South Shore Testing & Environmental

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January 14, 2022

Mr. Griffin Haupert
Rexco Development
1285 Corona Point Court
Corona, California 92879

SUBJECT: **PRELIMIMARY GEOTECHNICAL INVESTIGATION**
Proposed Serrano Oaks Apartment Homes
APN Nos. 163-400-026, -028, & -029, 4.12-Acres (Gross)
Clay Street, North of Linares Avenue
Jurupa Valley, Riverside County, California
Work Order No. 0292102.00

Dear Mr. Haupert:

Pursuant to your authorization, a preliminary geotechnical investigation was conducted on the subject site in accordance with the 2019 California Building Code, Section 1803.5.11. Attached as Plate 1, the Geotechnical Map is a not-to-scale image of the 20-scale "Conceptual Site Plan, prepared by Summa Architecture of Bonsall, CA, indicating the approximate location of proposed development, the exploratory borings, and pertinent geotechnical information.

Scope of Work

The scope of work performed for this study included the following:

1. Onsite observation and documentation of existing site geometry with respect to the location of the proposed apartment buildings, leasing office, recreation building, common pool, and driveway and parking areas.

2. Advancement of four (4) exploratory borings to the total depth explored of 51.5-ft below the ground surface (bgs) for sample recovery, laboratory testing and observation of subsurface conditions.

3. Engineering analysis of test results to develop specifications for grading and preliminary foundation design.

4. Research of geologic literature and unpublished geotechnical reports to develop design specifications for hazards such as seismic shaking and related effects.

5. Preparation of report of findings, including conclusions and recommendations for grading and minimum foundation design.

Introduction

This investigation has been conducted resulting from a 2019 California Building Code Chapter 18 requirement for preliminary geotechnical investigation being conducted for all projects in Seismic Category D. This investigation will address geotechnical conditions existing on the site as they may pertain to the multi-family residential development to be constructed on the site. It is our understanding that the structures will be typical one- and two-story type V structures. Contained herein also are preliminary recommendations for foundation design for the proposed construction.

Site Description

The subject site is a 4.12-acre parcel of land located on the east side of Clay Street, north of Linares Avenue in the Jurupa Valley area, Riverside County, California. The geographical relationships of the site and surrounding area are depicted on our Site Location Map, **Figure 1**.

The subject site is currently vacant and undeveloped. Man-made development at the subject site include and existing sewer line along the easterly and southerly boundaries with associated man-hole, street improvements along Clay Street. Topographically, the subject site consists of relatively flat terrain that slopes to south-southwest at a less than 2 percent gradient. Drainage is generally accomplished by sheet flow to the south-southwest. At the time of our investigation, vegetation onsite generally consisted of a low, dried recently mowed annual weeds and grasses. Overall relief on the subject site is approximately 4-ft, from above mean sea elevations 776 to 780.

Proposed Development

The proposed development consists of construction of the Serrano Oaks Apartment Homes with 6 two-story apartment buildings, leasing office, a pool, rec building, common open-space, and driveway and parking areas. Owing to the relatively flat nature of the subject site, grading will consist of overexcavation and recompaction of the upper 4 to 5-ft of proposed building pads such that all footings will be founded into like materials.

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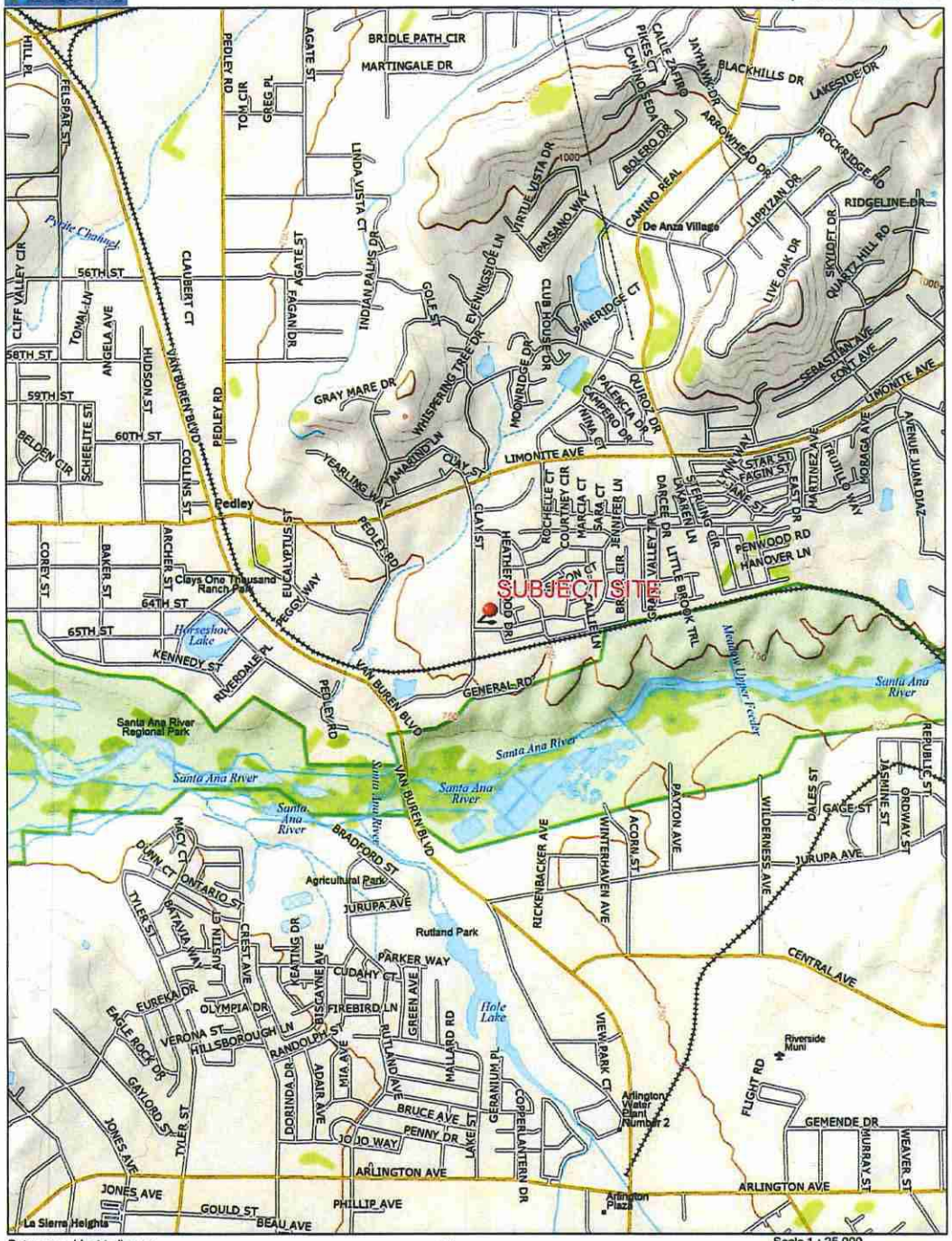

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TN

MN (11.4°E)

Scale 1 : 25,000

1" = 2,083.3 ft

FIGURE 1

Please refer to **Plate 1**, Geotechnical Map, for proposed site geometry and location of the proposed site development. Foundations are anticipated to consist of continuous spread and isolated column footings to carry structural loads, otherwise typical wood-framed, slab-on-grade construction.

Field Work

Field work on the site consisted of review of available literature and observation and logging of four (4) exploratory borings advanced to a maximum depth explored of 51.1-ft below the ground surface (bgs). Representative in-situ and bulk samples of onsite earth materials were obtained for laboratory testing and observing the condition of the onsite soils. Subsurface exploration of the subject site was performed on December 10, 2021, and the Exploratory Boring Logs are presented in **Appendix B**. The approximate locations of our exploratory borings are presented on our Geotechnical Map, **Plate 1**. Observation and sampling of the exploratory borings were performed by our field personnel, who logged approximately 41.5-ft of Old alluvial fan deposits (Morton & Cox, 2001) overlying dense granitic bedrock that extended to the total depth explored of 51.5-ft bgs.

Laboratory Testing

The results of laboratory testing are presented in **Appendix C**. It should be noted test results are preliminary and generally representative for the purposes of demonstrating feasibility of design for proposed construction. Additional testing recommended by this report may result in changes of minimum design requirements.

Subsurface Conditions

The U.S Geological Survey's Geologic Map of the Riverside West 7.5' Quadrangle (Morton & Cox, 2001) indicates the formational earth materials underlying the site to be late to middle Pleistocene-age Old alluvial fan deposits (map symbol - Qof). This unit is exposed at the ground surface throughout the subject site (Map Symbol – Qof) and extended to a depth of 41.5-ft bgs where granitic bedrock was encountered and extended to a depth of 51.5-ft bgs. A brief description of the formational units underlying the site that are considered pertinent to proposed development follows:

Old Alluvial Fan Deposits (Map Symbol – Qof)

Old alluvial fan deposits were encountered at the ground surface throughout the subject site and extended to a depth of 41.5-ft bgs. This upper portion of this unit generally consisted of red to orange brown sandy Silt (Unified Soil Classification – ML) that can be described as orange brown, sandy in part, dense, slightly moist to moist, medium dense to dense, trace of

SOUTH SHORE TESTING & ENVIRONMENTAL

GEOTECHNICAL MAP
PROPOSED SERRANO OAKS APARTMENT HOMES
APN: 163-400-026, -028, & -029
CLAY STREET, NORTH OF LINARES AVENUE
JURUPA VALLEY, RIVERSIDE COUNTY, CALIFORNIA

WORK ORDER: 0292102.00 DATE JAN. 2022 PLATE: 1 OF 1

LEGEND

UNITS

Qof - OLD ALLUVIAL FAN DEPOSITS

Kgr - GRANITIC BEDROCK

SYMBOLS

B-4 ● - APPROXIMATE LOCATION OF EXPLORATORY BORINGS

JURUPA VALLEY, CA

CONCEPTUAL SITE PLAN

REXCO DEVELOPMENT
1285 CORONA POINTE COURT, SUITE 102
CORONA, CA 92879
951.898.1502

OCTOBER 5, 2021

SCALE: 0 20 40 60 N

SUMMA ARCHITECTURE
5256 S. Mission Road, Ste 404
Bonsall, CA 92003
760.724.1198

clay and occasional calcareous veinlets. The lower portion of this unit generally consisted of silty Sand (SM) and Sand (SW) that can be described as orange-brown, fine to coarse grained, moderately to well graded, medium dense to dense, slightly moist to saturated.

Granitic Bedrock (Map Symbol – Kgr)

Granitic bedrock was encountered at a depth of approximately 41.5-ft bgs and extended to the total depth explored of 51.5-ft bgs. This unit generally can be described as orange-brown, coarse grained, slightly weathered, moist, micaceous, dense to very dense and friable. Detailed descriptions of the onsite units are presented on our exploratory boring logs included in **Appendix B**.

Groundwater

Groundwater was encountered within our exploratory boring B-1 at a depth of 27-ft bgs. Historic high groundwater is anticipated to be between 25 and 30-ft bgs (Carson & Matti, 1985). The observed groundwater appears to be in a perched confined condition within thin sandy layers below a depth of 27-ft bgs. The upper Old alluvial fan deposits generally consisted of sandy Silts ML) and Clayey Silts (ML - CL). Minor fluctuations can and will likely occur in moisture or free water content of the soil owing to rainfall and irrigation over time.

Excavation Characteristics

We anticipate that the onsite Old fan deposits can be excavated with moderate ease to moderate difficulty to the proposed depths utilizing conventional grading equipment in proper working condition.

Seismicity

There are no known active or potentially active faults transecting the site, and the site is not located within the presently defined boundaries of either an Alquist-Priolo Earthquake Fault Zone (Hart, 2000) or a County of Riverside fault hazard zone (County of Riverside GIS, 2022). Active fault zones regional to the site include the Chino-Central Avenue fault, the San Jacinto fault (San Bernardino segment), the Elsinore fault (Glen Ivy segment), Cucamonga fault, the Whittier fault, and the San Andreas fault (San Bernardino segment); which are located 17.2-km southwest, 18.3-km northeast, 21.2-km southwest, 23-km north, 25.8-km southwest, and 29.5-km northeast, respectively. The following table lists the known faults that would have the most significant impact on the site:

FAULT	MAXIMUM PROBABLE EARTHQUAKE (MOMENT MAGNITUDE)	SLIP RATE	FAULT TYPE
Chino-Central Avenue (17.2-km SW)	6.7	1 mm/year	A
San Jacinto (San Bernardino segment) (18.3-km NE)	6.7	12 mm/year	A
Elsinore (Glen Ivy segment) (21.2-km SW)	6.8	5 mm/year	A
Cucamonga (23-km N)	6.9	5 mm/year	A
Whittier (25.8-km SW)	6.8	2.5 mm/year	B
San Andreas (San Bernardino segment) (29.5-km NE)	7.5	24 mm/year	A

American Society of Civil Engineers (ASCE) - Seismic Parameters:

Based on the geologic setting and soil conditions encountered, the soils underlying the site are classified as "Site Class C, "Very Dense Soil & Soft Rock", according to the CBC. The seismic parameters according to the ASCE are summarized in the ASCE 7 Hazards Report presented in **Appendix E.** The corresponding value for peak ground acceleration from the design response spectrum based on the ASCE 7 seismic parameters is **0.613g.**

SEISMIC EFFECTS

Ground Accelerations

The most significant earthquake to affect the property is a 6.7 Richter magnitude earthquake on the Chino-Central Avenue fault zone. Based on Section 1803.5.12 of the 2019 California Building Code, peak ground accelerations modified for site class effects (PGA_M) of approximately **0.613g** are possible for the design earthquake. The seismic parameters according to the CBC are summarized in the ASCE 7 Hazards Report Summary Report presented in **Appendix E.**

Ground Cracks

The risk of surface rupture as a result of active faulting is considered negligible based on the absence of known active faulting on the site (Morton & Cox, 2001). Ground cracks can and do appear on sites for a variety of reasons including, but not limited to, strong seismic shaking, imperfections in subsurface strata (either man-made or natural), and the expansive nature of some soils near the ground surface. Therefore, the possibility of minor cracks at the ground surface for the life of the project cannot be fully eliminated.

Landslides

The proposed development is in an area of relatively flat terrain and a significant distance from any up-gradient steep slopes, and no landslides have been mapped in the immediate area (Morton & Cox, 2001). The risk of seismically induced landsliding to affect the proposed development is negligible.

Liquefaction

Groundwater was encountered at a depth of 27-ft bgs within exploratory boring B-1, which was advanced on the lower elevation of the subject site. Carson & Matti (1985) has mapped historic high groundwater in the vicinity of the subject site to be between 25 and 30-ft bgs. The subject site is underlain by dense to very dense Old alluvial fan deposits at the ground surface and extended to a depth of 41.5-ft bgs. Where it is underlain by very dense granitic bedrock. Owing to the perched condition of the onsite groundwater, the dense to very dense, and silty, clayey nature of the Old alluvial fan deposits; it is our opinion that liquefaction potential is low, and further analysis appears to be unwarranted at this time.

Seismically Induced Soil Settlement

The proposed footings are anticipated to be founded medium dense to dense engineered fill materials. The settlement potential, under seismic loading conditions for these onsite materials, in our opinion, is low.

Seiches and Tsunami

Considering the location of the site in relation to large bodies of water, seiches and tsunamis are not considered potential hazards of the site.

Rockfall Potential

The subject site is located in an area of relatively flat terrain and a significant distance away from up-gradient boulder outcroppings. The potential for rockfall for at the subject site is anticipated to be negligible.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

General

The development of the site as proposed is both feasible and safe from a geotechnical standpoint provided that the recommendations contained herein are implemented during design and construction.

1. According to the available 20-scale "Conceptual Site Plan", the proposed Serrano Oaks Apartment Homes will encompass the entire site. Site access will be established from Clay Street.

2. Observation of the exploratory borings and laboratory testing indicates that suitable material for support of fill and/or structure is near the surface on the site. Earth materials on the site are also suitable for use as compacted structural fill.

3. Observation, classification, and testing indicate that the near surface soils have a low expansion potential (EI = 27) consisting of low plastic sandy Silt (ML) and silty Sand (SM).

4. The subject site is underlain by approximately 41.5-ft of Old alluvial fan deposits, which is underlain by granitic bedrock, which extended to the total depth explored of 51.5-ft bgs.

RECOMMENDATIONS

Site Grading

General

The 20-scale "Conceptual Site Plan" (Summa, 2021) depicts proposed development on the subject site as an apartment complex including a leasing building, pool, rec building, open area, and driveway and parking areas. It is important to note that all imported soils must be observed and approved by the soil engineer prior to use as fill to verify compliance with project specifications and consistency with onsite soils with respect to expansion potential and structural contact pressure.

Site Specific Grading

A representative of this firm shall be present to observe the bottoms of all excavations. A representative of this firm shall be present during all fill placement operations to monitor and test as the earth materials are being placed. This observation and testing is intended to assure compliance with the recommendations of this report as well as project specifications as they relate to earthwork construction, County and State ordinances and Table 1705.6 of the 2019 CBC.

Complete removal of all undocumented fills and loose topsoil/colluvial soils and weathered Old alluvial fan deposits is recommended. Overexcavation within the building pads should extend a minimum of 4-ft bgs or 2-ft below bottom of deepest footing, whichever is greater. Overexcavation should extend a minimum of 5-ft outside the building footprint or equal to the depth of overexcavation, whichever is greater. Overexcavation within the street and parking areas should extend a minimum of 1 to 2-ft bgs. A representative of this firm shall be present to observe the bottoms of all excavations. A representative of this firm shall be present during all fill placement operations to monitor and test as the earth materials are being placed.

Where structural fill is to be placed within the pad areas, competent Old alluvial fan deposits should be suitably processed by moisture conditioning to near optimum moisture content, then compacted in the upper 12-inches to the minimum compaction requirement prior to placing fill. No structural fill shall be placed within the building areas on any ground without first being observed by a representative of the company providing this report and then providing written certification that the ground is competent and prepared to receive fill.

Onsite soils derived from excavations will be suitable for use as structural fill provided, they are free of large rock (6" or larger) and organic debris or construction waste. Approved fill material should be placed in 6 to 8-inch loose lifts, brought to optimum moisture content, and compacted

to a minimum of 90% of the maximum laboratory dry density, as determined by the ASTM D 1557-12 test method. No rocks larger than 6-inches in diameter should be used as fill material as they inhibit the compaction process. Rocks larger than 6-inches may be removed or crushed and used as fill material. Rocks larger than 6-inches that cannot be crushed, organic materials, concrete, asphaltic concrete or oil-bearing surface aggregate should be removed from the graded area and in the case of oil-bearing materials, removed and taken to an appropriate dump site that is designed to handle such.

Removals within parking areas and driveways should extend a minimum 1 to 2-ft below existing ground surface until medium dense to dense soils are encountered. Limits of excavation and removals should be verified by the project civil and geotechnical engineers.

Bearing Value and Footing Geometry

A safe allowable bearing value of 2,000 psf for foundations embedded into observed competent fill soils compacted to a minimum of 90 percent of the dry density as determined by ASTM D 1557 test method. Continuous footings, for single-story or equivalent structures, should have a minimum width of 15-inches and depth of 18-inches and conform to the minimum criteria of the 2019 CBC for low expansive soils (EI = 27). Continuous footings, for two-story or equivalent structures, should have a minimum width of 18-inches and depth of 24-inches and conform to the minimum criteria of the 2019 CBC for low expansive soils (EI = 27). The use of isolated column footings is not discouraged, however, where utilized, should have a minimum embedment of 18 inches below lowest soil grade. The minimum distance of the bottom outside edge of all footings and any slope face shall be 5-ft. All footings should be embedded a minimum of 12-inches into observed properly compacted fill, regardless of depth below the adjacent ground surface.

Settlement

The bearing value recommended above reflects a total settlement of 0.5-inches and a differential settlement of 0.5-inches within a horizontal distance of 20-ft (L/480). Most of this settlement is expected to occur during construction and as the loads are being applied.

Concrete Slabs

All concrete slabs on grade should be 4-inches thick, minimum. Contractors should be advised that when pouring during hot or windy weather conditions, they should provide large slabs with sufficiently deep weakened plane joints to inhibit the development of irregular or unsightly cracks. Also, 4-inch thick slabs should be jointed in panels not exceeding 8-ft in both directions to augment proper crack direction and development.

Moisture Barrier

When the intrusion of moisture through concrete slabs is objectionable, particularly with interior slabs where flooring is moisture sensitive, a vapor barrier should be installed onto the subgrade prior to the pouring of concrete. It should consist of a minimum 10-mil visqueen, protected from puncture with 2-inches of sand above and 2-inches of sand below. This is considered a minimum recommendation as there are other devices that provide as good as or better moisture protection. The project architect and or structural engineer may recommend alternative devices for moisture protection.

Reinforcement

From a Geotechnical standpoint, continuous footings should be reinforced with a minimum of two number 4 steel bar placed at the top and bottom. In no case should the content of steel in concrete footings be less than the recommended minimums of the appropriate sections of the A.C.I. standards. Slabs should be reinforced with a minimum of number 3 steel bars placed at the center of thickness at 24-inch centers both ways (CBC 2019). These are considered minimums and additional requirements may be imposed by other structural engineering design requirements. In addition, at the completion of grading, testing of the near surface soils may indicate that different or more stringent reinforcing schedule minimums may be appropriate. Careful consideration should be given to the recommendations that will be contained in the final report of compaction test results and foundation design requirements.

Concrete

Based on our corrosivity suite testing, Type II Portland cement concrete can be utilized for the subject site. Laboratory analysis results, which are included in **Appendix C**, indicated that the percentage by weight of soluble sulfates were reported as **0.014**, which equates to a **Negligible** sulfate exposure per American Concrete Institute (ACI), 318, Table 4.3.1 (2005). Soluble sulfate content testing should be conducted within the building pad at the completion of rough grading to confirm concentration of sulfite ions within the onsite earth materials.

Corrosivity test results, which are summarized in **Appendix C,** indicated saturated resistivity of 2,800 ohms/cm for the onsite soils, which indicates the onsite soils are moderately corrosive (NACE International, 1984). Results for pH and Chlorides are included in **Appendix C**. South Shore Testing and Environmental does not practice corrosion engineering. If specific information or evaluation relating to the corrosivity of the onsite or any import soil is required, we recommend that a competent corrosion engineer be retained to interpret or provide additional corrosion analysis and mitigation.

Lateral Loads

The bearing value of the soil may be increased by one third for short duration loading (wind, seismic). Lateral loads may be resisted by passive forces developed along the sides of concrete footings or by friction along the bottom of concrete footings. The value of the passive resistance for level ground may be computed using an equivalent fluid density of 300 pcf for level ground. The total force should not exceed 3,000 psf. A coefficient of friction of .32 may be used for the horizontal soil/concrete interface for resistance of lateral forces. If friction and passive forces are combined, then the passive values should be reduced by one third.

Oversize Rock

No oversize rock was encountered during our subsurface investigation of the subject site. Any oversize material generated during site development should be disposed of off-site, utilized in landscaping, or placed in an approved rock fill in accordance with **Appendix D** of this report.

Preliminary Structural Section

We recommend the following preliminary structural section for proposed asphalt driveways and parking areas onsite. For preliminary design purposes, the following pavement section may be considered based on a traffic index (TI) of 5 and 8 and an assumed R-value of 30. R-value testing should be conducted at the completion of precise grading to verify soils exposed at subgrade, and a final structural section design should be recommended at that time.

AREA	TI	PAVEMENT SECTION
Parking	5.0	0.25' (3.0") AC over 0.52' (6.2") ABII
Driveway (Light Duty)	5.0	0.25' (3.0") AC over 0.52' (6.2") ABII
Driveway (Heavy Duty)	8.0	0.38' (4.6") AC over 0.70' (11.3") ABII

AC – Asphalt Concrete
ABII – Class II Aggregate Base

It is recommended that the subgrade materials be compacted to a depth of 1 foot below subgrade elevation and that both the subgrade materials and the ABII be compacted to 95% relative to the maximum density of the respective materials, as determined by ASTM D1557 laboratory tests. R-Value testing should be conducted on imported soils prior to their approval as structural fill material.

Utility Trench Backfill

All trench excavations should be conducted in accordance with Cal-OSHA standards as a minimum. The soils encountered within our exploratory trenches are generally classified as Type "C" soil in accordance with current CAL/OSHA excavation standards. Based upon a soil classification of Type "C", the temporary excavations should not be inclined steeper than 1.5:1 (horizontal: vertical) for a maximum depth of 20-ft. For temporary excavations, deeper than 20-ft or for conditions that differ from those described for Type "C" in the CAL/OSHA excavation standards, the project geotechnical engineer should be contacted.

Utility trench backfill should be compacted to a minimum of 90 percent of the maximum dry density determined in laboratory testing by the ASTM D 1557-12 test method. It is our opinion that utility trench backfills consisting of onsite or approved sandy soils can best be placed by mechanical compaction to a minimum of 90 percent of the maximum dry density. The upper 1-ft of utility trench excavations located within pavement areas should be compacted to a minimum of 95 percent of the maximum dry density.

Fine Grading and Site Drainage

Fine grading of areas outside of the building footprint should be accomplished such that positive drainage exists away from all footings in accordance with 2019 CBC and local governing agency requirements. Run-off should be conducted in a non-erosive manner toward approved drainage devices per approved plans. No run-off should be allowed to concentrate and flow over the tops of slopes.

Construction

South Shore Testing & Environmental, or a duly designated representative, should be present during all earthwork construction in accordance with the standard specifications contained at the back of this report, to test and or confirm the conditions encountered during this study. In addition, post earthwork construction monitoring should be conducted at the following stages:

- At the completion of final grading of the building pads so that a finished surface compaction test may be obtained. Moisture content near optimum will necessarily need to be maintained, both to maintain proper compaction and to prevent wind erosion of the pad.

- At the completion of foundation excavations, but prior to the placement of steel and or other construction materials in them. As a requirement of this report, the undersigned must, in writing, certify that the foundations meet the minimum requirements of this report and the building plans for depth and width along with the earth materials being the

appropriate moisture content and compaction. Backfilling of over deepened footings with earth materials will not be allowed and must be poured with concrete. Consequential changes and differences may exist throughout the earth materials on the site. It may be possible that certain excavations may have to be deepened slightly if earth materials are found to be loose or weak during these observations.

- Any other pertinent post construction activity where soils are excavated or manipulated or relied upon in any way for the performance of buildings or hardscape features.

Supplemental Recommendations

If at any time during grading or construction on this site, conditions are found to be different than those indicated in this report, it is essential that the soil engineer be notified. The soil engineer reserves the right to modify in any appropriate way the recommendations of this report if site conditions are found to be different than those indicated in this report.

- The Old alluvial fan deposits exposed at the surface is observed to be silty Sand (SM) and sandy Silt (ML). It is slightly to moderately erosive and is very dense at shallow depths (±3-ft). The Old alluvial fan deposits are moderately to slightly porous and water percolates slightly to moderately well into this unit.

- Cuts to 5-ft, or slightly more will stand vertical for normal time periods associated with construction of backcuts for fill slopes or retaining walls. Time periods for unsupported cuts 5-ft or greater vertical should be limited to 60 days in the non-rainy season and 30 days in the rainy season.

Foundation & Grading Plan Reviews

Once foundation and grading plans are finalized, Foundation and Grading Plan reviews should be performed to review plans and confirm that the plans are in general conformance with recommendations presented in this report.

Construction Monitoring

Observation and testing by South Shore Testing & Environmental is necessary to verify compliance with recommendations contained in this report and to confirm that the geotechnical conditions encountered are consistent with those encountered. South Shore Testing & Environmental should conduct construction monitoring during any fill placement and subgrade preparation prior to placement of fill or construction materials.

LIMITATIONS

Our investigation was performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable Geotechnical Engineers and Geologists practicing in this or similar localities. No other warranty, expressed or implied, is made as to the conclusions and professional advice included in this report.

The report is issued with the understanding that it is used only by the owner and it is the sole responsibility of the owner or their representative to ensure that the information and recommendations contained herein are brought to the attention of the architect, engineer, and appropriate jurisdictional agency for the project and incorporated into the plans; and the necessary steps are taken to see that the contractor and subcontractors carry out such recommendations contained herein during construction and in the field.

The samples taken and used for testing and the observations made are believed representative; however, soil and geologic conditions can vary significantly between test locations. The evaluation or identification of the potential presence of hazardous or corrosive materials was not part of the scope of services provided by **South Shore Testing & Environmental**, or its assigns.

The findings of this report are valid as of the present date. However, changes in the condition of a property can occur with the passage of time, whether due to natural processes or the works of man on this or adjacent properties. In addition, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and revision as changed conditions are identified.

The firm that performed the geotechnical investigation for this project should be retained to provide testing observation services during construction to maintain continuity of geotechnical interpretation and to check that the recommendations presented herein are implemented during site grading, excavation of foundations and construction of improvements.

If another geotechnical firm is selected to perform the testing and observation services during construction operations, that firm should prepare a letter indicating their intent to assume the responsibilities of project geotechnical engineer of record. Selection of another firm to perform any of the recommended activities or failure to retain the undersigned to perform the recommended activities wholly absolves **South Shore Testing & Environmental**, the undersigned, and its assigns from all liability arising directly or indirectly from any aspects of this project.

We appreciate the opportunity to be of service. Limitations and conditions contained in reference documents are considered in full force and applicable. If you have any questions, please do not hesitate to call our office.

Respectfully submitted,

South Shore Testing & Environmental

John P. Frey
Project Geologist

William C. Hobbs, RCE 42265
Civil Engineer

ATTACHMENTS
Figure 1 - Site Location Map (2,000-scale)
Plate 1 - Geotechnical Map (not-to-scale)
Appendix A - References
Appendix B - Exploratory Boring Logs
Appendix C - Laboratory Test Results
Appendix D – Standards of Grading
Appendix E - ASCE 7 Hazards Report

APPENDIX A

References

REFERENCES

California Building Standards Commission (CBSC), 2019, "2019 California Building Code, California Code of Regulations, Title 24, Part 2, Volume 2 of 2".

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APPENDIX B

Exploratory Boring Logs

LOGGED BY: JPF	METHOD OF EXCAVATION: MOBILE DRILL RIG EQUIPPED W/6" HOLLOW STEM AUGERS ELEVATION: ± 776	DATE OBSERVED:12/10/2021 LOCATION: SEE PLATE 1

DEPTH (FEET)	CLASSIFICATION	BLOWS/FOOT	UNDISTURBED SAMPLE	BULK SAMPLE	MOISTURE CONTENT(%)	INPLACE DRY DENSITY (PCF)	BORING LOG NO._1____ DESCRIPTION	SOIL TEST
5		60		V I I I Λ	9.8	121.0	**OLD ALLUVISAL FAN DEPOSITS** SANDY SILT (ML): ORANGE BROWN, DENSE, MINOR COARSE SAND GRAINS, SLIGHTLY MOIST, DRY IN TOP 2', MINOR CALICHE VEINLETS	MAXIMUM DENSITY/OPTIMUM MOISTURE CONTENT, SIEVE ANALYSIS, EXPANSION INDEX, CORROSIVITY SUITE REMOLDED DIRECT SHEAR
10					9.5	117.0	SANDY SILT (ML):ORANGE BROWN, MINOR COARSE SAND GRAINS, DENSE, GRADING IN PART TO SILTY SAND, SLIGHTLY MOIST, TRACE OF CLAY	
15		64 88					SANDY SILT (ML): ORANGE BROWN, SANDY IN PART, DENSE, NO PORES, SLIGHTLY MOIST	SA-200 WASH (50.2% PASSING) MOISTURE
20		56					SILTY SAND (SM): ORANGE BROWN, FINE GRAINED, MINOR COARSE, POORLY GRADED, SLIGHTLY MOIST, DENSE, WEAKLY CEMENTED	SA-200 WASH (9.1% PASSING) MOISTURE CONTENT
25							SILTY SAND (SM): ORANGE BROWN, FINE TO COARSE GRAINED, WELL GRADED, MINOR COARSE MICA FLAKES	SA-200 WASH (7.2%PASSING) MOISTURE CONTENT
30		58					GW@27' SAND (SW): MEDIUM ORANGE GRAY, FINE TO COARSE GRAINED, WELL GRADED, DENSE, SATURATED	SA-200 WASH 5.8% PASSING)
35		45					CLAYEY SILT (ML): DARK BROWN, STIFF, DENSE, MINOR CLAY, TRACE COARSE SAND, SLIGHTLY MOIST, SILTY SAND (SM): DARK BROWN, FINE TO COARSE GRAINED, MOIST DENSE	MOISTURE CONTENT SA-200 WASH (28% PASSING) MOISTURE CONTENT
40		60						

JOB NO:0292102.00	LOG OF BORING	FIGURE: B-1

LOGGED BY: JPF	METHOD OF EXCAVATION: MOBILE DRILL RIG EQUIPPED W/6" HOLLOW STEM AUGERS ELEVATION: ± 776	DATE OBSERVED:12/10/2021 LOCATION: SEE PLATE 1

DEPTH (FEET)	CLASSIFICATION	BLOWS/FOOT	UNDISTURBED SAMPLE	BULK SAMPLE	MOISTURE CONTENT(%)	INPLACE DRY DENSITY (PCF)	BORING LOG NO._1____ DESCRIPTION	SOIL TEST
45		55					**GRANITIC BEDROCK** ORANGE BROWN, COARSE GRAINED, VERY DENSE, FRIABLE , MASSIVE, MOIST.	SA-200 WASH (10.2% PASSING) MOISTURE 50 BLOWS PER 5" SA-200 WASH, 16.6% PASSING
50		50					ORANGE BROWN, AS ABOVE, DENSE, MOIST, MICACOUS	50 BLOWS PER 5" SA-200 WASH, 31.5% PASSING
55		50					TOTAL DEPTH = 51.5' GROUNDWATER @27'	
60								
65								
70								
75								
80								

JOB NO:0292102.00	LOG OF BORING	FIGURE: B-1

LOGGED BY: JPF	METHOD OF EXCAVATION: MOBILE DRILL RIG EQUIPPED W/6" HOLLOW STEM AUGERS ELEVATION: ± 777	DATE OBSERVED:12/10/2021 LOCATION: SEE PLATE 1

DEPTH (FEET)	CLASSIFICATION	BLOWS/FOOT	UNDISTURBED SAMPLE	BULK SAMPLE	MOISTURE CONTENT(%)	INPLACE DRY DENSITY (PCF)	BORING LOG NO. 2 DESCRIPTION	SOIL TEST
							OLD ALLUVIAL FAN DEPOSITS	
							SANDY SILT (ML): RED BROWN, LOOSE IN UPPER 1', MEDIUM DENSE, SANDY IN PART,	
					8.2	124.0	SLIGHTLY MOIST, TRACE CALICHE VEINLETS	
5		26			8.9	120.0		
							SANDY SILT (MI): RED BROWN, DENSE, SLIGHTLY MOIST, SANDY IN PART	
		39						
10								
							SILTY SAND (ML): YELLOW BROWN, DENSE, TRACE OF GRAVEL, FINE TO COARSE GRAINED,	SA-200 WASH, 31.5% PASSING
							COARSER GRAINED WITH DEPTH	
							TOTAL DEPTH =11.5'	
							NO GROUND WATER	
15								
20								
25								
30								
35								
40								

JOB NO:0292102.00	LOG OF BORING	FIGURE: B-2

LOGGED BY: JPF	METHOD OF EXCAVATION: MOBILE DRILL RIG EQUIPPED W/6" HOLLOW STEM AUGERS ELEVATION: ± 777	DATE OBSERVED:12/10/2021 LOCATION: SEE PLATE 1

DEPTH (FEET)	CLASSIFICATION	BLOWS/FOOT	UNDISTURBED SAMPLE	BULK SAMPLE	MOISTURE CONTENT(%)	INPLACE DRY DENSITY (PCF)	BORING LOG NO._3____ DESCRIPTION	SOIL TEST
							OLD ALLUVIAL FAN DEPOSITS	
							SANDY SILT (ML): RED BROWN, LOOSE IN UPPER 1' TO MEDIUM DENSE, MINOR GRAVEL,	50 BLOWS PER 6"
		50			7.5	103.0	CALICHE VEINLETS	
5		26			8.9	120.0		
							SANDY SILT (MI): BROWN, DENSE, DRY, TRACE OF SAND	26 & 50 BLOWS PER 5"
		39						
10							SILTY SAND (SM): DARK BROWN, DENSE, DRY, FINE TO MEDIUM GRAINED, MINOR CALICHE	19 & 50 BLOWS FOR 2"
							VEINLETS	SA- 200 WASH 32.2% PASSING
15							SILTY SAND (SM): DARK ORANGE BROWN, AS ABOVE	
							TOTAL DEPTH =16.5'	
							NO GROUND WATER	
20								
25								
30								
35								
40								

JOB NO:0292102.00	LOG OF BORING	FIGURE: B-3

LOGGED BY: JPF	METHOD OF EXCAVATION: MOBILE DRILL RIG EQUIPPED W/6" HOLLOW STEM AUGERS ELEVATION: ± 780	DATE OBSERVED:12/10/2021 LOCATION: SEE PLATE 1

DEPTH (FEET)	CLASSIFICATION	BLOWS/FOOT	UNDISTURBED SAMPLE	BULK SAMPLE	MOISTURE CONTENT(%)	INPLACE DRY DENSITY (PCF)	BORING LOG NO._4___ DESCRIPTION	SOIL TEST
							OLD ALLUVIAL FAN DEPOSITS	
							SANDY SILT (ML): DARK BROWN, COARSE DRY TOP 1', MEDIUM DENSE, SLIGHTLY MOIST	
5								
		79					SILT (ML): DARK BROWN, DENSE, DRY	29 & 50 BLOWS PER 2" SA-200 WASH, 32.6% PASSING
							TRACE SAND, MINOR CALICHE VEINLETS	
10								
		75					SANDY SILT (SM): DARK BROWN AS ABOVE	25 BLOWS FOR 6" &50 BLOWS PER 2" SA- 200 WASH 31.7% PASSING
15							**TOTAL DEPTH =11.5'** **NO GROUND WATER**	
20								
25								
30								
35								
40								

JOB NO:0292102.00	LOG OF BORING	FIGURE: B-4

APPENDIX C

Laboratory Test Results

LABORATORY TESTING

A. Classification

Soils were visually classified according to the Unified Soil Classification System. Classification was supplemented by index tests such as maximum density and optimum moisture content.

B. Expansion Index

An expansion index test was performed on a representative sample of the onsite soils remolded and tested under a surcharge of 144 lb/ft^2, in accordance with ASTM D-4829-11. The test results are presented on **Figure C-1, Table I.**

C. Maximum Density/Optimum Moisture Content

A maximum density/optimum moisture content relationship was determined for a typical sample of the onsite soils. The laboratory standards used were ASTM 1557-Method A. The test results are summarized on **Figure C-1, Table II** and laboratory results are presented on **Figure C-2.**

D. Direct Shear

A remolded direct shear test was performed on a representative in-situ sample of the subsurface soils. The laboratory standard used was ASTM D 3080. The test results are presented on **Figure C-3**.

E. Corrosivity Suite

Corrosivity suite testing including resistivity, soluble sulfate content, pH and chloride content were performed on a representative sample of the onsite soils. The laboratory standards used were CTM 643, CTM 417 & CTM 422. The test results are presented on **Figure C-1, Table III**.

F. Particle Size Determination

A particle size determination consisting of mechanical analyses (sieve) was performed on a representative sample of the onsite soils, including 200 washes, in accordance with ASTM D 422-63 and CAL TEST 202. The test results are shown on **Figures C-4 through C-16.**

TABLE I EXPANSION INDEX		
TEST LOCATION	EXPANSION INDEX	EXPANSION POTENTIAL
B-1 @ 0-5 ft	27	Low

TABLE II MAXIMUM DENSITY/OPTIMUM MOISTURE RELATIONSHIP ASTM D 1557		
TEST LOCATION	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE (%)
B-1 @ 0-5 ft	133.5	9.0

TABLE III CORROSIVITY SUITE				
TEST LOCATION	SATURATED RESISTIVITY	pH	CHLORIDE CONTENT	SULFATE CONTENT
B-1 @ 0-5 ft	2,800	8.5	21 ppm	0.014 % by wt.

Figure C-1

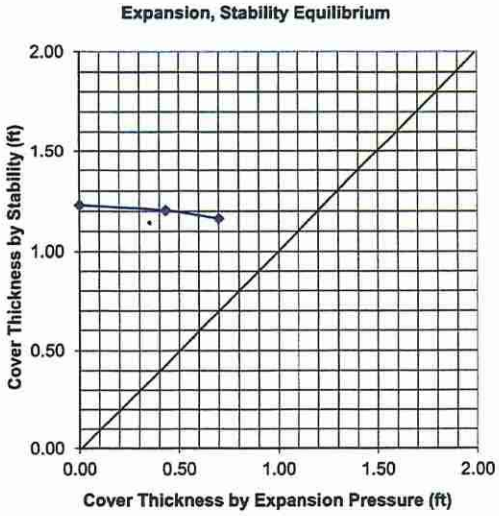
TEST SPECIMEN		A	B	C	D
Compactor air pressure	PSI	60	40	30	
Water added	%	5.6	7.4	10.2	
Moisture at compaction	%	15.7	17.5	20.3	
Height of sample	IN	2.56	2.63	2.66	
Dry density	PCF	115.0	111.6	106.8	
R-Value by exudation		9	6	4	
R-Value by exudation, corrected		9	6	4	
Exudation pressure	PSI	578	406	292	
Stability thickness	FT	1.16	1.20	1.23	
Expansion pressure thickness	FT	0.70	0.43	0.00	

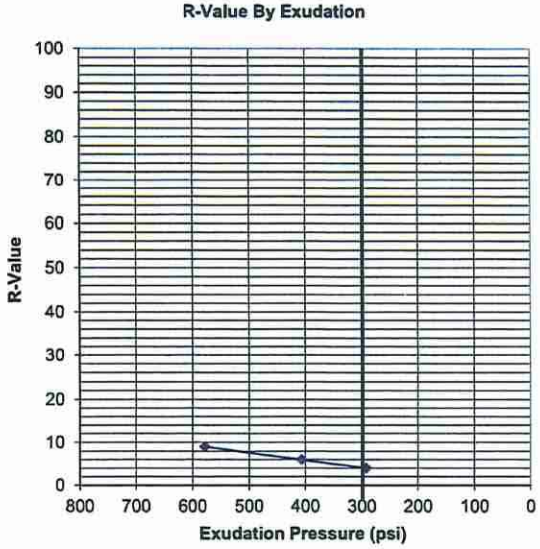
DESIGN CALCULATION DATA

Traffic index, assumed	5.0
Gravel equivalent factor, assumed	1.25
Expansion, stability equilibrium	0
R-Value by expansion	NA
R-Value by exudation	4
R-Value at equilibrium	4

SAMPLE INFORMATION

Sample Location:	RV-1
Sample Description:	Brown Sandy Clay
Notes:	1-52022
	0% Retained on 3/4 inch sieve
Test Method:	Cal-Trans Test 301





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9/2/2010

R - VALUE TEST RESULTS

Project: South Shore Testing

Number: 6377-E-SC

Date: January 2022 Plate: 1

Laboratory Compaction

(ASTM D 1557) SS work 0291202.06

Lot / Boring / Trench: B-1 Project No.: D211663-023

Sample No.: Proj. Name: SERENO OAKS APT HOMES

Depth (ft): 0-5 Technician: JP

Location: Date: 12/13/21

(D 2487) Description: REDDISH BROWN CLAYEY SAND

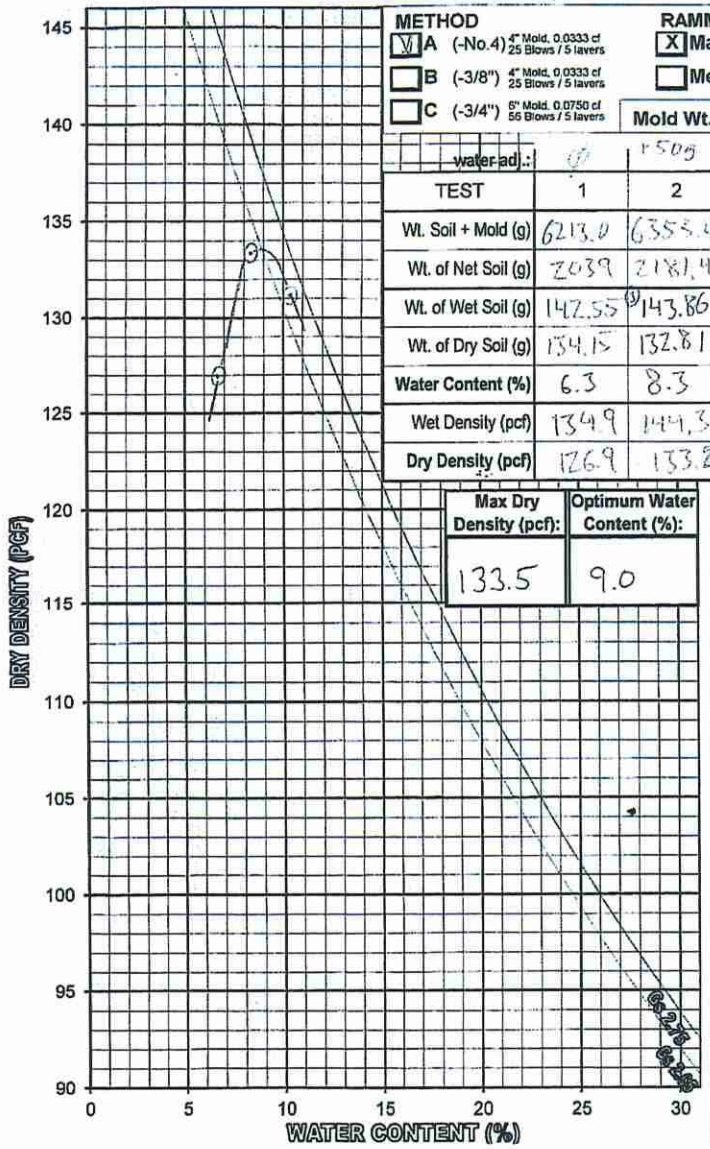
METHOD
- [V] A (-No.4) 4" Mold, 0.0333 cf, 25 Blows / 5 layers
- [ ] B (-3/8") 4" Mold, 0.0333 cf, 25 Blows / 5 layers
- [ ] C (-3/4") 6" Mold, 0.0750 cf, 56 Blows / 5 layers

RAMMER (10 lb, 18")
- [X] Manual
- [ ] Mechanical

PREPARATION
- [ ] Moist
- [ ] Dry

Mold Wt.: 4174.0 Rock Gs: 2.65

water adj.:	0	+509	+496		
TEST	1	2	3	4	5
Wt. Soil + Mold (g)	6213.0	6355.4	6360.3		
Wt. of Net Soil (g)	2039	2181.4	2186.3		
Wt. of Wet Soil (g)	147.55 (1)	143.86 (2)	143.68 (3)		
Wt. of Dry Soil (g)	134.15	132.81	130.25		
Water Content (%)	6.3	8.3	10.3		
Wet Density (pcf)	134.9	144.3	144.6		
Dry Density (pcf)	126.9	133.2	131.1		



Max Dry Density (pcf):	Optimum Water Content (%):
133.5	9.0

OVERSIZE DATA

Wt. Oversize Rock: 89

Wt. Passing Mat'l: 16375

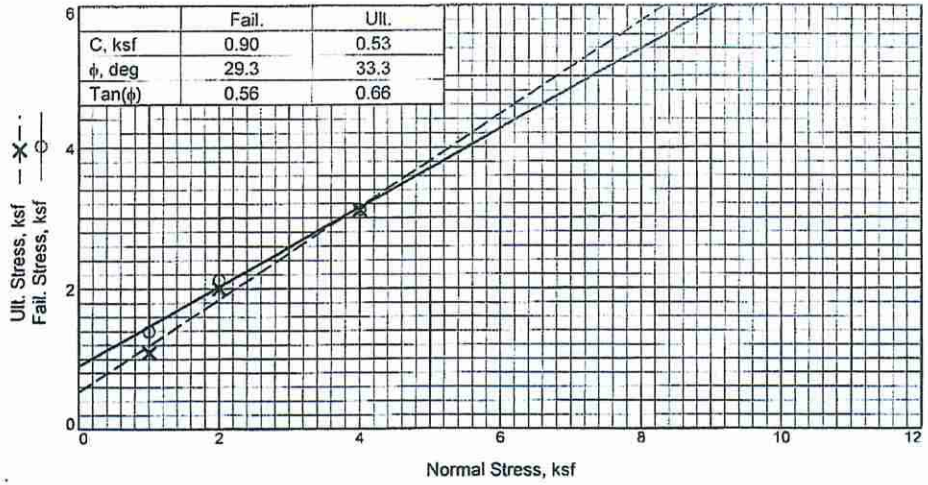
(Dry) Passing Mat'l: 15410

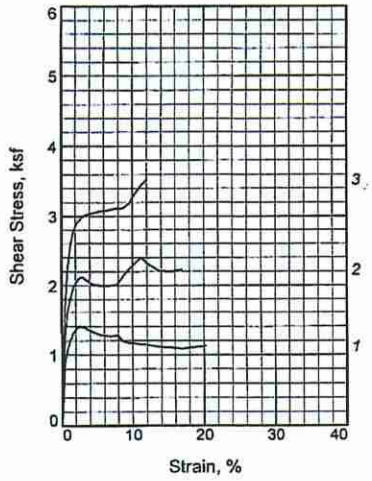
Wt. Total Sample: 15499

Oversize Content: 0.6 %

ROCK CORRECTION (D 4718)

Max Dry Density (pcf)	Water Content (%)	Oversize Content
		5%
		10%
		15%
		20%
		25%
		30%





Sample No.		1	2	3
Initial	Water Content, %	11.5	11.5	11.5
	Dry Density, pcf	120.2	120.2	120.2
	Saturation, %	81.2	81.2	81.2
	Void Ratio	0.3766	0.3766	0.3766
	Diameter, in.	2.42	2.42	2.42
	Height, in.	1.00	1.00	1.00
At Test	Water Content, %	15.7	15.1	14.3
	Dry Density, pcf	120.2	120.2	120.2
	Saturation, %	110.3	105.9	100.5
	Void Ratio	0.3766	0.3766	0.3766
	Diameter, in.	2.42	2.42	2.42
	Height, in.	1.00	1.00	1.00
Normal Stress, ksf		1.00	2.00	4.00
Fail. Stress, ksf		1.39	2.12	3.11
Strain, %		2.5	2.9	7.9
Ult. Stress, ksf		1.08	1.99	3.11
Strain, %		17.0	6.2	8.3
Strain rate, in./min.		0.020	0.020	0.020

Sample Type: Bulk
Description: Reddish Brown Clayey Sand

Specific Gravity= 2.65
Remarks: Max Dry Density: 133.5 pcf @ 9.0%
Moisture Remolded at 90% of max dry density

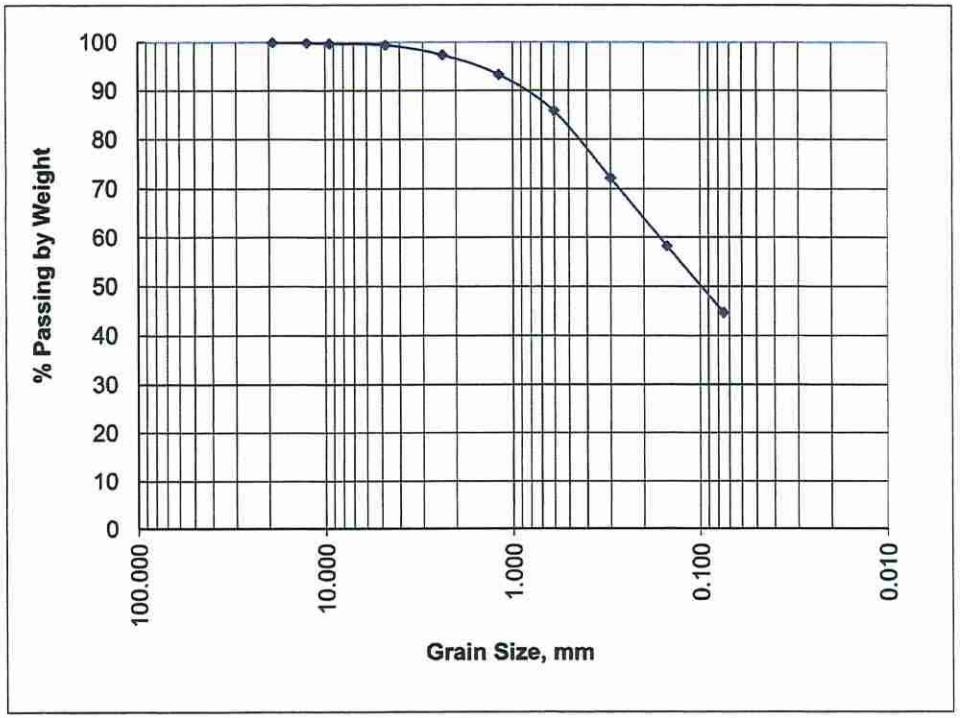
Figure _____

Client: South Shore Testing & Environmental

Project: Serrano Oaks Apt. Homes

Location: B-1
Depth: 0'-5'
Proj. No.: D211003-023 **Date Sampled:** Rec'd 12/13/21

Tested By: JW



U.S. Standard Sieve Sizes

3"	1.5"	3/4"	3/8"	#4	#8	#30	#50	#100	#200	
	Gravel			Sand						
Cobbles	Coarse		Fine	Coarse		Medium		Fine	Silt	Clay

Sieve Size	Grain Size, mm	% Passing
3/4 in.	19.000	**100.0**
1/2 in.	12.500	**99.8**
3/8 in.	9.500	**99.7**
#4	4.750	**99.4**
#8	2.360	**97.4**
#16	1.180	**93.3**
#30	0.600	**85.9**
#50	0.300	**72.2**
#100	0.150	**58.3**
#200	0.075	**44.7**

Location	Depth, ft.	Sample ID
B-1	0'-5'	

Classification	Description
SC	Clayey Sand

Project No.	D211003-023
Project Name	Serrano Oaks Apts
Client	South Shore
SS wo#	0292102.00

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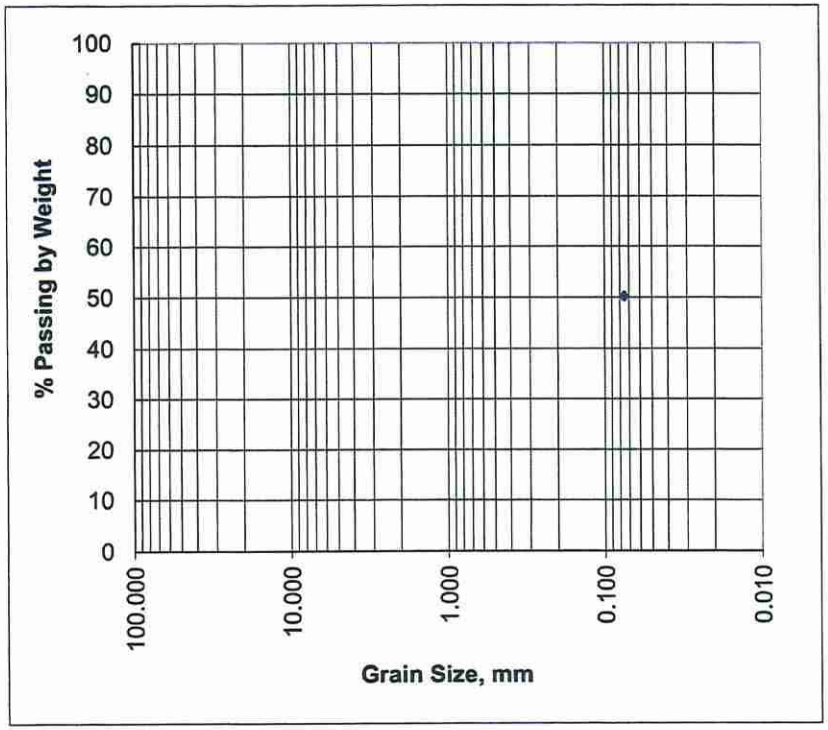
Temecula, CA 92590

No. 200 Sieve Analysis



U.S. Standard Sieve Sizes

	3	1.5	3/4	3/8	#4	#8	#30	#50	#100	#200		
	Gravel				Sand							
Cobbles	Coarse			Fine	Coarse		Medium		Fine		Silt	Clay

Sieve Size	Grain Size, mm	% Passing
3/4 in.	19.000	
1/2 in.	12.500	
3/8 in.	9.500	
#4	4.750	
#8	2.360	
#16	1.180	
#30	0.600	
#50	0.300	
#100	0.150	
#200	0.075	50.2

Location	Depth, ft.	Sample ID
B-1	15	

Classification	Description
ML	Sandy Silt

Project No.	D211003-023
Project Name	Serrano Oaks Apt's
Client	South Shore
South Shore wo#	0292102.00

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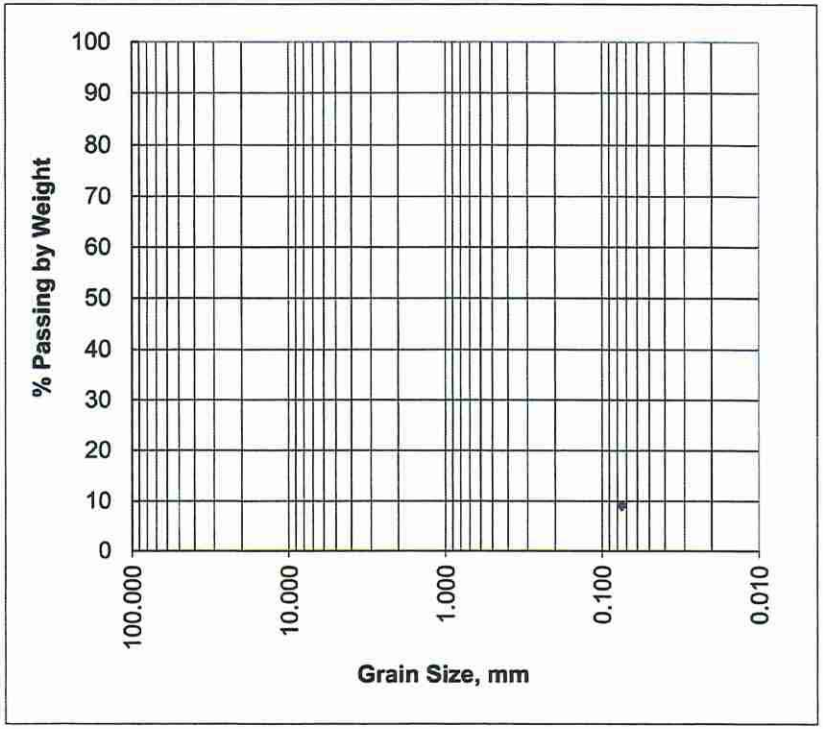
No. 200 Sieve Analysis



U.S. Standard Sieve Sizes

3	1.5	3/4	3/8	#4	#8	#30	#50	#100	#200		
	Gravel			Sand							
Cobbles	Coarse		Fine	Coarse		Medium		Fine		Silt	Clay

Sieve Size	Grain Size, mm	% Passing
3/4 in.	19.000	
1/2 in.	12.500	
3/8 in.	9.500	
#4	4.750	
#8	2.360	
#16	1.180	
#30	0.600	
#50	0.300	
#100	0.150	
#200	0.075	9.1

Location	Depth, ft.	Sample ID
B-1	20	

Classification	Description
SM	Silty Sand

Project No.	D211003-023
Project Name	Serrano Oaks Apt's
Client	South Shore
South Shore wo#	0292102.00

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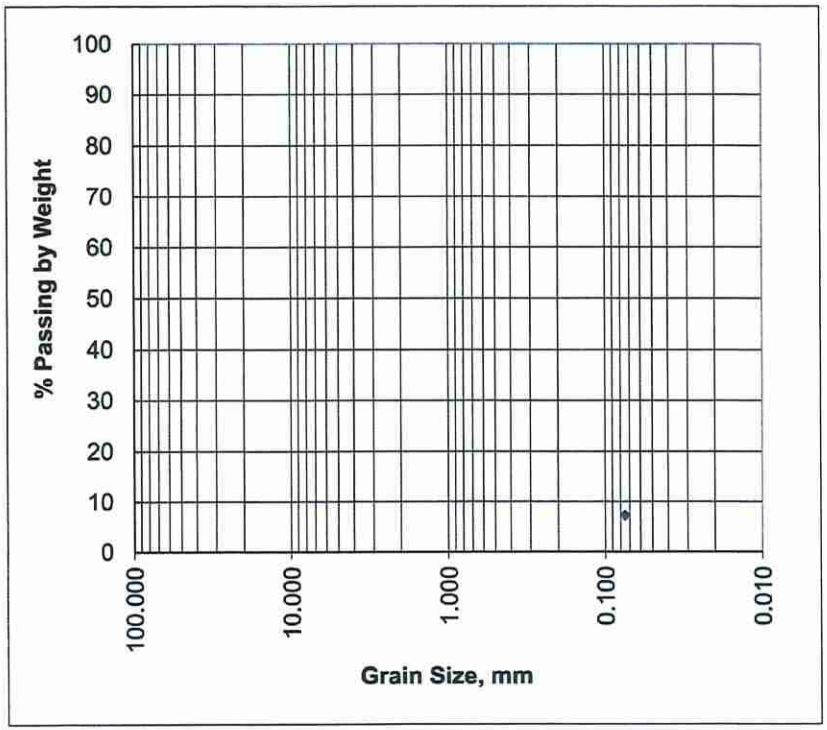

U.S. Standard Sieve Sizes

3	1.5	3/4	3/8	#4	#8	#30	#50	#100	#200		
	Gravel			Sand							
Cobbles	Coarse		Fine	Coarse		Medium		Fine		Silt	Clay

Sieve Size	Grain Size, mm	% Passing
3/4 in.	19.000	
1/2 in.	12.500	
3/8 in.	9.500	
#4	4.750	
#8	2.360	
#16	1.180	
#30	0.600	
#50	0.300	
#100	0.150	
#200	0.075	7.2

Location	Depth, ft.	Sample ID
B-1	25	

Classification	Description
SM	Silty Sand

Project No.	D211003-023
Project Name	Serrano Oaks Apt's
Client	South Shore
South Shore wo#	0292102.00

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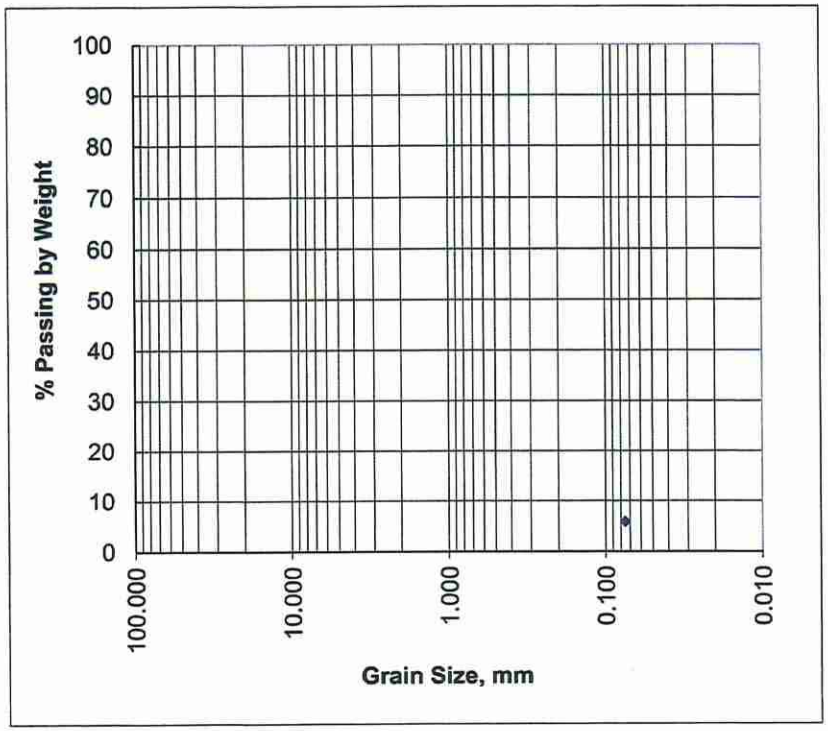
No. 200 Sieve Analysis



U.S. Standard Sieve Sizes

	3	1.5	3/4	3/8	#4	#8	#30	#50	#100	#200	
	Gravel				Sand						
Cobbles	Coarse			Fine	Coarse		Medium		Fine	Silt	Clay

Sieve Size	Grain Size, mm	% Passing
3/4 in.	19.000	
1/2 in.	12.500	
3/8 in.	9.500	
#4	4.750	
#8	2.360	
#16	1.180	
#30	0.600	
#50	0.300	
#100	0.150	
#200	0.075	5.8

Location	Depth, ft.	Sample ID
B-1	30.0	

Classification	Description
SM	Silty Sand

Project No.	D211003-023
Project Name	Serrano Oaks Apt's
Client	South Shore
South Shore wo#	0292102.00

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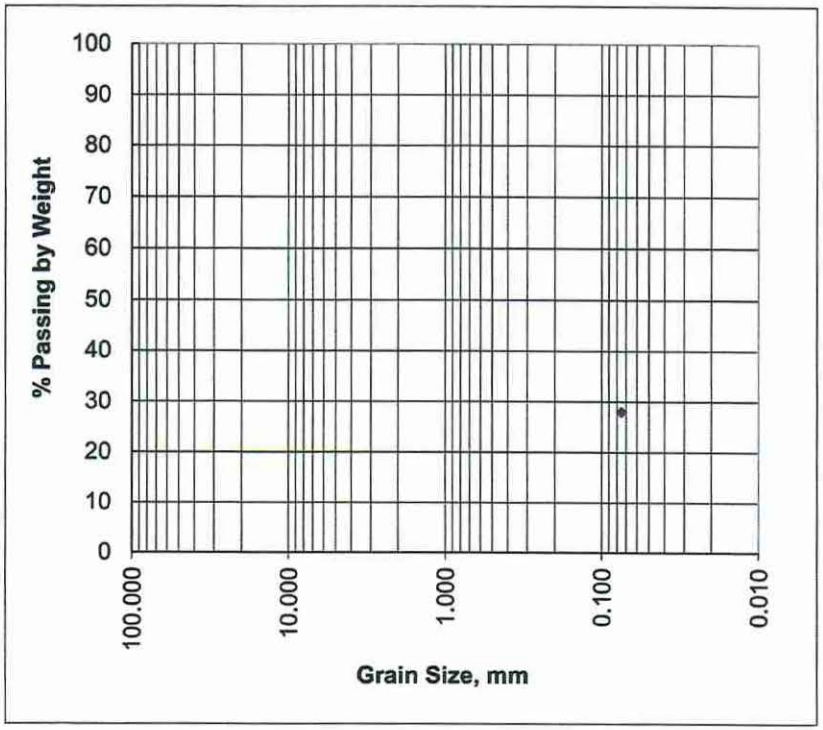
No. 200 Sieve Analysis



U.S. Standard Sieve Sizes

3	1.5	3/4	3/8	#4	#8	#30	#50	#100	#200		
	Gravel			Sand							
Cobbles	Coarse		Fine	Coarse		Medium		Fine		Silt	Clay

Sieve Size	Grain Size, mm	% Passing
3/4 in.	19.000	
1/2 in.	12.500	
3/8 in.	9.500	
#4	4.750	
#8	2.360	
#16	1.180	
#30	0.600	
#50	0.300	
#100	0.150	
#200	0.075	28.0

Location	Depth, ft.	Sample ID
B-1	35.0	

Classification	Description
SM	Silty Sand

Project No.	D211003-023
Project Name	Serrano Oaks Apt's
Client	South Shore
South Shore wo#	0292102.00

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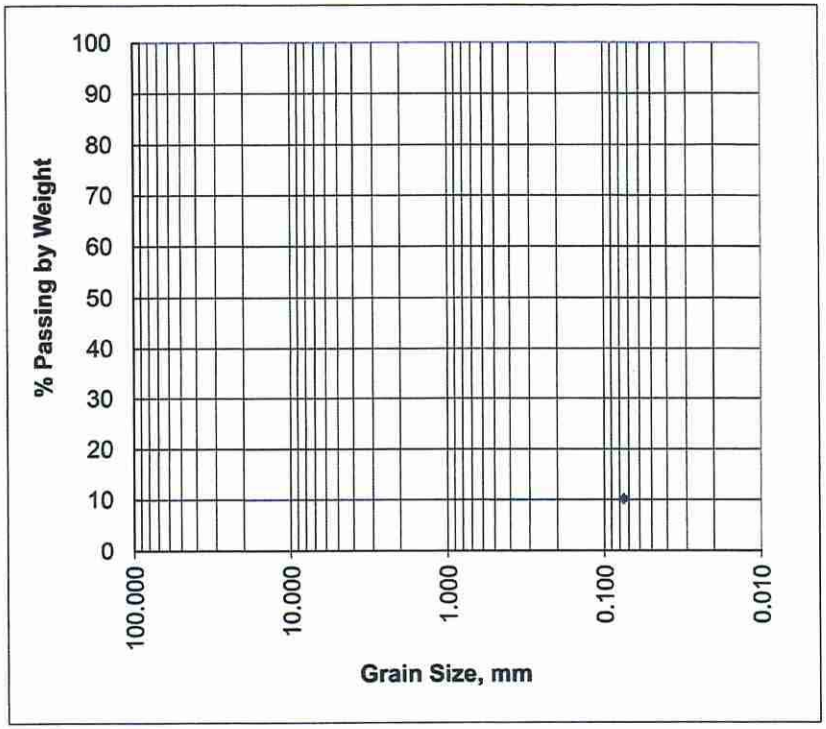
Temecula, CA 92590

No. 200 Sieve Analysis



U.S. Standard Sieve Sizes

	3	1.5	3/4	3/8	#4	#8	#30	#50	#100	#200		
	Gravel				Sand							
Cobbles	Coarse			Fine	Coarse		Medium		Fine		Silt	Clay

Sieve Size	Grain Size, mm	% Passing
3/4 in.	19.000	
1/2 in.	12.500	
3/8 in.	9.500	
#4	4.750	
#8	2.360	
#16	1.180	
#30	0.600	
#50	0.300	
#100	0.150	
#200	0.075	10.2

Location	Depth, ft.	Sample ID
B-1	40.0	

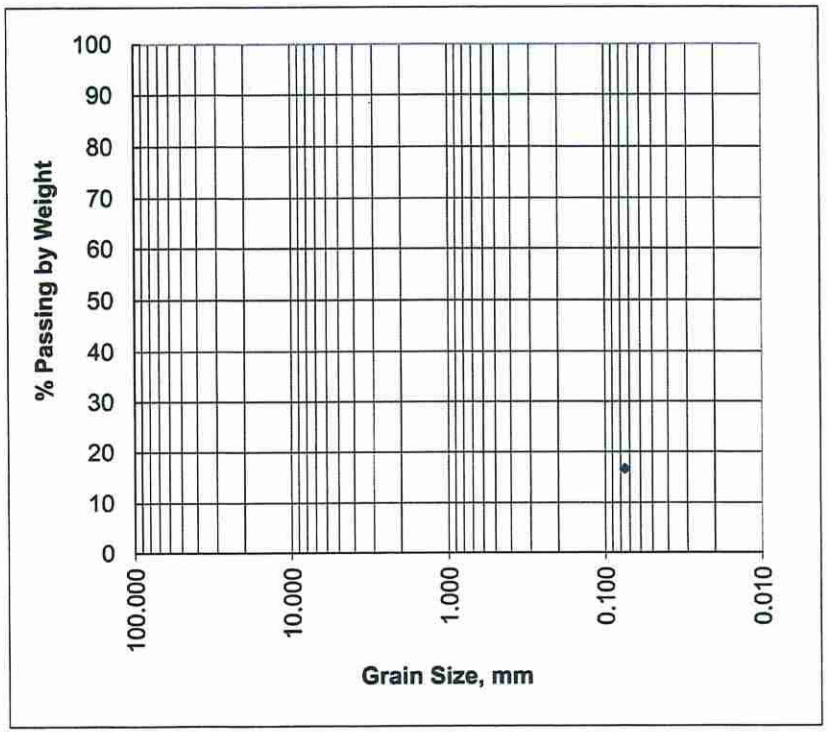
Classification	Description
SM	Silty Sand

Project No.	D211003-023
Project Name	Serrano Oaks Apt's
Client	South Shore
South Shore wo#	0292102.00

DGS

Dynamic Geotechnical Solutions
27570 Commerce Center Dr, # 128
Temecula, CA 92590

No. 200 Sieve Analysis



U.S. Standard Sieve Sizes

3	1.5	3/4	3/8	#4	#8	#30	#50	#100	#200		
	Gravel			Sand							
Cobbles	Coarse		Fine	Coarse		Medium		Fine		Silt	Clay

Sieve Size	Grain Size, mm	% Passing
3/4 in.	19.000	
1/2 in.	12.500	
3/8 in.	9.500	
#4	4.750	
#8	2.360	
#16	1.180	
#30	0.600	
#50	0.300	
#100	0.150	
#200	0.075	16.6

Location	Depth, ft.	Sample ID
B-1	45.0	

Classification	Description
SM	Silty Sand w/ Gravel

Project No.	D211003-023
Project Name	Serrano Oaks Apt's
Client	South Shore
South Shore wo#	0292102.00

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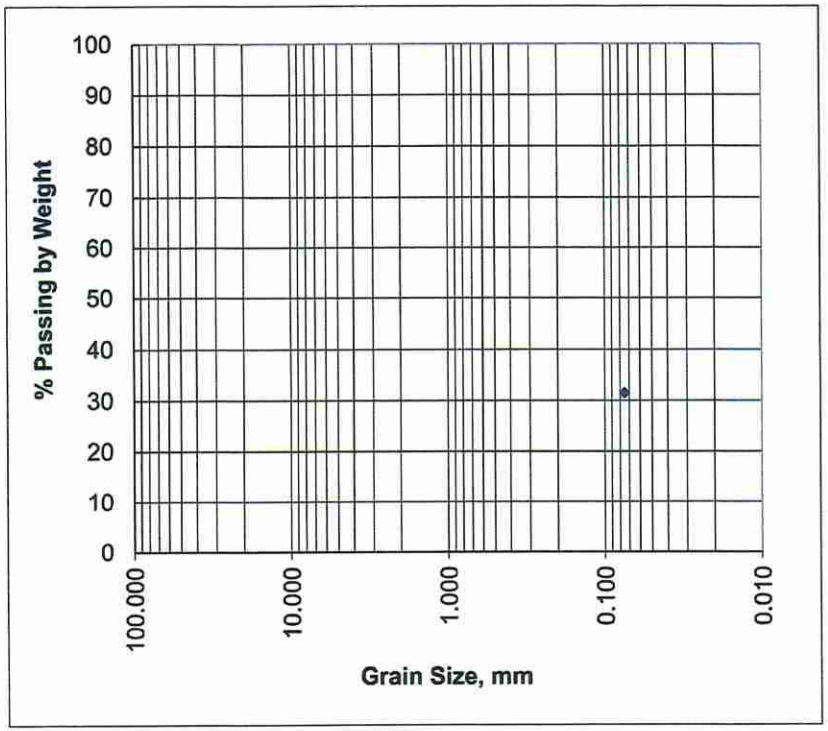
No. 200 Sieve Analysis



U.S. Standard Sieve Sizes

	3	1.5	3/4	3/8	#4	#8	#30	#50	#100	#200		
	Gravel				Sand							
Cobbles	Coarse			Fine	Coarse		Medium		Fine		Silt	Clay

Sieve Size	Grain Size, mm	% Passing
3/4 in.	19.000	
1/2 in.	12.500	
3/8 in.	9.500	
#4	4.750	
#8	2.360	
#16	1.180	
#30	0.600	
#50	0.300	
#100	0.150	
#200	0.075	31.5

Location	Depth, ft.	Sample ID
B-2	10.0	

Classification	Description
SM	Silty Sand w/ Gravel

Project No.	D211003-023
Project Name	Serrano Oaks Apt's
Client	South Shore
South Shore wo#	0292102.00

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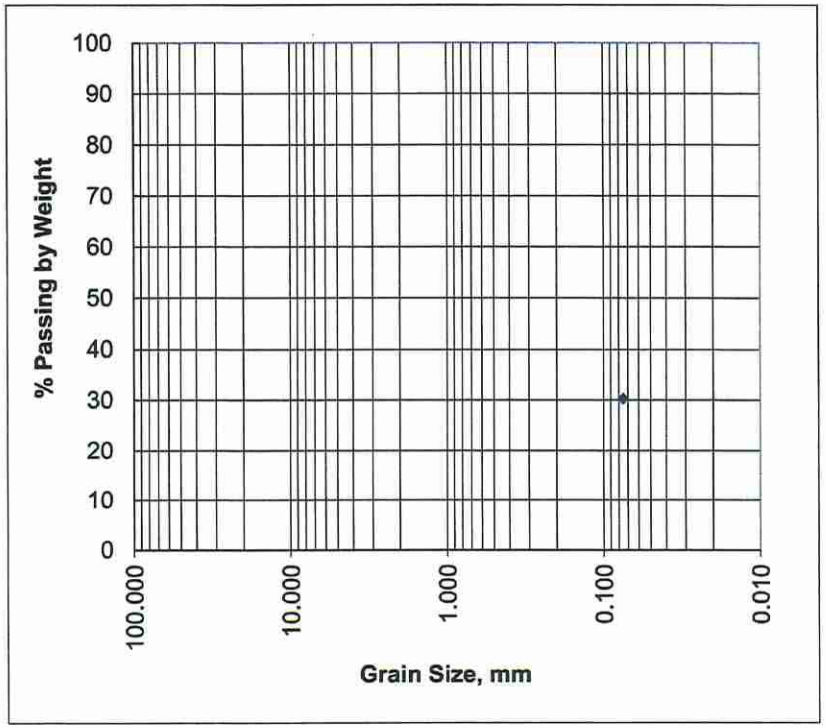
No. 200 Sieve Analysis



U.S. Standard Sieve Sizes

	3	1.5	3/4	3/8	#4	#8	#30	#50	#100	#200		
	Gravel				Sand							
Cobbles	Coarse			Fine	Coarse		Medium		Fine		Silt	Clay

Sieve Size	Grain Size, mm	% Passing
3/4 in.	19.000	
1/2 in.	12.500	
3/8 in.	9.500	
#4	4.750	
#8	2.360	
#16	1.180	
#30	0.600	
#50	0.300	
#100	0.150	
#200	0.075	30.3

Location	Depth, ft.	Sample ID
B-3	10.0	

Classification	Description
SM	Silty Sand

Project No.	D211003-023
Project Name	Serrano Oaks Apt's
Client	South Shore
South Shore wo#	0292102.00

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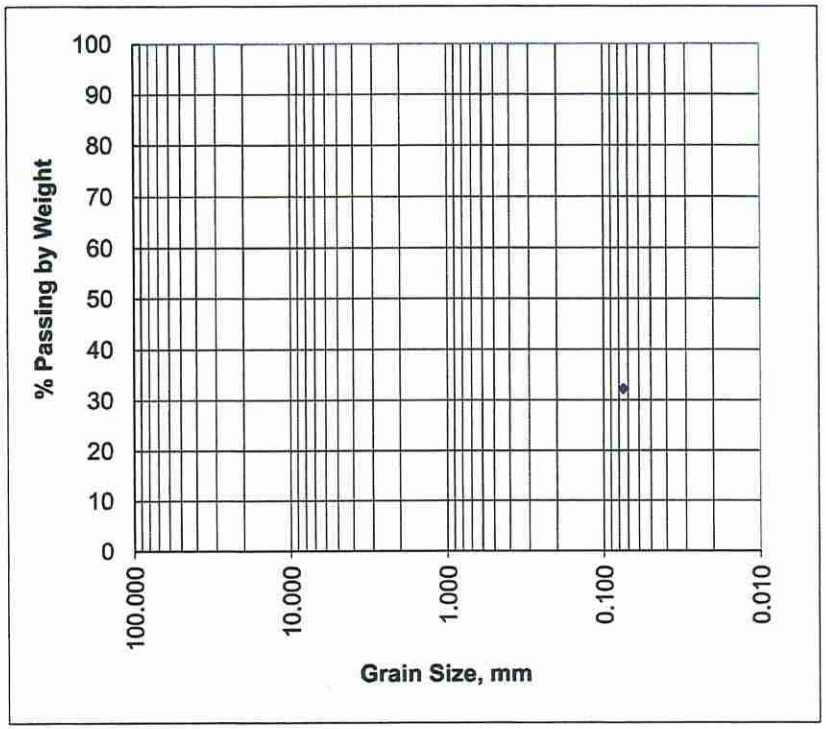
No. 200 Sieve Analysis



U.S. Standard Sieve Sizes

	3	1.5	3/4	3/8	#4	#8	#30	#50	#100	#200	
	Gravel				Sand						
Cobbles	Coarse			Fine	Coarse		Medium		Fine	Silt	Clay

Sieve Size	Grain Size, mm	% Passing
3/4 in.	19.000	
1/2 in.	12.500	
3/8 in.	9.500	
#4	4.750	
#8	2.360	
#16	1.180	
#30	0.600	
#50	0.300	
#100	0.150	
#200	0.075	32.2

Location	Depth, ft.	Sample ID
B-3	15.0	

Classification	Description
SM	Silty Sand

Project No.	D211003-023
Project Name	Serrano Oaks Apt's
Client	South Shore
South Shore wo#	0292102.00

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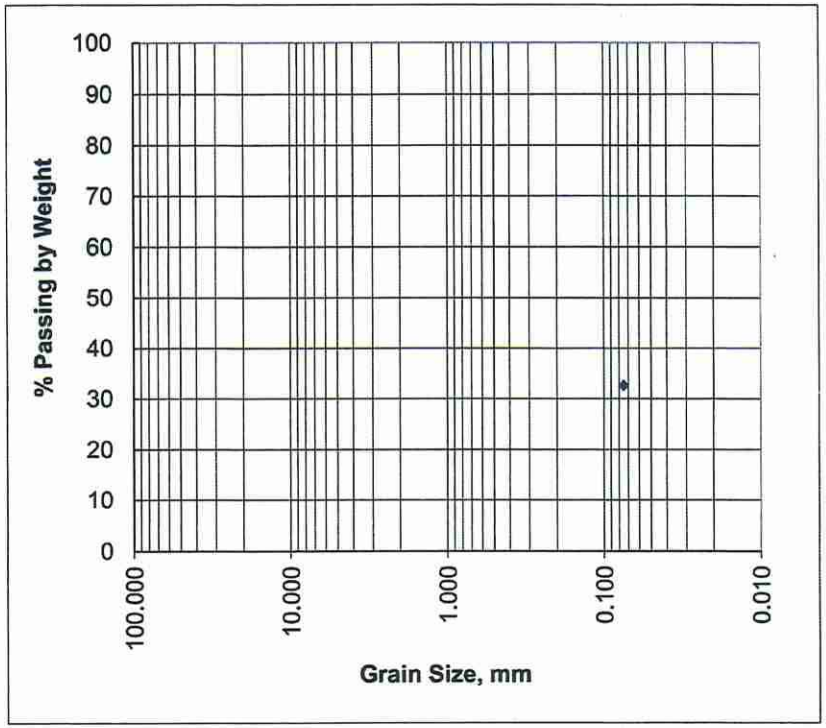
No. 200 Sieve Analysis



U.S. Standard Sieve Sizes

	3	1.5	3/4	3/8	#4	#8	#30	#50	#100	#200		
		Gravel			Sand							
Cobbles		Coarse		Fine	Coarse		Medium		Fine		Silt	Clay

Sieve Size	Grain Size, mm	% Passing
3/4 in.	19.000	
1/2 in.	12.500	
3/8 in.	9.500	
#4	4.750	
#8	2.360	
#16	1.180	
#30	0.600	
#50	0.300	
#100	0.150	
#200	0.075	32.6

Location	Depth, ft.	Sample ID
B-4	5.0	

Classification	Description
SM	Silty Sand

Project No.	D211003-023
Project Name	Serrano Oaks Apt's
Client	South Shore
South Shore wo#	0292102.00

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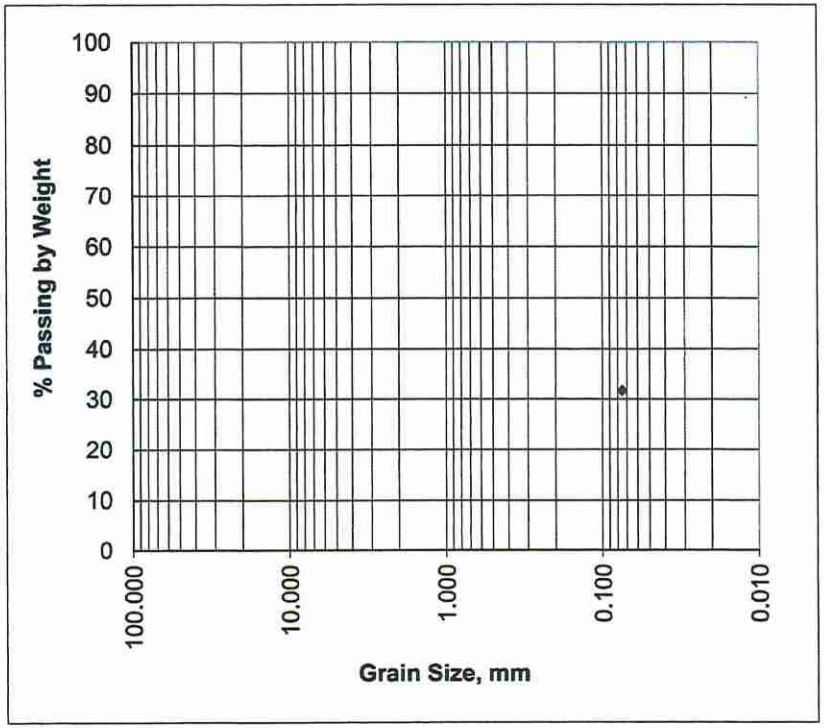
No. 200 Sieve Analysis



U.S. Standard Sieve Sizes

	3	1.5	3/4	3/8	#4	#8	#30	#50	#100	#200	
	Gravel				Sand						
Cobbles	Coarse			Fine	Coarse		Medium		Fine	Silt	Clay

Sieve Size	Grain Size, mm	% Passing
3/4 in.	19.000	
1/2 in.	12.500	
3/8 in.	9.500	
#4	4.750	
#8	2.360	
#16	1.180	
#30	0.600	
#50	0.300	
#100	0.150	
#200	0.075	31.7

Location	Depth, ft.	Sample ID
B-4	10.0	

Classification	Description
SM	Silty Sand

Project No.	D211003-023
Project Name	Serrano Oaks Apt's
Client	South Shore
South Shore wo#	0292102.00

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APPENDIX D

Standards of Grading

STANDARD GRADING AND EARTHWORK SPECIFICATIONS

These specifications present **South Shore Testing & Environmental,** standard recommendations for grading and earthwork.

No deviation from these specifications should be permitted unless specifically superseded in the geotechnical report of the project or by written communication signed by the Soils Consultant. Evaluations performed by the Soils Consultant during the course of grading may result in subsequent recommendations which could supersede these specifications or the recommendations of the geotechnical report.

- **GENERAL**

  - The Soils Consultant is the Owner's or Developer's representative on the project. For the purpose of these specifications, observations by the Soils Consultant include observations by the Soils Engineer, Soils Engineer, Engineering Geologist, and others employed by and responsible to the Soils Consultant.

  - All clearing, site preparation, or earthwork performed on the project shall be conducted and directed by the Contractor under the allowance or the supervision of the Soils Consultant.

  - The Contractor should be responsible for the safety of the project and satisfactory completion of all grading. During grading, the Contractor shall remain accessible.

  - Prior to the commencement of grading, the Soils Consultant shall be employed for the purpose of providing field, laboratory, and office services for conformance with the recommendations of the geotechnical report and these specifications. It will be necessary that the Soils Consultant provide adequate testing and observations so that he may provide an opinion as to determine that the work was accomplished as specified. It shall be the responsibility of the Contractor to assist the Soils 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, agency ordinances, these specifications, and the approved grading plans. If, in the opinion of the Soils Consultant, unsatisfactory conditions, such as questionable soil, poor moisture condition, inadequate compaction, adverse weather, etc, are resulting in a quality of work less then required in these specifications, the Soils Consultant will be empowered to reject the work and recommend that construction be stopped until the conditions are rectified.

  - It is the Contractor's responsibility to provides safe access to the Soils Consultant for testing and/or

grading observation purposes. This may require the excavation of the test pits and/or the relocation of grading equipment.

1.7 A final report shall be issued by the Soils Consultant attesting to the Contractor's conformance with these specifications.

- **SITE PREPARTION**

  - All vegetation and deleterious material shall be disposed of off-site. This removal shall be observed by the Soils Consultant and concluded prior to fill placement.

  - Soil, Alluvium or bedrock materials determined by the Soils Consultant as being unsuitable for placement in compacted fills shall be removed from the site or used in open areas as determined by the Soils Consultant. Any material incorporated as a part of a compacted fill must be approved by the Soils Consultant prior to fill placement.

  - After the ground surface to receive fill has been cleared, it shall be scarified, disced and/or bladed by the Contractor until it is uniform and free from ruts, hollows, hummocks, or other uneven features which may prevent uniform compaction.

    The scarified ground surface shall then be brought to optimum moisture, mixed as required, and compacted as specified. If the scarified zone is greater than twelve inches in depth, the excess shall be removed and placed in lifts not to exceed six inches or less.

    Prior to placing fill, the ground surface to receive fill shall be observed, tested, and approved by the soils consultant.

  - Any underground structures or cavities such as cesspools, cisterns, mining shafts, tunnels, septic tanks, wells, pipe lines, or others are to be removed or treated in a manner prescribed by the Soils Consultant.

  - In cut-fill transitions lots and where cut lots are partially in soil, colluvium or unweathered bedrock materials, in order to provide uniform bearing conditions, the bedrock portion of the lot extending a minimum of 5 feet outside of building lines shall be over excavated a minimum of 3 feet and replaced with compacted fill. Greater over excavation could be required as determined by Soils Consultant. Typical details are attached.

- **COMPACTED FILLS**

  - Material to be placed as fill shall be free of organic matter and other deleterious substances, and shall be approved by the Soils Consultant. Soils of poor gradation, expansion, or strength characteristics

shall be placed in areas designated by Soils Consultant or shall be mixed with other soils to serve as satisfactory fill material, as directed by the Soils Consultant.

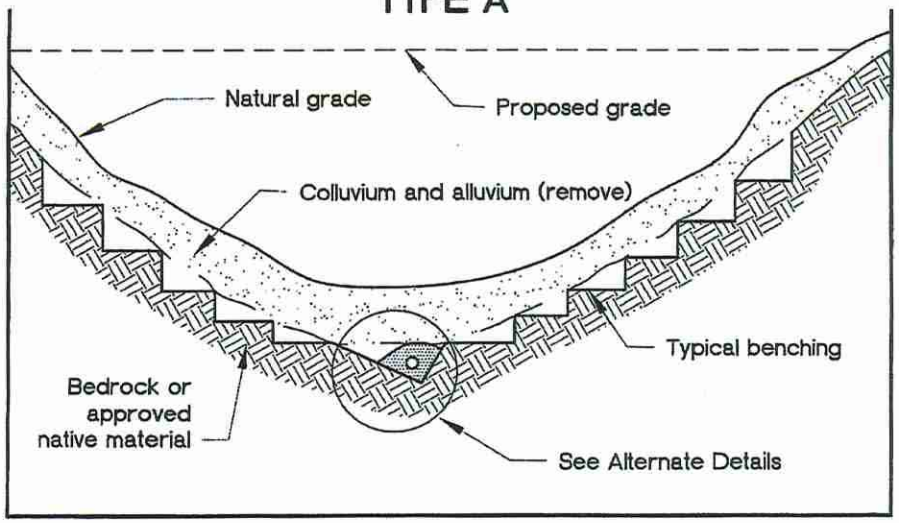
- Rock fragments less than six inches in diameter may be utilized in the fill, provided
    - They are not placed or nested in concentrated pockets
    - There is sufficient amount of approved soil to surround the rocks
    - The distribution of rocks is supervised by the Soils Consultant
- Rocks greater than twelve inches in diameter shall be taken off-site, or placed in accordance with the recommendations of the Soils Consultant, areas designated as suitable for rock disposal (A typical detail for Rock Disposal is attached.)
- Material that is spongy, subject to decay, or otherwise considered unsuitable shall not be used in the compacted fil.
- Representative samples of materials to be utilized as compacted fill shall be analyzed by the laboratory of the Soils Consultant to determine the physical properties. If any material other than that previously tested is encountered during grading, the appropriate analysis of this material shall be conducted by the Soils Consultant before being approved as fill material.
- Material used in the compacting process shall be evenly spread, watered, processed, and compacted in thin lifts not to exceed six inches in thickness to obtain a uniformly dense layer. The fill shall be placed and compacted on a horizontal plane, unless otherwise approved by the Soils Consultant.
- If the moisture content or relative compaction varies from that required by the Soils Consultant, the Contractor shall rework the fill until it has been approved by the Soils Consultant.
- Each layer shall be compacted to at least 90 percent of the maximum density in compliance with the testing method specified by the controlling government agency or ASTM 1557-70, whichever applies.

  If compaction to a lesser percentage is authorized by the controlling governmental agency because of a specific land use or expansive soil conditions the area to receive fill compacted to less than 90 percent shall either be delineated on the grading plan and/or appropriate reference made to the

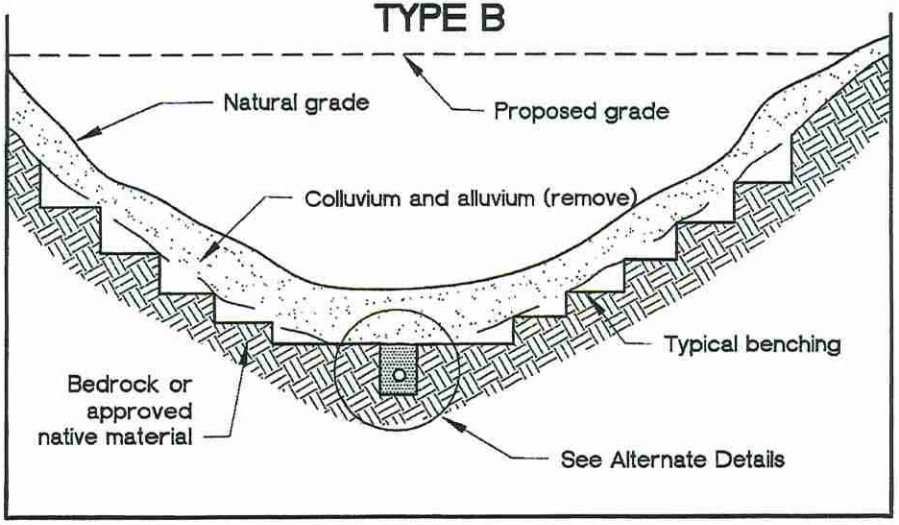
area in the geotechnical report.

- All fills shall be keyed and benched through all topsoil, colluvium, alluvium, or creep material, into sound bedrock, or firm material where the slope receiving fill exceeds a ratio of five horizontal to one vertical or in accordance with the recommendations of the Soils Consultant.
- The key for side hill fills shall be a minimum width of 15 feet within bedrock or firm materials, unless otherwise specified in the geotechnical report, (see detail attached.)
- Sub drainage devices shall be constructed in compliance with the ordinances of the controlling governmental agency, or with the recommendations of the Soils Consultant. (Typical Canyon Subdrain details are attached.)
- The contractor will be required to obtain a minimum relative compaction of at least 90 percent out to the finish slope face of fill slopes, buttresses, and stabilization fills. This may be achieved by either over building the slope and cutting back to the compacted core, or by direct compaction of the slope face with suitable equipment, or by any other procedure, which produces the required compaction approved by the Soils Consultant.
- All fill slopes should be planted or protected from erosion by other methods specified in the Soils report.
- Fill-over-cut slopes shall be properly keyed through topsoil, colluvium or creep material into rock or firm materials and the transition shall be stripped of all soils prior to placing fill (see attached detail.)

TYPE A

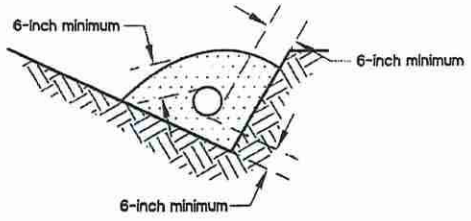


TYPE B

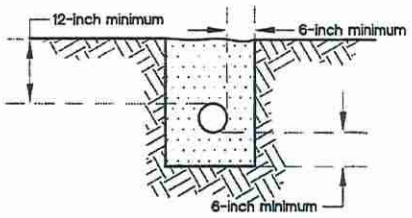


Selection of alternate subdrain details, location, and extent of subdrains should be evaluated by the geotechnical consultant during grading.

SOUTH SHORE TESTING	CANYON SUBDRAIN DETAIL	Plate 1



A-1



B-1

Filter material: Minimum volume of 9 cubic feet per lineal foot of pipe.

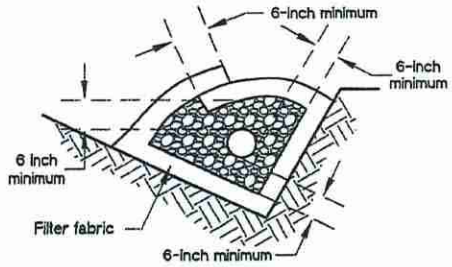
Perforated pipe: 6-inch-diameter ABS or PVC pipe or approved substitute with minimum 8 perforations (¼-inch diameter) per lineal foot in bottom half of pipe (ASTM D-2751, SDR-35, or ASTM D-1527, Schd. 40).

For continuous run in excess of 500 feet, use 8-inch-diameter pipe (ASTM D-3034, SDR-35, or ASTM D-1785, Schd. 40).

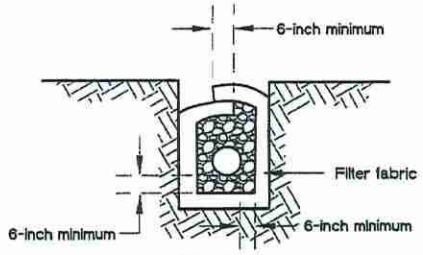
FILTER MATERIAL

Sieve Size	Percent Passing
1 inch	100
¾ inch	90-100
⅜ inch	40-100
No. 4	25-40
No. 8	18-33
No. 30	5-15
No. 50	0-7
No. 200	0-3

ALTERNATE 1: PERFORATED PIPE AND FILTER MATERIAL



A-2

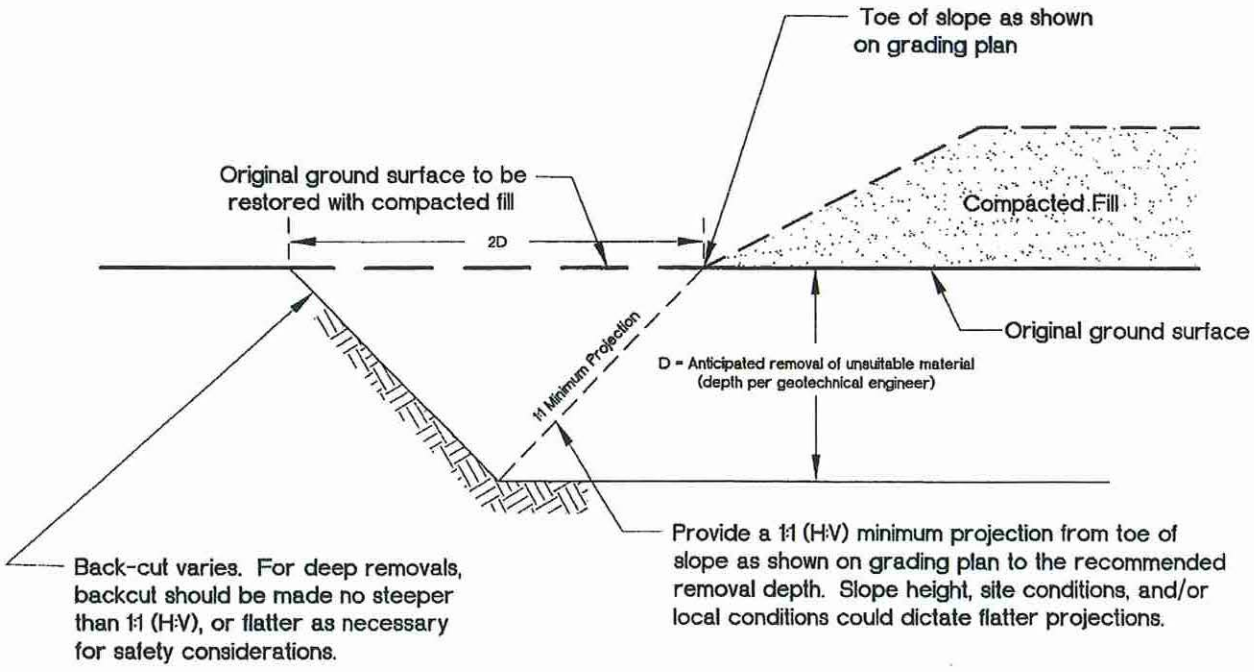


B-2

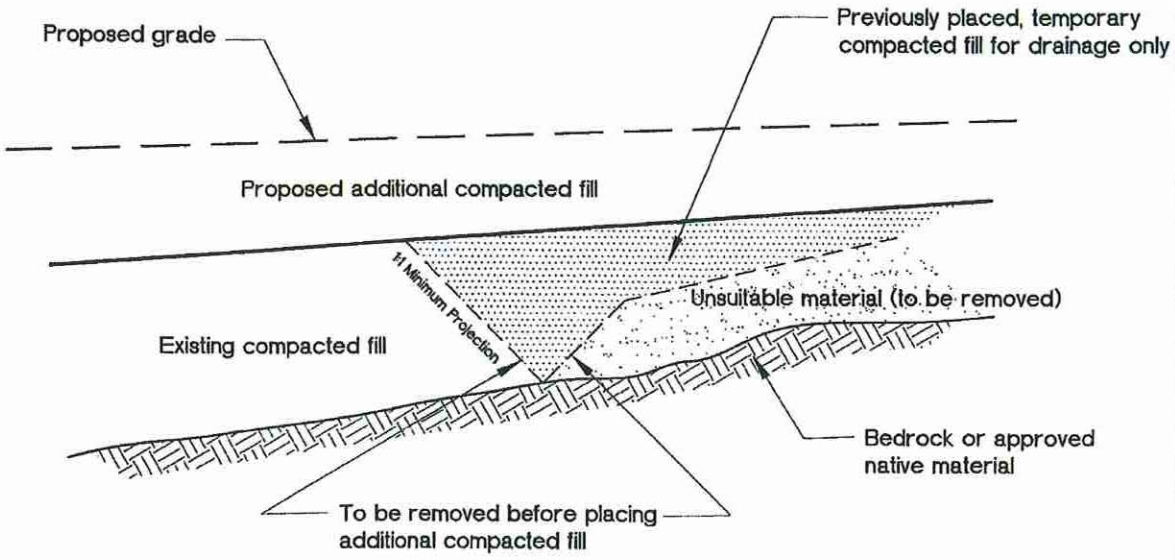
Gravel Material: 9 cubic feet per lineal foot.
Perforated Pipe: See Alternate 1
Gravel: Clean ¾-inch rock or approved substitute.
Filter Fabric: Mirafi 140 or approved substitute.

ALTERNATE 2: PERFORATED PIPE, GRAVEL, AND FILTER FABRIC

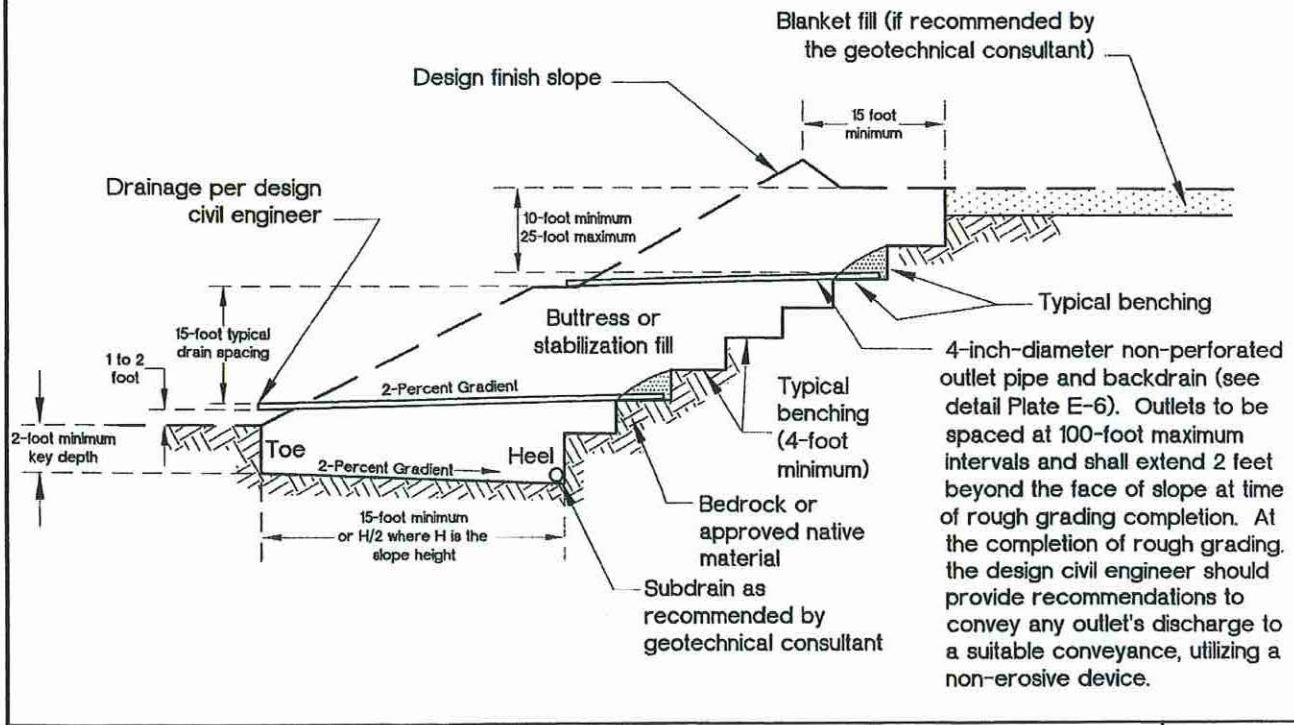
SOUTH SHORE TESTING	CANYON SUBDRAIN ALTERNATE DETAILS	Plate 2



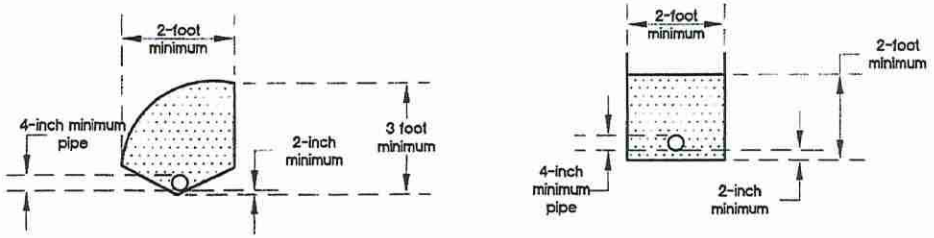
SOUTH SHORE TESTING	FILL SLOPE TOEING OUT ON FLAT ALLUVIATED CANYON DETAIL	PLATE 3



SOUTH SHORE TESTING	REMOVAL ADJACENT TO EXISTING FILL ADJOINING CANYON FILL DETAIL	Plate 4



SOUTH SHORE TESTING	TYPICAL STABILIZATION / BUTTRESS FILL DETAIL	Plate 5



Filter Material: Minimum of 5 cubic feet per lineal foot of pipe or 4 cubic feet per lineal feet of pipe when placed in square cut trench.

Alternative in Lieu of Filter Material: Gravel may be encased in approved filter fabric. Filter fabric shall be Mirafi 140 or equivalent. Filter fabric shall be lapped a minimum of 12 inches in all joints.

Minimum 4-Inch-Diameter Pipe: ABS-ASTM D-2751, SDR 35; or ASTM D-1527 Schedule 40, PVC-ASTM D-3034, SDR 35; or ASTM D-1785 Schedule 40 with a crushing strength of 1,000 pounds minimum, and a minimum of 8 uniformly-spaced perforations per foot of pipe. Must be installed with perforations down at bottom of pipe. Provide cap at upstream end of pipe. Slope at 2 percent to outlet pipe. Outlet pipe to be connected to subdrain pipe with tee or elbow.

Notes:
1. Trench for outlet pipes to be backfilled and compacted with onsite soil.
2. Backdrains and lateral drains shall be located at elevation of every bench drain. First drain located at elevation just above lower lot grade. Additional drains may be required at the discretion of the geotechnical consultant.

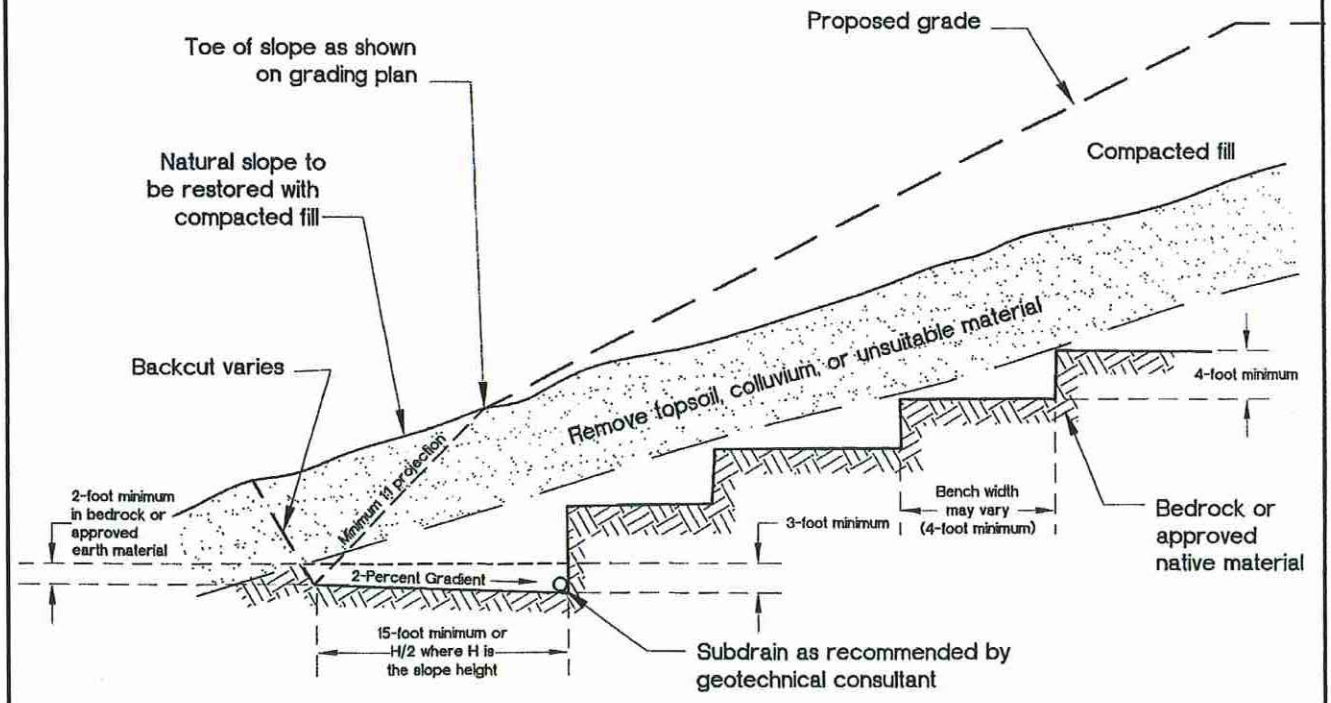
Filter Material shall be of the following specification or an approved equivalent.

Sieve Size	Percent Passing
1 inch	100
¾ inch	90-100
⅜ inch	40-100
No. 4	25-40
No. 8	18-33
No. 30	5-15
No. 50	0-7
No. 200	0-3

Gravel shall be of the following specification or an approved equivalent.

Sieve Size	Percent Passing
1½ inch	100
No. 4	50
No. 200	8

SOUTH SHORE TESTING	TYPICAL BUTTRESS SUBDRAIN DETAIL	Plate 6

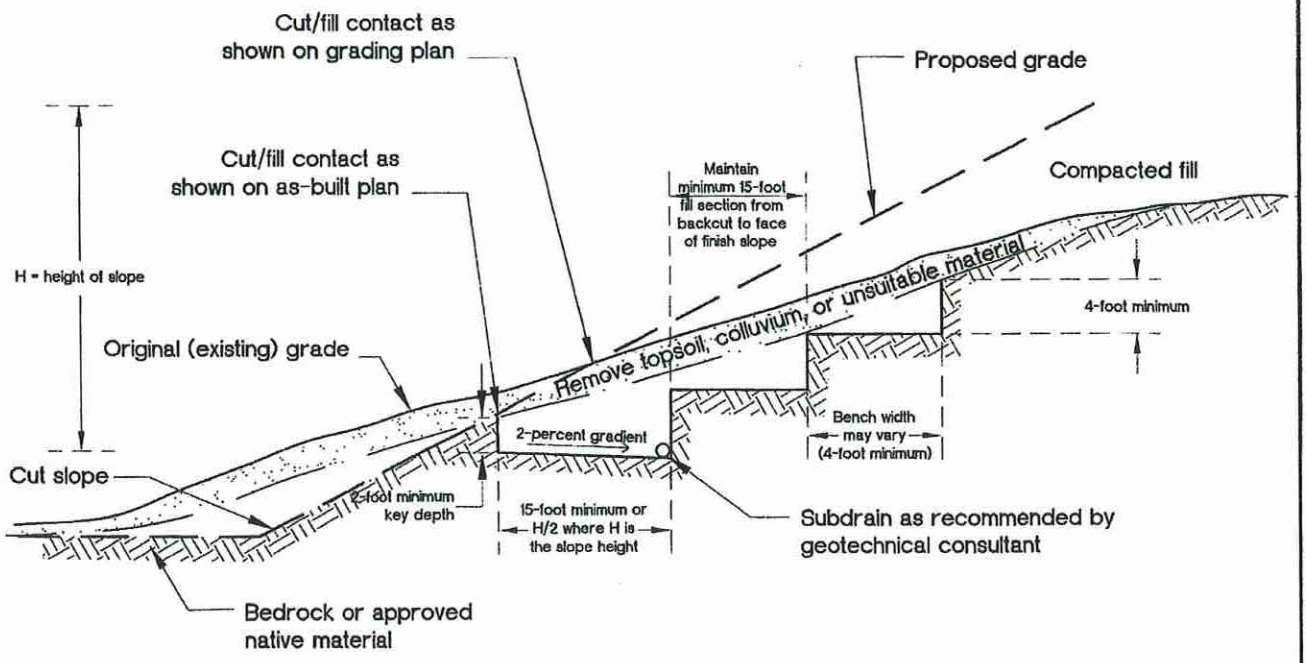


NOTES:

1. Where the natural slope approaches or exceeds the design slope ratio, special recommendations would be provided by the geotechnical consultant.

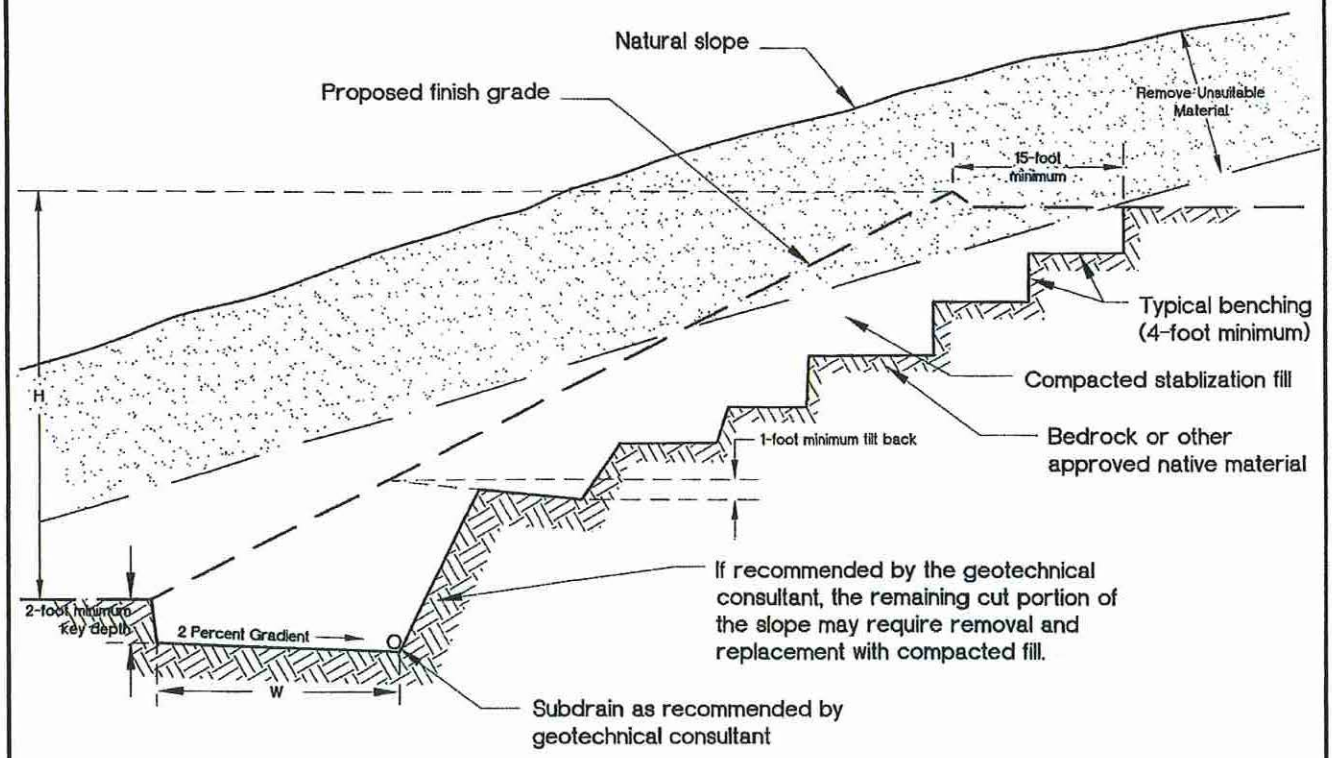
2. The need for and disposition of drains should be evaluated by the geotechnical consultant, based upon exposed conditions.

SOUTH SHORE TESTING	FILL OVER NATURAL (SIDEHILL FILL) DETAIL	Plate 7



NOTE: The cut portion of the slope should be excavated and evaluated by the geotechnical consultant prior to construction of the fill portion.

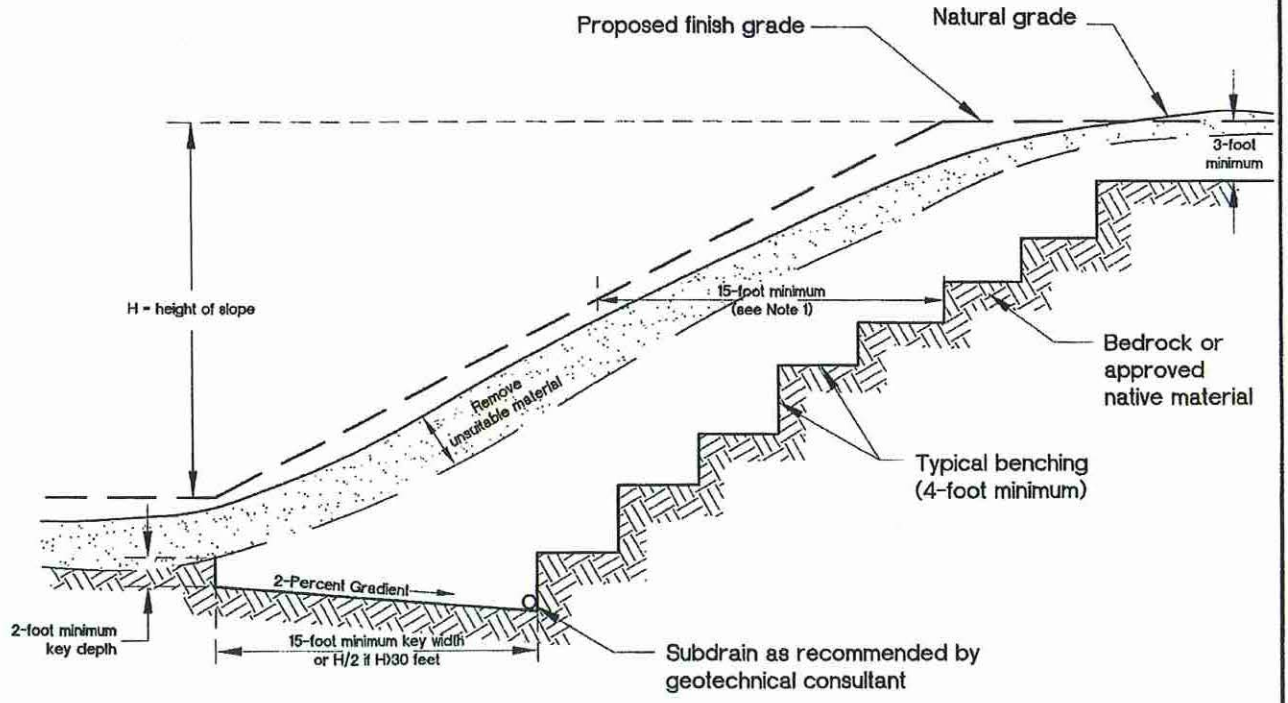
SOUTH SHORE TESTING	FILL OVER CUT DETAIL	Plate 8



NOTES:

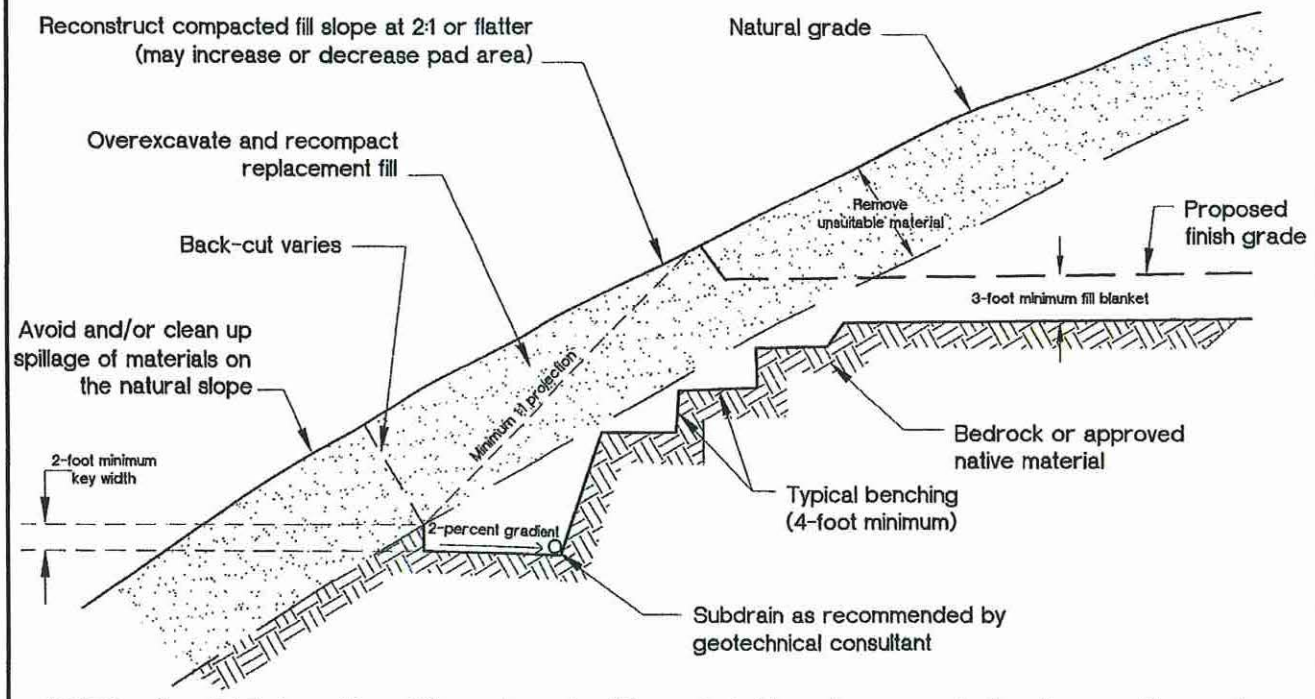
1. Subdrains may be required as specified by the geotechnical consultant.
2. W shall be equipment width (15 feet) for slope heights less than 25 feet. For slopes greater than 25 feet, W shall be evaluated by the geotechnical consultant. At no time, shall W be less than H/2, where H is the height of the slope.

SOUTH SHORE TESTING	STABLIZATION FILL FOR UNSTABLE MATERIAL EXPOSED IN CUT SLOPE DETAIL	Plate 9



NOTES:
1. 15-foot minimum to be maintained from proposed finish slope face to backcut.
2. The need and disposition of drains will be evaluated by the geotechnical consultant based on field conditions.
3. Pad overexcavation and recompaction should be performed if evaluated to be necessary by the geotechnical consultant.

SOUTH SHORE TESTING	SKIN FILL OF NATURAL GROUND DETAIL	Plate 10

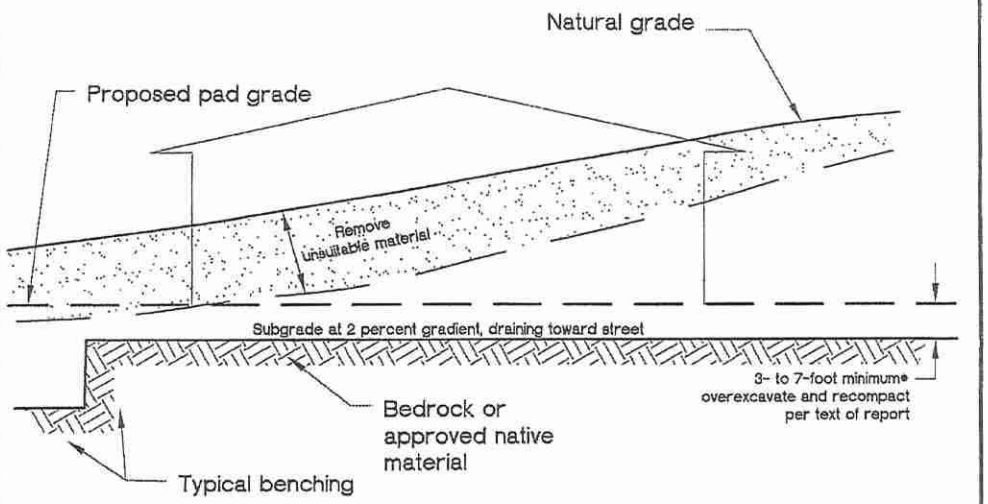


NOTES:

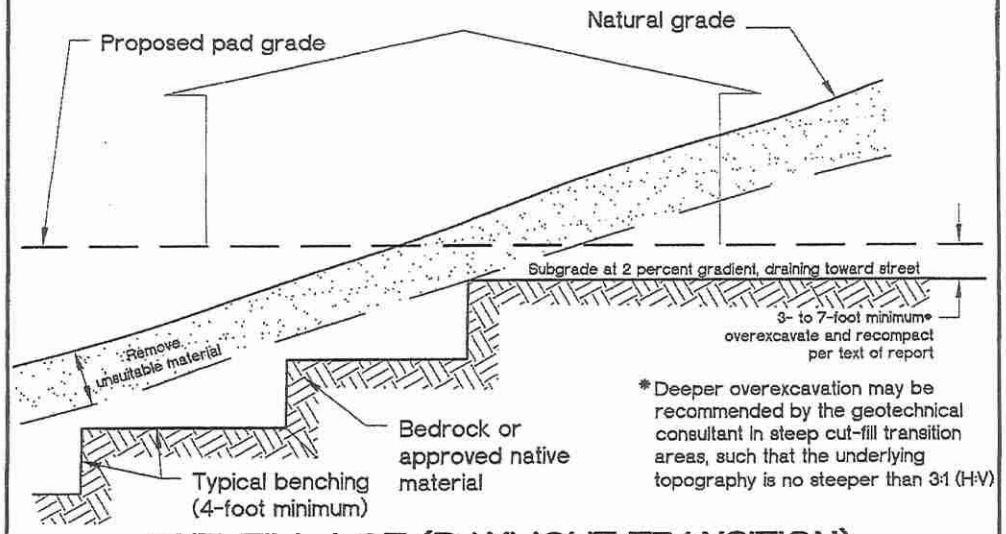
1. Subdrain and key width requirements will be evaluated based on exposed subsurface conditions and thickness of overburden.

2. Pad overexcavation and recompaction should be performed if evaluated necessary by the geotechnical consultant.

SOUTH SHORE TESTING	DAYLIGHT CUT LOT DETAIL	Plate 11



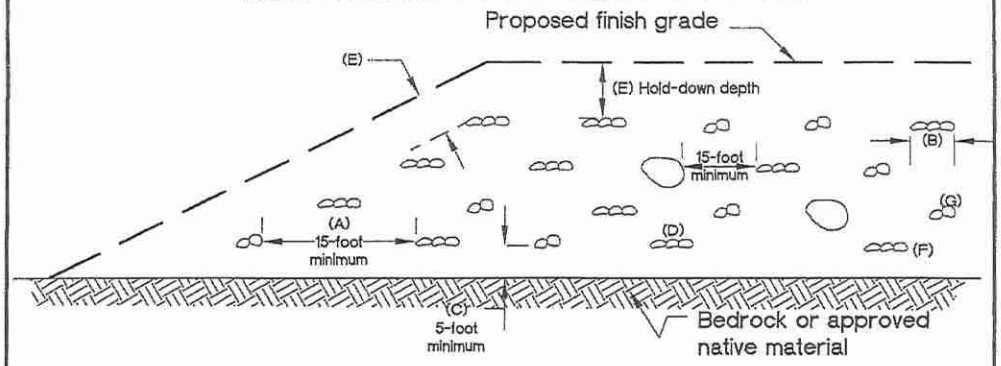
CUT LOT OR MATERIAL-TYPE TRANSITION



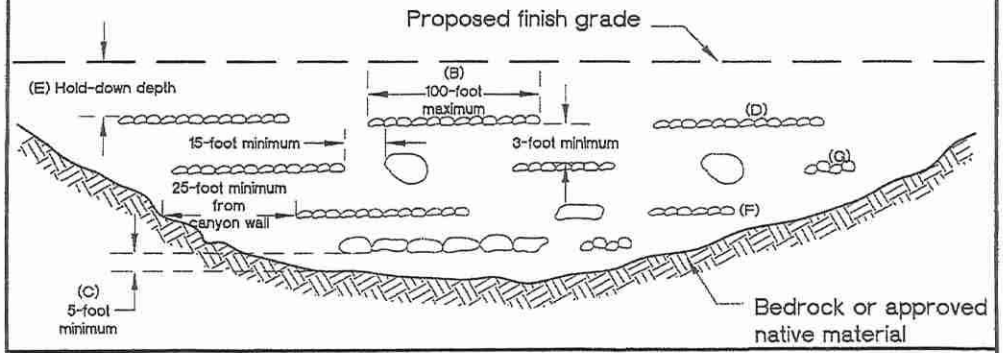
CUT-FILL LOT (DAYLIGHT TRANSITION)

SOUTH SHORE TESTING	TRANSITION LOT DETAILS	Plate 12

VIEW NORMAL TO SLOPE FACE



VIEW PARALLEL TO SLOPE FACE



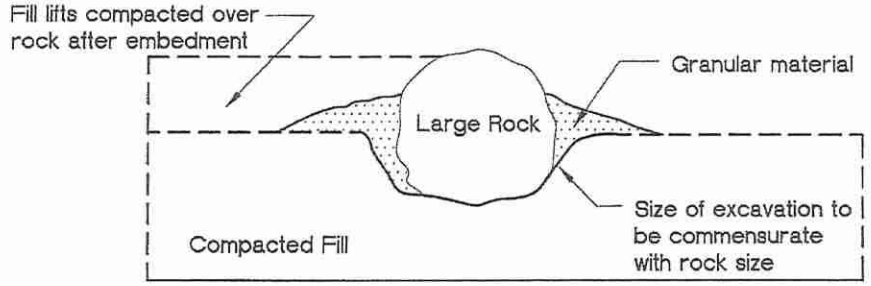
NOTES:

A. One equipment width or a minimum of 15 feet between rows (or windrows).
B. Height and width may vary depending on rock size and type of equipment. Length of windrow shall be no greater than 100 feet.
C. If approved by the geotechnical consultant, windrows may be placed directly on competent material or bedrock, provided adequate space is available for compaction.
D. Orientation of windrows may vary but should be as recommended by the geotechnical engineer and/or engineering geologist. Staggering of windrows is not necessary unless recommended.
E. Clear area for utility trenches, foundations, and swimming pools: Hold-down depth as specified in text of report, subject to governing agency approval.
F. All fill over and around rock windrow shall be compacted to at least 90 percent relative compaction or as recommended.
G. After fill between windrows is placed and compacted, with the lift of fill covering windrow, windrow should be proof rolled with a D-9 dozer or equivalent.

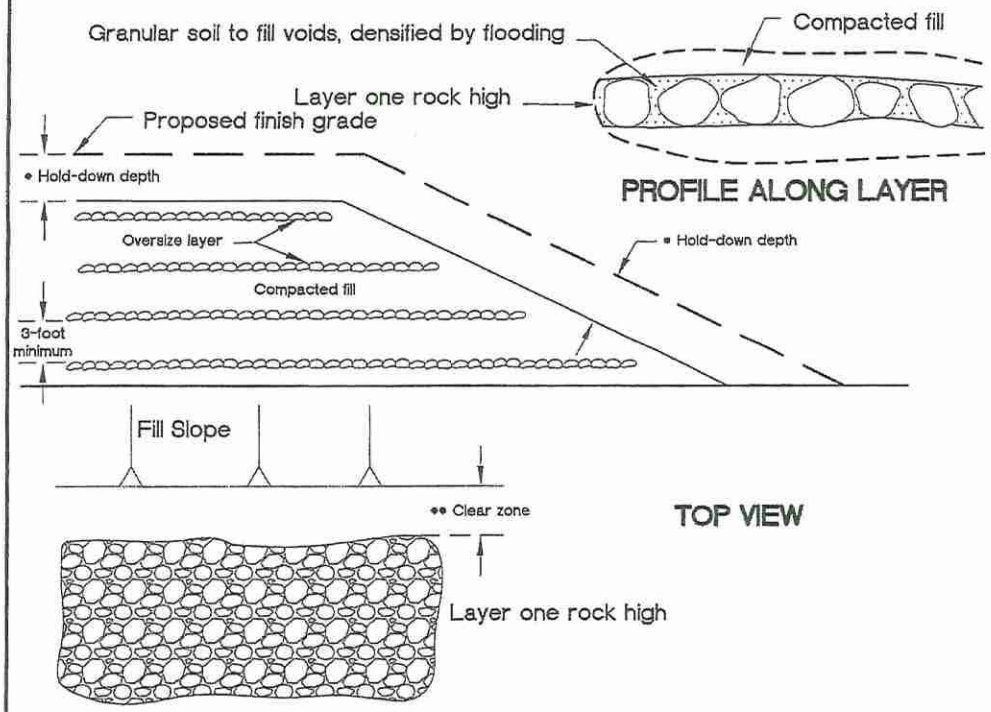
VIEWS ARE DIAGRAMMATIC ONLY AND MAY BE SUPERSEDED BY REPORT RECOMMENDATIONS OR CODE
ROCK SHOULD NOT TOUCH AND VOIDS SHOULD BE COMPLETELY FILLED

SOUTH SHORE TESTING	OVERSIZE ROCK DISPOSAL DETAIL	Plate 13

ROCK DISPOSAL PITS



ROCK DISPOSAL LAYERS



• Hold-down depth or below lowest utility as specified in text of report, subject to governing agency approval.
•• Clear zone for utility trenches, foundations, and swimming pools, as specified in text of report.

VIEWS ARE DIAGRAMMATIC ONLY AND MAY BE SUPERSEDED BY REPORT RECOMMENDATIONS OR CODE
ROCK SHOULD NOT TOUCH AND VOIDS SHOULD BE COMPLETELY FILLED IN

SOUTH SHORE TESTING	ROCK DISPOSAL DETAIL	Plate 14

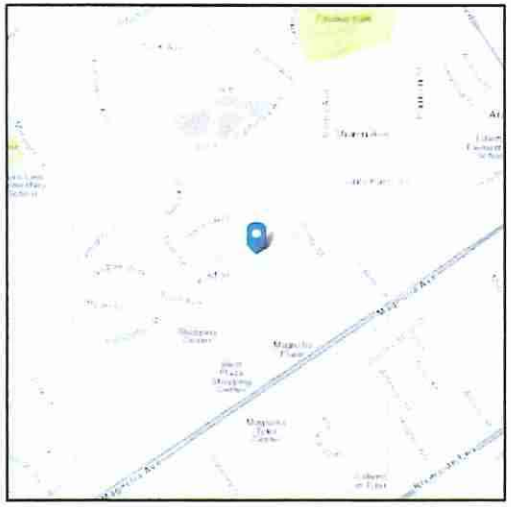
APPENDIX E

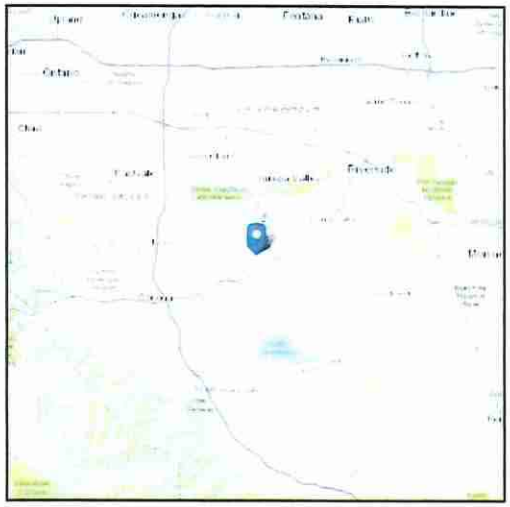
ASCE 7 Hazards Report

ASCE 7 Hazards Report

Address:
No Address at This Location

Standard:	ASCE/SEI 7-16	**Elevation:**	752.03 ft (NAVD 88)
Risk Category:	II	**Latitude:**	33.9172
Soil Class:	C - Very Dense Soil and Soft Rock	**Longitude:**	-117.4619





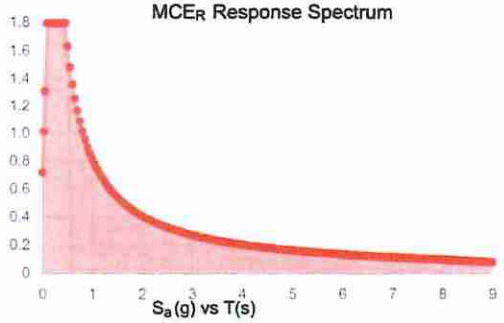
Seismic

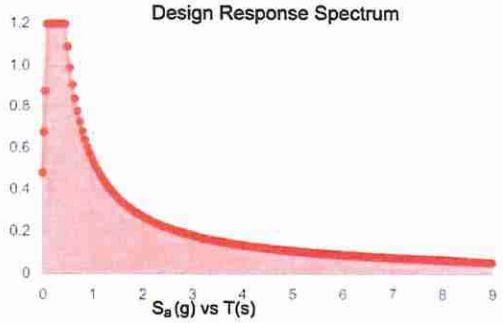
Site Soil Class: C - Very Dense Soil and Soft Rock

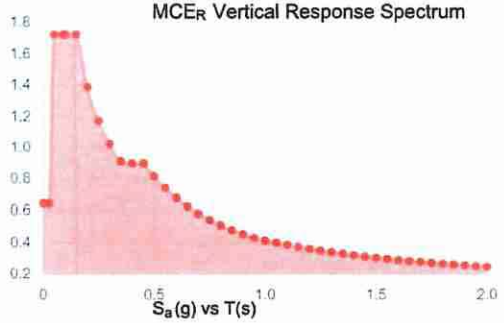
Results:

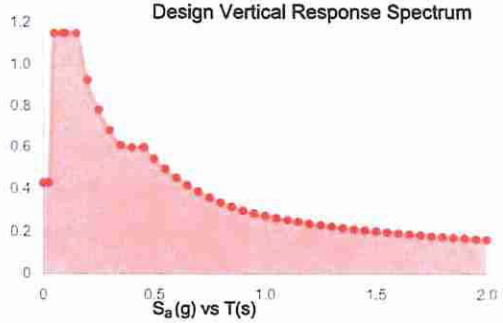
S_S :	1.5	S_{D1} :	0.545
S_1 :	0.574	T_L :	8
F_a :	1.2	PGA :	0.511
F_v :	1.426	PGA_M :	0.613
S_{MS} :	1.8	F_{PGA} :	1.2
S_{M1} :	0.818	I_e :	1
S_{DS} :	1.2	C_v :	1.2

Seismic Design Category D









Data Accessed: Mon Jan 17 2022

Date Source:
USGS Seismic Design Maps based on ASCE/SEI 7-16 and ASCE/SEI 7-16 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-16 Ch. 21 are available from USGS.

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