SIERRA GEOTECHNICAL SERVICES, INC.

ENVIRONMENTAL • GEOTECHNICAL • GEOLOGY • HYDROGEOLOGY • MATERIALS TESTING

July 10, 2025 Project No. 3.32183

474 Joaquin LLC
1055 Ashbury Street
San Francisco, CA 94117

Subject: **UPDATE GEOTECHNICAL INVESTIGATION**
474 Joaquin Road
Mammoth Lakes, California

Reference: **PRELIMINARY GEOTECHNICAL INVESTIGATION**
The Tallus Project
Mammoth Lakes, California
SGSI Project No 3.30496; Dated February 5, 2004

In accordance with your request, we herein submit the results of our supplemental geotechnical investigation for the 474 Joaquin Road residential project. The purpose of this investigation is to update the foundation and earthwork recommendations included in our 2004 report, based on additional subsurface data obtained for the new site design and to reassess site seismicity in accordance with the 2022 California Building Code (CBC), and Town of Mammoth Lakes Standards. Our work was performed in accordance with our executed Work Order Agreement dated March 31st , 2025.

Future construction on the subject site is feasible from a geotechnical standpoint. The primary geologic and geotechnical constraints to development are the potential for strong ground shaking from seismic hazards, and to a lesser degree stream course water seepage from snowmelt runoff.

The project is presently in conceptual design. Therefore, grading and foundation plans should be prepared in accordance with the recommendations contained within this report. As part of the review process, both plans should be submitted to our office to ensure conformance with our recommendations.

The conclusions and recommendations presented herein are considered site specific and should not be extrapolated to other areas or used for other projects.

We appreciate the opportunity to be of service to you. Should you have any questions regarding this report, please do not hesitate to contact us.

Respectfully,

SIERRA GEOTECHNICAL SERVICES, INC.

Joseph A. Adler
Principal Geologist
CEG 2198 (exp 3/31/2027)

Thomas A. Platz
Principal Engineer
PE C41039 (exp 3/31/2027)

UPDATE GEOTECHNICAL INVESTIGATION

FOR THE

474 JOAQUIN ROAD

MAMMOTH LAKES, CALIFORNIA

JULY 10, 2025
PROJECT NO. 3.32183

Prepared By:

SIERRA GEOTECHNICAL SERVICES, INC.
P.O. Box 5024
Mammoth Lakes, California 93546

www.sgsi.us

TABLE OF CONTENTS

PAGE

LIST OF ATTACHMENTS

1. PURPOSE AND SCOPE

This report presents the results of our supplemental geotechnical investigation for the proposed 18 building residential project to be constructed on the three contiguous parcels located at 474, 562, and 2604 Joaquin Road, in the Town of Mammoth Lakes, California (Figure 1).

The purpose of this investigation is to update the foundation and earthwork recommendations from our 2004 report based on additional subsurface data obtained for the new site design. This update also serves to bring the recommendations current with the latest requirements of the 2022 California Building Code (CBC) and Town of Mammoth Lakes standards, including a reassessment of site seismicity. The scope of this study included a review of the following:

- A review of readily available published and unpublished geotechnical literature, topographic maps, geologic maps, fault maps, and aerial photographs.
- A review of our above referenced geotechnical report.
- A review of Architectural Plans and Details – 474 Joaquin Road. Prepared Stanley Saitowitz Natoma Architects Inc. Pre-App Set PDF dated December 20, 2024.
- A review of the Preliminary Grading and Drainage Plans – 474 Joaquin Road. Prepared BKF Engineers Inc. PDF dated March 21, 2025.
- Performance of a subsurface exploration consisting of the excavation, logging, and sampling of 7 exploratory test pits in the site area. Bulk soil samples were obtained at selected intervals from the test pits and transported to our in-house geotechnical laboratory for analysis.
- Laboratory testing of the representative soil samples to evaluate soil properties for design purposes.
- Geologic and geotechnical evaluation and analysis of the collected field and laboratory data.
- Preparation of this written report presenting the results of our findings, conclusions, geotechnical recommendations, and construction considerations for the proposed development.

2. SITE DESCRIPTION

The project is located approximately 3.25 miles west of the intersection of State Highway 395 and State Highway 203 in Mammoth Lakes, Mono County, California (Figure 1). More specifically, the site is situated on the west side of Joaquin Road approximately 150-feet northwest its intersection with Meridian Boulevard. Site coordinates are 37.6409, -118.9775.

The subject property includes Assessor's Parcel Numbers (APNs) 033-170-003, 033-170-004 and 003-170-005. The parcels are rectangular in shape and slope gently to the northeast, with a combined total area of approximately 3.24 acres. Structures are located on parcels 003 and 004, which contain an approximately 3- to 4-foot-tall rock wall, and an existing single-family residence, respectively. Flowing stream drainages and culverts traverse parcel 004. Minor construction debris and material storage areas were observed on 003 and 004 parcels. On-site vegetation consists of a moderate density of pine trees, grasses, and groundcover.

3. PROPOSED DEVELOPMENT

Based upon a review of the preliminary project site plan, the development will include construction of 18, three-story townhomes building with attached garages, paved roadways, and parking areas, storm drainage, utilities, landscaping, and other appurtenances.

Foundations though not yet designed, will likely include shallow concrete strip and spread footings, retaining walls, as well as slab-on-grade.

This project is still in the design process. SGSI should therefore review final grading and foundation plans prior to construction to assure that they will be in conformance with our recommendations.

4. PREVIOUS FIELD WORK

As part of our 2004 study, one exploratory test pit (TP-1A) was excavated within the project area on December 23, 2003, using a Case excavator equipped with a 24-inch bucket. The log of TP-1A, along with laboratory test results obtained from samples collected within the test pit, is included in this report. The approximate location of TP-1A is shown on Figure 2.

5. GEOLOGIC AND GEOTECHNICAL SITE CONSTRAINTS

Geotechnical constraints to development include the potential for moderate ground shaking (Mw~6.6) along the nearby Hartley Springs fault located approximately 1.36-miles northwest of the subject site. Additionally, shallow groundwater seepage and the presence of mottled soils were observed throughout the site.

6. SUBSURFACE CONDITIONS

As observed during our 2004 and 2025 investigations, the site areas are underlain up to approximately 2 to 6-feet of surficial soils (undocumented fill and topsoil) which are underlain by competent native granular alluvial deposits.

Logs of the subsurface conditions encountered in exploratory test pits are provided in Appendix A. The approximate location of the exploratory test pits as well as the approximated depth of the unsuitable soils are shown on the Subsurface Location Map (Figure 2). Details of the laboratory testing are presented in Appendix B. Generalized descriptions of the materials encountered during this investigation follow.

6.1 Groundwater

Groundwater seepage was encountered in all test pits except TP-1A, which was excavated in December 2023 well after runoff had subsided. Although no seepage was observed in TP-1A at the time of excavation, mottled soils indicative of a seasonally high groundwater table were noted. Moderate to heavy seepage conditions were observed in the other test pits at depths ranging from approximately 2 to 6 feet below ground surface.

Excavations performed in the spring and early summer and/or near drainage outlets should anticipate some seepage. Where pad grades will be set at or near existing grade, a perimeter footing drain system may need to be installed to mitigate against potential moisture intrusion (see Section 21.1).

Subsurface strata which would retard the flow of water downward were not observed during the investigation.

7. FAULTING

The subject site is not underlain by known active or potentially active faults (i.e., faults that exhibit evidence of ground displacement in the last 11,000 years and 2,000,000 years, respectively). The site is **not** located within an Alquist-Priolo Earthquake Fault zone. However, the site is in a seismically active area and the potential for strong ground motion is considered significant. The closest active fault to the site is the Hartley Springs fault located 1.36-mi northwest of the subject site. A brief description of this fault zone is included herein.

7.1 Hartley Springs Fault Zone

The Hartley Springs fault is a significant high-angle, down-to-east normal fault along the eastern front of central Sierra Nevada, extending from the Mono Craters ring-fracture system into Long Valley caldera.

Although no detailed studies have been conducted along the Hartley Springs fault zone, the offset of several middle Pleistocene to latest Holocene deposits have been measured (Bailey and others, 1976; Clark and others, 1984; Bryant, 1984). Significant spatial and temporal variability in slip rates (Bryant, 1984), rate may have increased during middle Pleistocene (following Bishop tuff eruption) and decreased during late Pleistocene. Estimates of vertical slip-rate range from 0.15 mm/yr. (Clark and others, 1984) to 0.4 mm/yr. (Kistler, 1966 #5580; in Bryant, 1984).

8. CBC SEISMIC DESIGN PARAMETERS

Table I presents the Seismic Parameters for use in preparing a Design Response Spectra for the site. Site coordinates are 37.6409, -118.9775.

TABLE I

SEISMIC PARAMETER (ASCE 7-16; CBC 2022)	RECOMMENDED VALUE
Risk Category	II
Site Class	D – Default
S_S	1.595
S_1	0.511

S_{MS}	1.914
S_{DS}	1.276
F_a	1.2
PGA/PGA_M	0.681/0.817

Conformance to the above criteria for strong ground shaking does not constitute any kind of guarantee or assurance that significant structural damage or ground failure will not occur during a large magnitude earthquake. Design of structures should comply with the requirements of the governing jurisdictions, building codes, and standard practices of the Structural Engineers Association of California.

9. SECONDARY EARTHQUAKE EFFECTS

Secondary effects that can be associated with severe ground shaking following a relatively large earthquake include ground rupture, soil lurching, liquefaction, dynamic settlement, avalanches, and lateral spreading. These secondary effects of seismic shaking are discussed in the following sections.

9.1 Ground Rupture

Our review of available geologic literature indicated that there are no known active, potentially active, or inactive faults that transect the subject site. Therefore, surface ground rupture is not a concern.

9.2 Soil Lurching

Soil lurching refers to the rolling motion on the ground surface by the passage of seismic surface waves. Effects of this nature are likely to be most severe where the thickness of soft sediments varies appreciably under structures. In its present condition, the potential for lurching at the subject site is considered low due to the minor presence of potentially compressible soils within the upper few feet of material below existing grades. The potential for lurching may be greatly reduced if the potentially compressible soils are removed and properly compacted during grading, as per the earthwork recommendations provided herein.

9.3 Liquefaction

The project site is not located within any areas zoned for liquefaction hazards by local/state jurisdictions. Liquefaction of cohesionless soils can be caused by strong vibratory motion due to earthquakes. Liquefaction is characterized by a loss of shear strength in the affected soil layers, thereby causing the soil to behave as a viscous liquid. This effect may be manifested at the ground surface by settlement and, possibly, sand boils where insufficient confining overburden is present over layers. In order for the potential effects of liquefaction to be manifested at the ground surface, the soils generally have to be granular, loose to medium-dense and saturated relatively near the ground surface and must be subjected to ground shaking of sufficient magnitude and duration.

Though groundwater is relatively shallow, and site soils granular, based upon our experience, soil density increases greatly with depth. Therefore, the potential for liquefaction and dynamic settlement are considered low.

9.4 Dynamic Settlement

Foundations will either bear upon competent native deposits, or compacted fill. In either case, foundations will not be impacted by the shallow unsuitable surficial soils and therefore the potential for dynamic settlement will be greatly reduced and/or negated.

9.5 Snow Avalanches and Rockslides

Avalanches and rockslides can be triggered by moderate to large earthquakes in alpine terrain, resulting in the downslope movement of snow and/or rock in both vertical and lateral directions. These hazards typically impact structures located at the base of steep slopes or within the potential flow path. Based on site topography and location, the potential for avalanche impacts at the subject site is considered remote.

9.6 Lateral Spreading

Lateral spreading refers to landslides that form on gentle slopes as a result of seismic activity and have a fluid like movement. It differs from slope failures in that complete ground failure involving large movement does not occur due to the relatively smaller gradient of the initial ground surface. Soil types that are highly susceptible to lateral spread include silts and shale. Soils in the immediate vicinity of the building site consist of dense, sands with minor amounts of fines. Based on these findings, lateral spreading is not expected to occur on the site.

10. EXPANSIVE SOILS

Expansive soils are soils that shrink/swell when subjected to moisture. Shrink/swell potential is the relative change in volume to be expected with changes in moisture content; that is, the extent to which the soil shrinks as it dries or swells when it gets wet. The extent of shrinking and swelling is influenced by the amount and kind of clay in the soil. Shrinking and swelling of soils causes damage to building foundations, roads, and other structures. On-site soils consist of silty, fine to coarse sands. Based on these findings, there is a *very low* expansion potential at the site.

11. VOLCANIC HAZARDS

The Town of Mammoth Lakes sits within an active volcanic area. The most significant potential sources of volcanic activity are the Mono-Inyo Craters and the resurgent dome within the Long Valley caldera.

Future eruptions in the Mammoth Lakes area are certain to occur, but they can be neither reliably predicted nor prevented. The odds of an eruption occurring in any given year are very low. The Mono Lake-Long Valley region is currently being monitored by several agencies and institutions to detect signs of any magmatic unrest and approaching eruptions.

12. ASBESTOS

Naturally occurring Asbestos is not present in the project area.

13. RADON

Radon gas is known to be present in the Mammoth Lakes area. However, the presence and amounts of the gas can be highly variable over short distances. So, while one site or structure may contain high concentrations of the gas, an adjacent building may contain limited amounts.

With respect to the site area, Radon levels are unknown. A passive mitigation system may need to be incorporated during construction. Therefore, a Radon specialist should be consulted.

14. SUBSIDENCE

The subject site is located not within an area known for past cases of substantial subsidence due to fluid removal. It is our opinion that the potential for significant subsidence due to the extraction of fluids is negligible. Soils subject to hydro-collapse, such as loose cemented silty and clayey soils were not noted in the test pits. Significant soil settlement associated with wetting of the subgrade materials is not anticipated.

15. FLOOD HAZARDS

Based upon a review of the FEMA Flood Hazards areas map 06051C1388D, 2/18/2011) for the Mammoth Lakes area the site is in Zone X outside of a special flood and/or 0.2% annual chance flood plain.

16. CONCLUSIONS

Based upon the results of this study, it is our opinion that geologic hazards at the site area are minimal and any future construction within, is feasible from a geologic and geotechnical standpoint. The following more explicitly summarize our findings.

- There are no known active, potentially active, or inactive faults that transect the subject site. Evidence of past soil failures, or landslides on the site were not encountered.
- Seismic hazards at the site may be caused by ground shaking during seismic events on regional active faults. The nearest known active regional fault is the Hartley Springs fault located approximately 1.36-mi northwest of the site.
- A volcanic eruption could occur somewhere along Mono-Inyo Craters volcanic chain producing pyroclastic flows and surges, as well as volcanic ash and pumice fallout, which could significantly impact the subject site. The odds however, of such an eruption are very low.
- Radon gas levels at the site area are unknown, but likely exist. Radon though can be mitigated during construction by installation of passive mitigation system.
- The site is located within FEMA Flood Zone X - outside of a special flood and/or 0.2% annual chance flood plain.
- Groundwater seepage was encountered in all test pits except TP-1A, which was excavated in December 2023 well after runoff had subsided. Although no

seepage was observed in TP-1A at the time of excavation, mottled soils indicative of a seasonally high groundwater table were noted. Moderate to heavy seepage conditions were observed in other the test pits at depths ranging from approximately 2 to 6 feet below ground surface.

- Excavations performed in the spring and early summer during the snowmelt runoff and/or near drainage outlets should anticipate some groundwater seepage. Where pad grades will be set at or near existing grade, perimeter footing drain systems may need to be installed to mitigate against potential moisture intrusion (see Section 21.1).

- Site soils encountered during our field investigation generally consist of loose to dense, very fine to coarse-grained sands, with abundant gravels, cobbles, and boulders.

- As observed during our 2004 and 2025 investigations, the site areas are underlain up to approximately 2 to 6-feet of surficial soil deposits – undocumented fill and topsoil - which are underlain by competent native granular alluvial deposits. Due to density, debris, and organics, the fill and topsoil are considered unsuitable for both foundation and new fill support and should be removed from all structural areas within the site.

- The depth of the unsuitable soils is based upon the areas observed during the field investigation. It should be anticipated that the overall depth and extent of the unsuitable materials exposed during construction may vary from that encountered.

- Reasonably continuous construction observation and review during site grading and foundation installation should be employed. This will allow for evaluation of the actual soil conditions and the ability to provide appropriate revisions where required during construction.

- It should be noted that rock loss will be significant in this material and that on-site rock crushing should be considered and import soils may be required for fill and backfill areas.

- Subsurface strata which would retard the flow of water downward were not observed during the investigation.

- Excavations at the site will be achievable using standard earthmoving equipment.

17. RECOMMENDATIONS

The following sections provide preliminary geotechnical design recommendations which should be implemented during site development to mitigate site geologic constraints. Implementation of the recommendations included within this report and adherence to the CBC, does not, however, preclude property damage during or following a natural hazard.

The following recommendations should be adhered to during site development. These recommendations are based on empirical and analytical methods typical of the standard of practice in California. If these recommendations appear not to cover any specific feature of the project, please contact our office for additions or revisions to the recommendations.

17.1 Geotechnical Review

Geotechnical review is of paramount importance in engineering practice. The poor performance of many foundation and earthwork projects has been attributed to inadequate construction review. SGSI should be provided with the opportunity to review the following items, or we waive all liability for all geotechnical issues associated with grading and/or construction related to the subject site and project.

17.1.1 Plan and Specification Review

SGSI should review final grading and foundation plans prior to construction to assure that they are in conformance with this report; some of the recommendations contained herein may need to be revised after reviewing.

17.2 General Earthwork

Earthwork should be performed in accordance with the General Earthwork and Grading Specifications in Appendix C and the following recommendations. The recommendations contained in Appendix C are general grading specifications provided for typical grading projects. Some of the recommendations may not be strictly applicable to this project. The specific recommendations contained in the text of this report supersede the general recommendations in Appendix C. The contract between the developer and earthwork contractor should be worded such that it is the responsibility of the contractor to place the fill properly in accordance with the recommendations of this report and the specifications in Appendix C notwithstanding the testing and observation of the geotechnical consultant.

17.3 Site Preparation

Prior to grading, the proposed structural improvement areas (i.e., all structural fill, pavements areas and structural building, etc.) of the site should be cleared of surface and subsurface obstructions, including vegetation. Vegetation and debris should be disposed of offsite. Holes resulting from removal of buried obstructions, which extend below the recommended removal depths described herein or below finished site grades (whichever is lower) should be filled with properly compacted soil. Should existing underground utilities be encountered they should be completely removed and properly backfilled.

17.4 Earthwork

Site grading and excavation should be observed by SGSI. Such observations are considered essential to identify field conditions that differ from those anticipated by the investigation, to adjust design to actual field conditions, and to determine that the grading is accomplished in general accordance with the recommendations of this report. Recommendations for overexcavations and removal of unsuitable soils (remedial grading), and for mitigating cut/fill transition conditions are included below.

Site soils are suitable for use as compacted fill if they are processed in accordance with the recommendations in Appendix C. Approved fill soils should be placed in thin lifts (8-inches loose thickness) and moisture conditioned to at least optimum moisture content. All fills should be compacted to a minimum of 90-percent of the laboratory maximum dry density per ASTM D 1557.

General earthwork and grading recommendations which include guidelines for site preparation fill compaction, slope work, temporary excavations, and trench backfill are provided in Appendix C.

Remedial Grading: Up to approximately 2 to 6-feet of surficial soils, considered unsuitable for the support of new fill or structural loads, were observed on-site. See Figure 2 for approximate thickness of surficial soils. These soils shall be over-excavated and removed from within all structural areas. Excavations should extend to a minimum horizontal distance of at least 5-feet outside any building footprints. All removal bottoms should be observed (tested as needed) by the geotechnical consultant prior to placing fill soils, if any. Additional removals and recommendations are provided in Appendix C.

Cut/Fill Transitions: To reduce the potential for differential settlement, cut/fill transitions shall not be allowed below foundation elements. If this occurs, we recommend either of the following:

- Footings shall be deepened to extend into uniform competent native soils, and all soils below interior concrete slabs be undercut/removed so that slabs will be supported on at least a 2-foot-thick compacted fill mat. Excavations for deepened footings can be replaced up to structural depth with concrete, gravel, or min 2-sack slurry. Additionally, in lieu of the 2-foot fill mat, the slab may be designed to accommodate for differential settlements which conservatively speaking may be 1" static over 30'.

- Or footings in cut areas may be over-excavated to at least 2-feet below bottom of the deepest footing (all footings supported on a compacted fill mat), to a minimum horizontal distance of 5-feet beyond the footings, and the overexcavated area then replaced with screened native or import fill compacted to a minimum 90-percent.

17.5 Foundations

Foundations should be designed in accordance with structural considerations and the following recommendations. Strip and pad footings may be used to support the proposed structures. Site soils are non-reactive. Sulfate Exposure Class is "S0".

Continuous and isolated column foundations should be sized according to the allowable soil bearing pressures shown in Table II below. The pressures shown on Table II are for dead load and frequently applied live loads.

TABLE II

Allowable Soil Bearing Pressure (psf)	Lateral Resistance (psf/ft)	Friction Coefficient
3,000	300	0.35

The allowable pressure may be increased by one-third when considering loads of short duration such as wind or seismic forces. When combining passive pressure and frictional resistance, the passive pressure component should be reduced by one-third.

An increase of 500 psf in allowable bearing pressure may be applied for every additional 6 inches of embedment, up to a maximum of 4,000 psf.

Foundation reinforcement shall be designed in accordance with the structural engineer requirements.

17.6 Lateral Earth Pressures

The recommended equivalent fluid pressure for each case for walls founded above the static ground water and backfilled with select soils is provided in Table III. Wall footings should be designed in accordance with structural considerations.

TABLE III

Slope of Backfill Behind Retaining Wall	Active Pressure Non-restrained (psf/ft)	At-Rest Pressure restrained walls (psf/ft)
Level	30	45
2:1 Slope	45	60

Passive Resistance – 300 psf/ft.
Coefficient of friction against sliding - 0.35
Soil Unit Weight – 130 pcf

The passive resistance and coefficient of friction may be used in combination if there is a fixed structure, such as a floor slab over the toe of the retaining wall. If the two values are used in combination, the passive resistance value should be reduced by one-third.

Walls subjected to surcharge loads should be designed for an additional uniform lateral pressure equal to one-third the anticipated surcharge load for unrestrained walls, and one-half the anticipated surcharge load for restrained walls. Surcharge loading effects from the adjacent structures should be evaluated by the structural engineer.

Wall backfill should have an expansion index (EI) of no greater than 20 and a sand equivalent (SE) greater than 15. The backfill soils should be tested by the soils engineer prior to backfill operations starting for the retaining wall structures.

17.6.1 Dynamic Earth Pressures

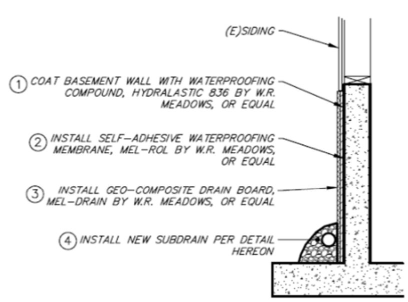
Seismic loading should be considered in the design of retaining walls over 6' using a horizontal seismic coefficient Kh = 0.2g. For cantilevered retaining walls, the seismic-induced pressure increment may be represented as an inverted triangular distribution, acting from the base of the wall stem to the top. For braced basement walls, the seismic increment may be modeled as a uniform (rectangular) pressure distribution applied from the base to the top of the wall.

17.7 Retaining Wall Drainage and Waterproofing

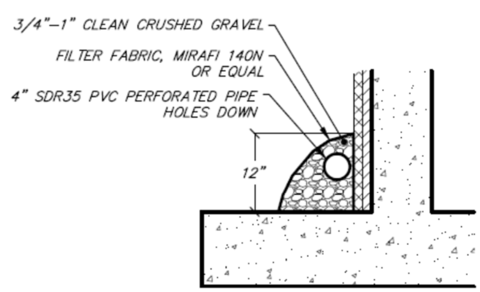
All retaining wall structures should be provided with appropriate drainage and waterproofing. Drainage should consist of continuous drains installed along the base of the wall out-letting to a storm drain system or the surface if grade allows.

Waterproofing shall consist of:

- Placement of a concrete joint sealer (WR Meadows SealTight or Eq.) at all cold joints (especially at any footing/wall interfaces) and within/over any rock pockets and any form tie penetrations.
- Placement of a flexible adhesive waterproofing membrane (Mel-Rol, Bituthene or eq) directly over the joint sealer.
- Placement of geo-composite drain board, over the waterproofing membrane.



WATERPROOFING DETAIL
NTS



④ SUBDRAIN DETAIL
NTS

The lateral earth pressures assume sufficient drainage behind the walls to prevent any build-up of hydrostatic pressures. If adequate drainage is not provided, we recommend that an additional equivalent fluid pressure of 40 pcf be added to the values recommended for both restrained and unrestrained walls.

17.8 Anticipated Settlement

The majority of the foundation settlement is expected to occur on initial application of loading. We estimate that the proposed structures, designed and constructed as recommended herein, and founded within compacted fill or native soils will undergo total settlement on the order of ½-inches. Differential settlement of up to ¼-inch over a horizontal span of 30-feet may be expected.

17.9 Foundation Construction

The following preliminary recommendations assume very low to low expansive soils near finish pad grade.

- Footings should be designed in accordance with the structural engineer's requirements. Exterior and interior foundations shall be founded within compacted fill or competent native soils.
- Exterior foundations shall have a minimum embedment depth of 24-inches below adjacent grade. Interior foundations shall have a minimum embedment depth of 12-inches below adjacent grade.
- Exterior site retaining wall footings < 24" thick and without slab over the toe of the footing, will require at least 18" of soil cover; interior - 12". All retaining wall footings > 24" in thickness, with or without slab, will require at least 12" of soil cover over the toe.
- Site exposure (freeze-thaw) category is midway F1/F2. Therefore, F2 should be considered.
- All footing excavations should be observed by a representative of SGSI prior to placement of reinforcing steel, to assure proper embedment into competent soils.
- Footing trenches should not have any rocks or boulders protruding into the trench bottom. Soft soil pockets created by rock removal during foundation excavation shall be replaced with approved fill material and compacted to 90-percent of the material's maximum dry density.

17.10 Foundation Setback

We recommend a minimum horizontal setback distance from the face of slopes for all structural footings and settlement-sensitive structures (i.e., fences, walls, signs, etc.). This distance is measured from the outside edge of the bottom of the footing, horizontally to the slope face (or to the face of a retaining wall). A **7-foot minimum** setback shall be established for the outside footing face (bearing elevation) to the finished grade slope face. We should note that the soils within a slope setback area possess poor long term lateral stability, and improvements (such as retaining walls, walkways, fences, pavement, underground utilities, etc.) constructed within this setback area may be subject to lateral movement and/or differential settlement.

Utility trenches that parallel or nearly parallel structural footings should not encroach within a 1:1 plane extending downward and outward to a lateral distance of 5-feet from the outside edge of the bottom of the footing.

17.11 Concrete Slab-on-Grade Floors

Interior: For design of concrete slab-on-grade floors and estimating their deflections, a modulus of subgrade reaction (K_s) of 200 pci for compacted fill and 250 pci for native soils, may be used. The value should be adjusted for larger areas, including mat-slabs, using the following expressions for cohesionless soil:

Square Footing: $K_{sf} = K_s \left[\frac{B+1}{2B}\right]^2$

Rectangular Footing: $K_{sf,rec} = K_s \frac{(1+\frac{0.5B}{L})}{1.5}$

Strip Footing: $0.67K_{sf}$

K_s = modulus of subgrade value
B = footing width, or least dimension of rectangular or strip
L = Length of footing

Slab thickness, control joints, and reinforcement shall meet the requirements of the Structural Engineer of record.

Concrete slabs should be underlain by a vapor barrier/retarder (Stego Wrap or equivalent - 15 mil minimum thickness), which is in turn underlain a 4-inch layer of ¾” crushed stone which will act as a capillary break. All penetrations and laps in the moisture barrier should be appropriately sealed. The membrane should have a high puncture resistance and should be installed so that there are no openings or holes. All seams should be overlapped and sealed at the laps per the manufacturer's recommendations. Where pipes extend through the membrane, the barrier should be sealed to the pipes.

Moisture retarders can reduce but not eliminate moisture vapor movement from the underlying soils up through the slab. We recommend that the floor coverings installer test the moisture vapor flux rate prior to attempting application of the flooring. "Breathable" floor coverings should be considered if the vapor flux rates are high. A slip-sheet should be used if crack sensitive floor coverings are planned.

The use of reinforcement in slabs and foundations will generally reduce the potential for drying and shrinkage cracking. However, some cracking may be expected as the concrete cures. Concrete cracking and/or spalling is often aggravated by a high cement ratio, high or low concrete temperature at the time of placement, small nominal aggregate size, rapid moisture loss, or the addition of water during placement. The use of low slump concrete (not exceeding 4-inches at the time of placement), a water-cement ratio no greater than 0.45 by weight, and proper curing methods can reduce the potential for shrinkage cracking.

Exterior Concrete Flatwork: Concrete flatwork should be a minimum 4-inches in thickness and should be supported by very low expansion subgrade soils (EI < 20) compacted to at least 90-percent relative compaction. Flatwork should be reinforced with at least #3 rebar placed at slab mid-height on 18-inch centers, both ways. Flatwork subjected to vehicle traffic should be a minimum of 5-inches thick and underlain by at least 4-inches of Class II Base, compacted to at least 95-percent relative compaction. Crack control joints should be used and should have a maximum spacing of 5-foot on center each way for sidewalks, and 10-foot on center each way for slabs. A vapor retarder is not needed. Actual crack control joints and reinforcing should be designed by the project Civil Engineer.

Sand-Set Pavers: If sand-set pavers or flagstones are used for some exterior hardscape we recommend that they be placed in accordance with the manufacturer's recommendations. At a minimum, we also recommend that pavers be underlain by at least 4-inches of compacted Class II Aggregate Base, compacted to at least 95-percent relative compaction. A representative from our office should observe the subgrade conditions for all hardscape prior to placement of Base. Prior to placement of the Base, the subgrade soils should be scarified, and moisture conditioned to a depth of at least 6-inches, as necessary, and compacted in accordance with the compaction section of this report.

18. FLEXIBLE PAVEMENT RECOMMENDATIONS

Pavement sections were determined using the Caltrans method for design of flexible pavements. Traffic Indices utilized in this method of design are based on estimated equivalent axle loads over a period of 20 years. The pavement sections were designed for an *assumed* traffic loading, environmental conditions, and an R-value of 84 obtained from Obsidian Villas Phase II site. Based upon our experience, environmental conditions such as freeze-thaw and thermal cracking will most likely govern the life of the pavement.

TABLE IV

Traffic Index	Asphaltic-Concrete (AC) Thickness (inches)	Class II Aggregate Base (AB) (R=78) Thickness (inches)
5 or less	3	4
7	4	6

The Hot Mix Asphalt (HMA) construction process should follow the "method" process as described in Section 39 of the Caltrans Standard Specifications. HMA should be Type A using the Standard construction process complying with Section 39, "Hot Mix Asphalt" of the Standard Specifications. Asphalt binder to be mixed with the aggregate should conform to the provisions of Section 92, "Asphalts", of the Standard Specifications and should be Performance Graded Polymer Modified (PG Polymer Modified) Asphalt Binder PG 64-28 PM, if available. HMA shall be compacted to 92-96%.

Class II Aggregate Base shall all be compacted to a minimum of 95-percent of the material's maximum dry density as determined by ASTM D1557. Class II Aggregate Base should conform to Section 26 of the CSS. The top 12-inches of the subgrade shall be scarified and re-compacted to 95-percent. The subgrade shall be smooth and uniform, and true to the required grade and cross section.

19. CORROSION POTENTIAL

Based on corrosion potential testing performed on a soil sample collected during our 2004 investigation, the measured pH was 6.8, with chloride and sulfate concentrations both less than 50 ppm, and a soil resistivity of 10,010 ohm-cm. These results indicate that the site soils are non-corrosive and non-reactive. Accordingly, the Sulfate Exposure Class is classified as “S0” in accordance with ACI 318.

20. BULK/SHRINK AND ROCK LOSS ESTIMATES

Based upon estimated densities of compacted fills, native soils (3” minus) will shrink on the order of approximately 10-15% when over-excavated and compacted. Rock loss, however, will be much greater and is estimated near 25% of the over-excavated material.

21. DRAINAGE

Water should not be allowed to pond adjacent to buildings, and drainage should not flow uncontrolled over the top of, or down the face of, any descending slopes. Positive site drainage should direct runoff away from foundations and pavement areas; Site drainage should be directed to an approved drainage facility. Positive drainage may be accomplished by providing drainage away from buildings at a gradient of at least 5-percent for earthen surfaces for a distance of at least 10-feet away from the face of wall. If 10-feet cannot be achieved, an alternative of a gradient of at least 5-percent to an area drain or swale having a gradient of 2-percent is acceptable.

Planters with open bottoms adjacent to buildings should be avoided. Planters should not be designed adjacent to buildings unless provisions for drainage, such as catch basins, liners, and/or area drains, are made.

21.1 Sub-drainage

Groundwater seepage could be encountered during construction as well as after construction as a result of snowmelt runoff, rainfall, and/or landscape irrigation. To mitigate against any seepage, perimeter subdrains may need to be installed surrounding the structures. *The need for subdrainge can be evaluated on a case-by-case basis.* If needed, subdrains should be installed in accordance with the following recommendations:

- A 4-inch PVC or SDR 35 perforated pipe encapsulated within 12-inches of “clean” ¾ to 1-inch crushed aggregate, wrapped with filter fabric, should be placed at/or within 6-inches below the bottom of the continuous building perimeter footings.

- The maximum lateral distance away from the bottom of the footing, should be no greater than 12-inches.

- The pipe should outlet away from the building perimeter via a 4-inch non-perforated PVC "tight-line". The tight line should be outlet into an approved drainage device.

- Gradient of pipe flow should be maintained at a minimum of ½ to 1-percent. Following placement, the pipe should be field surveyed to ensure proper gradient of flow.

21.2 Crawlspace Protection

Crawlspace areas should be covered by at least a 4-inch-thick layer of clean crushed gravel aggregate which in turn is overlain by a 15-mil minimum thickness Stego-wrap moisture barrier. All penetrations and laps in the moisture barrier should be appropriately sealed. The membrane should have a high puncture resistance and should be installed so that there are no openings or holes. All seams should be overlapped and sealed at the laps per the manufacturer's recommendations. Where pipes extend through the membrane, the barrier should be sealed to the pipes. In addition, crawlspace areas shall be well ventilated.

22. CONSTRUCTION CONSIDERATIONS

Excavations will be required to construct retaining walls, footings, install utilities, and to remove locally weak or unsuitable soils. All excavations that will be deeper than 4-feet and will be entered by workers should be shored or sloped for safety in accordance with Occupational Safety and Health Administration (OSHA) standards. For *temporary excavations,* we recommend OSHA soil classification **Type B**.

Upon making the excavations, the soil classifications and excavation performance should be evaluated in the field by the geotechnical consultant on a case-by-case basis in accordance with the OSHA regulations. For trench or other excavations, OSHA requirements regarding personnel safety should be met using appropriate shoring (including trench boxes) or by laying back the slopes to no steeper than 1:1 in native deposits. Temporary excavations that encounter seepage may be shored or stabilized by placing sandbags or gravel along the base of the seepage zone. Excavations encountering seepage should be evaluated on a case-by-case basis. On-site safety of personnel is the responsibility of the contractor.

Excavation spoils should not be stockpiled adjacent to excavations as they can surcharge the soils and trigger failure. In addition, proper erosion protection is recommended to reduce the possibility for erosion of slopes during grading and building construction. Ultimately, it is the contractor's responsibility to maintain safe working conditions for persons on-site.

If earthwork is performed during the dry season, moisture conditioning will be required to raise the in-situ moisture contents to near optimum moisture content (per ASTM D1557). If earthwork is performed during or shortly after wet weather conditions, the moisture content of the onsite soils could be appreciably above optimum. Consequently, subgrade preparation and fill placement may be difficult. Additional recommendations for wet weather construction can be provided at the time of construction, if required.

23. GEOTECHNICAL OBSERVATION AND TESTING DURING CONSTRUCTION

The recommendations provided in this report are based on limited subsurface observations and geotechnical analysis. The interpolated subsurface conditions should be checked in the field during construction. Geotechnical observation and testing are required per the California Building Code (CBC). Geotechnical observation and/or testing should be performed by SGSI at the following stages:

- During grading (removal bottoms, fill placement, backfill, and compaction).
- After presoaking building pads and other concrete-flatwork subgrades, and prior to placement of aggregate base or concrete.
- Preparation of pavement subgrade and placement of aggregate base.
- After building and wall footing excavation and prior to placing concrete and/or reinforcement.
- When any unusual soil conditions are encountered during any construction operation subsequent to issuance of this report.

24. LIMITATIONS

This report has been prepared for the sole use and benefit of our client. The conclusions of this report pertain only to the site investigated. It should be understood that the consulting provided, and the contents of this report are not perfect. Any errors or omissions noted by any party reviewing this report, and/or any other geotechnical aspects of the project, should be reported to this office in a timely fashion. The client is the only party intended by this office to directly receive this advice. Unauthorized use of or reliance on this report constitutes an agreement to defend and indemnify Sierra Geotechnical Services Incorporated from and against any liability, which may arise as a result of such use or reliance, regardless of any fault, negligence, or strict liability of Sierra Geotechnical Services Incorporated.

Conclusions and recommendations presented herein are based upon the evaluation of technical information gathered, experience, and professional judgment. Other consultants could arrive at different conclusions and recommendations. Final decisions on matters presented are the responsibility of the client and/or the governing agencies. No warranties in any respect are made as to the performance of the project.

The findings of this report are valid as of the present date. However, changes in the conditions of a property can occur with the passage of time, whether they are 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 within this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and should not be relied upon after a period of three years.

25. REFERENCES

Bailey, R.A., (1989). Geologic Map of the Long Valley Caldera, Mono-Inyo Craters Volcanic Chain, and Vicinity, Eastern California: U.S. Geological Survey, Map I-1933, 1:1,000,000

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

FEMA (2011). FEMA Flood Insurance Rate Map, 06051C1388D, effective on 02/18

Hart, Earl W., and Bryant, William A (1999). Fault-rupture Hazard Zones in California, California Geological Survey Special Publication 42, 38p.

Hill, D.P., D. Dzurisin, W.L. Ellsworth, E.T. Endo, D.L. Galloway, T.M. Gerlach, M.J.S. Johnston, J. Langbein, K.A. McGee, C.D. Miller, D. Oppenheimer, and M.L. Sorey, 2002, Response plan for volcano hazards in the Long Valley caldera and Mono Craters region, California: U.S. Geological Survey Bulletin 2185, 58 p.

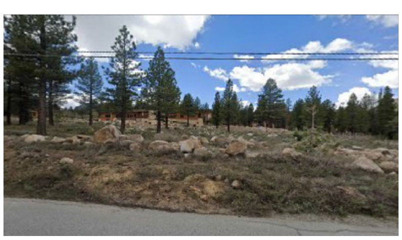
Miller, C.D., 1985, Holocene eruptions at the Inyo volcanic chain, California: Implications for possible eruptions in Long Valley caldera: Geology, v. 13, pp. 14-17.

Miller, C.D., 1989, Potential hazards from future volcanic eruptions in California: U.S. Geological Survey Bulletin 1847, 17 p.

Kistler, R.W., 1966, Geologic map of the Mono Craters quadrangle, Mono and Tuolumne counties, California: U.S. Geological Survey Geologic Quadrangle Map GQ-462, 1:62,500 scale.

Sieh, K.E., and M.I. Bursik, 1986, Most recent eruption of the Mono Craters, eastern central California: Journal of Geophysical Research, v. 91, n. B12, p. 12539-12571.

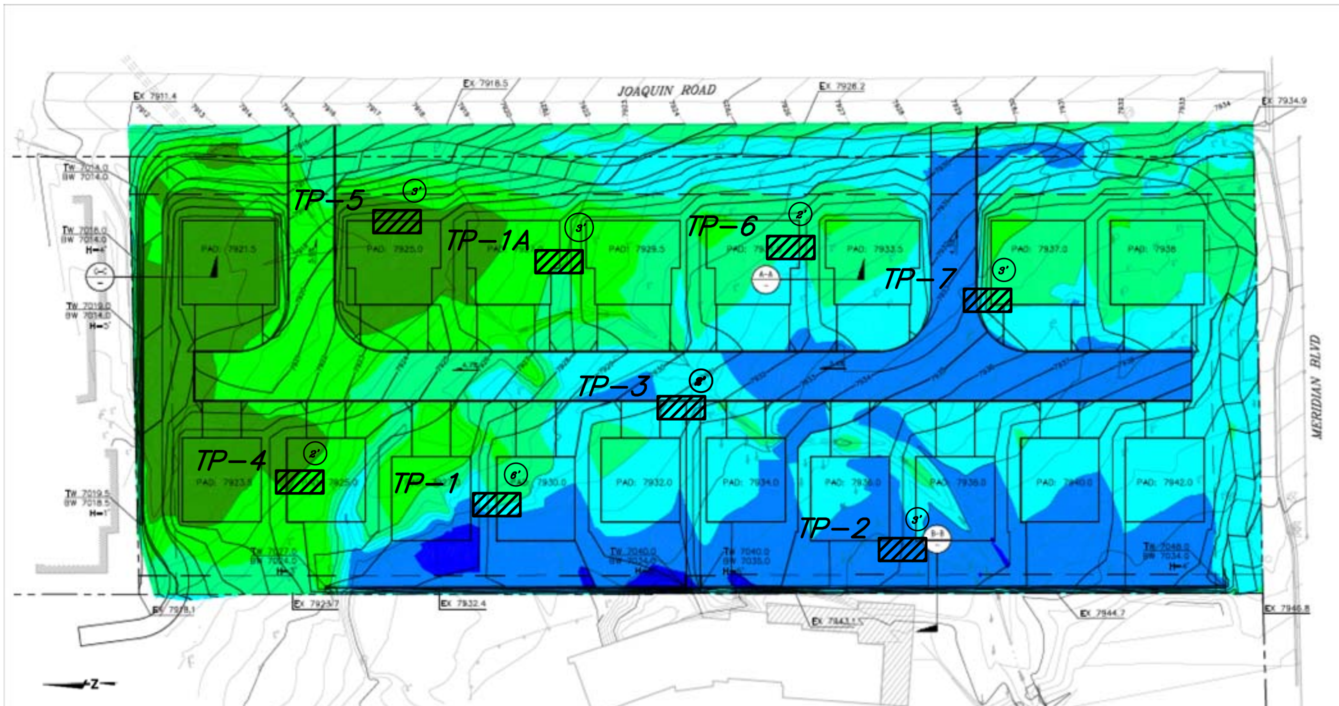
Sorey, M.L., B. Evans, M. Kennedy, J. Rogie, and A. Cook, 1999, Magmatic gas emissions from Mammoth Mountain, Mono County, California: California Geology, v. 52, n. 5, p. 4-16.



NOT TO SCALE

SIERRA GEOTECHNICAL SERVICES, INC.

PROJECT: VICINITY MAP 474 JOAQUIN ROAD	
SCALE: NTS	DATE: 7/2025
DRAWING: FIG1.DWG	DRAWN BY: JAA
JOB NO.: 3.32183	FIGURE: FIGURE 1



CUT / FILL SUMMARY

CUT (CY)	FILL (CY)	NET FILL (CY)
6,200	6,450	250

ABBREVIATIONS

CY	CUBIC YARD
EW	EDGE OF WALL
EX	EXISTING
FF	FINISH FLOOR
FL	FLOW LINE
FS	FINISH SURFACE
TC	TOP OF CURB
TW	TOP OF WALL

Elevations Table

Number	Minimum Elevation	Maximum Elevation	Color
1	-10'	-5'	
2	-5'	-2'	
3	-2'	0'	
4	0'	2'	
5	2'	5'	
6	5'	10'	

LEGEND

TP-7 — APPROXIMATE LOCATION OF EXPLORATORY TEST PIT (2025)

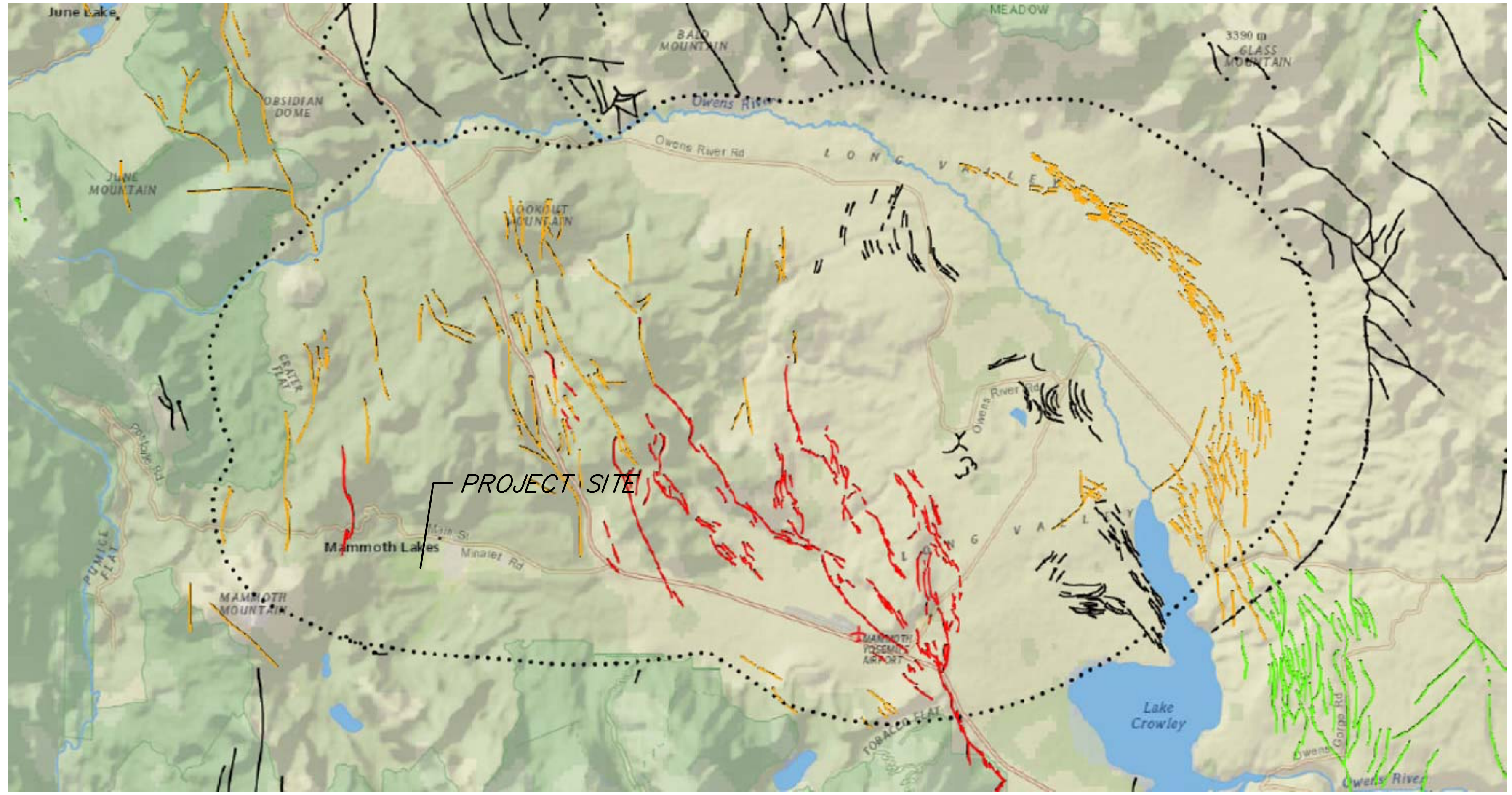
TP-1A — APPROXIMATE LOCATION OF EXPLORATORY TEST PIT (2004)

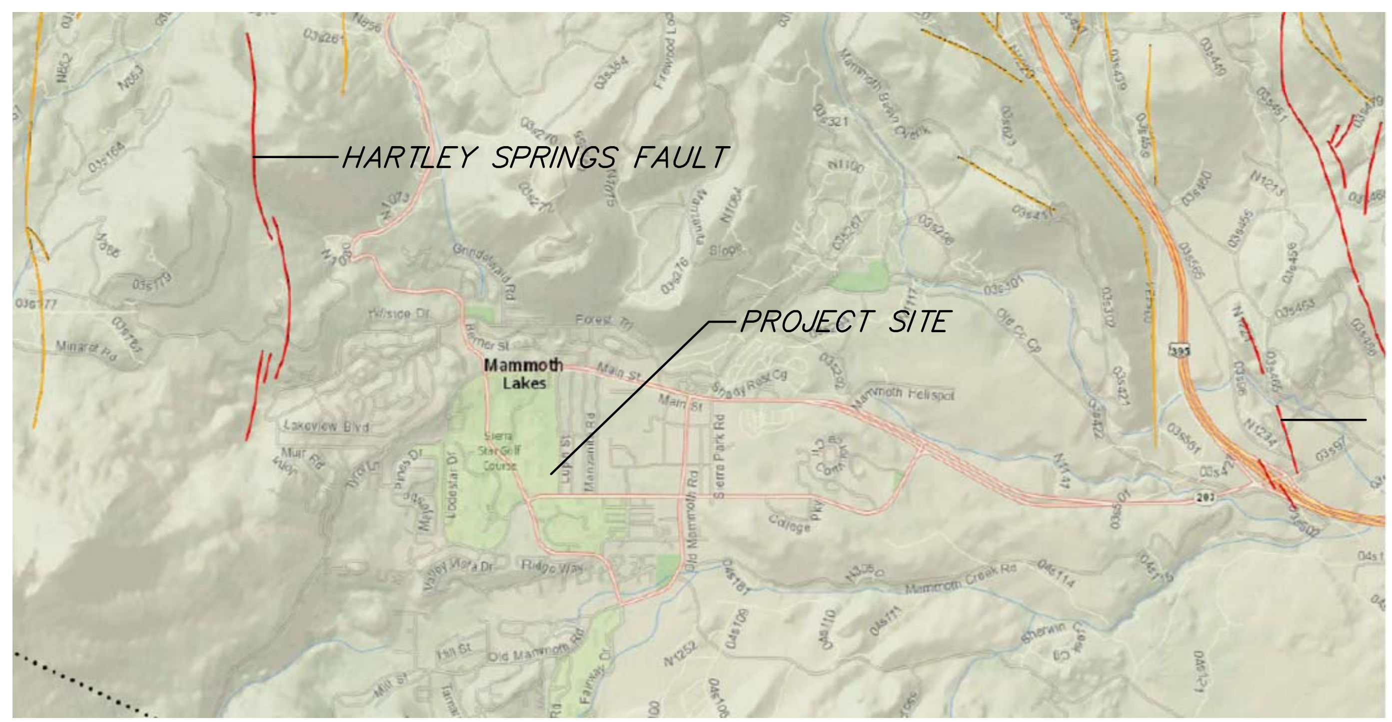
(4 1/2') APPROXIMATE DEPTH OF UNSUITABLE SOILS

GEOLOGIC CONTACT
AF = FILL
QAL = TOPSOIL/ALLUVIUM

SIERRA GEOTECHNICAL SERVICES, INC.

PROJECT:	SUBSURFACE LOCATION MAP 474 JOAQUIN ROAD		
SCALE:	NTS	DATE:	7/2025
DRAWING:	FIG2.DWG	DRAWN BY:	JAA
JOB NO.:	3.32183	FIGURE:	FIGURE 2





HISTORIC FAULTS, WELL CONSTRAINED

LATEST QUATERNARY, (<15000 YEARS) WELL CONSTRAINED

BOUNDARY OF LONG VALLEY CALDERA

PROJECT: GEOLOGIC HAZARDS MAP 474 JOAQUIN ROAD	
SCALE: NTS	DATE: 7/2025
COORDINATES: 37.6409,-118.9775	DRAWN BY: JAA
JOB NO.: 3.32183	FIGURE: FIGURE 3

SIERRA GEOTECHNICAL SERVICES, INC.

APPENDIX A

EXPLORATORY TEST PIT LOGS

A field investigation was conducted on May 9, 2025, and included the excavation of seven exploratory test pits (TP-1 through TP-7) using a Hitachi 60 USB excavator equipped with a 24-inch bucket. Logs of the test pits are included in this report, and generalized soil descriptions are provided in Section 6. The approximate locations of the test pits are shown on the Subsurface Geotechnical Map (Figure 2).

In addition, as part of a previous investigation documented in our 2004 report, one exploratory test pit (TP-1A) was excavated in the project area on December 23, 2003, using a Case excavator equipped with a 24-inch bucket. The log of TP-1A is included in this report, and its approximate location is also shown on Figure 2.

Representative bulk soil samples were collected during the investigation for laboratory testing. Details of the laboratory test methods and results are provided in Appendix B.

SIERRA GEOTECHNICAL SERVICES, INC.

APPENDIX A

TEST PIT LOGS

JOB NO: **3.32183**
DATE: **5/9/2025**
EQUIP: **Hitachi 60 USB with 24" bucket**

PROJECT: **474 Joaquin**
LOGGED BY: **MM**

TEST PIT	DEPTH (FT)	U.S.C.S. GROUP SYMBOL	SAMPLE DEPTH (FT)	PERCENT MOISTURE	DRY DENSITY (pcf)	DESCRIPTION
1	0 - 6	SM				**FILL** Medium brown, dense, damp, silty, very fine to coarse SAND. Minor trash and debris, sub-rounded boulders to 4' diameter.
	6 - 9	SM	6 - 9			**TOPSOIL/ALLUVIUM** Dark brown, dense, moist to wet, silty, very fine to coarse SAND. Few sub-rounded gravels, and few roots.
	9	SM				3" cobbles, sub-rounded to rounded, dense.
						--- *Total Depth = 9-feet. Groundwater at 6-feet.*
2	0 - 3	SM				**FILL** Medium brown, loose, damp to moist, silty, very fine to coarse SAND. Abundant cobbles and boulders to 6' diameter.
	3 - 5	SM				**TOPSOIL/ALLUVIUM** Medium brown to black, dense, wet, silty, fine to coarse SAND. Few boulders. Heavy groundwater seepage at 3'.
						-- *Total Depth = 5-feet. Groundwater at 3-feet.*

SIERRA GEOTECHNICAL SERVICES, INC.

APPENDIX A

TEST PIT LOGS

JOB NO: 3.32183
DATE: 5/9/2025
EQUIP: Hitachi 60 USB with 24” bucket

PROJECT: 474 Joaquin
LOGGED BY: MM

TEST PIT	DEPTH (FT)	U.S.C.S. GROUP SYMBOL	SAMPLE DEPTH (FT)	PERCENT MOISTURE	DRY DENSITY (pcf)	DESCRIPTION
3	0 - 4	SM				**TOPSOIL/ALLUVIUM** Dark brown, loose, damp to moist, silty, very fine to medium SAND. Abundant rounded cobbles, few boulders, few roots extending 1-foot.
	4 - 5	SM				Medium brown, mottled, wet, abundant cobbles.
						Total Depth = 5-feet. Groundwater at 4-feet.
4	0 - 4	SM				**TOPSOIL/ALLUVIUM** Medium brown, loose to dense, moist, silty, very fine to coarse SAND. Few gravels.
	4 - 6	SM				Dark brown, dense, wet, silty, very fine to coarse SAND.
						Total Depth = 6-feet. Groundwater at 4-feet.
5	0 - 3	SM				**TOPSOIL/ALLUVIUM** Medium brown, loose, moist, silty, very fine coarse SAND. Few boulders, few roots extending to 3 feet.
	3 - 4	SM				Light brown, dense, wet, silty, very fine to coarse SAND. Few cobbles.
						Total Depth = 4-feet. Groundwater at 3-feet.

SIERRA GEOTECHNICAL SERVICES, INC.

APPENDIX A

TEST PIT LOGS

JOB NO: 3.32183
DATE: 5/9/2025
EQUIP: Hitachi 60 USB with 24" bucket

PROJECT: 474 Joaquin
LOGGED BY: MM

TEST PIT	DEPTH (FT)	U.S.C.S. GROUP SYMBOL	SAMPLE DEPTH (FT)	PERCENT MOISTURE	DRY DENSITY (pcf)	DESCRIPTION
6	0 - 2	SM				**TOPSOIL/ALLUVIUM** Medium brown, loose, moist, silty, very fine coarse SAND. Few boulders, few roots extending to 2 feet.
	2 - 3	SM				Light brown, dense, wet, silty, very fine to coarse SAND. Few cobbles. --- *Total Depth = 3-feet. Groundwater at 3-feet.*
7	0 - 2	SM				**FILL** Brown, loose, moist, silty, very fine to coarse SAND. Few gravels and cobbles.
	2 - 4	SM				**TOPSOIL/ALLUVIUM** Medium brown, loose, moist, silty, very fine coarse SAND. Few boulders, few roots. --- *Total Depth = 4-feet. Groundwater at 4-feet.*

SIERRA GEOTECHNICAL SERVICES INC.
P.O. BOX 5024
MAMMOTH LAKES, CA 93546

APPENDIX A

TEST PIT LOGS

JOB NO: **3.30496**
DATE: **12/22/03**
ELEV: **7924' MSL**

PROJECT: **Tallus (Fairway 10)**
LOGGED BY: **P.S.**

TEST PIT	DEPTH (FT)	U.S.C.S. GROUP SYMBOL	SAMPLE DEPTH	DRY PERCENT MOISTURE	DENSITY (pcf)	DESCRIPTION
						TOPSOIL
1	0 - 2½	SM				Dark brown, loose, moist, silty, very fine- to coarse SAND, abundant cobbles and boulders to approximately 48-inches diameter.
	2½- 5	SP				Brown, medium dense, moist, fine- to coarse SAND, abundant cobbles and boulders to approximately 48-inches diameter.
						ALLUVIUM
	5 - 7½	SP-SM				Gray to light reddish-brown, moist, medium-dense, silty, very fine to coarse SAND, abundant gravels, cobble clasts, and boulders to approximately 36-inches diameter, mottled.
	7½ - 10½	SP				Light gray to reddish-brown, moist, medium-dense to dense, fine to coarse SAND, abundant gravels and cobble clasts.
						Boulder refusal at 10 ½–feet.

APPENDIX B
LABORATORY TEST RESULTS

Laboratory tests were performed on the representative test samples to provide a basis for development of design parameters. Laboratory tests were performed in general accordance with the American Society of Testing and Materials (ASTM) procedures. The results of our laboratory testing are presented herein. Selected samples were tested for the following parameters:

Classification
Soils were visually and texturally classified in accordance with the Unified Soil Classification System (USCS) in general accordance with ASTM D 2488. USCS classifications are presented on the test pit logs (Appendix A).

Gradation Analysis
Gradation analysis tests were performed on a selected representative soil sample in general accordance with ASTM D 422. These test results were utilized in evaluating the soil classifications in accordance with the USCS.

Proctor Density Tests
The maximum dry density and optimum moisture content of selected representative soil samples were evaluated using the Modified Proctor method in general accordance with ASTM D 1557.

Soil Corrosivity Test
Soil pH, and minimum resistivity tests were performed on representative samples in general accordance with CT643. The sulfate and chloride content of the selected samples were evaluated in general accordance with CT417 and CT422, respectively.

Sample Location	Sample Description	pH	Min Resistivity (ohm/cm)
TP-1A @ 2-3’	Brown, silty, very fine to medium grained SAND	6.8	10,010

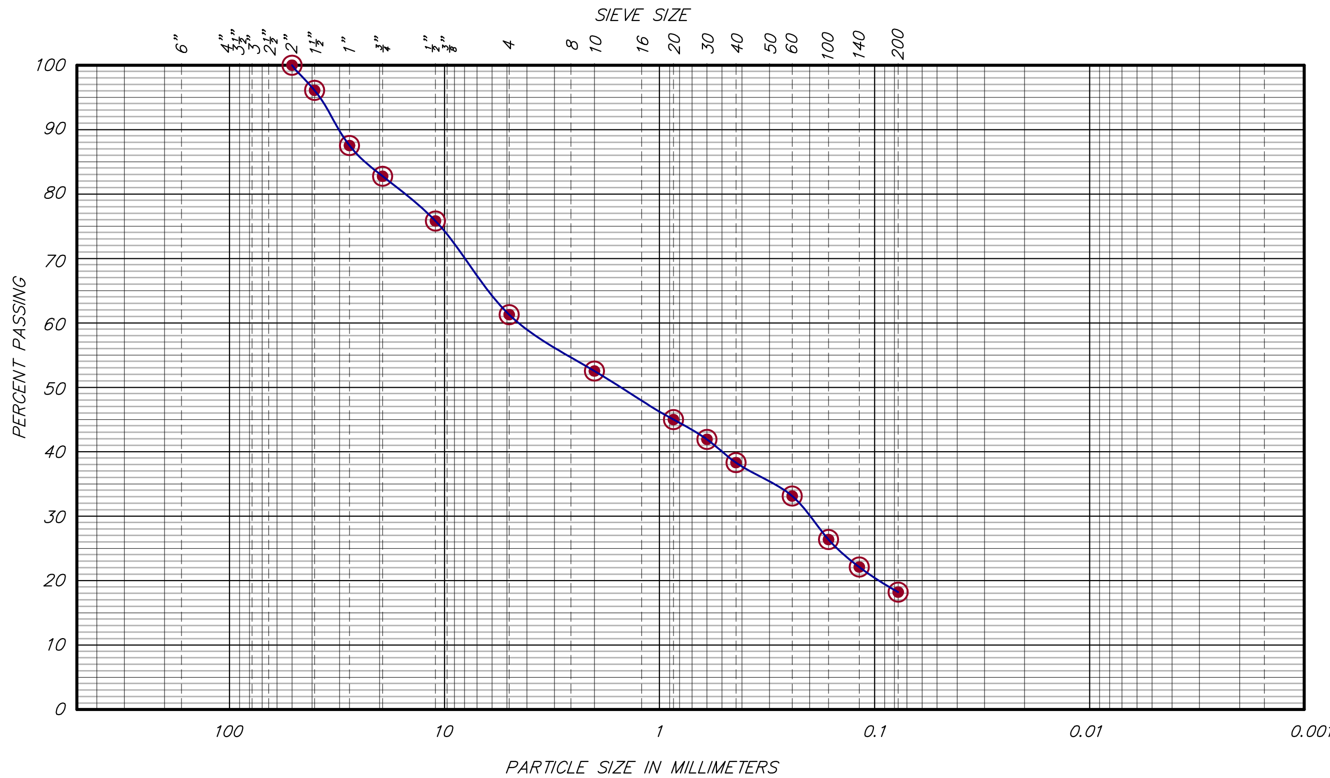
Sample Location	Sample Description	Chloride (ppm)	Sulfate Content (wt.%)
TP-1A @ 2-3’	Brown, silty, very fine to medium grained SAND	< 25	< 50

R-Value: The resistance value was determined by the California Materials Method No. 301 for typical soils. One sample was prepared and exudation pressure and "R"-value determined. The graphically determined R-value at exudation pressure of 300 psi is summarized in the table below:

Sample Location	Sample Description	R-Value
Obsidian Phase II	Dark brown, silty, very fine to medium grained SAND	84

PARTICLE SIZE DISTRIBUTION REPORT

PER ASTM TEST METHODS D2487 & D6913



% >3"	% GRAVEL		% SAND			% FINES	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0	17.3	21.4	8.8	13.7	20.6	18.2	n/a

SIEVE SIZE	PERCENT RETAINED	PERCENT PASSING	SPECIFIED PERCENT	PASS? (Yes or No)
5"				
4-1/2"				
4"				
3-1/2"				
3"				
2-1/2"				
2"	0	100		
1-1/2"	3.9	96.1		
1"	12.5	87.5		
3/4"	17.3	82.7		
1/2"	24.2	75.8		
No. 4	38.7	61.3		
No. 10	47.5	52.5		
No. 20	55.0	45.0		
No. 30	58.1	41.9		
No. 40	61.2	38.8		
No. 60	66.9	33.1		
No. 100	73.6	26.4		
No. 140	77.9	22.1		
No. 200	81.8	18.2		
Pan	84.1	15.9		

SOIL DESCRIPTION

Silty sand with gravel

ATTERBERG LIMITS

PL = n/a LL = n/a PI = n/a

COEFFICIENTS

D_{85} = n/a D_{60} = 4.25 D_{50} = 1.37
D_{30} = 0.20 D_{15} = n/a D_{10} = n/a
C_U = n/a C_C = n/a

CLASSIFICATION

USCS = SM AASHTO = n/a

REMARKS

Specific Gravity (per ASTM D854) = n/a

SIERRA GEOTECHNICAL SERVICES, INC.

BISHOP: 873 NORTH MAIN STREET, SUITE 150, BISHOP, CA 93514 • Phn: (760) 937-4789
CARLSBAD: 7040 AVENIDA ENCINAS, SUITE 104-469, CARLSBAD, CA 92011
MAMMOTH: PO Box 5024, MAMMOTH LAKES, CA 93546 • Phn: (760) 937-4608
SGS

PROJECT: 474 Joaquin Rd, Mammoth Lakes, CA		CLIENT: 474 Joaquin, LLC, Poorva Garg	
SAMPLE LOCATION & DEPTH: TP-1 at 6-9' Deep		MATERIAL: Native Subgrade	
SAMPLED: 5/9/2025	DELIVERED: 5/10/2025	TESTED: 5/14/2025	TESTED BY: MDM
JOB NO: 3.32183	USCS NO: 1	DRAFTED BY: DD	REVIEWED BY: DD/JA

SIERRA GEOTECHNICAL SERVICES

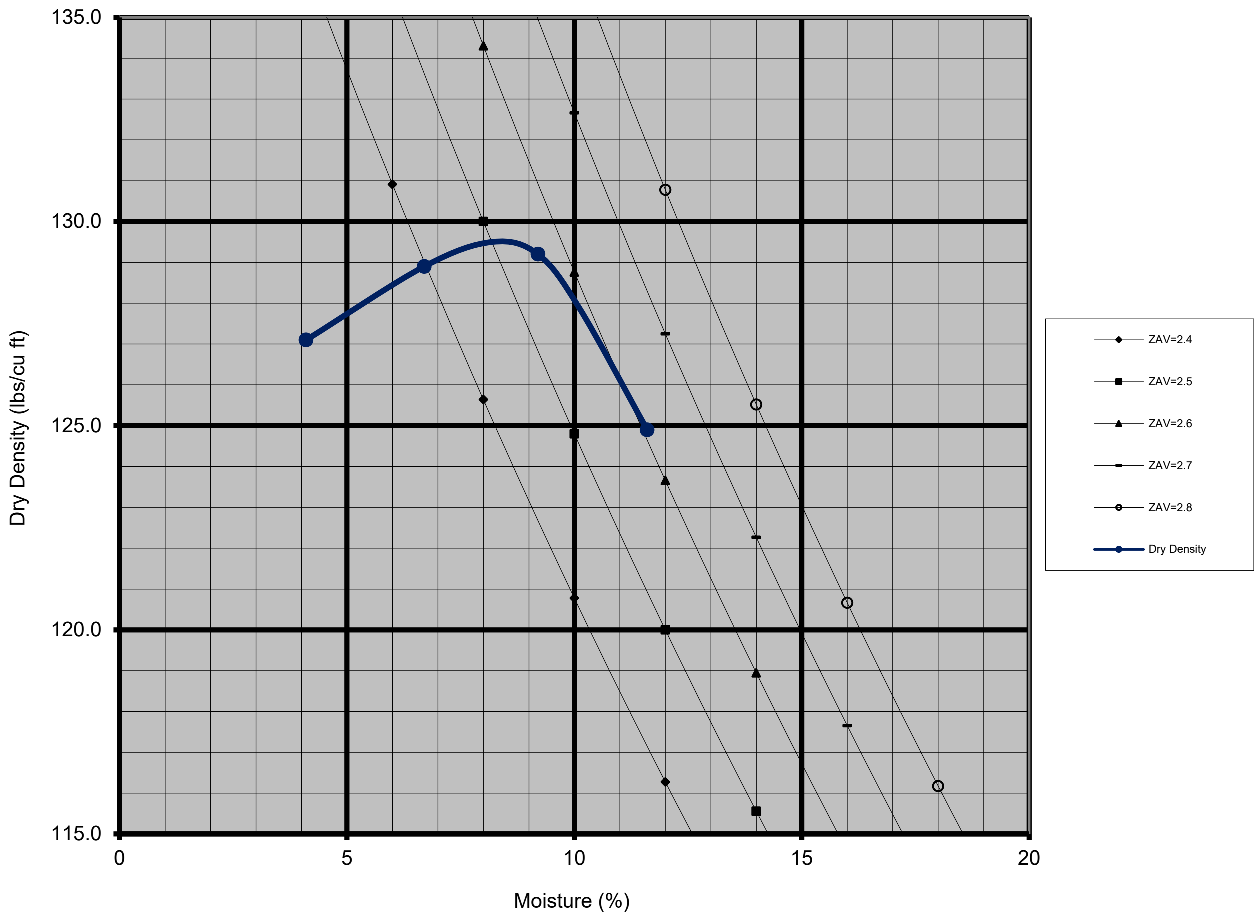
GEOTECHNICAL • GEOLOGY • HYDROGEOLOGY • ENVIRONMENTAL • MINING • MATERIALS

Caltrans Lab #214

MAXIMUM DENSITY-MOISTURE CURVE (PROCTOR)

per ASTM D1557

Project Name								Project No.	
474 Joaquin Road, Mammoth Lakes, CA								3.32183	
Client				Contact				Sample Date	Deliver Date
474 Joaquin Rd, LLC								5/9/2025	5/10/2025
Material				Location				Sampled By	Delivered By
Native				TP-1 at 6-9'				MDM	MDM
Proctor No	Test Date	Test Pit	Belt Cut	Screen	Chute	Stockpile	Truck	Tested By	Reviewed By
1	5/14/25	X						MDM	DD/JA



Laboratory Data:

Test #	Soil & Mold (lb)	Mold (lb)	Soil (lb)	Wet Density (pcf)	Percent Moisture	Dry Density (pcf)	Mold Volume (cf)	Max. Dry Density (pcf)	Optimum Moisture (%)
1	14.033	9.665	4.368	132.4	4.1	127.1	0.03300	129.5	8.5
2	14.204	9.665	4.539	137.5	6.7	128.9			
3	14.310	9.665	4.645	140.8	9.0	129.2		With Rock	
4	14.265	9.665	4.600	139.4	11.6	124.9		Correction	
								136.0	

Note: ZAV=Zero Air Voids per Specific Gravity of Soil Solids

Thomas A Platz, PE C41039

BISHOP: 873 NORTH MAIN STREET, SUITE 150, BISHOP, CA 93514 • Phn: (760) 937-4789
CARLSBAD: 7040 AVENIDA ENCINAS, SUITE 104-469, CARLSBAD, CA 92011
MAMMOTH: PO Box 5024, MAMMOTH LAKES, CA 93546 • Phn: (760) 937-4608
SGS

SIERRA GEOTECHNICAL SERVICES, INC.

APPENDIX C
GENERAL EARTHWORK AND GRADING

General

These general earthwork and grading specifications are for the grading and earthwork shown on the approved grading or construction plan(s) and/or indicated in the geotechnical report(s). These Specifications shall be used in conjunction with the Geotechnical Report for the project prepared by SGSI. In the case of conflict, the recommendations contained in the text of the Geotechnical Report are a part of the earthwork and grading specifications and shall supersede the provisions contained hereinafter.

Earthwork and grading should be conducted in accordance with applicable grading ordinances, the current California Building Code, and the recommendations of this report. The following recommendations are provided regarding specific aspects of the proposed earthwork construction. These recommendations should be considered subject to revision based on field conditions observed by the geotechnical consultant during grading.

Geotechnical Consultant of Record

Prior to commencement of work, the owner shall employ the Geotechnical Consultant of Record. The Geotechnical Consultant shall be responsible for reviewing the approved geotechnical report(s) and accepting the adequacy of the preliminary geotechnical findings, conclusions, and recommendations prior to the commencement of grading or construction.

During grading and earthwork operations, the Geotechnical Consultant shall observe, map, and document the subsurface exposures to verify the geotechnical design assumptions. If the observed conditions are found to be significantly different than the interpreted assumptions during the design phase, the Geotechnical Consultant shall inform the owner, recommend appropriate changes in design to accommodate the observed conditions, and notify the review agency where required. Subsurface areas to be geotechnically observed, mapped, elevations recorded, and/or tested include natural ground, after it has been cleared for receiving fill but before it has been placed, bottoms of all "remedial removal areas, all key bottoms, and benches made on sloping ground to receive fill.

The Geotechnical Consultant shall observe the moisture-conditioning and processing of the subgrade and fill materials and perform relative compaction testing of fill to determine the attained level of compaction. The Geotechnical Consultant shall provide the test results to the owner and the contractor on a routine and frequent basis.

The Earthwork Contractor

The Earthwork Contractor shall be solely responsible for performing the grading in accordance with the plans and specifications. The Earthwork Contractor shall review and accept the plans, geotechnical report(s), and these Specifications prior to the commencement of grading.

The Earthwork Contractor shall have the sole responsibility to provide adequate equipment and methods to accomplish the earthwork in accordance with applicable grading codes and agency ordinances, these Specifications, and the recommendations in the approved geotechnical report(s) and grading plan(s). If, in the opinion of the Geotechnical Consultant unsatisfactory conditions, such as unstable soil, improper moisture condition, inadequate compaction, adverse weather, etc. are resulting in a quality of work less than required in these Specifications, the Geotechnical Consultant shall reject the work and may recommend to the owner that construction be stopped until the conditions are rectified.

Site Preparation

Clearing and Grubbing: Site preparation includes removal of deleterious materials, unsuitable materials, and existing improvements from areas where new improvements or new fills are planned.

Deleterious materials, which include vegetation, trash, and debris, should be removed from the site, and legally disposed of off-site. Unsuitable materials include loose or disturbed soils, undocumented fills, contaminated soils, or other unsuitable materials. The Geotechnical Consultant shall evaluate the extent of these removals depending on specific site conditions. Earth fill material shall not contain more than 1 percent of organic materials (by volume). No fill lift shall contain more than 5 percent of organic matter. Nesting of the organic materials shall not be allowed.

If potentially hazardous materials are encountered, the contractor shall stop work in the affected area, and a hazardous material specialist shall be informed immediately for proper evaluation and handling of these materials prior to continuing to work in that area.

As presently defined by the State of California, most refined petroleum products (gasoline, diesel fuel, motor oil, grease, coolant etc. have chemical constituents that are hazardous waste. As such, the indiscriminate dumping or spillage of these fluids onto the ground may constitute a misdemeanor, punishable by fine and/or imprisonment and shall not be allowed.

Any existing subsurface utilities that are to be abandoned should be removed and the trenches backfilled and compacted. If necessary, abandoned pipelines may be filled with grout or slurry cement as recommended by, and under the observation of, the Geotechnical Consultant.

Excavation

After clearing and grubbing of organic matter and other unsuitable material, loose or porous soils shall be removed to the depth recommended in the Geotechnical Report. The depth of removal and compaction should be observed and approved by a representative of the Consultant. The exposed surface shall then be plowed or scarified to a minimum depth of 6 inches and until the surface is free from uneven features that would tend to prevent uniform compaction by the equipment to be used.

Remedial removal depths are estimates only. The actual extent of removal shall be determined by the Geotechnical Consultant based on the field evaluation of exposed conditions during grading.

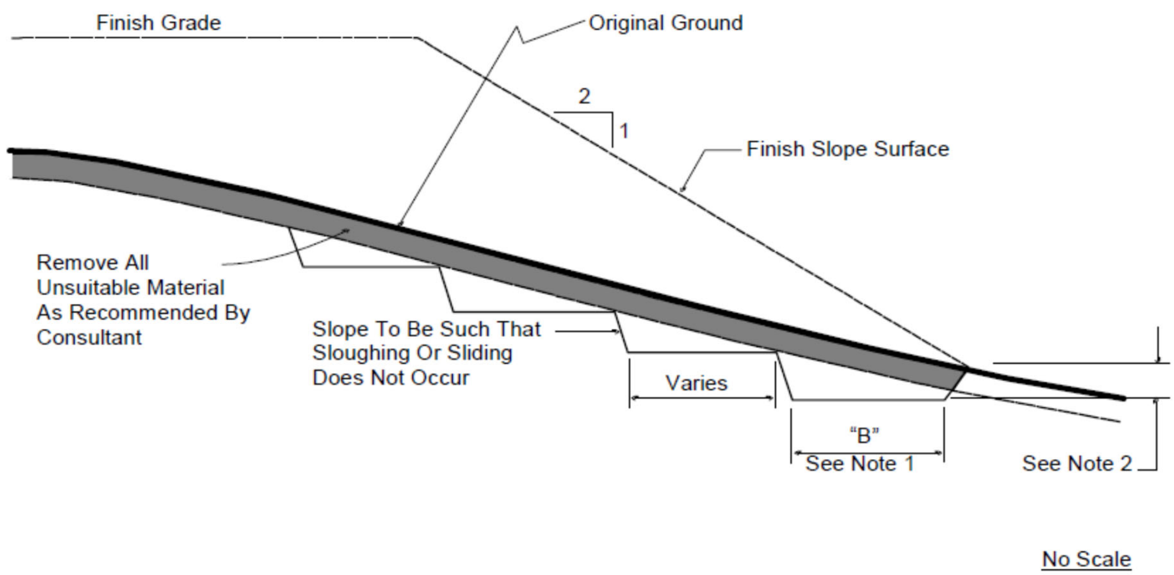
All areas to receive fill, including removal and processed areas, key bottoms, and benches, shall be observed, mapped, elevations recorded, and/or tested prior to being accepted by the Geotechnical Consultant as suitable to receive fill. The Contractor shall obtain a written acceptance from the Geotechnical Consultant prior to fill placement. A licensed surveyor shall provide the survey control for determining elevations of processed areas, keys, and benches.

Slopes

Where the slope ratio of the original ground is steeper than 5:1 (horizontal:vertical), or where recommended by the Consultant, the original ground should be benched in accordance with the following illustration:

SIERRA GEOTECHNICAL SERVICES, INC.

TYPICAL BENCHING DETAIL



1) Key width "B" should be a minimum of 4-feet. The bottom of the key should be graded horizontal or inclined slightly into the natural slope.
2) The outside of the key should be below a minimum of at least 2-feet deep into dense formational material.
3) Bench heights shall not exceed 2-foot vertical.

Fill placed on ground sloping flatter than 5:1 shall also be benched or otherwise overexcavated to provide a flat subgrade for the fill.

Compaction of slopes shall be accomplished by backrolling of slopes with sheepsfoot rollers at increments of 3 to 4 feet in fill elevation, or by other methods producing satisfactory results acceptable to the Geotechnical Consultant. Upon completion of grading, relative compaction of the fill, out to the slope face, shall be at least 90 percent of maximum density per ASTM Test Method D1557.

Cut and fill slopes shall be a maximum of 2:1 (horizontal to vertical) unless approved by the Geotechnical Consultant.

Planting and irrigation of cut and fill slopes and/or installation of erosion control and drainage devices should be completed due to the erosion potential of the soil.

Fill Material

Material to be used as fill shall be essentially free of organic matter and other deleterious substances evaluated and accepted by the Geotechnical Consultant prior to placement. Soils of poor quality, such as those with unacceptable gradation, high expansion potential, or low strength shall be placed in areas acceptable to the Geotechnical Consultant or mixed with other soils to achieve satisfactory fill material. Any import soils shall be tested for suitability in advance by the project Geotechnical Engineer.

Oversize rock material, or other irreducible material with a maximum dimension greater than 8 inches, shall not be buried or placed in fill unless location, materials, and placement methods are specifically accepted by the Geotechnical Consultant. Placement operations shall be such that nesting of oversized material does not occur and such that oversize material is completely surrounded by compacted or densified fill. Oversize material shall not be placed within 10 vertical feet of finish grade or within 2 feet of future utilities or underground construction.

Compaction

All fill and backfill associated with the proposed construction should be placed at a minimum relative compaction of 90% of the material's maximum dry density, and slightly above optimum moisture content, using equipment capable of producing a uniformly compacted product throughout the entire fill lift.

Fill materials below optimum moisture content should be moistened and mixed to achieve a uniform condition above optimum moisture. Overly wet fill materials can be aerated by blading or other suitable methods or mixed with drier materials to reach the required moisture content.

The fill and backfill should be placed in horizontal lifts with a loose thickness not exceeding 8 inches, appropriate for spreading, mixing, and compacting with the available equipment. Retaining wall backfill should consist of granular material (maximum particle size ≤ 3 inches) with an expansion index (EI) of no greater than 50 and a sand equivalent (SE) greater than 30.

No fill materials shall be placed during unfavorable weather conditions. If work is interrupted by inclimate, fill operations should not resume until the Geotechnical engineer confirms through field testing that the moisture content and density of the fill comply with the specified requirements. Adherence to these procedures will ensure proper compaction and long-term stability of the fill.

Compaction Testing

Field-tests for moisture content and relative compaction of the fill soils shall be performed by the Geotechnical Consultant. Location and frequency of tests shall be at the Consultant's discretion based on field conditions encountered. Compaction test locations will not necessarily be selected on a random basis. Test locations shall be selected to verify adequacy of compaction levels in areas that are judged to be prone to inadequate compaction (such as close to slope faces and at the fill/bedrock benches).

Tests shall be taken at intervals not exceeding 2 feet in vertical rise and/or 1,000 cubic yards of compacted fill soils embankment. In addition, as a guideline, at least one test shall be taken on slope faces for each 5,000 square feet of slope face and/or each 10 feet of vertical height of slope. The Contractor shall assure that fill construction is such that the testing schedule can be accomplished by the Geotechnical Consultant. The Contractor shall stop or slow down the earthwork construction if these minimum standards are not met.

Temporary Excavations

Temporary excavation shall be made no steeper than 1:1 (horizontal to vertical). The recommended slope for temporary excavations does not preclude local raveling and sloughing. Where wet soils are exposed, flatter excavation of slopes and dewatering may be necessary. In areas of insufficient space for slope cuts, or where soils with little or no binder are encountered, shoring shall be used.

All large rocks exposed above temporary cuts shall be removed prior to foundation excavation. In addition, any rocks exposed during development from raveling and sloughing should be removed immediately.

All excavations should comply with the requirements of the California Construction and General Industry Safety Orders and the Occupational Safety and Health Act and other public agencies having jurisdiction.

Trench Backfill

Exterior trenches, paralleling a footing and extending below a 1:1 plane projected from the outside bottom edge of the footing, shall be compacted to a minimum of 95-percent per ASTM D1557. All trenches in structural areas and under concrete flatwork shall be compacted to a minimum of 95-percent per ASTM D1557. All trenches in non-structural areas shall be compacted to a minimum of 85-percent per ASTM D1557.

All material used for trench backfill shall be approved by the Geotechnical Engineer prior to placement. All bedding and backfill of utility trenches shall be done in accordance with the applicable provisions of Standard Specifications of Public Works Construction. Bedding material shall have a Sand Equivalent greater than 30 (SE>30). The bedding shall be placed to 1-foot over the top of the conduit and densified by jetting. Backfill shall be placed and densified to a minimum of 95-percent of maximum from 1-foot above the top of the conduit to the surface.

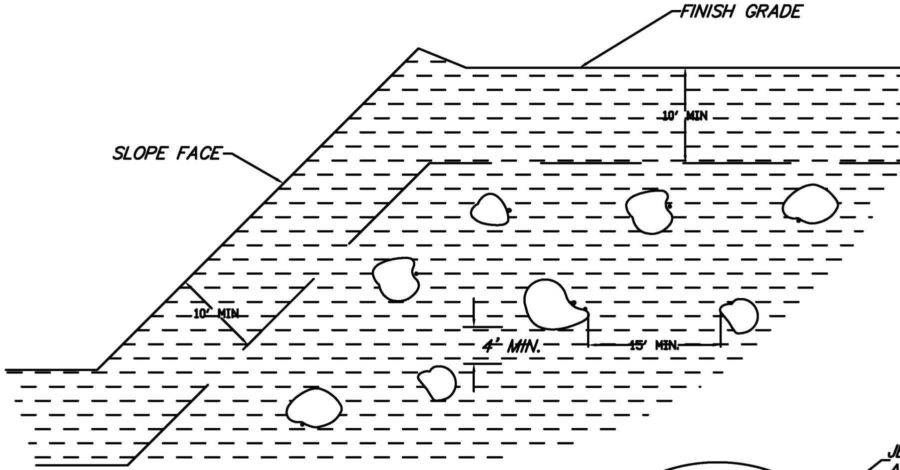
Lift thickness of trench backfill shall not exceed those allowed in the Standard Specifications of Public Works Construction unless the Contractor can demonstrate to the Geotechnical Consultant that the fill lift can be compacted to the minimum relative compaction by his alternative equipment and method. The Geotechnical Consultant shall test the trench backfill for relative compaction. At least one test should be made for every 300 feet of trench and 2 feet of fill.

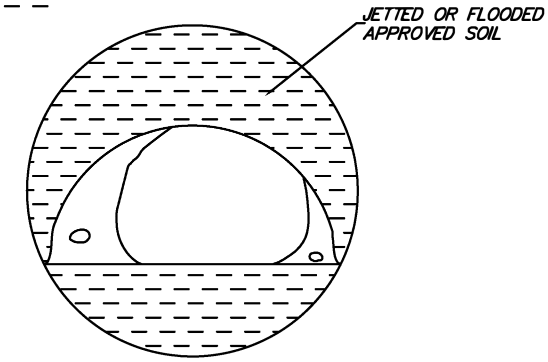
Regulations of the governing agency may supersede the above, and all trench excavations should conform to all applicable safety codes. The Contractor shall follow all OSHA and Cal/OSHA requirements for safety of trench excavations.

Subdrain Installation

Subdrain systems shall be installed in accordance with the approved geotechnical report(s), the grading plan, and the Standard Details. The Geotechnical Consultant may recommend additional subdrains and/or changes in subdrain extent, location, grade, or material depending on conditions encountered during grading.

All subdrains shall be surveyed by a land surveyor/civil engineer for line and grade after installation and prior to burial. Sufficient time should be allowed by the Contractor for these surveys.

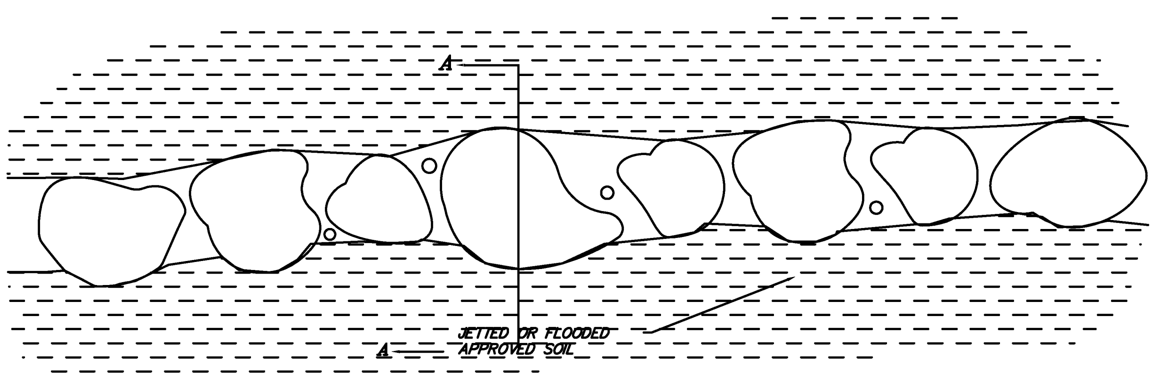




SECTION A–A'

- OVERSIZE ROCK IS LARGER THAN 8 INCHES IN LARGEST DEMENSION
- BACKFILL WITH APPROVED SOIL JETTED OR FLOODED IN PLACE TO FILL ALL THE VOIDS
- DO NOT BURY ROCK WITHIN 10 FEET OF FINISH GRADE
- WINDROW OF BURIED ROCK SHALL BE PARALLEL TO THE FINISHED SLOPE FACE

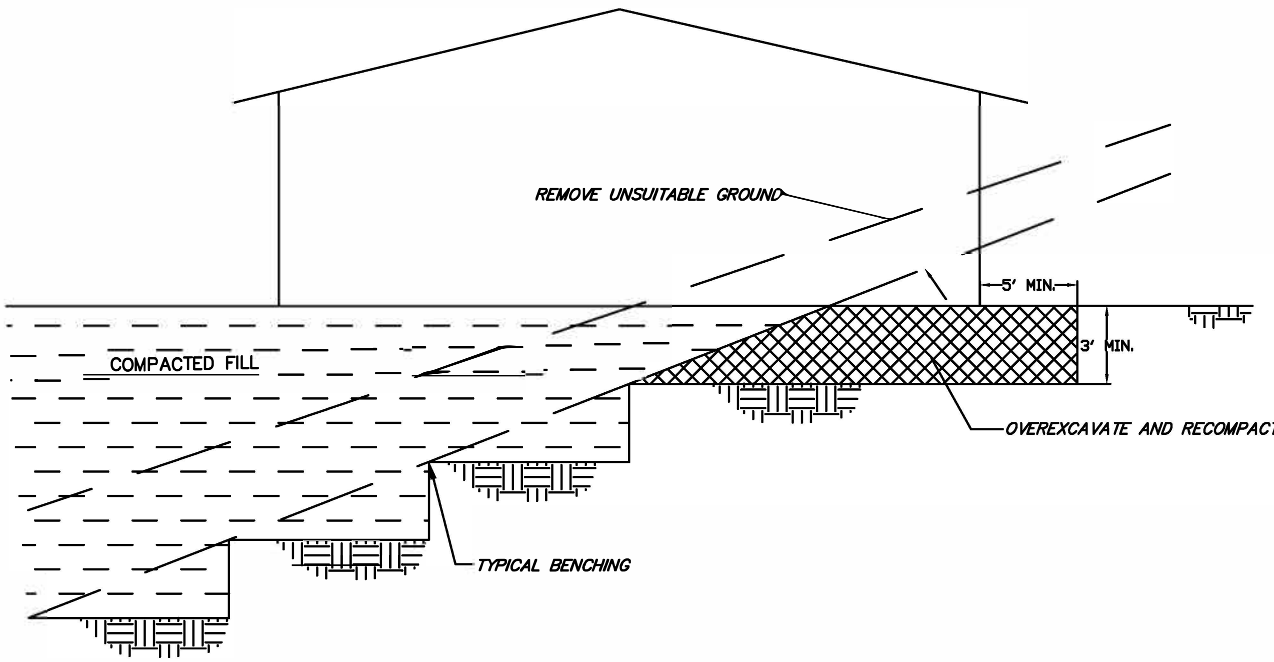
PROFILE ALONG WINDROW



SGS
SIERRA GEOTECHNICAL SERVICES, INC.

PROJECT: *OVERSIZE ROCK DISPOSAL*	
SCALE: N.T.S	DATE:
DRAWING: OVERSIZE.DWG	DRAWN BY:
JOB NO.:	FIGURE: *APPENDIX*

CUT–FILL TRANSITION LOT OVEREXCAVATION



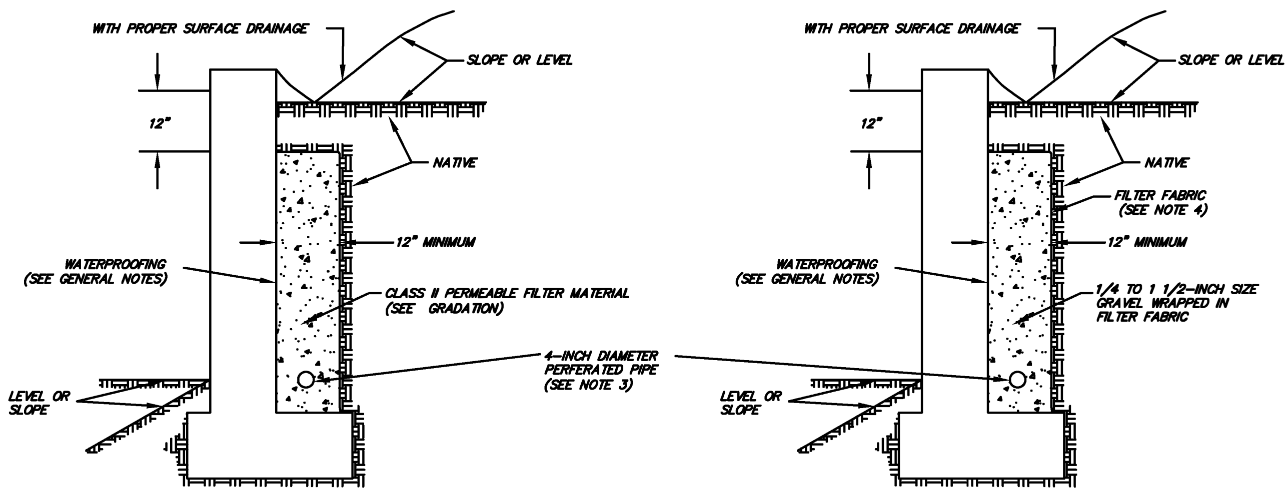
SIERRA GEOTECHNICAL SERVICES, INC.

PROJECT: CUT–FILL TRANSITION LOTS	
SCALE: NTS	DATE:
DRAWING:	DRAWN BY:
JOB NO.:	FIGURE: APPENDIX

SUBDRAIN OPTIONS AND BACKFILL WHEN NATIVE MATERIAL HAS EXPANSION INDEX OF <50

OPTION 1: PIPE SURROUNDED WITH CLASS II PERMEABLE MATERIAL

OPTION 2: GRAVEL WRAPPED IN FILTER FABRIC



Class II Filter Permeable Material Gradation
Per Caltrans Specifications

Sieve Size	Percent Passing
1"	100
3/4"	90–100
3/8"	40–100
No. 4	25–40
No. 8	18–33
No. 30	5–15
No. 50	0–7
No. 200	0–3

GENERAL NOTES:

*Waterproofing should be provided where moisture nuisance problem through the wall is underirable.
*Waterproofing of the walls is not under purview of the geotechnical engineer.
*All drains should have a gradient of 1 percent minimum.
*Outlet portion of the subdrain should have a 4–inch diameter solid pipe discharged into a suitable disposal area desgned by the project engineer. The subdrain pipe should be accessible for maintenance(rodding).
*Other subdrain backfill options are subject to the review by the geotechncial engineer and midfication of the design parameters.

Notes:
1) Sand should have a sand equivalent of 30 or greater and may be densified by water jetting.
2) 1 Cu. ft. per ft. of 1/4 to 1 1/2–inch size gravel wrapped in filter fabric.
3) Pipe type should be ASTM D1527 Acrylonitrile Butadiene Styrene (ABS) SDR35 or ASTM D1785 Polyvinyl Chloride plastic (PVC), Schedule 40, Amco A2000 PVC, or approved equivalent. Pipe should be installed with perforations down. Perforations should be 3/8–inch in diameter placed at the ends of a 120–degreee arc in two rows at 3–inch on center (staggered).
4) Filter fabric should be Mirafi 140NC or approved equivalent.
5) Retaining wall plans should be reviewed and approved by the geotechnical engineer.
6) Walls over six feet in height are subject to a special review by the geotechnical engineer and modifcations to the above requirments.

SIERRA GEOTECHNICAL SERVICES, INC.

PROJECT: RETAINING WALL DETAIL	
SCALE: N.T.S	DATE:
DRAWING: RETWALL.DWG	DRAWN BY:
JOB NO.:	FIGURE: APPENDIX