2	2430	5210	0.36	40.6	740	1590	0.36
134.5	2490	4980	0.33	41.0	760	1520	0.33
136.2	2450	4070	0.21	41.5	750	1240	0.21
137.8	2350	3580	0.12	42.0	720	1090	0.12
139.4	1960	3660	0.30	42.5	600	1120	0.30
141.1	1700	4120	0.40	43.0	520	1250	0.40
142.7	2120	4570	0.36	43.5	650	1390	0.36
144.4	2300	4830	0.35	44.0	700	1470	0.35
146.0	1890	4330	0.38	44.5	580	1320	0.38
147.6	2080	4170	0.33	45.0	640	1270	0.33
149.3	1900	5130	0.42	45.5	580	1560	0.42
150.9	1530	3550	0.39	46.0	470	1080	0.39
152.6	1540	4630	0.44	46.5	470	1410	0.44
154.2	1750	3620	0.35	47.0	530	1100	0.35
155.8	1870	6540	0.46	47.5	570	1990	0.46
157.5	2100	6060	0.43	48.0	640	1850	0.43
159.1	1840	7090	0.46	48.5	560	2160	0.46
160.8	1810	6290	0.45	49.0	550	1920	0.45
162.4	2110	4270	0.34	49.5	640	1300	0.34
164.0	2270	4220	0.30	50.0	690	1290	0.30
165.7	2020	4220	0.35	50.5	620	1290	0.35
167.3	1870	6170	0.45	51.0	570	1880	0.45
169.0	1970	5950	0.44	51.5	600	1810	0.44
170.6	2210	5750	0.41	52.0	670	1750	0.41
172.2	2470	5560	0.38	52.5	750	1690	0.38
173.9	2710	5460	0.34	53.0	830	1670	0.34
175.5	3030	5850	0.32	53.5	920	1780	0.32
177.2	2980	7750	0.41	54.0	910	2360	0.41

Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio Based on Receiver-to-Receiver Travel Time Data - Borehole B-3A

American Units				Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio	Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V_s	V_p			V_s	V_p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
178.8	3400	8770	0.41	54.5	1040	2670	0.41
180.5	3580	8330	0.39	55.0	1090	2540	0.39
182.1	3090	7940	0.41	55.5	940	2420	0.41
183.7	3030	7940	0.41	56.0	920	2420	0.41
185.4	3240	8550	0.42	56.5	990	2610	0.42
187.0	3470	8330	0.39	57.0	1060	2540	0.39
188.7	3470	9520	0.42	57.5	1060	2900	0.42
190.3	3580	9010	0.41	58.0	1090	2750	0.41
191.9	3880	8770	0.38	58.5	1180	2670	0.38
193.6	4070	8550	0.35	59.0	1240	2610	0.35
195.2	3620	8770	0.40	59.5	1100	2670	0.40
196.9	3580	8330	0.39	60.0	1090	2540	0.39
198.5	3880	8770	0.38	60.5	1180	2670	0.38
200.1	4120	9520	0.39	61.0	1250	2900	0.39
201.8	3750	8770	0.39	61.5	1140	2670	0.39
203.4	3090	7750	0.41	62.0	940	2360	0.41
205.1	3170	8330	0.42	62.5	970	2540	0.42
206.7	3550	9260	0.41	63.0	1080	2820	0.41
208.3	3920	9260	0.39	63.5	1200	2820	0.39
210.3	3750	9010	0.40	64.1	1140	2750	0.40
211.6	3330	7750	0.39	64.5	1020	2360	0.39
213.3	3510	8770	0.40	65.0	1070	2670	0.40
214.9	3790	9520	0.41	65.5	1150	2900	0.41
216.5	3920	9260	0.39	66.0	1200	2820	0.39
218.2	4020	9260	0.38	66.5	1220	2820	0.38
219.8	3920	10100	0.41	67.0	1200	3080	0.41
221.5	3700	9520	0.41	67.5	1130	2900	0.41
223.1	3470	8550	0.40	68.0	1060	2610	0.40
224.7	3880	8770	0.38	68.5	1180	2670	0.38
226.4	3970	9010	0.38	69.0	1210	2750	0.38
228.0	3830	8550	0.37	69.5	1170	2610	0.37
229.7	4170	9520	0.38	70.0	1270	2900	0.38
231.3	4500	10100	0.38	70.5	1370	3080	0.38
232.9	5210	11110	0.36	71.0	1590	3390	0.36
234.6	5130	10750	0.35	71.5	1560	3280	0.35
236.2	4630	10420	0.38	72.0	1410	3180	0.38
237.9	4980	10420	0.35	72.5	1520	3180	0.35
239.5	4900	9800	0.33	73.0	1490	2990	0.33
241.1	4020	9260	0.38	73.5	1220	2820	0.38
242.8	3830	9010	0.39	74.0	1170	2750	0.39

Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio Based on Receiver-to-Receiver Travel Time Data - Borehole B-3A

American Units				Metric Units			
Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio	Depth at Midpoint Between Receivers	Velocity		Poisson's Ratio
	V_s	V_p			V_s	V_p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
244.4	3700	8130	0.37	74.5	1130	2480	0.37
246.1	3400	8330	0.40	75.0	1040	2540	0.40
247.7	3270	8130	0.40	75.5	1000	2480	0.40
249.3	3240	8130	0.41	76.0	990	2480	0.41
251.0	3400	8130	0.39	76.5	1040	2480	0.39
252.6	4070	9260	0.38	77.0	1240	2820	0.38
254.3	4270	9010	0.35	77.5	1300	2750	0.35
255.9	4170	9520	0.38	78.0	1270	2900	0.38
257.6	3880	9520	0.40	78.5	1180	2900	0.40
259.2	3620	8770	0.40	79.0	1100	2670	0.40
260.8	4220	9260	0.37	79.5	1290	2820	0.37

Notes: "-" means no data available at that depth.

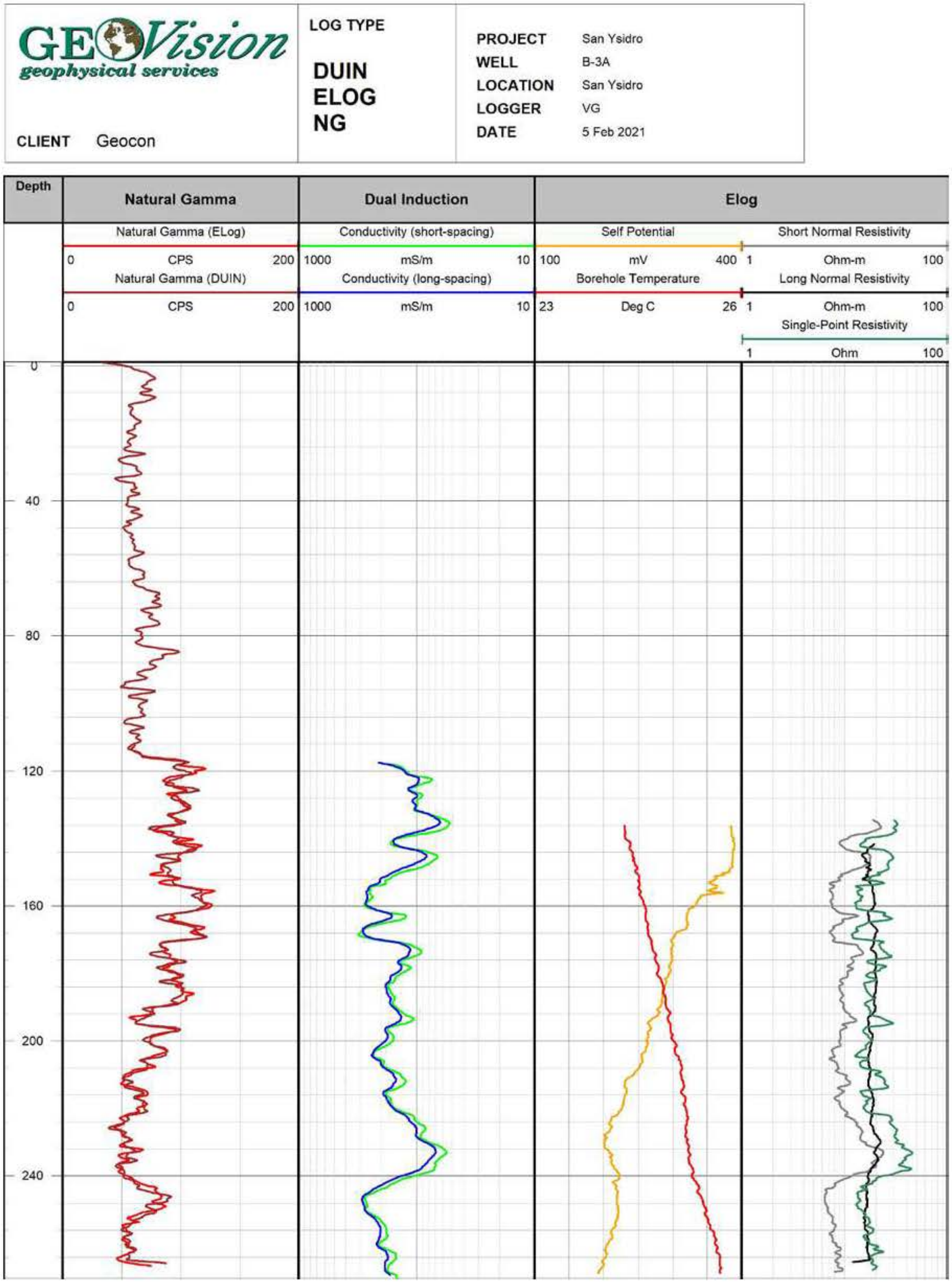


Figure 11: Borehole B-3A Dual Induction, Elog and Natural Gamma

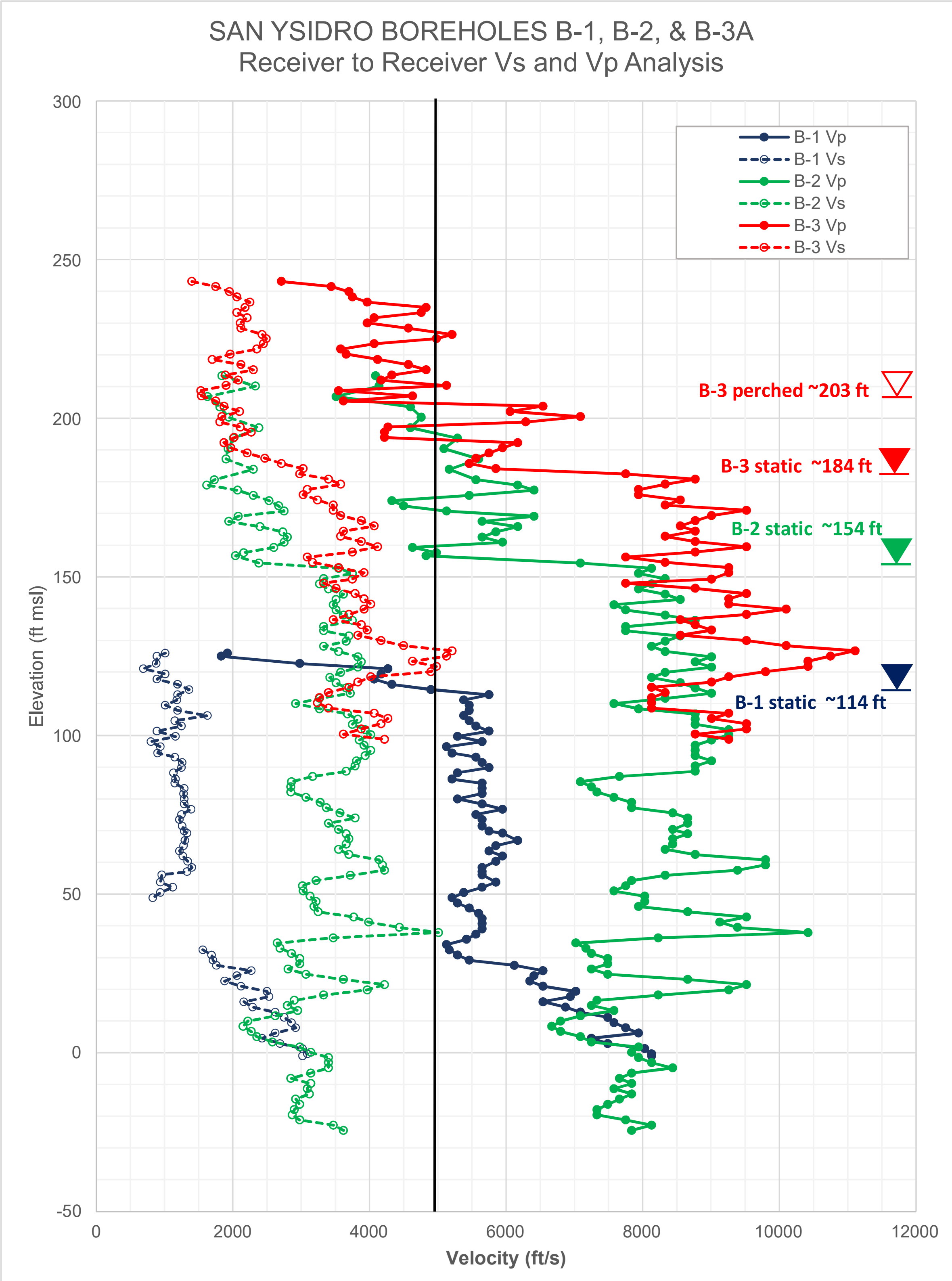


Figure 12: B-1, B-2 and B-3A Suspension R1-R2 P- and S_H-wave Velocity Comparison

APPENDIX A

SUSPENSION VELOCITY MEASUREMENT QUALITY ASSURANCE SUSPENSION SOURCE TO RECEIVER ANALYSIS RESULTS

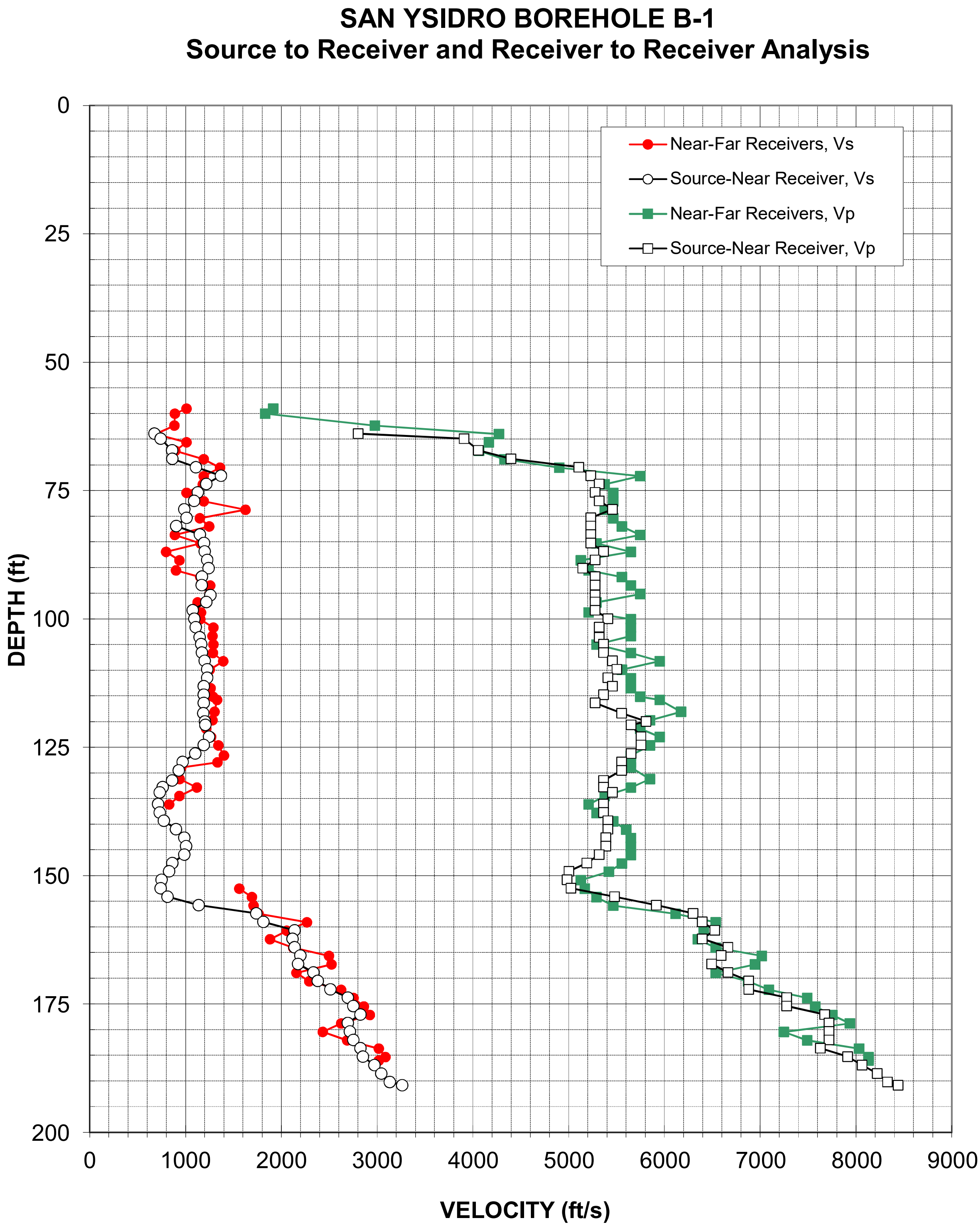


Figure A-1: Borehole B-1, Suspension S-R1 P- and SH-wave velocities

Table A-1. Borehole B-1, S - R1 quality assurance analysis P- and S_H-wave data

Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole B-1

American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V_s	V_p			V_s	V_p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
63.9	680	2800	0.47	19.5	210	850	0.47
64.9	740	3910	0.48	19.8	230	1190	0.48
67.2	860	4060	0.48	20.5	260	1240	0.48
68.8	860	4400	0.48	21.0	260	1340	0.48
70.5	1110	5100	0.48	21.5	340	1560	0.48
72.1	1370	5230	0.46	22.0	420	1590	0.46
73.7	1220	5320	0.47	22.5	370	1620	0.47
75.4	1130	5280	0.48	23.0	340	1610	0.48
77.0	1090	5320	0.48	23.5	330	1620	0.48
78.7	990	5460	0.48	24.0	300	1660	0.48
80.3	1010	5230	0.48	24.5	310	1590	0.48
81.9	900	5230	0.48	25.0	280	1590	0.48
83.6	1150	5230	0.47	25.5	350	1590	0.47
85.2	1190	5230	0.47	26.0	360	1590	0.47
86.9	1200	5360	0.47	26.5	370	1640	0.47
88.5	1230	5280	0.47	27.0	370	1610	0.47
90.1	1240	5150	0.47	27.5	380	1570	0.47
91.8	1170	5280	0.47	28.0	360	1610	0.47
93.4	1170	5280	0.47	28.5	360	1610	0.47
95.4	1260	5280	0.47	29.1	380	1610	0.47
96.7	1220	5280	0.47	29.5	370	1610	0.47
98.3	1080	5280	0.48	30.0	330	1610	0.48
100.0	1090	5410	0.48	30.5	330	1650	0.48
101.6	1110	5320	0.48	31.0	340	1620	0.48
103.6	1150	5320	0.48	31.6	350	1620	0.48
104.9	1160	5360	0.48	32.0	350	1640	0.48
106.5	1170	5360	0.47	32.5	360	1640	0.47
108.2	1200	5460	0.47	33.0	370	1660	0.47
109.8	1230	5500	0.47	33.5	370	1680	0.47
111.5	1230	5410	0.47	34.0	370	1650	0.47
113.1	1190	5460	0.48	34.5	360	1660	0.48
114.7	1190	5360	0.47	35.0	360	1640	0.47
116.4	1190	5280	0.47	35.5	360	1610	0.47
118.4	1190	5550	0.48	36.1	360	1690	0.48
120.0	1200	5810	0.48	36.6	370	1770	0.48
120.6	1210	5650	0.48	36.8	370	1720	0.48
122.9	1250	5750	0.48	37.5	380	1750	0.48

Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio Based on Source-to-Receiver Travel Time Data - Borehole B-1

American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V_s	V_p			V_s	V_p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
124.6	1190	5750	0.48	38.0	360	1750	0.48
126.2	1100	5650	0.48	38.5	340	1720	0.48
127.9	970	5550	0.48	39.0	300	1690	0.48
129.5	930	5550	0.49	39.5	280	1690	0.49
131.5	860	5360	0.49	40.1	260	1640	0.49
132.8	760	5360	0.49	40.5	230	1640	0.49
133.8	730	5460	0.49	40.8	220	1660	0.49
136.1	710	5360	0.49	41.5	220	1640	0.49
137.7	730	5360	0.49	42.0	220	1640	0.49
139.3	770	5410	0.49	42.5	240	1650	0.49
141.0	900	5410	0.49	43.0	270	1650	0.49
142.6	990	5390	0.48	43.5	300	1640	0.48
144.3	1000	5390	0.48	44.0	310	1640	0.48
145.9	990	5320	0.48	44.5	300	1620	0.48
147.6	860	5190	0.49	45.0	260	1580	0.49
149.2	830	5000	0.49	45.5	250	1530	0.49
150.8	750	4980	0.49	46.0	230	1520	0.49
152.5	740	5020	0.49	46.5	230	1530	0.49
154.1	810	5480	0.49	47.0	250	1670	0.49
155.8	1140	5920	0.48	47.5	350	1800	0.48
157.4	1740	6300	0.46	48.0	530	1920	0.46
159.0	1810	6390	0.46	48.5	550	1950	0.46
160.7	2140	6530	0.44	49.0	650	1990	0.44
162.3	2120	6390	0.44	49.5	650	1950	0.44
164.0	2140	6660	0.44	50.0	650	2030	0.44
165.6	2200	6590	0.44	50.5	670	2010	0.44
167.2	2180	6490	0.44	51.0	660	1980	0.44
168.9	2340	6660	0.43	51.5	710	2030	0.43
170.5	2380	6880	0.43	52.0	730	2100	0.43
172.2	2510	6880	0.42	52.5	770	2100	0.42
173.8	2690	7280	0.42	53.0	820	2220	0.42
175.4	2750	7280	0.42	53.5	840	2220	0.42
177.1	2830	7670	0.42	54.0	860	2340	0.42
178.7	2690	7720	0.43	54.5	820	2350	0.43
180.4	2720	7720	0.43	55.0	830	2350	0.43
182.0	2750	7720	0.43	55.5	840	2350	0.43
183.6	2830	7630	0.42	56.0	860	2320	0.42
185.3	2850	7910	0.43	56.5	870	2410	0.43
186.9	2970	8060	0.42	57.0	910	2460	0.42

Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio Based on Source-to-Receiver Travel Time Data - Borehole B-1

American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V_s	V_p			V_s	V_p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
188.6	3040	8220	0.42	57.5	930	2510	0.42
190.2	3130	8330	0.42	58.0	960	2540	0.42
190.9	3260	8440	0.41	58.2	990	2570	0.41

Notes: "-" means no data available at that depth.

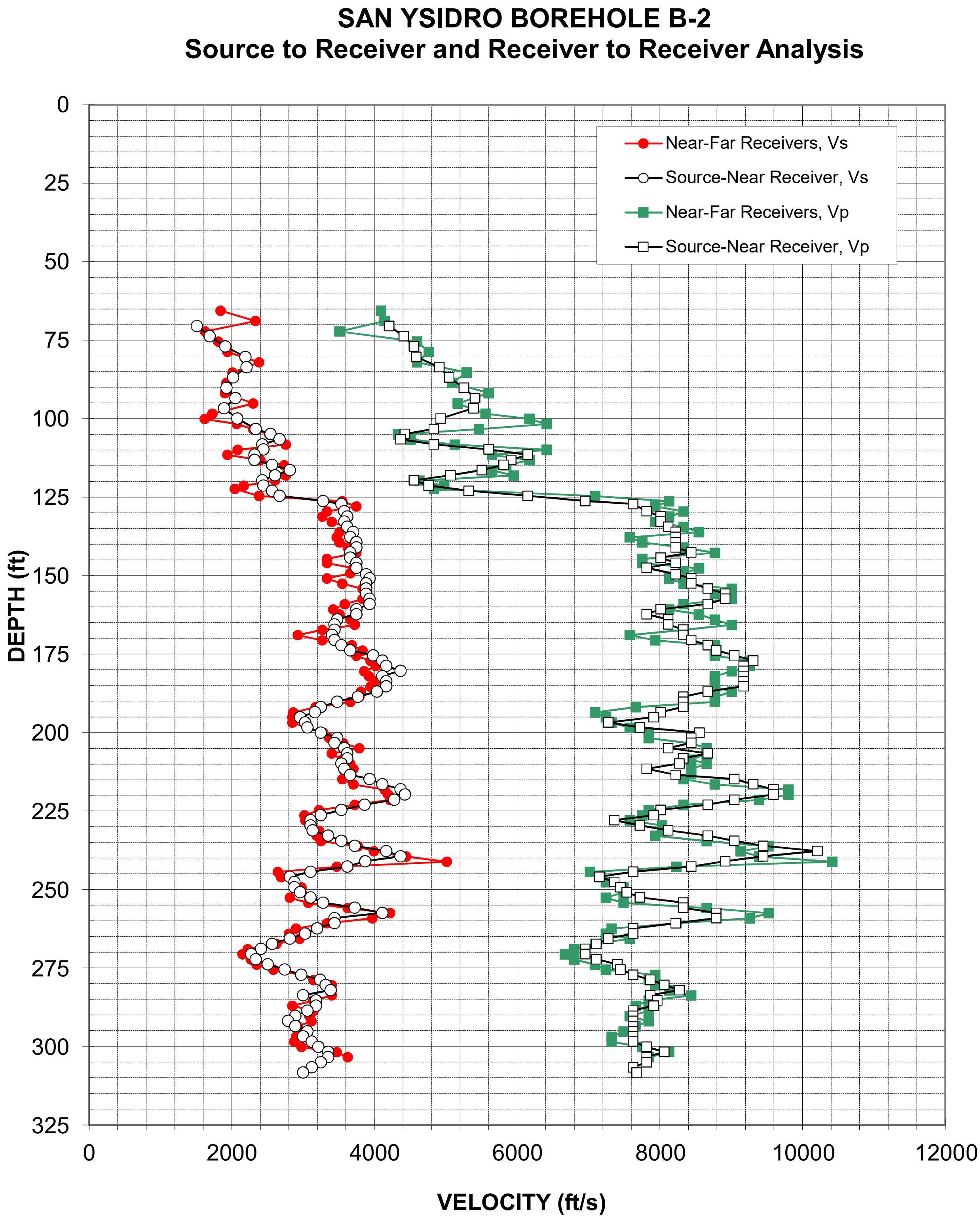


Figure A-2: Boring B-2, Suspension S-R1 P- and S_H-wave velocities

Table A-2. Borehole B-2, S - R1 quality assurance analysis P- and S_H-wave data

Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole B-2

American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V_s	V_p			V_s	V_p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
70.5	1510	4210	0.43	21.5	460	1280	0.43
73.7	1690	4410	0.41	22.5	510	1340	0.41
77.0	1910	4550	0.39	23.5	580	1390	0.39
80.3	2190	4590	0.35	24.5	670	1400	0.35
83.6	2210	4910	0.37	25.5	670	1500	0.37
86.9	2020	5040	0.40	26.5	620	1540	0.40
90.1	1920	5250	0.42	27.5	590	1600	0.42
93.4	2050	5410	0.42	28.5	620	1650	0.42
96.7	1890	5390	0.43	29.5	580	1640	0.43
100.0	2080	4930	0.39	30.5	630	1500	0.39
103.3	2340	4830	0.35	31.5	710	1470	0.35
104.9	2540	4430	0.25	32.0	770	1350	0.25
106.5	2670	4370	0.20	32.5	810	1330	0.20
108.2	2430	4830	0.33	33.0	740	1470	0.33
109.8	2440	5600	0.38	33.5	740	1710	0.38
111.5	2320	6150	0.42	34.0	710	1870	0.42
113.1	2320	5920	0.41	34.5	710	1800	0.41
114.7	2560	5810	0.38	35.0	780	1770	0.38
116.4	2810	5500	0.32	35.5	860	1680	0.32
118.0	2600	5060	0.32	36.0	790	1540	0.32
119.7	2430	4550	0.30	36.5	740	1390	0.30
121.3	2440	4760	0.32	37.0	740	1450	0.32
122.9	2560	5320	0.35	37.5	780	1620	0.35
124.6	2670	6150	0.38	38.0	810	1870	0.38
126.2	3280	6960	0.36	38.5	1000	2120	0.36
127.2	3540	7630	0.36	38.8	1080	2320	0.36
129.5	3580	7810	0.37	39.5	1090	2380	0.37
131.1	3620	8010	0.37	40.0	1100	2440	0.37
132.8	3580	8010	0.38	40.5	1090	2440	0.38
134.4	3620	8120	0.38	41.0	1100	2470	0.38
136.1	3700	8220	0.37	41.5	1130	2510	0.37
137.7	3660	8220	0.38	42.0	1120	2510	0.38
139.3	3750	8220	0.37	42.5	1140	2510	0.37
141.0	3750	8220	0.37	43.0	1140	2510	0.37
142.6	3660	8440	0.38	43.5	1120	2570	0.38
144.3	3660	8010	0.37	44.0	1120	2440	0.37
145.9	3750	8220	0.37	44.5	1140	2510	0.37

Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio Based on Source-to-Receiver Travel Time Data - Borehole B-2

American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V_s	V_p			V_s	V_p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
147.6	3750	7810	0.35	45.0	1140	2380	0.35
149.5	3880	8220	0.36	45.6	1180	2510	0.36
150.8	3930	8440	0.36	46.0	1200	2570	0.36
152.5	3880	8440	0.37	46.5	1180	2570	0.37
154.1	3880	8670	0.37	47.0	1180	2640	0.37
155.8	3880	8920	0.38	47.5	1180	2720	0.38
157.4	3930	8920	0.38	48.0	1200	2720	0.38
159.0	3930	8670	0.37	48.5	1200	2640	0.37
160.7	3750	8010	0.36	49.0	1140	2440	0.36
162.3	3750	7810	0.35	49.5	1140	2380	0.35
164.0	3480	8120	0.39	50.0	1060	2470	0.39
165.6	3440	8120	0.39	50.5	1050	2470	0.39
167.2	3440	8330	0.40	51.0	1050	2540	0.40
168.9	3400	8330	0.40	51.5	1040	2540	0.40
170.5	3440	8440	0.40	52.0	1050	2570	0.40
172.2	3540	8670	0.40	52.5	1080	2640	0.40
173.8	3660	8790	0.40	53.0	1120	2680	0.40
175.4	3980	9040	0.38	53.5	1210	2760	0.38
177.1	4110	9310	0.38	54.0	1250	2840	0.38
178.7	4160	9170	0.37	54.5	1270	2800	0.37
180.4	4370	9170	0.35	55.0	1330	2800	0.35
182.0	4110	9170	0.37	55.5	1250	2800	0.37
183.6	4160	9170	0.37	56.0	1270	2800	0.37
185.3	4160	9170	0.37	56.5	1270	2800	0.37
186.9	4030	8670	0.36	57.0	1230	2640	0.36
188.6	3770	8330	0.37	57.5	1150	2540	0.37
190.2	3480	8330	0.39	58.0	1060	2540	0.39
191.8	3250	8330	0.41	58.5	990	2540	0.41
193.5	3170	8010	0.41	59.0	960	2440	0.41
195.1	2960	7910	0.42	59.5	900	2410	0.42
196.8	3030	7280	0.40	60.0	920	2220	0.40
198.4	3060	7720	0.41	60.5	930	2350	0.41
200.0	3250	8550	0.42	61.0	990	2610	0.42
201.7	3480	8440	0.40	61.5	1060	2570	0.40
203.3	3440	8440	0.40	62.0	1050	2570	0.40
205.0	3580	8120	0.38	62.5	1090	2470	0.38
206.6	3620	8670	0.39	63.0	1100	2640	0.39
208.2	3620	8330	0.38	63.5	1100	2540	0.38
209.9	3540	8270	0.39	64.0	1080	2520	0.39

Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio Based on Source-to-Receiver Travel Time Data - Borehole B-2

American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity V_s	Velocity V_p	Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity V_s	Velocity V_p	Poisson's Ratio
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
211.5	3580	7810	0.37	64.5	1090	2380	0.37
213.5	3660	8220	0.38	65.1	1120	2510	0.38
214.8	3930	9040	0.38	65.5	1200	2760	0.38
216.4	4110	9310	0.38	66.0	1250	2840	0.38
218.1	4370	9590	0.37	66.5	1330	2920	0.37
219.7	4430	9590	0.36	67.0	1350	2920	0.36
221.4	4280	9040	0.36	67.5	1300	2760	0.36
223.0	3860	8670	0.38	68.0	1180	2640	0.38
224.7	3540	8010	0.38	68.5	1080	2440	0.38
226.3	3250	7910	0.40	69.0	990	2410	0.40
227.9	3100	7360	0.39	69.5	950	2240	0.39
229.6	3100	7720	0.40	70.0	950	2350	0.40
231.2	3130	8120	0.41	70.5	960	2470	0.41
232.9	3350	8670	0.41	71.0	1020	2640	0.41
234.5	3540	9040	0.41	71.5	1080	2760	0.41
236.1	3720	9450	0.41	72.0	1130	2880	0.41
237.8	4160	10210	0.40	72.5	1270	3110	0.40
239.4	4370	9450	0.36	73.0	1330	2880	0.36
241.1	3870	8920	0.38	73.5	1180	2720	0.38
242.7	3620	8440	0.39	74.0	1100	2570	0.39
244.3	3100	7630	0.40	74.5	950	2320	0.40
246.0	2810	7150	0.41	75.0	860	2180	0.41
247.6	2880	7360	0.41	75.5	880	2240	0.41
249.3	2880	7450	0.41	76.0	880	2270	0.41
250.9	2960	7540	0.41	76.5	900	2300	0.41
252.5	3100	7720	0.40	77.0	950	2350	0.40
254.2	3280	8330	0.41	77.5	1000	2540	0.41
255.8	3720	8330	0.38	78.0	1130	2540	0.38
257.5	4110	8790	0.36	78.5	1250	2680	0.36
259.1	3440	8790	0.41	79.0	1050	2680	0.41
260.7	3440	8220	0.39	79.5	1050	2510	0.39
262.4	3200	7630	0.39	80.0	970	2320	0.39
264.0	3030	7630	0.41	80.5	920	2320	0.41
265.7	2810	7280	0.41	81.0	860	2220	0.41
267.3	2560	7110	0.43	81.5	780	2170	0.43
268.9	2410	6960	0.43	82.0	730	2120	0.43
270.6	2270	6960	0.44	82.5	690	2120	0.44
272.2	2340	7110	0.44	83.0	710	2170	0.44
273.9	2500	7400	0.44	83.5	760	2260	0.44

Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio
Based on Source-to-Receiver Travel Time Data - Borehole B-2

American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V_s	V_p			V_s	V_p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
275.5	2740	7450	0.42	84.0	840	2270	0.42
277.1	2970	7630	0.41	84.5	910	2320	0.41
278.8	3240	7860	0.40	85.0	990	2400	0.40
280.4	3310	8060	0.40	85.5	1010	2460	0.40
282.1	3390	8270	0.40	86.0	1030	2520	0.40
283.7	3000	7860	0.41	86.5	910	2400	0.41
285.3	3180	7960	0.41	87.0	970	2430	0.41
287.0	3180	7910	0.40	87.5	970	2410	0.40
288.6	3060	7630	0.40	88.0	930	2320	0.40
290.3	2890	7630	0.42	88.5	880	2320	0.42
291.9	2790	7630	0.42	89.0	850	2320	0.42
293.5	2890	7630	0.42	89.5	880	2320	0.42
295.2	3060	7630	0.40	90.0	930	2320	0.40
296.8	3000	7630	0.41	90.5	910	2320	0.41
298.5	3120	7630	0.40	91.0	950	2320	0.40
300.1	3210	7810	0.40	91.5	980	2380	0.40
301.8	3350	8060	0.40	92.0	1020	2460	0.40
303.4	3350	7810	0.39	92.5	1020	2380	0.39
305.0	3250	7810	0.40	93.0	990	2380	0.40
306.7	3120	7630	0.40	93.5	950	2320	0.40
308.3	3000	7670	0.41	94.0	910	2340	0.41

Notes: "-" means no data available at that depth.

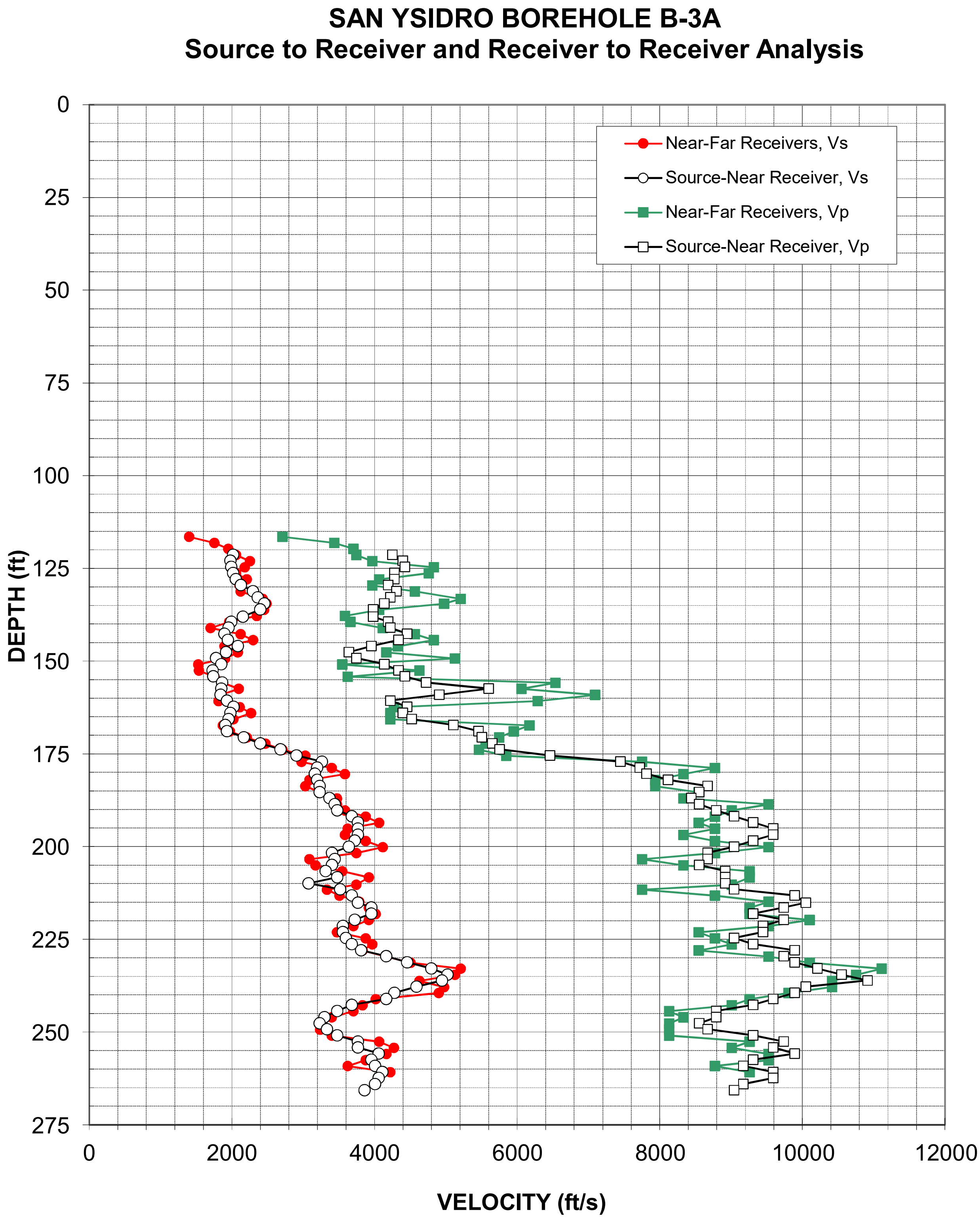


Figure A-3: Boring B-3A, Suspension S-R1 P- and S_H-wave velocities

Table A-3. Borehole B-3A, S - R1 quality assurance analysis P- and S_H-wave data

Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio Based on Source-to-Receiver Travel Time Data - Borehole B-3A

American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V_s	V_p			V_s	V_p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
121.3	2020	4250	0.35	37.0	610	1290	0.35
122.9	1980	4400	0.37	37.5	600	1340	0.37
124.6	1990	4430	0.37	38.0	610	1350	0.37
126.2	2020	4280	0.36	38.5	610	1300	0.36
127.9	2060	4280	0.35	39.0	630	1300	0.35
129.5	2120	4190	0.33	39.5	650	1280	0.33
131.1	2290	4310	0.30	40.0	700	1310	0.30
132.8	2360	4220	0.27	40.5	720	1290	0.27
134.4	2450	4140	0.23	41.0	750	1260	0.23
136.1	2400	3980	0.22	41.5	730	1210	0.22
138.0	2150	3980	0.29	42.1	660	1210	0.29
139.3	1990	4190	0.35	42.5	610	1280	0.35
141.0	1950	4220	0.36	43.0	600	1290	0.36
142.6	1900	4460	0.39	43.5	580	1360	0.39
144.3	1940	4340	0.37	44.0	590	1320	0.37
145.9	2080	3960	0.31	44.5	630	1210	0.31
147.6	1920	3640	0.31	45.0	580	1110	0.31
149.2	1780	3750	0.35	45.5	540	1140	0.35
150.8	1850	4140	0.37	46.0	560	1260	0.37
152.5	1730	4340	0.41	46.5	530	1320	0.41
154.1	1740	4430	0.41	47.0	530	1350	0.41
155.8	1860	4720	0.41	47.5	570	1440	0.41
157.4	1850	5600	0.44	48.0	560	1710	0.44
159.0	1840	4910	0.42	48.5	560	1500	0.42
160.7	1930	4220	0.37	49.0	590	1290	0.37
162.3	2020	4460	0.37	49.5	620	1360	0.37
164.0	1980	4400	0.37	50.0	600	1340	0.37
165.6	1950	4520	0.39	50.5	600	1380	0.39
167.2	1910	5100	0.42	51.0	580	1560	0.42
168.9	1930	5460	0.43	51.5	590	1660	0.43
170.5	2170	5500	0.41	52.0	660	1680	0.41
172.2	2400	5650	0.39	52.5	730	1720	0.39
173.8	2680	5750	0.36	53.0	820	1750	0.36
175.4	2900	6460	0.37	53.5	890	1970	0.37
177.1	3260	7450	0.38	54.0	990	2270	0.38
178.7	3200	7720	0.40	54.5	970	2350	0.40
180.4	3170	7810	0.40	55.0	960	2380	0.40

Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio Based on Source-to-Receiver Travel Time Data - Borehole B-3A

American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V_s	V_p			V_s	V_p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
182.0	3200	8120	0.41	55.5	970	2470	0.41
183.6	3230	8670	0.42	56.0	980	2640	0.42
185.3	3230	8550	0.42	56.5	980	2610	0.42
186.9	3370	8440	0.41	57.0	1030	2570	0.41
188.6	3440	8550	0.40	57.5	1050	2610	0.40
190.2	3480	8790	0.41	58.0	1060	2680	0.41
191.8	3680	9040	0.40	58.5	1120	2760	0.40
193.5	3770	9310	0.40	59.0	1150	2840	0.40
195.1	3770	9590	0.41	59.5	1150	2920	0.41
196.8	3770	9590	0.41	60.0	1150	2920	0.41
198.4	3720	9310	0.40	60.5	1130	2840	0.40
200.0	3640	9040	0.40	61.0	1110	2760	0.40
201.7	3400	8670	0.41	61.5	1040	2640	0.41
203.3	3440	8670	0.41	62.0	1050	2640	0.41
205.0	3400	8550	0.41	62.5	1040	2610	0.41
206.6	3310	8920	0.42	63.0	1010	2720	0.42
208.2	3480	8920	0.41	63.5	1060	2720	0.41
209.9	3070	8920	0.43	64.0	940	2720	0.43
211.5	3520	9040	0.41	64.5	1070	2760	0.41
213.2	3680	9890	0.42	65.0	1120	3010	0.42
215.1	3770	10050	0.42	65.6	1150	3060	0.42
216.4	3960	9740	0.40	66.0	1210	2970	0.40
218.1	3960	9310	0.39	66.5	1210	2840	0.39
219.7	3720	9740	0.41	67.0	1130	2970	0.41
221.4	3560	9450	0.42	67.5	1080	2880	0.42
223.0	3560	9450	0.42	68.0	1080	2880	0.42
224.7	3600	9040	0.41	68.5	1100	2760	0.41
226.3	3680	9310	0.41	69.0	1120	2840	0.41
227.9	3810	9890	0.41	69.5	1160	3010	0.41
229.6	4160	9740	0.39	70.0	1270	2970	0.39
231.2	4460	9890	0.37	70.5	1360	3010	0.37
232.9	4800	10210	0.36	71.0	1460	3110	0.36
234.5	5020	10550	0.35	71.5	1530	3220	0.35
236.1	4950	10910	0.37	72.0	1510	3330	0.37
237.8	4590	10050	0.37	72.5	1400	3060	0.37
239.4	4280	9890	0.38	73.0	1300	3010	0.38
241.1	4160	9590	0.38	73.5	1270	2920	0.38
242.7	3680	9310	0.41	74.0	1120	2840	0.41
244.3	3480	8790	0.41	74.5	1060	2680	0.41

Summary of Compressional Wave Velocity, Shear Wave Velocity, and Poisson's Ratio Based on Source-to-Receiver Travel Time Data - Borehole B-3A

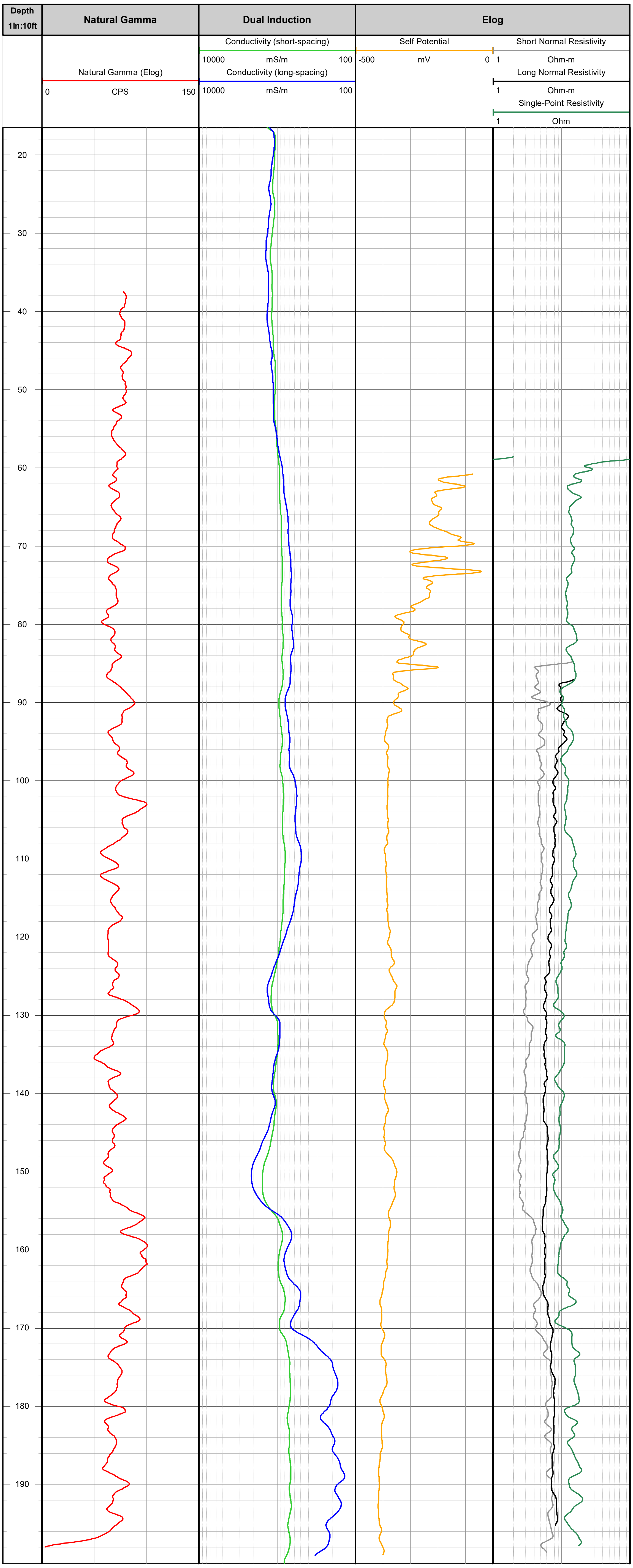
American Units				Metric Units			
Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio	Depth at Midpoint Between Source and Near Receiver	Velocity		Poisson's Ratio
	V_s	V_p			V_s	V_p	
(ft)	(ft/s)	(ft/s)		(m)	(m/s)	(m/s)	
246.0	3300	8790	0.42	75.0	1000	2680	0.42
247.6	3230	8550	0.42	75.5	980	2610	0.42
249.3	3330	8670	0.41	76.0	1020	2640	0.41
250.9	3480	9310	0.42	76.5	1060	2840	0.42
252.5	3770	9740	0.41	77.0	1150	2970	0.41
254.2	3770	9590	0.41	77.5	1150	2920	0.41
255.8	4060	9890	0.40	78.0	1240	3010	0.40
257.5	3960	9310	0.39	78.5	1210	2840	0.39
259.1	4010	9170	0.38	79.0	1220	2800	0.38
260.7	4110	9590	0.39	79.5	1250	2920	0.39
262.4	4060	9590	0.39	80.0	1240	2920	0.39
264.0	4010	9170	0.38	80.5	1220	2800	0.38
265.7	3860	9040	0.39	81.0	1180	2760	0.39

Notes: "-" means no data available at that depth.

APPENDIX B

DUAL INDUCTION, ELOG and NATURAL GAMMA LOGS

	LOG TYPE	
CLIENT Geocon	DUIN ELOG NG	PROJECT San Ysidro WELL B-1 LOCATION San Ysidro LOGGER GG DATE 04 Dec 20



GEOVision geophysical services

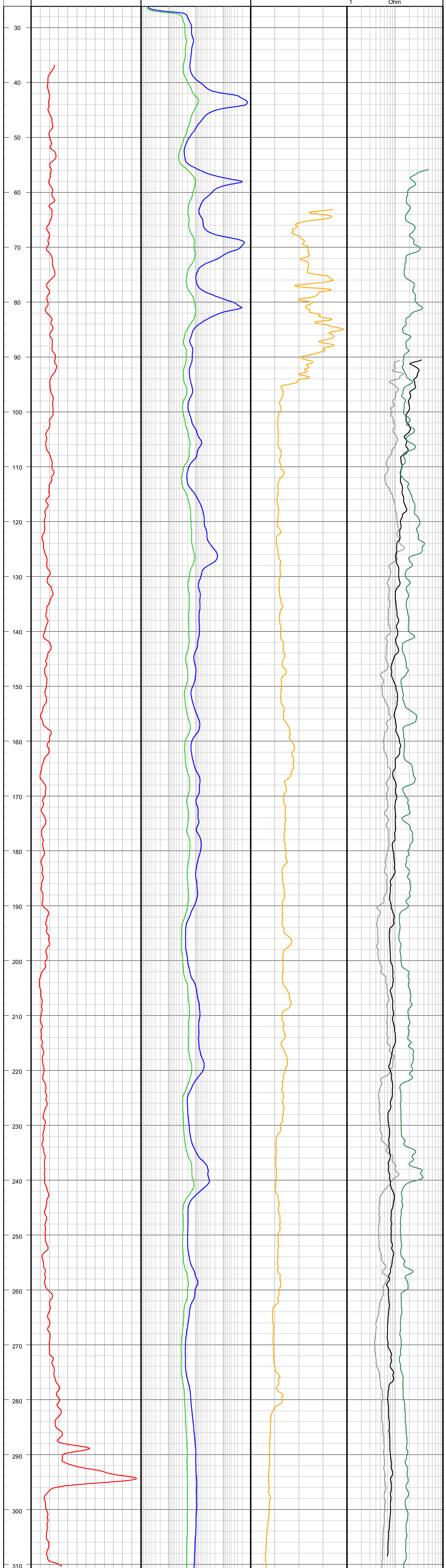
CLIENT Geocon

LOG TYPE

DUIN
ELOG
NG

PROJECT	San Ysidro
WELL	B-2
LOCATION	San Ysidro
LOGGER	GG
DATE	16 Dec 20

Depth 1in:10ft	Natural Gamma	Dual Induction	Elog	
	Natural Gamma (Elog) 0 CPS 600	Conductivity (short-spacing) 10000 mS/m; Conductivity (long-spacing) 10000 mS/m	Self Potential -400 mV 0	Short Normal Resistivity 1 Ohm-m; Long Normal Resistivity 1 Ohm-m; Single-Point Resistivity 1 Ohm



GEOVision geophysical services

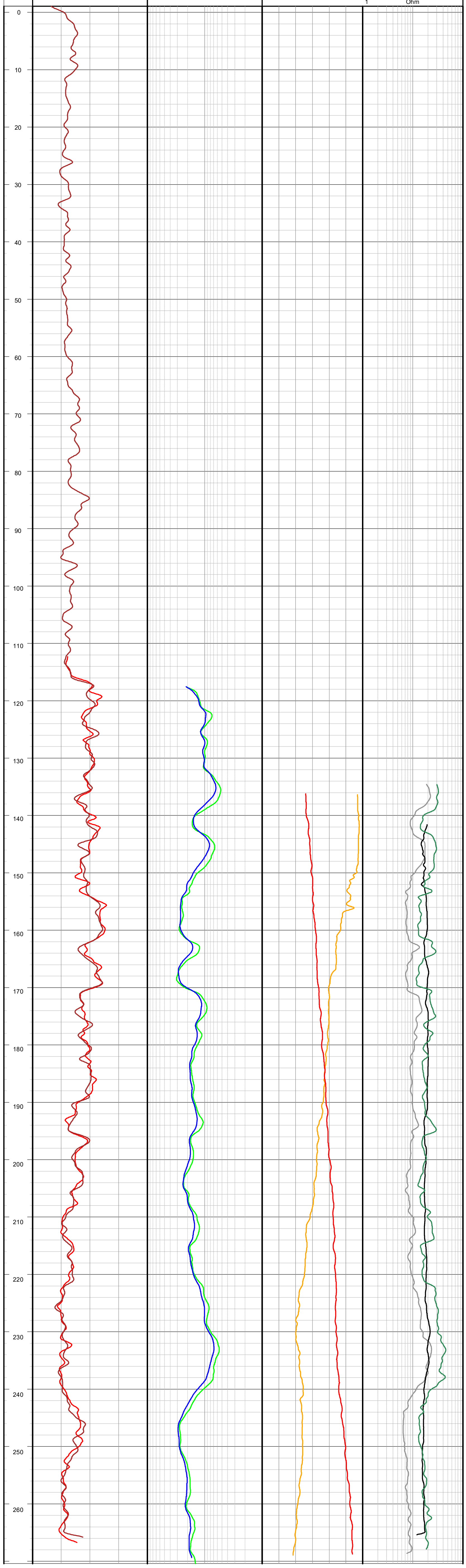
CLIENT Geocon

LOG TYPE

DUIN
ELOG
NG

PROJECT	San Ysidro
WELL	B-3A
LOCATION	San Ysidro
LOGGER	VG
DATE	5 Feb 2021

Depth 1in:10ft	Natural Gamma	Dual Induction	Elog	
	Natural Gamma (ELog) 0 CPS 200	Conductivity (short-spacing) 1000 mS/m	Self Potential 100 mV 400	Short Normal Resistivity 1 Ohm-m
	Natural Gamma (DUIN) 0 CPS 200	Conductivity (long-spacing) 1000 mS/m	Borehole Temperature 23 Deg C 26	Long Normal Resistivity 1 Ohm-m
				Single-Point Resistivity 1 Ohm



APPENDIX C

BORING GEOPHYSICAL LOGGING SYSTEMS - NIST TRACEABLE CALIBRATION RECORDS

MICRO PRECISION CALIBRATION, INC
2165 N. Glassell St.,
Orange, CA 92865
714-901-5659

Certificate of Calibration

Date: Sep 25, 2020 **Cert No. 551220083842967**

Customer:
GEOVISION
1124 OLYMPIC DRIVE
CORONA CA 92881

		Work Order #:	LA-90048091
		Purchase Order #:	OH-200925-01
MPC Control #:	BG9698	Serial Number:	15014
Asset ID:	15014	Department:	N/A
Gage Type:	LOGGER	Performed By:	TYLER MCKEEN
Manufacturer:	OYO	Received Condition:	IN TOLERANCE
Model Number:	03331-0000	Returned Condition:	IN TOLERANCE
Size:	N/A	Cal. Date:	September 18, 2020
Temp/RH:	26.7°C / 41.2%	Cal. Interval:	12 MONTHS
Location:	Calibration performed at MPC facility	Cal. Due Date:	September 18, 2021

Calibration Notes:
See Attached Data Sheet For Calculations (1 Page)

This Certificate Supersedes Cert No. 551220083842711, Corrected Serial Number.

Calibrated IAW customer supplied data form Rev 2.1
Frequency measurement uncertainty = 0.0005 Hz
Unit calibrated with Panasonic Toughbook CF-31 Ser#: 2ITYA90009

Calibrated to 4:1 accuracy ratio.

Standards Used to Calibrate Equipment

I.D.	Description.	Model	Serial	Manufacturer	Cal. Due Date	Traceability #
DB8748	GPS TIME AND FREQUENCY RECEIVER	58503A	3625A01225	HEWLETT PACKARD	Apr 30, 2021	551220083021224
LAS0052	ARB / FUNC GENERATOR	33250A	MY40029031	AGILENT	Oct 31, 2020	551220083302616
BD7715	UNIVERSAL COUNTER	53131A	3416A05377	HEWLETT PACKARD	Apr 30, 2021	551220082934517

Calibrating Technician: TYLER MCKEEN

QC Approval: NIKOLAS GROHMAN

STATEMENTS OF PASS OR FAIL CONFORMANCE: The uncertainty of measurement has been taken into account when determining compliance with specification. All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCSL Z540.3-2006 and in case without guard banded the probability of false-accept depending on test uncertainty ratio.

THE CALIBRATION REPORT STATUS:
PASS- Term used when compliance statement is given, and the measurement result is PASS.
PASS^{Z}- Term used when compliance statement is given, and the measurement result is conditional passed or PASS^{Z}.
FAIL- Term used when compliance statement is given, and the measurement result is FAIL.
FAIL^{Z}- Term used when compliance statement is given, and the measurement result is conditional failed or FAIL^{Z}.
REPORT OF VALUE - Term used when reported measurement is not requiring compliance statement in report.
ADJUSTED- When adjustments are made to an instrument which changes the value of measurement from what was measured as found to new value as left.
LIMITED - When an instrument fails calibration but is still functional in a limited manner.

The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated. This calibration report complies with ISO/IEC 17025:2017 and ANSI/NCSL Z540.3. Calibration cycles and resulting due dates were submitted/approved by the customer. Any number of factors may cause an instrument to drift out of tolerance before the next scheduled calibration. Recalibration cycles should be based on frequency of use, environmental conditions and customer's established systematic accuracy. All standards are traceable to SI through the National Institute of Standards and Technology (NIST) and/or recognized national or international standards laboratories. Services rendered include proper manufacturer's service instruction and are warranted for no less than thirty (30) days. The information on this report pertains only to the instrument identified, this may not be reproduced in part or in a whole without the prior written approval of the issuing MP Calibration Laboratory.

MICRO PRECISION CALIBRATION, INC
2165 N. Glassell St.,
Orange, CA 92865
714-901-5659

Certificate of Calibration

Date: Sep 25, 2020 **Cert No. 551220083842967**

Procedures Used in this Event

Procedure Name	Description
GEOVISION SEISMIC Rev. 2.1	Seismic Logger/Recorder Calibration Procedure, Rev. 2.1

Calibrating Technician: TYLER MCKEEN

QC Approval: NIKOLAS GROHMAN

STATEMENTS OF PASS OR FAIL CONFORMANCE: The uncertainty of measurement has been taken into account when determining compliance with specification. All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCSL Z540.3-2006 and in case without guard banded the probability of false-accept depending on test uncertainty ratio.

THE CALIBRATION REPORT STATUS:
PASS- Term used when compliance statement is given, and the measurement result is PASS.
PASS^{z}- Term used when compliance statement is given, and the measurement result is conditional passed or PASS^{z}.
FAIL- Term used when compliance statement is given, and the measurement result is FAIL.
FAIL^{z}- Term used when compliance statement is given, and the measurement result is conditional failed or FAIL^{z}.
REPORT OF VALUE - Term used when reported measurement is not requiring compliance statement in report.
ADJUSTED- When adjustments are made to an instrument which changes the value of measurement from what was measured as found to new value as left.
LIMITED - When an instrument fails calibration but is still functional in a limited manner.

The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated. This calibration report complies with ISO/IEC 17025:2017 and ANSI/NCSL Z540.3. Calibration cycles and resulting due dates were submitted/approved by the customer. Any number of factors may cause an instrument to drift out of tolerance before the next scheduled calibration. Recalibration cycles should be based on frequency of use, environmental conditions and customer's established systematic accuracy. All standards are traceable to SI through the National Institute of Standards and Technology (NIST) and/or recognized national or international standards laboratories. Services rendered include proper manufacturer's service instruction and are warranted for no less than thirty (30) days. The information on this report pertains only to the instrument identified, this may not be reproduced in part or in a whole without the prior written approval of the issuing MP Calibration Laboratory.

BG9698

SUSPENSION PS SEISMIC LOGGER/RECORDER CALIBRATION DATA FORM

INSTRUMENT DATA

System mfg.:	OYO	Model no.:	3331
Serial no.:	15014	Calibration date:	9/18/2020
By:	MICROPRECISION	Due date:	9/18/2021
Counter mfg.:	HEWLETT PACKARD	Model no.:	53131A
Serial no.:	3416A05377	Calibration date:	4/23/2020
By:	MICROPRECISION	Due date:	4/30/2021
Signal generator mfg.:	AGILENT	Model no.:	33250A
Serial no.:	MY40029031	Calibration date:	10/31/2019
By:	MICROPRECISION	Due date:	10/31/2020
Laptop controller mfg.:	PANASONIC	Model no.:	CF-31
Serial no.:	21TYA90009	Calibration date:	N/A

SYSTEM SETTINGS:

Gain: 10
Filter: 5 Hz Low Cut, 20 KHz Hi Cut
Range: 5-200 μs
Delay: 0
Stack (1 std): ✓
System date = correct date and time: ✓ 8:20 AM 9/18/2020

PROCEDURE:

Set sine wave frequency to target frequency with amplitude of approximately 0.25 volt peak
Note actual frequency on data form.
Set sample period and record data file to disk. Note file name on data form.
Pick duration of 9 cycles using PSLOG.EXE program, note duration on data form, and save as .sps file. Calculate average frequency for each channel pair and note on data form.

Average frequency must be within +/- 1% of actual frequency at all data points.

Maximum error ((AVG-ACT)/ACT*100)% As found 0.13% As left 0.13%

Target Frequency (Hz)	Actual Frequency (Hz)	Sample Period (microS)	File Name	Time for 9 cycles Hn (msec)	Average Frequency Hn (Hz)	Time for 9 cycles Hr (msec)	Average Frequency Hr (Hz)	Time for 9 cycles V (msec)	Average Frequency V (Hz)
50.00	50.00	200	001	180.0	50.00	180.0	50.00	180.0	50.00
100.0	100.0	100	002	90.00	100.0	90.00	100.0	90.00	100.0
200.0	200.0	50	003	44.90	200.4	44.90	200.4	45.00	200.0
500.0	500.0	20	004	18.00	500.0	18.00	500.0	18.00	500.0
1000	1000	10	005	8.990	1001	9.010	998.9	8.990	1001
2000	2000	5	006	4.500	2000	4.500	2000	4.500	2000

Calibrated by: Tyler McKeen (Name) 9/18/20 (Date) (Signature)

Witnessed by: ROBERT STELLER (Name) 9/18/2020 (Date) (Signature)

Suspension PS Seismic Recorder/Logger Calibration Data Form Rev 2.1 February 7, 2012

MICRO PRECISION CALIBRATION, INC
2165 N. Glassell St.,
Orange, CA 92865
714-901-5659

ANAB ACCREDITED ISO/IEC 17025 CALIBRATION LABORATORY AC-1969.03

Certificate of Calibration

Date: Nov 11, 2020 **Cert No. 551220083929139**

Customer:
GEOVISION
1124 OLYMPIC DRIVE
CORONA CA 92881

		Work Order #:	LA-90048480
		Purchase Order #:	19401-201023-01
MPC Control #:	AM6767	Serial Number:	160023
Asset ID:	160023	Department:	N/A
Gage Type:	LOGGER	Performed By:	TYLER MCKEEN
Manufacturer:	OYO	Received Condition:	IN TOLERANCE
Model Number:	3403	Returned Condition:	IN TOLERANCE
Size:	N/A	Cal. Date:	October 27, 2020
Temp/RH:	22.5°C / 42.9%	Cal. Interval:	12 MONTHS
Location:	Calibration performed at MPC facility	Cal. Due Date:	October 27, 2021

Calibration Notes:
See attached data sheet for calculations. (1 Page)
Calibrated IAW customer supplied data form Rev 2.1
Frequency measurement uncertainty = 0.0005 Hz
Unit calibrated with Laptop Panasonic Model CF-29, s/n: 6AKSB01291 and RG Micrologger II Serial No. 5772
Calibrated To 4:1 Accuracy Ratio

Calibration performed in accordance with approved GEOVision calibration procedures included in work Instruction No. 13
Software: ML PS 4.00 Suspension Logger, GVLog.jar (2004) and pslog.exe ver 1.00 software.

Standards Used to Calibrate Equipment

I.D.	Description.	Model	Serial	Manufacturer	Cal. Due Date	Traceability #
DB8748	GPS TIME AND FREQUENCY RECEIVER	58503A	3625A01225	HEWLETT PACKARD	Apr 30, 2021	551220083021224
BD7715	UNIVERSAL COUNTER	53131A	3416A05377	HEWLETT PACKARD	Apr 30, 2021	551220082934517
LAS0018	ARB / FUNC GENERATOR	33250A	US40001522	AGILENT	Apr 30, 2021	551220083580408

Calibrating Technician: QC Approval:

TYLER MCKEEN ILYA VAKS

MICRO PRECISION CALIBRATION, INC
2165 N. Glassell St.,
Orange, CA 92865
714-901-5659

Certificate of Calibration

AC-1969.03

Date: Nov 11, 2020 **Cert No. 551220083929139**

Procedures Used in this Event

Procedure Name	Description
GEOVISION SEISMIC Rev. 2.1	Seismic Logger/Recorder Calibration Procedure, Rev. 2.1

Calibrating Technician: QC Approval:

Ilya Vaks

TYLER MCKEEN ILYA VAKS

STATEMENTS OF PASS OR FAIL CONFORMANCE: The uncertainty of measurement has been taken into account when determining compliance with specification. All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCSL Z540.3-2006 and in case without guard banded the probability of false-accept depending on test uncertainty ratio.

THE CALIBRATION REPORT STATUS:
PASS- Term used when compliance statement is given, and the measurement result is PASS.
PASS^Z- Term used when compliance statement is given, and the measurement result is conditional passed or PASS^Z.
FAIL- Term used when compliance statement is given, and the measurement result is FAIL.
FAIL^Z- Term used when compliance statement is given, and the measurement result is conditional failed or FAIL^Z.
REPORT OF VALUE - Term used when reported measurement is not requiring compliance statement in report.
ADJUSTED- When adjustments are made to an instrument which changes the value of measurement from what was measured as found to new value as left.
LIMITED - When an instrument fails calibration but is still functional in a limited manner.

The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated. This calibration report complies with ISO/IEC 17025:2017 and ANSI/NCSL Z540.3. Calibration cycles and resulting due dates were submitted/approved by the customer. Any number of factors may cause an instrument to drift out of tolerance before the next scheduled calibration. Recalibration cycles should be based on frequency of use, environmental conditions and customer's established systematic accuracy. All standards are traceable to SI through the National Institute of Standards and Technology (NIST) and/or recognized national or international standards laboratories. Services rendered include proper manufacturer's service instruction and are warranted for no less than thirty (30) days. The information on this report pertains only to the instrument identified, this may not be reproduced in part or in a whole without the prior written approval of the issuing MP Calibration Laboratory.

GEOVision geophysical services

SUSPENSION PS SEISMIC LOGGER/RECORDER CALIBRATION DATA FORM

INSTRUMENT DATA

System mfg.:	OYO	Model no.:	3403
Serial no.:	160023	Calibration date:	10/27/2020
By:	Micro Precision	Due date:	10/27/2021
Counter mfg.:	Hewlett Packard	Model no.:	53131A
Serial no.:	3416A05377	Calibration date:	04/23/2020
By:	Micro Precision	Due date:	04/30/2021
Signal generator mfg.:	Agilent	Model no.:	33250A
Serial no.:	US40001522	Calibration date:	04/02/2020
By:	Micro Precision	Due date:	04/30/2021
Laptop controller mfg.:	Panasonic	Model no.:	CF-29
Serial no.:	6AKSB01291	Calibration date:	N/A

SYSTEM SETTINGS:

Gain:	0 (2 all) (lowest)
Filter	10 KHz low pass
Range:	200 to 5 microsec
Delay:	Ø
Stack (1 std)	1
System date = correct date and time	yes

PROCEDURE:

Set sine wave frequency to target frequency with amplitude of approximately 0.25 volt peak
Note actual frequency on data form.
Set sample period and record data file to disk. Note file name on data form.
Pick duration of 9 cycles using PSLOG.EXE program, note duration on data form, and save as .sps file. Calculate average frequency for each channel pair and note on data form.

Average frequency must be within +/- 1% of actual frequency at all data points.

Laptop 6AKSB01291
CF-29
Software ML PS 4.00
PSLog.exe v1.00
GVLog.jar ver 2004

Maximum error ((AVG-ACT)/ACT*100)% As found 0.2% As left 0.2%

Target Frequency (Hz)	Actual Frequency (Hz)	Sample Period (microS)	File Name Co23	Time for 9 cycles Hn (msec)	Average Frequency Hn (Hz)	Time for 9 cycles Hr (msec)	Average Frequency Hr (Hz)	Time for 9 cycles V (msec)	Average Frequency V (Hz)
50.00	50.00	200	001	180	50.00	180	50.00	179.8	50.06
100.0	100.0	100	002	90	100.0	90.1	99.89	89.9	100.1
200.0	200.0	50	003	45.1	199.6	45.1	199.6	45.05	199.8
500.0	500.0	20	004	18	500.0	~~18.3~~ 18	500.0	18	500.0
1000	1000	10	005	8.99	1001	9.00	1000	8.99	1001.
2000	2000	5	006	4.5	2000	4.495	2002	4.505	1998

Calibrated by: Tyler McLean — Name; 10/27/20 — Date; [signature] — Signature

Witnessed by: Emily Feldman — Name; 10/27/20 — Date; [signature] — Signature

Suspension PS Seismic Recorder/Logger Calibration Data Form Rev 2.1 February 7, 2012

MICRO PRECISION CALIBRATION, INC
2165 N. Glassell St.,
Orange, CA 92865
714-901-5659

Certificate of Calibration

ISO/IEC 17025 CALIBRATION LABORATORY
AC-1969.03

Date: Nov 11, 2020 **Cert No. 551220083929148**

Customer:

GEOVISION
1124 OLYMPIC DRIVE
CORONA CA 92881

MPC Control #:	AM6768	Work Order #:	LA-90048480
Asset ID:	160024	Purchase Order #:	19401-201023-01
Gage Type:	LOGGER	Serial Number:	160024
Manufacturer:	OYO	Department:	N/A
Model Number:	3403	Performed By:	TYLER MCKEEN
Size:	N/A	Received Condition:	IN TOLERANCE
Temp/RH:	26.7°C / 41.2%	Returned Condition:	IN TOLERANCE
Location:	Calibration performed at MPC facility	Cal. Date:	October 27, 2020
		Cal. Interval:	12 MONTHS
		Cal. Due Date:	October 27, 2021

Calibration Notes:

See attached data sheet for calculations. (1 Page)
Calibrated IAW customer supplied data form Rev 2.1
Frequency measurement uncertainty = 0.0005 Hz
Unit calibrated with Laptop Panasonic Model CF-29, s/n: 6AKSB01291 and RG Micrologger II Serial No. 5772
Calibrated To 4:1 Accuracy Ratio

Calibration performed in accordance with approved GEOVision calibration procedures included in work Instruction No. 13
Software: ML PS 4.00 Suspension Logger, GVLog.jar (2004) and pslog.exe ver 1.00 software.

Standards Used to Calibrate Equipment

I.D.	Description.	Model	Serial	Manufacturer	Cal. Due Date	Traceability #
DB8748	GPS TIME AND FREQUENCY RECEIVER	58503A	3625A01225	HEWLETT PACKARD	Apr 30, 2021	551220083021224
BD7715	UNIVERSAL COUNTER	53131A	3416A05377	HEWLETT PACKARD	Apr 30, 2021	551220082934517
LAS0018	ARB / FUNC GENERATOR	33250A	US40001522	AGILENT	Apr 30, 2021	551220083580408

Calibrating Technician: TYLER MCKEEN

QC Approval: Ilya Vaks

ILYA VAKS

STATEMENTS OF PASS OR FAIL CONFORMANCE: The uncertainty of measurement has been taken into account when determining compliance with specification. All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCSL Z540.3-2006 and in case without guard banded the probability of false-accept depending on test uncertainty ratio.

THE CALIBRATION REPORT STATUS:
PASS- Term used when compliance statement is given, and the measurement result is PASS.
PASS^{Z}- Term used when compliance statement is given, and the measurement result is conditional passed or PASS^{Z}.
FAIL- Term used when compliance statement is given, and the measurement result is FAIL.
FAIL^{Z}- Term used when compliance statement is given, and the measurement result is conditional failed or FAIL^{Z}.
REPORT OF VALUE - Term used when reported measurement is not requiring compliance statement in report.
ADJUSTED- When adjustments are made to an instrument which changes the value of measurement from what was measured as found to new value as left.
LIMITED - When an instrument fails calibration but is still functional in a limited manner.

The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated. This calibration report complies with ISO/IEC 17025:2017 and ANSI/NCSL Z540.3. Calibration cycles and resulting due dates were submitted/approved by the customer. Any number of factors may cause an instrument to drift out of tolerance before the next scheduled calibration. Recalibration cycles should be based on frequency of use, environmental conditions and customer's established systematic accuracy. All standards are traceable to SI through the National Institute of Standards and Technology (NIST) and/or recognized national or international standards laboratories. Services rendered include proper manufacturer's service instruction and are warranted for no less than thirty (30) days. The information on this report pertains only to the instrument identified,

MICRO PRECISION CALIBRATION, INC
2165 N. Glassell St.,
Orange, CA 92865
714-901-5659

Certificate of Calibration

AC-1969.03

Date: Nov 11, 2020 **Cert No. 551220083929148**

Procedures Used in this Event

Procedure Name	Description
GEOVISION SEISMIC Rev. 2.1	Seismic Logger/Recorder Calibration Procedure, Rev. 2.1

Calibrating Technician: QC Approval:

Ilya Vaks

TYLER MCKEEN ILYA VAKS

STATEMENTS OF PASS OR FAIL CONFORMANCE: The uncertainty of measurement has been taken into account when determining compliance with specification. All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCSL Z540.3-2006 and in case without guard banded the probability of false-accept depending on test uncertainty ratio.

THE CALIBRATION REPORT STATUS:
PASS- Term used when compliance statement is given, and the measurement result is PASS.
PASS^{Z}- Term used when compliance statement is given, and the measurement result is conditional passed or PASS^{Z}.
FAIL- Term used when compliance statement is given, and the measurement result is FAIL.
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LIMITED - When an instrument fails calibration but is still functional in a limited manner.

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GEOVision geophysical services

SUSPENSION PS SEISMIC LOGGER/RECORDER CALIBRATION DATA FORM

INSTRUMENT DATA

System mfg.:	OYO	Model no.:	3403
Serial no.:	160024	Calibration date:	10/27/2020
By:	Micro Precision	Due date:	10/27/2021
Counter mfg.:	Hewlett Packard	Model no.:	53131A
Serial no.:	3416A 05377	Calibration date:	04/23/2020
By:	Micro Precision	Due date:	04/30/2021
Signal generator mfg.:	Agilent	Model no.:	33250A
Serial no.:	US40001522	Calibration date:	04/02/2020
By:	Micro Precision	Due date:	04/30/2021
Laptop controller mfg.:	Panasonic	Model no.:	CF-29
Serial no.:	6AKSB01291	Calibration date:	N/A

SYSTEM SETTINGS:

Gain:	0 (2 all / lowest)
Filter	10kHz low pass
Range:	200 to 5 microsec
Delay:	0
Stack (1 std)	1
System date = correct date and time	Yes

PROCEDURE:

Set sine wave frequency to target frequency with amplitude of approximately 0.25 volt peak
Note actual frequency on data form.
Set sample period and record data file to disk. Note file name on data form.
Pick duration of 9 cycles using PSLOG.EXE program, note duration on data form, and save as .sps file. Calculate average frequency for each channel pair and note on data form.

Software ML PS 4.00
PS Log.exe V.1.00
GVLog.jar ver. 2004

Average frequency must be within +/- 1% of actual frequency at all data points.

Maximum error ((AVG-ACT)/ACT*100)% As found 0.12% As left 0.12%

Target Frequency (Hz)	Actual Frequency (Hz)	Sample Period (microS)	File Name C024	Time for 9 cycles Hn (msec)	Average Frequency Hn (Hz)	Time for 9 cycles Hr (msec)	Average Frequency Hr (Hz)	Time for 9 cycles V (msec)	Average Frequency V (Hz)
50.00	50.00	200	001	180.2	49.94	180	50.00	180.2	49.94
100.0	100.0	100	002	89.9	100.1	90	100.0	89.9	100.1
200.0	200.0	50	003	45	200.0	45.05	199.8	45	200.0
500.0	500.0	20	004	18	500.0	18	500.0	18	500.0
1000	1000	10	005	9	1000	9.01	998.9	9	1000
2000	2000	5	006	4.495	2002	4.495	2002	4.505	1998

Calibrated by: [signature] Name — Date 10/29/20 — Signature Tyler McKean

Witnessed by: Emily Feldman Name — Date 10/27/20 — Signature [signature]

Suspension PS Seismic Recorder/Logger Calibration Data Form Rev 2.1 February 7, 2012

APPENDIX H

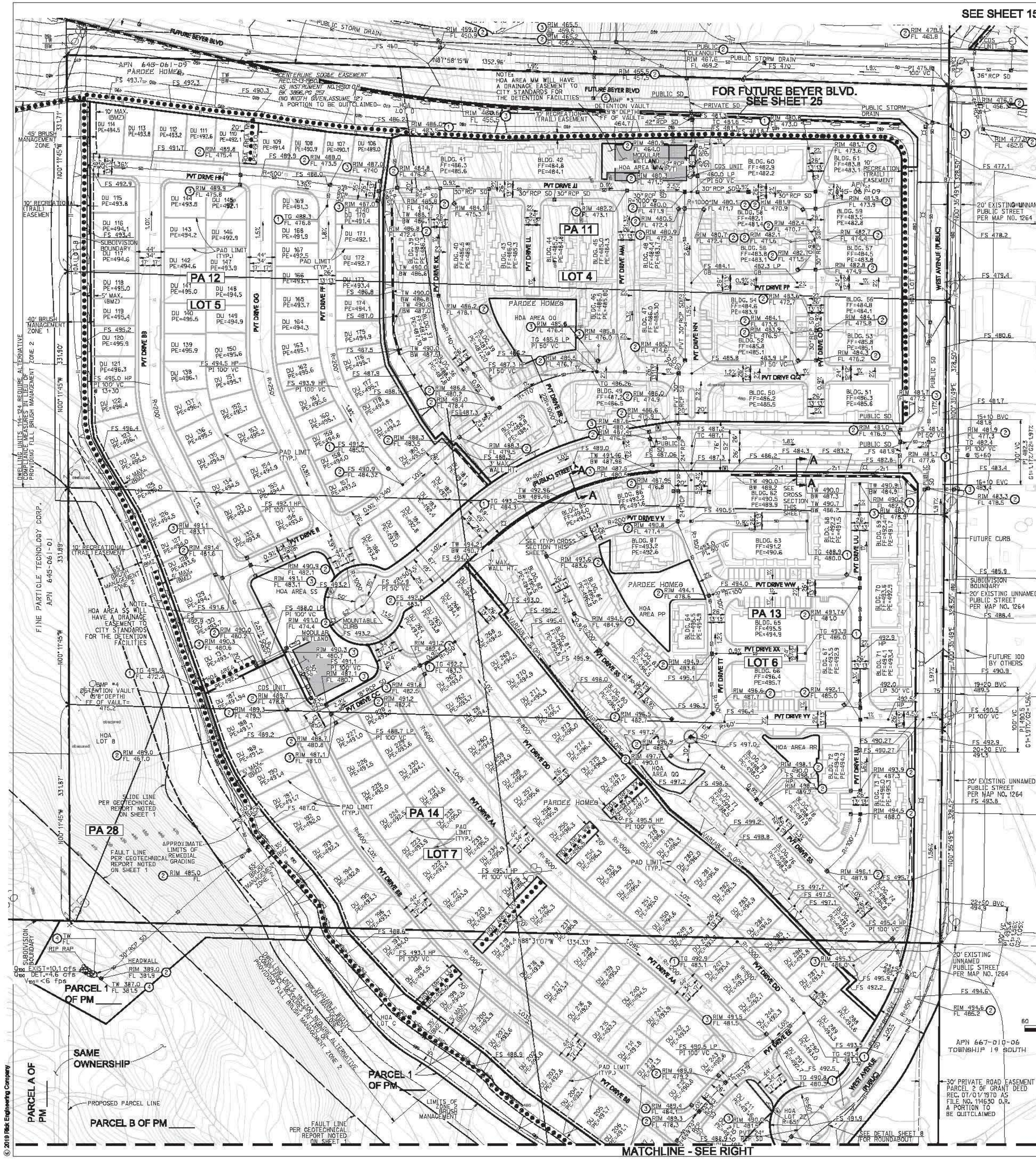
APPENDIX H

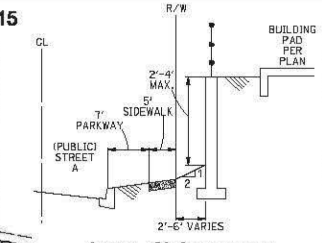
RICK ENGINEERING VTM PLAN

FOR

SOUTHWEST VILLAGE VTM-1
SAN DIEGO, CALIFORNIA

PROJECT NO. 06847-42-04



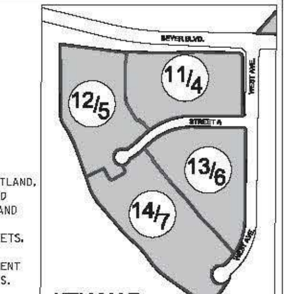


(PUBLIC) STREET A RETAINING WALL TYPICAL SECTION A-A

NO SCALE

NOTES

1. SLOPES LESS THAN 3' HIGH ARE NOT SHOWN.
2. CONTOURS ARE SHOWN AT 2' INTERVALS.
3. DRAINAGE FACILITIES AND STRUCTURES TO BE CONSTRUCTED PER CITY OF SAN DIEGO STANDARD DRAWINGS FOR PUBLIC WORKS CONSTRUCTION.
4. SEE SHEETS 17 & 18 FOR SEWER, WATER, AND FIRE SERVICE DESIGN.
5. DAYLIGHT GRADING CONDITIONS AT THE NORTH EASTERN CORNER OF THE DEVELOPMENT CORRELATES WITH WORK TO BE CONCURRENTLY PERFORMED PER TENTATIVE MAP NO. 114999 (CANDLELIGHT) & TENTATIVE MAP NO. 1478488 (SOUTWIND).
6. STREETS A AND WEST AVE. ARE PUBLIC STREETS.
7. STREETS AA-YY ARE PRIVATE DRIVES.
8. DETAILS AND CUT SHEETS FOR WATER QUALITY STRUCTURES (MODULAR WETLAND, CDS UNIT, STORM TRAP SUB-SURFACE WATER QUALITY VAULT) CAN BE FOUND AS PART OF THE PDP STORM WATER QUALITY MANAGEMENT PLAN (SWQMP) AND ARE SUBJECT TO CHANGE
9. ALL STORM DRAINS ARE PRIVATE EXCEPT THOSE LOCATED IN PUBLIC STREETS.
10. RETAINING WALLS LESS THAN 3 FEET ARE NOT SHOWN.
11. HOA AREA SS AND YY WILL HAVE A DRAINGE AND FLOOD STORAGE EASEMENT FOR ASSOCIATED DRAINAGE FACILITIES PER CITY ENGINEERS' REQUIREMENTS.
12. AT STORM DRAIN DISCHARGE LOCATIONS, ENERGY DISSIPATORS WILL BE INSTALLED TO REDUCE VELOCITIES TO NON-ERODIBLE VELOCITIES. NO ADDITIONAL RUNOFF FLOW RATE WILL BE PROPOSED AT THE DISCHARGE LOCATION.
13. ALL PRIVATE STORM DRAIN CONNECTING TO PUBLIC STORM DRAIN WILL REQUIRE AN ENCROACHMENT MAINTENANCE REMOVAL AGREEMENT (EMRA).
14. SEE SHEET 27 FOR BORROW SITE PLAN.



KEY MAP
NOT TO SCALE

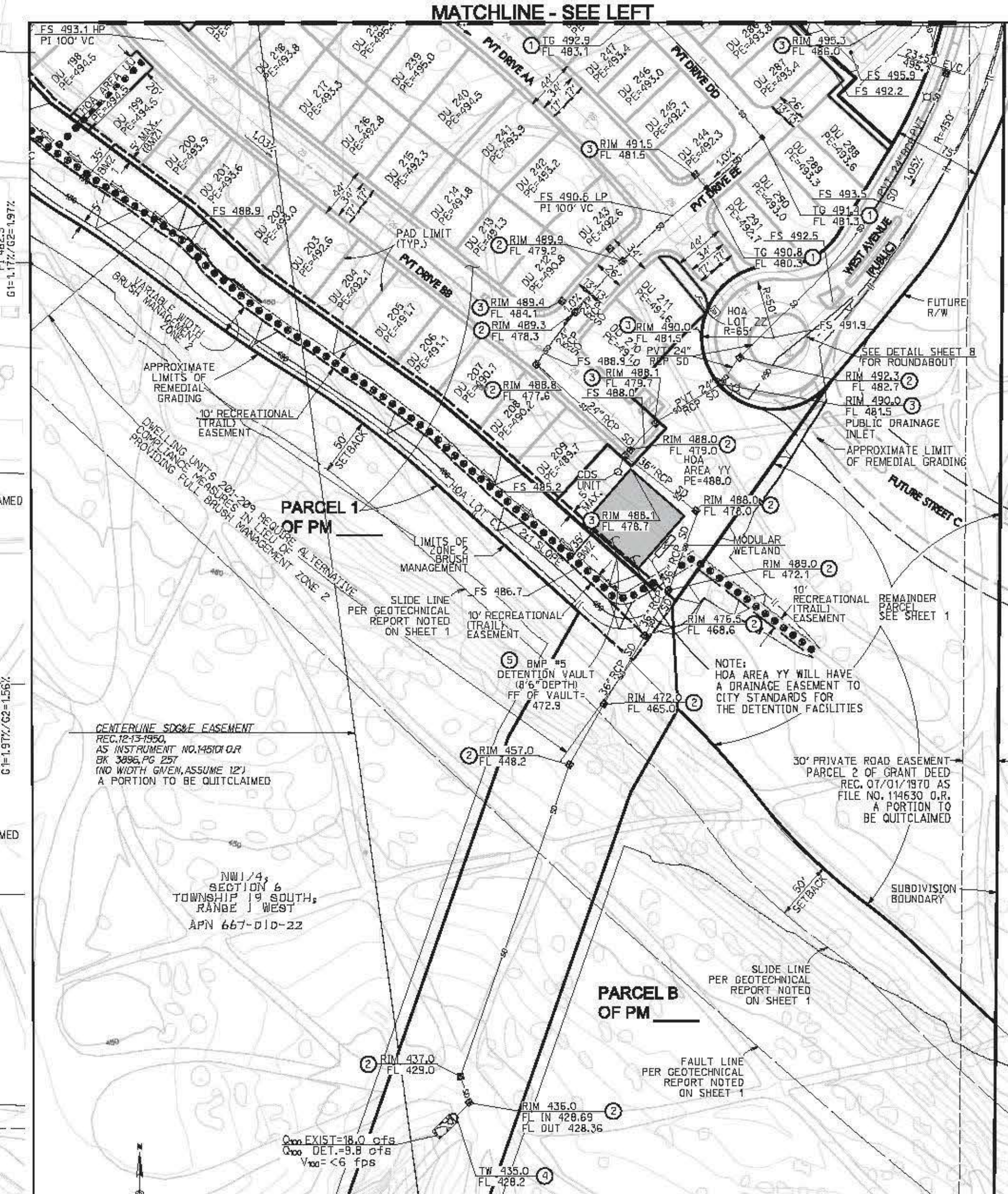
12/5 DENOTES: PLANNING AREA/LOT NUMBER

STORM DRAIN NOTES

1. CATCH BASIN
2. TYPE A-4 CLEAN OUT
3. STORM DRAIN CURB INLET
4. STORM DRAIN HEADWALL W/RIPRAP
5. STORM DRAIN TREATMENT FACILITY CSD UNIT, UNDERGROUND DETENTION VAULT, MODULAR WETLAND

WQ VOLUMES

BMP #3 24,130 CF
BMP #4 8,375 CF
BMP #5 12,992 CF



GRAPHIC SCALE: 1"=60'

ENGINEER OF WORK

TIMOTHY W. GABRIELSON
R.C.E. No. 51503
EXP. DATE: 06-30-2022
DATE

J-15013-C

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LAMBERT COORDINATES:	140-1759
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I.O.:	24007891

PREPARED BY:
RICK ENGINEERING COMPANY

ADDRESS:
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(619) 291-0707

PROJECT NAME:
SOUTHWEST VILLAGE VTM/PDP/SDP

SHEET TITLE:
GRADING & DRAINAGE PLAN - SOUTH

REVISION 1:	11/15/2019
REVISION 2:	08/07/2020
REVISION 3:	
REVISION 4:	
REVISION 5:	
REVISION 6:	
REVISION 7:	

ORIGINAL DATE: 3-29-2019

SHEET 16 OF 41

JOB NUMBER: 15013C

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