Appendix E-1

Preliminary Geotechnical Evaluation and Geologic Field Reconnaissance Report

HALEY ALDRICH

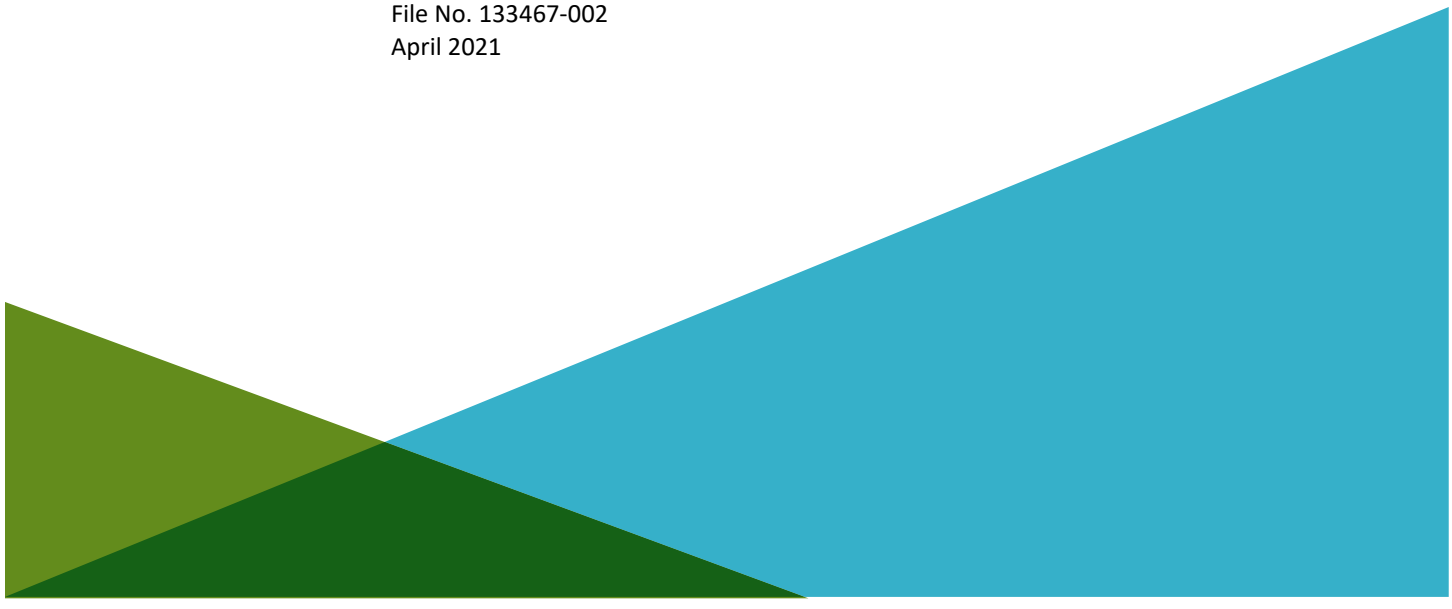
www.haleyaldrich.com

NELSON SLOAN QUARRY RESTORATION AND BENEFICIAL REUSE OF SEDIMENT PROJECT REPORT
2721 MONUMENT ROAD
SAN DIEGO, CALIFORNIA

by
Haley & Aldrich, Inc.
Costa Mesa, California

for
Dudek
Encinitas, California

File No. 133467-002
April 2021



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27 April 2021
File No. 133467-002

Dudek
605 Third Street
Encinitas, California 92024

Attention: Mr. Shawn Shamlou

Subject: Preliminary Geotechnical Evaluation and Geologic Field Reconnaissance Report
Nelson Sloan Quarry Restoration and Beneficial Reuse of Sediment Project
2721 Monument Road
San Diego, California

Ladies and Gentlemen:

Haley & Aldrich, Inc., completed a preliminary geotechnical evaluation and geologic field reconnaissance for the proposed restoration of the Nelson Sloan Quarry (Quarry) in the Tijuana River Valley in southern San Diego County, California. This report summarizes the literature research, an examination of aerial photographs, and geologic field observations and provides field recommendations. The study combined a review of historical data as well as field mapping the current site conditions to evaluate the feasibility of restoring the Quarry project site.

Based on our evaluation of the subsurface conditions at the project site, we have concluded that the proposed reclamation of the proposed project site within the Quarry at a slope configuration as steep as 2:1 (horizontal to vertical) is geotechnically feasible. Based on our slope stability analysis, the static factors of safety for the project's proposed slopes are between 1.60 and 2.37. These factors of safety are considered acceptable for the proposed project design features and are considered stable slope configurations.

Please contact either of the undersigned if you have any comments or questions regarding this report.

Sincerely yours,
HALEY & ALDRICH, INC.

Catherine H. Ellis

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HALEY ALDRICH

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1. Introduction

Haley & Aldrich, Inc., (Haley & Aldrich) performed this preliminary geotechnical evaluation and geologic field reconnaissance to evaluate the surface soil and geologic conditions for the project within the Nelson Sloan Quarry (Quarry), and based on the conditions observed, provide geotechnical engineering recommendations for its restoration.

The larger Quarry property is about 70 acres in size. The project site (Site) is approximately 40-acre property including portions of the Quarry, which lies within the southeastern corner of the Tijuana River Valley Regional Park. Federal lands managed by U.S. Customs and Border Protection (USCBP) are located south of the property (the international border fence is 450 feet south of the project property's boundary); County jurisdictional lands are located west and north of the project property. Interstates 5 and 805 provide regional access to the property and are 1.15 mile and 1.9 mile, respectively, east of the Site.

The northeastern corner of the Site is situated approximately 400 feet south of the Monument Road/Old Dairy Mart Road intersection in the Border Highlands/Tijuana Hills area (see Figure 1). The 40-acre Site is in the southwestern portion of the County of San Diego and encompasses the Assessor's Parcel Numbers (APNs) 664-011-05-00 and 664-011-04-00 in full. The Site is predominantly coastal highlands with elevations up to 285 feet above mean sea level along the southern section of the Site and has finger canyons extending down to the valley on the northern section of the Site. Smuggler's Gulch, Spooner Mesa and Goat Canyon are located west of the Site; San Ysidro is 3 miles east of the Site.

The Quarry in the Site is vacant and crossed by several dirt roads and paths, and incorporates an irrigation system. Disturbance associated with previous staging of the soil/sediment stockpile areas are visible on the eastern portion of the project site. USCBP has also installed several floodlights supported by wood poles on the top of the mesa to visually surveil the border fence and surrounding area from this elevated vantage point. Except for the USCBP floodlights, there are no structures located on the project site.

1.1 BACKGROUND AND EXISTING SITE CONDITIONS

The former Nelson Sloan Sand and Gravel Quarry is located in the Tijuana River Valley. On 11 March 1982, the City of San Diego approved Conditional Use Permit (CUP) No. 497 for the Borrow Area Border Pit. A Reclamation Plan was submitted and approved with the CUP Application. The twenty-year CUP permitted the extraction of approximately 7.5 million cubic yards of sand and gravel from the Site by the applicant, Nelson & Sloan Company. Approximately one third of the permitted volume of sand and gravel was actively mined from the Site over the twenty-year operational life of the quarry. The Quarry's operations ceased when the CUP expired in 2002, and it was then acquired by the County of San Diego with grant funding provided by California Coastal Conservancy with conditions that the project property be used for habitat protection and open space.

1.2 PROJECT DESCRIPTION

The Nelson Sloan Quarry Restoration and Beneficial Reuse of Sediment Project includes reclamation of the previously excavated Quarry slopes and restoration of the natural habitat at the Site by constructing compacted slopes reusing the sediments excavated from Tijuana River. Currently, sediment management activities are undertaken by City, County, State, and Federal entities, and their partners in the Tijuana River Valley. These entities typically haul the excess sediment offsite to regional landfills or construction sites. The proposed project will instead allow these entities to place appropriate material in the Quarry as part of the phased landform reclamation, creation, and habitat restoration project. Through a series of phases, the proposed Project would include construction of contour-graded finished slopes and transition points and stabilized hillsides and manufactured slopes to prevent land sliding by placing and compacting approximately 1,000,000 cubic yards (CY) total of fill material. Finished graded slopes will be revegetated with naturally occurring scrubs found on adjacent mesa slopes. The Project also requires the installation of a temporary irrigation system and/or the use of water trucks aid in the establishment of the revegetated areas.

The proposed landform reclamation and habitat restoration would occur on an approximately 20-acre site (Site) and proposed activities are estimated to occur over an up to 15-year timeframe.

1.3 SCOPE OF WORK

The scope of work included: 1) performing project property visits to collect data and observe existing Site conditions and surrounding features as they pertain to the proposed restoration, 2) geologically logging the exposed soil strata at the Site, and 3) conducting an engineering analysis and preparing a report that summarizes our evaluation findings.

2. Geology

2.1 REGIONAL GEOLOGY

A review of regional geology (Kennedy and Tan, 2008) suggests that most of the near-surface material prior to quarrying operations comprised three major formations and surface deposits. The Tertiary-age deposits of the San Diego Formation consist of fine- to medium-grained sandstone and cobble conglomerates that are mapped at the base of the slope. The formation provided the primary materials that were being quarried. Quaternary-age deposits from the Lindavista Formation (Qvop) overlay the San Diego Formation. The very old paralic deposits primarily consist of dense granular deposits (sand and some gravel), cross-bedded sandstone, and cobbly sandstone and some siltstone lenses. Quaternary-age deposits from the Bay Point Formation (Qop_6) lie above the Lindavista Formation. These old paralic deposits primarily comprise beach, estuarine, or colluvial deposits characterized by interbedded siltstone, sandstone, and conglomerate. The Lindavista Formation and Bay Point Formation deposits are mildly cemented with iron oxides. Looser and finer-grained materials may be present within the washes or along the quarry floor. Landslides, mudslides, and minor faulting has been mapped throughout the area in the noted formations. A Regional geology map is shown on Figure 2.

2.2 LOCAL GEOLOGY

The geology of the Quarry's wall comprises the San Diego, Lindavista, and Bay Point Formations. The Bay Point Formation consists of reddish-brown well-graded sandstone with lenses and a mixture of fine- to coarse-gravels. Beds and lenses consisted of a fine- to coarse-graded sandstone and siltstone in the Bay Point Formation. The Lindavista Formation consisted of a light-brown well-graded sandstone with lenses of cobbly sandstone and fine-grained sandstone. The Bay Point and Lindavista Formations exhibited mild cementation with iron oxides and most likely iron and calcium carbonate minerals. The San Diego Formation consist of a grayish silty fine-medium grained sandstone to fine-grained sandy silt with cobble conglomerate lenses.

2.3 SEISMIC SETTINGS

Southern California is a very active seismic area comprising many Holocene Epoch faults (within the last 11,000 years), and there are major faults near the Site. Many of the Holocene faults in the region have been designated as Alquist-Priolo Special Studies Zones (Earthquake Fault Zones as known today), as these faults exhibit evidence of surface rupture in the Holocene Epoch or are "sufficiently active and/or well-defined." Known Holocene faults with 100 miles of the site are listed below in Table I.

TABLE I

Active Faults within 100 km (from USGS, 2008)

Fault Name	Distance (kilometer)	Mw max
Newport Inglewood alt 1	14.5	7.5
Newport Inglewood alt 2	14.5	7.5
Rose Canyon	14.5	6.9
Coronado Bank	25.1	7.4
Palos Verdes Connected	25.1	7.7
Elsinore J+CM	71.0	7.5

Fault Name	Distance (kilometer)	Mw max
Elsinore J	71.0	7.4
Elsinore T+J	71.0	7.5
Elsinore T+J+CM	71.0	7.6
Elsinore W+GI+T+J	71.0	7.7
Elsinore W+GI+T+J+CM	71.0	7.8
Elsinore GI+T+J	71.0	7.6
Elsinore GI+T+J+CM	71.0	7.7
Elsinore CM	71.0	6.9
Earthquake Valley	77.6	6.8
Newport Inglewood offshore	78.5	7.0
Elsinore GI+T	87.6	7.3
Elsinore T	87.6	7.1
Elsinore W+GI+T	87.6	7.5

2.4 GROUNDWATER

Groundwater levels near the base of the slope should be over 20 to 25 feet below the ground surface and exist within the San Diego Formation (Bulletin 118). Groundwater becomes shallower toward the alluvial deposits of the Tijuana River to the north side of the Site, where the depth to groundwater ranges from just below the ground surface to approximately 10 feet below the ground surface in the alluvium in the Tijuana River floodplain north of the Site. Groundwater should not impact the proposed grading activities at the Site.

3. Field Reconnaissance

A California registered Certified Engineering Geologist visited the Site on 12 February 2021 to evaluate its geologic conditions as well as the adjacent areas. The geologic conditions were documented in a photo log provided as Appendix A. The surface conditions are presented on the Field geology map, Figure 3; cross sections detailing the conceptual bedrock depths are presented on Figure 4.

The topographical conditions along the western Quarry wall consist of moderately steep to steep slopes that are approximately 180 feet high along its northern section. Inclinations vary from approximately 2 feet horizontal to 1 foot vertical (2H:1V) along the northern section of the Quarry to near-vertical along the southern section of the Quarry. The slopes are generally vegetated with small trees and brush. Slope inclinations become near-vertical further south toward the International Border, and the surface is highly eroded and less vegetated (Appendix A; Photos 1 and 2).

Deep rilling was observed on the highly erodible section of the San Diego Formation along the middle to northern side of the western quarry slope with surface deposit fanning generated by the slope wash (Qsw) and young alluvium material ([Qal]; Appendix A, Photo 3).

Two- to 3-inch wide vertical fractures were observed in the San Diego Formation along the western Quarry wall. The fractures or rills were infilled with a dark-brown consolidated mud deposit. No evidence of fine-grained sediment was observed outside of the fracture or rills. The southwest corner of the west Quarry wall showed evidence of excavator bucket teeth marks and benching observed in the bench cuts (Appendix A, Photo 4).

A mudslide feature was observed toward the center of the west quarry wall that comprises the San Diego and Lindavista Formations. The lower section of the mudslide was excavated when the access road was constructed. The mud slide shows high instability because of erosion and voids present at the base of the slide and deep rilling about 20 feet in depth. Bioturbation, slumping, rilling and hoodoos were also observed along the base and body of the mud slide area (Appendix A, Photo 5). The southwest corner of the quarry wall exhibited a near vertical slope and had accumulated debris at its base that ranged from sand to large boulders. Fractures were also observed in the San Diego and Lindavista Formations, Appendix A, Photo 6.

Hummocky topography consistent with loose slope wash and young alluvium deposits have been deposited across the Quarry floor. The Quarry floor exhibits a veneer of fine sandy silt to silty fine sand with dense vegetation. When probed, the slope wash is a wedge of detritus approximately 3 to 5 feet thick along the western quarry wall that thins to approximately 6 inches thick on the Quarry's eastern side (Figure 4). In general, the boulders to gravels were sub-rounded to rounded consisting of volcanic, quartzite, and granitic clasts. The largest grain size observed on the Site was boulders encountered in spoil piles on the Quarry flats, along the bottom of the southern Quarry floor, and occasionally in the Lindavista and Bay Point Formations.

The San Diego Formation had a mild cementation on the outer 1 to 2 feet of the outer Quarry wall and was very erodible where the cementation was not encountered. This outer cementation may be due to moisture evaporating along the exposed walls. The San Diego Formation along the west quarry slope ranged from vertical to a 1:1 slope. Bedding attitudes were obtained in the Lindavista Formation at the top and middle of the formation, respectively, (N4E, 5W) and (N6E, 60W). Bedding attitude from the

base of the San Diego Formation was recorded as N3E, 6W. The beds strike generally north to south and exhibit bedding angles that dip into the slope along the western Quarry wall and exhibit no bedding plain failures. However, the highly erodible formations could fail across the bedding planes.

Based on the on / off site topography, the estimated mapped thickness of the San Diego Formation was approximately 40 feet thick to the base of the outcrop, the Lindavista Formation was approximately 65 feet thick, and the Bay Point Formation was approximately 55 feet thick.

Loose slope wash and young alluvium deposits draped the surface of the Quarry bottom. Talus piles as high as 8 feet were encountered along the toes of the existing Quarry slopes. The slope wash consisted mostly of the grayish sands of the San Diego Formation. The talus mounds consisted of a mix of all the formations on the quarry slope with mostly mixed sands of the San Diego formation. The thickness of the slope wash and young alluvium material deposit ranged from approximately 6 inches along the eastern section of the Quarry to 5 feet thick along the western edge of the Quarry along the talus mounds, as displayed on the geologic cross sections. The talus was approximately 8 feet in height.

Prior investigation revealed faulting, landslides, and possible mudslide features present near the Quarry area. Though a regional geology map of the quarry shows some faulting, no extensive active or older faulting was observed during our brief visit to the project property. Fault trenching was not performed for this evaluation.

3.1 SLOPE STABILITY

The Bay Point Formation bestows rock fall hazards where large gravels to boulders could dislodge and roll or fall down the Quarry slope. The site geologic structure does not illustrate any slope failures along bedding planes, but since the materials are weak across bedding, there is a potential of cross-bedding failures or mudflows generated from storm water flowing over the Quarry's slopes. The San Diego Formation has a potential for extensive erosion and mud flows due to piping of surface water flowing over the formation and entering animal burrows (bioturbation) during major to moderate rain events. Erosional rills are deep and most likely was eroded out by piping of the burrows. No erosional slope hazards were observed during the moderate rain event that occurred during the site visit.

3.2 FLOOD HAZARDS

The project property is classified by Federal Emergency Management Agency's National Flood Hazard Program as a Zone X area of Minimal Flood Hazard as evaluated on 15 May 2012. Based on our observations, it does not appear that the project property topography has changed significantly since the hazard evaluation.

4. Slope Stability Analysis

4.1 MATERIAL PROPERTIES

According to our understanding of the project, backfill materials to be used in construction of the landforms and slopes may include import materials excavated from the Goat Canyon Sediment Basin and other flood control facilities and habitat restoration projects located in the Tijuana River Valley. However, since the engineering properties of these import sources were not known at the time we prepared this report, the material properties for the slope stability analysis were based on our geologic reconnaissance and experience in the area. Subsurface materials within the Site limits are expected to include competent bedrock material and imported granular alluvial deposits consisting of sand, gravel, and cobbles.

For the slope stability analysis, the design subsurface profile has been simplified to consist of layers of a competent bedding surface and well-graded sand with gravel as compacted fill.

Soil shear strength properties for the sand and gravel layers were selected based on the assumed properties of the import material. A design friction angle and adhesion value for each material was selected. The unit weight of each soil type was estimated based on typical values for similar materials in this region. The soil properties used for analysis are presented in Table II.

TABLE II

Material Properties Used for Slope Stability Analysis

Material Name	Unit Weight (pounds per cubic foot)	Friction Angle (degrees)	Cohesion (pounds per square foot)
Competent Bedding Surface	120	32	200
Compacted Fill	120	32	100

Prior to import, actual engineering properties of the on-site soils and import materials shall be evaluated through performing adequate geotechnical sampling and laboratory testing to confirm that they satisfy the minimum unit weight, friction angle, and cohesion used in the presented slope stability analysis.

4.2 SLOPE STABILITY RESULTS

The proposed sidewall slopes were analyzed by the limit equilibrium (method of slices) method, using circular searches with Simplified Bishop's Method to calculate the factor of safety against sliding. We used the RocScience Slide 7.0 software program to perform the geotechnical slope stability analysis. Slope stability analyses were performed on the slope sections presented in the 80 percent design submittals titled, "Grading Plans for Nelson Sloan Quarry Restoration Project-Tijuana River Valley" (Plans) prepared for The City of San Diego, Development Services Department, by Dudek.

A static factor of safety of 1.5 or greater for slopes analyzed using this method is typically considered adequate for demonstrating stability. The minimum factor of safety for each slope restoration phase is presented in Table III. Properties used for the analysis of the source material is described in the

"Material Properties" section above. Graphical depictions of each analysis scenario and associated critical failure surface are provided in Appendix B.

TABLE III

Results of Slope Stability Analyses

Slope Restoration Phase	Factor of Safety Static
Phase 1	1.60
Phase 2	2.05
Phase 3	1.74
Phase 4	2.37
Phase 5	1.90

Slope stability models were developed based on the proposed fill slope cross-sections A through E for the construction phases 1 through 5 presented in the Plans. The Factors of Safety reported in Table III incorporate those segments of the cross-sections include maximum slope inclination of 2 to 1 (Horizontal to Vertical).

4.3 CONSTRUCTION PROVISIONS

Based on our site reconnaissance and engineering evaluation, we recommend following general provisions for the construction of the engineered fill slopes:

- Surfaces subject to receiving any fill shall be adequately grubbed and be clean of any loose, unstable, unsuitable soils, rocks, and organics. Rockfalls and previous mudflows shall be excavated to competent material and dense formations. Excavation on slope surfaces shall be performed in general accordance with the provisions of 2019 California Building Code-Appendix J-Section J106.
- Prior placement of any fill on proposed slopes, including between phases, the slope surfaces subject to receive any fill shall be adequately benched in accordance with the general requirements of the 2019 California Building Code-Appendix J-Section J107 including a 2-foot minimum bench height and 10-foot keyway width.
- Surfaces to receive any fill shall be scarified to a minimum of 8 inches and moisture conditioned as appropriate prior to fill placement.
- Fill material shall be placed and compacted as engineering fill.
- To prevent surface erosion and formation of the rills and gullies during the rainy season and/or construction watering, a surface drainage system and sediment traps shall be considered during each phase of the slope construction. Surface water shall be drawn away from the slope surfaces and construction benching stages. Surface water shall be prevented from ponding on surfaces subject to receive fills. Excess moisture conditioning of the slope surfaces could also contribute to instability of the in-place fills.

- Incomplete bench surfaces shall be covered with a minimum of 2 feet of compacted fill until construction resumes. Benching surfaces shall not be left exposed for longer 30 days or when expecting delays in phased construction.

5. Conclusions

Based on our evaluation of the subsurface conditions at the Quarry and the surrounding area at the Site, we conclude that the restoration is geotechnically feasible.

We have analyzed the geotechnical slope stability of the design slopes for the Site, based on our current field reconnaissance and topographic data provided by Dudek. Through this analysis, the calculated static factors of safety for the proposed slopes at the Site will be in excess of 1.60, indicating stable conditions. These factors of safety are considered acceptable for the proposed project design features and considered representative of stable slope configurations. Slope stability models were developed based on the proposed fille slope cross-sections A through E for the construction phases 1 through 5 presented in the preliminary Plans.

In summary, the results of the field observations and the slope stability analysis leads us to conclude that the subsurface conditions at the Site support the proposed reclamation to be geotechnically feasible.

The scope of this report is limited to a geotechnical evaluation of the Site. We understand that the proposed reclamation plan evaluated for this study does not include the construction of new temporary or permanent structures. If temporary or permanent structures are subsequently planned at the project property, we recommend that a supplemental study be performed to address geotechnical impacts and provide recommendations for foundation and seismic design.

6. Limitations

The conclusions and recommendations presented in this report result from limited engineering studies and are based on our interpretation of the existing geotechnical conditions and available subsurface data. Actual subsurface conditions may vary. If any variations or unforeseen conditions are encountered during Site development, or if the proposed project differs from that which is described in this report, Haley & Aldrich should be notified so that supplemental recommendations can be made.

References

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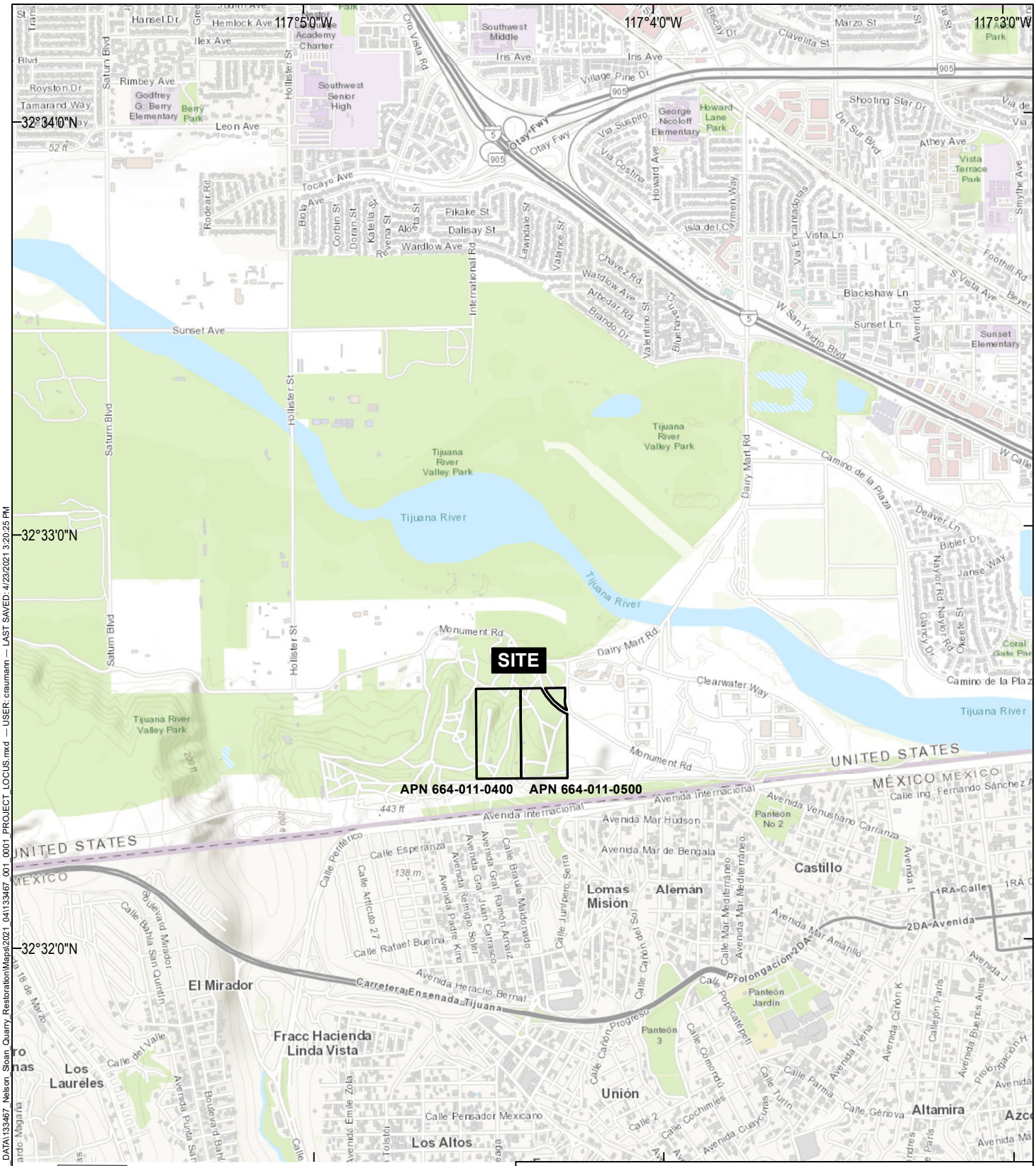
FIGURES



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HALEY ALDRICH

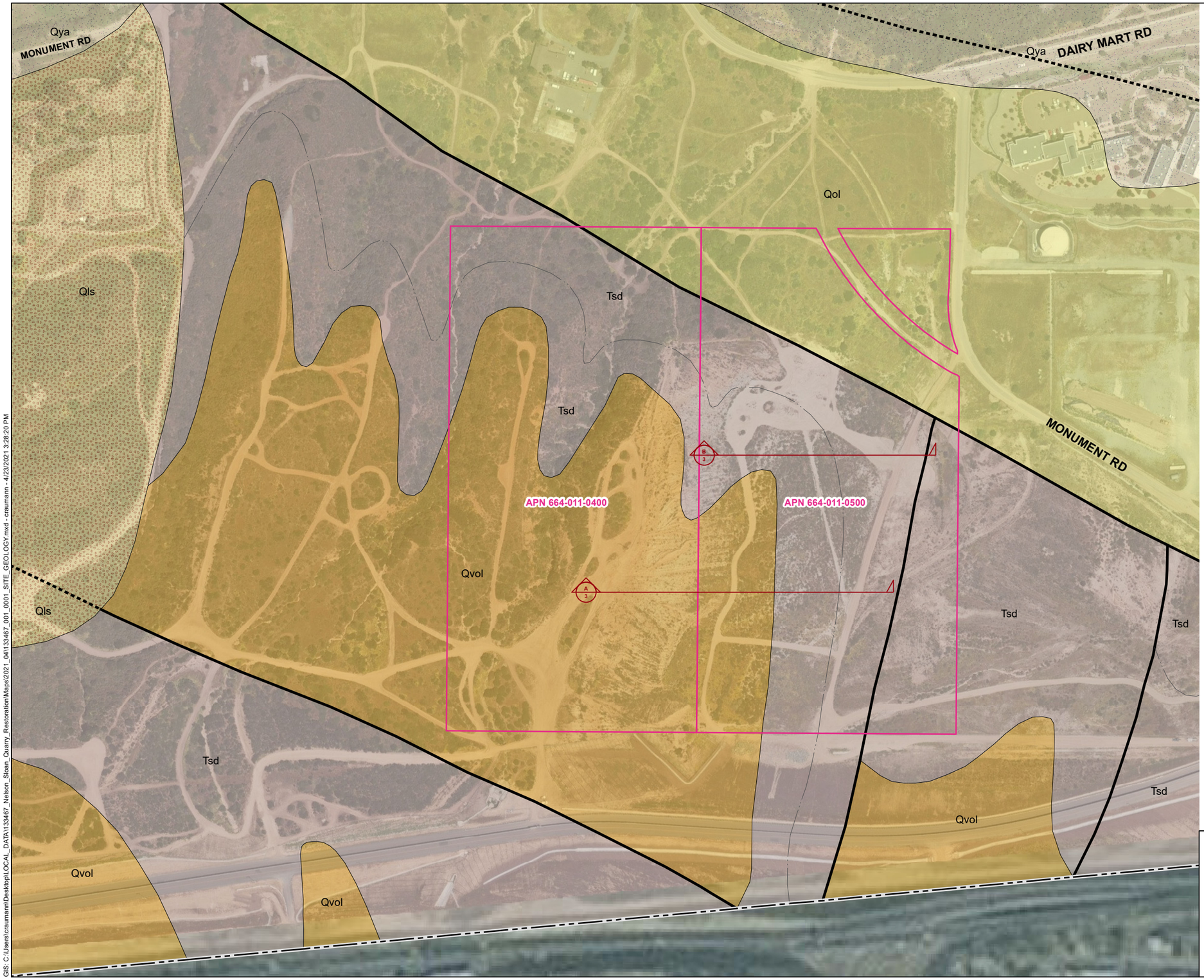
NELSON SLOAN RECLAMATION PROJECT
SAN DIEGO COUNTY, CALIFORNIA

PROJECT LOCUS

MAP SOURCE: ESRI
SITE COORDINATES: 32°32'29.3"N, 117°4'26.7"W

APPROXIMATE SCALE: 1 IN = 2000 FT
APRIL 2021

FIGURE 1



EXPLANATION

- Qls - Landslide deposits; may include debris flows and older landslides (Holocene and Pleistocene)
- Qya - Young alluvial valley deposits (Holocene and late Pleistocene)
- Qol - Old lacustrine, playa, and estuarine (paralic) deposits (late to middle Pleistocene)
- Qvol - Very old lacustrine, playa, and estuarine (paralic) deposits (middle to early Pleistocene)
- Tsd - Coarse-grained Tertiary age formations of sedimentary origin (early Pleistocene and late Pliocene)
- Contact, identity and existence certain, location accurate
- Reference contact, identity and existence certain, location accurate
- Fault, identity and existence certain, location accurate
- Fault, identity and existence certain, location concealed
- International border
- Cross section location
- Project site

NOTES

1. GEOLOGY DATA SOURCE: GEOLOGIC MAP OF SAN DIEGO 30X60 QUADRANGLE, COMPILED BY MICHAEL P. KENNEDY AND SIANG TAN, 2008, AS SHOWN IN COMPILATION OF QUATERNARY SURFICIAL DEPOSITS, CALIFORNIA GEOLOGICAL SURVEY (CGS) SPECIAL REPORT 217

2. AERIAL IMAGERY SOURCE: ESRI

N

0 260 520
SCALE IN FEET

HALEY ALDRICH

NELSON SLOAN RECLAMATION PROJECT
SAN DIEGO COUNTY, CALIFORNIA

REGIONAL GEOLOGIC MAP

APRIL 2021

FIGURE 2

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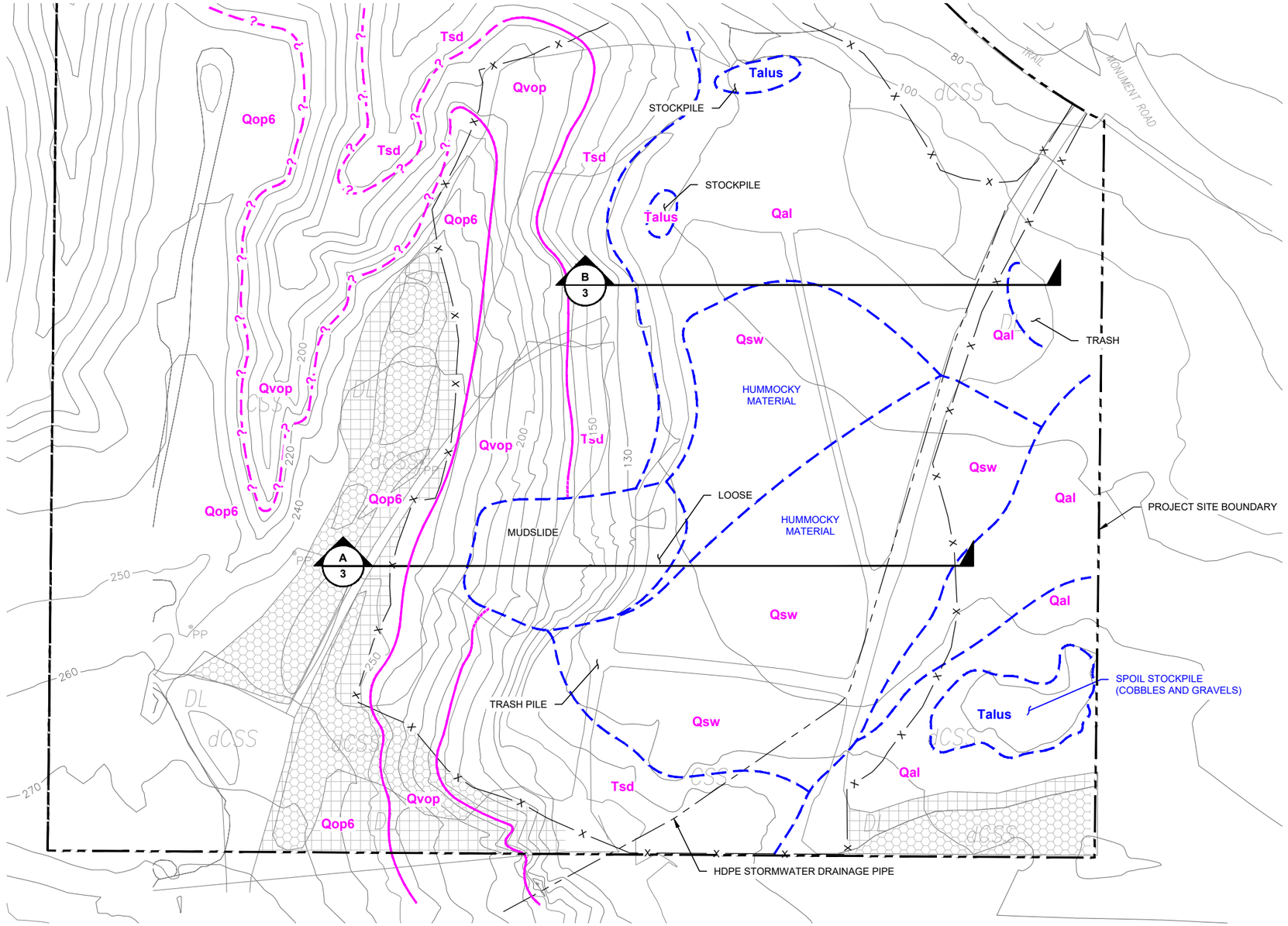


LEGEND

Qsw	SLOPE WASH DEPOSITS; UNCONSOLIDATED, LATE HOLOCENE
Qal	YOUNG ALLUVIAL VALLEY DEPOSITS (HOLOCENE AND LATE PLEISTOCENE)
Qop6	OLD LACUSTRINE, PLAYA, AND ESTUARINE (PARALIC) DEPOSITS (LATE TO MIDDLE PLEISTOCENE)
Qvop	VERY OLD LACUSTRINE, PLAYA, AND ESTUARINE (PARALIC) DEPOSITS (MIDDLE TO EARLY PLEISTOCENE)
Tsd	COARSE-GRAINED TERTIARY AGE FORMATIONS OF SEDIMENTARY ORIGIN (EARLY PLEISTOCENE AND LATE PLIOCENE)
	PROJECT SITE BOUNDARY
	QUARRY FLOOR CONTACT BETWEEN SURFACE CONTACTS.
	CONTACT BETWEEN FORMATIONS
	CONTACT BETWEEN FORMATIONS WHERE INFERRED
	CONTACT BETWEEN FORMATIONS WHERE CONCEALED
?	UNIT WAS EXTRAPOLATED ON TOPOGRAPHY
	50 FT TOPOGRAPHIC CONTOUR
	10 FT TOPOGRAPHIC CONTOUR

N

0 150 300

SCALE IN FEET

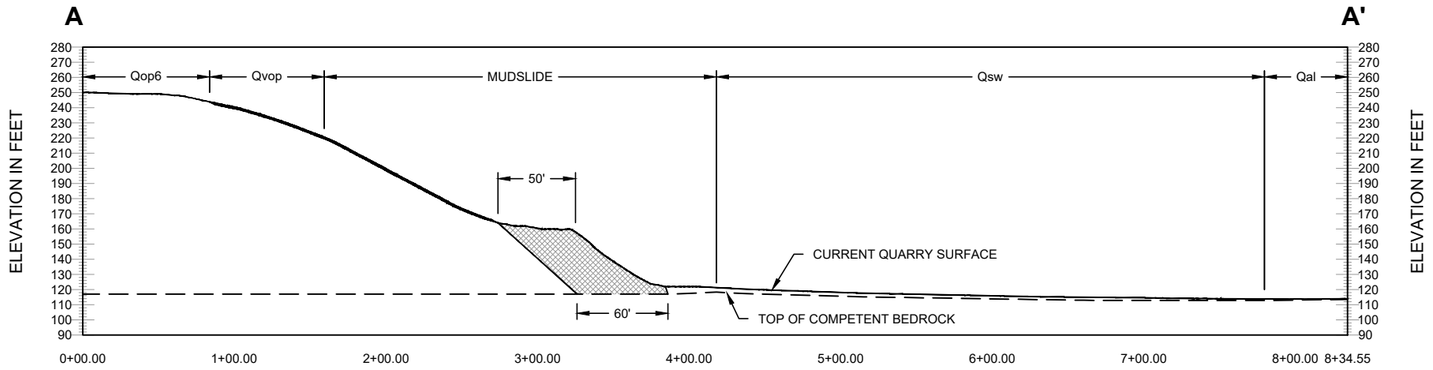
HALEY ALDRICH

NELSON SLOAN QUARRY RESTORATION
SAN DIEGO, CALIFORNIA

FIELD GEOLOGY MAP

SCALE: AS SHOWN
APRIL 2021

FIGURE 3



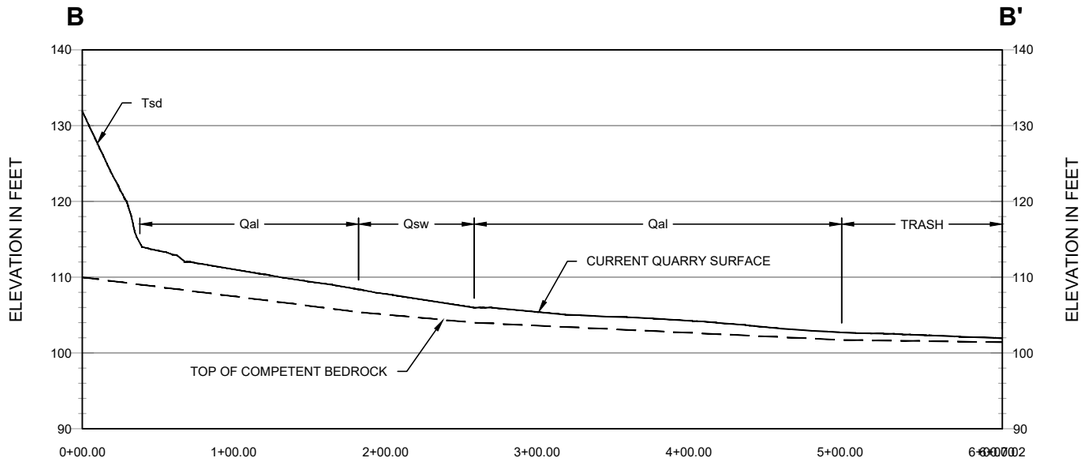
A **CROSS SECTION A'A'**

SCALE: AS SHOWN

HORIZ. 0 100 200

VERT. 0 100 200

SCALE IN FEET



2 **CROSS SECTION B'B'**

SCALE: AS SHOWN

HORIZ. 0 100 200

VERT. 0 20 40

SCALE IN FEET

LEGEND

Qsw	SLOPE WASH DEPOSITS; UNCONSOLIDATED, LATE HOLOCENE
Qal	YOUNG ALLUVIAL VALLEY DEPOSITS (HOLOCENE AND LATE PLEISTOCENE)
Qop6	OLD LACUSTRINE, PLAYA, AND ESTUARINE (PARALIC) DEPOSITS (LATE TO MIDDLE PLEISTOCENE)
Qvop	VERY OLD LACUSTRINE, PLAYA, AND ESTUARINE (PARALIC) DEPOSITS (MIDDLE TO EARLY PLEISTOCENE)
Tsd	COARSE-GRAINED TERTIARY AGE FORMATIONS OF SEDIMENTARY ORIGIN (EARLY PLEISTOCENE AND LATE PLIOCENE)
	ESTIMATED SLOPE OF SLIDE REQUIRES REMOVAL

HALEY ALDRICH

NELSON SLOAN QUARRY RESTORATION
SAN DIEGO, CALIFORNIA

CONCEPTUAL BEDROCK DEPTHS

SCALE: AS SHOWN
APRIL 2021

FIGURE 4

APPENDIX A

Photo Log

Photo 1: Looking west across the quarry floor-northern section.

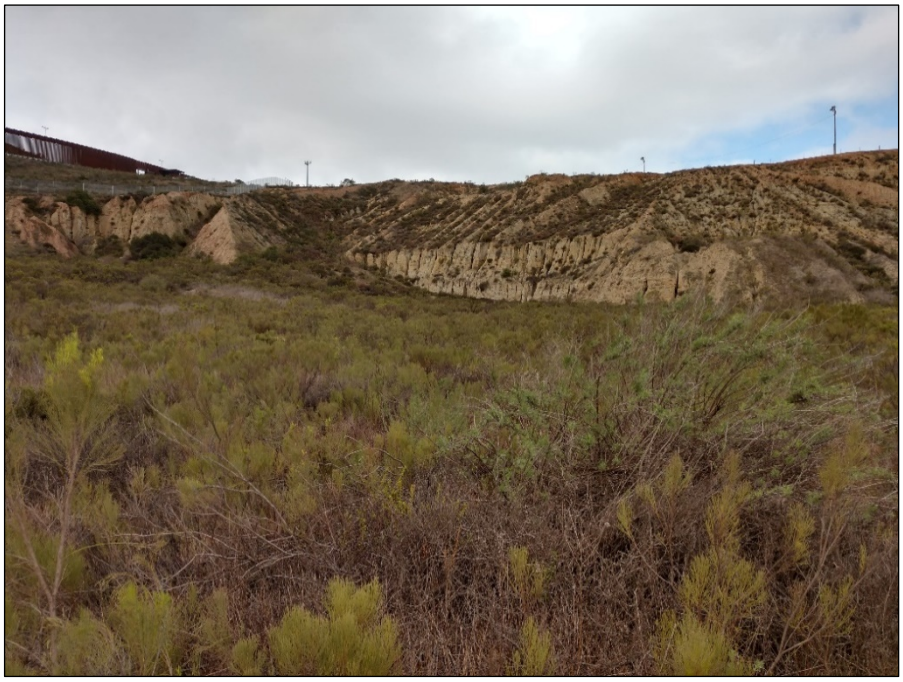


Photo 2: Looking west across the quarry floor -southern section.

Photo 3: Looking west towards the Northern section of the quarry wall.

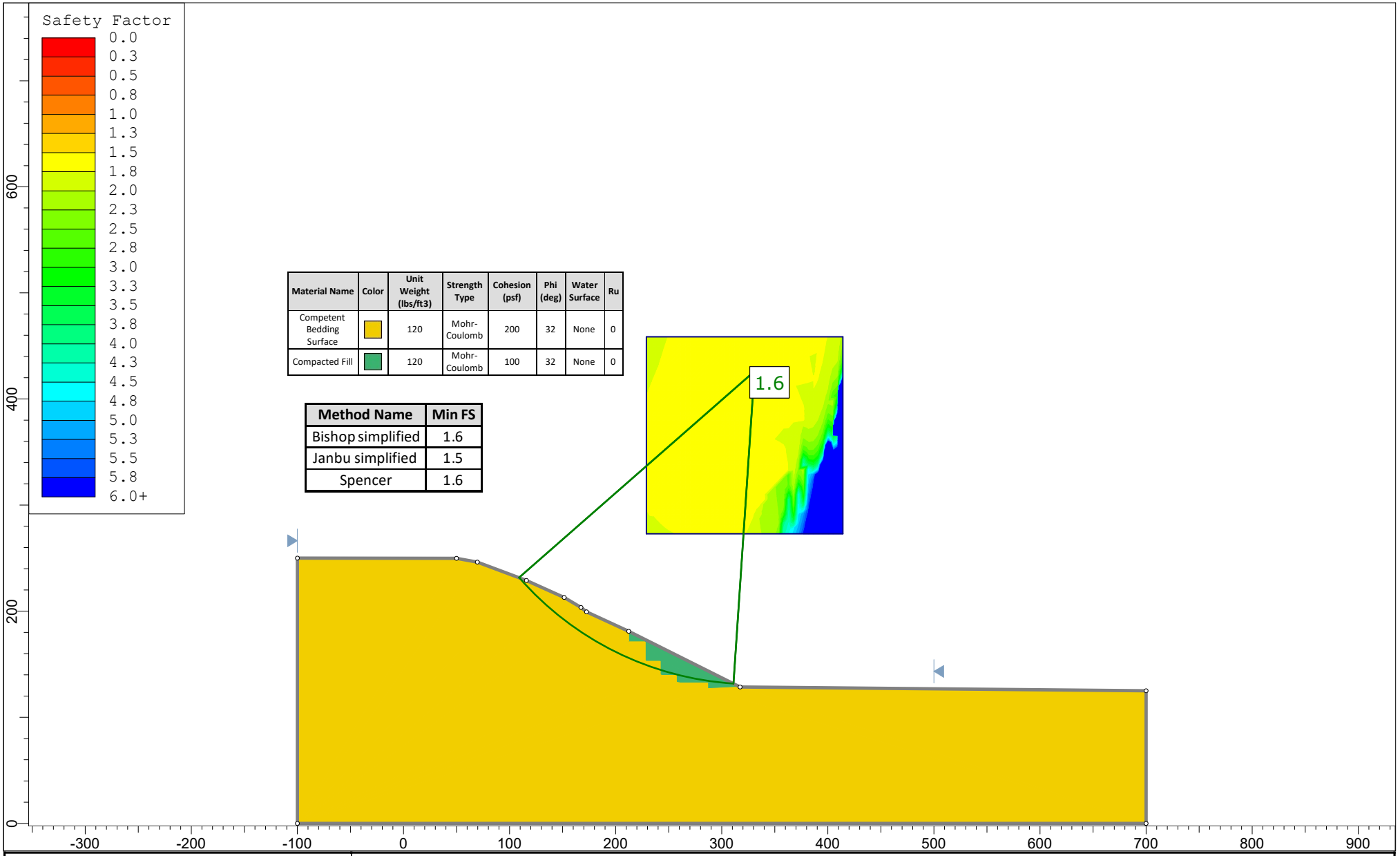
Photo 4: Looking west towards the middle section of the quarry wall.

Photo 5: Looking west towards the mudslide feature along the quarry wall.

Photo 6: Looking southwest towards the southern section of the quarry wall.

APPENDIX B

Slope Stability Analysis



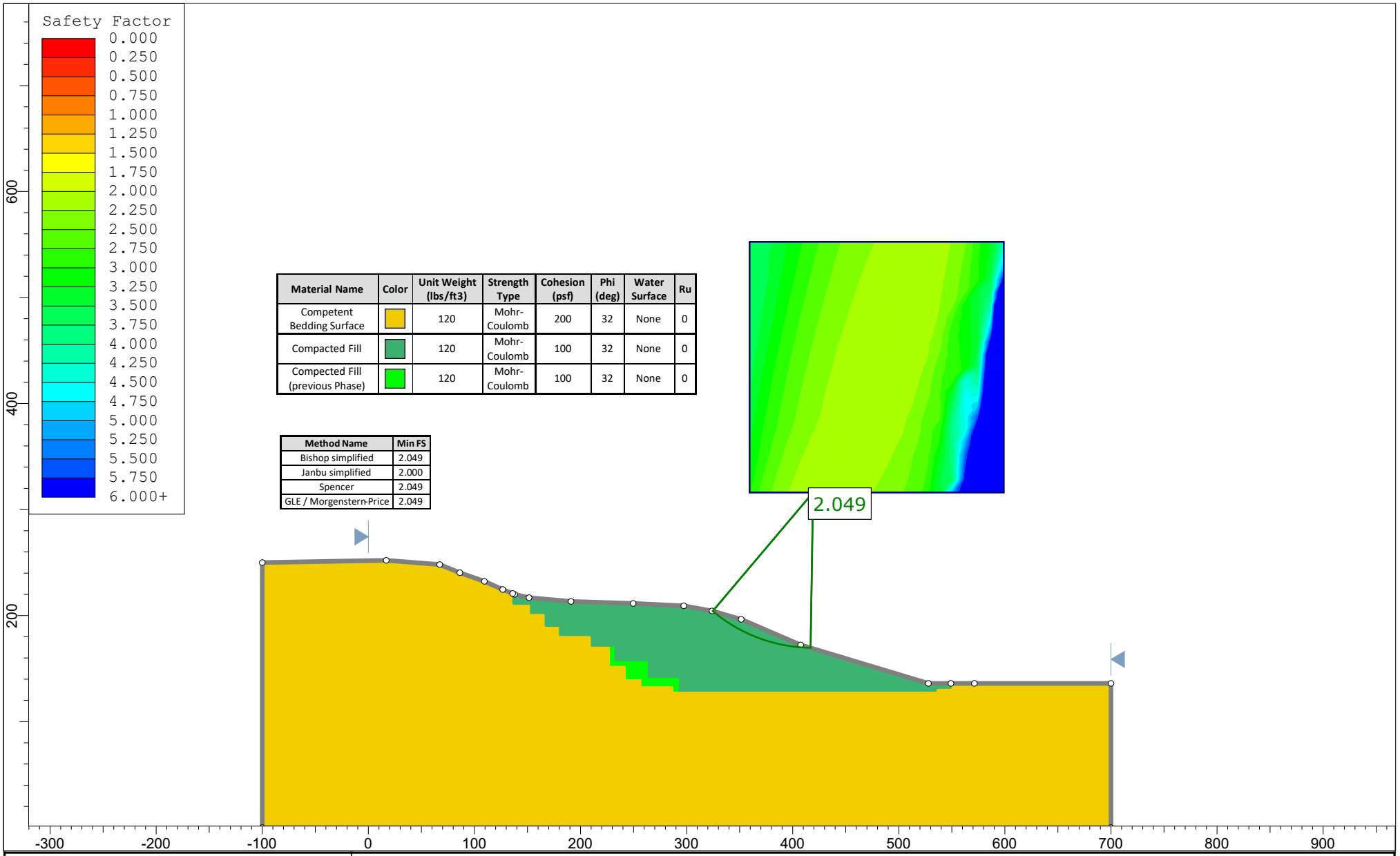
Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
Competent Bedding Surface		120	Mohr-Coulomb	200	32	None	0
Compacted Fill		120	Mohr-Coulomb	100	32	None	0

Method Name	Min FS
Bishop simplified	1.6
Janbu simplified	1.5
Spencer	1.6

HALEY ALDRICH

SLIDEINTERPRET 9.004

Project	NELSON SLOAN QUARRY, SAN DIEGO COUNTY, CALIFORNIA		
Group	Phase 1	*Scenario*	Master Scenario
Drawn By	N. Akbariyh	*Company*	HALEY & ALDRICH, INC.
Date	4/14/2021		Figure B-1



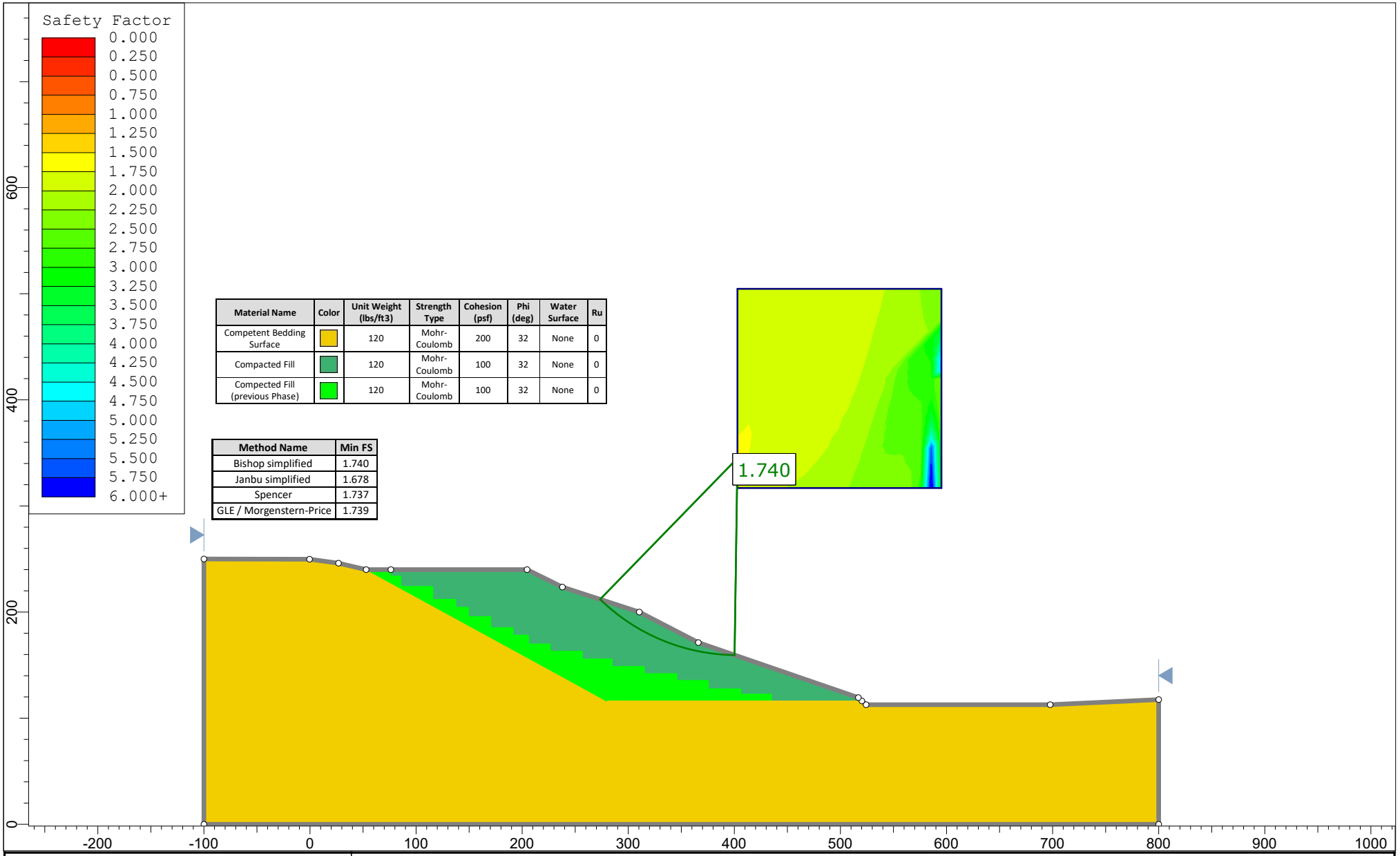
Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
Competent Bedding Surface		120	Mohr-Coulomb	200	32	None	0
Compacted Fill		120	Mohr-Coulomb	100	32	None	0
Compected Fill (previous Phase)		120	Mohr-Coulomb	100	32	None	0

Method Name	Min FS
Bishop simplified	2.049
Janbu simplified	2.000
Spencer	2.049
GLE / Morgenstern-Price	2.049

HALEY ALDRICH

SLIDEINTERPRET 9.004

Project	NELSON SLOAN QUARRY, SAN DIEGO COUNTY, CALIFORNIA		
Group	Phase 2	*Scenario*	Master Scenario
Drawn By	N. Akbariyh	*Company*	HALEY & ALDRICH, INC.
Date	4/14/2021		Figure B-2



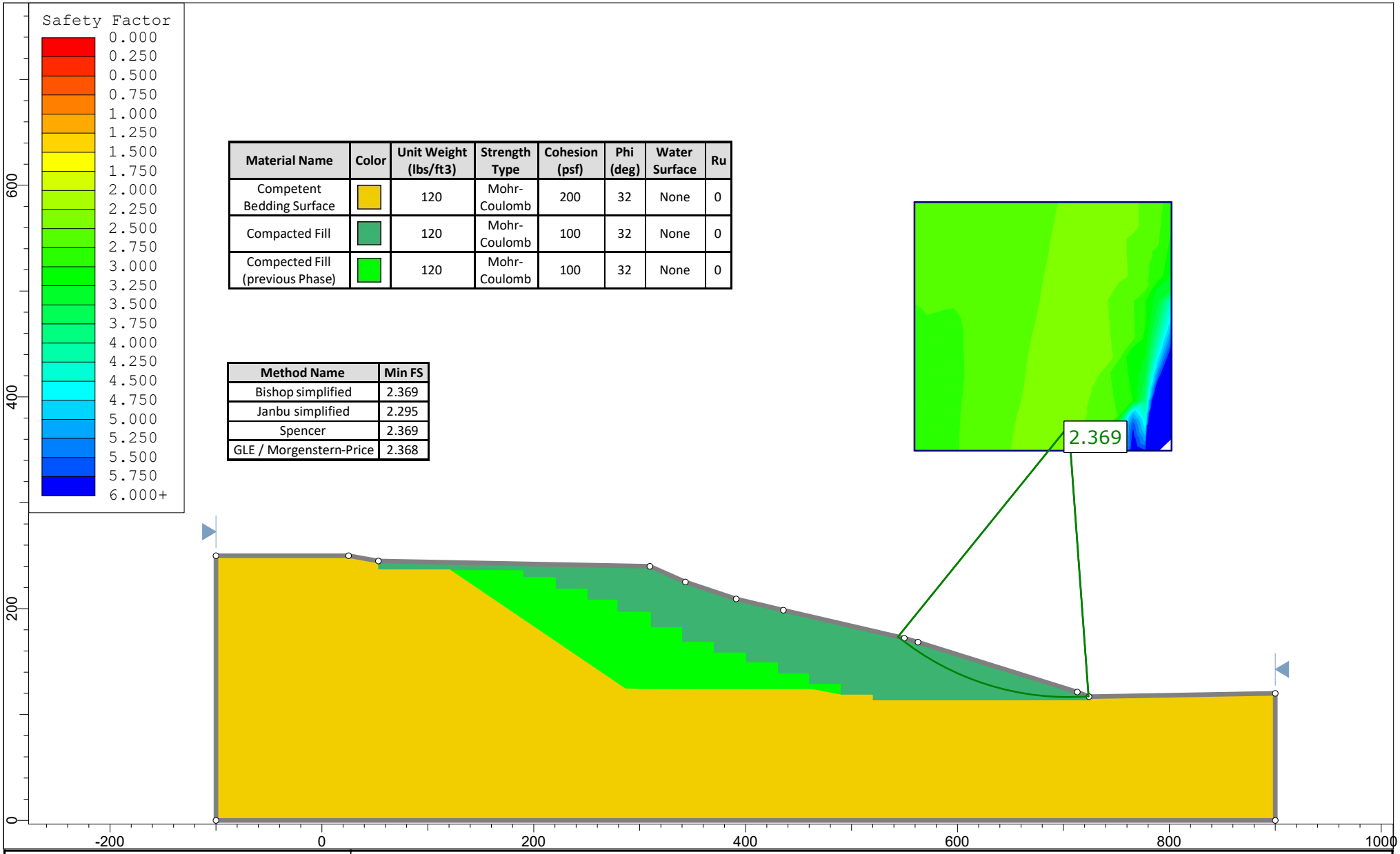
Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
Competent Bedding Surface		120	Mohr-Coulomb	200	32	None	0
Compacted Fill		120	Mohr-Coulomb	100	32	None	0
Compected Fill (previous Phase)		120	Mohr-Coulomb	100	32	None	0

Method Name	Min FS
Bishop simplified	1.740
Janbu simplified	1.678
Spencer	1.737
GLE / Morgenstern-Price	1.739

HALEY ALDRICH

SLIDEINTERPRET 9.004

Project	NELSON SLOAN QUARRY, SAN DIEGO COUNTY, CALIFORNIA		
Group	Phase 3	*Scenario*	Master Scenario
Drawn By	N. Akbariyeh	*Company*	HALEY & ALDRICH, INC.
Date	4/15/2021		Figure B-3



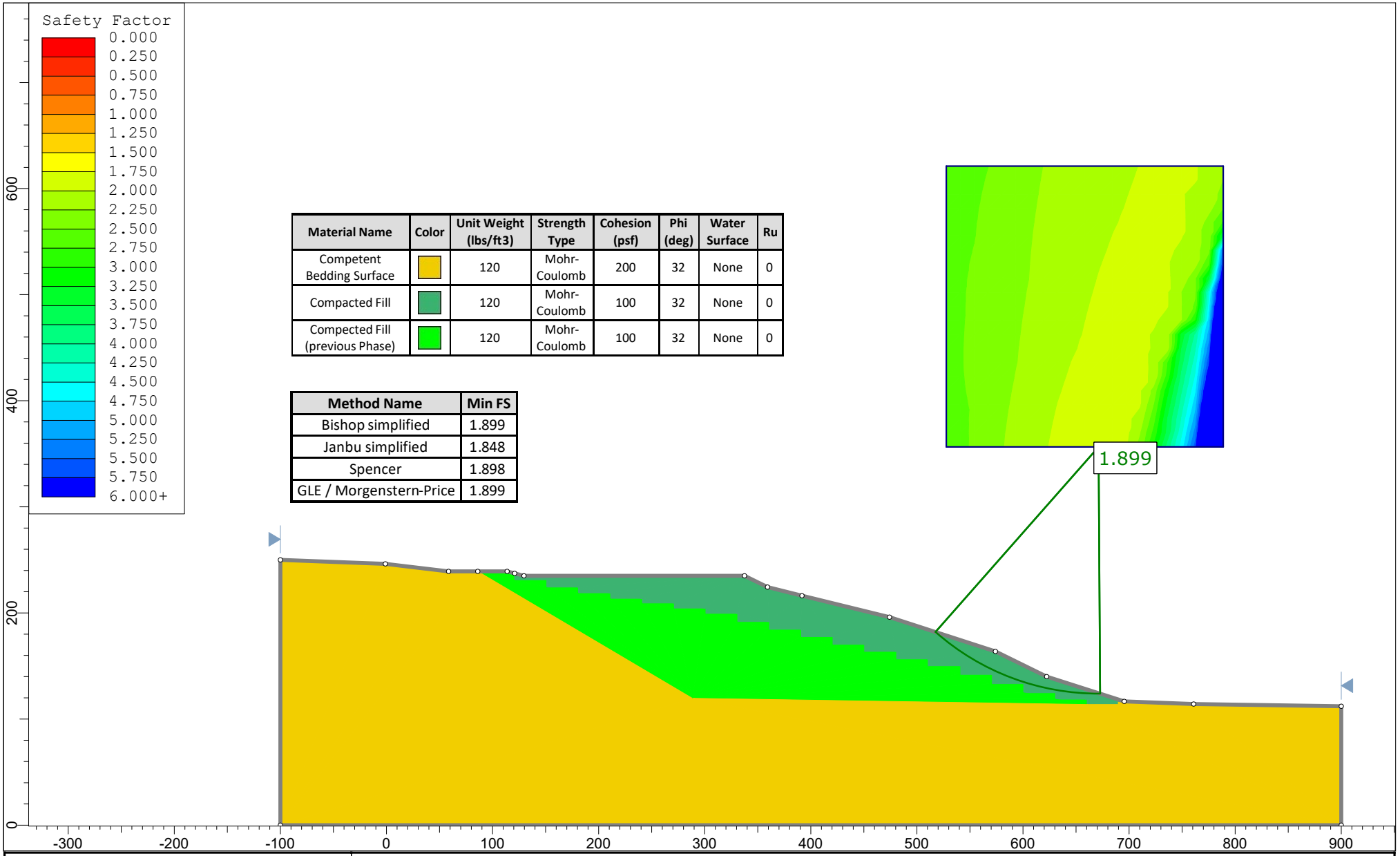
Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
Competent Bedding Surface		120	Mohr-Coulomb	200	32	None	0
Compacted Fill		120	Mohr-Coulomb	100	32	None	0
Competed Fill (previous Phase)		120	Mohr-Coulomb	100	32	None	0

Method Name	Min FS
Bishop simplified	2.369
Janbu simplified	2.295
Spencer	2.369
GLE / Morgenstern-Price	2.368

HALEY ALDRICH

SLIDEINTERPRET 9.004

Project	NELSON SLOAN QUARRY, SAN DIEGO COUNTY, CALIFORNIA		
Group	Phase 4	*Scenario*	Master Scenario
Drawn By	N. Akbariyeh	*Company*	HALEY & ALDRICH, INC.
Date	4/15/2021		Figure B-4



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru
Competent Bedding Surface		120	Mohr-Coulomb	200	32	None	0
Compacted Fill		120	Mohr-Coulomb	100	32	None	0
Compected Fill (previous Phase)		120	Mohr-Coulomb	100	32	None	0

Method Name	Min FS
Bishop simplified	1.899
Janbu simplified	1.848
Spencer	1.898
GLE / Morgenstern-Price	1.899

HALEY ALDRICH

SLIDEINTERPRET 9.004

Project	NELSON SLOAN QUARRY, SAN DIEGO COUNTY, CALIFORNIA		
Group	Phase 5	*Scenario*	Master Scenario
Drawn By	N. Akbariyeh	*Company*	HALEY & ALDRICH, INC.
Date	4/15/2021		Figure B-5