DIAZ • YOURMAN
& ASSOCIATES
Geotechnical Services

May 19, 2023

Project No. 2023-005

Mr. Patrick Wong, CPD, ENV SP
Kimley-Horn and Associates, Inc.
660 South Figueroa Street, Suite 2050
Los Angeles, CA 9017

Subject: Geotechnical Services Memorandum
Restroom Building Replacement at Chumash Park
City of Agoura Hills, California

Dear Mr. Patrick Wong:

This memorandum summarizes Diaz•Yourman & Associates' (DYA) geotechnical services for the proposed improvements within Chumash Park, City of Agoura Hills, California (Project). Kimley-Horn and Associates, Inc. authorized DYA's services with a task order signed on March 9, 2023.

PROJECT DESCRIPTION AND SCOPE OF SERVICES

The proposed Project is located in the City of Agoura Hills as shown on the Vicinity Map Figure 1. The proposed project will primarily consist of a new, pre-fabricated restroom facility that will be located at the Chumash Park property. The restroom facility will be a lightly loaded, single story structure that will be erected at or near existing grades and will be served by new utilities (electrical, sewer, and water).

The objective of DYA's task is to determine the underlying soil conditions before replacing the existing restroom facility with the pre-fabricated restroom facility.

DYA's services consisted of performing one boring to an approximate depth of 10 feet to characterize the subsurface soils below the proposed structure using hand-auger drilling techniques. The boring locations is shown on Figure 2.

DYA's geotechnical services were to provide geotechnical engineering consultation during the design phase of the Project and consisted of the following:

- Reviewing existing geotechnical data if available at the site.
- Performing a limited subsurface exploration and laboratory testing program.
- Evaluating existing subsurface soil conditions in the upper 10 feet of soils.

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- Performing geotechnical engineering analyses to develop conclusions and recommendations regarding bearing capacity of the subsurface soils underneath the proposed building footings.
- Preparing this memorandum.

Figure 1 - VICINITY MAP

GEOTECHNICAL DATA REVIEW

Boring logs from California's State Water Resources Control Board's GeoTracker database (GeoTracker GAMA, 2023) and DYA's database were searched in the Project vicinity to substantiate our subsurface characterization, however, none were available. A groundwater monitoring well was located approximately 2,500 feet Southwest of the project site. Outside sources such as the California Geological Survey (CGS) reviewed for the memorandum are included in the references.

FIELD INVESTIGATION AND LABORATORY TESTING

DYA's field exploration, conducted on April 7, 2023, consisted of performing one soil boring at the locations shown on the Site Plan on Figure 2. The boring was performed using hand-auger drilling techniques to a depth of approximately 5.5 feet below ground surface (bgs) where it met refusal due to difficult drilling conditions and the presence of groundwater. Bag samples were collected during the exploration for laboratory testing. A boring log was generated using data collected from the field exploration and is presented in Attachment 1.

Soil samples collected from the boring were re-examined in the laboratory to substantiate field classifications. Selected soil samples were tested for moisture content, dry density, percent passing the No. 200 sieve, Atterberg limits, one strength test, one swell-collapse test, and corrosion potential (pH, electrical resistivity, soluble chlorides, and soluble sulfates). The soil samples tested are identified on the boring log. Laboratory test data are summarized on the boring logs in Attachment 1 and presented on individual test reports in Attachment 2.

Path: C:\Users\ashley\diazyourman.com\Projects - Documents\2023\2023-005 Chumash Park\Figures\PRO\BingBorloc.aprx

Figure 2 - Boring Location

SURFACE AND SUBSURFACE SITE CONDITIONS

The Project site is generally located within a residential area, bounded by single family homes, apartments, and a school. The surface at our boring locations consisted of landscaped areas covered with grass, trees and bushes, adjacent to the existing restroom structure as well as a playground. The ground surface elevation is approximately 860 feet above mean sea level (NAVD 88).

Based on the subsurface exploration performed by DYA, the existing subsurface soils generally consisted of medium-dense to dense clayey sands and stiff to hard sandy lean clays. in-situ test result of the subsurface materials are summarized in Table 1.

Table 1 – SUBSURFACE SOIL CHARACTERISTICS

BORING ID	DEPTH (feet)	SOIL TYPE[1]	SOIL % PASSING 200 SEIVE (%)	LIQUID LIMIT (LL)	PLASTIC LIMIT (PL)	PLASTIC INDEX (PI)
DYB23-01	2.5	SC	25.64	48	23	25
	5	SC	31.98	47	23	24

Note(s):
1. Based on the Unified Soil Classification System (USCS).

Groundwater was encountered during DYA's subsurface exploration at 4.5 feet bgs. Historically highest groundwater contours developed by the California Geological Survey (CGS, 2,000) the historically highest groundwater level near the Project site was shown to be approximately 10 feet bgs. While the existing groundwater level was higher than the historically highest groundwater recorded, the recent rains may have contributed to a higher-than-normal groundwater level.

CONCLUSIONS AND RECOMMENDATIONS

Based on geotechnical considerations, the site is suitable for the proposed Project. The proposed lightly loaded structures can be supported on a layer of compacted fill. The primary geotechnical considerations are the presence of variable subsurface conditions that include compressible clays, potential shallow design groundwater level, and construction dewatering. The sandy soils located near the groundwater level became significantly muddy when disturbed. Accordingly, construction dewatering may likely be required to construct below-ground structures such as building pad and utility lines that are located within 5 feet of current groundwater levels. Excavations should be sloped. Construction of below-ground structures should be planned to optimize excavation quantity, potential construction dewatering, cost, and schedule.

SEISMIC/GEOLOGIC HAZARDS

The site, like most of Southern California, will be subject to strong ground shaking during major earthquakes. Seismic design, if needed, can be performed according to the criteria listed in Table 2. Even though the site is located within a liquefaction zone, the proposed improvements are not habitable structures, and liquefaction evaluation and mitigation are not necessary (CGS, 1997) and were not a part of DYA's scope. The soils encountered in DYA borings were primarily loose to dense sands. If similar dense soils are present below the historically highest groundwater level of 5 feet, liquefaction and liquefaction-induced settlement can be expected to be very low.

Table 2 - SEISMIC/GEOLOGIC DESIGN CRITERIA

CHARACTERISTIC	CRITERIA
Geographic Coordinates (Latitude/Longitude)	34.150518°, -118.756003°
Site Class[1]	F[2]
Risk Category[1]	I, II, or III
Alquist - Priolo Special Study Zone[3]	Site outside a special study zone
California Seismic Hazards Mapping Act, Liquefaction Zone[3]	Site is currently in a Liquefaction Zone
California Seismic Hazards Mapping Act, Landslide Zone[3]	Site is not within a Landslide Zone

Note(s):
1. International Code Council (ICC), 2019, California Building Code (CBC) Section 1613. Risk category was assumed.
2. The site subsurface soils are subject to liquefaction and accordingly, the site class is for category F. However, for a building with a period less than 0.5 seconds, soil class D parameters can be used.
3. California Geological Survey ([CGS], formerly California Division of Mines and Geology, 2000).

EARTHWORK

Earthwork will be required to prepare the building pad and provide compacted soil beneath shallow foundations (mat foundations), concrete flatwork, and utility trenches.

Our recommendations for the site as they pertain to preparation and grading for the construction of the proposed buildings within the footprint of the tank structure are provided below. Deeper excavations might be required to install underground utility pipelines associated with the proposed improvements.

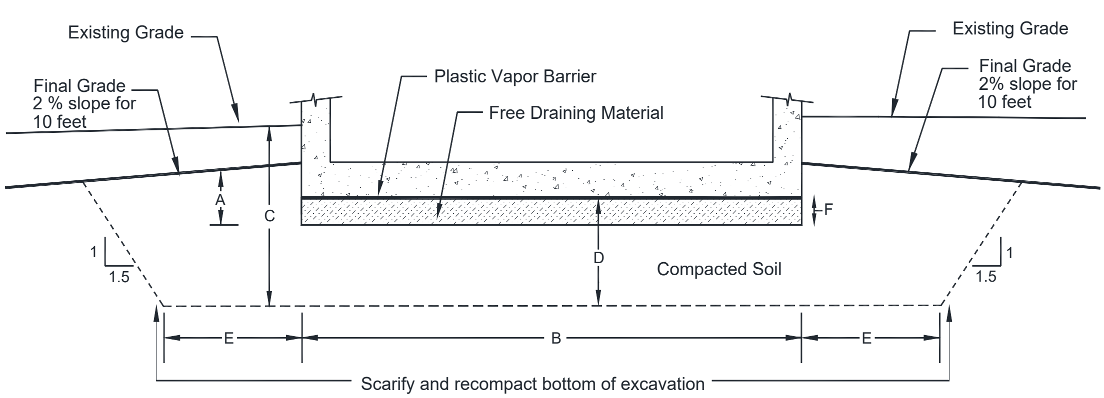
Site Preparation and Grading

Prior to the start of construction, the following should be performed:

- All utilities should be located in the field and rerouted, removed, abandoned, or protected.
- Areas to be graded should be stripped of vegetation and debris, and the material removed from the site.
- Pavement and concrete should be separated for recycling.
- Uncertified fill should be removed to a sufficient depth below the existing ground surface as discussed below.

We understand that the contractor will demolish the restroom facility structure and remove the existing soil underneath and replace with new structural backfill for the construction of the new building pad. In the event loose soil is encountered beneath the proposed foundations, the soils should be excavated and replaced with compacted structure backfill. The upper soil should be excavated and replaced with compacted fill as shown on Figure 3 for mat foundations.

NOT TO SCALE



LOCATION	MINIMUM DIMENSIONS (feet)
Foundation Type	Mat
A. Footing Embedment Below Finish Grade	0.75
B. Mat Foundation Width	31.5
C. Excavation Below Existing Grade (mat)	2
D. Compacted Soil/Fill Below mat	2
E. Excavation beyond slab	2
F. Free Draining Material (optional)	0.5
FOUNDATION BEARING PRESSURE (psf)	
Static (net) Allowable Bearing Capacity (FS≥ 3)	1,500[1]

Notes:

1. Based on International Building Code (IBC), 2021, Section 1806.2, for typical soils encountered during our field investigation.

- psf = pounds per square foot; FS = factor of safety.

Figure 3 - GRADING/FOUNDATION DETAILS (MAT FOUNDATION)

The bottom of the excavation should be:

- Scarified to a depth of 8 inches.
- Moisture-conditioned to above optimum moisture content.
- Compacted to at least 90% relative compaction[1].

The bottom of the excavations should be proof rolled to check for any loose or soft soils prior to placing fill. The bottom of the excavation should be firm, hard, and unyielding and free of deleterious material.

[1] Relative compaction refers to the in-place dry density of soil expressed as a percentage of the maximum dry density of the same material, as determined by ASTM International (ASTM) D1557 test method. Optimum moisture content is the moisture content corresponding to the maximum dry density, as determined by the ASTM D1557 test method.

Where the soils at the bottom of the excavation preclude compaction, they should be excavated to a depth sufficient to achieve a firm and unyielding surface at the planned bottom of excavation or the base of fill. Generally, an overexcavation depth of 1 to 2 feet is sufficient. Using geogrids and/or easily compactable material such as crushed rock can reduce the depth of excavation. The geogrids should satisfy the requirements of Standard Specifications for Public Works Construction ([Greenbook]; Building News, 2021) Table 213-5.2 (D) Biaxial S1. The Project geotechnical engineer should approve the compacted subgrade prior to placement of structure backfill.

Structural backfill should be compacted by:

- Placing in loose layers less than 8 inches thick.
- Moisture-conditioning to above optimum moisture content.
- Compacting to at least 95% relative compaction.

The surface of the compacted subgrade/foundation pad should be firm, hard, and unyielding. Materials for structure backfill should meet the criteria in Table 6. The structure backfill should be free of organic and unsuitable material. The structural fill should be placed as required by the Project specifications.

Concrete flatwork (i.e., sidewalks, hardscape, curbs, and gutters) should be underlain by a minimum of 12 inches of compacted engineered soil compacted to at least 95% relative compaction and at least 2% above optimum moisture content.

Table 3 - FILL AND BACKFILL CRITERIA

CRITERIA	STRUCTURE BACKFILL[1]	IMPORT FILL
Caltrans Specifications Section[2]	19-3.02.B	19-6.02
Greenbook Specifications Section[2]	217-3	--
Maximum particle size (inches)	2	2
Maximum percentage passing the No. 200 sieve (%)	30	20
Maximum liquid limit (%)	30	25
Maximum plasticity index (%)	20	10
Minimum sand equivalent	-[3]	--

Note(s):
1. Structure backfill is material placed within the zone shown on Figure 3.
2. The fills and backfill should meet the specified Caltrans (Caltrans, 2022)/Greenbook (Building News, 2021) criteria and the additional recommendations provided in this table.
3. Minimum sand equivalent of 20 is required behind retaining/basement walls (within a horizontal distance of 5 feet or one-half of the wall height, whichever is greater).

If the upper soils in the vicinity of the site are planned to be used as structure backfill, the soils should be verified to see whether they meet the above structure backfill criteria.

Site grading can be accomplished with conventional heavy-duty construction equipment. Fill and backfill should be compacted using soil compactors as recommended by the Caterpillar Performance Handbook (2021) or equivalent.

The probability of encountering high groundwater or perched groundwater is unknown at this time. If wet conditions are encountered during construction, the contractor should implement dewatering techniques.

FOUNDATION DESIGN

The proposed restroom structure can be supported on a mat foundation placed on a layer of compacted structure backfill as shown on Figure 3. Static allowable bearing capacity for the mat foundation is presented on Figure 3 and include a factor of safety of at least 3, against shear failure. For properly constructed mat foundation supported on compacted fill, total static settlement and differential settlement due to proposed maximum structural load of 1,500 psf is estimated to be less than 1 inch and ½ inch respectively. Most of the static settlements are expected to occur as the loads are applied or shortly thereafter.

Slabs-on-grade and mat foundations should be underlain by 6 inches of compacted free-draining granular materials. The free-draining granular material should satisfy the requirements listed in Section 4.6.4 of the American Concrete Institute's (ACI) 360R-10 guideline (ACI, 2010). However, we recommend that the free-draining material contain a maximum of 5% fines (passing the No. 200 sieve).

Moisture vapor will tend to migrate through the slab-on-grade. A waterproofing specialist should be consulted. To reduce vapor migration through the floor building slab, the following should be considered:

- Minimum 10-mil-thick plastic vapor barrier with joints overlapped by at least 6 inches and taped.
- Sealing the plastic vapor barrier around plumbing, electrical, and other conducts.
- No sand above the plastic vapor barrier.
- Minimum 7-day wet cure; curing compounds can be used provided that they are applied and tested in accordance with Project specifications and removed prior to application of floor coverings.
- Two-month drying period before floor coverings are placed, pending moisture testing performed in accordance with the recommendations of the floor covering manufacturer.
- Concrete mix design, materials, placement, curing, and finishing in conformance with the Greenbook and the American Concrete Institute (ACI; 2004, 2010, 2014).

The plastic vapor barrier should satisfy the requirements of ASTM International (ASTM) E1745 (Class "A"). ACI 302.1R-04 (ACI, 2004) defines a vapor barrier as having a water vapor transmission rate (WVTR) of 0.00 perms, plus a testing tolerance generally of a WVTR of 0.008 perms or less when tested in accordance with ASTM E96. Note that commonly used "poly" or "visqueen" does not meet ASTM E1745 requirements. Vapor barriers should be installed in accordance with ASTM E1643. Care should be taken to seal the plastic vapor barrier and avoid puncturing the plastic vapor barrier during construction.

CONSTRUCTION DEWATERING CONSIDERATION

Construction dewatering may be required to install the structures if shallow groundwater induces pumping at the site. The type, design, installation, and operation of the dewatering system are the responsibility of the contractor. The design of the dewatering system should be completed by the contractor and reviewed by the professional engineer prior to construction. The extent of the dewatering requirement will vary depending on the soil conditions and the type, depth of the excavation, and the actual level of the groundwater at the time of construction.

SOIL CORROSION POTENTIAL

The soil sample was tested for pH, soluble chloride and soluble sulfate, and soil electrical resistivity for corrosion potential. The test values are summarized in Table 2.

The sulfate concentration in the soil was 816 parts per million (ppm). Based on this, we recommend that the concrete be designed for exposure class S1 from American Concrete Institute (ACI) 318 (ACI, 2014).

Also presented in Table 2 are Caltrans (2021) corrosion criteria. The corrosion potential test results are presented in Attachment 2. For structural elements, Caltrans considers a site to be corrosive if one or more of the following conditions exist: chloride concentration is 500 parts per million (ppm) or greater; sulfate concentration is 1,500 ppm or greater; and/or the pH is 5.5 or less. Soil resistivity serves as an indicator parameter for the possible presence of soluble salts, and it is not a definitive parameter to classify the soil as corrosive. However, a minimum resistivity value of soil less than 1,500 ohm-cm indicates the presence of high quantities of soluble salts and a higher propensity for corrosion. In addition to the soil characteristics, external factors such as nearby active corrosion systems will greatly affect the need for an active corrosion protection system. The test data provided herein can be used by others to develop details of corrosion protection. Based on Caltrans standards and the chemical test results, the on-site soils are classified as not corrosive to the proposed improvements.

Table 4- CORROSION TESTS SUMMARY

CONSTITUENT	CRITERIA FOR CORROSIVE MATERIALS	VALUES
pH[1]	<5.5	7.7
Soluble sulfate content (ppm)[1]	>1,500	816.4
Soluble chloride content (ppm)[1]	>500	428.9
Minimum Electrical resistivity (ohm-cm)	<1,500	2,010

Note:
1. Caltrans corrosion criteria (2021).
- ppm = parts per million.

Borrow soils imported to the Project site should be tested for corrosion potential.

LIMITATIONS

This memorandum has been prepared for the Project based on a scope provided by HDR. The data, opinions, and recommendations contained in this memorandum are applicable to the specific design element(s) and location(s) that are the subject of this memorandum. They have no applicability to any other design elements or to any other locations, and any and all subsequent users accept any and all liability resulting from any use or reuse of the data, opinions, and recommendations without the prior written consent of DYA.

Services performed by DYA have been conducted in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions. No other representation, expressed or implied, and no warranty or guarantee is included or intended.

This memorandum is intended for use only for the Project described. In the event that any changes in the nature, design, or location of the facilities are planned, the conclusions and recommendations contained in this memorandum should not be considered valid unless the changes are reviewed and conclusions of this report modified or verified in writing by DYA. We are not responsible for any claims, damages, or liability associated with the interpretation of subsurface data obtained from limited boring and nearby geotechnical data or reuse of the subsurface data or engineering analyses without our express written authorization.

We appreciate the opportunity to work with you on this Project. Please call if you have any questions.

Sincerely,

DIAZ•YOURMAN & ASSOCIATES

Osvaldo Berumen
Staff Engineer

Saroj Weeraratne, PhD, PE, GE
Geotechnical Engineer 2374

SW/OB:dr

Attachment 1: Field Exploration
Attachment 2: Laboratory Testing

REFERENCES

American Concrete Institute, 2014, ACI 318, Building Code Requirements for Structural Concrete.

Building News, 2021, "Greenbook," Standard Specifications for Public Works Construction.

CGS Special Publication 117A, Guidelines for Evaluating and Mitigating Seismic Hazards in California, 1997

California Geological Survey, 2000, Open File Report 2000-008, Seismic Hazard Zone Report for the Thousand Oaks 7.5-Minute Quadrangle, Los Angeles County, California, 2000.

Caltrans, 2021, Corrosion Guidelines Version 3.2, Division of Engineering Services, Materials Engineering and Testing Services, Corrosion and Structural Concrete Field Investigation Branch, May 2021.

Caltrans, 2022, Standard Plans and Specifications.

Caterpillar Performance Handbook, 2022 Caterpillar, Inc., Edition 49

GeoTracker GAMA, 2023, California State Water Resources Control Board GeoTracker GAMA Online Database, Accessed on April, 2023. https://www.waterboards.ca.gov/gama/geotracker_gama.shtml.

Kimley-Horn, Communications and Correspondence, 2023.

ATTACHMENT 1
FIELD EXPLORATION

SOIL CLASSIFICATION SYSTEM-ASTM D2487

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE-GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE-GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

"Push" Sampler

Bag Sample

Standard Penetration Test (SPT) Sampler

Dual-Mass Dynamic Cone Penetration (DCP) Test

Concrete/Rock Core

Groundwater Surface

SPT "N" = 0.65 x modified California blows per foot

NP = Nonplastic
EI = Expansion Index Test
SG = Specific Gravity
SE = Sand Equivalent
UC = Unconfined Comp.
CD = Consol. Drained Triaxial.
CU = Consol. Undrained Triaxial.
UU = Undrained, Unconsol. Triaxial.
RV = R-Value
CA = Chemical Analysis
DS = Direct Shear
CN = Consolidation
CP = Collapse Potential
SA = Grain size; HD = Hydrometer
MD = Compaction Test
HC = Hydraulic Conductivity Test
CBR = California Bearing Ratio
[PID] Reading in ppm above background

Agoura Hills Chumash Park Restroom Project

Project No. 2023-005

PLATE
A1

BORING LOCATION:	See Figure No. 2	**ELEVATION AND DATUM (feet):**	
LATITUDE:	34° 9' 1.9" N	**LONGITUDE:**	-119° 14' 38.7" W
DRILLING EQUIPMENT:	Hand Auger	**DRILLING METHOD:**	Hand Augering
BORING DIAMETER (inches):	3	**BORING DEPTH (feet):**	6
DATE STARTED:	4/7/23	**DATE COMPLETED:**	4/7/23
SPT HAMMER DROP:	30 inches **WT:** 140 lbs	**DRIVE HAMMER DROP:**	0 inches **WT:** 0 lbs
LOGGED BY: AG	**CHECKED BY:** OB	**DRIVE SAMPLER DIAMETER (inches)**	**ID:** **OD:**

Elevation (feet)	Depth (feet)	Sampler	Sample Top Depth (feet)	Blows per 6 Inches	SPT N Blows per Foot	Pkt. Pntmtr/ [Tor Vane] (tsf)	DESCRIPTION	Lab Sample Type/Depth (ft)	Recovery (inch/inch)	Sample Condition	Time	PID- sample/ [Background]	Other
							CLAYEY SAND (SC): brown; moist; medium dense; medium plasticity; coarse to fine SAND; trace coarse to fine GRAVEL; rootlets;iron oxide stains						
							light brown						
	5						wet						
							Bottom of boring at 5.5 feet. Groundwater encountered at 4.5 feet. Boring backfilled with cuttings.						
	10												

LOG OF BORING DYB23-01

Agoura Hills Chumash Park Restroom Project

Project No. 2023-005

ATTACHMENT 2

LABORATORY TESTING

MATERIALS FINER THAN 75-µm (No. 200) SIEVE by WASHING
ASTM D1140

HUSHMAND ASSOCIATES, INC.
Geotechnical and Earthquake Engineers

Client: Diaz Yourman & Associates
Project: Restroom Building Replacement at Chumash Park
Project No.: 2023-005

HAI Project No.: DYAL-23-004
Performed by: GA
Checked by: KL
Date: 4/10/2023

Boring No.	Sample No.	Depth (ft)	Sample Description (USCS)	Dry Soil before Wash + $W_{Container}$	Dry Soil after #200 Wash + $W_{Container}$	$W_{Container}$	Wt of soil retained on # 200 sieve	Initial wt of dry soil	**Soil % passing 200 sieve**
				g	g	g	g	g	**%**
DYB23-01	1	2.5	Light Brown, Clayey Sand (SC)	653.72	542.82	220.65	322.17	433.07	**25.61**
DYB23-01	2	5	Brown, Clayey Sand (SC)	925.70	700.36	221.12	479.24	704.58	**31.98**

Liquid Limit, Plastic Limit, and Plasticity Index of Soils

ASTM D4318

HUSHMAND ASSOCIATES, INC.
Geotechnical and Earthquake Engineers

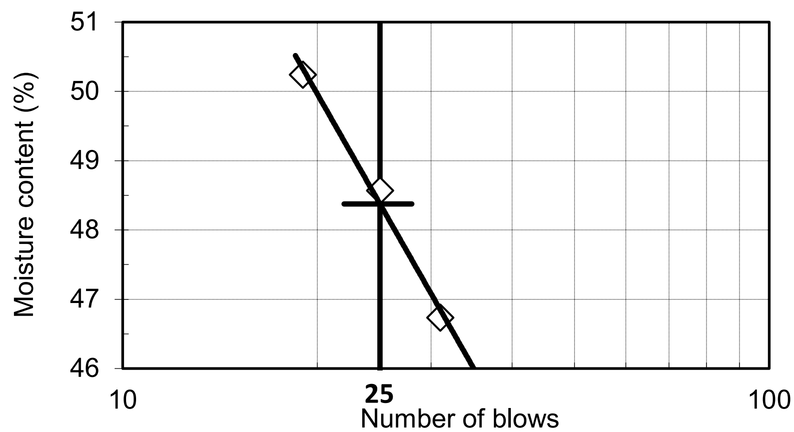
Client:	Diaz Yourman & Associates	*HAI Project No.:*	DYAL-23-004
Project Name:	Restroom Building Replacement at Chumash Park	*Tested by:*	GA
Project No.:	2023-005	*Checked by:*	KL
Boring No.:	DYB23-01	*Date:*	04/10/23
Sample No.:	1		
Depth (ft):	2.5		
Soil Description:	Light Brown, Clayey Sand (SC)		

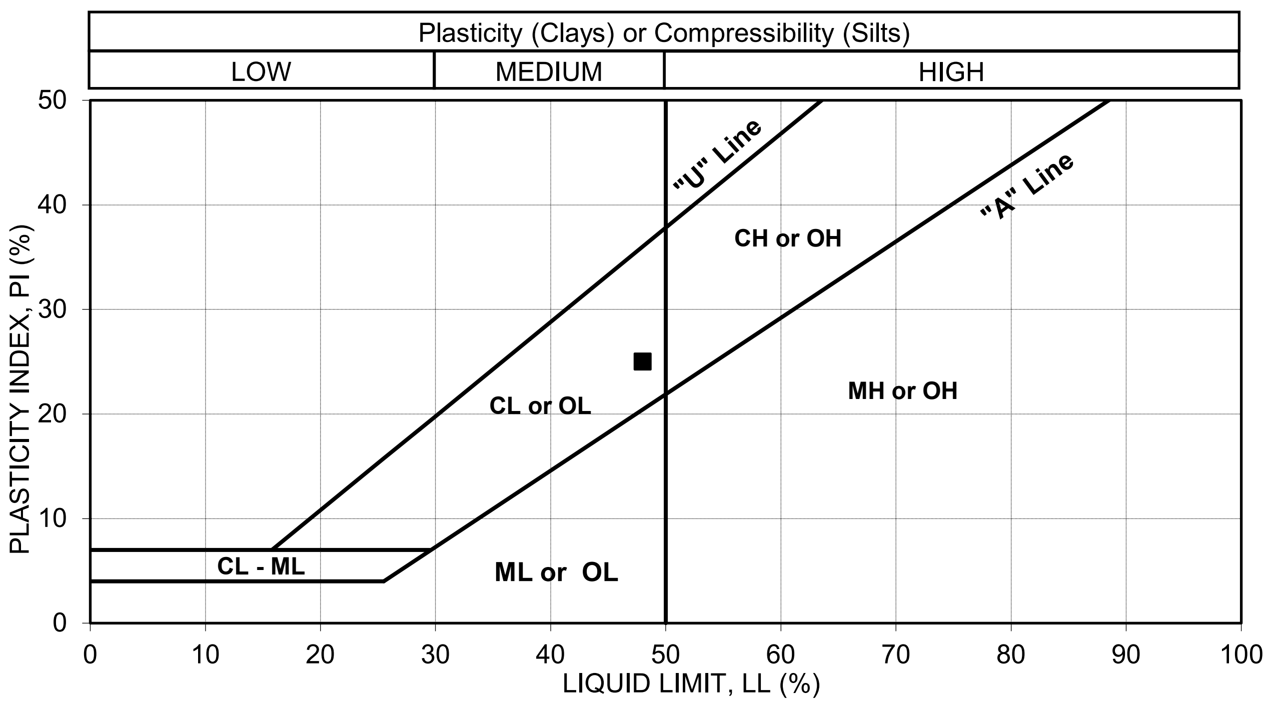
Test		LL	LL	LL	PL	PL
No. of blows	**-**	**31**	**25**	**19**	**-**	**-**
Wt. of Wet Soil + Container	(g)	26.2	26.6	26.7	9.4	9.6
Wt. of Dry soil + Container	(g)	21.4	21.5	21.5	7.9	8.0
Wt. of Container	(g)	10.9	11.0	11.2	1.1	1.1
Water content	**(%)**	**46.7**	**48.6**	**50.2**	**23.5**	**23.4**

Liquid Limit (LL)	**48**
Plastic Limit (PL)	**23**
Plasticity Index (PI)	**25**
USCS	**CL**

Remarks:

- Fine Sample is Less than 50% of Passing #200)





Liquid Limit, Plastic Limit, and Plasticity Index of Soils

ASTM D4318

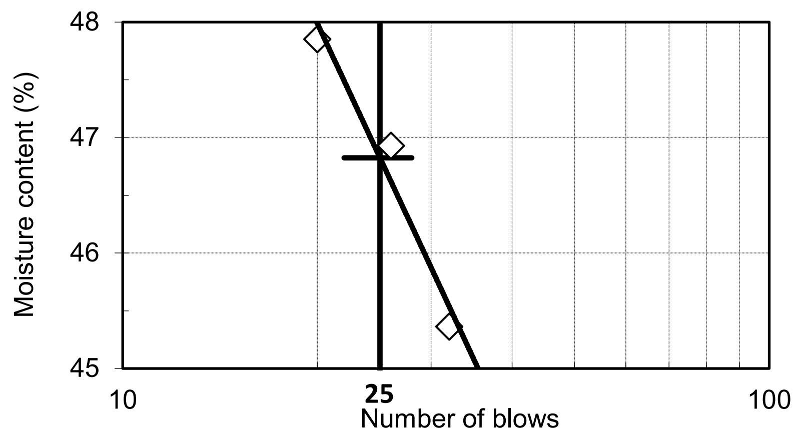
Client:	Diaz Yourman & Associates	*HAI Project No.:*	DYAL-23-004
Project Name:	Restroom Building Replacement at Chumash Park	*Tested by:*	GA
Project No.:	2023-005	*Checked by:*	KL
Boring No.:	DYB23-01	*Date:*	04/10/23
Sample No.:	2		
Depth (ft):	5.0		
Soil Description:	Brown, Clayey Sand (SC)		

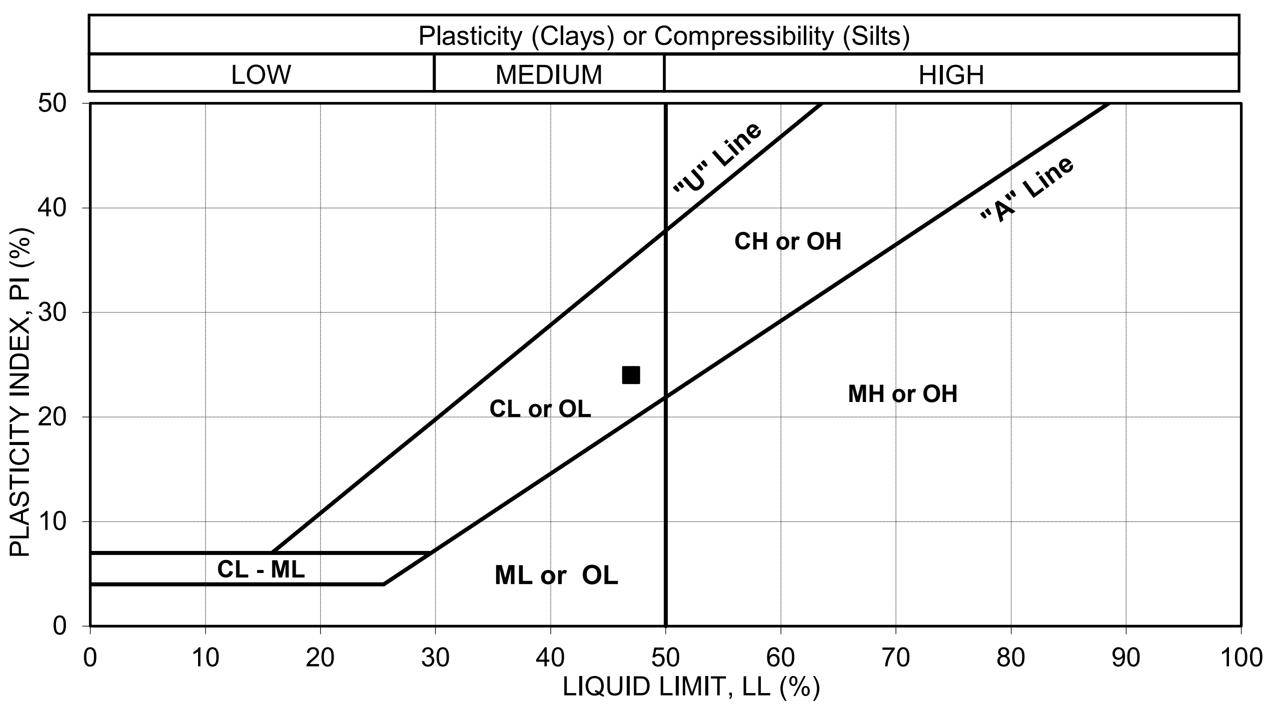
Test		LL	LL	LL	PL	PL
No. of blows	**-**	**32**	**26**	**20**	**-**	**-**
Wt. of Wet Soil + Container	(g)	25.5	25.8	25.6	9.4	9.4
Wt. of Dry soil + Container	(g)	21.0	21.1	20.8	7.8	7.9
Wt. of Container	(g)	11.0	11.0	10.8	1.1	1.1
Water content	**(%)**	**45.4**	**46.9**	**47.9**	**22.9**	**23.4**

Liquid Limit (LL)	**47**
Plastic Limit (PL)	**23**
Plasticity Index (PI)	**24**
USCS	**CL**

Remarks:

- Fine Sample is Less than 50% of Passing #200)





Soil Analysis Lab Results

Client: HAI
Job Name: Restroom Building Replacement at Chumash Park
Client Job Number: DYAL-23-004 / 2023-005
Project X Job Number: S230413A
April 14, 2023

	Method	ASTM D4327		ASTM D4327		ASTM G187		ASTM G51
Bore# / Description	**Depth**	**Sulfates** SO_4^{2-}		**Chlorides** Cl^-		**Resistivity**		**pH**
						As Rec'd	**Minimum**	
	(ft)	**(mg/kg)**	**(wt%)**	**(mg/kg)**	**(wt%)**	**(Ohm-cm)**	**(Ohm-cm)**	
DYB23-01 0	0-5	816.4	0.0816	428.9	0.0429	2,010	449	7.7

Cations and Anions, except Sulfide and Bicarbonate, tested with Ion Chromatography
mg/kg = milligrams per kilogram (parts per million) of dry soil weight
ND = 0 = Not Detected | NT = Not Tested | Unk = Unknown
Chemical Analysis performed on 1:3 Soil-To-Water extract
PPM = mg/kg (soil) = mg/L (Liquid)

Note: Sometimes a bad sulfate hit is a contaminated spot. Typical fertilizers are Potassium chloride, ammonium sulfate or ammonium sulfate nitrate (ASN). So this is another reason why testing full corrosion series is good because we then have the data to see if those other ingredients are present meaning the soil sample is just fertilizer-contaminated soil. This can happen often when the soil samples collected are simply surface scoops which is why it's best to dig in a foot, throw away the top and test the deeper stuff. Dairy farms are also notorious for these items.