

February 29, 2024
Project No. E080-065

Engineering Resources of Southern California

1861 W. Redlands Blvd.
Redlands, California 92373

Attention: Mr. Moe Ahmadi, P.E.

Subject: Revised Geotechnical Engineering Investigation
Soboba Septic to Gravity Sewer System
Soboba Band of Luiseno Indians Reservation
San Jacinto, California

Dear Mr. Ahmadi:

This report presents the findings of our geotechnical investigation for the proposed Soboba sewer project. The primary geotechnical issue is the potential for caving of loose unconsolidated sandy soils during pipeline construction. The report addresses this and other issues and provides geotechnical engineering parameters and recommendations regarding project design and construction.

We appreciate the opportunity to work with you on this project. Please contact us if you have any questions or need any additional information.

Sincerely,
INLAND FOUNDATION ENGINEERING, INC.


Allen D. Evans, P.E., G.E.
Principal


Christopher Hogan Rangel
Project Geologist

ADE:CHR:es
Distribution: Addressee

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INTRODUCTION

This report presents the results of the geotechnical investigation conducted for the proposed Soboba Band of Luiseno Indians septic to gravity sewer system project. This report includes a summary of the site geologic conditions and geotechnical recommendations for project design and construction.

Our project understanding and scope of service were based on discussions with Engineering Resources and review of the referenced plan set below.

- Soboba Septic to Gravity Sewer System, Soboba Road, Castille Canyon Road, Poppet Flats Road, and Noli Road, Sheets 1 -70 of 70, prepared by Engineering Resources of Southern California, undated.

We also reviewed the following report prepared previously by IFE for a proposed water main along much of the same alignment proposed for this project.

- Preliminary Geotechnical Investigation, Proposed Water System Pipeline Improvements, Soboba Band of Luiseno Indian Reservation, San Jacinto, California, prepared by Inland Foundation Engineering, Inc., dated July 13, 2006

SCOPE OF SERVICE

The purpose of the geotechnical investigation was to evaluate the subsurface conditions and to provide geotechnical engineering recommendations for the proposed sewer project. Our scope of service included:

- *Review of the general geologic conditions and specific subsurface conditions of the project alignment.*
- *Evaluation of the engineering and geologic data collected.*
- *Preparation of this report with geotechnical conclusions and recommendations for design and construction.*

The tasks performed to achieve these objectives included:

- *Collection and review of new and existing data relative to the project alignment.*
- *Subsurface exploration consisting of eight (8) eight-inch diameter hollow stem auger borings to evaluate the nature and stratigraphy of the subsurface soil and to obtain representative samples for laboratory testing.*

- *Visual reconnaissance of the site and surrounding area to ascertain the presence of unstable or adverse geologic conditions.*
- *Laboratory testing of representative samples to evaluate the classification and engineering properties of the soil.*
- *Analysis of the data collected and the preparation of this report with geotechnical conclusions and recommendations.*
- *Evaluation of hazardous materials/waste was not within the scope of service provided.*

PROJECT AND SITE DESCRIPTION

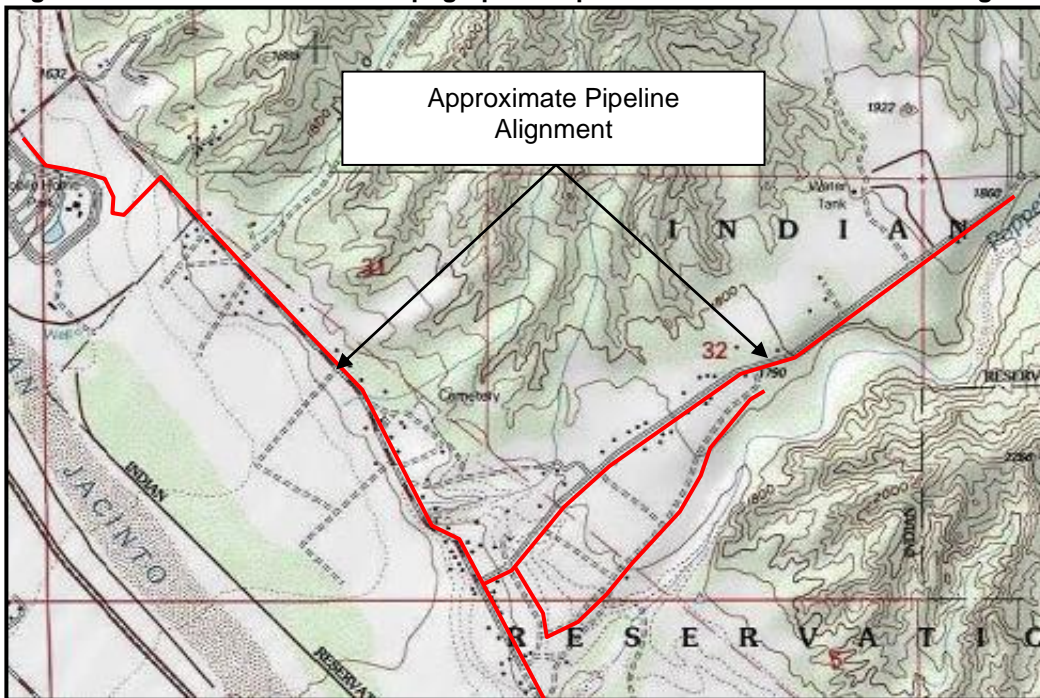
The project will consist of the design and construction of approximately 6,065 feet of 15-inch VCP sewer in Soboba Road, Castile Canyon Road, Poppet Flats Road, and Noli Road. The proposed project alignment consists predominately of improved streets paved with asphalt concrete and developed private lots.

The ground surface elevation along the project alignment is gently sloping with a gradual increase in elevations. The anticipated invert depth of the proposed sewer will range from approximately 9 to 30 feet below existing ground surface. The project is expected to be constructed using conventional excavation and backfill methods. Figure 1 and 2 below shows the project location and general topography.

Figure 1: Site Location. Google Earth Aerial Photograph (2023)



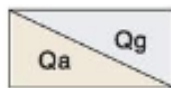
Figure 2: Site Location. USGS Topographic Map of the San Jacinto 7.5' Quadrangle



GEOLOGIC SETTING

According to the USGS Preliminary Geologic Map of the San Jacinto 7.5' Quadrangle (Dibblee and Minch, 2003), the project alignment is underlain by young and old alluvial deposits (map symbol Qa and Qoa). Figure 3 below shows a portion of the referenced geologic map with the mapped geologic units in the vicinity of the project.

Figure 3: Geologic Map of the San Jacinto 7.5' Quadrangle (Dibble and Minch, 2003)

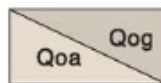


SURFICIAL SEDIMENTS

Alluvial sediments, unconsolidated, undissected

Qg Alluvial sand and gravel of major stream channels

Qa Alluvial sand and clay of valley areas, covered by gray soil, includes stream channel gravel and sand in mountain areas



OLDER SURFICIAL SEDIMENTS

Dissected older alluvial deposits, slightly indurated, undeformed, late Pleistocene age

Qoa Alluvial gravel and sand of low terrace remnants

Qog Alluvial gravel and sand of high terrace remnants

SUBSURFACE CONDITIONS

Eight (8) exploratory borings were drilled for the subject geotechnical investigation. We also reviewed 21 exploratory boring logs and associated laboratory test data from the referenced 2006 geotechnical investigation, conducted in location of the proposed sewer alignment. Subsurface conditions encountered in the exploratory borings are summarized below. Detailed descriptions are shown on the boring logs in Appendix A.

Soil Classification and Density: Exploratory borings B-01 and B-02 were drilled near the west end of the alignment. Artificial fill was encountered to a depth of about 7 feet in boring B-01 that consisted generally of dense silty clayey sand (SC-SM). The underlying native alluvial soil consisted of medium dense silty sand (SM) and sand (SP)

to the depth explored, 21.5 feet. The soil encountered within boring B-02 consisted of fine-grained sandy silty clay (CL-ML) and sandy silt (ML) to a depth of about 19 feet. Below 19 feet, the soil consisted of sand (SP) and silty sand (SM).

Exploratory borings B-03 through B-08 were conducted within the general area of the proposed alignment along Noli Road, Poppet Flats Road and Castile Canyon Road. Native alluvial soil was encountered within these borings and consisted generally of interlayered coarse-grained silty sand (SM), sand with silt (SP-SM), and sand (SP) to a maximum depth explored of 35 feet. The soil was generally loose to medium dense and dry to slightly moist at the time of the investigation.

The subsurface conditions along the project alignment encountered in the 2006 borings were similar to those encountered during the current investigation. The borings all extended to approximately 21.5 feet below existing grades. The conditions encountered generally consisted of loose to medium dense native alluvial soil classified as silty sand (SM), sand (SP), sand with silt (SP-SM), and sandy silt (ML).

Groundwater: No groundwater was encountered in the exploratory borings. According to the California Department of Water Resources Water Data Library several groundwater monitoring wells are located in the near project vicinity. Well number 337742N1169245W001, located approximately 3,400 feet southwest of Soboba Road, indicates monitoring from January 2012 to present. The depth of groundwater during that period was as shallow as 183 feet below ground surface. Well number 337657N1169175W001, located approximately 3,000 feet southwest of Soboba Road, indicates monitoring from January 2012 to present. The depth of groundwater during that period was as shallow as 500 feet below ground surface. Well number 337649N1169067W001, located approximately 2,200 feet south of Soboba Road, indicates monitoring from January 2012 to present. The depth of groundwater during that period was as shallow as 73 feet below ground surface.

Seasonally perched or trapped groundwater may be present at shallower depths within the project area, particularly following prolonged periods of precipitation, and could be encountered during excavation for the sewer project. The contractor should make his own investigation of the groundwater conditions at the time of construction and be prepared, if necessary, to dewater the trench excavations necessary for this project.

Corrosion: Analytical testing was performed on three soil samples at varying depths from boring B-01, B-03, and B-07. The results indicate that sulfate concentrations are less than 0.10 percent. In accordance with ACI 201.2R, Table 6.1.4.1a, the soil can be classified as Class S0 with respect to sulfate exposure. ACI exposure classes for water-soluble sulfate in soil are shown in Table 1 below.

Table 1: ACI Exposure Classes for Water-Soluble Sulfate

Exposure Class	Water-soluble sulfate (SO₄²⁻) in soil, % by mass
S0	SO ₄ ²⁻ < 0.10
S1	0.10 ≤ SO ₄ ²⁻ < 0.20
S2	0.20 ≤ SO ₄ ²⁻ < 2.00
S3	SO ₄ ²⁻ > 2.00

The tested samples indicate chloride concentrations of 17, 18, and 23 ppm. These levels are generally not high enough to be of concern with respect to corrosion of ferrous metals or concrete reinforcing steel. The soil can be considered slightly alkaline to alkaline with pH values of 9.5, 9.1, and 7.9.

The tested minimum saturated resistivity values, ranged from 5,321 ohm-cm to 8,840 ohm-cm, indicate the soil is moderately corrosive with respect to buried ferrous metal. Specific corrosion control measures, such as coating of pipe with non-corrosive material or alternative non-metallic pipe material, may be necessary if there is a potential for saturated soil. Correlations between soil resistivity and ferrous metal corrosion are shown in the following Table 2.

Table 2: Correlation Between Soil Electrical Resistivity and Ferrous Metal Corrosion¹

Soil Resistivity (ohm-cm)	Corrosivity Category
> 10,000	Mildly Corrosive
2,001 to 10,000	Moderately Corrosive
1,001 to 2,000	Corrosive
1 to 1,000	Severely Corrosive

¹Romanoff, Melvin, Underground Corrosion, NBS Circular 579, Reprinted by NACE, 1989

IFE does not practice corrosion engineering. We recommend that a qualified corrosion engineer be consulted for additional guidance.

CONCLUSIONS AND RECOMMENDATIONS

On the basis of the field and laboratory exploration and testing, construction of the proposed sewer pipeline is feasible from a geotechnical engineering standpoint. The primary issue requiring mitigation is the potential for collapse and caving of loose sandy material during trenching operations. A shoring plan for construction should be prepared by a qualified shoring engineer. The following sections present geotechnical recommendations for project design and construction.

Excavation and Shoring: All trenches and other excavations should be configured and shored in accordance with Cal/OSHA requirements. Existing soil along the pipeline alignment that is readily excavated with conventional excavation and trenching equipment should be classified as Type C, according to Cal/OSHA criteria. For Type C soil, unshored excavations should have a maximum slope of 1.5:1 (H:V) and should not exceed 20 feet in height.

On a preliminary basis, the most feasible types of shoring for this project appear to be 1) trench boxes and 2) soldier piles with steel plate lagging. Trench boxes are commonly used for shoring during pipeline construction. They can be readily moved from location to location as the pipeline is excavated and backfilled. Trench boxes can be stacked for deeper excavations and have been used for pipeline excavations as deep as 30 feet. Trench boxes are typically moved and stacked using project excavation equipment and require sufficient lateral and overhead clearance.

Soldier piles with steel or timber lagging are more common in pipeline construction with limited overhead and lateral clearance. The soldier piles consist of steel I-beams placed in drilled holes that are drilled in advance and backfilled with slurry or gravel. Steel plate or timber lagging is then placed between the soldier piles as the excavation advances. The plate or timber is removed in stages and the excavation is backfilled and the soldier piles are removed from the ground upon project completion. In some cases, the soldier piles and lagging may be left in the ground permanently.

Shoring, shields, or other protective systems should be used in accordance with all specifications, recommendations, and limitations provided by the manufacturer. Braced shoring should be designed using an at-rest earth pressure of 60 pounds per cubic foot. Cantilever shoring should be designed using an active earth pressure of 40 pounds per cubic foot. A registered professional engineer should design shoring or benching for excavations deeper than twenty feet.

Pipe trench should be excavated to the line and grade shown on the drawings. The pipe trench should provide at least 12 inches of clearance between the edge of the pipe and the wall of the trench. The sides of the trench should be parallel to the pipe and maintained a uniform distance from the pipe.

If excavation for the pipe extends below the design invert grade, the bottom of the excavation should be refilled with approved material. Where soft or otherwise unstable materials are encountered, the excavation should be deepened and stabilized with gravel or other approved bedding material. All excavations should be free of trash, debris, or other unsuitable material prior to the placement of backfill.

Pipe Bedding: The native soil along the project alignment is generally not suitable for use as pipe bedding. Pipe bedding material should comply with the pipe manufacturer's recommendations or the Standard Specifications for Public Works Construction (Greenbook). A minimum bedding thickness of 6 inches should be placed to provide uniform and adequate longitudinal support under the pipe. The bedding material should not be compacted within 6 inches of the bottom of the pipe. Blocking should not be used to bring the pipe to grade. Bell holes at each joint should be provided to permit the joint to be assembled properly while maintaining uniform pipe support.

Backfill and Compaction: All excavation backfill and compaction should be in accordance with Greenbook requirements and the following recommendations.

Pipe Zone Backfill: Pipe zone backfill, extending from the top of pipe bedding to at least 12 inches over the top of pipe, should be free of organic matter and deleterious substances, contain no rocks larger than three (3) inches and no more than 15 percent rocks larger than two (2) inches. In general, the native alluvial soil and bedrock excavation spoils should be suitable for use as select backfill material. Alternatively, imported pipe zone material can be used. Imported pipe zone backfill should consist of clean, cohesionless soil having a sand equivalent greater than 30 and fewer than 10% particles finer than the No. 200 Sieve. To provide protection from particle migration, imported pipe zone material should also meet the following criteria:

$$D_{15} > 0.15 \text{ and } D_{50} < 5 \text{ mm,}$$

Where D_{15} and D_{50} represent bedding material particle sizes corresponding to 15 and 50 percent passing by weight, respectively. Concrete sand conforming to the requirements of ASTM C 33 will meet the piping criteria for this project. If this criteria cannot be met, a filter fabric should be used.

Pipe zone material should be placed and compacted in a manner that will assure firm continuous encasement for the pipe. The minimum relative compaction within the pipe zone should be 90 percent unless otherwise specified.

Flooding or jetting of native pipe zone backfill is not recommended. Flooding or jetting and vibratory compaction may be carefully used with imported pipe zone material meeting the above requirements.

Trench Backfill: Trench backfill material over the pipe zone should be native or approved granular soil, free of organic and deleterious materials, rocks or lumps greater than 3 inches in greatest dimension and other unsuitable material. In general, the native soil is suitable for use as trench backfill. Trench backfill may be compacted at near optimum moisture content by mechanical means as necessary for the achievement

of satisfactory compaction. Flooding or jetting is not recommended. Unless otherwise specified by the drawings, specifications or encroachment permits, the minimum acceptable degree of compaction should be 90 percent of the maximum dry density. This is with the exception of the upper 12 inches within roadway areas which should be compacted to a minimum of 95 percent relative compaction.

Testing and Observation: During all grading and backfilling, tests and observations should be performed by a representative of IFE to verify that the exposed subsurface conditions are as expected and that grading is performed in accordance with the project specifications. Density testing should be performed in accordance with the current ASTM D1556 or ASTM D6938 test methods.

LIMITATIONS

This report was prepared for Engineering Resources of Southern California for use in the design and construction of the proposed Soboba sewer project. This report may only be used by Engineering Resources of Southern California for this purpose. The use of this report by other parties or for other purposes is not authorized without written permission by Inland Foundation Engineering, Inc.

The recommendations of this report are considered to be preliminary. The final design parameters should be confirmed during site excavation and grading on the basis of actual conditions exposed. To this extent, this report is not considered to be complete until the completion of both the design process and site preparation.

The findings and recommendations of this report are based on interpolation of soil conditions between and beyond boring locations. Soil conditions may be present that are different than those indicated in this report.

The information in this report represents professional opinions that have been developed using that degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical consultants practicing in this or similar localities. No other warranty, either expressed or implied, is made.

REFERENCES

California Building Standards Commission, 2022, California Building Code (CBC), California Code of Regulations, Title 24, Part 2, Volume 2.

United States Geological Survey, San Jacinto 7.5' Quadrangle (Dibblee and Minch, 2003)

Preliminary Geotechnical Investigation, Proposed Water System Pipeline Improvements, Soboba Band of Luiseno Indian Reservation, San Jacinto, California, prepared by Inland Foundation Engineering, Inc., dated July 13, 2006

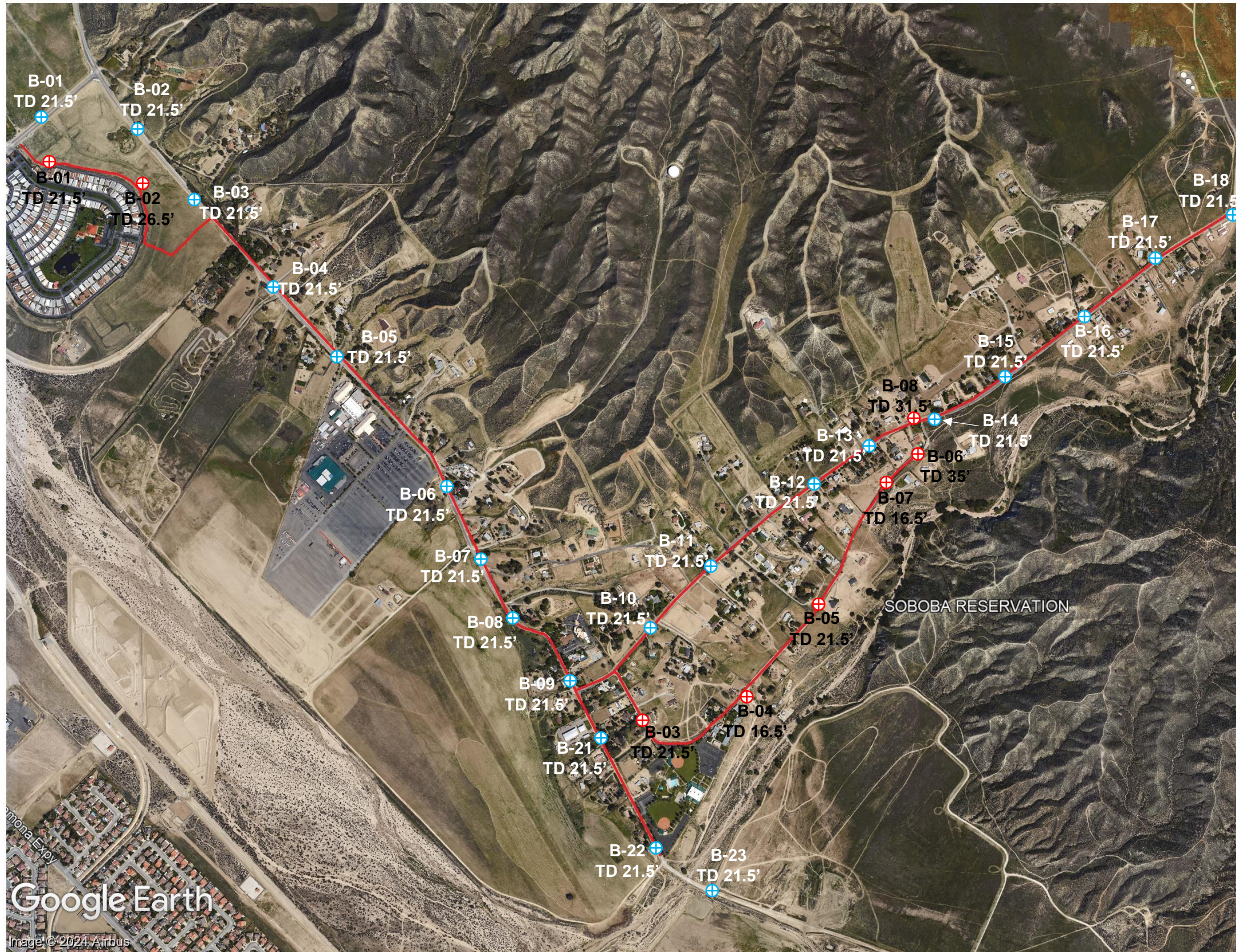
***APPENDIX A –
Site Exploration***

APPENDIX A

SITE EXPLORATION

Eight exploratory borings were drilled with a truck-mounted hollow-stem auger drill rig at the approximate locations shown on Figure No. A-2. The materials encountered during drilling were logged by a staff geologist. Boring logs are included with this report as Figures A-3 through A-10.

Representative soil samples were obtained within the borings by driving a thin-walled steel penetration sampler with successive 30-inch drops of a 140-pound hammer. The numbers of blows required to achieve each six inches of penetration were recorded on the boring logs. Two different samplers were used: a Standard Penetration Test (SPT) sampler and a modified California sampler with brass sample rings. Representative bulk soil samples were also obtained from the auger cuttings. Samples were placed in moisture sealed containers and transported to our laboratory for further testing and evaluation. Laboratory tests results are discussed and included in Appendix B.



Google Earth

Image © 2024 Airbus

Base Map: Google Earth Imagery

SITE PLAN

Engineering Resources of Southern California
 Proposed Sewer Alignment
 Soboba Band of Luiseno Indians Reservation
 San Jacinto, California

LEGEND

- ⊕ Approximate Location of Borings (2024)
- ⊕ Approximate Location of Borings (2006)



IFE Inland Foundation Engineering, Inc.
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Figure No. A-2	Engineering Resources of Southern Ca Proposed Sewer Alignment Soboba Band of Luiseno Indians Reservation San Jacinto, CA	
	Drawn By: HR	Project No. E080-065
	Not to Scale	Date: January 2024

LOG OF BORING B-01

DRILLING RIG	<u>CME-75</u>	DATE DRILLED	<u>12/14/23</u>	HAMMER TYPE	<u>Auto-Trip</u>
DRILLING METHOD	<u>Rotary Auger</u>	HAMMER WEIGHT	<u>140-lb.</u>	HAMMER DROP	<u>30-inches</u>
LOGGED BY	<u>HR</u>	BORING DIAMETER	<u>8-inches</u>		
GROUND ELEVATION	<u>+/- 1593 ft</u>				

SUMMARY OF SUBSURFACE CONDITIONS

This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered and is representative of interpretations made during drilling. Contrasting data derived from laboratory analysis may not be reflected in these representations.

DEPTH (ft)	U.S.C.S.	GRAPHIC LOG	DESCRIPTION	BULK SAMPLE	DRIVE SAMPLE	SAMPLE TYPE	BLOW COUNTS /6"	MOISTURE (%)	DRY UNIT WT. (pcf)
			ARTIFICIAL FILL, SILTY CLAYEY SAND , fine to medium, olive-gray, slightly moist, dense.			AU			
5	SC-SM					SS	28 50	10	117
10	SM		SILTY SAND , fine to coarse, grayish-brown, slightly moist, medium dense.			AU SS	9 12	3	119
15			SAND , fine to coarse, light gray, dry to slightly moist, medium dense.			SS	14 15	1	108
20	SP		- fine grained -			SS	11 18	15	104
			End of boring at 21.5 feet. No groundwater encountered. Backfilled with native soil.						

IFE BORING - GINT STD US LAB.GDT - 2/14/24 14:39 - P:\E080\E080-065 SOBOBA SEWERGINT.GPJ



CLIENT	<u>ERSC</u>
PROJECT NAME	<u>Soboba Septic to Sewer</u>
PROJECT LOCATION	<u>Soboba Reservation</u>
	<u>San Jacinto, CA</u>
PROJECT NUMBER	<u>E080-065</u>

FIGURE NO.

A-3

LOG OF BORING B-02

DRILLING RIG	<u>CME-75</u>	DATE DRILLED	<u>12/14/23</u>	HAMMER TYPE	<u>Auto-Trip</u>
DRILLING METHOD	<u>Rotary Auger</u>	HAMMER WEIGHT	<u>140-lb.</u>	HAMMER DROP	<u>30-inches</u>
LOGGED BY	<u>HR</u>	BORING DIAMETER	<u>8-inches</u>		
GROUND ELEVATION	<u>+/- 1606 ft</u>				

SUMMARY OF SUBSURFACE CONDITIONS

This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered and is representative of interpretations made during drilling. Contrasting data derived from laboratory analysis may not be reflected in these representations.

DEPTH (ft)	U.S.C.S.	GRAPHIC LOG	DESCRIPTION	BULK SAMPLE	DRIVE SAMPLE	SAMPLE TYPE	BLOW COUNTS /6"	MOISTURE (%)	DRY UNIT WT. (pcf)
			SANDY SILTY CLAY , gray, dry, very stiff to hard.	█	█	AU			
5	CL-ML	[Hatched Pattern]		█	█	SS	35 42	4	116
10				█	█	SS	11 16	15	94
15	ML	[Vertical Lines]	SANDY SILT , grayish-brown, slightly moist, very stiff.	█	█	AU SS	17 17	13	112
20				SAND , fine, gray, slightly moist, medium dense.	█	█	SS	12 30	11
25	SM	[Dotted Pattern]	SILTY SAND , fine, olive-gray, slightly moist, medium dense.	█	█	SS	8 7	7	89
			End of boring at 26.5 feet. No groundwater encountered. Backfilled with native soil.						

IFE BORING - GINT STD US LAB.GDT - 2/14/24 14:39 - P:\E080\E080-065 SOBoba SEWER\GINT.GPJ



CLIENT	<u>ERSC</u>
PROJECT NAME	<u>Soboba Septic to Sewer</u>
PROJECT LOCATION	<u>Soboba Reservation</u>
	<u>San Jacinto, CA</u>
PROJECT NUMBER	<u>E080-065</u>

FIGURE NO.

LOG OF BORING B-03

DRILLING RIG	<u>CME-75</u>	DATE DRILLED	<u>12/14/23</u>	HAMMER TYPE	<u>Auto-Trip</u>
DRILLING METHOD	<u>Rotary Auger</u>	HAMMER WEIGHT	<u>140-lb.</u>	HAMMER DROP	<u>30-inches</u>
LOGGED BY	<u>HR</u>	BORING DIAMETER	<u>8-inches</u>		
GROUND ELEVATION	<u>+/- 1689 ft</u>				

DEPTH (ft)	U.S.C.S.	GRAPHIC LOG	SUMMARY OF SUBSURFACE CONDITIONS	BULK SAMPLE	DRIVE SAMPLE	SAMPLE TYPE	BLOW COUNTS /6"	MOISTURE (%)	DRY UNIT WT. (pcf)
			<p>This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered and is representative of interpretations made during drilling. Contrasting data derived from laboratory analysis may not be reflected in these representations.</p> <p>ASPHALT CONCRETE over AGGREGATE BASE, (3 inches over 3 inches) SILTY SAND, fine to coarse, light gray, dry to slightly moist, medium dense.</p>			AU			
5			- fine grained, loose -			SS	7 9	0	93
10	SM					SS	6 6	1	102
15			- medium dense below 15 feet -			SS	7 12	2	101
20						SS	9 10	9	93
			End of boring at 21.5 feet. No groundwater encountered. Backfilled with native soil.						

IFE BORING - GINT STD US LAB.GDT - 2/14/24 14:39 - P:\E080\E080-065 SOBoba SEWERGINT.GPJ







CLIENT	<u>ERSC</u>
PROJECT NAME	<u>Soboba Septic to Sewer</u>
PROJECT LOCATION	<u>Soboba Reservation</u>
	<u>San Jacinto, CA</u>
PROJECT NUMBER	<u>E080-065</u>

FIGURE NO.

A-5

LOG OF BORING B-04

DRILLING RIG	<u>CME-75</u>	DATE DRILLED	<u>12/14/23</u>	HAMMER TYPE	<u>Auto-Trip</u>
DRILLING METHOD	<u>Rotary Auger</u>	HAMMER WEIGHT	<u>140-lb.</u>	HAMMER DROP	<u>30-inches</u>
LOGGED BY	<u>HR</u>	BORING DIAMETER	<u>8-inches</u>		
GROUND ELEVATION	<u>+/- 1701 ft</u>				

DEPTH (ft)	U.S.C.S.	GRAPHIC LOG	SUMMARY OF SUBSURFACE CONDITIONS	BULK SAMPLE	DRIVE SAMPLE	SAMPLE TYPE	BLOW COUNTS /6"	MOISTURE (%)	DRY UNIT WT. (pcf)
			This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered and is representative of interpretations made during drilling. Contrasting data derived from laboratory analysis may not be reflected in these representations.						
	SW-SM		SAND with SILT , fine to coarse, dark grayish-brown, slightly moist, medium dense.			AU			
5			SAND , fine to coarse, light gray, dry, medium dense.			SS	11 13	3	95
10	SP					SS	15 15	3	116
15						SS	16 19	5	113
			End of boring at 16.5 feet. No groundwater encountered. Backfilled with native soil.						

IFE BORING - GINT STD US LAB.GDT - 2/14/24 14:39 - P:\E080\E080-065 SOBOBA SEWERGINT.GPJ



CLIENT	<u>ERSC</u>
PROJECT NAME	<u>Soboba Septic to Sewer</u>
PROJECT LOCATION	<u>Soboba Reservation</u>
	<u>San Jacinto, CA</u>
PROJECT NUMBER	<u>E080-065</u>

FIGURE NO.

A-6

LOG OF BORING B-05

DRILLING RIG	<u>CME-75</u>	DATE DRILLED	<u>12/14/23</u>	HAMMER TYPE	<u>Auto-Trip</u>
DRILLING METHOD	<u>Rotary Auger</u>	HAMMER WEIGHT	<u>140-lb.</u>	HAMMER DROP	<u>30-inches</u>
LOGGED BY	<u>HR</u>	BORING DIAMETER	<u>8-inches</u>		
GROUND ELEVATION	<u>+/- 1738 ft</u>				

SUMMARY OF SUBSURFACE CONDITIONS

This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered and is representative of interpretations made during drilling. Contrasting data derived from laboratory analysis may not be reflected in these representations.

DEPTH (ft)	U.S.C.S.	GRAPHIC LOG	DESCRIPTION	BULK SAMPLE	DRIVE SAMPLE	SAMPLE TYPE	BLOW COUNTS /6"	MOISTURE (%)	DRY UNIT WT. (pcf)
			ASPHALT CONCRETE , (4 inches)			AU			
			SAND with SILT , fine to medium, brown, slightly moist, loose.			SS	5 6	13	108
5	SP-SM								
10			SILTY SAND , fine to medium, brown, slightly moist, medium dense.			AU SS	9 9	6	111
15	SM					SS	6 7	10	111
20	SP					SS	16 19	3	115
			End of boring at 21.5 feet. No groundwater encountered. Backfilled with native soil.						

IFE BORING - GINT STD US LAB.GDT - 2/14/24 14:39 - P:\E080\E080-065 SOBoba SEWERGINT.GPJ



CLIENT	<u>ERSC</u>
PROJECT NAME	<u>Soboba Septic to Sewer</u>
PROJECT LOCATION	<u>Soboba Reservation</u>
	<u>San Jacinto, CA</u>
PROJECT NUMBER	<u>E080-065</u>

FIGURE NO.

A-7

LOG OF BORING B-06

DRILLING RIG	<u>CME-75</u>	DATE DRILLED	<u>1/3/24</u>	HAMMER TYPE	<u>Auto-Trip</u>
DRILLING METHOD	<u>Rotary Auger</u>	HAMMER WEIGHT	<u>140-lb.</u>	HAMMER DROP	<u>30-inches</u>
LOGGED BY	<u>HR</u>	BORING DIAMETER	<u>8-inches</u>		
GROUND ELEVATION	<u>+/- 1796 ft</u>				

DEPTH (ft)	U.S.C.S.	GRAPHIC LOG	SUMMARY OF SUBSURFACE CONDITIONS	BULK SAMPLE	DRIVE SAMPLE	SAMPLE TYPE	BLOW COUNTS /6"	MOISTURE (%)	DRY UNIT WT. (pcf)
			<p>This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered and is representative of interpretations made during drilling. Contrasting data derived from laboratory analysis may not be reflected in these representations.</p>						
			<p>ASPHALT CONCRETE over AGGREGATE BASE, (3 inches over 2 inches) SAND, fine to coarse, grayish-brown, dry, loose.</p>						
5									
				X	X	SS	7 7	3	104
10	SP								
				X	X	SS	6 7	2	109
15			- medium dense -						
				X	X	SS	7 11	4	110
20			<p>SAND with SILT, fine to coarse, grayish-brown, dry, medium dense.</p>						
				X	X	SS	12 12	3	107
25									
				X	X	SS	9 11	4	111
30	SP-SM								
				X	X	SS	13 23	5	108
35			<p>End of boring at 35 feet. No groundwater encountered. Backfilled with native soil.</p>						

IFE BORING - GINT STD US LAB.GDT - 2/14/24 14:39 - P:\E080\E080-065 SOBoba SEWERGINT.GPJ



CLIENT	<u>ERSC</u>
PROJECT NAME	<u>Soboba Septic to Sewer</u>
PROJECT LOCATION	<u>Soboba Reservation</u>
	<u>San Jacinto, CA</u>
PROJECT NUMBER	<u>E080-065</u>

FIGURE NO.

A-8

LOG OF BORING B-07

DRILLING RIG	<u>CME-75</u>	DATE DRILLED	<u>1/3/24</u>	HAMMER TYPE	<u>Auto-Trip</u>
DRILLING METHOD	<u>Rotary Auger</u>	HAMMER WEIGHT	<u>140-lb.</u>	HAMMER DROP	<u>30-inches</u>
LOGGED BY	<u>HR</u>	BORING DIAMETER	<u>8-inches</u>		
GROUND ELEVATION	<u>+/- 1771 ft</u>				

DEPTH (ft)	U.S.C.S.	GRAPHIC LOG	SUMMARY OF SUBSURFACE CONDITIONS	BULK SAMPLE	DRIVE SAMPLE	SAMPLE TYPE	BLOW COUNTS /6"	MOISTURE (%)	DRY UNIT WT. (pcf)
			This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered and is representative of interpretations made during drilling. Contrasting data derived from laboratory analysis may not be reflected in these representations.						
		ASPHALT CONCRETE over AGGREGATE BASE, (2 inches over 2 inches)							
		SILTY SAND, fine to coarse, grayish-brown, dry to slightly moist, loose to medium dense.							
5		SM		AU	X	SS	10 11	3	114
10				X	X	SS	9 10	7	106
15		SP	SAND, coarse, grayish-brown, dry, medium dense.	X	X	SS	10 15	2	105
			End of boring at 16.5 feet. No groundwater encountered. Backfilled with native soil.						

IFE BORING - GINT STD US LAB.GDT - 2/14/24 14:39 - P:\E080\E080-065 SOBoba SEWERGINT.GPJ



CLIENT	<u>ERSC</u>
PROJECT NAME	<u>Soboba Septic to Sewer</u>
PROJECT LOCATION	<u>Soboba Reservation</u>
	<u>San Jacinto, CA</u>
PROJECT NUMBER	<u>E080-065</u>

FIGURE NO.

A-9

LOG OF BORING B-08

DRILLING RIG	<u>CME-75</u>	DATE DRILLED	<u>1/3/24</u>	HAMMER TYPE	<u>Auto-Trip</u>
DRILLING METHOD	<u>Rotary Auger</u>	HAMMER WEIGHT	<u>140-lb.</u>	HAMMER DROP	<u>30-inches</u>
LOGGED BY	<u>HR</u>	BORING DIAMETER	<u>8-inches</u>		
GROUND ELEVATION	<u>+/- 1796 ft</u>				

DEPTH (ft)	U.S.C.S.	GRAPHIC LOG	SUMMARY OF SUBSURFACE CONDITIONS				BULK SAMPLE	DRIVE SAMPLE	SAMPLE TYPE	BLOW COUNTS /6"	MOISTURE (%)	DRY UNIT WT. (pcf)
			This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered and is representative of interpretations made during drilling. Contrasting data derived from laboratory analysis may not be reflected in these representations.									
			SAND WITH SILT , fine to coarse, grayish-brown, slightly moist, medium dense.				█	█	AU			
5								X	SS	7 8	5	113
10	SW-SM	█						X	SS	7 9	4	100
15			SILTY SAND , fine to coarse, olive brown, moist, loose to medium dense.					X	SS	5 6	10	109
20	SM	█						X	SS	11 11	3	108
25			SAND WITH SILT , fine to coarse, grayish-brown, slightly moist, medium dense.					X	SS	14 20	3	111
30	SW-SM	█						X	SS	14 16	5	110
			End of boring at 31.5 feet. No groundwater encountered. Backfilled with native soil.									

IFE BORING - GINT STD US LAB.GDT - 2/14/24 14:39 - P:\E080\E080-065 SOBoba SEWERGINT.GPJ



CLIENT	<u>ERSC</u>
PROJECT NAME	<u>Soboba Septic to Sewer</u>
PROJECT LOCATION	<u>Soboba Reservation</u>
	<u>San Jacinto, CA</u>
PROJECT NUMBER	<u>E080-065</u>

FIGURE NO.

A-10

***APPENDIX B –
Laboratory Testing***

APPENDIX B

LABORATORY TESTING

Representative soil samples obtained from the borings were selected for laboratory testing. Descriptions of the tests performed are provided below.

Unit Weight and Moisture Content: Ring samples were weighed and measured to evaluate their unit weight. A small portion of each sample was then tested for moisture content. The testing was performed per ASTM D2937 and D2216. The results of this testing are shown on the boring logs (Figures A-3 through A-10).

Sieve Analysis: Twelve soil samples were selected for sieve analysis testing in accordance with ASTM D6913. These tests provide information for classifying the soil in accordance with the Unified Classification System. The results of this testing are shown on Figure Nos. B-2 through B-4.

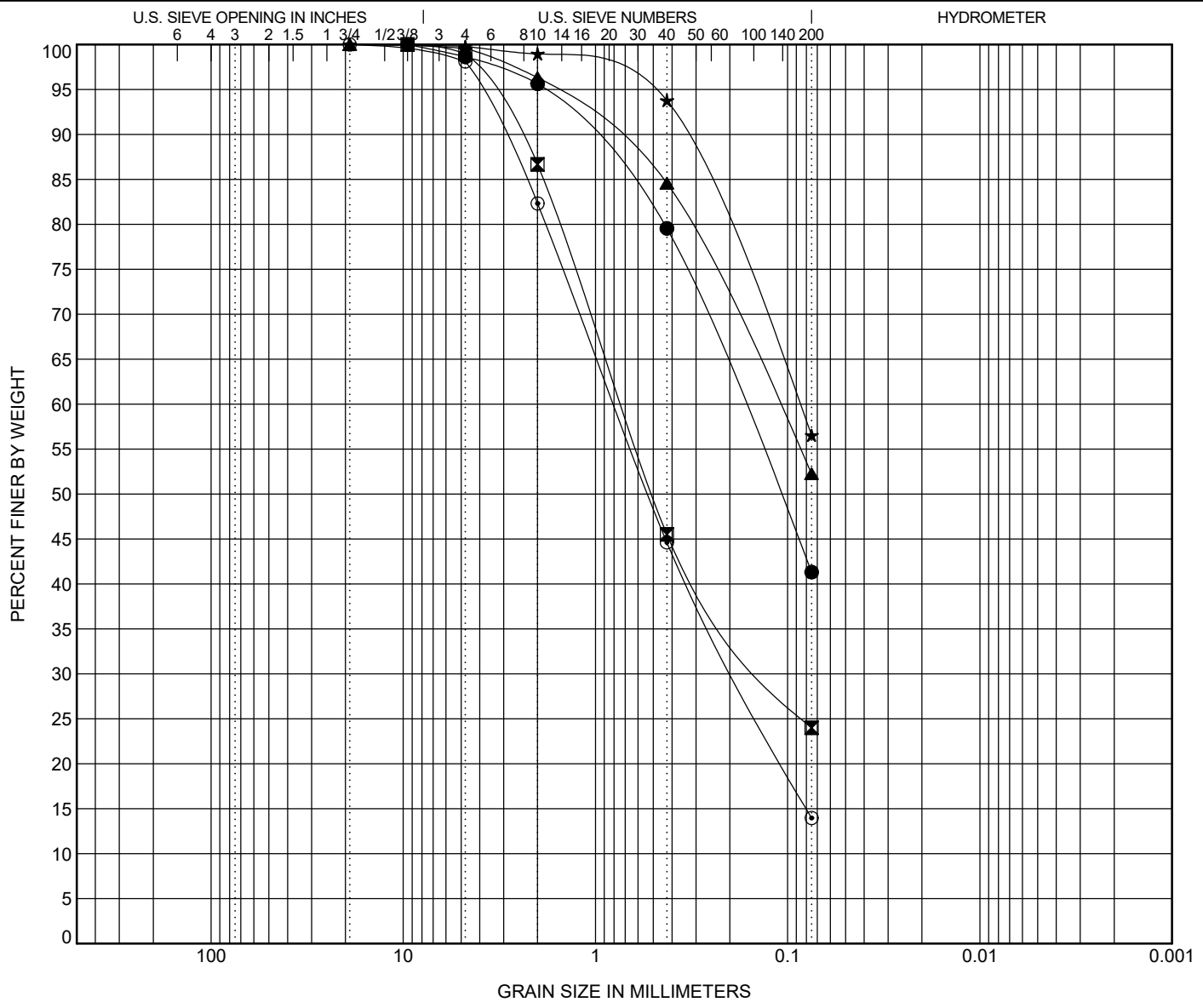
Plastic Index: Two samples were selected for plastic index testing in accordance with ASTM D4318. This test provides information regarding soil plasticity and is also used for classifying the soil in accordance with the Unified Classification System. The results are shown on Figure Nos. B-2 through B-4.

Maximum Density-Optimum Moisture: Three soil samples were selected for maximum density testing in accordance with ASTM D1557. The maximum density is compared to the in-situ density of the soil to evaluate its relative compaction. The results of this testing are shown on Figure B-5.

Direct Shear Strength: Three samples were selected and transported to AP Engineering and Testing in Pomona, California for direct shear strength testing in accordance with ASTM D3080. This testing measures the shear strength of the soil under various normal pressures and is used to develop parameters for foundation bearing capacity and lateral earth pressure. Test results are shown on Figure Nos. B-6 through B-8.

Analytical Testing: Three samples were selected and transported to AP Engineering and Testing in Pomona, California to evaluate the concentration of soluble sulfates and chlorides, pH level, and resistivity of and within the on-site soils. The test results are shown on Figure No. B-9.

IFE SIEVE ANALYSIS - GINT STD US LAB.GDT - 2/14/24 07:10 - P:\E080\E080-065 SOBoba SEWER\GINT.GPJ



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

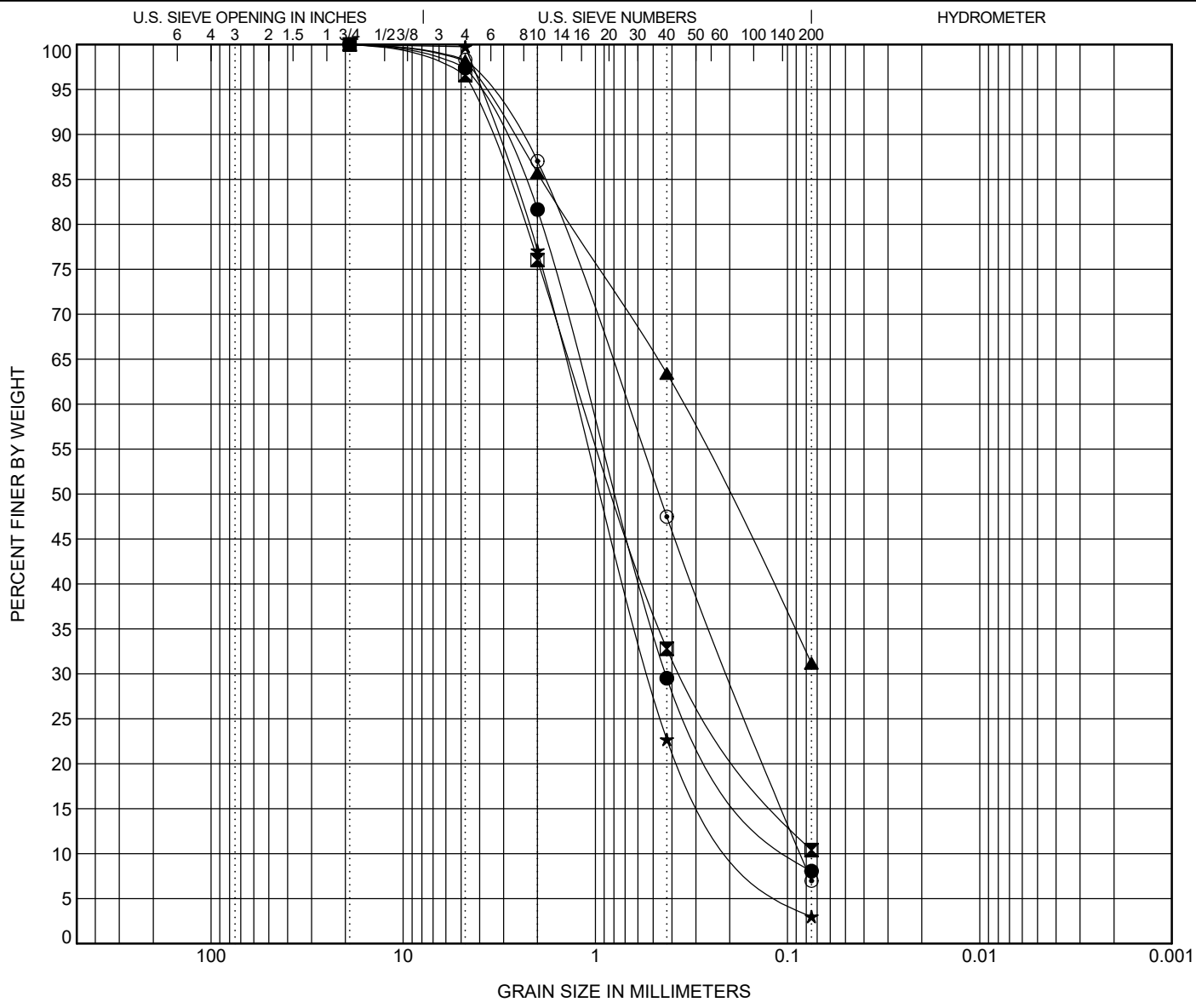
SAMPLE	DEPTH	Classification					LL	PL	PI	Cc	Cu
● B-01	0.0	SILTY, CLAYEY SAND(SC-SM)					25	19	6		
☒ B-01	10.0	SILTY SAND(SM)									
▲ B-02	0.0	SANDY SILTY CLAY(CL-ML)					28	21	7		
★ B-02	15.0	SANDY SILT(ML)									
◎ B-03	1.0	SILTY SAND(SM)									
BOREHOLE	DEPTH	D100	D90	D50	D10	%Gravel	%Sand	%Silt	%Clay		
● B-01	0.0	9.5	1.163	0.111	0.425	1.4	57.3	41.3	0.0		
☒ B-01	10.0	9.5	2.531	0.503	0.425	1.1	74.9	24.0	0.0		
▲ B-02	0.0	19	0.87	0.25	0.425	0.4	47.3	52.3	0.0		
★ B-02	15.0	19	0.356	0.15	0.425	0.2	43.3	56.5	0.0		
◎ B-03	1.0	19	3.046	0.53	0.425	1.9	84.1	14.0	0.0		

GRADATION CURVES (ASTM D6913, ASTM D4318)

INLAND FOUNDATION ENGINEERING, INC.

FIGURE NO. B-2

CLIENT ERSC PROJECT NAME Soboba Septic to Sewer
 PROJECT NUMBER E080-065 PROJECT LOCATION Soboba Reservation
San Jacinto, CA



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SAMPLE	DEPTH	Classification	LL	PL	PI	Cc	Cu		
● B-04	0.0	WELL-GRADED SAND with SILT(SW-SM)				2.02	11.98		
☒ B-05	1.0	WELL-GRADED SAND with SILT(SW-SM)				1.43	15.47		
▲ B-05	10.0	SILTY SAND(SM)							
★ B-06	5.5	WELL-GRADED SAND(SW)				1.60	8.85		
◎ B-06	20.5	POORLY-GRADED SAND with SILT(SP-SM)				0.68	8.13		
BOREHOLE	DEPTH	D100	D90	D50	D10	%Gravel	%Sand	%Silt	%Clay
● B-04	0.0	19	3.165	0.781	0.088	2.6	89.3		8.1
☒ B-05	1.0	19	3.599	0.787		3.4	86.2		10.4
▲ B-05	10.0	19	2.694	0.206		1.9	67.0		31.2
★ B-06	5.5	19	3.274	0.925	0.139	0.2	96.8		3.0
◎ B-06	20.5	19	2.512	0.469	0.085	1.7	91.3		7.0

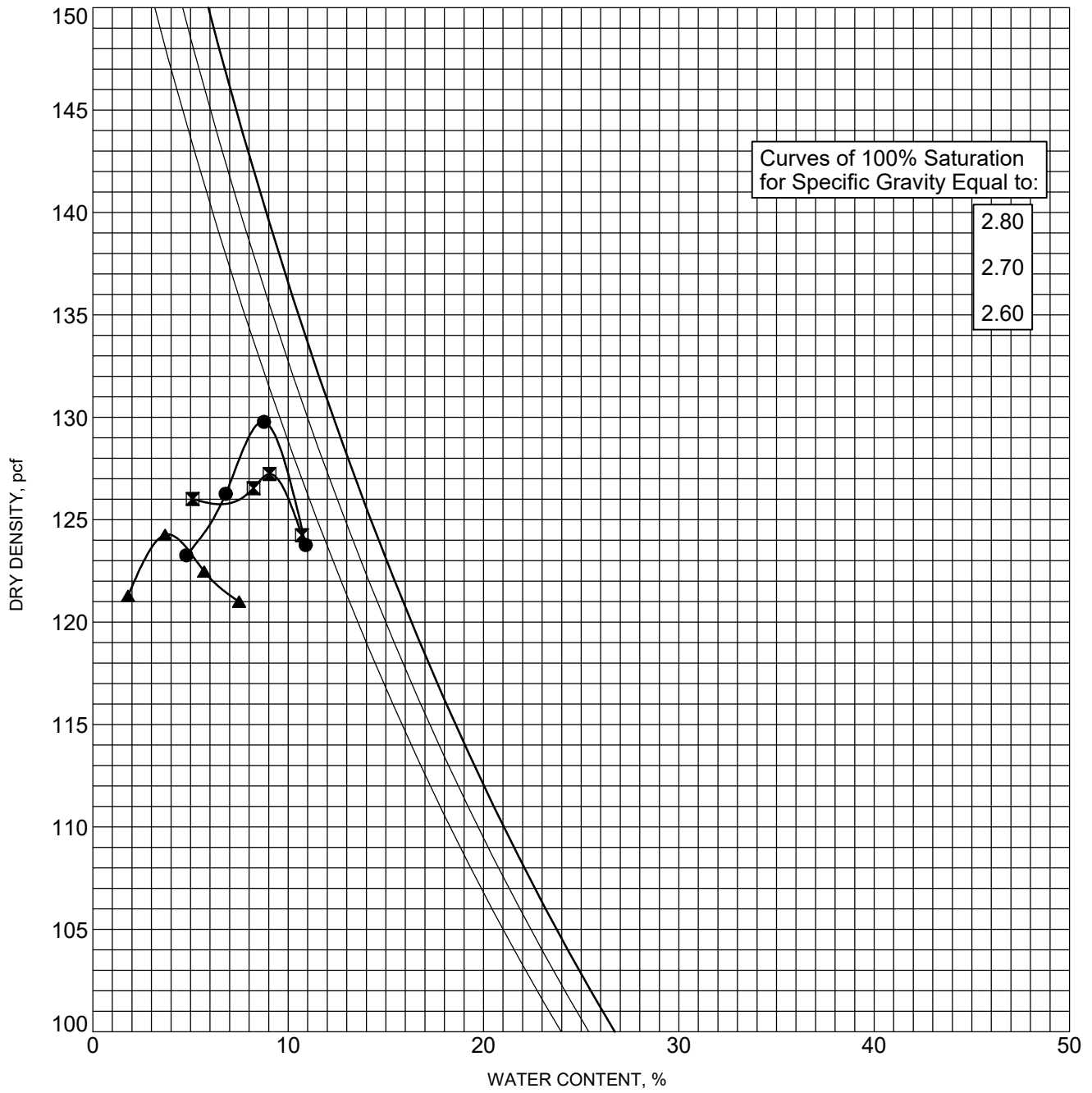
GRADATION CURVES (ASTM D6913, ASTM D4318)

INLAND FOUNDATION ENGINEERING, INC.

FIGURE NO. B-3

CLIENT	<u>ERSC</u>	PROJECT NAME	<u>Soboba Septic to Sewer</u>
PROJECT NUMBER	<u>E080-065</u>	PROJECT LOCATION	<u>Soboba Reservation</u>
			<u>San Jacinto, CA</u>

IFE SIEVE ANALYSIS - GINT STD US LAB.GDT - 2/14/24 07:10 - P:\E080\E080-065 SOBOBA SEWER\GINT.GPJ



BOREHOLE	DEPTH	Description of Materials	Max DD	Optimum WC
● B-01	0.0	SILTY, CLAYEY SAND(SC-SM)	129.8 PCF	8.7 %
⊠ B-03	1.0	SILTY SAND(SM)	127.2 PCF	9.0 %
▲ B-07	5.0	SILTY SAND(SM)	124.3 PCF	3.8 %

MOISTURE-DENSITY CURVES (ASTM D1557)

INLAND FOUNDATION ENGINEERING, INC.

FIGURE NO. B-5

CLIENT	<u>ERSC</u>	PROJECT NAME	<u>Soboba Septic to Sewer</u>
PROJECT NUMBER	<u>E080-065</u>	PROJECT LOCATION	<u>Soboba Reservation</u>
			<u>San Jacinto, CA</u>



DIRECT SHEAR TEST RESULTS
ASTM D 3080

Project Name: Soboba
Project No.: E080-065
Boring No.: B-01
Sample No.: - **Depth (ft):** 5-6
Sample Type: Mod. Cal.
Soil Description: Clayey Sand
Test Condition: Inundated **Shear Type:** Regular

Tested By: ST **Date:** 02/06/24
Computed By: JP **Date:** 02/07/24
Checked by: AP **Date:** 02/07/24

Wet Unit Weight (pcf)	Dry Unit Weight (pcf)	Initial Moisture Content (%)	Final Moisture Content (%)	Initial Degree Saturation (%)	Final Degree Saturation (%)	Normal Stress (ksf)	Peak Shear Stress (ksf)	Ultimate Shear Stress (ksf)
134.1	126.2	6.2	12.3	50	99	1	1.488	0.816
						2	2.152	1.571
						3	3.173	2.280

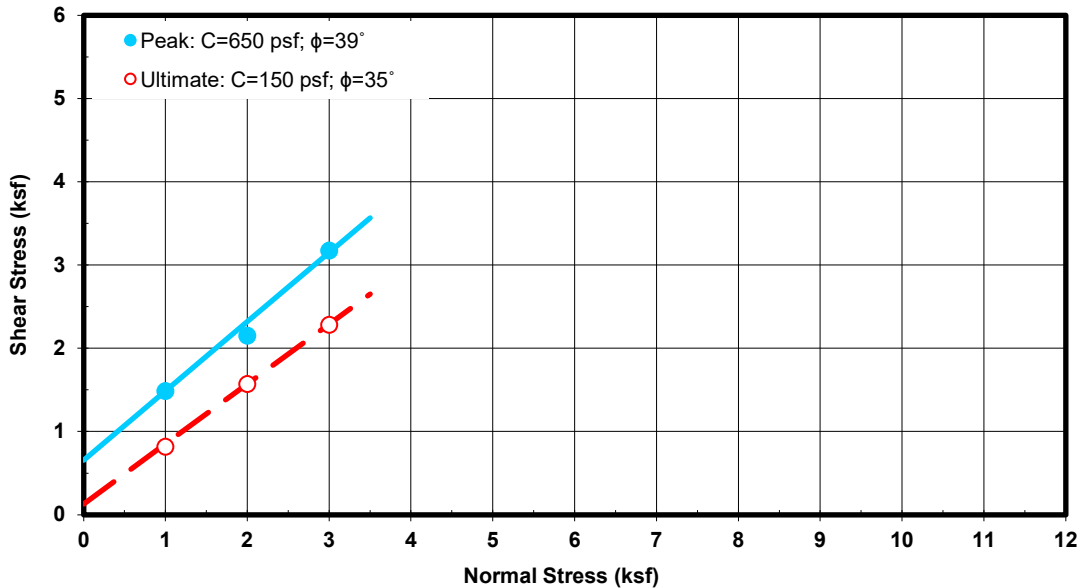
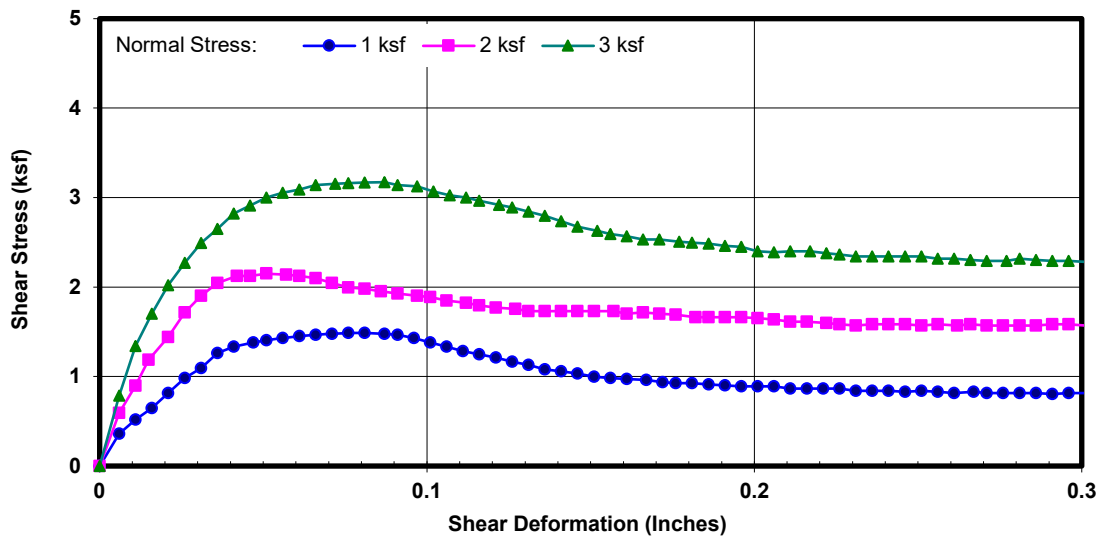


Figure B-6



DIRECT SHEAR TEST RESULTS
ASTM D 3080

Project Name: Soboba
Project No.: E080-065
Boring No.: B-02
Sample No.: - **Depth (ft):** 5.5-6.5
Sample Type: Mod. Cal.
Soil Description: Silty Sand
Test Condition: Inundated **Shear Type:** Regular

Tested By: ST **Date:** 02/06/24
Computed By: JP **Date:** 02/07/24
Checked by: AP **Date:** 02/07/24

Wet Unit Weight (pcf)	Dry Unit Weight (pcf)	Initial Moisture Content (%)	Final Moisture Content (%)	Initial Degree Saturation (%)	Final Degree Saturation (%)	Normal Stress (ksf)	Peak Shear Stress (ksf)	Ultimate Shear Stress (ksf)
100.0	97.0	3.1	23.7	11	87	1	0.660	0.648
						2	1.195	1.188
						3	1.914	1.914

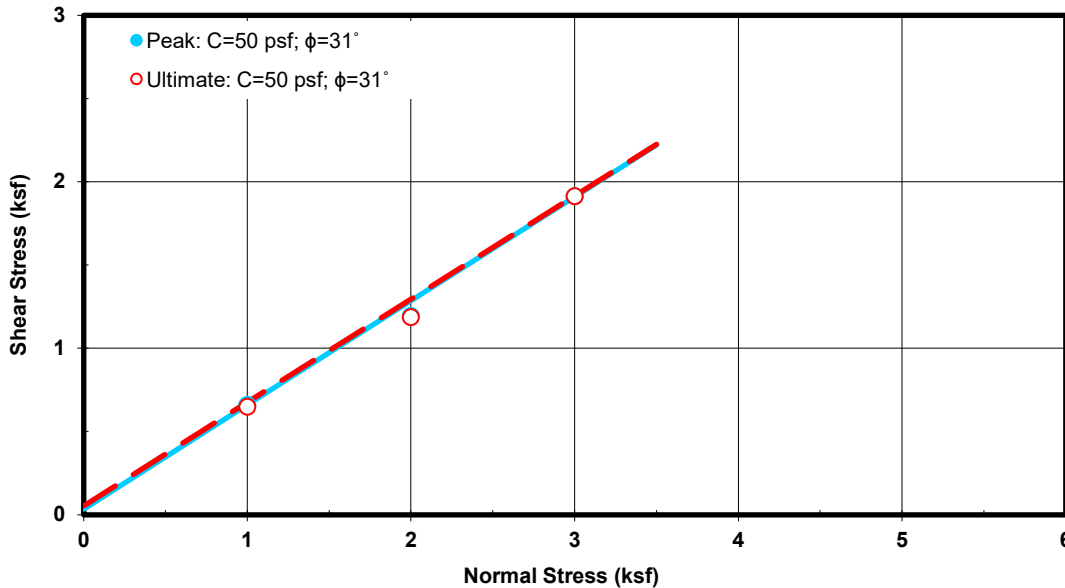
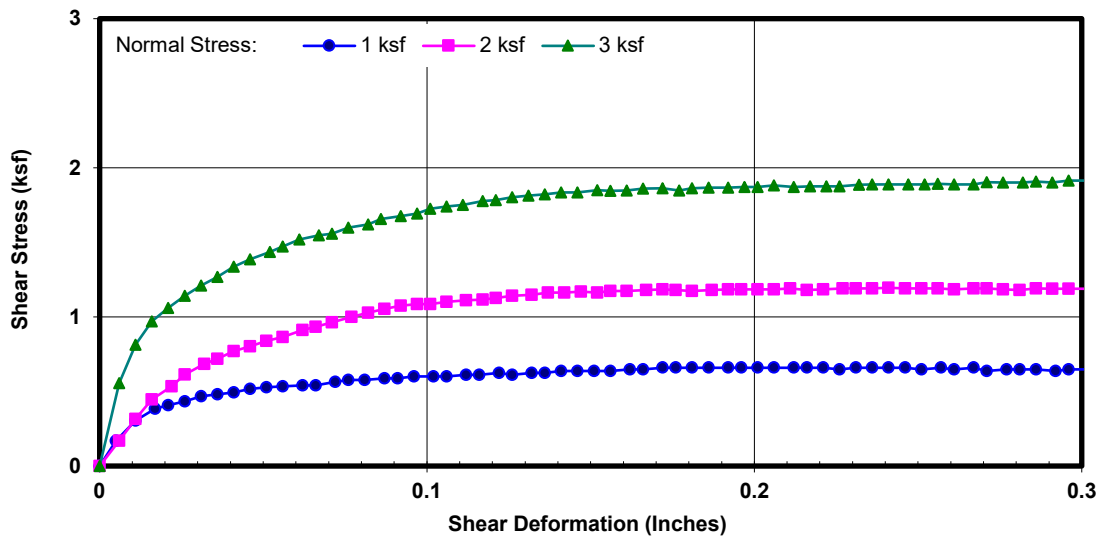


Figure B-7



DIRECT SHEAR TEST RESULTS
ASTM D 3080

Project Name: Soboba
Project No.: E080-065
Boring No.: B-06
Sample No.: - **Depth (ft):** 15.5-16.5
Sample Type: Mod. Cal.
Soil Description: Silty Sand
Test Condition: Inundated **Shear Type:** Regular

Tested By: ST **Date:** 02/06/24
Computed By: JP **Date:** 02/07/24
Checked by: AP **Date:** 02/07/24

Wet Unit Weight (pcf)	Dry Unit Weight (pcf)	Initial Moisture Content (%)	Final Moisture Content (%)	Initial Degree Saturation (%)	Final Degree Saturation (%)	Normal Stress (ksf)	Peak Shear Stress (ksf)	Ultimate Shear Stress (ksf)
98.1	95.5	2.7	24.4	10	86	1	0.816	0.780
						2	1.644	1.548
						3	2.232	2.112

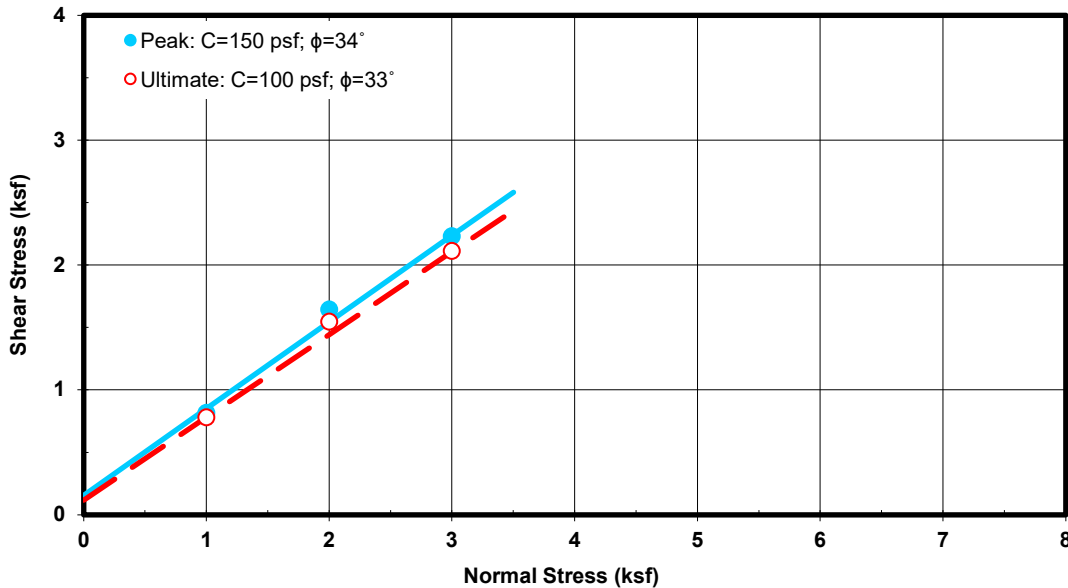
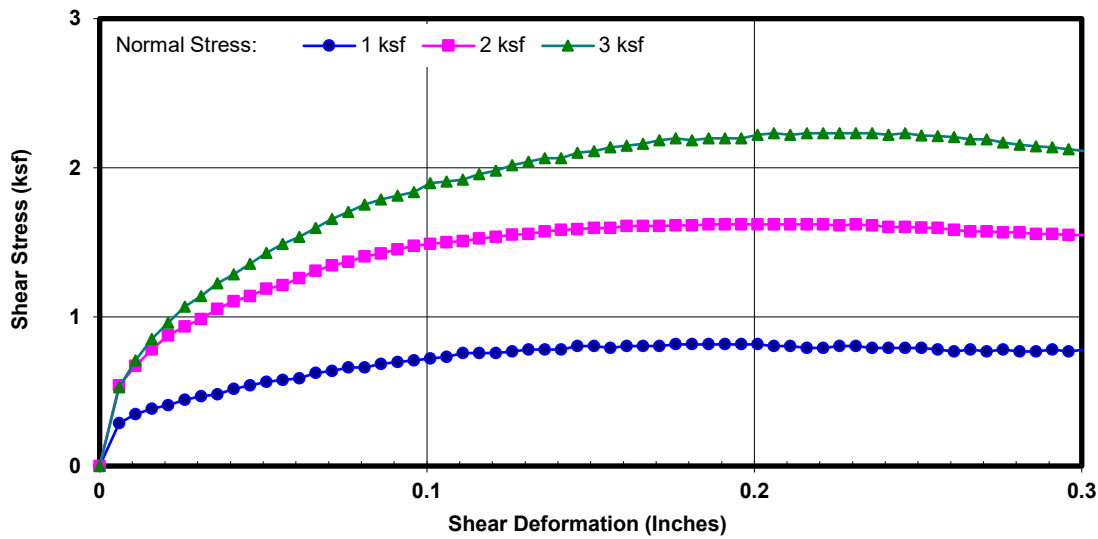


Figure B-8



CORROSION TEST RESULTS

Client Name: Inland Foundation Engineering
 Project Name: Soboba
 Project No.: E080-065

AP Job No.: 24-0151
 Date: 02/06/24

Boring No.	Sample No.	Depth (feet)	Soil Description	Minimum Resistivity (ohm-cm)	pH	Sulfate Content (ppm)	Chloride Content (ppm)
B-01	-	10-15	Silty Sand	5,398	9.5	20	17
B-03	-	1-5	Silty Sand	5,321	9.1	21	18
B-07	-	5-10	Silty Sand	8,840	7.9	23	23

NOTES: Resistivity Test and pH: California Test Method 643
 Sulfate Content : California Test Method 417
 Chloride Content : California Test Method 422
 ND = Not Detectable
 NA = Not Sufficient Sample
 NR = Not Requested