GEO ENVIRON
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING CONSULTANTS, INC.
4071 E. La Palma Ave., Ste. B, Anaheim, Ca 92807 • (714) 632-3190 • Fax (714) 632-3191

Job No: 21-1108P
May 17, 2021

Rahman Engineering
13611 12th St,Unit B
Chino, CA 91710

Subject: **Preliminary Geotechnical Investigation for Foundation Design, Proposed Apartment Buildings, on Alessandro Blvd, APN 484-030-026, 484-030-013, Moreno Valley, California**

Reference:

1) Rahman Engineering, April 2020, "Proposed Residential Units, on Alessandro Blvd, APN 484-030-026, 484-030-013, Moreno Valley, California'

Gentlemen:

In accordance with your request and authorization, we have performed a preliminary geotechnical engineering evaluation for the subject project. The accompanying report presents the preliminary results of our field exploration work, laboratory tests, review of our geotechnical experience previously performed in the general vicinity of the project site, as well as engineering analysis. The subsurface and foundation conditions are discussed and preliminary recommendations for the geotechnical engineering aspects of the project are presented herein. This report will be considered preliminary until final plans and construction details are available for our review and may be subject to change.

The opportunity to be of service is appreciated. If you have any questions concerning our findings, please call at your convenience.

Respectfully submitted,

Geo Environ Eng. Consultants, Inc.

Jabed Masud, MSCE
Principal

REGISTERED PROFESSIONAL ENGINEER
ESMAIL RASTEGARI
No. 43332
Exp.03/30/2024
CIVIL
STATE OF CALIFORNIA

Esmail Rastegari, P.E.
Principal

JM//ER/gm

Attachments:

Appendix 'A' - Drawings
Appendix 'B' - Boring Logs
Appendix 'C' - Laboratory Test Results

SCOPE

The scope of this study designed to determine and evaluate the surface and subsurface conditions on the subject site and to present preliminary recommendations for the foundation systems and grading requirements as they relate to the planned development.

The scope included the following geotechnical functions:

1. Review of available literature pertaining to the site and vicinity.
2. Evaluation of natural and manmade surface features at the site.
3. Drilling and logging of exploratory borings.
4. Securing of bulk and undisturbed samples of earth materials from the borings for laboratory testing.
5. Laboratory testing of selected samples.
6. Engineering analysis of data obtained during the study.
7. Preparation of this report and the accompanying illustrations to present the findings, conclusions, and recommendations pertaining to the planned construction.

LOCATION

The subject property upon which the soils explorations have been performed is located at Alessandro Blvd, north of Copper Cove, 1.5 mile 10 Freeway, in the City of Moreno Valley, California. Adjoining the properties are the residential properties.

SITE DESCRIPTION

The subject site is a rectangular shaped property, 1.76 acre in size. The site is flat, and currently vacant.

PROPOSED CONSTRUCTION

Preliminary details of the proposed construction were provided by the Client and the project Civil Engineer. Four (4) residential units are planned to be constructed within the subject site. Building A, B and D will have 24 units, 3-story in height, and building C will have 16 units, 2-story in height. No subterrean structures are proposed within the subject site. The building structures are anticipated to be supported on continuous and isolated pad footing type foundations. Loads on the foundations are unknown but expected to be between 50 and 100 kips for column loads and between 2 and 4 kips per linear foot for wall loads. Should details involved in final design vary from those outlined above, this firm should be notified for review and possible revision of our recommendations.

FIELD STUDY

A field study consisting of site observations and subsurface exploration was conducted on May 12, 2021. Three (3) exploratory borings were drilled to a maximum depth of 15.0. The soils encountered in the exploratory logs were logged by our field personnel. The boring logs are included in Appendix 'B'. The approximate location of the borings are shown on the plot plan in Appendix 'A'. Disturbed and undisturbed samples of the soils encountered were obtained at frequent intervals in the borings. Undisturbed samples were obtained by driving a thin walled steel sampler with successive drops of a 140-pound weight having a free fall of 30 inches. The blow count for each one foot of penetration is shown on the boring logs. Undisturbed soils were retained in brass rings with a 1-inch height and 2.413-inch inside diameter. The ring samples were retained in close fitting moisture proof containers and transported to our laboratory for testing.

The exploratory borings used for subsurface exploration used for subsurface exploration were backfilled with reasonable effort to restore the area to their original condition prior to leaving the site. As with any backfill in an area as small and deep as a boring, consolidation and subsidence of the backfill soil may result in time, causing a depression of the boring area and potentially hazardous condition. The client and/or owner of the property are advised to periodically examine the boring areas, and if necessary, backfill any depressions. Geo Environ., shall not be liable for any injury or damage resulting from subsidence of the backfill.

LABORATORY TESTS

The results of laboratory tests performed on disturbed, undisturbed, and remolded soil samples are presented in appendix 'C'. Following is a listing and brief explanation of the laboratory tests which were performed as part of this study. The remaining soil samples are stored in our laboratory for future reference. Unless notified to the contrary, all samples will be disposed of 30 days after this report.

Classification

The field classification of the soils were verified in the laboratory in general accordance with the Unified Soil Classification System. The classification is shown on the boring logs.

Field Moistures and Densities

The field moisture content was determined for each of the disturbed and undisturbed soil samples. The dry density was also determined for each of the undisturbed samples. The dry density was is determined in pounds per cubic foot and the field moisture content is determined as a percentage of the dry weight of the soil. Both results are shown on boring logs.

Consolidation Tests

Settlement predictions of the soil's behavior under load were made on the basis of the consolidation tests which are performed in general accordance with ASTM D-2435 procedures. Results are plotted on the "Consolidation Test Graph".

Expansion Characteristics

Laboratory expansion tests were performed on a near surface soil sample in general accordance with ASTM D-4829 procedures. The resulting volume change due to the increase in moisture content is recorded and the expansion index calculated.

Direct Shear Test

Direct Shear test was performed in the Direct Shear Test Machine which is of the strain control type in general with ASTM D-3080 procedure. Each sample was sheared under varying pressures normal to the face of the specimen to determine the shear strength (cohesion and angle of internal friction). Samples were tested in a submerged condition. The result is plotted on the "Direct Shear Test Graph."

GEOTECHNICAL CONDITIONS

Subsurface Soils

The subject site is underlain with native soils (Alluvium) classified as fine sandy Silt, slightly moist, and very dense to a depth of approximately 7.5 feet, then silty Clay, moderately moist, very stiff in consistency to 15 feet, the maximum depth explored. More details information of the subsurface soils are presented in the boring logs (Appendix B). The soil strata as shown on the boring logs represents the soil conditions in the actual boring locations and other variations may occur between the borings. Lines of demarcation represent the approximate boundary between the soil types, but the transition may be gradual.

Groundwater

Groundwater was not encountered in the soil borings during our subsurface exploration. The depth of groundwater is expected to be greater then 50 feet below the existing grade, based on the data retrieved from the near by sites.

Seismicity

Nearby active fault lines include the San Jacinto, San Andreas, these have associated postulated, maximum probable earthquake magnitudes of 6.9. In turn, the probabilistic ground motion acceleration range upwards to $\pm$ 0.69 g. The related California Building Code factors include the type b, San Jacinto Fault the near source zone at 6.8 kilometers toward the south and a soil profile type of alluvium or Sd. Based on the California Building Code acceptance of some structural damage without collapse, the subject development may be designed in accordance with the seismic formulas and requirements presented in the current version of the California Building Code. It is the responsibility of the project structural engineer to utilize the critical seismic factors to be used for building design and to implement the applicable sections of the code.

Liquefaction

Based on the subsurface soils, silt and clay, high blow counts and the depth to groundwater the site in general is not designated as susceptible to liquefaction.

CONCLUSIONS

- The plan construction and development of the site is considered feasible from a geotechnical engineering point of view provided the engineering recommendations of this report are followed.
- The surface and the subsurface soil on the site will be adequate for the support of the structure and any fill soils proposed for the site.
- The proposed structure, grading, and development of the site will not cause adverse safety hazards or instability to the adjacent properties or their structures.
- conversely, the adjacent properties or their structures will not cause adverse safety hazards or instability to the planned development.

- Laboratory expansion test indicate that the soils on the site have low to medium expansion potential.
- The site, in general, is designated as not susceptible to liquefaction.

The following sections present specific recommendations for the design and construction of the project.

General Site Preparation

All earthwork and grading shall be performed in accordance with the recommendations presented herein, and in accordance with all applicable requirements of the Grading Code of the City of Moreno Valley, California. The following recommendations may need to be modified and/ or supplemented during rough grading as field conditions necessitate.

All unsuitable or uncertified fill should be removed from the proposed building areas. As a minimum, the proposed building areas shall be overexacavated to a depth of 3.0 feet below the existing grade, or 2 feet below the proposed footing bottoms, whichever is greater and replaced as a certified compacted fill. **Where possible**, the limits of overexcavation for building areas shall extend at least 3.0 feet beyond the proposed building limits or to the property line, whichever is less.

The competency of the exposed overexcavation bottoms must be determined by the soil engineer or his representative at the time they are exposed and prior to scarification or placement of fill. All overexcavation bottoms and any areas to receive fill shall be scarified a minimum of 6 inches, watered or aerated as necessary to achieve optimum moisture content, and properly compacted to at least 90% of maximum dry density. For the purpose of estimating earthwork quantities, a shrinkage factor of 10-15 % may be assumed for the existing near surface on-site soil to be used as fill and compacted to 90% of maximum dry density. Subsidence due to grading is estimated to be 0.1 feet.

Any soil to be placed as fill, whether natural or import, shall be approved by the soil engineer or his representative prior to their placement. The fill material shall be free from vegetation, organic material or debris. Import soil shall be no more expansive than the existing near surface soils on the site. Suitable fill soil shall be placed in horizontal lifts not exceeding 6 inches in thickness after compaction and uniformly watered or aerated to obtain optimum moisture content. Each layer shall be spread evenly and shall be thoroughly mixed during the spreading to ensure uniformity of the soil and optimum moisture

in each layer. After each lift has been placed, it shall be thoroughly compacted to not less than 90% of maximum dry density. The soil engineer or his representative shall observe the placement of fill and should take sufficient tests to verify the moisture content and the uniformity and degree of compaction obtained. In-place density testing should be performed in accordance with ASTM acceptable to the local building authority. The optimum moisture content and the maximum dry density for compacted soils shall be determined in accordance with ASTM D-1557 procedures. Due to the possibility of imported fill soil in the building areas and / or variable soil strata that may be exposed in the building pad, typical soil samples should be obtained at completion of rough grading for laboratory testing to confirm the expansion characteristics of the graded site.

FOUNDATION RECOMMENDATIONS

Design of Conventional Continuous House and Retaining Wall Footings

- All exterior continuous footings should have minimum embedment of 24 inches and 18 inches below lowest adjacent final grade, for 3-story and 2-story structures, respectively . Interior footings may be embedded to 18 inches below lowest adjacent final grade .
- The width of the footings should be minimum 18 inches and 15 inches for 3-story and 2-story structures, respectively.
- All footings should use a minimum of four (4) No. 4 steel reinforcing bars, top and bottom of footings to help prevent cracking from possible soil imperfections and expansion.
- The pad footings should be 24 inches square and 24 inches in depth, reinforced with No. 4 bars spaced a maximum 18 inches on centers, both ways, near the bottoms of the footings.

The project Architect/ or Structural engineer shall determine actual footing widths, depths and reinforcements necessary to resist design vertical, horizontal and uplift forces.

Allowable Soil Bearing Capacities

An allowable soil bearing value of 2000 psf may be used for design of continuous and column footings, into competent native soils. A 1/3 increase in the above bearing value may be used when considering short term loading from wind or seismic sources.

Lateral Bearing Pressure

- Allowable lateral soil pressures (Equivalent Fluid Pressure), Passive case: 300 psf/ ft to a maximum 3000 pcf.
- Allowable Coefficient of Friction between concrete and soil: 0.35

Settlement

The proposed structure is not anticipated to exceed a maximum settlement of ½ inch or a differential settlement of 0.25 inch.

Seismic Design

The followings are the seismic design parameters, in accordance with the ASCE 7-16

Site Latitude: 33.91663

Site Longitude:-117.220094

Site Class: **D**-Default

Mapped Spectral Response Acceleration-Short Period:

(0.2 sec)-Ss: 1.65

Mapped Spectral Response Acceleration-Short Period:

(1 sec)-S1: 0.643

Short Period Site Coefficient-**Fa**: **1.2**

Long Period Site Coefficient- **Fv: null**

Adjusted Spectral Response Acceleration-Short Period: (0.2 sec)-**Sms: 2.125**

Adjusted Spectral Response Acceleration-Short Period:

(1 sec)-**Sm1**: **null**

Design Spectral Response Acceleration-Short Period:

(0.2 sec)-**Sds**: **1.32**

Design Spectral Response Acceleration-Short Period:

(1 sec)-**Sd1**: **null**

FLOOR SLAB RECOMMENDATIONS

Floor slabs should be a minimum of 4 inches thick. Floor slabs should be reinforced with # 3 rebars at 18- inches on centers.

Concrete slabs should be underlain with a minimum 10 mil polyvinyl chloride membrane vapor retarder with a minimum overlap of 12 inches in all directions. This membrane should be sandwiched between two, two-inch layers of sand. The concrete section and/or reinforcing should be increased as necessary for excessive design floor loads or anticipated concentrated loads. In areas where moisture sensitive floor covering are anticipated over the slab, The concrete section and/ or reinforcing should be increased as necessary for excessive design floor slabs or anticipated concentrated loads. The slab subgrade should be moisture conditioned to minimum 5% over optimum moisture content condition to a depth of 12 inches immediately prior to placement of the moisture barrier or pouring concrete.

RETAINING WALL RECOMMENDATIONS

Retaining walls if planned should be founded to the same depths into undisturbed natural soil or compacted fill as standard foundations and may be designed for the same average allowable bearing value across the footing, allowable lateral soil pressure and allowable lateral sliding resistance as previously recommended. Retaining walls should be designed to resist the active pressures summarized in the following table. The active pressure is normally calculated from the lowermost portion of the footing to the highest ground surface at the back of the wall, including necessary factors for sloping ground. The active and passive pressures indicated in the table are equivalent fluid densities. Walls that are not free to rotate or that are braced at the top should use active pressures that are 50% greater than those indicated in the table. Retaining wall design for passive resistance should neglect the top foot of earth in front of the wall.

Retaining Wall (Equivalent Fluid Pressures)

Slope of adjacent ground	Active Pressure with Sand or Gravel Backfill
Level	30 pcf
2:1	43 pcf

Drainage and Waterproofing

A subdrain system shall be constructed behind and at the base of all retaining walls to allow drainage and to prevent buildup of excessive hydrostatic pressures. Typical subdrains may include weep holes with a continuous gravel gallery, perforated pipe surrounded by filter rock, or other approved devices. Gravel galleries or filter material, if not properly designed and graded for the on-site soils, shall be enclosed in a geotextile fabric such as Mirafi 140N or a suitable equivalent to prevent infiltration of fines and clogging of the system. Subdrains should maintain a positive flow gradient away from the retaining walls and have outlets that drain in a non-erosive manner.

Wall Backfill

Backfill directly behind retaining walls (if backfill width is less than 2 feet) may consist of 3/4" maximum diameter rounded to subrounded gravel. If wider areas are backfilled with gravels, the gravel shall be enclosed in a geotextile filter fabric. If other types of soil or gravel are used for backfill, mechanical compacting methods will be necessary to obtain a relative compaction of at least 90% of maximum dry density. Backfill directly behind retaining walls shall not be compacted by wheel, track or other rolling by heavy construction equipment unless the wall is designed for the surcharge loading from the compaction equipment. If other imported granular backfill is used behind the wall, the upper 12 inches of backfill in unpaved areas shall consist of typical on-site soil compacted to a minimum of 90% of the laboratory maximum dry density. This will prevent the infiltration of surface runoff into the granular backfill and into the subdrain system. In place density tests and laboratory maximum density and optimum moisture content for backfill materials shall be determined in accordance with ASTM procedures.

CEMENT TYPE

Negligible exposure to sulfate can be expected for concrete placed in contact with onsite soils. However, type II cement is recommended for concrete in contact with soil materials.

TEMPORARY CONSTRUCTION CUTS

Temporary construction cuts for retaining walls, foundations, utility trenches, etc., in excess of 5 feet in depth will have to be properly shored or cut back into an inclination not steeper than 1 : 1 (horizontal to vertical). Where more restrictive, the safety requirements for excavations contained in the State Construction Safety Orders enforced by the State Division of Industrial Safety (CAL-OSHA) and/ or the safety codes of the local agency having jurisdiction over the project shall apply.

All excavation should meet the minimum requirements of the Occupational Safety and Health Association (OSHA) standards. Excavations during construction should be carried out in such a manner that failure or ground movement will not occur.

FINISH GRADING

Based on the CBC , the ground immediately adjacent to the foundation shall be sloped away from the building at a slope of not less than one unit vertical in 20 units horizontal (5% slope) for a minimum distance of 10 feet measured perpendicular to the face of the wall. If in case, 10 feet of horizontal distance is not achieved , a 5% slope shall be provided to an approved alternative method of diverting water away from the foundation. Swales used for this purpose shall be sloped a minimum of 2% where located within 10 feet of the building foundation. Impervious surfaces within 10 feet of the building foundation shall be sloped a minimum of 2% away fro m the building.

HARDSCAPE, PAVEMENT RECOMMENDATION

The subgrade soils below concrete flat work should be compacted to a minimum compaction of 90 percent then throughly moistened prior to placing of concrete. To reduce the potential unsightly cracking, concrete sidewalk and patio type slabs should be at least 4 inches thick and provided with sawcuts or expansion joints every 6 feet or less. Concrete driveway slabs should be at least 4 inches thick and provided with saw cuts or expansion joints every 10 feet or less. Reinforcing should consist of at least with #3 bars spaced 24 inches O.C., both ways.

PLANTERS

Planters around perimeters of the structures shall be designed to ensure that adequate drainage is maintained and minimal irrigation water is allowed to drain into the soil underlying the buildings. Separately constructed planters with solid bottoms, independent of the underlying soil, arerecommended and should drain directly onto surrounding paved areas or into a properly designed subdrain system.

TRENCH BACKFILL

Trench excavations for utility lines which extend under building and paved areas are within the zone of influence of adjacent foundations shall be properly backfilled and compacted in accordance with the following recommendations.

The pipe should be bedded and backfilled with clean sand or approved granular soil (minimum Sand Equivalent Value of 30) to a depth of at least 1 foot over the pipe. This backfill should be uniformly watered and compacted to a firm condition. The remainder of the backfill should be on-site soil or very low to low expansive import soil, which should be placed in loose lifts not exceeding 12 inches in thickness, watered or aerated t optimum moisture content, and mechanically compacted to at least 90% of maximum dry density as determined by ASTM D-1557 procedures. Water jetting of the backfill is not allowed.

PLAN REVIEW

Subsequent to formulation of final development plans and specifications but prior to construction, grading and foundation plans should be reviewed by Geo Environ to verify compatibility with site geotechnical conditions and conformance with recommendations contained herein.

CONSTRUCTION OBSERVATIONS

Geo Environ must observe all foundation excavations. Observations should be made prior to installation of concrete forms and reinforcing steel in order to verify or modify, if necessary, conclusions and recommendations in this report.

Observations of the foundation excavations, finish grading, utility or other trench backfill, pavement subgrade and base course, retaining wall backfill, or other earthwork completed for the subject projects should be performed by Geo Environ. If these further observations are not requested, liability for these items will not be assumed by Geo Environ.

If any of these observations to verify site geotechnical conditions are not performed by Geo Environ, liability for the safety and stability of the project is limited only to the actual portions of the project observed and tested by Geo Environ. In order to provide timely observations, this firm should be notified at least 48 hours in advance of excavation.

CLOSURE & LIMITATIONS

The findings, conclusions, and recommendations presented reflect our best estimate of subsurface conditions based on the data obtained from a limited subsurface exploration performed during the field study. The conclusions and recommendations are based on generally accepted geotechnical engineering principles and practices. No further warranties are implied nor made.

Due to the possible variability of soil and subsurface conditions within the site, conditions may be encountered during grading and development that may differ from those presented herein. Should any variation or unusual condition become apparent during grading and development, this office should be contacted to evaluate these conditions prior to continuation of work and necessary revisions to the recommendations.

This office should be notified if changes of ownership occur or if the final plans for the site development indicate structures areas, type of structures, or structural loading conditions differing from those presented in this report.

If the site is not developed or grading does not begin within 12 month following the date of this report, further studies may be required to ensure that the surface or subsurface conditions have not changed.

Any charges for necessary review or updates will be at the prevailing rate at the time the review work is performed.

TECHNICAL REFERENCES

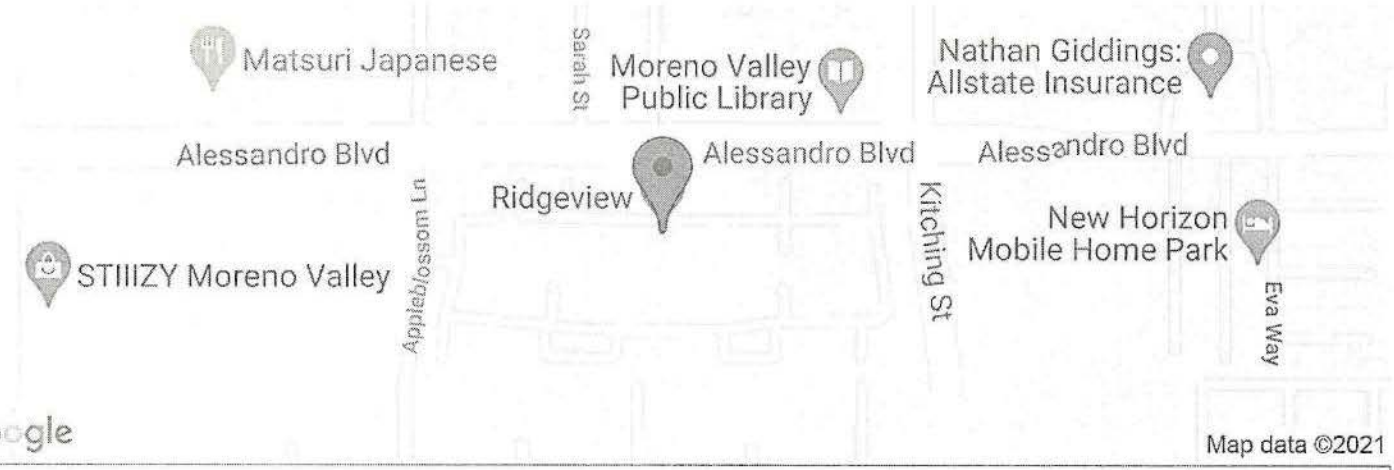
1. California Building Code 2019 foundation design parameters
2. City of Moreno Valley Building and Grading Code
2. USGS, Ground Acceleration from Earthquakes
3. USGS, Seismic Design Values for Buildings
4. California Division of Mines and Geology (CDMG), Seismic Hazard & Liquefaction Evaluation
5. California Division of Mines and Geology (CDMG), Historic Groundwater Elevations

OSHPD

Residential Development

25335 Alessandro Blvd, Moreno Valley, CA 92553, USA

Latitude, Longitude: 33.91663, -117.220094



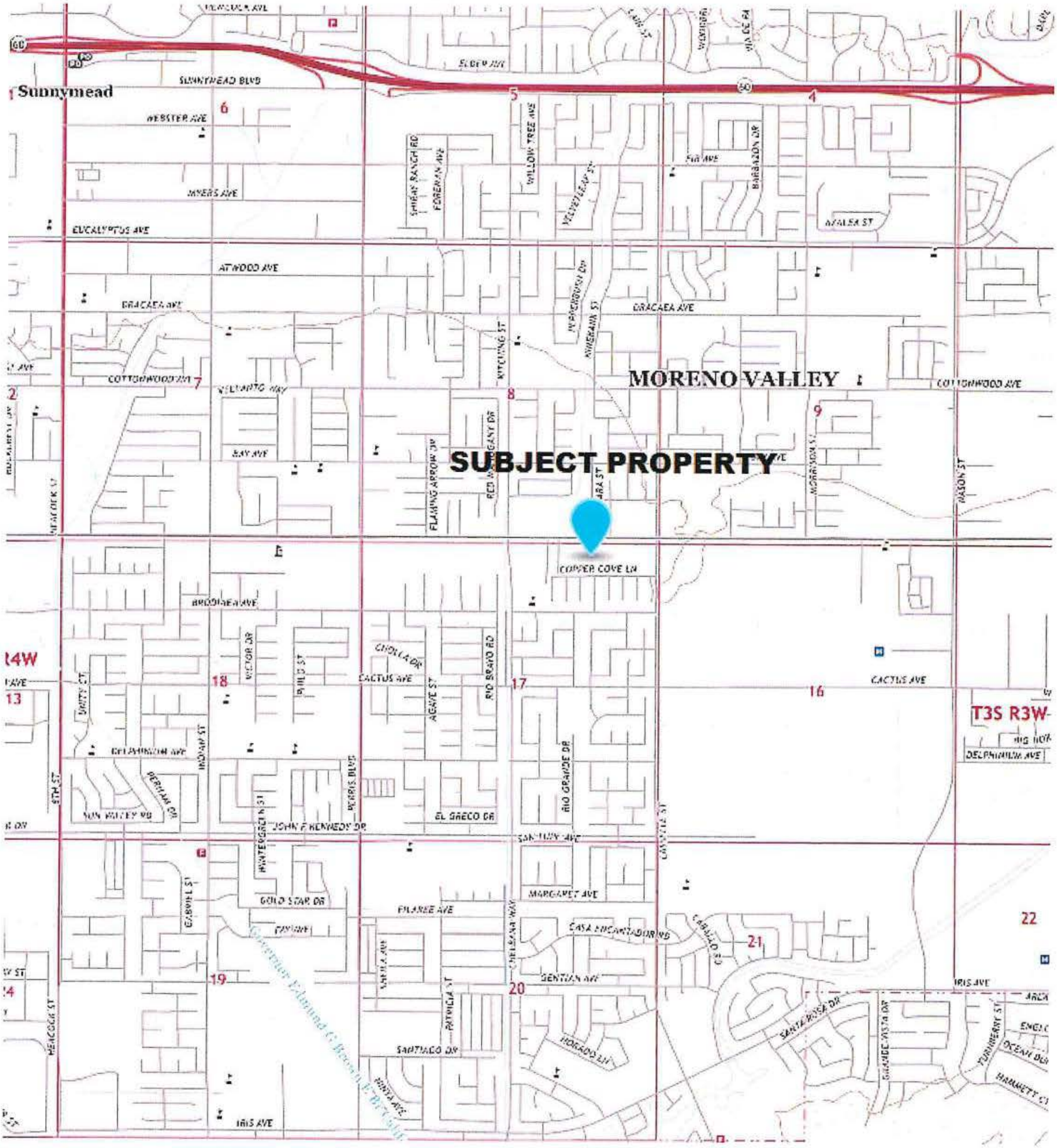
Date	5/18/2021, 11:53:12 AM
Design Code Reference Document	ASCE7-16
Risk Category	II
Site Class	D - Default (See Section 11.4.3)

Type	Value	Description
S_S	1.65	MCE_R ground motion. (for 0.2 second period)
S_1	0.643	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.98	Site-modified spectral acceleration value
S_{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{DS}	1.32	Numeric seismic design value at 0.2 second SA
S_{D1}	null -See Section 11.4.8	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	null -See Section 11.4.8	Seismic design category
F_a	1.2	Site amplification factor at 0.2 second
F_v	null -See Section 11.4.8	Site amplification factor at 1.0 second
PGA	0.699	MCE_G peak ground acceleration
F_{PGA}	1.2	Site amplification factor at PGA
PGA_M	0.839	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
SsRT	1.847	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	2.009	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	1.65	Factored deterministic acceleration value. (0.2 second)
S1RT	0.716	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.798	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.643	Factored deterministic acceleration value. (1.0 second)
PGAd	0.699	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.92	Mapped value of the risk coefficient at short periods

APPENDIX A

DRAWINGS


SUBJECT PROPERTY
MORENO VALLEY
Sunnymead
SUNNYMEAD BLVD
WEBSTER AVE
MYERS AVE
EUCALYPTUS AVE
ATWOOD AVE
DRACAEA AVE
COTTONWOOD AVE
BAY AVE
COPPER COVE LN
BRODIAEA AVE
CACTUS AVE
DELPHINIUM AVE
JOHN F KENNEDY DR
EL GRECO DR
MARGARET AVE
GOLD STAR DR
GENTIAN AVE
SANTIAGO DR
IRIS AVE
SANTA ROSA DR
WILLOW TREE AVE
FLAMING ARROW DR
RIO BRAVO RD
RIO GRANDE DR
PERRIS BLVD
INDIAN ST
HEACOCK ST
MASON ST
AZALEA ST
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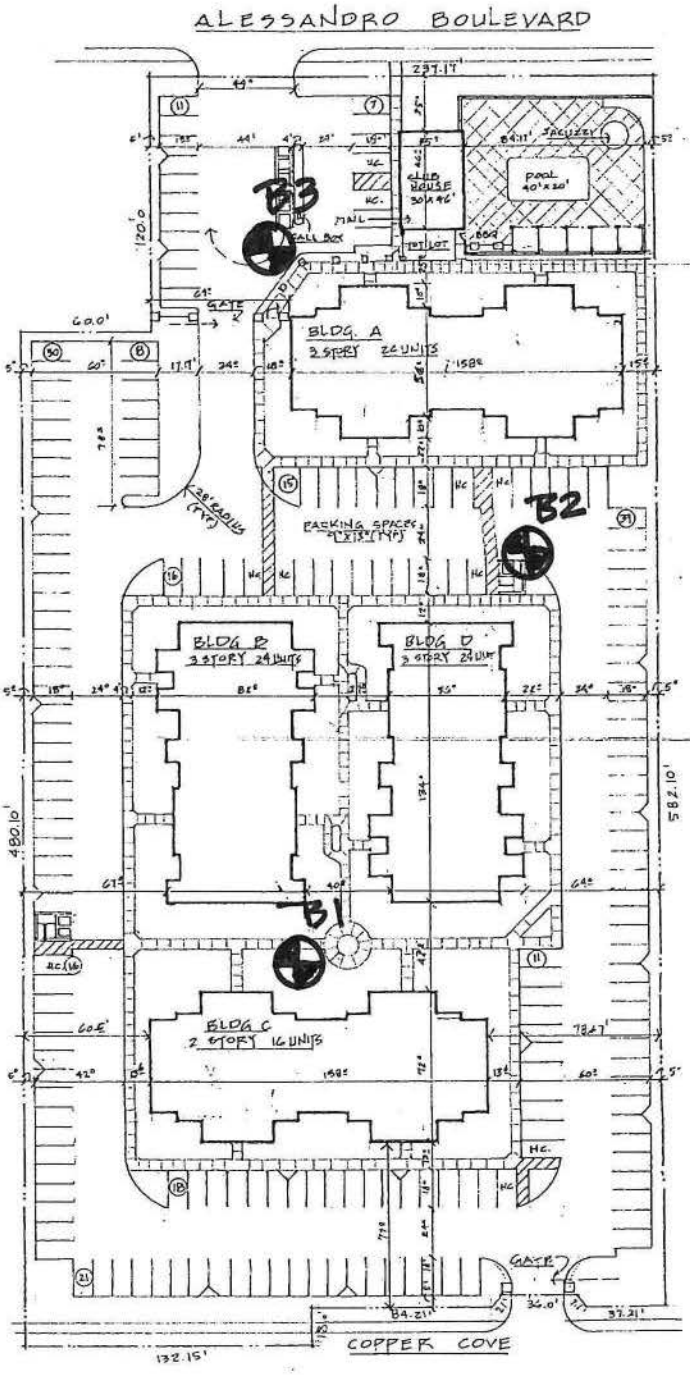

FLAMINGO BAY

MORENO VALLEY

UNIT COUNT		PARKING REQ'D	
1 BED X 1 BATH	24	1.5/UNIT :	36
2 BED X 2 BATH	64	2.0/UNIT :	128
TOTAL UNITS	88	GUEST : .25/UNIT	22
		TOTAL REQ'D	186
		PROVIDED	192

COMMON AREA REQ'D 300 SF/UNIT 26,400 SF.
PROVIDED 38,740 SF.

ADA PARKING REQ'D:

VAN ACCESSIBLE 9'x 8'-17'	4
STADARD 9'+ 5'-14'	6
TOTAL	10

2 TRASH ENCLOSURES WITH ROOFS
2-4 CU. YD BINS EACH

PRIVATE AREAS REQ'D

PATIO'S	150 SF
BALCONY	100 SF

LANDSCAPING
35% OF NET SITE AREA

SITE PLAN
1" = 30'
0 15' 30'

FAIRBROOK

B1
SOIL BORING

GEO ENVIRON
GEOTECHNICAL & ENVIRONMENTAL ENG. CONSULTANTS, INC
4071 E. LA PALMA AVE., STE B
ANAHEIM, CA 92807

APPENDIX B

BORING LOGS

PROJECT NO. 21-1108

DATE: 5/12/2021

CLIENT Rahman Engineering

PROJECT ADDRESS Betwn Alessandro Blvd & Copper Cove Lane, APN #484-030-026, 484-030-013, Moreno Valley, CA

DRILLING COMPANY Geo Environ

DRILLING METHOD/SAMPLING METHOD California Sampler, Automatic Trip Hammer

Boring No. B-1

Depth (feet)	Sample Type	Classification	Blow Counts (blows/foot)	Graphic Log	Dry Density (pcf)	Moisture Content (%)	Description
2		ML	55		116.5	3.9	Medium brown, fine sandy silt, dense, dry
5		ML	45		112.6	3.4	Same as above
10		CL	60		123.9	9.4	Medium brown, silty clay, moist, very dense
15		CL	60		120.2	12.3	Same as above
20							
25							
30							
35							
40							
45							
50							

California Sampler

Standard Penetration Slit Spoon Sampler (SPT)

Shelby Tube

CPP Sampler

Bulk/ Bag Sample

Stabllized Ground water

Groundwater At time of Drilling

GEO ENVIRON

GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING CONSULTANTS, INC.

PROJECT NO. 21-1108

Boring No. B-2

DATE: 5/12/2021

CLIENT Rahman Engineering

PROJECT ADDRESS Betwn Alessandro Blvd & Copper Cove Lane, APN #484-030-026, 484-030-013, Moreno Valley, CA

DRILLING COMPANY Geo Environ

DRILLING METHOD/SAMPLING METHOD California Sampler, Automatic Trip Hammer

Depth (feet)	Sample Type	Classification	Blow Counts (blows/foot)	Graphic Log	Dry Density (pcf)	Moisture Content (%)	Description
2	◪	ML	57		109.3	3.1	Medium brown, fine sandy silt, dense, dry
5	◪	ML	50		122.2	3.8	Same as above
10	◪	ML	50		107.6	3.2	Same as above
15							
20							
25							
30							
35							
40							
45							
50							

◪ California Sampler

⊠ Standard Penetration Slit Spoon Sampler (SPT)

▥ Shelby Tube

▤ CPP Sampler

☒ Bulk/ Bag Sample

▼ Stabllized Ground water

▽ Groundwater At time of Drilling

GEO ENVIRON

GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING CONSULTANTS, INC.

PROJECT NO. 21-1108

DATE: 5/12/2021

CLIENT Rahman Engineering

PROJECT ADDRESS Betwn Alessandro Blvd & Copper Cove Lane, APN #484-030-026, 484-030-013, Moreno Valley, CA

DRILLING COMPANY Geo Environ

DRILLING METHOD/SAMPLING METHOD California Sampler, Automatic Trip Hammer

Boring No. B-3

Depth (feet)	Sample Type	Classification	Blow Counts (blows/foot)	Graphic Log	Dry Density (pcf)	Moisture Content (%)	Description
2	◪	ML	55		130.1	3.7	Medium brown, fine silty sand, dense, dry
5	◪	ML	60		111.9	3.5	Same as above
10	◪	ML	60		126.6	2.5	Light brown, sandy silt, dense, dry
15							
20							
25							
30							
35							
40							
45							
50							

◪ California Sampler

⊠ Standard Penetration Slit Spoon Sampler (SPT)

▥ Shelby Tube

▤ CPP Sampler

⊠ Bulk/ Bag Sample

▼ Stabllized Ground water

▽ Groundwater At time of Drilling

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APPENDIX C

LABORATORY TEST RESULTS

EXPANSION CHARACTERISTICS
(ASTM D-4829)

0-21	Very Low
21-50	Low
51-90	Medium
91-130	High
131+	Very High

Sample	Soil Type	Expansion Index	Expansion Classification
B1 @ 0-5'	Fine sandy Silt	20	Low

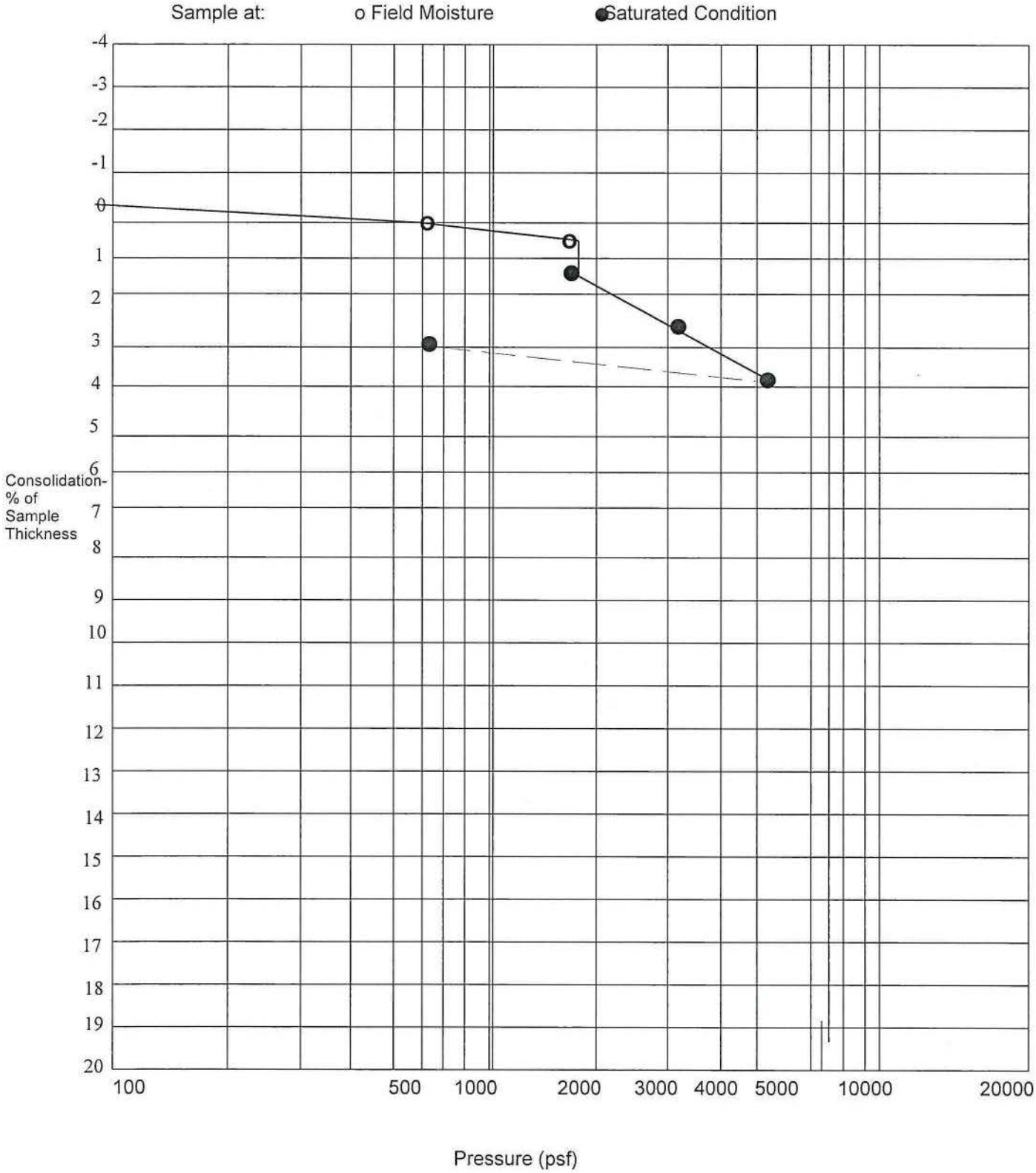
MAXIMUM DRY DENSITY
(ASTM D1557)

Sample	Soil Type	Max. Density (pcf)	Opt. Mois.(%)
B1 @ 0-5	Fine sandy Silt	126.0	10.5

ATTERBERG'S LIMITS TEST

Sample	Liquid Limit	Plastic Limit	Plasticity Index	Soil Class.
B-1 @ 5'	41	29	12	ML (Silt)

CONSOLIDATION CURVE: ASTM D-2435
PROJECT NO: 21-1108P
CLIENT: Rahman Eng.
JOB ADDRESS: Alessandro Blvd, Moreno Valley
SAMPLE ID: B 1 @ 5 ft
SOIL CLASS: Fine sandy Silt
Date: 5/13/21



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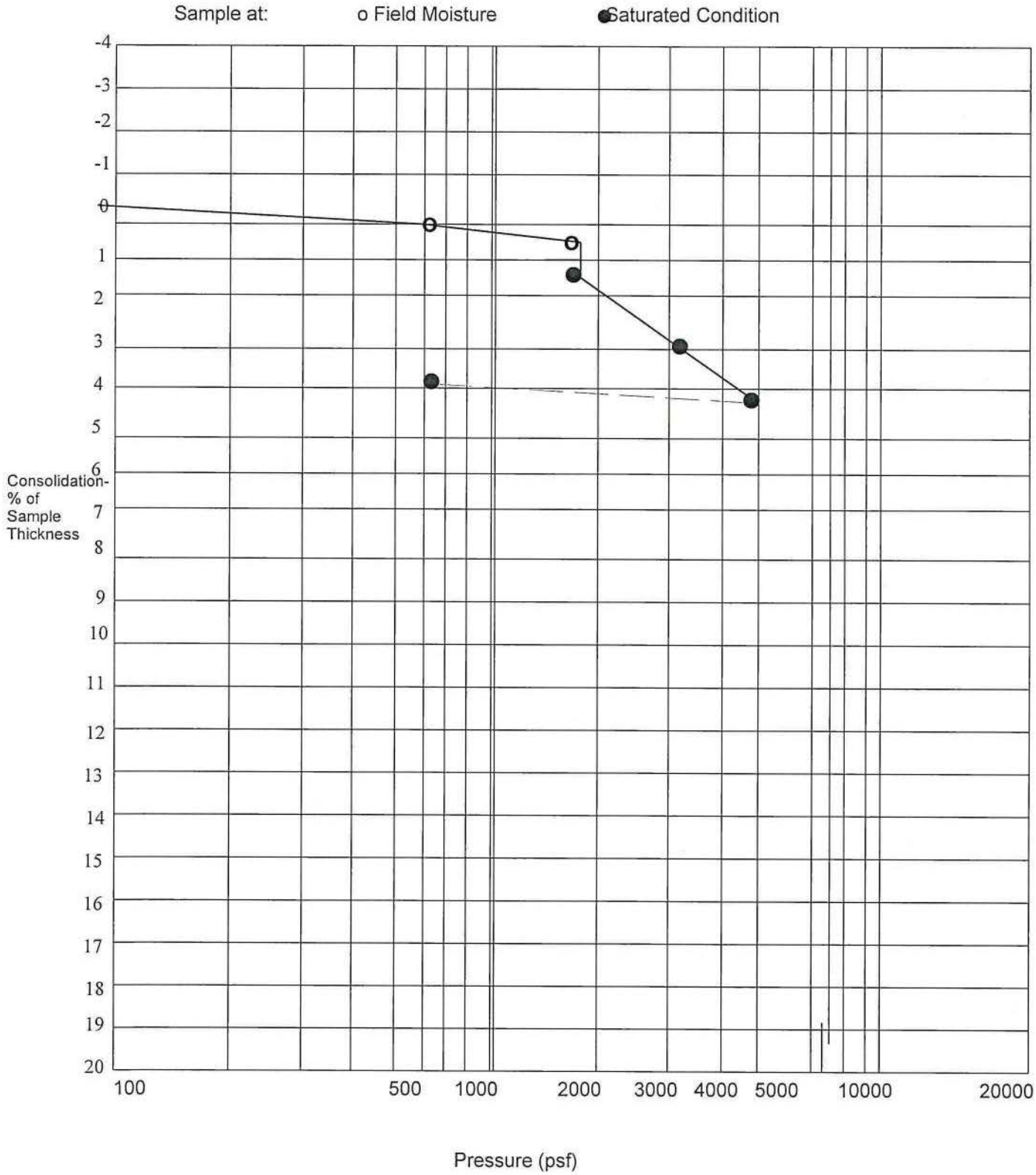
CONSOLIDATION CURVE: ASTM D-2435
PROJECT NO: 21-1108P
CLIENT: Rahman Eng.
JOB ADDRESS: Alessandro Blvd, Moreno Valley
SAMPLE ID: B 3 @ 5 ft
SOIL CLASS: Fine sandy Silt
Date: 5/14/21



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DIRECT SHEAR TEST

CLIENT: Rahman Eng. PROJECT NO: 21-1108P DATE: 5/13/21

PROJECT ADDRESS: Alessandro Blvd, Moreno Valley SAMPLE ID: B-1 @ 0-5'

SOIL CLASS: Fine Sandy Silt DRY DENSITY (pcf): 112.5 MOIS. (Initial): 12.5 (final): 25.7

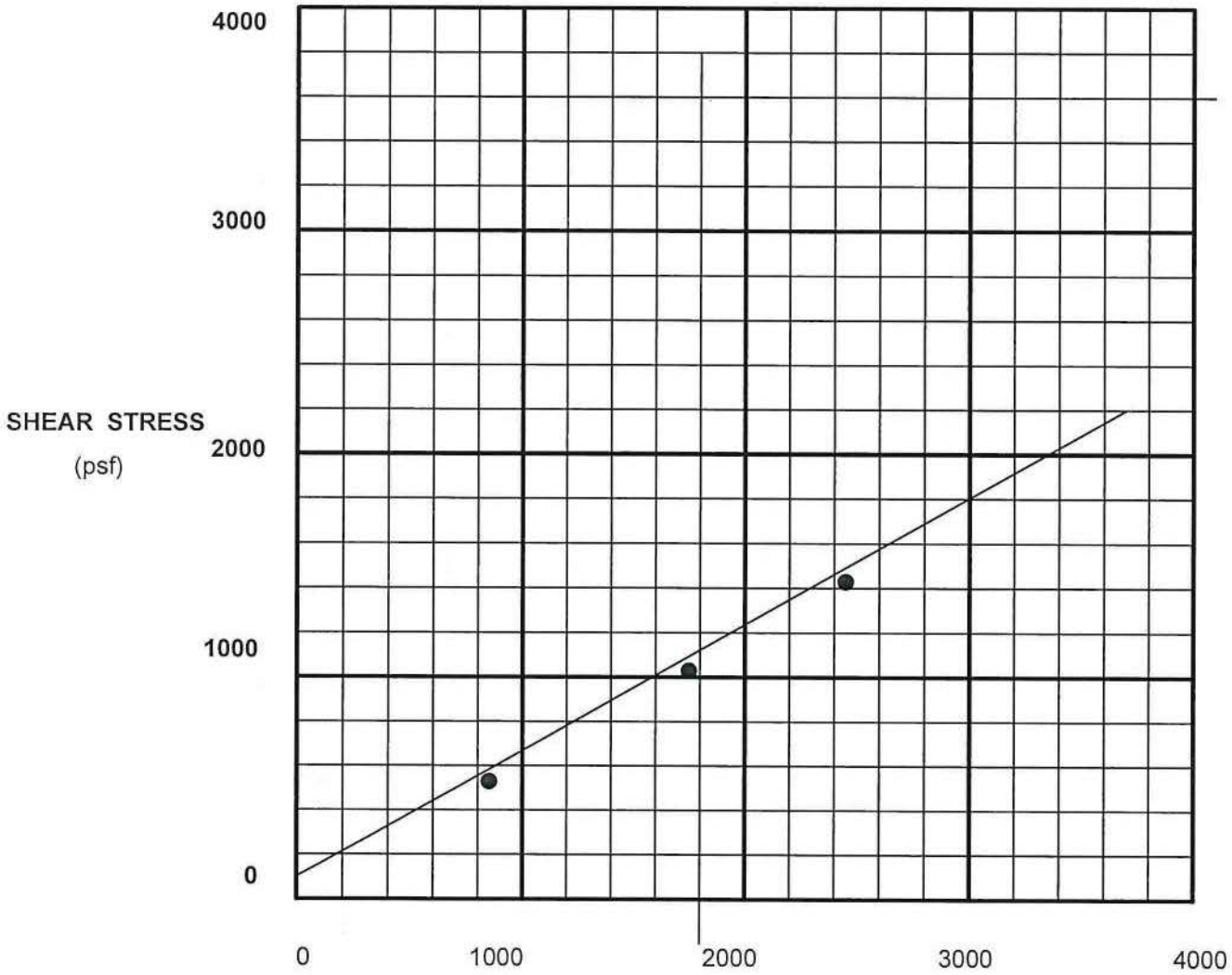
UNDISTURBED: RE MOLDED: X (90% Re. Comp) STRAIN RATE: 0.005 in/min

SAMPLE SIZE: Dia: 2.413 TECH: F.M. REVIEWED BY : E.R.

SHEAR STRENGTH: ULTIMATE RESIDUAL

PHI: 31 deg C: 50 PHI: C:

SAMPLE TESTED IN SUBMERGED CONDITION



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