Appendix 5.5-1 Preliminary Geotechnical Investigation

Appendices

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Preliminary Geotechnical Investigation for the Proposed Residential Care Facility, Located at 959 Genevieve Street, APN: 298-390-51, City of Solana Beach, County of San Diego, California

Project No. M1109-001

Dated: May 22, 2014

Prepared For:

Mr. John DeWald
PACIFIC SOUND INVESTORS, LLC
1855 Freda Lane
Cardiff, California 92007

Geotechnical Consulting, Inc.

MATRIX

Date: May 22, 2014

Project No. M1109-001

Client: **PACIFIC SOUND INVESTORS, LLC**
1855 Freda Lane
Cardiff, California 92007

Attention: Mr. John DeWald

Subject: Preliminary Geotechnical Investigation for the Proposed Residential Care Facility, Located at 959 Genevieve Street, APN: 298-390-51, City of Solana Beach, County of San Diego, California

Matrix Geotechnical Consulting (MATRIX) is pleased to submit herewith our Preliminary Geotechnical Report for the proposed Residential Care Facility, located at 959 Genevieve Street, APN: 298-390-51-00, City of Solana Beach, County of San Diego, California. This report presents the results of our review of published geologic reports and/or maps; our review of aerial photographs; the results of our geologic field mapping, a previous field exploration and laboratory testing review by others, and presents our engineering judgment, opinions, conclusions and recommendations pertaining to the geotechnical design aspects of the proposed facility.

Based on the results of the above efforts, it is our opinion that the subject site is suitable for the proposed development, provided the recommendations presented herein are incorporated into the design of the project and implemented during site grading and construction. MATRIX should review final rough grading plans and structural plans when those become available and revise our recommendations presented herein, if we deem it necessary.

It has been a pleasure to be of service to you on the preliminary design aspects of this project. Should you have any questions regarding the content of this report or should you require additional information, please do not hesitate to contact this office at your earliest convenience.

Very Truly Yours,

MATRIX GEOTECHNICAL CONSULTING

Chris Josef | Principal

MATRIX
Geotechnical Consulting, Inc.

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1.0 INTRODUCTION

1.1 Purpose and Scope of Services

The purpose of our preliminary geotechnical investigation was to review previous geotechnical reporting completed for the subject site, evaluate the pertinent geologic and geotechnical conditions on the site and to provide preliminary geotechnical design criteria for grading, construction, foundation design, and other relevant geotechnical aspects to the proposed residential care facility.

Our scope of services consisted of:

- Review of previously prepared geotechnical/geologic reports, geologic maps and aerial photographs pertinent to the site (Appendix A).
- A review of a previous subsurface investigation consisting of the excavation, sampling, and logging of six (6) hollow-stem auger borings, to depths ranging from approximately 16½ feet to 50½ feet. Logs of the borings are presented in Appendix B, with the approximate locations depicted on the Geotechnical Map, Plate 1. The borings were excavated to evaluate the general characteristics of the subsurface soil/bedrock on the site including classification of site soil, determination of depth to groundwater (if present), and to obtain representative soil samples.
- Geologic mapping of the site.
- A review of previous laboratory testing of representative soil samples obtained during the 2011 subsurface exploration (Appendix C).
- Engineering and geologic analysis of the data with respect to the design and construction of the proposed residential care facility.
- Preparation of General Earthwork and Grading Specifications (Appendix D).
- Preparation of this report presenting our review, conclusions and preliminary geotechnical design recommendations for the design and construction of the proposed development.

1.2 Location and Site Description

The subject site is located at 959 Genevieve Street, bounded by Genevieve Street to the north, Marine View Avenue and existing residences to the east, an existing residence to the south, and Interstate 5 to the west. The general location and configuration of the site is shown on the Site Location Map (Figure 1).

A single story residential structure exists in the north central portion of the site along with a driveway, shed, and other improvements. An existing sewer easement partially bisects the site extending from Genevieve to the rear property lines of the existing residences to the east. In addition, a small drainage ditch extends westerly across the site, south of the existing residential structure. The remainder of the site is open space area. The topography of the site is gently sloping to the west at a general elevation ranging from approximately 112 to 148 feet above mean sea level (msl) within the site.

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FIGURE 1
SITE LOCATION MAP

Project Name	PACIFIC SOUND INVESTORS
Project No.	M1109-001
Geo/Eng	MIB/JPN
Scale	NOT TO SCALE
Date	MAY 2014

1.3 Previous Geotechnical Investigations and Aerial Photograph Review

Based on our review and discussion with Mr. John DeWald of Pacific Sound Investors, LLC, previous geotechnical investigations have been conducted on the site by LGC, 2011. Report copies were reviewed by Matrix Geotechnical Consulting and incorporated into our conclusions and recommendations for the site (referenced in Appendix A).

We reviewed paired stereo aerial photographs for the site and vicinity taken between from 1972 through 2010. The photographs were obtained from Continental Aerial Photo, Inc. Scales of the photographs reviewed (where available) ranged from approximately 1" = 1,250' to approximately 1" = 5,000'. A summary table of the photos reviewed is presented in Appendix A.

1.4 Proposed Development and Grading

It is our understanding that the proposed development is to be a residential care facility. The preliminary configuration of the development is shown on the Geotechnical Map, Plate 1. Grading plans were not provided for this investigation, however, once grading plans become available, MATRIX should review the proposed development and provide supplemental recommendations/information as necessary.

1.5 Previous Report Review and Subsurface Investigation

A prior consultant performed the previous subsurface investigation in 2011, which consisted of six (6) hollow-stem borings to depths ranging from approximately 16.5 to 50.5 feet below existing ground surface. The approximate locations of the borings are shown on the Geotechnical Map (Plate 1).

Based upon our review of the previous report and subsurface exploration, selective site soil/bedrock samples consisting of representative relatively undisturbed, standard penetration test and bulk samples were retained for laboratory testing. MATRIX reviewed the prior consultant's laboratory testing and determined that in-situ density and water content, maximum dry density and optimum water content, expansion, sulfate and chloride content, resistivity, pH, and R-value were evaluated for the subject site. The previously evaluated data have been incorporated into this report and presented in Appendix C.

2.0 GEOTECHNICAL CONDITIONS

2.1 Regional Geology

Regionally, the site is located in the Peninsular Ranges Geomorphic Province of California. The Peninsular Ranges are characterized by steep, elongated valleys that trend west to northwest. The mountainous regions are underlain by Pre-Cretaceous, metasedimentary and metavolcanic rocks and Cretaceous plutonic rocks of the Southern California Batholith. Tertiary and Quaternary rocks are generally comprised of non-marine and marine sediments consisting of sandstone, mudstones, conglomerates, and occasional volcanic units. A map of the regional geology is presented on the Regional Geologic Map, Figure 2.

2.2 Local Geology

Based upon our understanding of the regional area, a review of the geotechnical bore logs, and review of the previous reporting, the earth materials on the site are comprised of undocumented artificial fill, residual soil, Quaternary alluvium, and Tertiary Torrey Sandstone. A general description of the earth materials observed on the site is provided in the following paragraphs:

Artificial Fill, Undocumented (Afu): Undocumented artificial fill was encountered within the existing residential pad and driveway areas within approximately 1 foot of the ground surface. This soil consists predominately of light brown, dry to damp, medium dense silty sand.

Residual Soil (not a mapped unit): Residual soil was encountered mantling the Tertiary Torrey Sandstone throughout the site to a maximum depth of approximately 2.5 feet below ground surface. This soil consists predominately of dark brown to brown, dry to moist, loose to medium dense silty sand.

Quaternary Alluvium (map symbol Qal): Quaternary young alluvium was mapped within the drainage channel and low-relief portions of the site to an estimated depth of 4 to 6 feet below existing surface. These alluvial deposits consist predominately of silty sand and sand which are generally light brown to dark brown, damp to moist, and loose to medium dense.

Tertiary Torrey Sandstone (map symbol Tt): Tertiary Torrey Sandstone was encountered below the near surface soil described above and extended across the site to the depths of the various borings. This formation consists predominately of light brown to red brown, dry to moist, moderately hard to very hard, massive, slightly to intensely weathered sandstone. Bedding generally dips approximately 4 degrees to the west (USGS, 2005).

2.3 Landslides

Our review of the pertinent geologic literature did not indicate the presence of landslides on or directly adjacent to the site.

2.4 Groundwater

Groundwater was not encountered during the current subsurface investigation to the maximum explored depth of 50.5 feet below existing ground surface.

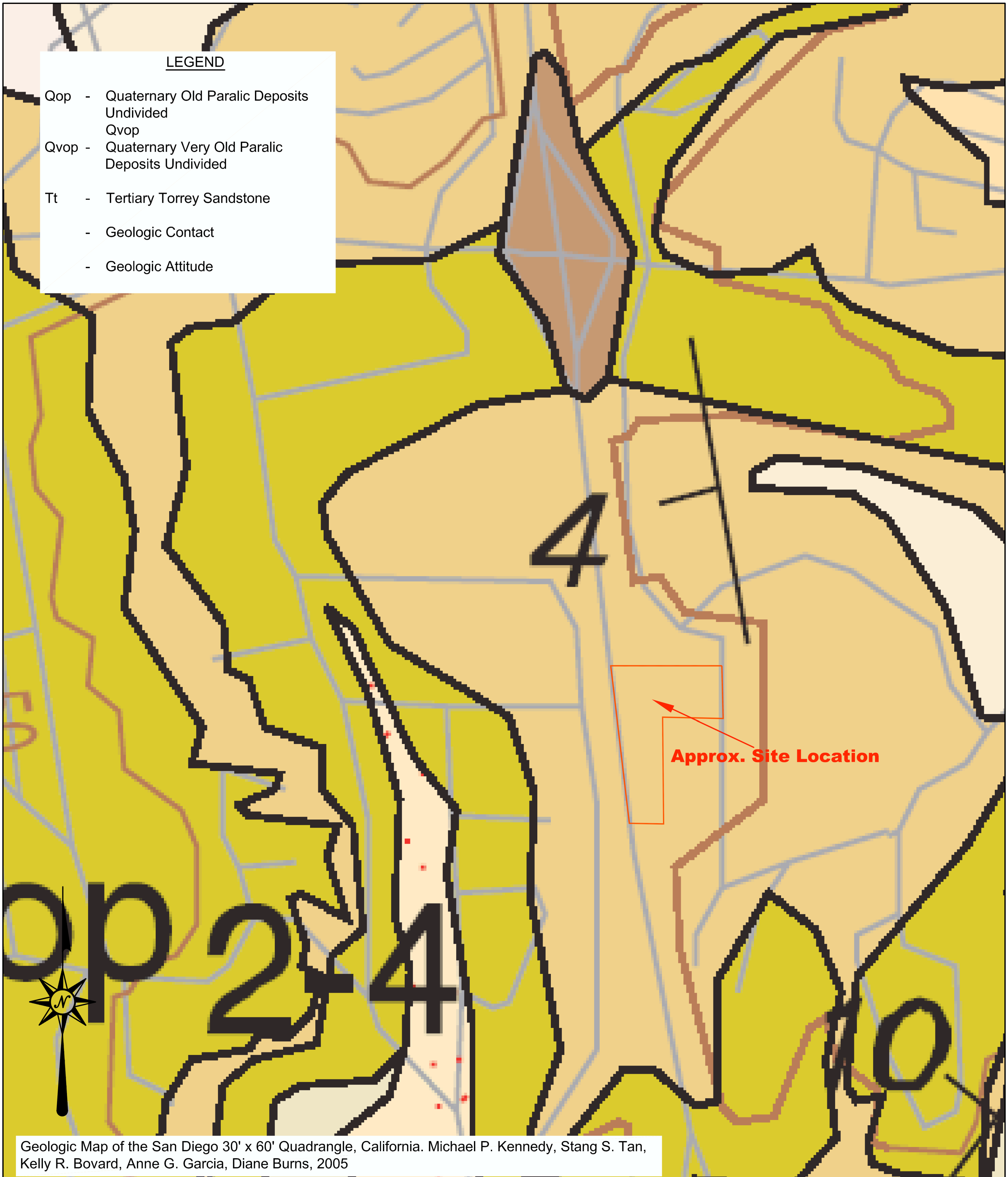

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FIGURE 2
REGIONAL GEOLOGIC MAP

Project Name	PACIFIC SOUND INVESTORS
Project No.	M1109-001
Geo/Eng	MIB/JPN
Scale	NOT TO SCALE
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2.5 Surface Water

Surface water runoff should be directed away from planned structures. The design of surface drainage is the responsibility of the project civil engineer.

2.6 Faulting

The subject site is not located within an Alquist-Priolo Earthquake Fault Zone and there are no known faults (active, potentially active, or inactive) onsite. The possibility of damage from ground rupture is considered nil because active faults are not known to cross the site. Secondary seismic related hazards are provided below:

2.6.1 Liquefaction & Seismically Induced Settlement

Liquefaction is a seismic phenomenon in which loose, saturated, granular soil behaves similarly to a fluid when subjected to high-intensity ground shaking. Liquefaction occurs when three general conditions exist: 1) shallow groundwater; 2) low density non-cohesive (granular) soil; and 3) high-intensity ground motion. Studies indicate that saturated, loose to medium dense, near surface cohesionless soil exhibits the highest liquefaction potential. Dry cohesionless soil may experience dynamic compaction during an earthquake. In general, cohesive soil is not considered susceptible to liquefaction.

The potential for liquefaction is considered nil because of the absence of shallow groundwater and lack of low-density cohesionless soil (site is underlain by Torrey Sandstone Formation). A dry sand settlement of approximately 1-inch is anticipated. For design purposes a differential settlement of approximately ½-inch because of seismic shaking may be used.

2.6.2 Shallow Ground Rupture

Shallow ground rupture cannot be completely precluded at the proposed site. However, based on our geologic mapping, literature review, and aerial photo analysis it appears that active faulting/potential shallow ground rupture is considered unlikely because of the absence of faulting on or near the subject site. The potential for ground cracking due to shaking from distant seismic events is considered nil, although it is a possibility at any site.

2.6.3 Tsunamis and Seiches

The subject site is not located within a tsunami inundation area (CGS, 2009). Based on the elevation of the proposed development at the site with respect to sea level and its distance from large open bodes of water, the potential of seiche and/or tsunami is considered to be nil.

2.7 Seismic Design Parameters

The design spectrum was developed based on the CBC, 2013. A site Coordinate of 32.9884° N, -117.2548° W was used to derive the seismic parameters presented below.

Table 1- Seismic Design Parameters

Seismic Soil Parameters (2013 CBC Section 1613)	
Site Class Definition (Table 1613.5.2)	D
Mapped Spectral Response Acceleration Parameter Ss (for 0.2 second) (Figure 1613.5(3))	1.38
Mapped Spectral Response Acceleration Parameter, S_1 (for 1.0 second) (Figure 1613.5(4))	0.51
Site Coefficient Fa (short period) (Table 1613.5.3(1))	1.00
Site Coefficient F_v (1-second period) (Table 1613.5.2(2))	1.50
Adjusted Maximum Considered Earthquake (MCE) Spectral Response Acceleration Parameter S_{MS} (short period) (Eq. 16-37)	1.38
Adjusted Maximum Considered Earthquake (MCE) Spectral Response Acceleration Parameter S_{M1} (1-second period) (Eq. 16-38)	0.77
Design Spectral Response Acceleration Parameter, S_{DS} (short period) (Eq. 16-39)	0.92
Design Spectral Response Acceleration Parameter, S_{D1} (1-second period) (Eq. 16-40)	0.51

2.8 Slope Stability

The site is gently sloping and we understand that significant slopes are not proposed to develop the site for its intended use. Once final grading plans become available, MATRIX should review the proposed development and provide supplemental recommendations regarding slope stability as necessary.

2.9 Laboratory Testing

From our review of the previous reporting, laboratory testing of the onsite soil consisted of representative samples obtained from within the bores. The following tests were performed: in-situ density and water content, R-value, Expansion Index, sulfate and chloride content, resistivity, pH, direct shear, and remolded direct shear. The prior consultants evaluated data and discussion of the tests performed and a summary of the results are presented in Appendix C. These results should be confirmed at the completion of site grading performed by the engineering geologist/geotechnical engineer's on site representative.

3.0 CONCLUSIONS

Based on the review of the previous consultant's preliminary geotechnical investigation and our understanding of the site, it is our opinion that the proposed residential care facility is feasible from a geotechnical standpoint, provided the conclusions and recommendations contained in this report are considered and incorporated into the project design process and implemented during construction. The following is a summary of the primary geotechnical factors determined from our review of the prior report and our analysis of the site.

- Based on the review of the prior subsurface exploration and review of pertinent geologic maps and reports, the site is underlain by undocumented artificial fill, residual soil, Quaternary alluvium, and Tertiary Torrey Sandstone.
- The site is not located within a State of California Earthquake fault zone.
- Groundwater is not considered a constraint for the proposed development.
- The potential for liquefaction is considered negligible.
- Active or potentially active faults are not known to exist on the site.
- There are not any known landslides impacting the site.
- Laboratory test results of the near surface soil indicate a very low expansion potential and a negligible potential for soluble sulfate attack on Type II/V concrete.
- Laboratory test results of the near surface soil indicate that onsite soil has a moderate corrosion potential to buried metals.
- All existing undocumented artificial fill, residual soil, Quaternary alluvium, and unsuitable upper intensely weathered Tertiary Torrey Sandstone are prone to potential settlement and should be overexcavated to underlying competent Tertiary Torrey Sandstone, within areas of proposed structures, fill or improvements. Anticipated removal depths range from approximately 2 to 6 feet below the existing surface.
- The existing onsite soil appears, from a geotechnical perspective, to be suitable material for use as fill, provided it is relatively free from rocks (larger than 3 inches in maximum dimension), construction debris, and organic material. It is anticipated that the onsite soil may be excavated with conventional heavy-duty construction equipment.

4.0 RECOMMENDATIONS

4.1 Site Earthwork

We anticipate that earthwork at the site will consist of site preparation and remedial grading, followed by construction of slab-on-grade type foundations. All earthwork and grading should be performed in accordance with all applicable requirements of the appropriate reviewing agency and the General Earthwork and Grading Specifications for Rough Grading included in Appendix D. In case of conflict, the following recommendations shall supersede those included as part of Appendix D.

4.1.1 Site Preparation

Prior to grading of areas that may receive structural fill, engineered structures or other improvements the areas should be cleared of surface obstructions, existing debris and stripped of vegetation. Vegetation and debris should be removed and properly disposed of offsite. All debris from the proposed demolition activities at the site should be removed and properly disposed of offsite. Holes resulting from the removal of buried tree root systems, obstructions, structures or utilities, which extend below finished site grades should be excavated to firm native soil and replaced with a suitable compacted fill material. Areas to receive fill and/or other surface improvements should be scarified to a minimum depth of 6 inches per the attached earthwork and grading specifications, brought to a near-optimum field water content, and recompacted to 90 percent or more relative compaction (based on American Standard of Testing and Materials [ASTM] Test Method D1557).

4.1.2 Overexcavation and Recompaction

The site is underlain by approximately 2 to 6 feet of potentially compressible soil (undocumented artificial fills, residual soil, Quaternary alluvium, and upper intensely weathered Tertiary Torrey Sandstone), which may settle under the surcharge of fill and/or foundation loads.

The upper 2 to 6 feet of soil within the proposed structural building areas should be over excavated and replaced with compacted fill. In addition, overexcavation should extend a minimum of three (3) feet below the bottom of any proposed footings. Overexcavation within building areas should extend 5 feet or more beyond the proposed structure. In areas where walls are proposed, the upper 2 to 3 feet of unsuitable soil should be overexcavated and recompacted. Within any pavement areas the upper 2 feet of all unsuitable soil, should be removed and recompacted. However, localized, deeper overexcavation should be anticipated where deemed necessary by the geotechnical consultant based on observations during grading. The proposed grading should provide a 1:1 (h:v) fill prism, extending outwards, below the proposed structural building footprints or wall foundations.

4.1.3 Import Soil for Grading

In the event import soil is needed to achieve final design grades, all potential import materials should be free of deleterious/oversize materials, have a very low expansion potential, negligible corrosion potential, and receive prior approval by the project geotechnical consultant 48 hours prior to commencement of delivery onsite. Laboratory testing of import soil must consist of maximum density and optimum water content, expansion index, sulfate, chloride, resistivity, pH, and sieve analysis.

4.1.4 Shrinkage and Bulking

Volumetric changes in earth quantities occur when excavated onsite earth materials are replaced as properly compacted fill. The following (Table 2) is an estimate of shrinkage and bulking factors for the various geologic units found on the site. These estimates are based on in-place densities of the various materials and on the estimated average degree of relative compaction specified during grading.

TABLE 2
Bulking and Shrinkage

GEOLOGIC UNIT	SHRINKAGE/BULKING PERCENT
Undocumented Artificial Fill	5 to 10 (shrinkage)
Residual Soil	5 to 15 (shrinkage)
Quaternary Alluvium	5 to 15 (shrinkage)
Tertiary Torrey Sandstone	0 to 1 (bulking)

The above estimates of shrinkage are intended as an aid for project engineers in determining earthwork quantities. **However, these estimates should be used with some caution because those are not absolute values,** rather preliminary rough estimates which may vary with depth of overexcavation, stripping losses, field conditions at the time of grading, etc. (Handling losses, and reduction in volume because of removal of oversized material, are not included in these estimates).

4.1.5 Temporary Stability of Excavations

All excavations for the proposed development must be performed in accordance with current OSHA (Occupational Safety and Health Agency) regulations and those of other regulatory agencies, as appropriate.

Temporary excavations maybe cut vertically up to five feet. Excavations over five feet should be slot-cut, shored, or cut to a 1H:1V (horizontal, H: vertical, V) slope gradient. Surface water should be diverted away from exposed cuts, and not be allowed to pond on top of the cut slopes. Temporary cuts should not be left open for an extended period of time. Recommendations and stability calculations can be provided upon request for the use of cantilevered shoring, soldier piles, and underpinning.

4.1.6 Fill Placement and Compaction

Areas prepared to receive structural fill and/or other surface improvements should be scarified to a minimum depth of 6 inches, brought to optimum-water content, and recompacted to 90 percent or more relative compaction (based on ASTM Test Method D1557). The optimum lift thickness to produce a uniformly compacted fill will depend on the type and size of compaction equipment used. In general, fill should be placed in uniform lifts generally not exceeding 8 inches in uncompacted thickness. Placement and compaction of fill should be performed in accordance with local grading ordinances under the observation and testing of the geotechnical consultant. In general, oversized material greater than 8 inches shall not be placed within 10 vertical feet of finish grade or within 2 feet of future utilities or underground construction.

4.1.7 Trench Backfill and Compaction

Onsite soil is generally considered to be suitable as trench backfill provided it is screened of rocks and other material over 3 inches in diameter and organic matter. Trench backfill should be compacted in uniform lifts (generally not exceeding 8 inches in uncompacted thickness) by mechanical means to 90 percent or more relative compaction (per ASTM Test Method D1557).

If trenches are shallow and the use of conventional equipment may result in damage to the utilities clean sand, having sand equivalent (SE) of 30 or greater, should be used to bed and shade the utilities. Sand backfill should be densified. The densification may be accomplished by jetting or flooding. However, a representative of MATRIX shall observe the sub-soil conditions within the trench to determine the soil drainage condition potential. Silt or clay bearing sub-soil within a trench suggests the use of a vibratory plate and then tamping to ensure adequate compaction of the trench backfill. A representative from MATRIX should observe, probe, and test the backfill to verify compliance with the project specifications.

4.1.8 Cal/OSHA Soil Classification

Based on the soil types encountered during our preliminary investigation, onsite soil can be generally classified as Type B. MATRIX does not limit the soil classification to one type as soil may locally change over short distances. Furthermore, this classification should not preclude a Cal/OSHA "competent person" from determining soil type on a case-by-case basis.

4.2 Foundation Selection

4.2.1 General

Preliminary recommendations for conventional foundation design and construction are presented herein. When the final structural loads for the proposed structures become available, those should be provided to our office to verify the recommendations presented herein.

The information and recommendations presented in this section are not meant to supersede design by the project structural engineer or civil engineer specializing in the structural design or those of a corrosion consultant.

4.2.2 Conventional Foundations

Continuous footings must be founded at a minimum depth of 18-inches for both exterior and interior construction. All continuous footings should have a minimum width of 15 inches.

Shallow foundations may be designed for a maximum allowable bearing capacity of 2,000 lb/ft^2, for continuous and spread footings. This value may be increased by 300 psf for each additional foot in depth and 150 psf for each additional foot of width to a maximum value of 3,000 psf. Spread or isolated interior pad footings shall have a minimum width of 24 inches and be founded 18 inches deep into certified compacted fill. A factor of safety greater than 3 was used in evaluating the above bearing capacity values. The bearing capacities should be re-evaluated when loads and footing sizes have been finalized.

Lateral forces on footings may be resisted by passive earth resistance and friction at the bottom of the footing. Foundations may be designed for a coefficient of friction of 0.35, and a passive earth pressure of 225 $lb/ft^2/ft$. The passive earth pressure incorporates a factor of safety of about 1.5. A one third increase in the passive pressure may be used for wind and seismic loads. When combining passive and friction forces, passive resistance should be reduced by 1/3.

All footing trenches and bearing pads must be cut neat and level, and should be free of sloughed materials. Subgrade soil must be pre-moistened at optimum water content or slightly above.

TABLE 3 CONVENTIONAL CONTINUOUS FOUNDATION DESIGN PARAMETERS	
Expansion Potential	**Very Low**
Footing Depth Below Lowest Adjacent Finish Grade	
Interior/Exterior	18
Footing Width	15
Footing Reinforcement	No. 4 Rebar One (1) on Top One (1) on Bottom
Slab Thickness	4 inches
Under-Slab Requirements	A moisture and vapor retarding system (Stego) should be placed below the slab on grade and water sensitive areas as discussed in Section 4.2.3
Slab Subgrade Moisture	At 10% optimum water content or slightly above prior to placing concrete
Footing Embedment Next to Swales and Slopes If exterior footings adjacent to drainage swales are proposed within five (5) feet horizontally of the swale, the footing should be embedded sufficiently to assure embedment below the bottom of the swale is maintained. Footings adjacent to slopes should be embedded such that at least five (5) feet is provided horizontally from the edge of the footing to the face of the slope.	

4.2.3 Building Floor Slabs

We recommend a minimum floor slab thickness of 4 inches, reinforced with No. 3 bars spaced a maximum of 18 inches on center, both ways. All slab reinforcement should be supported on concrete chairs to provide proper placement of the reinforcing near mid-depth of the slab, or as otherwise specified by the project structural engineer.

Interior floor slabs with moisture sensitive floor coverings should be underlain by a 15-mil thick moisture/vapor barrier (Stego), to mitigate the upward migration of moisture from the underlying subgrade soil. The moisture/vapor barrier product used should meet the performance standards of an ASTM E 1745 Class A material, and be properly installed in accordance with ACI publication 302. It is the responsibility of the contractor to ensure that the moisture-vapor barrier system is placed in accordance with the project plans and manufacturers and architectural specifications, and that the moisture/vapor retarder materials are free of tears and punctures prior to concrete placement. Additional moisture reduction and/or prevention measures may be needed, depending on the performance requirements of future interior floor coverings. Lap the membrane twelve inches or more and tape the seams.

Sand layer requirements are the purview of the structural engineer, and should be provided in accordance with ACI Publication 302 "Guide for Concrete Floor and Slab Construction". Two inches of sand above and below the vapor barrier can be used as a guide. Ultimately, the design of the moisture retarder system and recommendations for concrete placement and curing are the purview of the developer, architect, building designer or the engineer responsible for the design of the foundations and floor slabs on grade.

Subgrade preparation below the concrete and sand shall consist of 4-inches of ¾-inch crushed aggregate rock or equivalent material. The crushed aggregate base should be water conditioned and be proofrolled a minimum of 3 passes, each way, with a vibratory plate compactor.

Prior to placing concrete, vapor barrier, and sand, the subgrade soil below all floor slabs should be pre-watered to achieve a water content that is at least equal or slightly greater than optimum water content. This water content should penetrate to a minimum depth of 12 inches into the subgrade soil. The water content of the floor slab subgrade soil should be verified by the geotechnical engineer within 24-hours prior to concrete placement. Proper concrete curing techniques should be utilized to reduce the potential for slab curling or the formation of excessive shrinkage cracks.

4.3 Lateral Earth Pressures and Retaining Wall Design Considerations

The following lateral earth pressures are recommended for any proposed retaining walls. The recommended lateral pressures for approved on-site soil (sand equivalency greater than 30, expansion index less than 20) for level or sloping backfill are presented on Table 4.

TABLE 4
Lateral Earth Pressures

CONDITIONS	EQUIVALENT FLUID WEIGHT (pcf)	
	Level Backfill	2:1 Backfill Sloping Upwards
Active	45	55
At-Rest	65	95
Passive	250	

Restrained structural walls should be designed for lateral earth pressures exerted on it. The magnitude of these pressures depends on the amount of deformation that the wall can yield under load. If the wall can yield enough to mobilize the full shear strength of the soil, it can be designed for "active" pressure. If the wall cannot yield under the applied load, the shear strength of the soil cannot be mobilized and the earth pressure will be higher. Such walls should be designed for "at-rest" conditions. If a structure moves toward the soil, the resulting resistance developed by the soil is the "passive" resistance. The equivalent fluid pressure values assume free-draining conditions. The backfill soil shall have a sand equivalency greater than 30, expansion index less than 20, and be compacted to 90 percent or more relative compaction (based on ASTM Test Methods D2922 and D3017).

CLASS 2 FILTER PERMEABLE MATERIAL GRADATION PER CALTRANS SPECIFICATIONS	
SIEVE SIZE	PERCENT PASSING
1"	100
$\frac{3}{4}$"	90-100
$\frac{3}{8}$"	40-100
No. 4	25-40
No. 8	18-33
No. 30	5-15
No. 50	0-7
No. 200	0-3

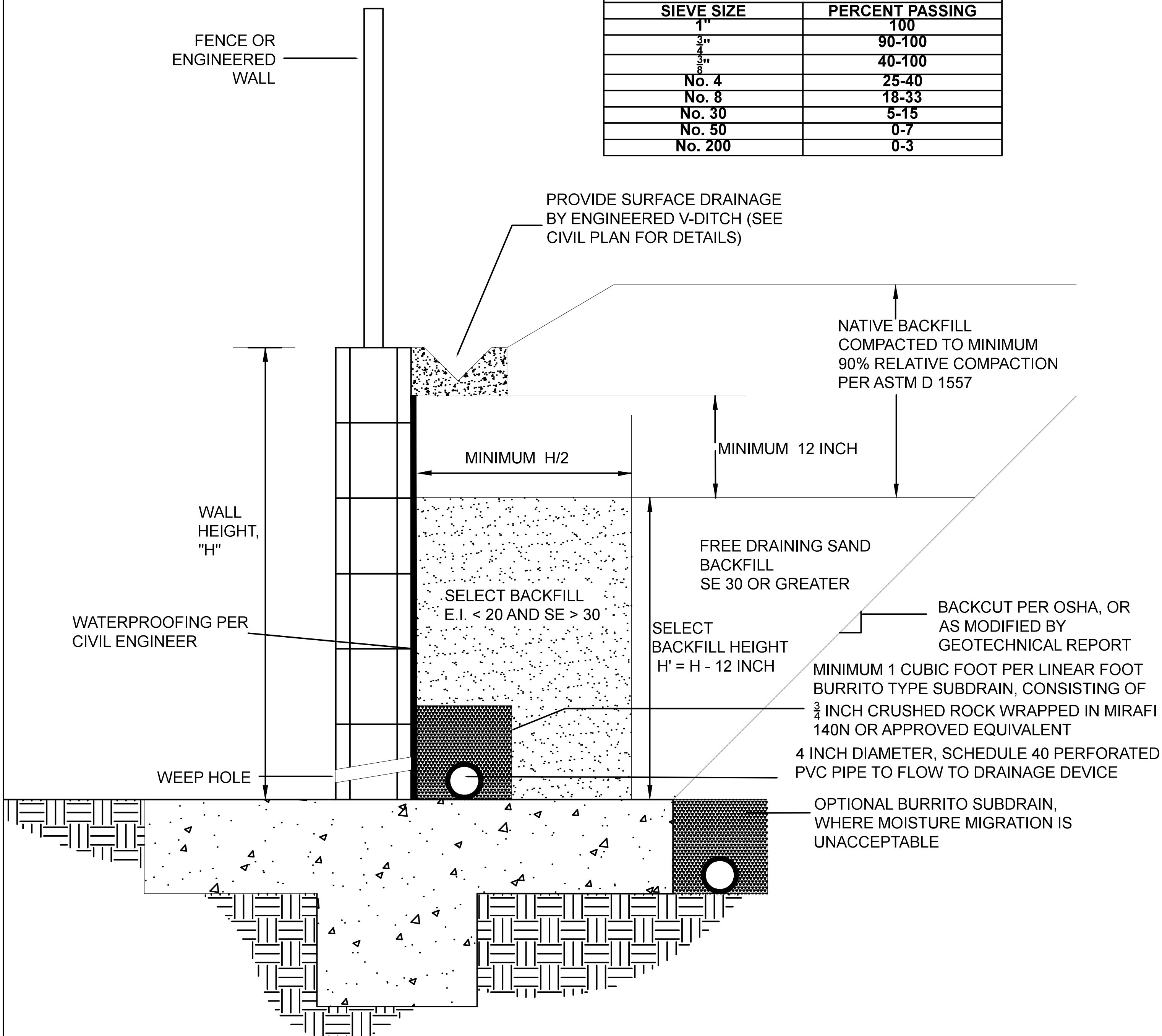

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FIGURE 3
RETAINING WALL DIAGRAM

Project Name	PACIFIC SOUND INVESTORS
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The walls should be constructed and backfilled as soon as possible after backcut excavation. Prolonged exposure of backcut slopes may result in some localized slope instability. If conditions other than those assumed above are anticipated, the project geotechnical engineer should provide the equivalent fluid pressure values on an individual-case basis.

The geotechnical and structural engineers must evaluate surcharge-loading effects from the adjacent structures. All retaining wall structures must be provided with appropriate drainage, and appropriately waterproofed and constructed with backdrains to include perforated drain pipe. The drain pipe should be sloped to drain to a suitable outlet. Typical wall drainage design is illustrated on Figure 3. It should be noted that the recommended subdrain does not provide protection against seepage through the face of the wall and/or efflorescence. If such seepage or efflorescence is undesirable, retaining walls should be waterproofed to mitigate this potential.

A friction coefficient of 0.35 may be used for sliding resistance at the concrete and soil interface. Wall footings should be designed in accordance with structural considerations. The passive resistance value may be increased by one-third when considering loads of short duration such as wind or seismic loads.

Foundations for retaining walls in properly compacted fill should be embedded at least 24 inches below lowest adjacent grade. At this depth, an allowable bearing capacity of 2,000 psf may be assumed.

All excavations must be made in accordance with Cal/OSHA. Excavation safety is the sole responsibility of the contractor.

4.4 Structural Setbacks

Structural setbacks, in addition to those required per the CBC, are not required due to geologic or geotechnical conditions within the site.

4.5 Corrosivity to Concrete and Metal

The National Association of Corrosion Engineers (NACE) defines corrosion as “a deterioration of a substance or its properties because of a reaction with its environment”. The “environment” from a geotechnical viewpoint is the prevailing foundation soil and the “substances” are the reinforced concrete foundations or various buried metallic elements such as rebars, piles, pipes, etc., which are in direct contact with or within close vicinity of the foundation soil.

In general, soil environments that are detrimental to concrete have high concentrations of soluble sulfates and/or pH values of less than 5.5. ACI 318R-05 Table 4.3.1 provides specific guidelines for the concrete mix design based on different amount of soluble sulfate content. The minimum amount of chloride ions in the soil environment that are corrosive to steel, either in the form of reinforcement protected by concrete cover, or plain steel substructures such as steel pipes or piles, is 500 ppm per California Test 532.

Based on testing performed during this investigation within the project site, the onsite soil is classified as having a negligible sulfate exposure condition in accordance with ACI 318R-05 Table 4.3.1. It is also our opinion that onsite soil should be considered to have a moderate corrosion potential to buried metals because of its low resistivity.

Despite the minimum recommendation above, Matrix Geotechnical Consulting is not a corrosion-engineering firm. Therefore, if required by the local government agency, we recommend that you consult with a competent corrosion engineer and conduct additional testing to evaluate the actual corrosion potential of the site and to provide recommendations to reduce the corrosion potential with respect to the proposed improvements. The recommendations of the corrosion engineer may supersede our findings and recommendations.

4.6 Nonstructural Concrete Flatwork

Concrete flatwork (such as walkways, bicycle trails, etc.) has a high potential for cracking because of changes in soil volume related to soil-moisture fluctuations. To mitigate that potential, concrete should be designed in accordance with the minimum guidelines outlined in Table 5. These guidelines will reduce the potential for irregular cracking and promote cracking along construction joints, but will not eliminate all cracking or lifting. Thickening the concrete and/or adding additional reinforcement will further reduce cosmetic distress.

TABLE 5
Nonstructural Concrete Flatwork for Very Low Expansive Soil

	Private Sidewalks	Private Drives	Patios/ Entryways	City Sidewalk Curb and Gutters
Minimum Thickness (in.)	4 (nominal)	4(full)	4 (full)	City/Agency Standard
Presaturation	Presoak to 12 inches	Presoak to 12 inches	Presoak to 12 inches	City/Agency Standard
Reinforcement		No. 3 at 24 inches on centers*	No. 3 at 24 inches on centers	City/Agency Standard
Thickened Edge		8” x 8”	8” X 8”	City/Agency Standard
Crack Control	Saw cut or deep open tool joint to a minimum of 1/3 the concrete thickness	Saw cut or deep open tool joint to a minimum of 1/3 the concrete thickness	Saw cut or deep open tool joint to a minimum of 1/3 the concrete thickness	City/Agency Standard
Maximum Joint Spacing	5 feet	10 feet or quarter cut whichever is closer	6 feet	City/Agency Standard

*Confirm Through Structural Design

4.7 Preliminary Pavement Design

Structural pavement sections presented herein for pavements are based on test results from soil samples recovered during our subsurface exploration. However, it should be understood that the soil material exposed during grading may differ from the materials sampled and tested during this investigation. Therefore, preliminary pavement recommendations are subject to verification and possible revision based on any revised Traffic Indicies as well as sampling and testing of subgrade soil present after grading.

Previous Laboratory testing indicated an R-value of 30 for near surface soil. For planning and design purposes, we have prepared the following preliminary pavement section (Table 6) based on assumed Traffic Indices (T.I.) of 5.0, 6.0, and 7.0 for the site. The City of Solana Beach minimum pavement section was also considered in our pavement design.

TABLE 6
Preliminary Pavement Design
Recommended Minimum Pavement Sections

Preliminary Asphaltic Concrete Pavement Design			
Assumed Traffic Index	5.0	6.0	7.0
Design R-value	30	30	30
AC Thickness (inches)	3.0	4.0	5.5
AB Thickness (inches)	6.0	7.0	13.0

Notes: AC – Asphaltic Concrete
AB – Aggregate Base

The thicknesses of the provided section are considered minimum thicknesses. We utilized a design R-Value of 30 for these minimum recommendations. Increasing the thickness of any or all of the above layers will reduce the likelihood of the pavement experiencing distress during its service life. The above recommendations are based on the assumption that proper maintenance and irrigation of the areas adjacent to the roadway will occur through the design life of the pavement. Failure to maintain a proper maintenance and/or irrigation program may jeopardize the integrity of the pavement.

Aggregate base should be compacted to a minimum of 95 percent relative compaction over subgrade compacted to a minimum of 95 percent relative compaction per ASTM D1557, through the upper 12 inches. Aggregate base should meet the specifications of the latest edition of the "Standard Specifications for Public Works Construction" (Greenbook) or the specifications of Caltrans Class 2 aggregate base. MATRIX should provide geotechnical observation and testing during construction.

4.8 Control of Surface Water and Drainage Control

Positive drainage of surface water away from structures is very important. Water must not be allowed to pond adjacent to buildings. Positive drainage may be accomplished by providing drainage away from buildings at a gradient of at least 2 percent for a distance of at least 5 feet, and further maintained by a swale or drainage path at a gradient of at least 1 percent. Where necessary, drainage paths may be shortened by use of area drains and collector pipes.

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

4.9 Slope Landscaping and Maintenance (as necessary)

Adequate slope and pad drainage facilities must be incorporated into the design of the finish grading for the subject site. The overall stability of graded slopes should not be adversely affected provided all drainage provisions are properly constructed and maintained thereafter and provided all engineered slopes are landscaped with a deep rooted, drought tolerant and maintenance free plant species, as recommended by the project landscape architect and reviewed by MATRIX.

4.10 Future Plan Reviews, Construction Observation and Testing

Future plan reviews are necessary to verify that recommendations and conclusions from Matrix Geotechnical Consulting feasibility and preliminary studies have been incorporated into the plans. Modifications to the plan or additional subsurface exploration/laboratory testing may be required based upon our review; therefore our review should be performed before any related construction is initiated. Such reviews should include, but are not limited to:

- Rough Grading Plans
- Precise Grading Plans
- Foundation Plans
- Retaining Wall Plans
- Onsite Storm Water Disposal System Evaluation
- Storm Drain/Sewer/Water/Dry Utility Plans

Plans should be forwarded to the project geotechnical engineer and/or engineering geologist for review and comments, as deemed necessary.

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 by a representative of MATRIX.

The geotechnical consultant should also perform construction observation and testing during future grading, excavations, backfill of utility trenches, preparation of pavement subgrade and placement of aggregate base, foundation or retaining wall construction or when an unusual soil condition is encountered at the site. Grading plans, foundation plans, and final project drawings should be reviewed by this office prior to construction.

5.0 LIMITATIONS

Our services were performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable 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 samples taken and submitted for laboratory testing, the observations made and the in-situ field testing performed are believed representative of the entire project; however, soil and geologic conditions revealed by excavation may be different than our preliminary findings. If this occurs, the changed conditions must be evaluated by the project soil engineer and geologist and design(s) adjusted as required or alternate design(s) recommended.

This report is issued with the understanding that it is the responsibility of the owner, or of his/her representative, to ensure that the information and recommendations contained herein are brought to the attention of the architect and/or project engineer and incorporated into the plans, and the necessary steps are taken to see that the contractor and/or subcontractor properly implements the recommendations in the field. The contractor and/or subcontractor should notify the owner if they consider any of the recommendations presented herein to be unsafe.

The findings of this report are valid as of the present date. However, changes in the conditions of a property can and do occur with the passage of time, whether they be 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.

The opportunity to be of service is appreciated. Should you have any questions regarding the content of this report, or should you require additional information, please do not hesitate to contact this office at your earliest convenience.

Respectfully submitted,

MATRIX GEOTECHNICAL CONSULTING

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APPENDIX A

REFERENCES

APPENDIX A

References

Campbell K.W., 1997 "Empirical Near-Source Attenuation Relationships for Horizontal and Vertical Components of Peak Ground Acceleration, Peak Ground Velocity and Pseudo-Absolute Acceleration Response Spectra," Seismological Research Letters, Vol. 68, No. 1, pp. 154-179.

_______, 1998, Maps of Known Active Fault Near-Source Zones in California and Adjacent Portions of Nevada, Prepared by California Division of Mines and Geology.

CGS, Tsunami Inundation Map for Emergency Planning, State of California, County of San Diego, Del Mar Quadrangle, dated June 1, 2009.

LGC Inland, Inc., 2011, Preliminary Geotechnical Investigation for the Proposed Assisted and Dementia Residential Facility Complex, Located at 959 Genevieve Street, APN: 298-390-51, City of Solana Beach, County of San Diego, California, Dated May 17.

USGS, 2005, Geologic Map of the San Diego 30'x60' Quadrangle, Southern California, Version 1.0

Aerial Photograph Interpretation Table

SOURCE	FLIGHT	FRAME (S)	FLIGHT DATE	SCALE
Continental	107-5	11, 12	4/16/72	1"=5,000'
Continental	210 17B	39, 40	10/23/78	1"=1,250'
Continental	FC SD 11	21, 22	4/8/80	1"=4,000'
Continental	SD 3	15, 16	1/14/88	1"=2,500'
Continental	C98-5	104, 105	10/30/93	1"=2,200'
Continental	C-123-5	56, 57	8/12/98	1"=2,000'
Google Earth	N/A	N/A	11/1/2010	N/A

APPENDIX B

PREVIOUS BORE LOGS

Geotechnical Boring Log B-1

Date: 4/25/11	**Project Name:** Pacific Sound Investors-Solana Beach — Page 1 of 2
Project Number: I11-2413-10	**Logged By:** SER
Drilling Company: CALPAC Drilling	**Type of Rig:** B-61
Drive Weight (lbs.): 140 lbs	**Drop (in.):** 30 inches **Hole Dia. (in.):** 8
Top of Hole Elevation (ft): 114	**Hole Location:** See Geotechnical Map

Elevation (MSL)	Depth (ft.)	Blow Count / 12"	Sample No.	Geologic / Group Symbol	DESCRIPTION	In-Situ Moist. (%)	Dry Density (pcf)	SPT Depth	SPT N	Type of Test
114	0			Afu SM	**Artifical Fill, Undocumented** Silty Sand; brown to dark brown, moist, loose to medium dense					
				Tt	**Tertiary Torrey Sandstone**					
110		3 4 6	R-1 Bag 1 @ 1-5'		SANDSTONE; light brown to brown, moist, moderately hard, fine to medium grained, slightly friable	11.9	106.4	2.5-4.0	8	Corrosion Expansion
	5	4 7 8	R-2			8.8	102.4	5.0-6.5	10	
		6 8 13	R-3		brown, moist, moderately hard, fine to medium grained	15.8	113.2	7.5-9.0	14	
105	10	5 8 11	R-4		light brown	13.4	106.6	10.0-11.5	13	
100	15	3 4 5	S-1		SANDSTONE: light brown, damp, soft to moderately hard, fine to coarse grained	7.5		15.0-16.5	9	
95	20	5 9 14	R-5		SANDSTONE: light brown, damp, moderately hard, fine to coarse grained	4.2	102.9	20.0-21.5	15	
90	25	4 5 7	S-2		SANDSTONE: light brown, damp, moderately hard, fine to medium grained, friable	8.7		25.0-26.5	12	
85	30									

Standard Penetration Test CURVE: 10 30 50

Sample Legend
- ☒ Bag Sample
- SPT
- Ring Sample (CA modified)

Geotechnical Consulting

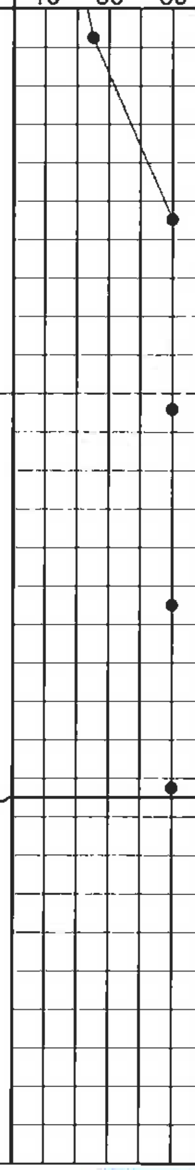
LGC INLAND

Geotechnical Boring Log B-1

Date: 4/25/11	**Project Name:** Pacific Sound Investors-Solana Beach — Page 2 of 2
Project Number: I11-2413-10	**Logged By:** SER
Drilling Company: CALPAC Drilling	**Type of Rig:** B-61
Drive Weight (lbs.): 140 lbs	**Drop (in.):** 30 inches **Hole Dia. (in.):** 8
Top of Hole Elevation (ft): 114	**Hole Location:** See Geotechnical Map

Elevation (MSL)	Depth (ft.)	Blow Count / 12"	Sample No.	Soil Graphic	Geologic / Group Symbol	DESCRIPTION	In-Situ Moist.(%)	Dry Density (pcf)	SPT Depth	SPT N	Type of Test
	30	8 14 23	R-6			SANDSTONE; light brown, moist, moderately hard, fine to medium grained, slightly friable, well indurated	10.9	111.8	30.0-31.5	25	
80	35	18 50[5.5"]	S-3			SANDSTONE; light brown to reddish brown, damp, hard, fine to medium grained, highly friable	6.4		35.0-36.0	50	
75	40	21 50[2"]	R-7			Silty SANDSTONE; light brown, damp, very hard, very fine to medium grained	5.8	101.7	40.0-40.8	50	
70	45	13 50	S-4			Silty SANDSTONE; light brown, damp, very hard, very fine to medium grained	8.7		45.0-46.0	50	
65	50	50[6"]	R-8			Silty SANDSTONE; light brown, dry, very hard, very fine to medium grained (partial recovery)			50.0-50.5	50	
60	55										
55	60										

Standard Penetration Test CURVE (10, 30, 50)



Total Depth: 50.5'
No Groundwater
0-3': Capped with Concrete
3-50.5': Backfilled with Bentonite

Sample Legend
- Bag Sample
- SPT
- Ring Sample (CA modified)

Geotechnical Consulting — LGC INLAND

Geotechnical Boring Log B-2

Date: 4/25/11	**Project Name:** Pacific Sound Investors-Solana Beach — Page 1 of 1
Project Number: I11-2413-10	**Logged By:** SER
Drilling Company: CALPAC Drilling	**Type of Rig:** B-61
Drive Weight (lbs.): 140 lbs	**Drop (in.):** 30 inches **Hole Dia. (in.):** 8
Top of Hole Elevation (ft): 115	**Hole Location:** See Geotechnical Map

Elevation (MSL)	Depth (ft.)	Blow Count / 12"	Sample No.	Geologic / Group Symbol	DESCRIPTION	In-Situ Moist.(%)	Dry Density (pcf)	SPT Depth	SPT N	Type of Test
115	0			Afu SM	**Artificial Fill, Undocumented** Silty Sand; light brown, dry to damp, medium dense					
		3 3 3	R-1	Tt	**Tertiary Torrey Sandstone** Silty SANDSTONE; brown, moist, moderately hard, fine to medium grained, intensely weathered, scattered rootlets	14.6	99.6	2.5-4.0	4	
110	5	4 8 11	R-2			11.3	114.4	5.0-6.5	13	
		6 7 17	R-3		SANDSTONE; brown, moist, moderately hard, moderately weathered, scattered rootlets	14.8	111.6	7.5-9.0	16	
105	10	5 7 11	R-4		SANDSTONE; light brown, moist, moderately hard, fine to medium grained, slightly weathered	12.9	106.9	10.0-11.5	12	
100	15	8 9 11	S-1		SANDSTONE; light brown to brown, damp, moderately hard, fine to coarse grained	9.9		15.0-16.5	20	
					Total Depth: 16.5' No Groundwater					
95	20									
90	25									
85	30									

Standard Penetration Test CURVE (10, 30, 50)

Sample Legend
- ⊠ Bag Sample
- SPT
- Ring Sample (CA modified)

Geotechnical Consulting

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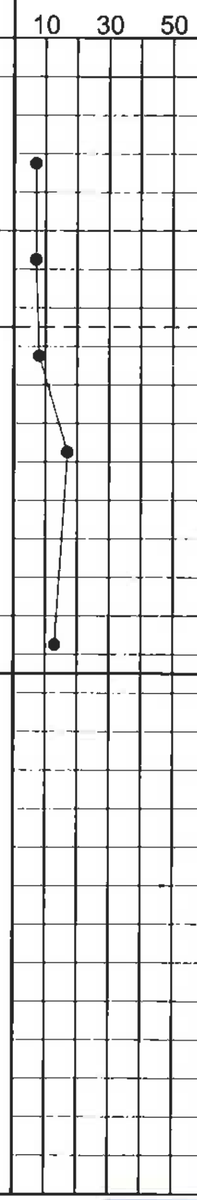
Geotechnical Boring Log B-3

Date: 4/25/11	**Project Name:** Pacific Sound Investors-Solana Beach — Page 1 of 1
Project Number: I11-2413-10	**Logged By:** SER
Drilling Company: CALPAC Drilling	**Type of Rig:** B-61
Drive Weight (lbs.): 140 lbs	**Drop (in.):** 30 inches **Hole Dia. (in.):** 8
Top of Hole Elevation (ft): 123	**Hole Location:** See Geotechnical Map

Elevation (MSL)	Depth (ft.)	Blow Count / 12"	Sample No.	Geologic / Group Symbol	DESCRIPTION	In-Situ Moist.(%)	Dry Density (pcf)	SPT Depth	SPT N	Type of Test
123	0			SM	**Residual Soil** Silty Sand; dark brown, moist, loose, fine to medium grained, abundant rootlets					
				Tt	**Tertiary Torrey Sandstone**					
120		3 3 7	R-1		Silty SANDSTONE; dark brown to brown, moist, soft to moderately hard,fine to medium grained, intensely weathered, scattered rootlets	10.1	98.4	2.5-4.0	7	
	5	3 4 6	R-2		SANDSTONE; brown, moist, moderately hard, fine to meduim grained, slightly weathered	7.9	101.2	5.0-6.5	7	
115		3 4 8	R-3		Silty SANDSTONE; dark brown, very moist, moderately hard, fine to medium grained	17.7	105.9	7.5-9.0	8	
	10	9 10 16	R-4		dark brown to brown	11.9	117.0	10.0-11.5	17	
110										
	15	3 4 9	S-1		SANDSTONE; light brown to brown, very moist, moderately hard, fine to medium grained	10.5		15.0-16.5	13	
105					Total Depth: 16.5' No Groundwater					
	20									
100										
	25									
95										
	30									

Standard Penetration Test — CURVE



Sample Legend

- ☒ Bag Sample
- SPT
- Ring Sample (CA modified)

Geotechnical Consulting

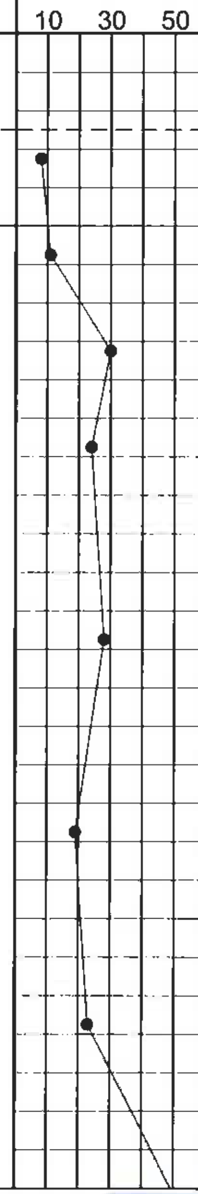
LGC INLAND

Geotechnical Boring Log B-4

Date: 4/27/11	**Project Name:** Pacific Sound Investors-Solana Beach — Page 1 of 2
Project Number: I11-2413-10	**Logged By:** SER
Drilling Company: CALPAC Drilling	**Type of Rig:** B-61
Drive Weight (lbs.): 140 lbs	**Drop (in.):** 30 inches **Hole Dia. (in.):** 8
Top of Hole Elevation (ft): 123	**Hole Location:** See Geotechnical Map

Elevation (MSL) and Depth (ft.)	Blow Count / 12"	Sample No.	Soil Graphic	Geologic / Group Symbol	DESCRIPTION	In-Situ Moist.(%)	Dry Density (pcf)	SPT Depth	SPT N	Type of Test
0		Bag 1 @ 1-5'		SM	**Residual Soil** Silty Sand, brown to dark brown, moist, loose, fine to medium grained					
120	4 5 7	R-1		SC	Clayey Sand; dark brown to black,very moist, medium dense, fine to medium grained	18.2	109.3	2.5-4.0	8	
5	7 7 10	R-2			**Tertiary Torrey Sandstone** SANDSTONE; light brown to brown, moist, moderately hard, fine to medium grained with trace clay	10.4	111.4	5.0-6.5	11	
115	9 21 23	R-3			SANDSTONE; light brown, moist, hard, fine to medium grained with trace clay, slight oxidation	13.0	118.6	7.5-9.0	30	
10	8 13 23	R-4			SANDSTONE; light brown to brown, moist, hard, fine to medium grained	10.9	119.6	10.0-11.5	24	
110										
15	5 13 15	S-1			moderately hard	9.9		15.0-16.5	28	
105										
20	9 13 15	R-5			SANDSTONE; light brown, damp, moderately hard, fine to medium grained with trace coarse grains	9.2	123.9	20.0-21.5	19	
100										
25	6 9 14	S-2			SANDSTONE; light brown to yellow brown, damp, moderately hard, fine to medium grained	7.5		25.0-26.5	23	
95										
30										

Standard Penetration Test CURVE



Sample Legend

- Bag Sample
- SPT
- Ring Sample (CA modified)

Geotechnical Consulting

LGC INLAND

Geotechnical Boring Log B-4

Date: 4/27/11	**Project Name:** Pacific Sound Investors-Solana Beach — Page 2 of 2
Project Number: I11-2413-10	**Logged By:** SER
Drilling Company: CALPAC Drilling	**Type of Rig:** B-61
Drive Weight (lbs.): 140 lbs	**Drop (in.):** 30 inches **Hole Dia. (in.):** 8
Top of Hole Elevation (ft): 123	**Hole Location:** See Geotechnical Map

Elevation (MSL) and Depth (ft.)	Blow Count / 12"	Sample No.	Soil Graphic	Geologic / Group Symbol	DESCRIPTION	In-Situ Moist.(%)	Dry Density (pcf)	SPT Depth	SPT N	CURVE (10 30 50)	Type of Test
30	50[3.5"]	R-6			SANDSTONE; orange to yellow brown, damp, very hard, fine to medium grained	5.6	94.0	30.0-30.3	50		
90											
35	44 50[3"]	S-3			SANDSTONE; light brown to yellow brown, damp, very hard, fine to medium grained	8.7		35.0-35.8	50		
					Total Depth: 36' No Groundwater 0-3': Capped with Concrete 3-36': Backfilled with Bentonite						
85											
40											
80											
45											
75											
50											
70											
55											
65											
60											

Sample Legend

- ☒ Bag Sample
- ◪ SPT
- ⧗ Ring Sample (CA modified)

Geotechnical Consulting

LGC INLAND

Geotechnical Boring Log B-5

Date: 4/27/11	**Project Name:** Pacific Sound Investors-Solana Beach	Page 1 of 1
Project Number: I11-2413-10	**Logged By:** SER	
Drilling Company: CALPAC Drilling	**Type of Rig:** B-61	
Drive Weight (lbs.): 140 lbs	**Drop (in.):** 30 inches **Hole Dia. (in.):** 8	
Top of Hole Elevation (ft): 131	**Hole Location:** See Geotechnical Map	

Elevation (MSL)	Depth (ft.)	Blow Count / 12"	Sample No.	Geologic / Group Symbol	DESCRIPTION	In-Situ Moist.(%)	Dry Density (pcf)	Standard Penetration Test SPT Depth	N	Type of Test
130	0			SM	**Residual Soil** Silty SAND; brown to dark brown, moist, loose to slightly hard, fine to medium grained					
		4 4 6	R-1	Tt	**Tertiary Torrey Sandstone** SANDSTONE; light brown to brown, moist, loose to moderately hard, fine to medium grained	13.7	110.7	2.5-4.0	7	
125	5	5 8 10	R-2		SANDSTONE; light brown to brown, moist, moderately hard, fine to medium grained	14.9	112.7	5.0-6.5	12	
		6 8 10	R-3		fine to medium grained with trace coarse grains	13.5	107.1	7.5-9.0	12	
120	10	5 9 11	R-4		fine to medium grained	14.4	110.0	10.0-11.5	13	
115	15	4 6 7	S-1		SANDSTONE; light brown, moist, moderately hard, fine to medium grained	8.1		15.0-16.5	13	
					Total Depth: 16.5' No Groundwater					
110	20									
105	25									
	30									

SPT CURVE: 10 30 50

Sample Legend
- Bag Sample
- SPT
- Ring Sample (CA modified)

Geotechnical Consulting

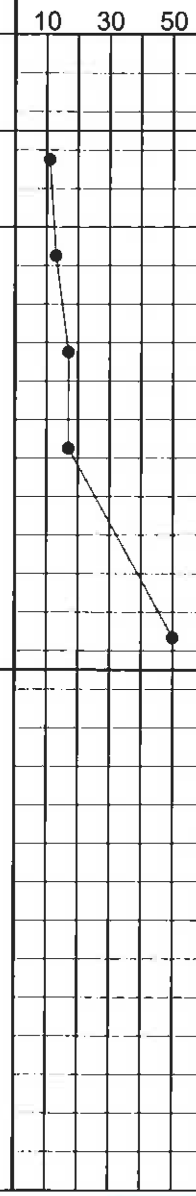
LGC INLAND

Geotechnical Boring Log B-6

Date: 4/27/11	**Project Name:** Pacific Sound Investors-Solana Beach — Page 1 of 1
Project Number: I11-2413-10	**Logged By:** SER
Drilling Company: CALPAC Drilling	**Type of Rig:** B-61
Drive Weight (lbs.): 140 lbs	**Drop (in.):** 30 inches **Hole Dia. (in.):** 8
Top of Hole Elevation (ft): 144	**Hole Location:** See Geotechnical Map

Elevation (MSL) and Depth (ft.)	Blow Count / 12"	Sample No.	Soil Graphic	Geologic / Group Symbol	DESCRIPTION	In-Situ Moist.(%)	Dry Density (pcf)	SPT Depth	SPT N	Type of Test
0				SM	**Residual Soil** Silty SAND; dark brown, moist, loose, trace rootlets					
140 / 5	5 7 10	R-1		Tt	**Tertiary Torrey Sandstone** Silty SANDSTONE; light brown to brown, damp, moderately hard, fine to medium grained	4.4	106.6	2.5-4.0	11	
	5 7 12	R-2			SANDSTONE; light brown to tan, dry to damp, moderately hard, fine to medium grained	1.4	109.6	5.0-6.5	13	
135	6 11 15	R-3				4.9	108.9	7.5-9.0	17	
10	8 10 16	R-4			SANDSTONE; light brown to brown, moist, moderately hard, fine to medium grained with trace clay	6.7	114.1	10.0-11.5	17	
130 / 15	8 38 50[4"]	S-1			SANDSTONE: light brown, damp, very hard, fine to medium grained	8.1		15.0-16.3	50	
125 / 20 / 120 / 25 / 115 / 30					Total Depth: 16.5' No Groundwater					

Standard Penetration Test CURVE



Sample Legend
- Bag Sample
- SPT
- Ring Sample (CA modified)

Geotechnical Consulting

LGC INLAND

APPENDIX C

LABORATORY TESTING PROCEDURES AND TEST RESULTS

APPENDIX C

Laboratory Testing Procedures and Test Results

The laboratory-testing program was directed towards providing quantitative data relating to the relevant engineering properties of the soil. Samples considered representative of site conditions were tested in general accordance with American Society for Testing and Materials (ASTM) procedure and/or California Test Methods (CTM), where applicable. The following summary is a brief outline of the test type and a table summarizing the test results.

Soil Classification: Soil were classified according the Unified Soil Classification System (USCS) in accordance with ASTM Test Methods D2487 and D2488. The soil classifications (or group symbol) are shown on the laboratory test data and boring logs.

Expansion Index: the Expansion Index Test, U.B.C. Standard No. 18 2 and/or ASTM D4829 evaluated the expansion potential of selected samples. Specimens are molded under a given compactive energy to approximately the optimum water content and approximately 50 percent saturation or approximately 90 percent relative compaction. The prepared 1-inch-thick by 4-inch-diameter specimens are loaded to an equivalent 144 psf surcharge and are inundated with tap water until volumetric equilibrium is reached. The results of these tests are presented in the table below:

SAMPLE LOCATION	SAMPLE DESCRIPTION	EXPANSION INDEX	EXPANSION POTENTIAL*
B-1 @ 1-5’	Brown Silty SAND	0	Very Low

* Per ASTM D4829

Soluble Sulfates: The soluble sulfate contents of selected samples were determined by standard geotechnical methods (CTM 417). The soluble sulfate content is used to determine the appropriate cement type and maximum water-cement ratios. The test results are presented in the table below:

SAMPLE LOCATION	SAMPLE DESCRIPTION	SULFATE CONTENT (ppm)	SULFATE EXPOSURE*
B-1 @ 1-5’	Brown Silty SAND	0.000	Negligible

*Per ACI 318R-05 Table 4.3.1

Minimum Resistivity and pH Tests: Minimum resistivity and pH tests were performed with CTM 643. The results are presented in the table below:

SAMPLE LOCATION	SAMPLE DESCRIPTION	pH	MINIMUM RESISTIVITY (ohm-cm)
B-1 @ 1-5’	Brown Silty SAND	7.5	3400

Chloride Content: Chloride content was tested with CTM 422. The results are presented below:

SAMPLE LOCATION	SAMPLE DESCRIPTION	CHLORIDE CONTENT (ppm)
B-1 @ 1-5’	Brown Silty SAND	0

<u>R-Value</u>: The resistance R-value was determined by the ASTM D2844 for street subgrade soil. The results were used for pavement design purposes.

SAMPLE LOCATION	SAMPLE DESCRIPTION	R-VALUE
B-4 @ 1-5'	Dark brown clayey SAND	30

<u>Maximum Dry Density Tests</u>: The maximum dry density and optimum water content of typical materials were determined in accordance with ASTM D1557. The results of these tests are presented in the table below:

SAMPLE LOCATION	SAMPLE DESCRIPTION	MAXIMUM DRY DENSITY (% by weight)	OPTIMUM WATER CONTENT (%)
B-1 @ 1-5'	Brown Silty SAND	123.3	9.8

<u>Direct Shear</u>: Direct shear tests were performed on selected remolded and/or undisturbed samples in accordance with ASTM 3080. The results of these tests ate presented in the table below and in the test data in the following page(s

SAMPLE LOCATION	SAMPLE DESCRIPTION	FRICTION ANGLE (degrees)	APPARENT COHESION (psf)
B-1 @ 5'	Light brown SANDSTONE	37	235
B-4 @ 1-5'	Brown Silty SAND	36	219

APPENDIX D

GENERAL EARTHWORK AND GRADING SPECIFICATIONS

APPENDIX D

MATRIX GEOTECHNICAL CONSULTING

EARTHWORK SPECIFICATIONS

These specifications present generally accepted standards and minimum earthwork requirements for the development of the project. These specifications shall be the guidelines for earthwork except where specifically superceded in preliminary geology and soil reports, grading plan review reports or by prevailing grading codes or ordinances of the controlling agency.

1.0 GENERAL

1.1 The contractor shall be responsible for the satisfactory completion of all earthwork in accordance with the project plans and specifications.

1.2 The project Soil Engineer and Engineering Geologist of their representative shall provide testing services, and Geotechnical consultation during the duration of the project.

1.3 All clearing, grubbing, stripping and site preparation for the project shall be accomplished by the Contractor to the satisfaction of the Soil Engineer.

1.4 It is the Contractor's responsibility to prepare the ground surface to receive the fills to the satisfaction of the Soil Engineer and to place, spread, mix and compact the fill in accordance with the job specifications and as requested by the Soil Engineer. The Contractor shall also remove all material considered by the Soil Engineer to be unsuitable for use in the construction of compacted fill.

1.5 The Contractor shall have suitable and sufficient equipment in operation to handle the amount of fill being placed. When necessary, equipment will be shut down temporarily in order to permit proper compaction of fills.

2.0 GENERAL

2.1 Excessive vegetation and all deleterious material should be disposed of offsite as required by the Soil Engineer. Existing fill, soil, alluvium or rock materials determined by the Soil Engineer as being unsuitable for placement in compacted fills shall be removed and wasted from the site. Where applicable, the Contractor may obtain the approval of the Soil Engineer and the controlling authorities for the project to dispose of the above-described materials, or a portion thereof, in designated areas onsite.

After removals as described above have been accomplished, earth materials deemed unsuitable in their natural, in-place condition, shall be removed as recommended by the Soil Engineer/Engineering Geologist.

2.2 After the removals as delineated in Item 2.0, 2.1 above, the exposed surfaces shall be disked or bladed by the Contractor to the satisfaction of the Soil Engineer. The prepared ground surfaces shall then be brought to the specified water content, mixed as required, and compacted and tested as specified. In areas where it is necessary to obtain the approval of the controlling agency, prior to placing fill, it will be the contractor's responsibility to notify the proper authorities.

2.3 Any underground structures such as cesspools, cisterns, mining shafts, tunnels, septic tanks, wells, pipelines or others not located prior to grading are to be removed or treated in a manner prescribed by the Soil Engineer and/or the controlling agency for the project.

3.0 COMPACTED FILLS

3.1 Any materials imported or excavated on the property may be utilized in the fill, provided each material has been determined to be suitable by the Soil Engineer. Deleterious material not disposed of during clearing or demolition shall be removed from the fill as directed by the Soil Engineer.

3.2 Rock or rock fragments less than eight inches in the largest dimension may be utilized in the fill, provided they are not placed in contracted pockets and the distribution of the rocks is approved by the Soil Engineer.

3.3 Rocks greater than eight inches in the largest dimension shall be taken offsite, or placed in accordance with the recommendations of the Soil Engineer in areas designated as suitable for rock disposal.

3.4 All fills, including onsite and import materials to be used for fill, shall be tested in the laboratory by the Soil Engineer. Proposed import materials shall be approved prior to importation.

3.5 The fill materials shall be placed by the Contractor in layers that when compacted shall not exceed six inches. Each layer shall be spread evenly and shall be thoroughly mixed during the spreading to obtain near uniform water content and a uniform blend of materials.

All compaction shall be achieved at optimum water content, or above, as determined by the applicable laboratory standard. No upper limit on the optimum water content is necessary; however, the Contractor must achieve the necessary compaction and will be alerted when the material is too wet and compaction cannot be attained.

3.6 Where the water content of the fill material is below the limit specified by the Soil Engineer, water shall be added and the materials shall be blended until a uniform water content, within specified limits, is achieved. Where the water content of the fill material is above the limits specified by the Soil Engineer, the fill materials shall be aerated by disked, blading or other satisfactory methods until the water content is within the limits specified.

3.7 Each fill layer shall be compacted to minimum project standards, in compliance with the testing methods specified by the controlled governmental agency and in accordance with recommendations for the Soil Engineer.

In the absence of specific recommendations by the Soil Engineer to the contrary, the compaction standard shall be ASTM D 1557.

3.8 Where a slope-receiving fill exceeds a ration of five-horizontal to one-vertical, the fill shall be keyed and benched through all unsuitable topsoil, colluvium, alluvium, or creep material, into sound bedrock or firm material, in accordance with the recommendations and approval of the Soil Engineer.

3.9 Side hill fills shall have a minimum key width of 15 feet into bedrock of firm material, unless otherwise specified in the soil report and approved by the Soil Engineer in the field.

3.10 Drainage terraces and subdrainage devices shall be constructed in compliance with the ordinances of the controlling governmental agency and/or with the recommendations of the Soil Engineer and Engineering Geologist.

3.11 The contractor shall be required to maintain the specified minimum relative compaction our to the finish slope face of fill slopes, buttresses, and stabilization fills as directed by the Soil Engineer and/or governing agency for the project. The may be achieved by either overbuilding 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 designated result.

3.12 Fill-over-cut slopes shall be properly keyed through topsoil, colluvium or creep material into rock or firm material: and the transition shall be stripped of all soil or unsuitable materials prior to placing fill.

The cut portion should be made and evaluated by the Engineering Geologist prior to placed of fill above.

3.13 Pad areas in natural ground and cut shall be approved by the Soil Engineer. Finished surfaces of these pads may require scarification and recompaction.

4.0 CUT SLOPES

4.1 The Engineering Geologist shall inspect all cut slopes and shall be notified by the Contractor when cut slopes are started.

4.2 During the course of grading, unforeseen adverse or potentially adverse geologist conditions are encountered, the Engineering Geologist and Soil Engineer shall investigate, analyze and make recommendations to treat these problems.

4.3 Non-erodible interceptor swales shall be placed at the top of cut slopes that face the same direction as the prevailing drainage.

4.4 Unless otherwise specified in soil and geological reports, no cut slopes shall be excavated higher or steeper than allowed by the ordinances or controlling governmental agencies.

4.5 Drainage terraces shall be constructed in compliance with the ordinances of the controlling governmental agencies, and/or in accordance with the recommendations of the Soil Engineer or Engineering Geologist.

5.0 GRADING CONTROL

5.1 Fill placement shall be observed by the Soil Engineer and/or his representative during the progress of grading.

Field density tests shall be made by the Soil Engineer and/or his representative to evaluate the compaction and water content compliance of each layer of fill. Density tests shall be performed at intervals not to exceed two feet of fill height. Where sheepsfoot rollers are used, the soil may be disturbed to a depth of several inches. Density determinations shall be taken in the compacted material below the disturbed surface at a depth determined by the Soil Engineer or his representative.

5.2 Where tests indicate that the density of any layer of fill, or portion thereof, is below the required relative compaction, or improper water content is evident, the particular layer or portion shall be reworked until the required density and/or water content has been attained. No additional fill shall be placed over an area until the last placed lift of fill has been test and found to meet the density and water content requirements and that lift approved by the Soil Engineer.

5.3 Where the work is interrupted by heavy rains, fill operations shall not be resumed until field observations and tests by the Soil Engineer indicate the water content and density of the fill are within the limits previously specified.

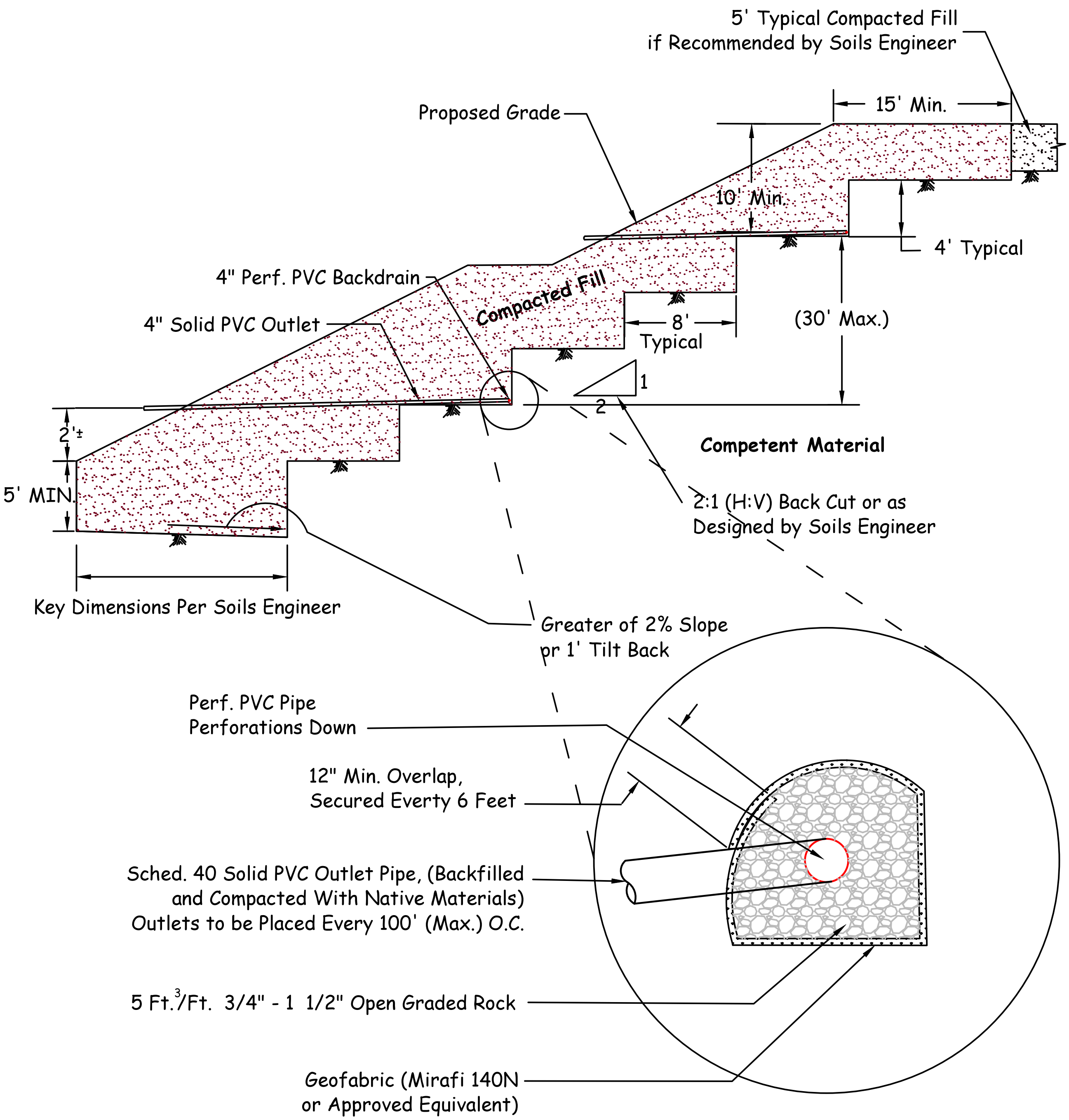
5.4 During construction, the Contractor shall properly grade all surfaces to maintain good drainage and prevent ponding of water. The Contractor shall take remedial measures to control surface water and to prevent erosion of graded area until such time as permanent drainage and erosion measures have been installed.

5.5 Observation and testing by the Soil Engineer shall be conducted during the filling and compacting operations in order that he will be able to state in his opinion all cut and filled areas area graded in accordance within the approved specifications.

5.6 After completion of grading and after the Soil Engineer and Engineering Geologist have finished their observations of the work, final reports shall be submitted. No further excavation or filling shall be undertaken without prior notification of the Soil Engineer and/or Engineering Geologist.

6.0 SLOPE

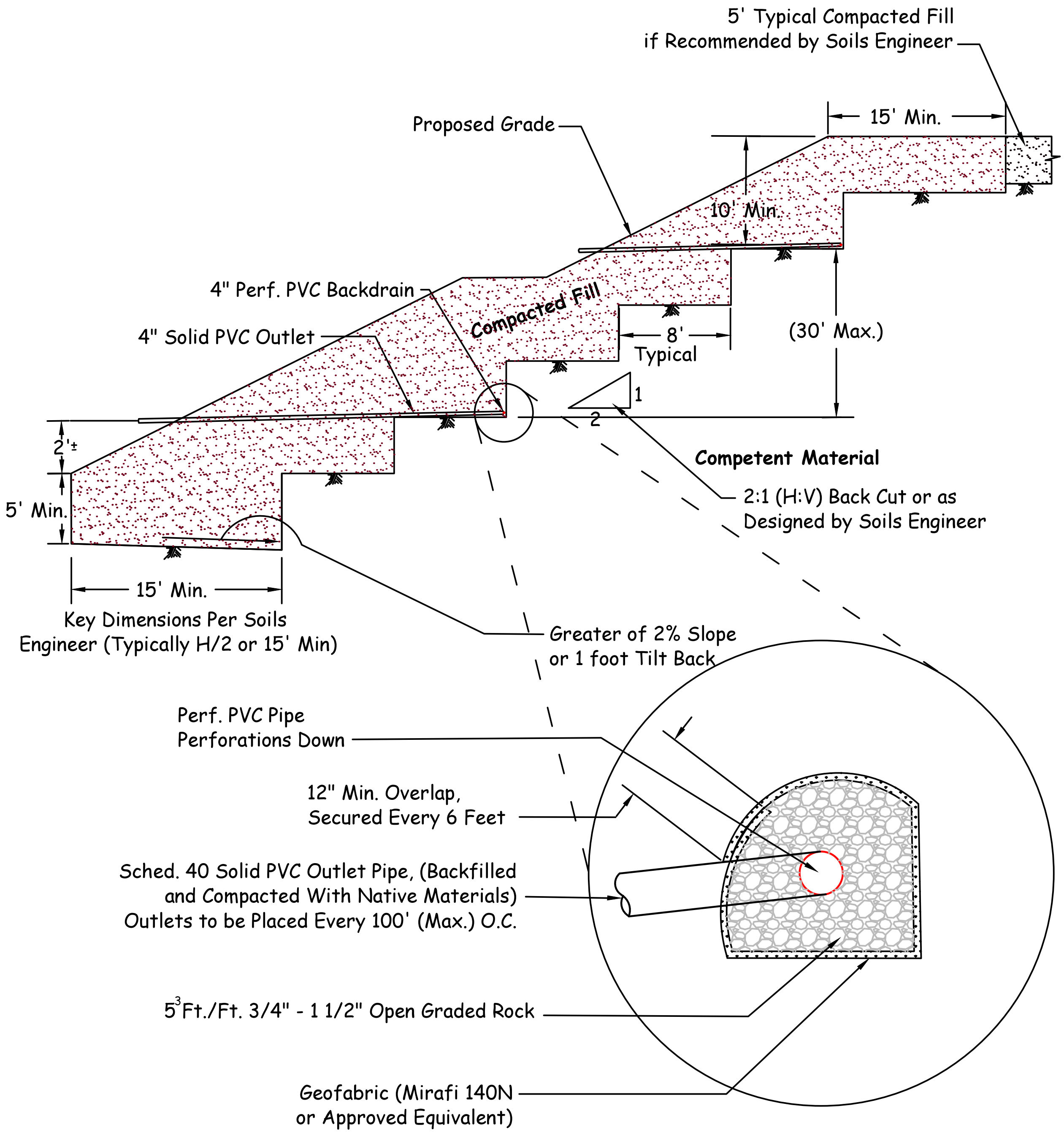
6.1 All finished cut and fill slopes shall be planted and/or protected from erosion in accordance with the project specification and/or recommended by a landscape architect.



MATRIX

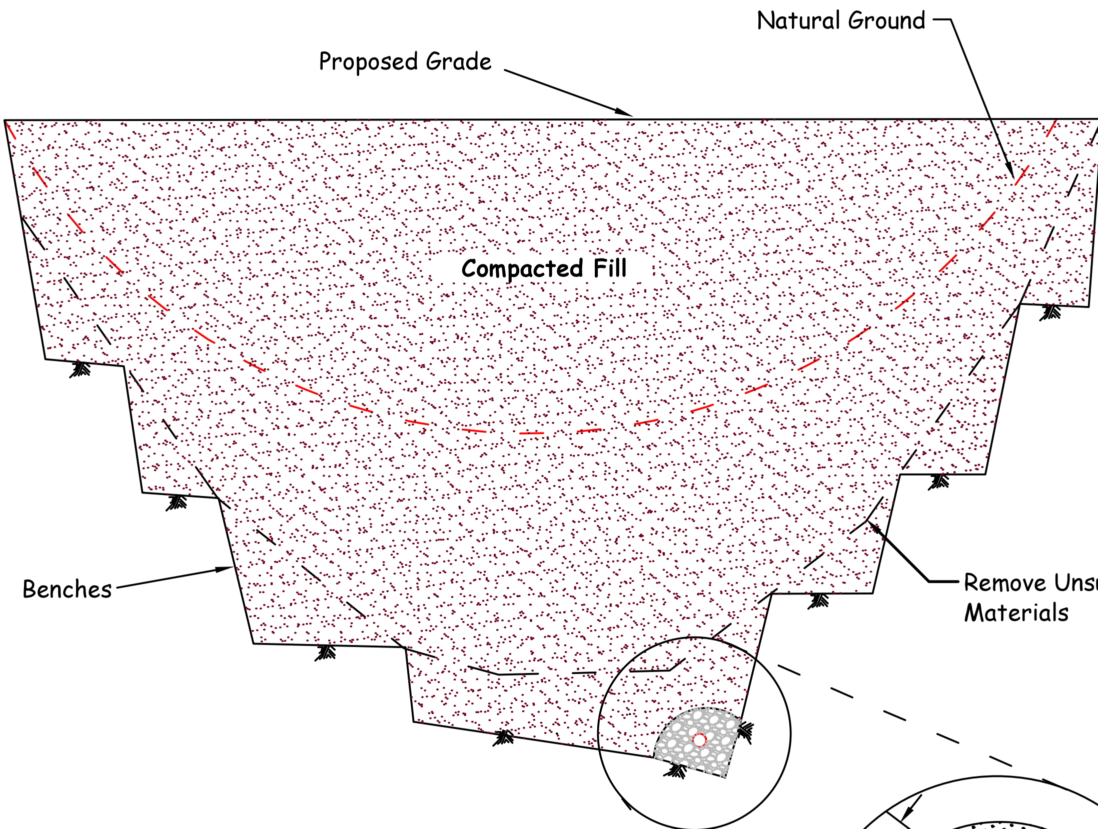
TYPICAL BUTTRESS DETAIL

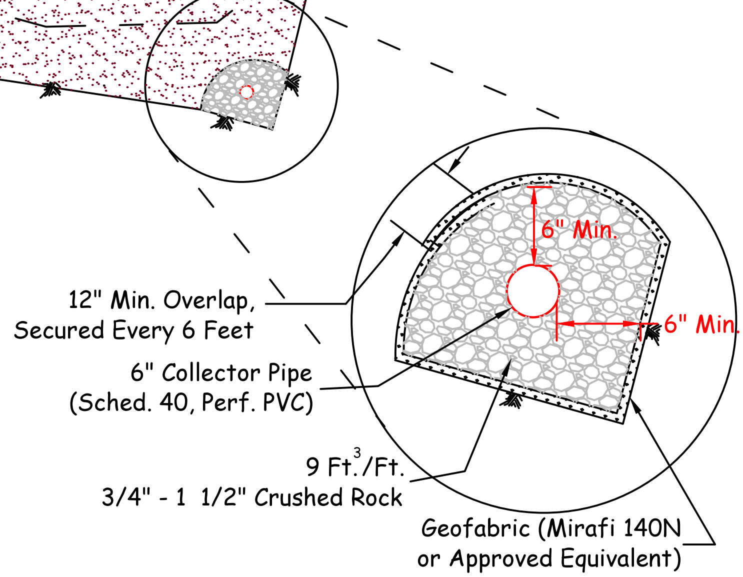
July 1, 2012



TYPICAL STABILIZATION FILL DETAIL

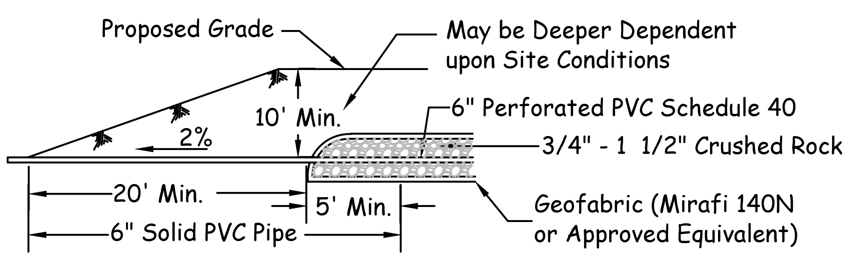
July 1, 2012





Notes:
1) Continuous Runs in Excess of 500' Shall Use 8" Diameter Pipe.
2) Final 20' of Pipe at Outlet Shall be Solid and Backfilled with Fine-grained Material.

Proposed Outlet Detail



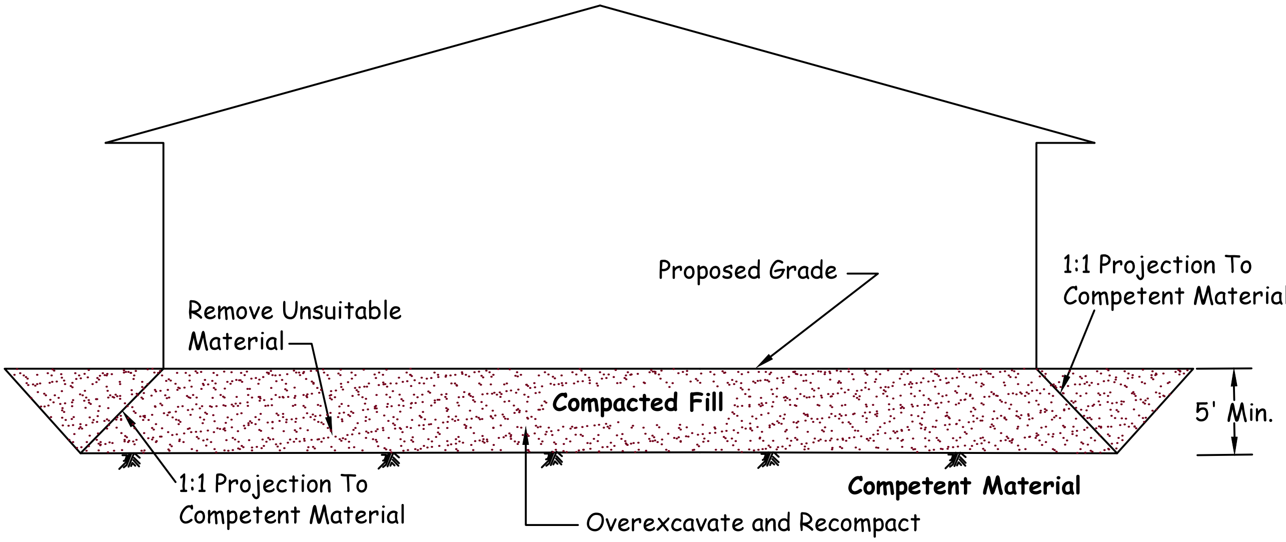
MATRIX

CANYON SUBDRAINS

July 1, 2012

Cut Lot

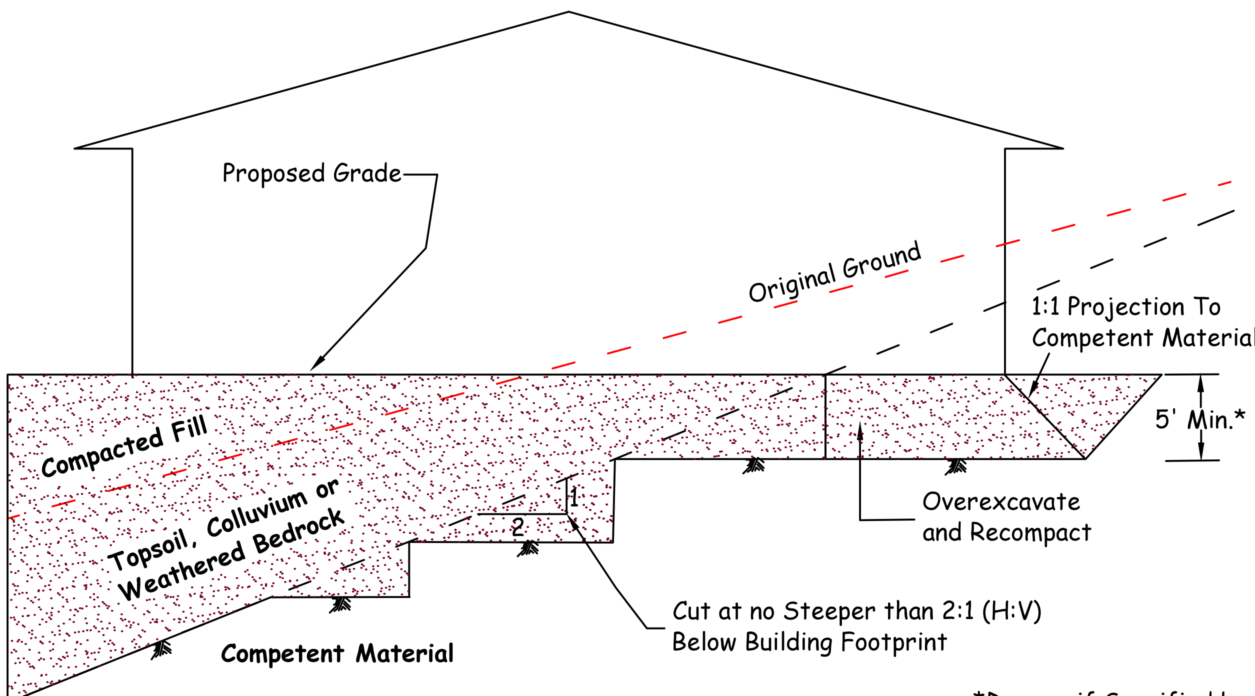
(Exposing Unsuitable Soils at Design Grade)



Note 1: Removal Bottom Should be Graded With Minimum 2% Fall Towards Street or Other Suitable Area (as Determined by Soils Engineer) to Avoid Ponding Below Building

Note 2: Where Design Cut Lots are Excavated Entirely Into Competent Material, Overexcavation May Still be Required for Hard-Rock Conditions or for Materials With Variable Expansion Characteristics.

Cut/Fill Transition Lot



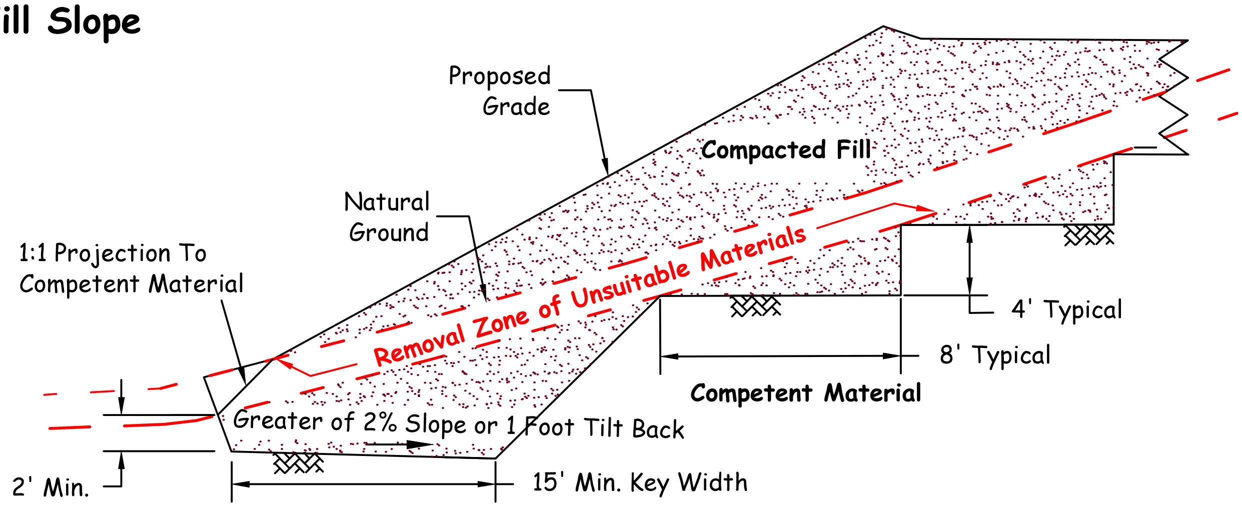
*Deeper if Specified by Soils Engineer

MATRIX

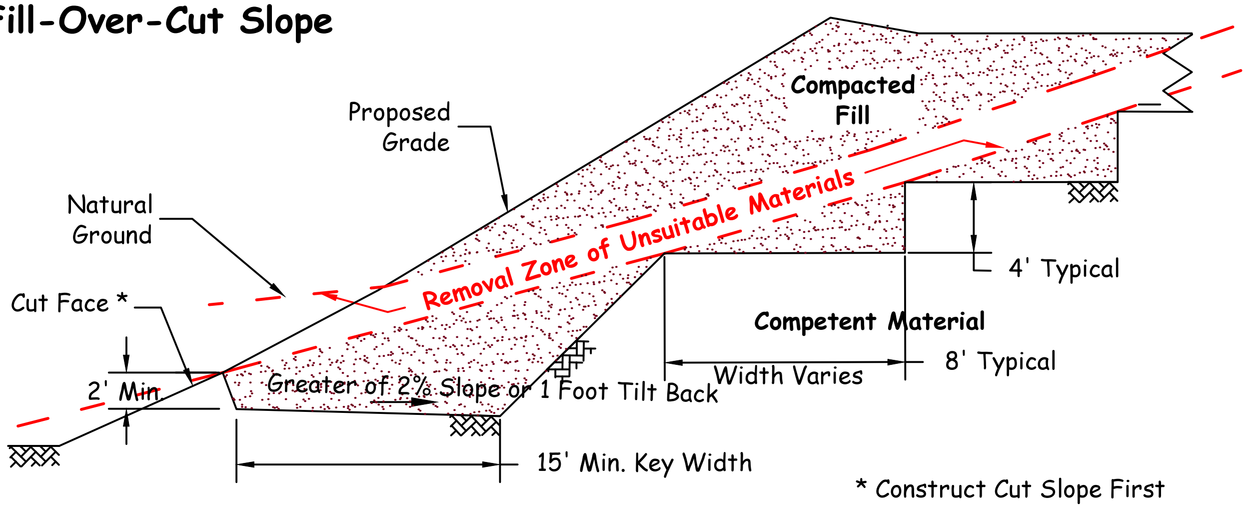
CUT AND TRANSITION LOT OVEREXCAVATION DETAIL

July 1, 2012

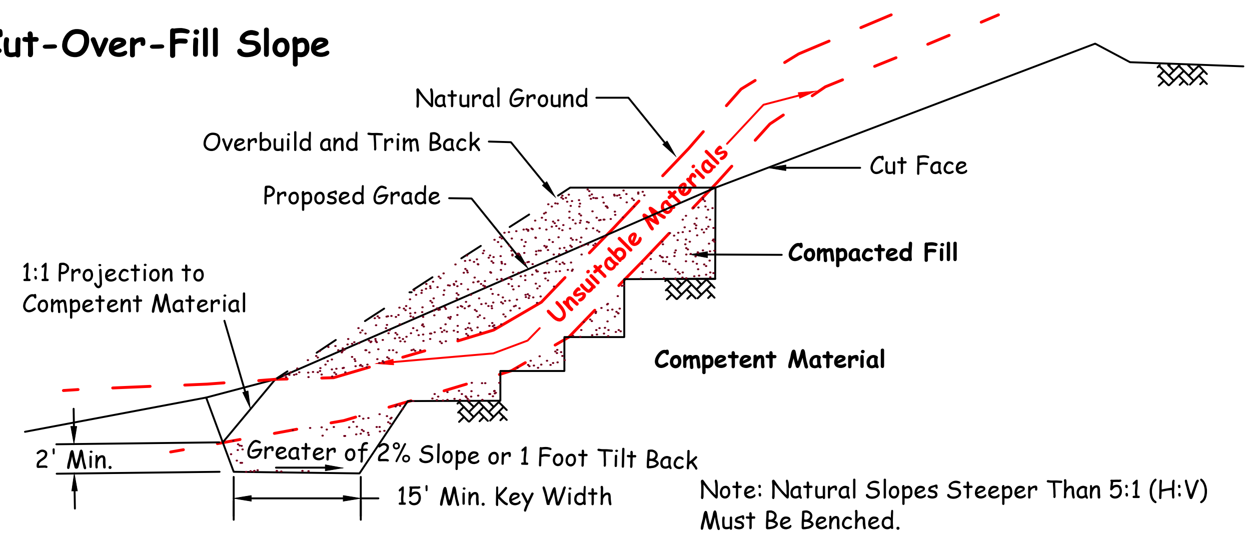
Fill Slope



Fill-Over-Cut Slope



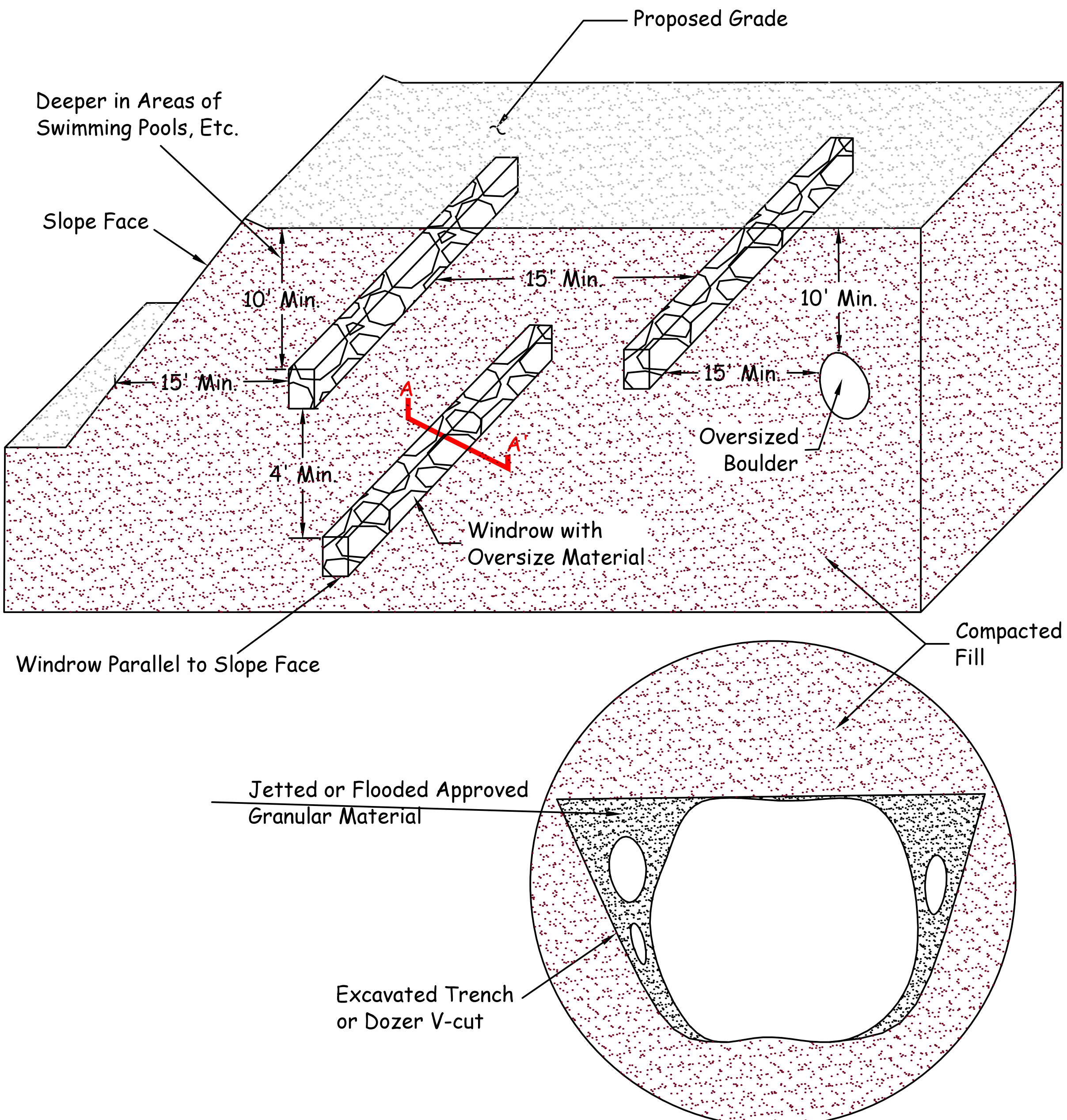
Cut-Over-Fill Slope



MATRIX

KEYING AND BENCHING

July 1, 2012

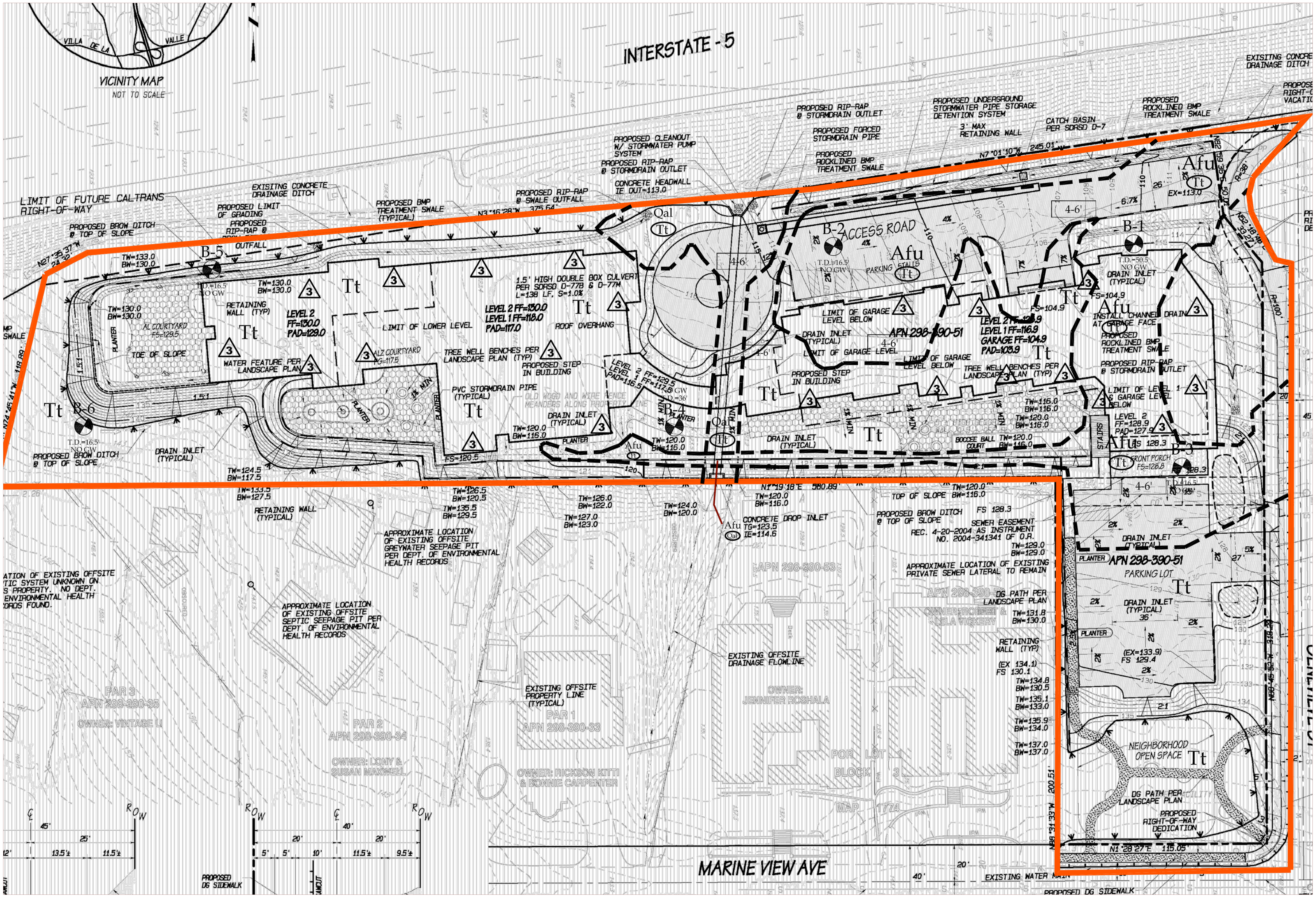


Note: Oversize Rock is Larger than 8" in Maximum Dimension.

Section A-A'

OVERSIZE ROCK DISPOSAL DETAIL

July 1, 2012



LEGEND
(Locations are Approximate)

Earth Units

Afu - Undocumented Fill

Qal - Alluvium (circled where buried)

Tt - Tertiary Torrey Sandstone (circled where buried)

Symbols

- Limits of Report

- Geologic Contact (dotted where buried)

3 - Removal Depth Below Bottom of Footing

B-8 T.D. = 51.5' NO GW - Geotechnical Bore Location (by others, 2011)

4-6' - Indicates Removal Depth (in feet)

MATRIX GEOTECHNICAL CONSULTING
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Michael Bracher	John P. Nielsen
Associate Geologist	Associate Engineer

GEOTECHNICAL MAP
APN: 298-390-51
CITY OF SOLANA BEACH, COUNTY OF SAN DIEGO, CALIFORNIA

Name:	RESIDENTIAL CARE FACILITY
Project No.	M1109-001
Client:	PACIFIC SOUND INVESTORS
Scale:	1" = 30'
Date:	MAY 2014
Sheet No.	1 OF 1
Plate No.	1

Date: January 06, 2016

Project No. M1109-001

Client: **PACIFIC SOUND INVESTORS, LLC**
1855 Freda Lane
Cardiff, California 92007

Attention: Mr. John DeWald

Subject: Geotechnical Response to Comments for the Proposed Residential Care Facility, Located at 959 Genevieve Street, APN: 298-350-51, City of Solana beach, County of San Diego, California

Reference: Matrix Geotechnical Consulting, Inc., 2014, Preliminary Geotechnical Investigation for the Proposed Residential Care Facility, Located at 959 Genevieve Street, APN: 298-390-51, City of Solana Beach, County of San Diego, California, Project No. M1109-001, Dated May 22.

PlaceWorks, 2015, CEQA Adequacy Review of the Preliminary Geotechnical Investigation for the Residential Care Facility, 929 Genevieve Street, Project No. SOLB-02, Dated September 2.

Matrix Geotechnical Consulting (MATRIX) is pleased to submit herewith our geotechnical response to Placeworks comments for the proposed Residential Care Facility, located at 959 Genevieve Street, APN: 298-390-51-00, City of Solana Beach, County of San Diego, California. Each comment listed by Placeworks is followed by a response.

Comment No. 1 The Matrix report identifies the lack of existing landslides on or adjacent to the site, but fails to make a determination on the susceptibility of the site or adjoining properties to future landslides…there is insufficient information in the report for determining the potential future impacts from landslides.

Response: The property is bordered on the west by a fill slope that supports I-5. Matrix does not have access to that property. However, Matrix personnel has observed the slope along its entirety and did not observe any evidence of slope instabilities, localized sloughing or erosional features. It is our opinion that the slope has the appearance of being stable. Furthermore, it is our opinion that the grading proposed for the site should not negatively impact the I-5 fill slope.

MATRIX
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On the south the property is bounded by existing slopes having gradients of 3:1 or flatter covered with grasses and exposing bedrock. We did not observe any evidence of slope instabilities on those exposures. On the site itself, the proposed grading indicates the ground gently sloping from south to north. It is anticipated that such grading will not produce other than minor pad grade slope changes

Comment No. 2 In addition, lateral spreading susceptibility, subsidence susceptibility, and erosion/loss of topsoil potential were not adequately discussed. Lateral spreading is closely related to liquefaction, and since the liquefaction potential at the site was determined to be "nil", it is expected that there is no susceptibility for lateral spreading. However, the Matrix report failed to discuss lateral spreading at all.

Response: Acknowledged. The likelihood of the effects of lateral spreading to occur on the site is very low to not likely. Based upon our review of the site, the boundary of the site does not border on any open channels, streams or water edges and shallow groundwater is not present within the upper 50 feet of the site. Also, the in-situ density of the formational Torrey Sandstone and the presence of future compacted fill, identify the restraining onsite soil conditions limiting the effects of lateral displacement. Erosion/loss of topsoil is not the purview of the geotechnical engineer and should be addressed by the civil engineer and landscape architect.

Comment No. 3 The development is most likely not going to utilize septic tanks, but the capability of the soils on the site to adequately support the use of septic tanks or alternative water disposal systems was not discussed in the Matrix report.

Response: Acknowledged. The onsite soil is not recommended for the use of adequately supporting septic tanks or alternative water disposal systems.

This opportunity to be of service is sincerely appreciated. Please call if you have any questions pertaining to this response letter.

Respectfully submitted,

MATRIX GEOTECHNICAL CONSULTANTS

PROFESSIONAL GEOLOGIST MICHAEL I. BRACHER NO. EG 1048 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

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Associate Engineering Geologist

John P. Nielsen, G.E. 641
Principal Geotechnical Engineer

REGISTERED PROFESSIONAL ENGINEER JOHN P. NIELSEN No. 641 EXP. 6/17 GEOTECHNICAL STATE OF CALIFORNIA

APPENDIX A

REFERENCES

APPENDIX A

References

Campbell K.W., 1997 "Empirical Near-Source Attenuation Relationships for Horizontal and Vertical Components of Peak Ground Acceleration, Peak Ground Velocity and Pseudo-Absolute Acceleration Response Spectra," Seismological Research Letters, Vol. 68, No. 1, pp. 154-179.

_______, 1998, Maps of Known Active Fault Near-Source Zones in California and Adjacent Portions of Nevada, Prepared by California Division of Mines and Geology.

CGS, Tsunami Inundation Map for Emergency Planning, State of California, County of San Diego, Del Mar Quadrangle, dated June 1, 2009.

USGS, 2005, Geologic Map of the San Diego 30'x60' Quadrangle, Southern California, Version 1.0

Aerial Photograph Interpretation Table

SOURCE	FLIGHT	FRAME (S)	FLIGHT DATE	SCALE
Continental	107-5	11, 12	4/16/72	1"=5,000'
Continental	210 17B	39, 40	10/23/78	1"=1,250'
Continental	FC SD 11	21, 22	4/8/80	1"=4,000'
Continental	SD 3	15, 16	1/14/88	1"=2,500'
Continental	C98-5	104, 105	10/30/93	1"=2,200'
Continental	C-123-5	56, 57	8/12/98	1"=2,000'
Google Earth	N/A	N/A	11/1/2010	N/A