soil PACIFIC INC.
Geotechnical and Environmental Services

Project No. A-8895-21
January 8, 2022

Mr. Gevork Martirosian,P.E.
Gevork Consulting Engineering
285 E. Imperial Hwy , Suite 208
Fullerton, Ca. 92835

Subject: **Soil and Foundation Evaluation Report**
Proposed Commercial Buildings
935 S Lilac Ave, Rialto, CA 92376

Dear Sir;

Pursuant to your authorization, we are pleased to submit our report for the subject project. Our evaluation was conducted in December 2021. This evaluation consists of field exploration; sub-surface soil sampling; laboratory testing; engineering evaluation and preparation of the following report containing a summary of our conclusions and recommendations.

The opportunity to be of service is appreciated. Should any questions arise pertaining to any portion of this report, please contact this firm in writing for further clarification.

Very truly,

Soil Pacific Inc.

Dr. Yones Kabir
President

Hoss Eftekhari
RCE

REGISTERED PROFESSIONAL ENGINEER
HOSS EFTEKHARI
No. C50121
EXP. 6-30-23
CIVIL
STATE OF CALIFORNIA

Soil and Foundation Evaluation Report
Proposed Commercial Buildings
935 S Lilac Ave, Rialto, CA 92376

Prepared For:

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Fullerton, Ca. 92835

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Proposed Commercial Buildings
935 S Lilac Ave, Rialto, CA 92376

LIMITATIONS

Between exploratory excavations and/or field testing locations, all subsurface deposits, consequent of their anisotropic and heterogeneous characteristics, can and will vary in many important geotechnical properties. The results presented herein are based on the information in part furnished by others and as generated by this firm, and represent our best interpretation of that data benefiting from a combination of our earthwork related construction experience, as well as our overall geotechnical knowledge. Hence, the conclusions and recommendations expressed herein are our professional opinions about pertinent project geotechnical parameters which influence the understood site use; therefore, no other warranty is offered or implied.

All the findings are subject to field modification as more subsurface exposures become available for evaluations. Before providing bids, contractors shall make thorough explorations and findings. Soil Pacific Inc., is not responsible for any financial gains or losses accrued by persons/firms or third party from this project.

In the event the contents of this report are not clearly understood, due in part to the usage of technical terms or wording, please contact the undersigned in writing for clarification.

SECTION 1.0
PRELIMINARY EVALUATION

1.1 Site Description

The area covered by our investigation consists of a parcel located at the southeast intersection of Randall Avenue and South of Lilac Avenue of the City of Rialto. The item site is a L shaped property occupied by a single-family residential building at the south portion.

A paved driveway from the S Lilac Avenue provides site access to the existing building. The remaining area are unpaved and undeveloped. Surrounding properties are mixed use of single-family residences and commercial buildings. Site access is through S Lilac Avenue. The building pad is flat in general having an average mean elevation of 1143 feet and sheet flow is toward the south/east.

1.2 Planned Land Use

It is understood that the proposed development will consist of construction of detached commercial buildings/strip shops with an access way and conventional parking areas. Existing building will be demolished.

1.3 Field Exploration

Subsurface conditions were explored by excavating four auger borings to maximum depth of 12 feet below the existing grade. Based on this evaluation the site is mostly underlain by fine to pebbly grained sand and gravel with some silt, interbedded with silty sand layers.

Based on this evaluation, the site is mostly underlain by fine to gravel and pebbles, sand with some silty matrix. The native soils underlain the thin top soils. The topsoils/fill soils mantel composed of silty sand and gravel. Encountered native soils at deeper elevation are mostly fine to large pebbles interbedded with sandy layers.

Boring locations and depths was determined by a combination of factors: accessibility, validity of information, and depth and extent of the encountered materials. The approximate locations of exploration borings are shown on the attached plot plan, Figure A-1-1. Soil sampling was performed by our staff engineer who logged the soils and obtained bulk and undisturbed samples for laboratory testing.

1.4 Laboratory Testing

1.4.1. Classification

Soils were classified visually according to the Unified Soil Classification System. Moisture content and dry density determinations were made for the samples taken at various depths in the exploratory excavations. Results of moisture-density and dry-density determinations, together with classifications, are shown on the boring logs, Appendix A.

1.4.2 Expansion

An expansion index test was performed on a representative sample in accordance with the California Building Code Standard. A very low to null expansion potential (EI=00) is anticipated for the encountered soils at the proposed sub-grade elevation (0-5 feet).

1.4.3 Direct Shear

Shear strength parameters are determined by means of strain-controlled, double plain, direct shear tests performed in general accordance with ASTM D-3080. Generally, three or more specimens are tested, each under a different normal load, to determine the effects upon shear resistance and displacement, and strength properties such as Mohr strength envelopes . The direct shear test is suited to the relatively rapid determination of consolidated drained strength properties because the drainage paths through the test specimen are short, thereby allowing excess pore pressure to be dissipated more rapidly than with other drained stress tests. The rate of deformation is determined from the time required for the specimen to achieve fifty percent consolidation at a given normal stress. The test can be made on all soil materials and undisturbed, remolded or compacted materials. There is however, a limitation on maximum particle size. Sample displacement during testing may range from 10 to 20 percent of the specimen's original diameter or length.

The sample's initial void ratio, water content, dry unit weight, degree of saturation based on the specific gravity, and mass of the total specimen may also be computed. The shear test results are plotted on the attached shear test diagrams and unless otherwise noted on the shear test diagram, all tests are performed on undisturbed, saturated samples.

Address:	935 S LILAC AVE
APN	013202118
City	RIALTO
Address	935 S LILAC AVE
Fault Zone	This parcel is NOT WITHIN an Earthquake Fault Zone.
Liquefaction Zone	This parcel has NOT been EVALUATED by CGS for liquefaction hazards.
Landslide Zone	This parcel has NOT been EVALUATED by CGS for seismic landslide hazards.

Fig. 1: Site aerial photo.

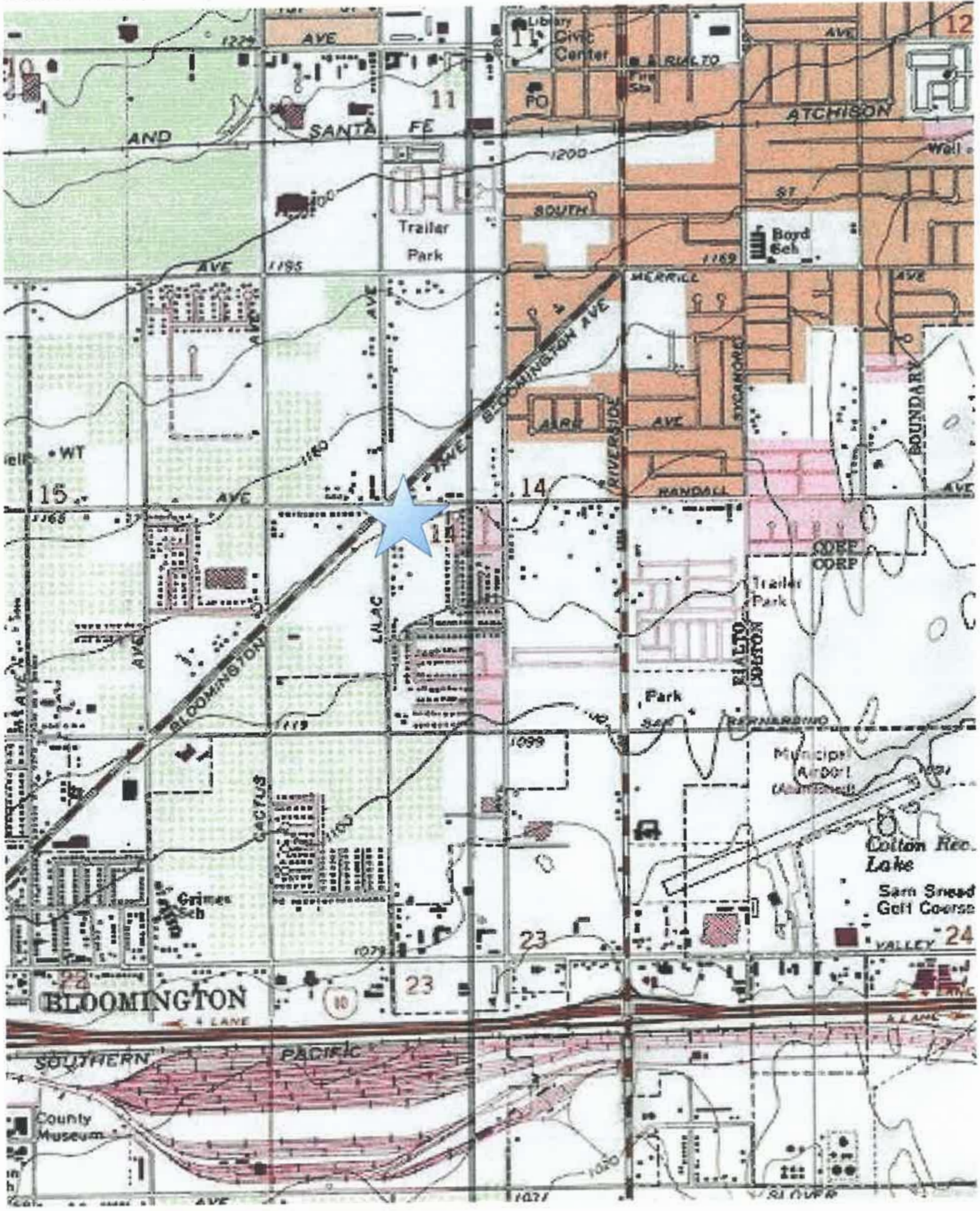


Figure 2: Site topographic map by USGS.

Section 2.0
Conclusions

The proposed construction is considered feasible from a soils engineering standpoint. All earthwork should be performed in accordance with applicable engineering recommendations presented herein or applicable Agency Codes, whichever are the most stringent.

2. 1 Earth Materials

The site is mostly underlain by gray to light brown, sand, gravel and pebbly silty sand of Quaternary fan deposits (Qa). The depth of topsoil/fill mantel may varies throughout the site. The thickness of top soil where the borings were performed was limited to a maximum 2-3 feet. Underlaying materials are relatively dense and damp in place.

2.2 Foundations

All foundation will be embedded into the same type of engineered fill soils. All newly designed isolated pad or continuous foundation must be embedded into firm and approved engineered soils. Cut and fill transition is not allowed.

2.3 Bearing Materials

The surficial soils up to 3 feet are disturbed and inadequate from a soil engineering standpoint.

2.4 Groundwater

The site is located within Upper Santa Ana Valley, Riverside -Arlington Basin/(California Department of Water Resources, [CDWR], 2018). Groundwater depth varies within the area and flow direction beneath the subject site is toward the south-southeast. No groundwater wells were listed on the property; however, several groundwater wells are listed in the site vicinity.

During our investigation, groundwater was not encountered within 12 feet of sub-surface exploration below the existing grade. The depth of groundwater may fluctuate depending upon the time and period of the year.

2.5 CBC Seismic Design Parameters

Earthquake loads on earthen structures and buildings are a function of ground acceleration which may be determined from the site-specific acceleration response spectrum. To provide the design team with the parameters necessary to construct the site-specific acceleration response spectrum for this project, we used two computer applications that are available on the United States Geological Survey (USGS) website, http://geohazards.usgs.gov/.

The attached printout attached in Appendix C provides parameters required to construct the site-specific acceleration response spectrum based 2020 CBC guidelines.

2.6 Chemical Contents

Chemical testing for detection of hydrocarbon or other potential contamination is beyond the scope of this report.

2.7 Liquefaction Study/ Secondary Seismic Hazard Zonation

Based on our site evaluation and review of the available information such a published "Emergency Operations Plan of The City of Rialto", liquefaction phenomenon is not expected in the City of Rialto except within the narrow Lytle Creek Wash and Near the Santa Ana River.

Liquefaction usually occurs due to dynamic loading of a saturated sand or silt causes pore water pressures to increase to levels where grain-to-grain contact pressure is significantly decreased and the soil material temporarily behaves as a viscous fluid.

2.8 Faulting and Seismicity

The subject site is not located with an active fault zone. The nearest active fault is located within 2.5 miles northeast of the site known as " San Jacinto Fault Zone".

CGS A-P	Fault Traces
QUAD NAME	San Bernardino North
FAULT NAME	San Jacinto Fault
FAULT ZONE	San Jacinto Fault Zone
LINE TYPE	Concealed

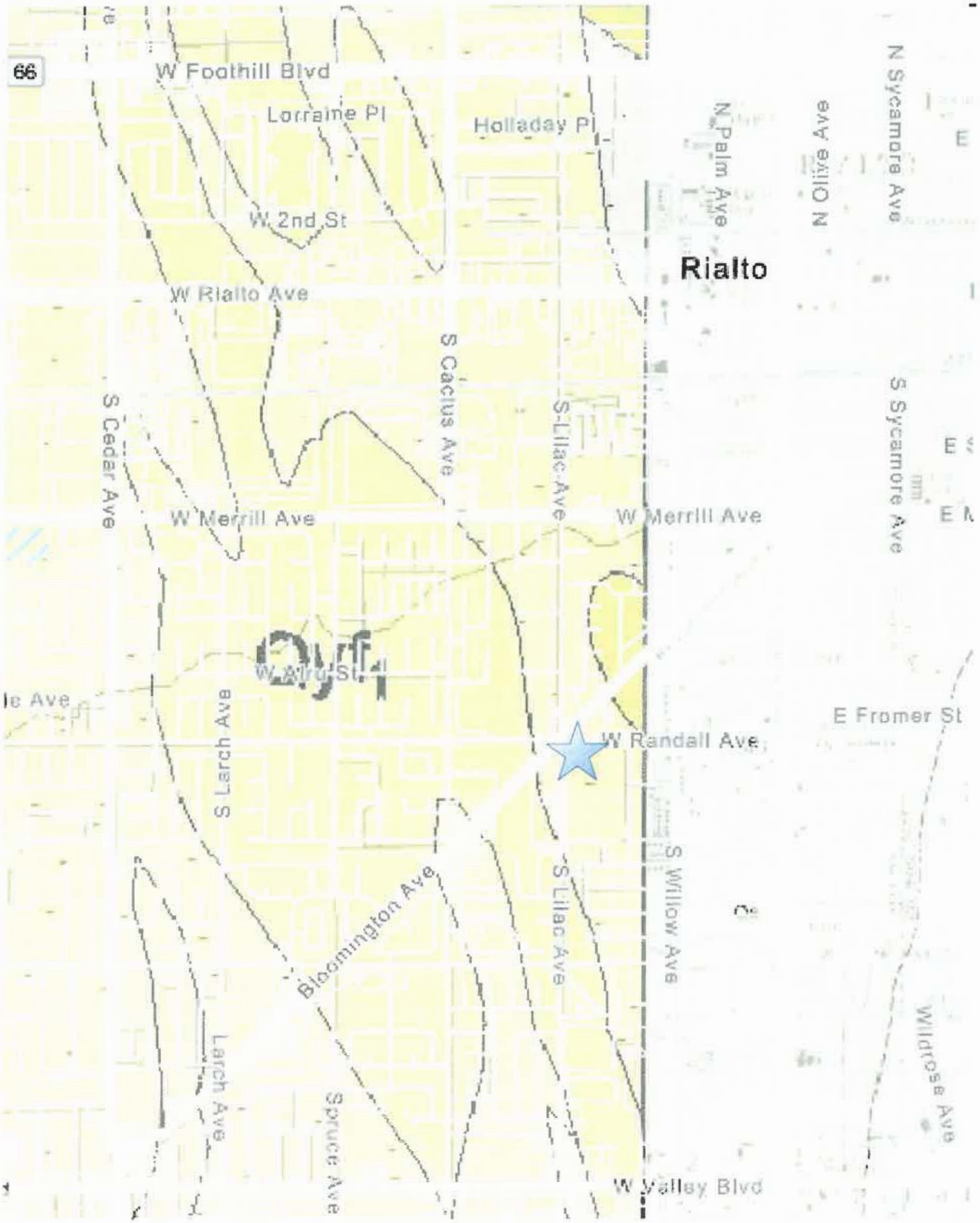


Figure 3: Site geologic Map (USGS)

Section 3.0
Recommendations

Based on our exploration and experience with similar projects, the proposed construction is considered feasible from a soils engineering standpoint providing the following recommendations are made a part of the plans and are implemented during construction.

3.1 Clearing and Site Preparation

The following recommendation will used in preparation of the grading plan/ soil removal and recompaction with the proposed building pad and beyond.

1. The areas to receive compacted fill should be stripped of all vegetation, construction debris and trashes, non engineered fill, left in place incompetent material up to approved soils (-3 feet). If soft spots are encountered, project soil engineer will evaluate the site conditions and will provide necessary recommendations.

2. The excavated area should be scarified to a minimum of 8 inches, adjusted to optimum moisture content, and reworked to achieve a minimum of 90 percent relative compaction.

3. Compacted fill should extend at least 5 feet beyond all perimeter footings or to a distance equal to the depth of the certified compacted fill, whichever is the greatest and feasible.

4. Compacted fill, consisting of on-site soil shall be placed in lifts not exceeding 6 inches in uncompacted thickness. The excavated onsite materials are considered satisfactory for reuse in the fill if the moisture content is near optimum. All organic material and construction debris should be removed and shall be segregated. Any imported fill should be observed, tested, and approved by the soils engineer prior to use as fill. Rocks larger than 6 inches in diameter should not be used in the fill.

5. The fill should be compacted to at least 90 percent of the maximum dry density for the material. The maximum density should be determined by ASTM Test Designation D 1557-00.

6. Field observation, and compaction testing should be performed by a representative of Soil Pacific Inc. during the grading to assist the contractor in obtaining the required degree of compaction and the proper moisture content. Where compaction is less than required, additional compaction effort should be made with adjustment of the moisture content, as necessary, until a minimum of 90 percent relative compaction is obtained.

3.2 Site Preparation and Excavations

If any unanticipated subsurface improvements (pipe lines, irrigation lines, etc.) are encountered during earthwork construction, this office should be informed and appropriate remedial recommendations would subsequently be provided. During earthwork construction, all remedial removals, and the general grading and construction procedures of the contractor should be observed, and the fill selectively tested by a representative of this office. If unusual or unexpected conditions are exposed in the field, they should be reviewed by this office and if warranted, additional recommendations will be offered.

3.3 Stability of Temporary Cuts

The stability of temporary cuts required during removal process depends on many factors, including the slope angle, the shearing strength of the underlying materials, and the height of the cut and the length of time the excavation remains open and exposed to equipment vibrations and rainfall. The geotechnical consultant should be present to observe all temporary excavations at the site. The possibility of temporary excavations failing may be minimized by:

1) keeping the time between cutting and filling operations to a minimum;
2) limiting excavation length exposed at any one time; and,
3) cutting no steeper than a 1: 1 (h:v) inclination for cuts in excess of 4 feet in height.
4) or shoring prior to cut.

3.4 Foundations

The following recommendations may be used in preparation of the design and construction of the foundation system.

3.4.1 Bearing Value

The allowable bearing value for conventional footings, having a minimum width of 18 inches and a minimum embedment of 24 inches embedded into approved competent materials should not exceed 2500 pounds per square foot. This value may be increased by one-third for short duration (wind or seismic) loading.

3.4.2 Isolated Square Pad Footings

The proposed structure can be adequately supported by shallow spread footing or isolated footings. The minimum embedment for individual pad footings should be 24 inches below the lowest adjacent grade. Allowable bearing value is 2500 psf to a maximum of 4000 psf. The bearing value may be increased by 1/3 when considering short duration seismic or wind loads.

3.4.3 Foundation Settlement

Based upon anticipated structural loads, the maximum total settlement for the proposed foundation is not expected to exceed 1 inch at design load. Differential settlement between adjacent footings and lateral displacement of lateral resisting elements should not exceed 1/2 inch.

3.4.4 Concrete Type

Based on experience with similar projects in the area, Type II concrete should be used.

3.4.5 Slabs-on-grade

If slabs-on-grade is designed then it should be a minimum of 5 inches in nominal thickness. Slab areas that are to be carpeted or tiled, or where the intrusion of moisture is objectionable, should be underlain by a moisture barrier consisting of 15-mil Visqueen, properly protected from the puncture by four inches of gravel per Calgreen requirements.

3.5 Utility Trench Backfill

Utility trenches backfill should be placed in accordance with Appendix D. It is the owners' and contractors' responsibility to inform subcontractors of these requirements and to notify Soil Pacific when backfill placement is to begin.

3.6 Seismic Design and Construction

Construction should be in conformance with seismic design parameters of the latest edition of California Building Code (C.B.C.) Please refer to the following table for related seismic design parameters.

SS (0.2 sec)	S1 (1.0 sec)	Soil Site Class	SDS (0.2 sec)	SD1 (1.0 sec)	PGAm	Seismic Design Cat
2.32	.86	D	1.56	1.52	.81	II

3.7 Surface and Sub-surface Drainage Provisions

Proper surface drainage gradients are helpful in conveying water away from foundations and other improvements. Subsurface drainage provisions are considered essential in order to reduce pore-pressure build-up behind retaining structures. Ponding of water enhances infiltration of water into the local soils, and should not be allowed anywhere on the pad.

3.8 Conventional Retaining Wall

If a conventional retaining wall is planned, the following design criteria may be used:

1) Where a free standing structure is proposed, a minimum equivalent fluid pressure, for lateral soil loads, of 40 pounds per cubic foot may be used for design for onsite non expansive granular soils conditions and level backfill (10:1 or less). If the wall is restrained against free movement (= ± 1% of wall height) then the wall should be designed for lateral soil loads approaching the at-rest condition. Thus, for restrained conditions, the above value should be increased to 61pcf. In addition, all retaining structures should include the appropriate allowances for any anticipated surcharge loads.

2) An allowable soil bearing pressure of 2500 lbs. per square foot may be used in design for footings imbedded a minimum of 24 inches below the lowest adjacent competent grade.

3) A friction coefficient of 0.30 between concrete and natural or compacted soil and a passive bearing value of 340 lbs. per square foot per foot of depth, up to a maximum of 1500 pounds per square foot at the bottom excavation level may be employed to resist lateral loads.

Back drain system will consisted of free-draining material consisting of at least 1 cubic foot of 3/4-inch crushed rock/ gravel should be utilized around pipe drains. If an open space greater than 1 foot exists between the back of the wall and the soil face, gravel backfill should be compacted by vibration. An impervious soil cap should be provided at the top of the wall backfill to prevent infiltration of surface waters into the back drain system. The cap may be a combination of concrete and/or compacted fine grained soils. The compacted backfill soil cap should be at least 1 foot thick when used in conjunction with a concrete slab type cap and at least 2 feet thick when used exclusively.

Any surcharges such as traffic and adjacent building loads shall be computed and adhered into the design by the structural engineer justification.

3.9 Concrete Driveway

1. The subgrade soils for all flatwork should be checked to have a minimum moisture content of 2 percentage points above the optimum moisture content to a depth of at least 18 inches.

2. Local irrigation and drainage should be diverted from all flatwork areas. Area drains and swales should be utilized to reduce the amount of subsurface water intrusion beneath the foundation and flatwork areas. Planter boxes adjacent to buildings should be sealed on the bottom and edges to retard intrusion of water beneath the structure.

3. The concrete flatwork should have enough cold joints to prevent cracking. Adequate reinforcement considering the expansion potential is required. A minimum of rebar no. 3 placed at 18 inches on center must be used.

4. Surface and shrinkage cracking of the finished slab may be significantly reduced if a low slump and water-cement ratio is maintained during concrete placement. Excessive water added to concrete prior to placement is likely to cause shrinkage cracking.

5. Construction joints and saw cuts should be designed and implemented by the concrete contractor or design engineer based on the medium expansive soil conditions. Maximum joint spacing should not exceed 8 feet in any direction.

6. Patio or driveway subgrade soil should be compacted to a minimum of 90 percent to a depth of 18 inches. All run-off should be gathered in gutters and conducted off site in a non-erosive manner. Planters located adjacent to footings should be sealed, and leach water intercepted.

3.10 Storm Water Management

For the storm water management percolation testing, one boring hole was used. Based on a single wall percolation method, on-site percolation will be 5.2 inches per hour not including the factor of safety.

3.11 Observation and Testing

It is recommended that **Soil Pacific Inc.** be present to observe and test during the following stages of construction:

☐ Site grading to confirm proper removal of unsuitable materials and to observe and test the placement of fill.

☐ Inspection of all foundation excavations prior to placement of steel or concrete.

☐ During the placement of retaining wall subdrain and backfill materials.

☐ Inspection of all slab-on-grade areas prior to placement of sand, Visqueen.

☐ After trenches have been properly backfilled and compacted.

☐ When any unusual conditions are encountered.

APPENDIX A

Field Exploration

Log of Sub-surface Exploration

Boring B-1

Equipment Type: Sh-2800		Boring # B-1
Diameter: 5"	Logged by: Y.K.	Date:12/22/21
Depth: 12 feet	G.water: - feet	Backfilled:Y

Std. Pen
Bulk/Bag
Ring
Drive Wt:
Drop:

Elev. (feet)	C/S N	Laboratory Moisture	Laboratory Dry Reading	USCS Letter	Graphic	Description of Earth Materials
				SM		Brown fine to coarse grained silty sand, sand and gravel, damp and dense
	6/7/9					
5	13/16/18			SP		Gray, light brown fine to gravelly sand, rounded bedrock fragments, pebbles with some silt. Damp and dense.
	14/12/19					Light brown, gravelly sand with some pebbels fragments, dense and damp.
10				GW		
	16/19/28					
15						
						End of subsurface exploration 12 feet.
20						
25						
30						
35						
40						

Log depicts conditions at the time and location drilled.

Soil Pacific Inc.
Geotechnical and Environmental Services

Project Name: 935 S Lilac Avenue, Rialto, California
Project Number: A-8895-21
Report Date:
Figure:

Log of Sub-surface Exploration

Boring B-2

Std. Pen
Bulk/Bag
Ring
Elev. (feet)

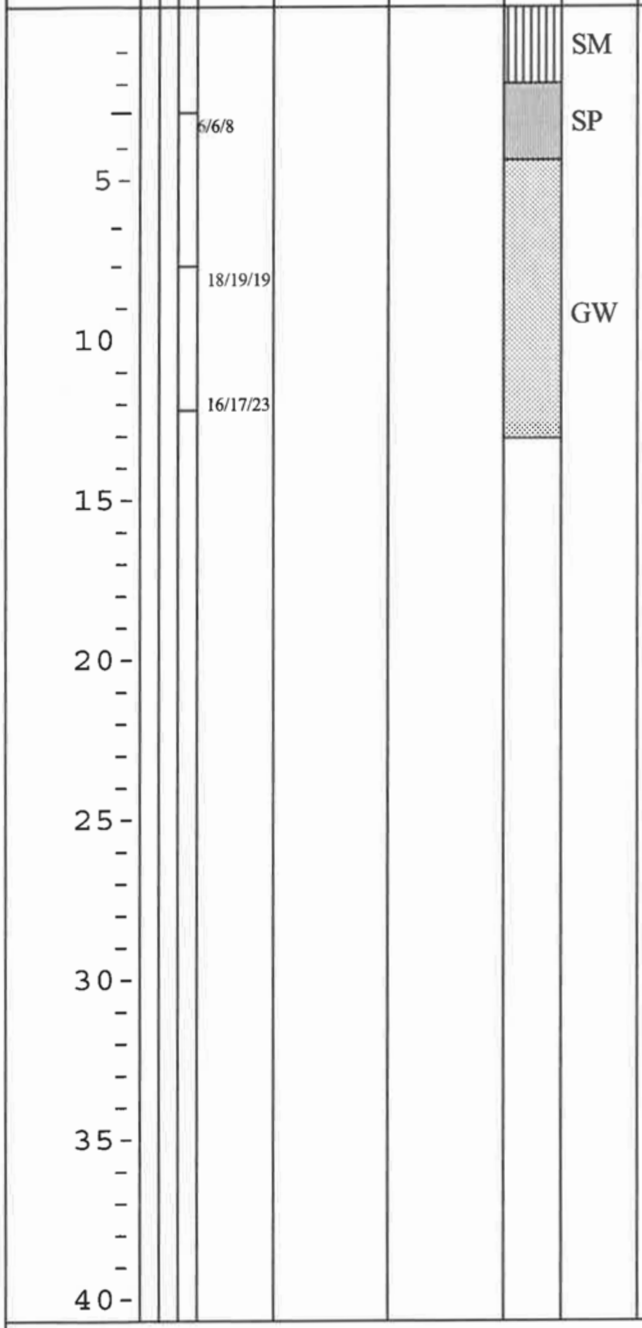
Drive Wt: Drop:
C/S
N

USCS Letter
Graphic

Laboratory
Moisture
Dry Reading

Equipment Type: Sh-2800
Boring # B-2
Diameter: 5"
Logged by: Y.K.
Date:12/22/21
Depth: 12 feet
G.water: - feet
Backfilled:Y

Description of Earth Materials



Brown fine to coarse grained silty sand, sand and gravel, damp and dense

Gray, light brown fine to gravelly sand, rounded bedrock fragments, pebbles with some silt. Damp and dense.

Light brown, gravelly sand with some pebbels fragments, dense and damp.

End of subsurface exploration 12 feet.

Log depicts conditions at the time and location drilled.

Soil Pacific Inc.

Geotechnical and Environmental Services

Project Name: 935 S Lilac Avenue, Rialto, California

Project Number: A-8895-21

Report Date:

Figure:

Log of Sub-surface Exploration

Boring B-3

Equipment Type: 7700			Boring # B-3
Diameter: 5"	Logged by: Y.K.		Date:1/3/21
Depth: 12 feet	G.water: - feet		Backfilled:Y

Std. Pen Bulk/Bag Ring Elev. (feet)	Drive Wt: Drop: C/S N	Laboratory Moisture	Laboratory Dry Reading	USCS Letter	Description of Earth Materials
				SM	Brown fine to coarse grained silty sand, sand and gravel, damp and dense
		5.1	115.2		
				SP	Gray, light brown fine to gravelly sand, rounded bedrock fragments, pebbles with some silt. Damp and dense.
5		4.3	117.1		
				GW	Light brown, gravelly sand with some pebbels fragments, dense and damp.
10		4.0	116.8		
15					
20					End of subsurface exploration 12 feet.
25					
30					
35					
40					

Log depicts conditions at the time and location drilled.

Soil Pacific Inc.

Geotechnical and Environmental Services

Project Name: 935 S Lilac Avenue, Rialto, California

Project Number: A-8895-21

Report Date:

Figure:

Log of Sub-surface Exploration

Boring B-4

Equipment Type: 7700		Boring # B-4
Diameter: 5"	Logged by: Y.K.	Date:1/3/21
Depth: 12 feet	G.water: - feet	Backfilled:Y

Std. Pen	Bulk/Bag	Ring	Elev. (feet)	Drive Wt: Drop: C/S N	Laboratory Moisture	Laboratory Dry Reading	Graphic	USCS Letter	Description of Earth Materials
							▥	SM	Brown fine to coarse grained silty sand, sand and gravel, damp and dense
					7.1	113.5	▒	SP	Gray, light brown fine to gravelly sand, rounded bedrock fragments, pebbles with some silt. Damp and dense.
			5		5.4	115.4	░		
			10				░	GW	Light brown, gravelly sand with some pebbels fragments, dense and damp.
					4.0	117.3	░		
			15						
									End of subsurface exploration 12 feet.
			20						
			25						
			30						
			35						
			40						

Log depicts conditions at the time and location drilled.

Soil Pacific Inc.

Geotechnical and Environmental Services

Project Name: 935 S Lilac Avenue, Rialto, California

Project Number: A-8895-21

Report Date:

Figure:

APPENDIX B

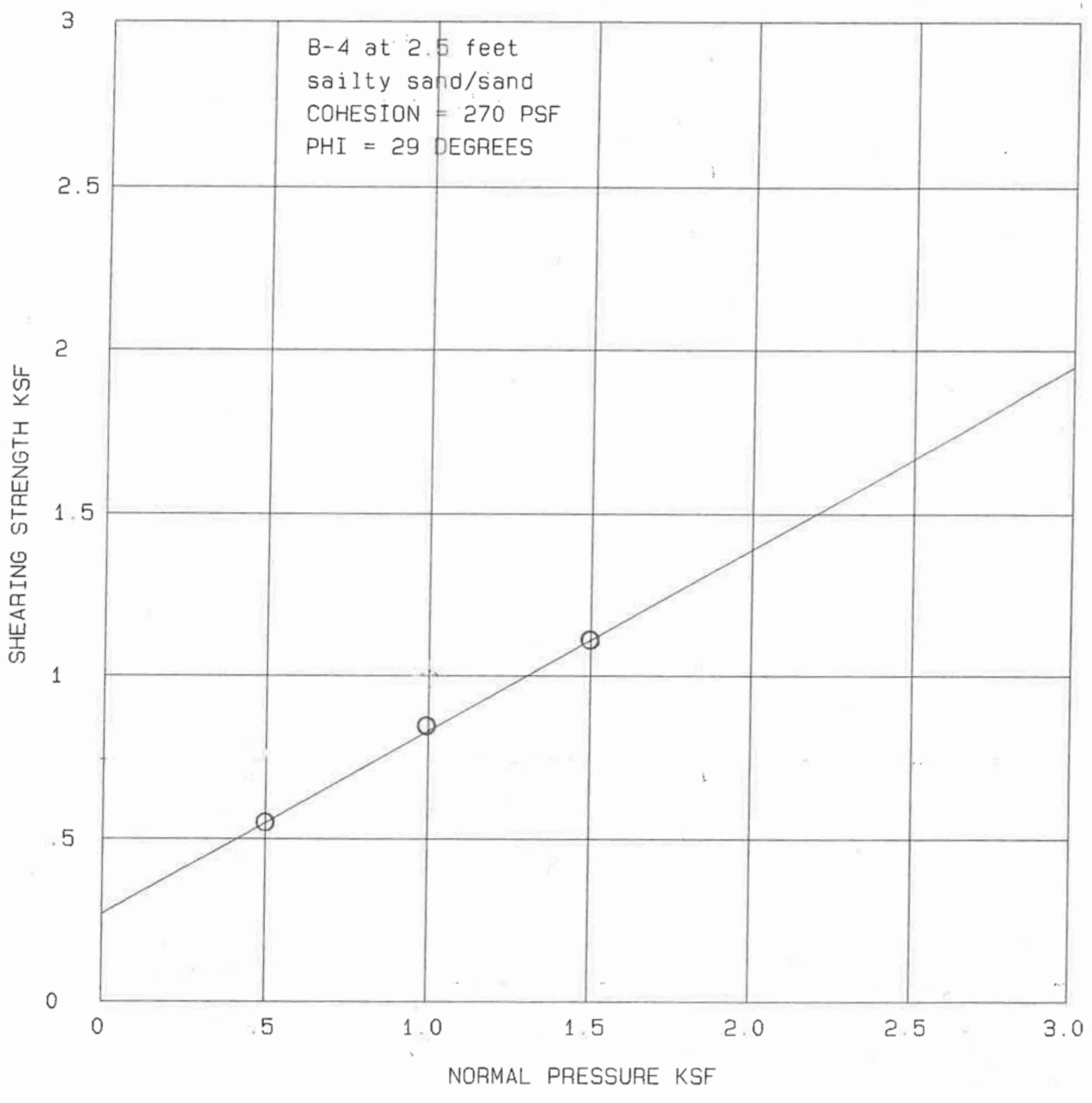
Laboratory

APPENDIX

SHEAR TEST DIAGRAM

J.O. A-8895-22

DATE 1/8/22



PLATE

APPENDIX

BEARING VALUE ANALYSIS

J.O. A-8895-22 DATE 1/8/22

COHESION = 270 PSF GAMA = 120 PCF PHI = 29 DEGREES

DEPTH OF FOOTING = 2 FEET

BREADTH OF FOOTING = 1.5 FEET

FOOTING TYPE = CONTINUOUS

BEARING CAPACITY FACTORS

Nc = 27.9 Nq = 16.4 Ng = 15.6

FOOTING COEFFICIENTS

K1 = 1 K2 = .5

REFERENCE: TERZAGHI & PECK; 1967; 'SOIL MECHANICS IN ENGINEERING PRACTICE'; PAGES 217 TO 225.

FORMULA

ULIMATE BEARING = (K1 * Nc * C) + (K2 * GA * Ng * B) + (Nq * GA * D) = 12875.3

$$\text{ALLOWABLE BEARING} = \frac{\text{ULTIMATE BEARING}}{3} = 4291.8$$

THE ALLOWABLE BEARING VALUE SHOULD NOT EXCEED 4291.8 PSF. DESIGN SHOULD CONSIDER EXPANSION INDEX.

PLATE

APPENDIX

BEARING VALUE ANALYSIS

J.O. A-8895-22 DATE 1/8/22

COHESION = 270 PSF GAMA = 120 PCF PHI = 29 DEGREES

DEPTH OF FOOTING = 2 FEET

BREADTH OF FOOTING = 2 FEET

FOOTING TYPE = SQUARE

BEARING CAPACITY FACTORS

Nc = 27.9 Nq = 16.4 Ng = 15.6

FOOTING COEFFICIENTS

K1 = 1.2 K2 = .4

REFERENCE: TERZAGHI & PECK; 1967; 'SOIL MECHANICS IN ENGINEERING PRACTICE'; PAGES 217 TO 225.

FORMULA

$$\text{ULIMATE BEARING} = (K1 * Nc * C) + (K2 * GA * Ng * B) + (Nq * GA * D) = 14473.5$$

$$\text{ALLOWABLE BEARING} = \frac{\text{ULTIMATE BEARING}}{3} = 4824.5$$

THE ALLOWABLE BEARING VALUE SHOULD NOT EXCEED 4824.5 PSF. DESIGN SHOULD CONSIDER EXPANSION INDEX.

APPENDIX

TEMPORARY BACKCUT STABILITY

J.O. A-8895-22 DATE 1/8/22

COHESION = 270 PSF GAMA = 120 PCF PHI = 29 DEGREES

CUT HEIGHT = 4 FEET

SOIL TYPE = Sand and gravel

BACKFILL ASSUMED TO BE LEVEL

PORE PRESSURE NOT CONSIDERED

FORMULA

$$\text{SAFETY FACTOR} = \frac{(C * L) + (GA * AREA * COS(Z) * TAN(PHI))}{GA * AREA * SIN(Z)} = 2.9$$

$$Z = 45 + (PHI/2)$$

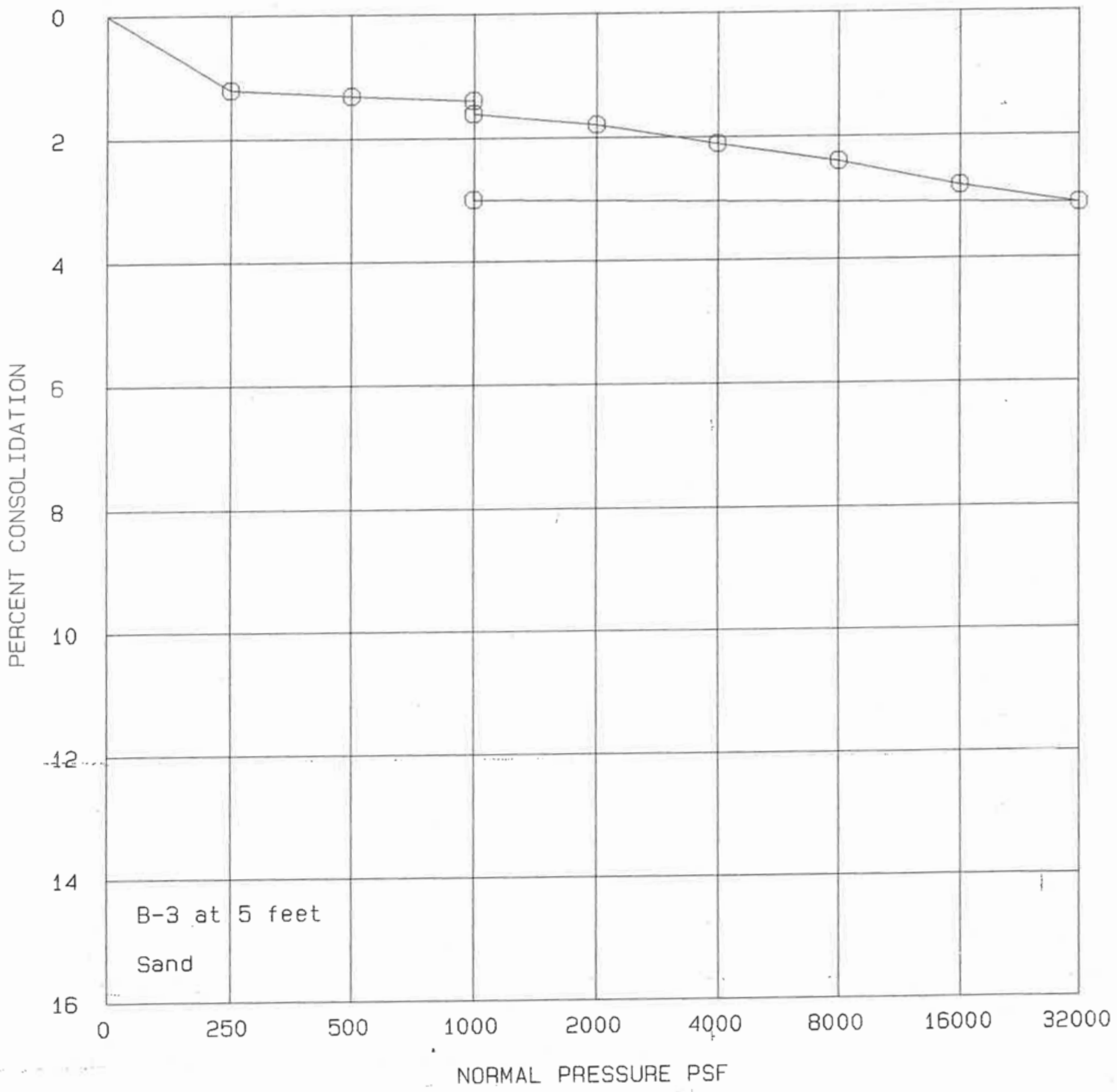
SINCE THE SAFETY FACTOR OF 2.9 IS GREATER THAN THE REQUIRED 1.25, THE TEMPORARY EXCAVATION IS CONSIDERED TO BE STABLE. THIS IS WITH A LEVEL AREA EQUAL TO THE LENGTH OF THE VERTICAL CUT ABOVE THE CUT.

PLATE

CONSOLIDATION PRESSURE CURVE

J.O. A-8895-22

DATE 1/8/22



PLATE

Earth Pressure Calculations

Soil Strength Parameters:

$\phi := 29$

$\gamma := 120$

Active :

$$\mathrm{Ka} := \tan\left[\left(45 - \frac{\phi}{2}\right)\cdot\left(\frac{\pi}{180}\right)\right]^2$$

Active earth Presure $\qquad \mathrm{Ka} = 0.347$

$\mathrm{Pa} := \mathrm{Ka}\cdot\gamma$

	slope angle range, degrees	
$\mathrm{Pa} = 41.637$	LEVEL BACKFILL BEHIND WALL	$\mathrm{Pa} = 41.637$
$\mathrm{Pa18} := \mathrm{Pa}\cdot 1.08$	5:1 BACKFILL BEHIND WALL	$\mathrm{Pa18} = 44.968$
$\mathrm{Pa18} := \mathrm{Pa}\cdot 1.22$	3:1 BACKFILL BEHIND WALL	$\mathrm{Pa18} = 50.797$
$\mathrm{Pa39} := \mathrm{Pa}\cdot 1.48$	2:1 BACKFILL BEHIND WALL	$\mathrm{Pa39} = 61.623$

Passive

$$\mathrm{Kp} := \tan\left[\left(45 + \frac{\phi}{2}\right)\cdot\left(\frac{\pi}{180}\right)\right]^2 \qquad \mathrm{Kp} = 2.882$$

Pasive Earth Presure

$\mathrm{Pp} := \mathrm{Kp}\cdot\gamma$

$\mathrm{Pp} = 345.847$

Atrest

$$\mathrm{Kat} := 1 - \sin\left(\phi\cdot\frac{\pi}{180}\right) \qquad \mathrm{Kat} = 0.515$$

$\mathrm{Pat} := \mathrm{Kat}\cdot\gamma$

$\mathrm{Pat} = 61.823$

Seismic lateral earth pressure

Free standing Wall

$\phi := 29 \cdot deg$ angle of internal friction of soil

$\delta := 17 \cdot deg$ angle of friction between soil and wall, (concrete or masonry)

$PGAm := .81$

$h := 8$ Height of wall

$$kh := \frac{\left[\left(\frac{2}{3}\right) PGAm\right]}{2}$$

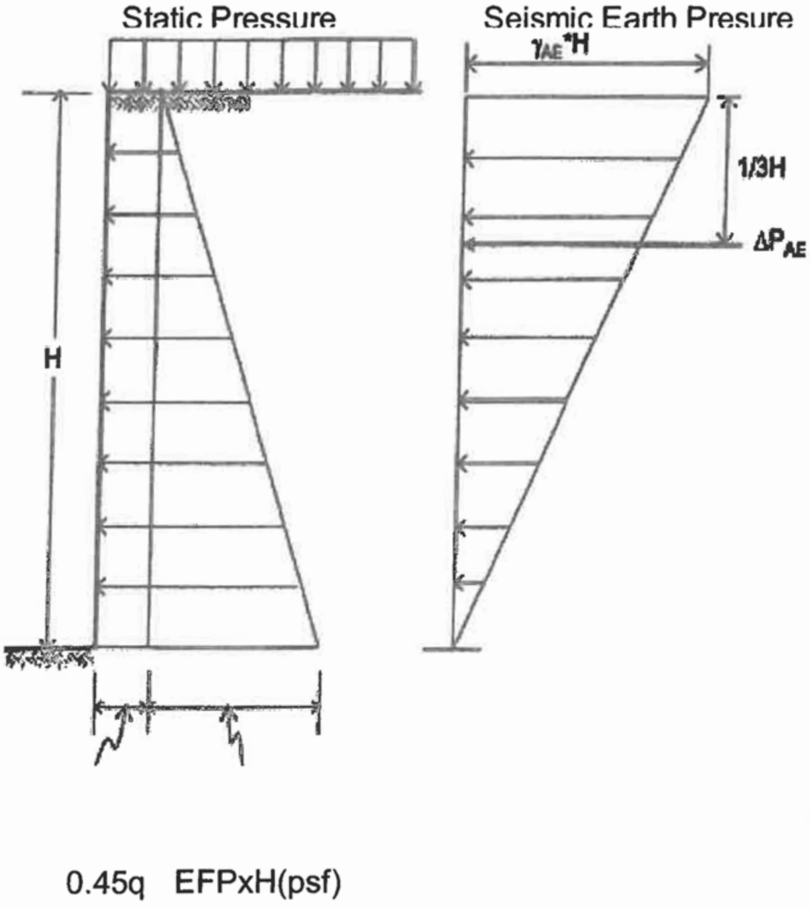
$kh = 0.27$

$\gamma := 120$ Soil Unit Weight

$$PaE := \frac{3}{8} \cdot \gamma \cdot h^2 \cdot kh$$

$PaE = 777.6$ PLF

$$EFPs := 2 \cdot \frac{PaE}{h^2}$$



$EFPs = 24.3$ PCF seismic Lateral Force (retaining wall In excess of 6 feet)

$q := 0$ Surcharge Load should be added by structural justification

Project No.= A – 6577 – 21

Porchet Method, Aka Inverse Borehole Method B-2

$\Delta T := 20$ Time Interval 10 Minutes

$D0 := 05$ Initial Depth to Water, (inch)

$Df := 140$ Final Depth to Water, (inch)

$Dr := 144$ Total Depth of the Test Hole

$r := 4$ Test Hole Redius, Inch

$H0 := Dr - D0$ Initial height of water at the selected time interval

$H0 = 139$

$Hf := Dr - Df$ Final height of water at the selected time interval

$Hf = 4$

$\Delta H := H0 - Hf$ ΔH=ΔDChange in height over the time interval

$\Delta H = 135$

$$Havg := \frac{(H0 + Hf)}{2}$$

$Havg = 71.5$

The Conversion Equation is used:

$$IR := \frac{\Delta H \cdot (60 \cdot r)}{\Delta T \cdot (r + 2Havg)}$$

$IR = 11.02$ inch /Hour Infiltration rate without including factor of safety

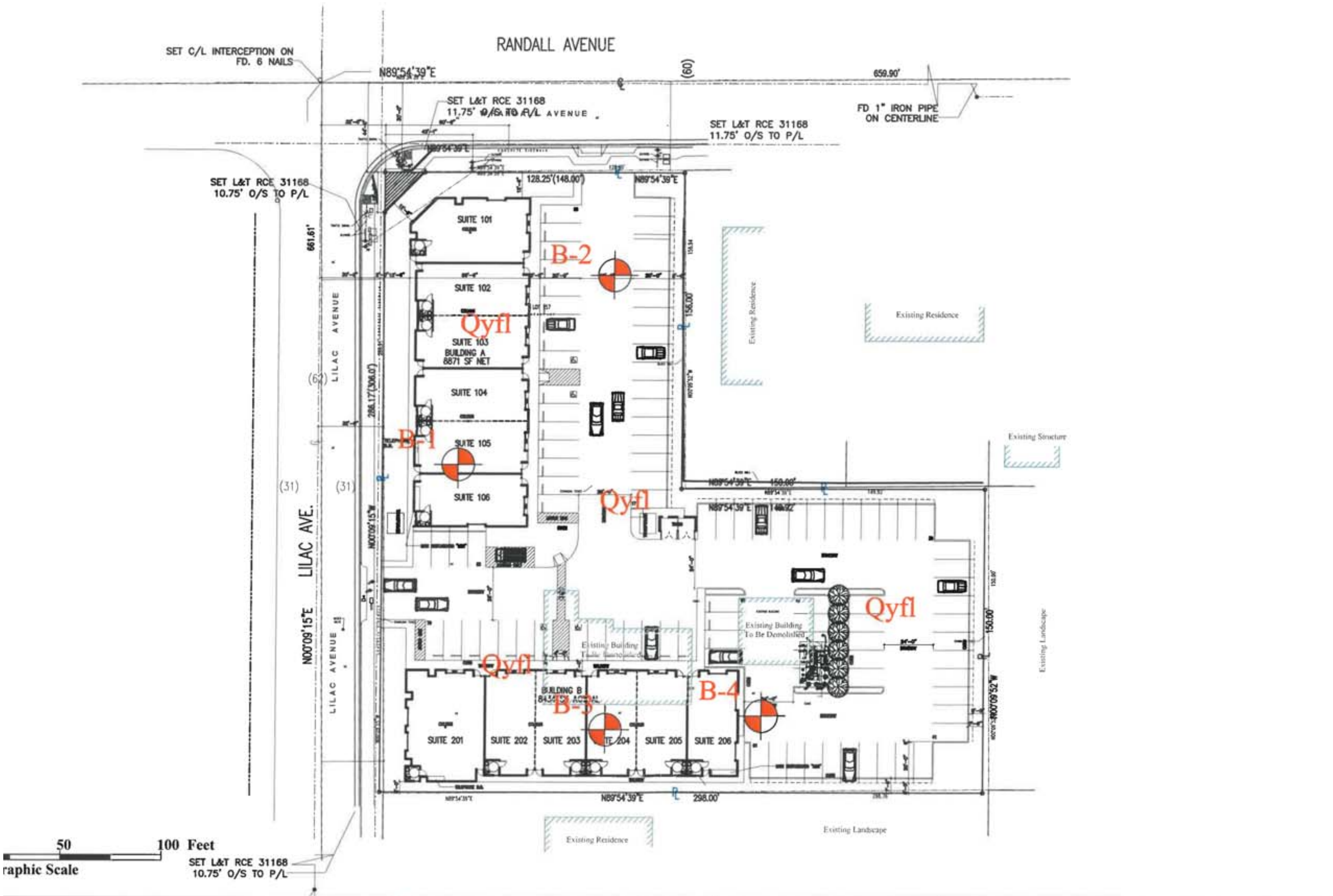
Factor of safety 3

$$IRsafe := \frac{IR}{3}$$

$IRsafe := 3.6$ Design rate inches/hour

APPENDIX C

References



oung alluvial-fan deposits of lytle Creek
oil Boring Location

soil PACIFIC Inc.
Geotechnical & Environmental Services
675 N. Eckhoff, Suite # A
Orange, CA 92868

Project Location:
935 S. Lilac Ave.,
Rialto CA

GEOTECHNICAL PLAN

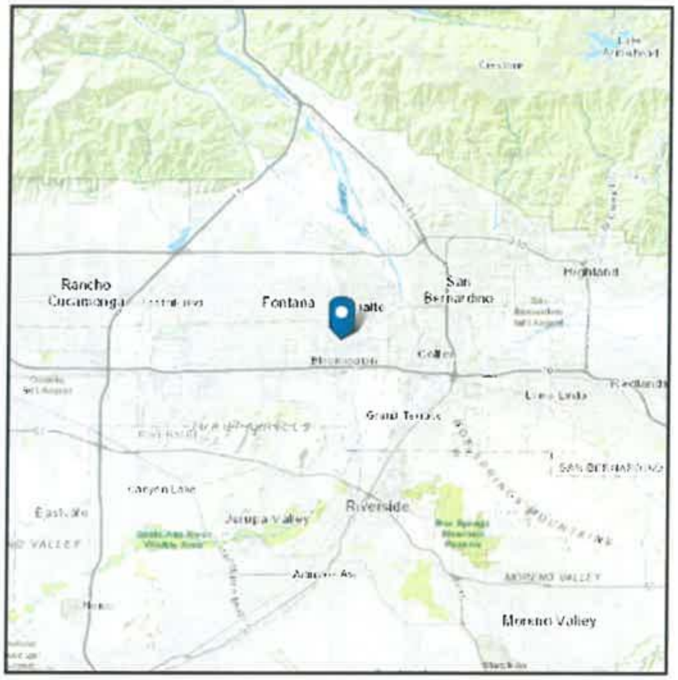
FIGURE-A-1-1
PROJECT NO.:A-8895-
DATE :01/04/2022
SCALE: 1"=5

ASCE 7 Hazards Report

Address:
935 S Lilac Ave
Rialto, California
92376

Standard: ASCE/SEI 7-22
Risk Category: II
Soil Class: D - Stiff Soil

Elevation: 1143.3 m (NAVD 88)
Latitude: 34.084397
Longitude: -117.378518

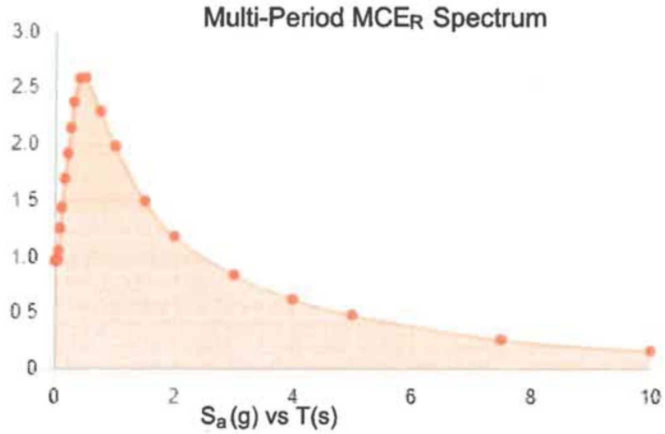


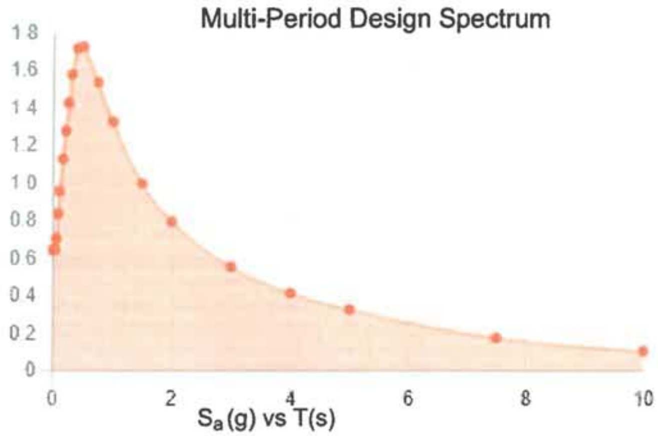
Seismic

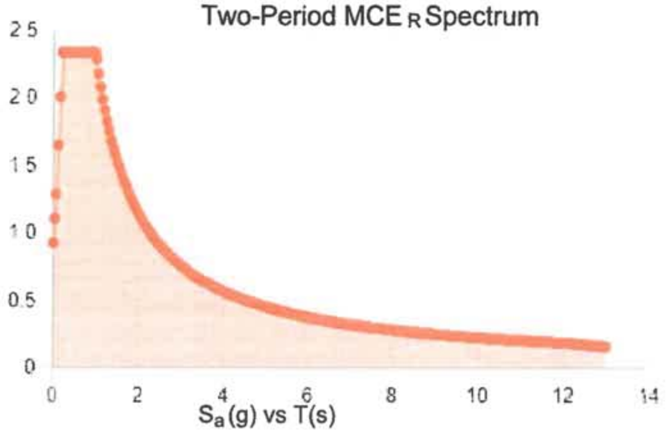
Site Soil Class:

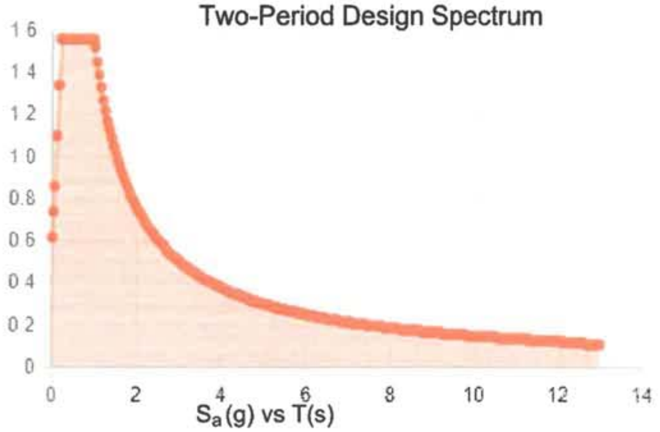
Results:

PGA_M :	0.81	T_L :	12
S_{MS} :	2.34	S_S :	2.32
S_{M1} :	2.29	S_1 :	0.86
S_{DS} :	1.56	S_{DC} :	
S_{D1} :	1.52	V_{S30} :	260


Multi-Period MCE_R Spectrum


Multi-Period Design Spectrum


Two-Period MCE_R Spectrum


Two-Period Design Spectrum

MCE_R Vertical Response Spectrum

Vertical ground motion data has not yet been made available by USGS.

Design Vertical Response Spectrum

Vertical ground motion data has not yet been made available by USGS.

Data Accessed: **Sat Jan 08 2022**

Date Source:

USGS Seismic Design Maps based on ASCE/SEI 7-22 and ASCE/SEI 7-22 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-22 Ch. 21 are available from USGS.

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APPENDIX D

General Grading Specifications

GENERAL EARTHWORK
AND GRADING SPECIFICATIONS

1. GENERAL INTENT

These specifications present general procedures and requirements for grading and earthwork as shown on the approved grading plans, including preparation of areas to be filled, placement of fill, installation of subdrains, and excavations. The recommendations contained in the geotechnical report are a part of the earthwork and grading specifications and shall supersede the provisions contained hereinafter in the case of conflict. Evaluations performed by the consultant during the course of grading may result in new recommendations of the geotechnical report.

2.EARTHWORK OBSERVATION AND TESTING

Prior to the commencement of grading, a qualified geotechnical consultant (soils engineer and engineering geologist, and their representatives) shall be employed for the purpose of observing earthwork and testing the fills for conformance with the recommendations of the geotechnical report and these specifications. It will be necessary that the consultant provide adequate testing and observation so that he may determine that the work was accomplished as specified. It shall be the responsibility of the contractor to assist the consultant and keep him apprised of work schedules and changes so that he may schedule his personnel accordingly.

It shall be the sole responsibility of the contractor to provide adequate equipment and methods to accomplish the work in accordance with applicable grading codes or agency ordinances, these specifications and the approved grading plans. If in the opinion of the consultant, unsatisfactory conditions, such as questionable soil, poor moisture condition, inadequate compaction, adverse weather, etc., are resulting in a quality of work less than required in these specifications, the consultant will be empowered to reject the work and recommend that construction be topped until the conditions are rectified. Maximum dry density tests used to determine the degree of compaction will be performed in accordance with the American Society of Testing and Materials tests method ASTM D 1557-00.

3.0 PREPARATION OF AREAS TO BE FILLED

3.1 Clearing and Grubbing: All brush, vegetation and debris shall be removed or piled and otherwise disposed of.

3.2 Processing: The existing ground which is determined to be satisfactory for support of fill shall be scarified to a minimum depth of 6 inches. Existing ground which is not satisfactory shall be overexcavated as specified in the following section. Scarification shall continue until the soils are broken down and free of large clay lumps or clods and until the working surface is reasonably uniform and free of uneven features which would inhibit uniform compaction.

3.3 Overexcavation: Soft, dry, spongy, highly fractured or otherwise unsuitable ground, extending to such a depth that the surface processing cannot adequately improve the condition, shall be overexcavated down to firm ground, approved by the consultant.

3.4 Moisture Conditioning: Overexcavated and processed soils shall be watered, dried-back, blended, and/or mixed, as required to attain a uniform moisture content near optimum.

3.5 Recompaction: Overexcavated and processed soils which have been properly mixed and moisture- conditioned shall be recompacted to a minimum relative compaction of 90 percent.

3.6 Benching: Where fills are to be placed on ground with slopes steeper than 5: 1 (horizontal to vertical units), the ground shall be stepped or benched. The lowest bench shall be a minimum of 15 feet wide, shall be at least 2 feet deep, shall expose firm material, and shall be approved by the consultant. Other benches shall be excavated in firm material for a minimum width of 4 feet. Ground sloping flatter than 5 : 1 shall be benched or otherwise overexcavated when considered necessary by the consultant.

3.7 Approval: All areas to receive fill, including processed areas, removal areas and toe-of-fill benches shall be approved by the consultant prior to fill placement.

4.0 FILL MATERIAL

4.1 General: Material to be placed as fill shall be free of organic matter and other deleterious substances, and shall be approved by the consultant. Soils of poor gradation, expansion, or strength characteristics shall be placed in areas designated by consultant or shall be mixed with other soils to serve as satisfactory fill material.

4.2 Oversize: Oversize material defined as rock, or other irreducible material with a maximum dimension greater than 12 inches, shall not be buried or placed in fills, unless the location, materials, and disposal methods are specifically approved by the consultant. Oversize disposal operations shall be such that nesting of oversize material does not occur, and such that the oversize material is completely surrounded by compacted or densified fill. Oversize material shall not be placed within 10 feet vertically of finish grade or within the range of future utilities or underground construction, unless specifically approved by the consultant.

4.3 Import: If importing of fill material is required for grading, the import material shall meet the requirements of Section 4. 1.

5.0 FILL PLACEMENT AND COMPACTION

5.1 Fill Lifts: Approved fill material shall be placed in areas prepared to receive fill in near-horizontal layers not exceeding 6 inches in compacted thickness. The consultant may approve thicker lifts if testing indicates the grading procedures are such that adequate compaction is being achieved with lifts of greater thickness. Each layer shall be spread evenly and shall be thoroughly mixed during spreading to attain uniformity of material and moisture in each layer.

5.2 Fill Moisture: Fill layers at a moisture content less than optimum shall be watered and mixed, and wet fill layers shall be aerated by scarification or shall be blended with drier material. Moisture-conditioning and mixing of fill layers shall continue until the fill material is at a uniform moisture content or near optimum.

5.3 Compaction of Fill: After each layer has been evenly spread, moisture conditioned, and mixed, it shall be uniformly compacted to not less than 90 percent of maximum dry density. Compaction equipment shall be adequately sized and shall be either specifically designed for soil compaction or of proven reliability, to efficiently achieve the specified degree of compaction.

5.4 Fill Slopes: Compaction of slopes shall be accomplished, in addition to normal compacting procedures, by backfilling of slopes with sheepsfoot rollers at frequent increments of 2 to 3 feet in fill elevation gain, or by other methods producing satisfactory results. At the completion of grading, the relative compaction of the slope out to the slope face shall be at least 90 percent.

5.5 Compaction Testing: Field tests to check the fill moisture and degree of compaction will be performed by the consultant. The location and frequency of tests shall be at the consultant's discretion. In general, the tests will be taken at an interval not exceeding 2 feet in vertical rise and/or 1,000 cubic yards of embankment.

6.0 SUBDRAIN INSTALLATION

Subdrain systems, if required, shall be installed in approved ground to conform to the approximate alignment and details shown on the plans or herein. The subdrain location or materials shall not be changed or modified without the approval of the consultant. The consultant, however, may recommend and upon approval, direct changes in subdrain line, grade or material. All subdrains should be surveyed for line and grade after installation, and sufficient time shall be allowed for the surveys, prior to commencement of filling over the subdrains.

7.0 EXCAVATION

Excavation and cut slopes will be examined during grading. If directed by the consultant, further excavation or overexcavation and refilling of cut areas shall be performed, and/or remedial grading of cut slopes shall be performed. Where fill-over-cut slopes are to be graded, unless otherwise approved, the cut portion of the slope shall made and approved by the consultant prior to placement of materials for construction of the fill portion of the slope.

8.0 TRENCH BACKFILLS

8.1 Supervision: Trench excavations for the utility pipes shall be backfilled under engineering supervision.

8.2 Pipe Zone: After the utility pipe has been laid, the space under and around the pipe shall be backfilled with clean sand or approved granular soil to a depth of at least one foot over the top of the pipe. The sand backfill shall be uniformly jetted into place before the controlled backfill is placed over the sand.

8.3 Fill Placement:'The onsite materials, or other soils approved by the engineer, shall be watered and mixed as necessary prior to placement in lifts over the sand backfill.

8.4 Compaction: The controlled backfill shall be compacted to at least 90 percent of the maximum laboratory density as determined by the ASTM compaction method described above.

8.5 Observation and 'Testing: Field density tests and inspection of the backfill procedures shall be made by the soil engineer during backfilling to see that the proper moisture content and uniform compaction is being maintained. The contractor shall provide test holes and exploratory pits as required by the soil engineer to enable sampling and testing.