

December 11, 2023  
Project No. S168-191

**STK ARCHITECTURE, INC.**  
42095 Zeno Drive, Suite A15  
Temecula, California 92590

Attention: Tony Finaldi, Architect

Subject: Geotechnical Investigation  
Mojave Barn and Corrals Revitalization Project  
Mojave Narrows Regional Park  
18000 Yates Road, Victorville, California

Dear Mr. Finaldi:

We are pleased to submit this geotechnical report prepared for the subject project. The primary geotechnical issues are loose near-surface soil and near-surface groundwater. These and other site issues are addressed in the report, which includes geotechnical conclusions and recommendations for project design and construction.

We appreciate the opportunity to work with you on this project. If you have any questions, please contact our office.

Respectfully,

**INLAND FOUNDATION ENGINEERING, INC.**

  
**Allen D. Evans, PE, GE**  
Principal



ADE:CHR:es  
Distribution: Addressee

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## **INTRODUCTION**

This report presents the results of the geotechnical investigation conducted for the proposed Mojave Barn and Corrals Revitalization project. The site is located within the Mojave Narrows Regional Park, 18000 Yates Road, in Victorville, California. Our understanding of the project is based on discussions with STK Architecture, Inc., and review of the following documents.

- Appendix D, Request for Project Proposal – On Call Architectural Services, Mojave Barn and Corrals Revitalization, 18000 Yates Road, Victorville, CA 92392, release date May 25, 2023
- Schematic Site Plan, Mojave Narrows Barn and Corral, dated September 18, 2023, prepared by STK Architects, Inc.

## **SCOPE OF SERVICE**

The purpose of this preliminary geotechnical investigation was to provide geotechnical parameters for design and construction of the proposed project. The scope of the geotechnical services included:

- *Review of the general geologic conditions and specific subsurface conditions of the project site.*
- *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:

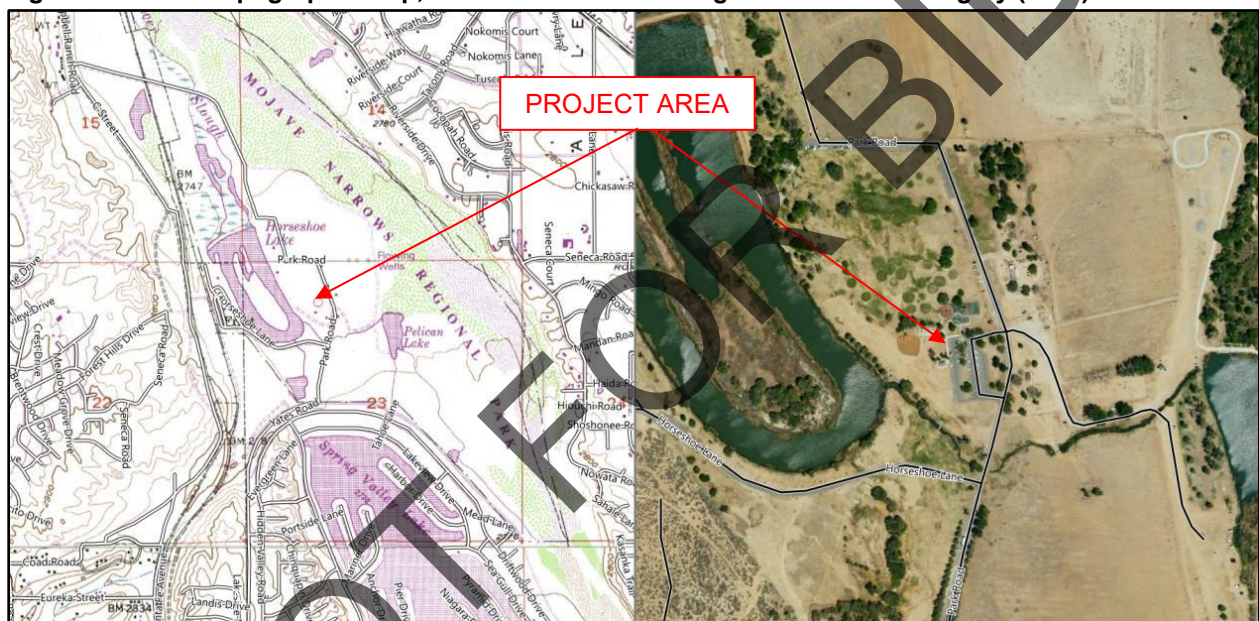
- *Collection and review of existing data relative to the site.*
- *Subsurface exploration to evaluate the nature and stratigraphy of the subsurface soil and to obtain representative samples for laboratory testing.*
- *Laboratory testing of representative samples to evaluate the classification and engineering properties of the soils.*
- *Analysis of the data collected and the preparation of this report with our geotechnical conclusions and recommendations.*

Evaluation of hazardous waste was not within the scope of service provided. Our scope of service did not include any detailed review or evaluation of geologic hazards at the project site including, but not limited to, liquefaction, landsliding and surface fault rupture. The intent of the geotechnical investigation and report is to provide geotechnical parameters and recommendations for project design and grading for construction of the proposed facilities.

## **PROJECT DESCRIPTION**

The project site is situated in the northwesterly portion of Section 23, T. 5 S., R. 4 West, SBB&M. The site is located within the Mojave Narrows Regional Park in Victorville, California. Figure 1 below shows the location of the project site.

**Figure 1: USGS Topographic Map, Victorville 7.5' Quadrangle and Satellite Imagery (2022)**



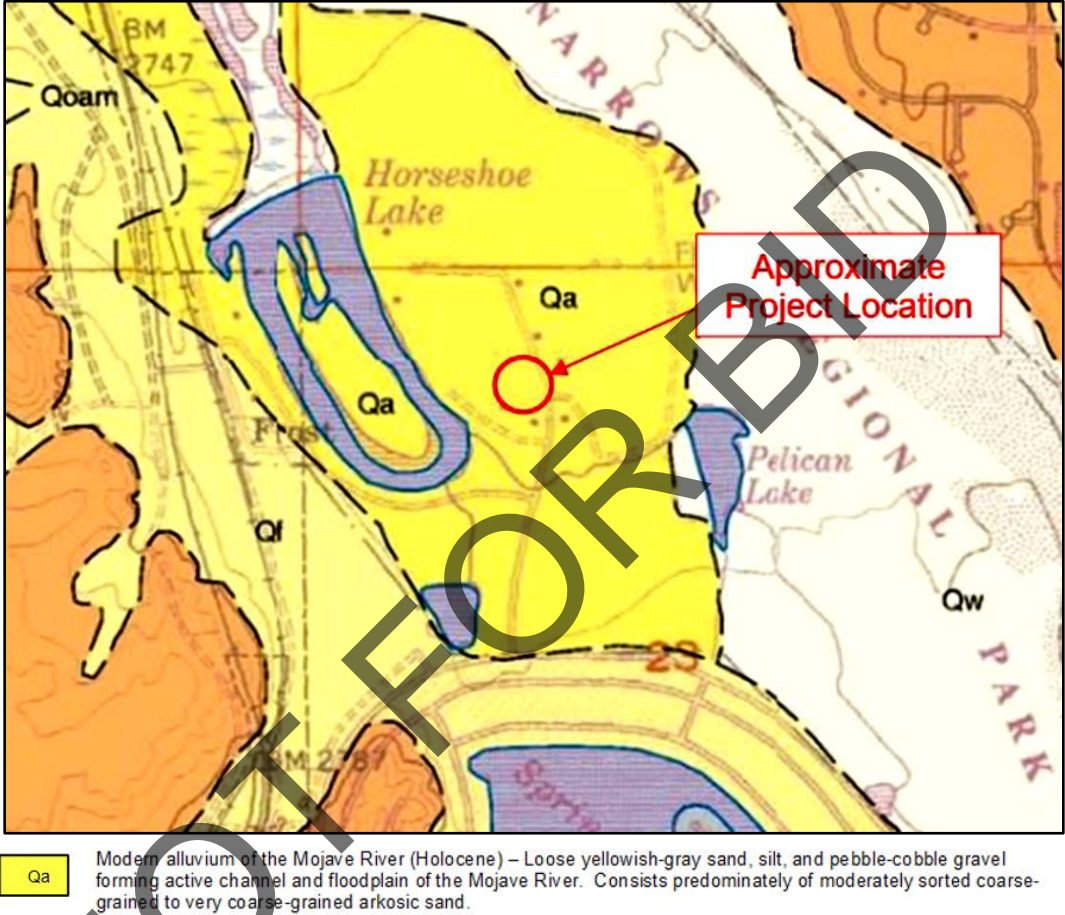
The project will include the installation of a prefabricated horse barn with four stalls. A building pad is to be constructed to support the prefabricated barn. We understand that renovation of the existing restroom and a new parking lot for 10 cars are also planned.

Grading plans were not available at the time of this report. The recommendations in this report are based on the assumption that site grading for the project will consist of cuts and fills within 2 feet of existing grade, exclusive of any remedial grading. Structure foundations will consist of shallow isolated and continuous footings with slab-on-grade floors.

**GEOLOGIC SETTING**

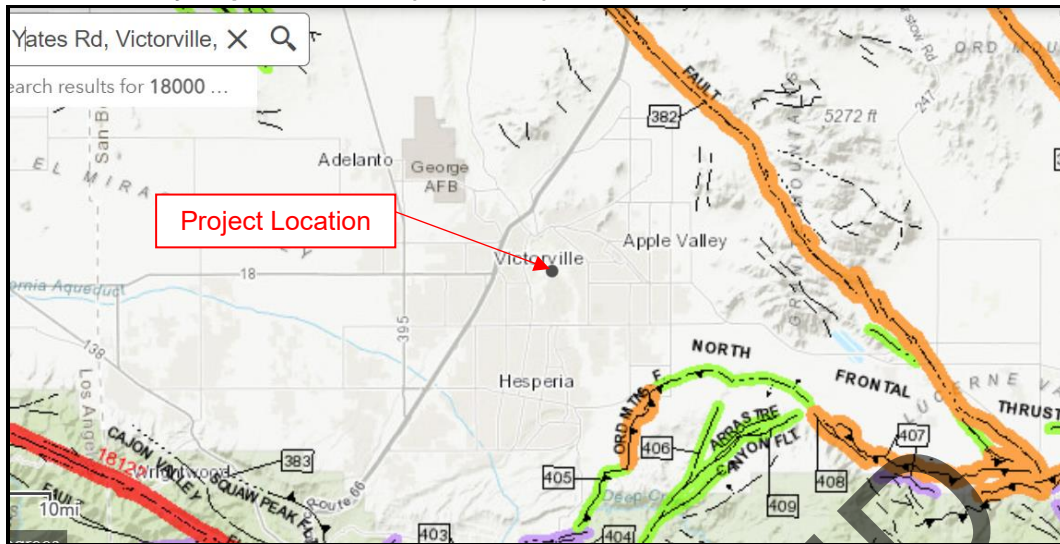
According to the regional USGS Geologic Map of the Victorville 7.5' Quadrangle (Hernandez, et al. 2008), the project site is underlain by quaternary alluvial deposits (map symbol Qa). Figure 2 below shows the mapped geologic units in the vicinity of the project site.

**Figure 2: USGS Geologic Map of the Victorville 7.5' Quadrangle (Hernandez, et al. 2008)**



**Faulting:** According to the California Geologic Survey (CGS) Fault Activity Map of California (CGS, 2015), the project location is not located within an area of active faulting. Figure 3 below shows a portion of the CGS Fault Activity Map, indicating the approximate location of the project site in relation to major faults.

**Figure 3: Fault Activity Map of California (CGS, 2015)**



The site and surrounding area have been subjected to strong ground shaking related to active faults that traverse the region. The approximate distances to major area faults and published maximum earthquake magnitudes are shown in Table 1:

**Table 1: Fault Zone, Distances and Maximum Earthquake Magnitudes**

Fault Zone	Approximate Distance (Km)	Earthquake Magnitude ( $M_w$ )
Helendale-South Lockhart Fault (Helendale Fault)	17.2	7.4
San Andreas Fault (Southern Branch)	31.9	7.6
San Jacinto Fault (San Bernardino Section)	33.75	7.0

**Groundwater:** The project site is located in an area with high groundwater levels. The California Department of Water Resources (DWR) *SGMA Dataviewer* website (DWR, 2023) indicates that several nearby wells have been historically monitored. State Well No. 05S04W23B001S, located approximately 1,600 feet east of the project site was monitored between the period of January 1996 and August 1996. The depth to groundwater during that period was as shallow as approximately 1.8 feet below the existing ground surface. State Well No. 05N04W23G001S, located approximately 1,800 feet northeast of the project site, was monitored on April 23, 1987. At that time, the depth to groundwater was 6.8 feet below the ground surface.

**Seismic Parameters:** The U.S. Seismic Design Maps website (OSHPD, 2023) was used to evaluate the seismic parameters for this project. Table 2 summarizes mapped design criteria from the 2022 California Building Code (CBC).

**Table 2: 2022 CBC Seismic Design Parameters**

Seismic Parameter	Value
<b>Site Location</b>	Latitude: 34.512076° (North) Longitude: -117.273040° (West)
<b>S<sub>s</sub></b> - MCER Ground Motion for 0.2-sec Period	1.142g
<b>S<sub>1</sub></b> - MCE <sub>R</sub> Ground Motion for 1-sec Period	0.44g
<b>S<sub>DS</sub></b> - Numeric Seismic Design Value at 0.2-sec period	0.914g
<b>PGA</b> - MCE <sub>g</sub> Peak Ground Acceleration	0.49g
<b>F<sub>PGA</sub></b> - Site Amplification Factor at PGA	1.2g
<b>PGA<sub>M</sub></b> - Site Modified Peak Ground Acceleration	0.588g
<b>SITE CLASS</b>	D (Default)

### **SUBSURFACE CONDITIONS**

Subsurface exploration at the site consisted of two exploratory borings to depths of 26.5 and 55.5 feet below ground surface. The site exploration is described in Appendix A. Boring locations are shown on Figure A-5.

**Soil Classification, Density and Moisture Content:** The soil encountered in both borings consisted of Quaternary alluvial deposits predominately comprised of interbedded sand (SP, SW), sand with silt (SP-SM), silty clayey sand (SC-SM), and clayey sand (SC). The soil was generally loose to depth of about 7.0 feet and medium dense below 7.0 feet. Loose soil was also encountered in boring B-01 at a depth of about 15 feet. The soil was moist to a depth of about 3.0 feet and very moist to wet (saturated) below 3.0 feet.

**Groundwater:** Groundwater was encountered in the exploratory borings drilled for this investigation at depths of 4.8 and 5.0 feet below ground surface. Historic high groundwater levels are assumed to have been at or near the project ground surface elevation.

**Corrosion Potential:** Analytical testing indicates the concentration of sulfates is 639 ppm. In accordance with ACI 318, Table 4.2.1, the soil is classified as Class S0 with respect to sulfate exposure.

The chloride concentration in the tested sample was 824 ppm and indicates that the soil is generally not corrosive with respect to ferrous metal. It is however, high enough to be of concern to concrete reinforcing steel and should be considered in combination with the chloride content of the hardened concrete.

The soil is slightly alkaline with a pH value of 7.9.

The saturated minimum resistivity value of 397 ohm-cm indicates the soil may be severely corrosive to buried ferrous metal. Specific corrosion control measures, such as wrapping the pipe with non-metallic coating or using non-metallic pipe should be considered.

Inland Foundation Engineering, Inc. does not practice corrosion engineering. We recommend a qualified corrosion engineer be consulted for additional guidance.

**Expansive Soil:** The near surface soil in the building area has in non-expansive potential. Special measures to mitigate the effects of expansive soil are not necessary.

## **CONCLUSIONS AND RECOMMENDATIONS**

The primary geotechnical issues that will require mitigation are the presence of loose near surface soil within the proposed structural and pavement areas and the presence of near-surface groundwater. The soil is not suitable for support of foundations or pavement in its existing condition and should be over-excavated and recompacted. These and other geotechnical engineering recommendations for project design and construction are presented below.

**Foundation Design:** The proposed storage barn can be supported by shallow continuous and isolated spread footings designed with an allowable bearing pressure of 1,500 pounds per square foot (psf). Footings should have a minimum width of 12 inches with bottoms a minimum depth of 12 inches below the lowest adjacent grade.

The allowable bearing pressure can be increased by  $\frac{1}{3}$  for short-term transient wind and seismic loads.

Settlement of foundations properly designed and constructed as recommended herein is expected to be 1.0 inch total. Differential settlement between foundations of similar size and load is expected to be less than one-half inch.

**Lateral Resistance:** Resistance to lateral loads will be provided by a combination of friction acting at the base of the slab or foundation and passive earth pressure. A coefficient of friction of 0.45 between soil and concrete may be used with dead load forces only. A passive earth pressure of 250 psf/ft may be used for the sides of footings poured against recompacted or dense native material. These values may be increased by  $\frac{1}{3}$  for short-term transient wind and seismic loads. Passive earth pressure should be ignored within the upper one foot, except where confined as beneath a floor slab, for example.

**Lateral Earth Pressure:** Retaining walls should be designed for an active earth pressure equivalent to that exerted by a fluid weighing not less than 40 pcf. Any applicable construction or seismic surcharges should be added to this pressure.

**Excavation and Trench Wall Stability:** All excavations should be configured in accordance with the requirements of CalOSHA. The soil should be classified as Type C. The classification of the soil and the shoring and/or slope configuration should be the responsibility of the contractor on the basis of the excavation depth and the soil encountered. The contractor should have a "competent person" onsite for the purpose of assuring safety within and about all construction excavations.

**Concrete Slabs-on-Grade:** Concrete slabs-on-grade should have a minimum thickness of four inches. During final grading and prior to the placement of concrete, all surfaces to receive concrete slabs-on-grade should be compacted to maintain a minimum compacted fill thickness of 12 inches.

Slabs should be designed and constructed in accordance with the provisions of the American Concrete Institute (ACI). Shrinkage of concrete should be anticipated and will result in cracks in all concrete slabs-on-grade. Shrinkage cracks may be directed to saw-cut "control joints" spaced on the basis of slab thickness and reinforcement. Control joint spacing in unreinforced concrete at maximum intervals equal to the slab thickness times 24 is recommended.

**Asphalt Concrete (AC) Pavement:** The following recommended structural sections are based on a design R-value of 50 and the traffic index (TI) values shown. The actual pavement subgrade soil should be evaluated during construction to verify that the pavement sections are appropriate.

**Table 5: Preliminary AC Pavement Designs**

Service	Asphalt Concrete Thickness (ft.)	Base Course Thickness (ft.)
Light traffic (autos, parking areas, T.I. = 5.0)	0.25	0.35
Heavy traffic (trucks, driveways, bus lanes, fire lanes T.I. =7.0)	0.30	0.45

Inland Foundation Engineering, Inc. does not practice traffic engineering. The TI values used to develop the recommended pavement sections are typical for projects of this type. We recommend that the project civil engineer or traffic engineer review the TIs to verify that they are appropriate for this project.

All surfaces to receive AC or PCC paving should be underlain by a minimum compacted fill thickness of 12 inches (excluding aggregate base). This should be performed as described in the Site Grading Section of the referenced report.

**General Site Grading:** All grading should be performed per the applicable provisions of the 2022 California Building Code and the following recommendations.

1. **Clearing and Grubbing:** The proposed barn construction area and all surfaces to receive compacted fill should be cleared of existing loose soil, vegetation, tree roots, artificial fill, debris, and other unsuitable materials. All organic matter and any other unsuitable material should be disposed of outside of the project area.
2. **Preparation of Surfaces to Receive Compacted Fill:** All surfaces to receive compacted fill should be reviewed and evaluated by this firm prior to processing to verify the exposed conditions are as expected. If undocumented fill, loose soil, roots or other deleterious materials are present, additional over-excavation may be necessary until satisfactory conditions are encountered. Upon approval, surfaces to receive fill should be scarified, brought to near optimum moisture content, and compacted to a minimum of 90 percent relative compaction.

3. **Placement of Compacted Fill:** Fill materials consisting of on-site or approved imported soil should be spread in shallow lifts and compacted at near optimum moisture content to a minimum of 90 percent relative compaction.
4. **Preparation of Structure Area(s):** The proposed barn areas should be over-excavated to a depth of 12 inches below slabs-on-grade or footing bottoms but need not exceed 3 feet below final design grades. Excavation deeper than 3 or 4 feet will encounter very moist to wet conditions. The excavation should extend laterally for at least five (5) feet outside of exterior foundation lines. Following excavation, the exposed soil should be evaluated by this firm, and the removed soil replaced as compacted fill, as recommended above.
5. **Utility Trench Backfill:** Utility trench backfill consisting of the on-site soil types should be placed by mechanical compaction, in lifts, to a minimum of 90 percent relative compaction. Compaction by jetting is not recommended.
6. **Testing and Observation:** During grading and backfilling, tests and observations should be performed by a representative of IFE to verify that the grading is performed in accordance with the recommendations in this report and other project requirements. Density testing should be performed per the current ASTM D1556 or ASTM D6938 test methods. The minimum acceptable degree of compaction should be 90 percent of the maximum dry density obtained by the ASTM D1557 test method.

## **LIMITATIONS**

The findings and recommendations of this report are based on interpolation of soil conditions between soil borings. Conditions may be present between boring locations 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 warranty, express or implied, is made.

This report was prepared for STK Architecture, Inc. for their use in the design of the proposed Mojave Barn and Corrals Revitalization project. This report may only be used by STK Architecture, Inc. for this purpose. The use of this report by parties or for other purposes is not authorized without written permission by Inland Foundation Engineering, Inc. Inland Foundation Engineering, Inc. will not be liable for any projects connected with the unauthorized use of this report.

The recommendations of this report are considered to be preliminary. The final design parameters may only be determined or confirmed at the completion of site grading on the basis of observations made during the site grading operation. To this extent, this report is not considered to be complete until the completion of both the design process and the site preparation.

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## **REFERENCES**

ASCE/SEI, 2017, ASCE Standard 7-16, Minimum Design Loads and Associated Criteria for Buildings and Other Structures.

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

California Department of Water Resources, 2023, Sustainable Groundwater Management (SGMA) Data Viewer, [SGMA Data Viewer \(ca.gov\)](https://www.water.ca.gov/sgma/data-viewer)

California Geological Survey (CGS), 2023, EQ Zapp: California Earthquake Hazards Zone Application.

California Geological Survey (CGS), 2015, Fault Activity Map of California.

City of Victorville General Plan Safety Element, dated November 2022, <https://www.victorvilleca.gov/home/showpublisheddocument/13959/638237231632670000>

OSHPD, 2023, U.S. Seismic Design Maps, <https://seismicmaps.org/>

San Bernardino County General Plan Geologic Overlay Map EHFH C.

United States Geologic Survey, Victorville 7.5' Quadrangle.

United States Geologic Survey, Geologic Map of the Victorville 7.5' Quadrangle (Hernandez et al., 2008)

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## APPENDIX A

### SITE EXPLORATION

Two exploratory borings were drilled at the approximate locations shown on Figure A-5. The materials encountered during drilling were logged by a staff geologist. Boring logs are included with this report as Figures A-3 and A-4.

Representative soil samples were obtained within the borings by driving a thin-walled steel penetration sampler. 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.

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# LOG OF BORING B-01

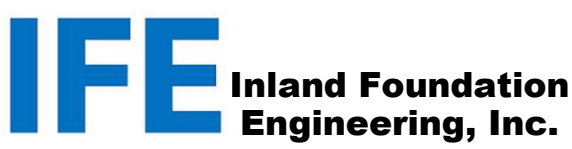
DRILLING RIG	<u>Mobile B-61</u>	DATE DRILLED	<u>11/9/23</u>	HAMMER TYPE	<u>Auto-Trip</u>
DRILLING METHOD	<u>Rotary Auger</u>	HAMMER WEIGHT	<u>140-lb.</u>	HAMMER DROP	<u>30-inches</u>
LOGGED BY	<u>FWC</u>	BORING DIAMETER	<u>8-inches</u>		
GROUND ELEVATION	<u>+/-</u>				

## 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)
	SM		<b>SILTY SAND</b> , very fine to fine, dark gray (10YR 4/1), moist, loose.			AU			
5	SP-SM		<b>SAND with SILT</b> , fine to coarse, dark gray (10YR 4/1), moist, loose.			AU	4	13	99
	SM					SS	5		
	SC-SM		<b>SILTY, CLAYEY SAND</b> , very fine to fine, grayish-brown (10YR 5/2), moist to wet, loose.			AU	5	5	101
	SM					SS	7		
10			<b>SILTY SAND</b> , fine to medium, grayish-brown (10YR 5/2), wet, medium dense.			SS	7	13	105
						SS	10		
15	SW		<b>SAND</b> , fine to very coarse, dark yellowish-brown (10YR 4/6), wet, medium dense.			SS	12	13	108
						SS	14		
						SPT	7	18	
						SPT	8		
20	SC-SM		<b>SILTY, CLAYEY SAND</b> , fine to coarse, very dark gray (10YR 3/1), wet, medium dense.			SPT	11	18	
						SPT	15		
25			<b>SAND with SILT</b> , fine to very coarse, light brownish-gray (10YR 6/2), wet, medium dense.			SPT	8	12	
	SP-SM					SPT	14		
30						SPT	12	13	
						SPT	16		
35	SM		<b>SILTY SAND</b> , fine to medium, dark gray (10YR 4/1), wet, medium dense.			SPT	11	26	
	SC-SM					SPT	18		
40			<b>SILTY, CLAYEY SAND</b> , very fine to fine, dark gray (10YR 4/1), wet, medium dense.			SPT	17	18	
						SPT	18		
			<b>SAND with SILT</b> , fine to very coarse, grayish-brown (2.5Y 5/2), wet, medium dense.			SPT	11	15	
45	SP-SM					SPT	11	16	
						SPT	15		
50						SPT	12	16	
						SPT	15		
55	SC		<b>CLAYEY SAND</b> , very fine to fine, olive-brown (2.5Y 5/5), wet, medium dense.			SPT	13	21	
						SPT	15		
			End of boring at 55.5 feet. Groundwater initially encountered at 6.5 feet. Final groundwater at 5.0 feet. Backfilled with native soil.			SPT			

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CLIENT	<u>STK Architecture, Inc.</u>
PROJECT NAME	<u>Mojave Narrows Barn and Corral Rev.</u>
PROJECT LOCATION	<u>18000 Yates Rd</u>
	<u>Victorville, CA</u>
PROJECT NUMBER	<u>S168-191</u>

FIGURE NO.

## LOG OF BORING B-02

DRILLING RIG	<u>Mobile B-61</u>	DATE DRILLED	<u>11/9/23</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>FWC</u>	BORING DIAMETER	<u>8-inches</u>		
GROUND ELEVATION	<u>+/-</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.						
	SM		<b>ARTIFICIAL FILL</b> , SILTY SAND, very fine to fine, dark brown, moist, loose.			AU			
	SM		<b>SILTY SAND</b> , very fine to fine, mottled brown (10YR 4/3), moist, loose.			SS	2		
5	SC		<b>CLAYEY SAND</b> , very fine to fine, brown (10YR 4/3), moist to wet, loose.			AU	4		
	SM		<b>SILTY SAND</b> , fine to medium, mottled tan, wet, medium dense.			SS	6		
	SM					SS	7		
10	SW-SM		<b>SAND with SILT</b> , fine to coarse, dark yellowish-brown (10YR 4/6), wet, medium dense.			AU	7		
	SM					SS	10		
	SM		<b>SILTY SAND</b> , fine to coarse grained, dark yellowish-brown (10YR 4/6), wet, medium dense.			SS	14		
15			<b>SAND with SILT</b> , fine to coarse, GRAY (10YR 5/1), wet, loose.				14		
						SPT	3		
						SPT	5		
20	SP-SM					SPT	6		
						SPT	7		
25						SPT	6		
						SPT	10		
			End of boring at 26.5 feet. Groundwater initially encountered at 6.5 feet. Final groundwater at 4.8 feet. Mottling encountered at 3 feet. Backfilled with native soil.						

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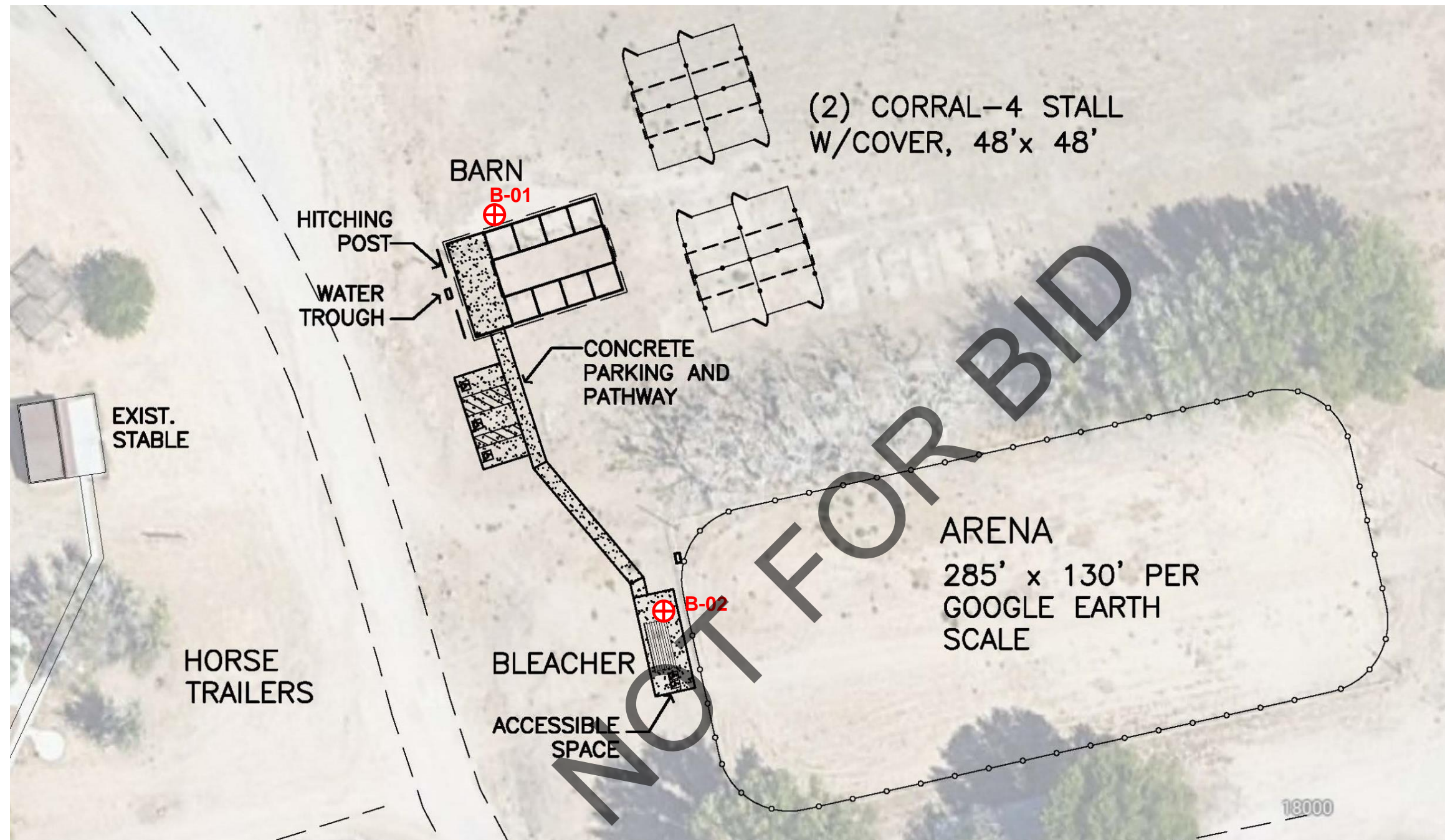
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CLIENT	<u>STK Architecture, Inc.</u>
PROJECT NAME	<u>Mojave Narrows Barn and Corral Rev.</u>
PROJECT LOCATION	<u>18000 Yates Rd</u>
	<u>Victorville, CA</u>
PROJECT NUMBER	<u>S168-191</u>

FIGURE NO.

**SITE PLAN**  
**New Barn and**  
**Corrals**  
**Mojave Narrows**  
**Regional Park**  
**San Bernardino**  
**County, California**



Base Map: Prepared by STK Architecture, Inc.



⊕ **Approximate Location of Exploratory Boring**

**IFE** Inland Foundation Engineering, Inc.  
 1310 S. Santa Fe Avenue, San Jacinto, CA 92583 | (951) 654-1555

Figure No. A-5	STK Architecture, Inc. New Barn and Corrals Mojave Narrows Regional Park San Bernardino County, CA	
	Drawn By: ES	Project No. S168-191
	Scale: 1" = ± 50'	Date: December 2023

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## APPENDIX B

### LABORATORY TESTING

Representative soil samples obtained from our borings were delivered to our laboratory. Descriptions of the tests performed are provided below. Results of the testing are appended.

**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 and A-4).

**Sieve Analysis:** Four 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. This classification system categorizes the soil into groups having similar engineering characteristics. The results of the testing are shown on Figure B-3.

**Plastic Index:** Two samples were selected for plastic index testing in accordance with ASTM D4318. These tests provide information regarding soil plasticity and are also used for developing classifications for the soil in accordance with the Unified Classification System. The results of the testing are shown on Figure B-3.

**Consolidation Testing:** Two samples were selected for consolidation testing in accordance with ASTM D2435. This test is used to evaluate the magnitude and rate of settlement of a structure or earth fill. The results of this testing are presented graphically on Figures B-4 and B-5.

**Direct Shear Strength:** One sample was 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 B-6.

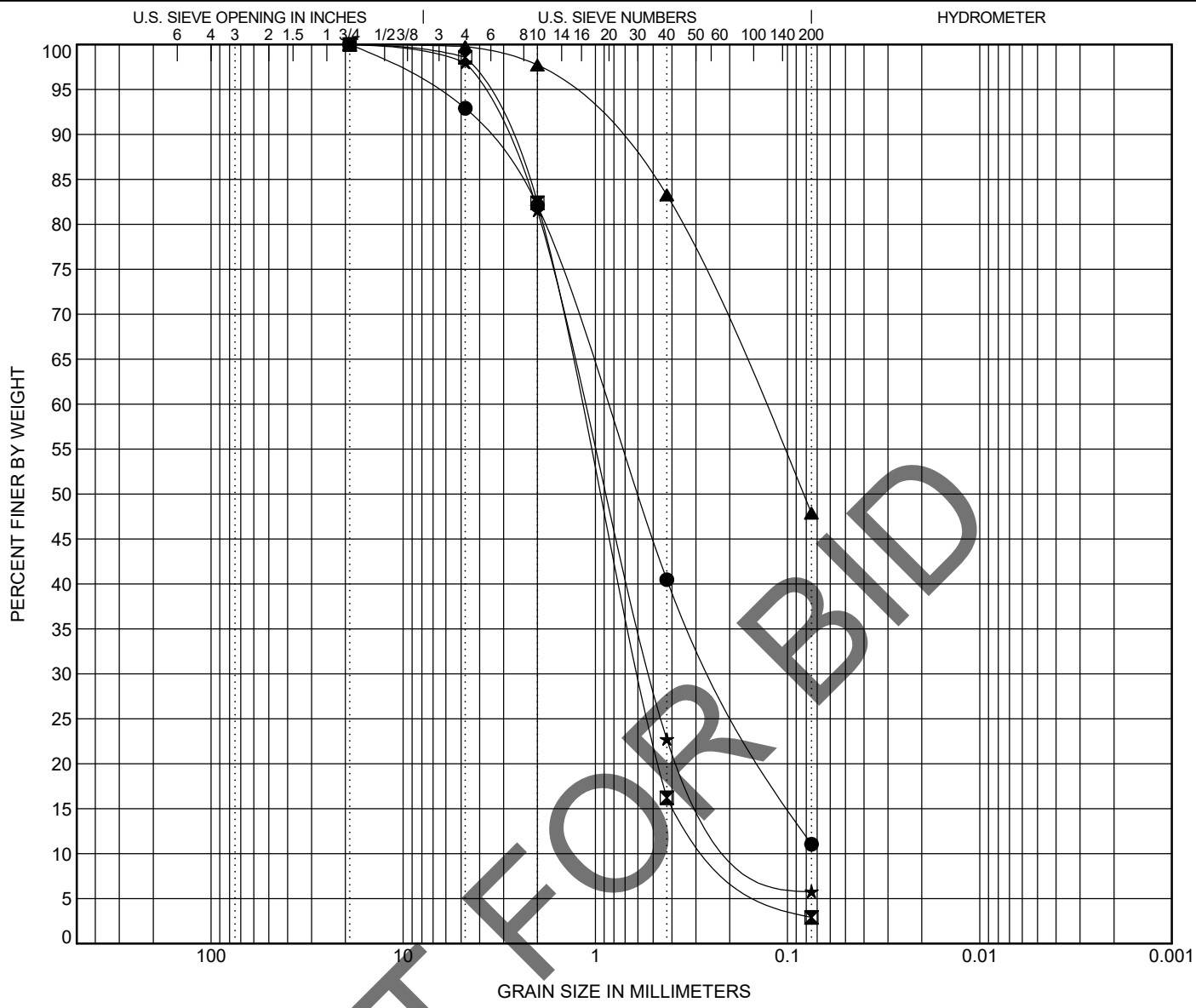
**Analytical Testing:** One sample was selected and transported to AP Engineering and Testing in Pomona, California to evaluate the concentration of soluble sulfates and chlorides, pH level, and resistivity of and within the on-site soils. The test results are shown on Figure B-7.

**R-value:** One bulk sample was transported to AP Engineering and Testing in Pomona, California for R-value testing in accordance with ASTM D2844. This test measures the potential strength of subgrade, subbase, and base course materials for use in pavements. Test results are shown on Figure B-8.

**Expansion Index:** One sample was selected for expansion index testing in accordance with ASTM D4829. This test provides information regarding the expansive characteristics of soil under standardized test conditions. The following table presents the results of this testing.

Sample Location	Sample Depth (ft)	Initial Dry Density (pcf)	Initial Moisture Content (%)	Expansion Index	Expansion Class
B-01	2.8-4.0	107.5	10.7	<.0001	Non-Expansive

NOT FOR BID



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

SAMPLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
● B-01	2.5	POORLY GRADED SAND with SILT(SP-SM)	NP	NP	NP	0.85	12.47
☒ B-01	7.0	WELL-GRADED SAND(SW)				1.54	6.26
▲ B-02	2.5	SILTY SAND(SM)	NP	NP	NP		
★ B-02	8.0	WELL-GRADED SAND with SILT(SW-SM)				2.02	9.81

BOREHOLE	DEPTH	D100	D90	D50	D10	%Gravel	%Sand	%Silt	%Clay
● B-01	2.5	19	3.765	0.606		7.1	81.9		11.1
☒ B-01	7.0	19	3.002	0.937	0.189	1.4	95.7		2.9
▲ B-02	2.5	19	0.874	0.083		0.2	51.9		47.9
★ B-02	8.0	19	3.119	0.871	0.116	2.0	92.2		5.8

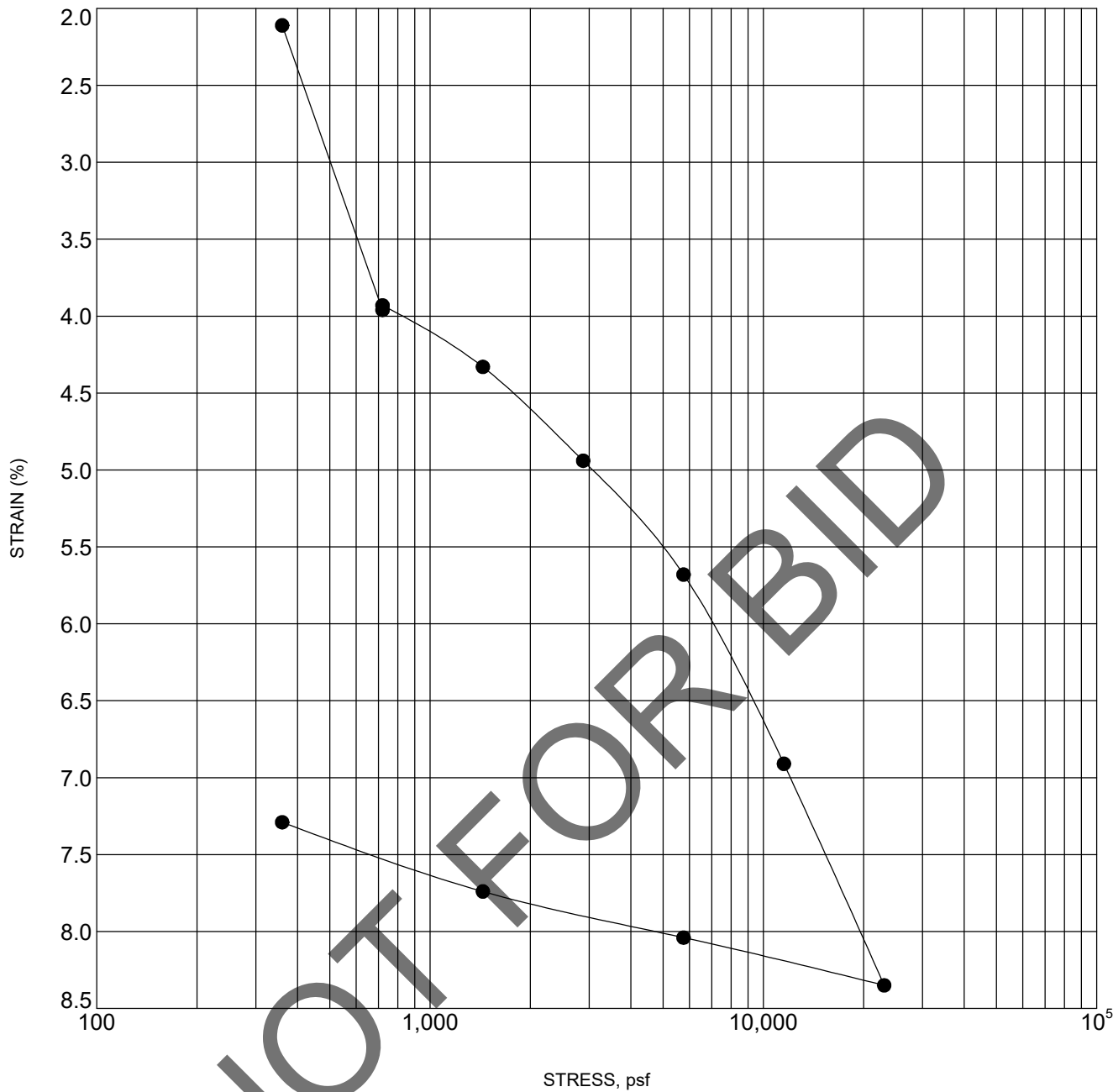
GRADATION CURVES (ASTM D6913, ASTM D4318)

INLAND FOUNDATION ENGINEERING, INC.

FIGURE NO. B-3

CLIENT	STK Architecture, Inc.	PROJECT NAME	Mojave Narrows Barn and Corral Rev.
PROJECT NUMBER	S168-191	PROJECT LOCATION	18000 Yates Rd
			Victorville, CA

IFE SIEVE ANALYSIS - GINT STD US LAB.GDT - 12/11/23 17:33 - P:\S168\S168-191.MOJAVE BARN\GINT.GPJ



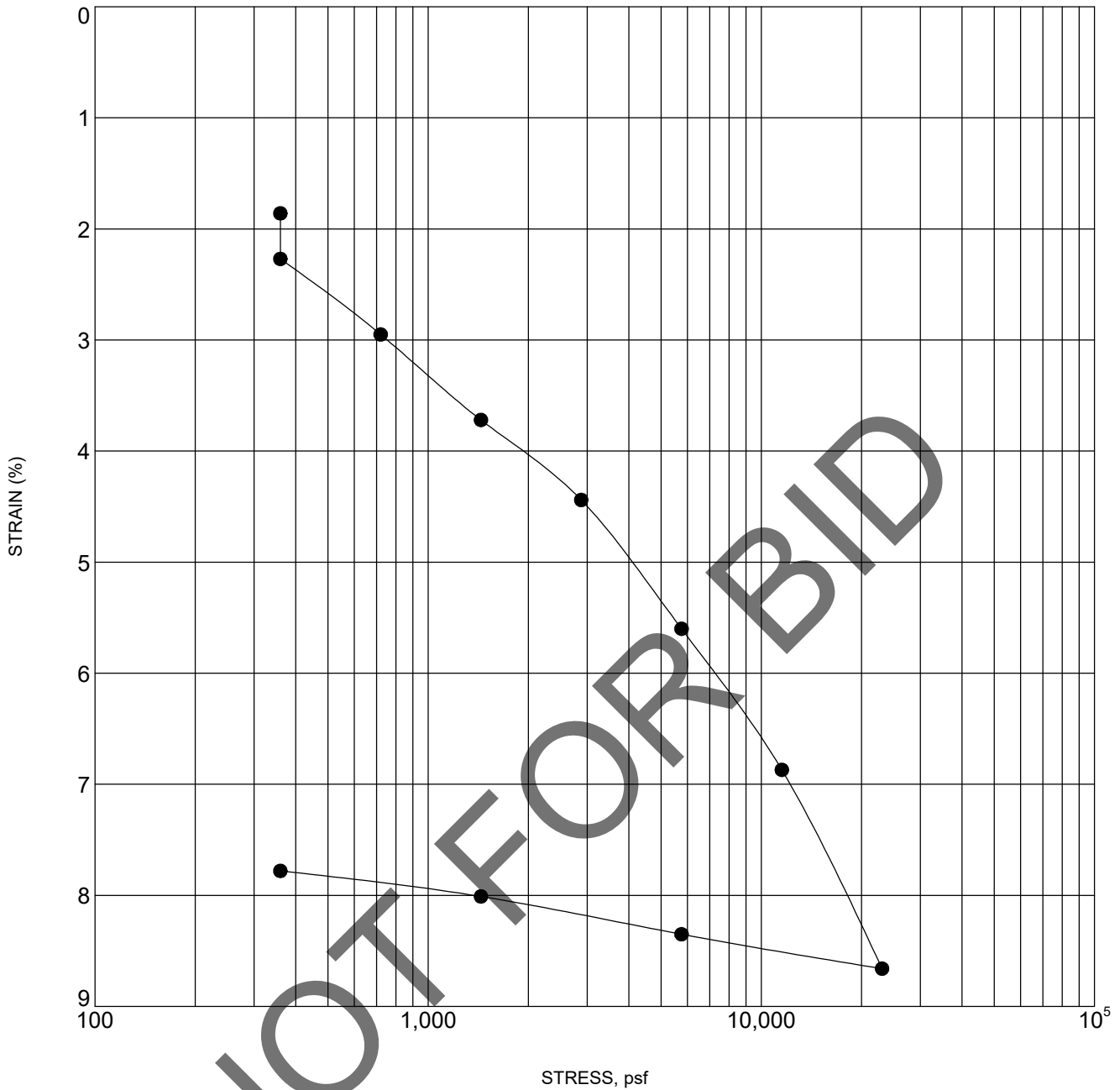
BOREHOLE	DEPTH	Classification	$\gamma_d$	MC%
● B-01	5.5	SILTY SAND(SM)	105	17

**CONSOLIDATION TEST (ASTM D2435)**

**INLAND FOUNDATION ENGINEERING, INC.**

FIGURE NO. B-4

<b>CLIENT</b>	<u>STK Architecture, Inc.</u>	<b>PROJECT NAME</b>	<u>Mojave Narrows Barn and Corral Rev.</u>
<b>PROJECT NUMBER</b>	<u>S168-191</u>	<b>PROJECT LOCATION</b>	<u>18000 Yates Rd</u>
			<u>Victorville, CA</u>



BOREHOLE	DEPTH	Classification	$\gamma_d$	MC%
● B-02	5.5	CLAYEY SAND(SC)	92	6

**CONSOLIDATION TEST (ASTM D2435)**

**INLAND FOUNDATION ENGINEERING, INC.**

FIGURE NO. B-5

<b>CLIENT</b>	<u>STK Architecture, Inc.</u>	<b>PROJECT NAME</b>	<u>Mojave Narrows Barn and Corral Rev.</u>
<b>PROJECT NUMBER</b>	<u>S168-191</u>	<b>PROJECT LOCATION</b>	<u>18000 Yates Rd</u>
			<u>Victorville, CA</u>



**DIRECT SHEAR TEST RESULTS**  
**ASTM D 3080**

**Project Name:** STK - Barn  
**Project No.:** S168-191  
**Boring No.:** B-02  
**Sample No.:** - **Depth (ft):** 2.5-3.5  
**Sample Type:** Mod. Cal.  
**Soil Description:** Silty Sand  
**Test Condition:** Inundated **Shear Type:** Regular

**Tested By:** ST **Date:** 11/22/23  
**Computed By:** JP **Date:** 11/29/23  
**Checked by:** AP **Date:** 12/08/23

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)
119.7	110.6	8.2	18.9	42	97	1	0.804	0.696
						2	1.524	1.296
						3	2.180	1.865

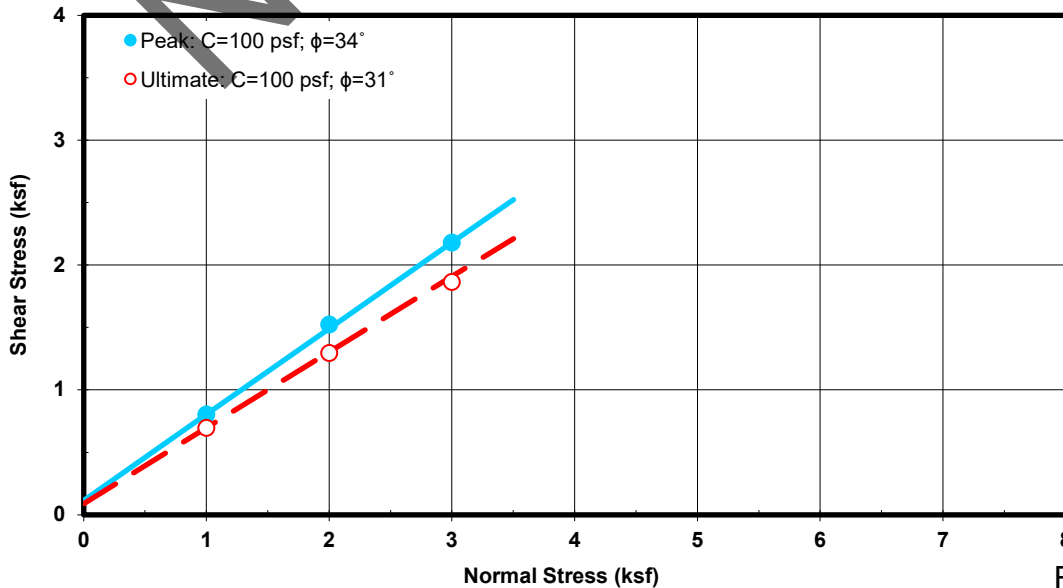
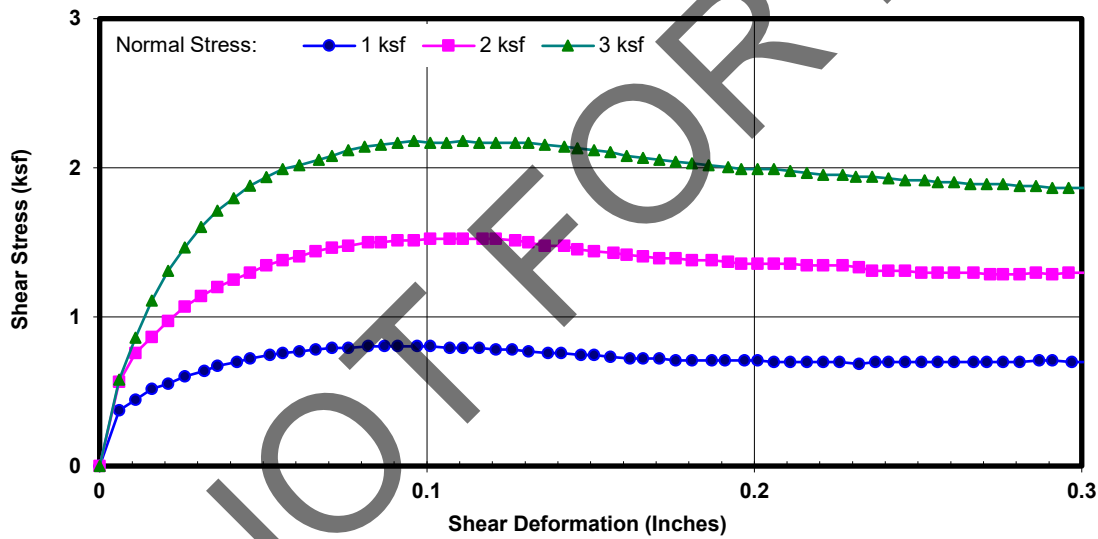


Figure No. B-6





**R-VALUE TEST DATA**

ASTM D2844

Project Name: STK - Barn  
 Project Number: S168-191  
 Boring No.: B-01  
 Sample No.: - Depth (ft.): 0-2.75  
 Location: N/A  
 Soil Description: Silty Sand

Tested By: ST Date: 11/22/23  
 Computed By: KM Date: 11/26/23  
 Checked By: AP Date: 12/08/23

Mold Number	C	A	B
Water Added, g	65	81	91
Compact Moisture(%)	10.0	11.5	12.4
Compaction Gage Pressure, psi	250	250	250
Exudation Pressure, psi	682	329	121
Sample Height, Inches	2.6	2.5	2.5
Gross Weight Mold, g	3058	3059	3055
Tare Weight Mold, g	1967	1966	1965
Net Sample Weight, g	1091	1094	1090
Expansion, inches $\times 10^{-4}$	38	28	7
Stability 2,000 (160 psi)	13/24	14/28	24/43
Turns Displacement	5.54	5.01	5.88
R-Value Uncorrected	72	70	54
R-Value Corrected	74	70	54
Dry Density, pcf	115.6	118.9	117.5
Traffic Index	8.0	8.0	8.0
G.E. by Stability	0.50	0.57	0.89
G.E. by Expansion	0.13	0.09	0.02

R-VALUE	By Exudation:	69
	By Expansion:	*N/A
	At Equilibrium: (by Exudation)	69
Remarks	Gf = 1.34, and 1.2 % Retained on the 3/4" *Not Applicable	

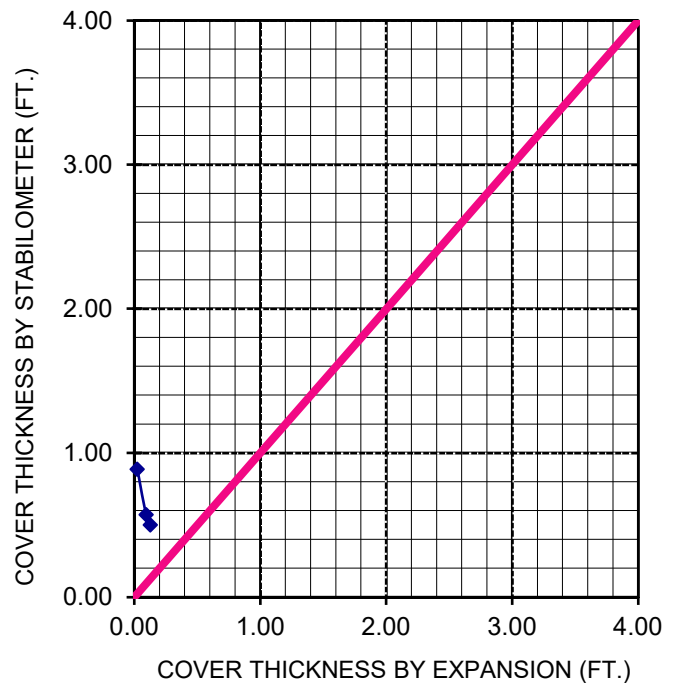
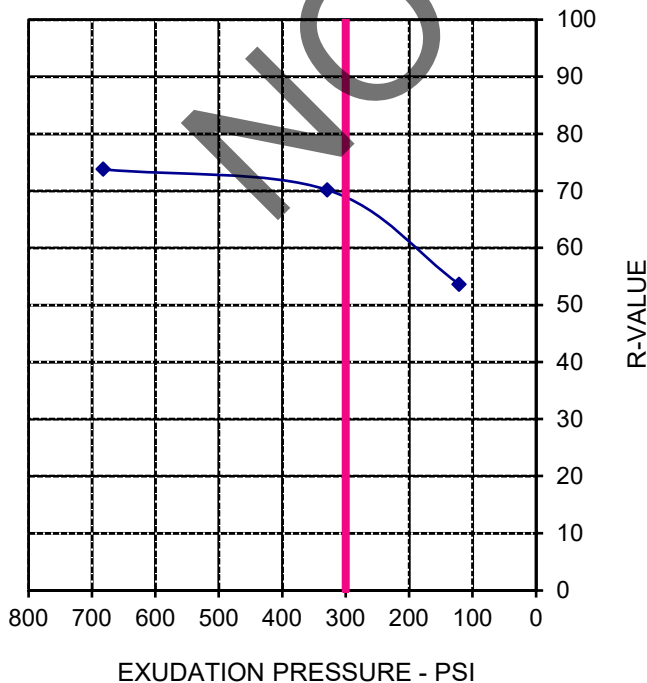


Figure No. B-8