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March 17, 2017 (Amended 3-20-17) CTE Job No. 25-0484G

Pacific Development Group
Attention: Mr. Tony Zarinelli
P.O. Box 3060
Newport Beach, CA 92658 E-Mail: (tzarinelli@pdgcenters.com)

Subject: Geotechnical Engineering Investigation
Proposed Commercial Development
SWC Main St. & Atherton Rd.
1601 South Main Street
Manteca, California 95337

Dear Mr. Zarinelli:

In accordance with your request and authorization of CTE CAL Inc. (CTE) proposal dated July 06, 2016, CTE has completed a preliminary geotechnical investigation at the above referenced project site. The attached report contains the results of our subsurface investigation, laboratory testing program, and engineering evaluation of the geotechnical and geological elements of the project site. Specifically, the report provides geotechnical engineering design parameters and construction recommendations for design of the proposed project structures and site improvements.

Based on CTE's subsurface investigations, site materials testing, and our geotechnical and geological engineering evaluation, the project is considered feasible from a geotechnical standpoint provided the recommendations contained in the attached report are incorporated into the project's design and construction. If you have any questions regarding our findings or recommendations, please do not hesitate to contact this office. The opportunity to be of service is appreciated.

Respectfully submitted,

CTE CAL, INC.

Rodney D. Ballard, GE #2173
Principal Engineer

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GEOTECHNICAL ENGINEERING INVESTIGATION
PROPOSED COMMERCIAL DEVELOPMENT
SWC MAIN STREET & ATHERTON DRIVE
1601 SOUTH MAIN STREET
MANTECA, CALIFORNIA 95337

PREPARED FOR:
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1.0 INTRODUCTION AND SCOPE OF SERVICES

1.1 Introduction

This report presents the results of the preliminary geotechnical investigation, performed by CTE CAL, Inc. (CTE) and provides conclusions and recommendations regarding the geotechnical design parameters and construction recommendations for a proposed commercial development to be located at 1601 S. Main St. in Manteca California on the SWC Main St. & Atherton Rd. The proposed development is to consist of a one to two story seven building commercial development exceeding 80,000 sf. of floor area, asphalt parking and associated site improvements. The site index map, Figure 1 shows the general location of the site.

The investigation contained herein included surface and subsurface field explorations, laboratory testing of site soil deposits, geologic and seismic hazard evaluation of the project site, and engineering evaluation and analysis of the proposed project site and improvements. Based on the results of the investigation and analysis performed by CTE the project is considered feasible if the recommendations contained herein are incorporated into the design and construction of the project. References utilized in the investigation and analyses cited are presented in Appendix A.

1.2 Scope of Services

The scope of services provided for this preliminary investigation included:

- Review of readily available geologic reports and documents pertinent to the site area.
- Explorations to determine subsurface conditions to the depths influenced by the proposed construction.
- Laboratory testing of representative soil samples to provide data to evaluate the geotechnical design characteristics of the site foundation soils.
- Determination of the general geology and evaluation of potential geologic seismic hazards at the site.

- Preparation of this report describing the investigations performed and providing opinions/conclusions and geotechnical engineering recommendations for design and construction.

2.0 SITE AND PROJECT DESCRIPTION

The project is proposed on an 18.40 acre lot located at 1601 S. Main St., APN 224-021-47 in Manteca California. The project site is bounded by Atherton Drive to the north, Main Street to the east, and residential properties to the west and south. At the time of our field reconnaissance, the site consisted of a vacant lot covered by native vegetation. Past use of the land suggests agricultural orchards.

The project is proposed to consist of a 7 building commercial development with total floor areas exceeding 80,000 sf. The project is proposed to include a 50,000 sf major anchor building with attaching 10,000 sf and 5,400 sf buildings. The remainder of the development includes 4 buildings including a restaurant and gasoline station. Asphalt parking and drive areas as well as associated site improvements are also proposed. Figure 1, Site Index Map, at the end of this report, shows the general location of the site with figure 2 containing a proposed site plan of the proposed project.

3.0 FIELD AND LABORATORY INVESTIGATIONS

3.1 Field Investigations

The field exploration program included performing a site reconnaissance and excavating ten exploratory borings in order to determine the geometry and geotechnical characteristics of subsurface geologic deposits at the site areas proposed for new construction. Representative samples of the subsurface soil deposits were obtained from the soil borings for use in laboratory testing to determine the engineering properties and geotechnical parameters recommended for design. The borings (designated B-1 through B-10) were excavated using a truck-mounted drill

rig using four-inch outer diameter solid stem flight augers to the maximum depth drilled of approximately 21.5 feet below existing ground surface (bgs).

3.1 Boring Explorations

The field subsurface exploration program included performing Standard Penetration Tests (SPT) using a standard split barrel sampler (1.4-inch inside diameter, 2-inch outside diameter) which was operated in accordance with ASTM D-1586. The drive samplers were utilized to obtain samples of the subsurface soils at depth intervals of 2-ft, 5-ft, 10-ft, 15-ft, and 20-ft by driving the samplers into the bottom of the borehole with successive blows of a 140-pound hammer free-falling 30 inches. The number of blows required to drive the samplers three, six-inch intervals (18-inches total of sampler penetration) at each sampling location were recorded and the raw results of the drive sampler testing are shown on the boring logs (contained in Appendix B) in the column "Blows/6 inches". The standard penetration blow counts (N) were collected and used during the geotechnical engineering evaluation and analysis to correlate soil strength and structure bearing characteristics.

Soils were logged in the field by a CTE Field Geologist and were classified based on the Unified Soil Classification System (ASTM D2487), sampler drive resistance, field testing, and visual observations. Exploration logs prepared for each of the borings provide soil descriptions, and blow count data. The boring and test pit logs are included in Appendix B which also contains the Boring Log Legend and Definition of Soil Terminology as shown on Plates BL1 and BL2, respectively. The location of the test borings are shown on Figure 2 at the end of this report.

Disturbed soil samples were obtained from the drive samplers during exploration activities. The samples were collected in capped, stainless steel sample tubes or placed in zip lock plastic bags. Bulk soil samples were recovered directly from drill cuttings or were obtained from surface deposits and place in sample bags. Soil samples were then transported to CTE's laboratory for further testing. Field descriptions within the boring logs have been modified, where appropriate, to reflect laboratory test results. Upon completion of drilling, the borings were backfilled from

final boring depth to original ground surface. Details of the soils encountered are shown on the Boring Logs which are presented in Appendix B.

3.2 Laboratory Testing Program

Laboratory tests were conducted on representative soil samples for classification purposes and to evaluate physical properties and engineering characteristics. Laboratory tests conducted on representative soil samples collected from the borings included moisture content, particle size distribution, Atterberg Limits, expansion indices, and an R-Value for asphalt pavement designs. Test method descriptions and laboratory test results are presented in Appendix C.

4.0 GEOLOGY

4.1 General Geologic Setting

The site lies within the northwest-trending San Joaquin Valley, which generally represents the northern portion of the Great Valley Geomorphic Province, in Central California. The San Joaquin Valley is a nearly flat alluvial plain bounded to the east by the Coast Ranges and to the west by the Sierra Nevada's. Basin and river sediments constitute the typical depositional history. The most recent deposits consist of Holocene alluvium from present day creeks and rivers, such as the San Joaquin River to the west and the Stanislaus River to the south of the project site.

Based on geologic reconaissance and observations made within the test borings, alluvial materials encountered during the investigation are considered to be consistent with Quaternary basin deposits as shown on published regional geologic map of the San Francisco - San Jose Quadrangle, prepared by Wagner et al. (1991). The mapped area shows one surficial geologic unit, Holocene Dune Sand deposits (Qs).

4.2 Generalized Soil Conditions

Soil materials encountered in our site explorations are generally consistent with the above referenced published geologic mapping. The native alluvial deposits encountered generally consisted of medium dense sands (SM/SC) with interbedded stiff to hard silts (ML) and clays (CL) to the maximum depth explored of approximately 21 feet below existing ground surface.

Since the earth material profile described above is generalized, the reader is advised to consult the Test Boring Logs contained in Appendix B, if determination of the earth material conditions at a specific depth and location are desired. The boring logs contain a more detailed earth material description regarding color, earth material type, and Unified Soil Classification System (USCS) symbol. It should be noted that earth material conditions cannot be fully determined by test borings and earth material sampling and testing. Hence, unexpected earth material conditions might be encountered during construction. If soil deposits are encountered during construction which vary substantially from materials encountered during the investigation appropriate recommendations will be during construction.

4.3 Groundwater Conditions

Observations of groundwater conditions were made in the test borings at the time of field exploration. Groundwater was observed in the borings at approximately 15 feet bgs. Groundwater levels were obtained through the California Department of Water Resource well data, for wells in the vicinity of the site dating back to 1965. The typical "Seasonal High Groundwater" at the site is approximately 15 feet bgs. The average "Low Groundwater" at the site is approximately 22 feet bgs. The highest recorded groundwater level was measured in 1983 from monitoring wells nearest to the site corresponding to a depth of about 10.4 feet below ground surface at the subject site.

Wet weather construction methods should be anticipated to be required if construction is scheduled to occur during the rainy season. During periods of appreciable precipitation localized higher groundwater / perched water situations should be expected producing locally or widespread saturated surface soils. If construction is undertaken during wet-season/heavy-rains, saturated soils will not be expected to be acceptable for grading or compaction and could hamper

progress due to limited equipment mobility and/or inability to achieve appropriate moisture content to achieve required soil compaction.

Saturated soils resulting from significant precipitation events may need to be dried by aeration or an additive, such as lime, cement, or kiln dust added to stabilize the working surface and allow for soil proper soil compaction. Moisture conditioning (drying or wetting) of the engineered fill will likely be needed for the project. Appropriate erosion control and permanent site surface drainage elements per the latest California Building Code should be designed and implemented as per the project civil engineer.

4.4 Geologic Hazards

Based on the investigation it appears that geologic hazards at the site are primarily limited to those caused by violent shaking from earthquake generated ground motion waves. The subject site is not located within a seismic hazard zone for susceptibility to liquefaction or landslides or in an Alquist-Priolo special studies zone. The underlying undisturbed soils encountered are not considered adequate for providing uniform support of moderately loaded structures with conventional shallow foundations unless remedial grading operations are performed as recommended herein. The soil conditions, groundwater level, and relatively short distances to several faults are significant geotechnical concerns that also control the selection of suitable foundation support for the proposed improvements. Design and construction recommendations presented herein have been developed based on the noted site conditions.

4.5 General Geologic Hazards Observation

Based on the site reconnaissance and review of the referenced literature, the site is not within a State of California-designated Alquist-Priolo Earthquake Fault Studies Zone, and no known active fault traces shown on published hazard mapping underlie or project toward the site. According to the California Division of Mines and Geology, a fault is active if it displays evidence of activity in the last 11,000 years (Hart and Bryant, revised 2007). Therefore, the potential for surface rupture from displacement or fault movement directly beneath the proposed improvements is considered low.

4.6 Local and Regional Faulting

Based on the "Quaternary fault and fold database of the United States" (Hart and Bryant, 2001, http://earthquakes.usgs.gov/hazards/qfaults), the Great Valley 7, located 13.9 miles to the southwest, is the closest known active fault and is indicated to be capable of generating an earthquake moment magnitude on the order of M=6.90. The Greenville Connected Fault is located 24.4 miles to the west and is indicated to be capable of generating an earthquake moment magnitude on the order of M=7.00.

The Ortigalita Fault is located 35.2 miles to the south and is indicated to be capable of generating an earthquake moment magnitude on the order of M=7.10. The Calaveras Fault is located 38.2 miles to the southwest and is indicated to be capable of generating an earthquake moment magnitude on the order of M=7.03.

The Hayward-Rodgers Fault is located 41.3 miles to the northwest and is indicated to be capable of generating an earthquake moment magnitude on the order of M=7.33. The San Andreas (North Coast Section) is located 59.8 miles to the west and is indicated to be capable of generating an earthquake moment magnitude on the order of M=7.94.

4.7 Seismic Ground Motion Values

Soils that underlie the site are considered to be consistent with Site Class D materials. Site ground motion with 10% probability of exceedance in 50 years is presented in Table 4.6a, below. The table is based on United States Geological Survey's Probabilistic Seismic Design Maps Page (online http://earthquake.usgs.gov/designmaps/us/application.php) for the site coordinates 37.7783° latitude and -120.2180° longitude. Based off the design code reference document, 2010 ASCE 7, Table 4.6a contains ground motions with 10 percent probability of exceedance in 50 years for the site, as underlain by soils corresponding to Site Class D.

TABLE 4.6a

Mapped and Design Spectral Accelerations

Description	Value
2013 CBC Site Classification [1]	D[2]
Site Latitude	37.7783°N
Site Longitude	-121.2180°W
S_S Spectral Acc. for a Short Period	1.011 g
S_1 Spectral Acc. for a 1-Sec. Period	0.358 g
Peak Ground Acceleration PGA	0.370 g

[1] In general accordance with the 2013 CBC, Table 1613.5.2. CBC Site Class is based on the average characteristics of the upper 100 feet of the subsurface profile.
[2] The 2013 CBC requires a site soil profile determination extending to a depth of 100 feet for seismic site classification. Borings for this study extended to a maximum depth of 21± feet, and this seismic site class definition considers soils below 21 feet depth to be consistent with the medium dense soils encountered above.

The site could be subjected to significant shaking in the event of a major earthquake on any of the faults listed above or other active faults within northern California.

4.8 Liquefaction and Seismic Settlement Evaluation

Liquefaction occurs when saturated fine-grained sands and/or silts lose their physical strength temporarily during earthquake induced shaking and behave as a liquid. This is due to loss of point-to-point grain contact and transfer of normal stress to the pore water. Liquefaction potential varies with water level, soil type, material gradation, relative density, and probable intensity and duration of ground shaking.

The California Geological Survey (CGS) has designated certain areas within California as potential liquefaction hazard zones. These mapped areas are considered at risk of liquefaction-related ground failure during a seismic event based upon mapped surficial deposits. The project site is not currently mapped for potential liquefaction hazard by the CGS (refer to CGS website: (http://gmw.consrv.ca.gov/shmp/html/pdf_maps_no.html). Based on readily available published geologic information, there is no historical record of liquefaction occurring at the site.

Groundwater was encountered at the time of the current study at approximately 15 feet bgs. Based on our explorations, which indicated the subsurface soils consist of medium dense silty and clayey sands (SM/SC) with interbedded stiff to hard silts (ML) and clays (CL), the possibility of large differential settlements due to seismic dry sand settlement or liquefaction is considered low. Therefore the potential for catastrophic building collapse or life threatening conditions due to a seismic event at the site are considered remote.

4.9 Earthquake Induced Landsliding

Based on information available on the California Geological Survey (CGS) website the subject site is not currently mapped within a State of California Seismic Hazard Zone for seismically induced landsliding. In addition, the site and surrounding terrain within the valley is relatively gently sloping; therefore, seismically induced and/or other landslides are not considered a significant hazard at the site.

4.10 Tsunamis and Seiche Evaluation

Based on site location, elevation, and tsunami hazard mapping, the site is not in a tsunami inundation hazard zone. In addition, oscillatory waves (seiches) are considered unlikely due to the absence of large confined bodies of water in the site area.

4.11 Compressible and Expansive Soils

Surficial soils existing at the site within the upper 2 to 3 feet are loose and are therefore not suitable for structure or improvement support in their current state. These surficial soils will require remedial grading as recommended herein. Site soils encountered below these surficial soils are described as silty and clayey sands and are not considered subject to significant compression under anticipated loads. In addition, soils encountered generally had low plasticity or were non-plastic within the depth of influence; therefore, they would not be expected to exhibit significant expansive characteristics.

4.12 Soil Corrosion Potential

Corrosion Guidelines by the California Department of Transportation Division of Engineering Services, Corrosion Technology Branch, Version 1.0, dated September 2003 indicate the following:

For Structural Elements, the Department considers a site to be corrosive if one or more of the following conditions exist for the representative soil and water samples taken at the site.
Chloride concentration is 500 ppm or greater, sulfate concentration is 2000 ppm or greater, or the pH is 5.5 or less.

Soil samples were obtained for corrosion analyses at B-3, see Figure 2 for location. Based on these guidelines and soil characteristics, it is anticipated that the subject site would be considered "non corrosive" to concrete improvements.

As requested, CTE also ran soil suitability for landscaping areas, please see the detailed report in Appendix C for further information.

CTE does not practice corrosion engineering. Therefore, if corrosion of proposed improvements is of more significant concern, a qualified corrosion engineer/consultant could be consulted.

5.0 CONCLUSIONS AND RECOMMENDATIONS

We conclude that the proposed construction is feasible from a geotechnical standpoint, provided the recommendations in this report are incorporated into the design of the project. Recommendations for the design and construction of the proposed structures and associated improvements are included below.

5.1 Site Preparation

Project site stripping should include the demolition, removal and disposal of all debris, vegetation, other organic material in all proposed building pad and improvement areas. Loose, wet or otherwise unstable soils should be excavated and evaluated by CTE for possible re-use as engineered fill or disposed of offsite. Utilities that extend into the construction area and are scheduled to be abandoned should be properly capped at the perimeter of the construction zone or moved as directed in the plans. CTE personnel shall observe and confirm that all debris, vegetation, other organic material has been adequately removed in all proposed improvement areas.

5.2 Grading and Earthwork

Based on the current proposed development and the subsurface soils encountered during our excavations CTE recommends that after stripping operations have been completed the proposed structure building pads be overexcavated to a depth of 2 feet below current grade or to the depth of the bottom of the structural foundations whichever is deeper. The building pads overexcavation should extend to a minimum distance of at least 5 feet outside of all proposed exterior structure foundation areas. The exposed overexcavated surface should then be scarified to a depth of approximately 12 inches and recompacted to 90 percent relative compaction per ASTM D1557 at moisture content at least two percent above optimum moisture content.

After stripping in proposed parking and drive isle pavement improvement areas is conducted, the stripped areas should be excavated to a depth of proposed pavement subgrade if above the subgrade level. The excavated surface should then be scarified to a minimum depth of 12 inches and recompacted to 95 percent relative compaction per ASTM D1557 at moisture content at least two percent above optimum. If after stripping the excavated level is located below the proposed pavement subgrade the stripped surface should be scarified, moisture conditioned to at least 2% above optimum moisture content and recompacted to 90% relative compaction. Soils should then be placed, moisture conditioned and compacted as stipulated above to the subgrade level. Prior to pavement base placement the subgrade surface should be scarified, moisture conditioned to at least 2% above optimum and re-compacted to at least 95% relative compaction.

If unanticipated, unsuitable materials are encountered at surface improvement subgrade or structure over-excavation such that proper compaction cannot be obtained, over-excavations to remove such material may be required.

CTE shall inspect and approve all structure over-excavations and pavement and surface improvement subgrade areas to confirm that adequate soil conditions have been reached. CTE shall observe and approve the scarification, moisture conditioning and recompaction of the excavated surfaces.

5.3 Structure Foundation Recommendations

CTE anticipates it will be feasible to utilize continuous and isolated spread foundations for use at this site. It is recommended that these structure foundations consist of spread footings constructed upon properly compacted engineered fill comprised of low to non-expansive soils per previous sections.

Reinforced continuous and isolated spread footings are considered suitable for use at this site to support the relatively light weight, 1-2 story structures. All spread footings should be founded in properly prepared and compacted engineered fill as recommended herein. Foundation dimensions and reinforcement should be based on allowable soil bearing values of 2,000 pounds per square foot (psf) for spread footings of at least 12-inches in width penetrating into and embedded below rough pad soil grade at least 18 inches. The allowable foundation bearing pressures apply to dead loads plus design live load conditions. The design bearing pressure may be increased by one-third when considering total loads that include short duration wind or seismic conditions. The weight of the foundation concrete below grade may be neglected in dead load computations. The weight of the footing should be neglected in the above downward capacity calculations

We recommend that all footings be reinforced as required by the structural engineer to provide structural continuity, to permit strong spanning of local irregularities and to be rigid enough to accommodate potential differential static movements. Based on our experience and

understanding of the site soil properties total static settlement of fully loaded structures will be up to 1 inch. Approximately ½ of this settlement will occur during construction and therefore the structures should be designed to accommodate differential settlements of one-half inch over 20 linear foot span. Dynamic settlement due to an earthquake event is calculated to be on the order of 0.5 inch with differential seismic settlement of about 0.25 inches. The dynamic settlement is in addition to the static settlement.

The foundation excavations should be clean (i.e., free of all loose slough) and dry prior to placing steel and concrete. Foundation excavations should be moisture conditioned to 120 percent over optimum moisture content prior to foundation and slab concrete placement. The concrete for the foundation should not be placed against a dry excavation surface. Concrete should be pumped or placed by means of a tremie or elephant's trunk to avoid aggregate segregation and earth contamination. Rebar reinforcement should be properly supported with proper clearances maintained during concrete placement. The concrete should be properly vibrated to mitigate formation of voids and to promote bonding of the concrete to steel reinforcing. These recommendations are predicated upon CTE's representative observing the bearing materials as well as the manner of concrete placement.

CTE's geotechnical engineer or his representative should observe soil conditions exposed in foundation excavations. If the soil conditions encountered differ significantly from those presented in this report, then supplemental recommendations will be required.

5.4 Lateral Load Resistance

Shallow footings may be designed to resist lateral loads using a coefficient of friction of 0.30 (total frictional resistance equals the coefficient of friction times the dead load). A design passive resistance value of 250 pounds per square foot per foot of depth (with a maximum value of 1500 pounds per square foot) may be used. The allowable lateral resistance can be taken as the sum of the frictional resistance and the passive resistance, provided the passive resistance does not exceed two-thirds of the total allowable resistance.

5.5 Retaining Walls

Free draining retaining walls backfilled using generally onsite undocumented fill soils per the preceding section of this report, may be designed using the equivalent fluid weights given in the table below. These values are also considered suitable for permanent shoring, if proposed.

TABLE 5.5 EQUIVALENT FLUID UNIT WEIGHTS (pounds per cubic foot)		
WALL TYPE	LEVEL BACKFILL	SLOPE BACKFILL 2:1 (HORIZONTAL: VERTICAL)
CANTLEVERED WALL	40	60
RESTRAINED WALL	58	88

Traffic surcharges on retaining walls should generally be equal to 1/3 of the vertical load of the traffic located within ten lateral feet of wall. Lateral pressures on cantilever retaining walls (yielding walls) due to earthquake motions may be calculated based on work by Seed and Whitman (1970). The total lateral thrust against a properly drained and backfilled cantilever retaining wall above the groundwater level can be expressed as:

$$P_{AE} = P_A + \Delta P_{AE}$$

For non-yielding (or "restrained") walls, the total lateral thrust may be similarly calculated based on work by Wood (1973):

$$P_{KE} = P_K + \Delta P_{KE}$$

Where P_A = Static Active Thrust (given previously Table 5.8)

P_K = Static Restrained Wall Thrust (given previously Table 5.8)

ΔP_{AE} = Dynamic Active Thrust Increment = $(3/8)\ k_h\ \gamma H^2$

ΔP_{KE} = Dynamic Restrained Thrust Increment = $k_h\ \gamma H^2$

k_h = ½ Peak Ground Acceleration = ½ (S_{DS}/2.5)

H = Total Height of the Wall

γ = Total Unit Weight of Soil $\approx$ 125 pounds per cubic foot

The increment of dynamic thrust in both cases should be based on a trapezoidal distribution (essentially an inverted triangle), with a line of action located at 0.6H above the bottom of the wall. The values above assume non-expansive backfill and free-draining conditions. Additional information for dynamic and static loading conditions for specific retaining structures can be provided on request from CTE.

Measures should be taken to prevent moisture buildup behind all retaining walls. Drainage measures should include free-draining backfill materials and sloped, perforated drains. These drains should discharge to an appropriate off-site location. Waterproofing should be as specified by the project architect.

5.6 Concrete Slabs-On-Grade

Lightly loaded concrete slabs-on-ground placed beneath the structures should be designed for the anticipated loadings, but measure at least 4 inches in thickness. Slab-on-grade reinforcement should consist of # 4 reinforcing bars placed on 24-inch centers, each way, at or above mid-slab height, but with proper cover. Control joints at appropriate spacing i.e. 12 feet each way should be saw-cut into the slab after concrete placement in accordance with ACI Design Manual, Section 302.1R-37 8.3.12 (tooled control joints are not recommended).

Positive separations and/or isolation joints should be provided between slabs and foundations, columns or utility lines to allow independent movement. Interior trench backfills placed beneath slabs should be compacted in accordance with recommendations outlined in the Earthwork section of this report and Appendix D. Other design and construction considerations, as outlined in the ACI Design Manual, Section 302.1R are recommended.

5.7 Seismic Design Criteria

The seismic ground motion values presented below were determined using the USGS Ground Motion Parameter Calculator using project site coordinates Based on the site investigation and evaluations, the following design coefficients are considered suitable for design based on the project requirements. The parameters provided were derived from the 2013 California Building Code (CBC) and ASCE 7-10 Standard.

CODE BASED GROUND MOTION VALUES (CBC 2013)	
S_S = 1.011 g	S_1 = 0.358 g
S_{MS} = 1.108 g	S_{M1} = 0.603 g
S_{DS} = 0.738 g	S_{D1} = 0.402 g

5.8 Pavement Section Alternatives

It is understood asphaltic concrete (A/C) pavement is proposed for the site. The upper 12 inches of subgrade beneath all pavements should be compacted to at least 95 percent (%) of laboratory determined maximum dry density, as per ASTM D1557, at moisture contents at least three percent above optimum moisture content. Pavements should be designed and constructed according to CALTRANS standards.

Preliminary pavement sections presented below are based on a Resistance Value of RV=71 by exudation and assumed Traffic Indices presented below. Based on our previous experience on similar sites we have assumed traffic indices (TI's) of 5 for parking areas and 6 for drive and truck traffic areas.

The pavement design is based on California Department of Transportation (CalTrans) Highway Design Manual and on anticipated traffic indices as indicated below, except the CalTrans safety factor has not been applied. If these assumptions are incorrect, then this office should be contacted to obtain further pavement recommendations.

TABLE 5.8
RECOMMENDED PAVEMENT SECTIONS

Traffic Area	Assumed Traffic Index	Preliminary Subgrade "R"-Value	Asphalt Pavements		Portland Cement Concrete Pavements, On Subgrade Materials (inches)
			AC Thickness (inches)	Class II Aggregate Base Thickness (inches)	
Truck Loading and Drive Areas	6.0	71	3.5	4	5.5
Auto Parking Area	5.0	71	3.0	4	5.5

* Caltrans class 2 aggregate base, ** Concrete should have a modulus of rupture of at least 600 psi

To significantly reduce concrete shrinkage cracking concrete pavements could be reinforced with nominal rebar, such as minimum #4 bars spaced no greater than 24 inches, on center, both ways, placed at above mid-slab height, but with proper concrete cover, or as designed by your structural designer. Concrete pavements not supporting heavy traffic could be unreinforced provided they are constructed with expansion/contraction and/or construction joints spaced no greater than 24 times the pavement thickness, both ways, in nearly square patterns, and are detailed in general accordance with ACI Guidelines. Doweling of concrete pavements at critical pathways is also recommended.

Asphalt concrete paved areas should be designed, constructed, and maintained in accordance with, for example, the recommendations of the Asphalt Institute, or other widely recognized authority. Concrete paved areas should be designed and constructed in accordance with the recommendations of the American Concrete Institute or other widely recognized authority, particularly with regard to thickened edges, joints, and drainage. The Standard Specifications for Public Works construction ("Greenbook") or CalTrans Standard Specifications may be referenced for pavement materials specifications.

5.9 Drainage

Foundation and concrete-slab-on grade performance depends greatly on how well the runoff waters drain from the site. This is true both during construction and over the entire life of the structure. The ground surface around structures should be graded so that water flows rapidly

away from the structures without ponding. The surface gradient needed to do this depends on the landscaping type. Should excessive irrigation, waterline breaks, or unusually high rainfall occur, saturated zones and groundwater may develop. Consequently, the site should be graded so that water drains away readily without saturating the foundation or landscaped areas or cascading over slope faces. A potential source of water, such as water pipes, drains, and the like should be frequently examined for signs of leakage or damage. Any such leakage or damage should be repaired promptly. The project Civil Engineers should thoroughly evaluate the on-site drainage and make provisions as necessary to keep surface waters from affecting the site.

5.10 Construction Observation

The recommendations provided in this report are based limited subsurface information observed, at locations, and within, exploratory borings performed for this project and preliminary concept design proposed construction as of the date of publication. The interpolated subsurface conditions, on which this report relies, should be checked in the field during construction to verify conditions described herein are as anticipated. Any changes which occur to preliminary information provided to this office as of the date of this publication, this office should be notified and afforded an opportunity to update information provided in this report.

Recommendations provided in this report are based on the understanding and assumption that CTE will provide the observation and testing services for the project. All earthworks should be observed and tested to verify that grading activity has been performed according to the recommendations contained within this report. The project engineer should evaluate all footing excavations before reinforcing steel placement.

5.11 Plan Review

CTE should review project grading and foundation plans before the start of earthworks to identify potential conflicts and to verify that the recommendations contained in the report are to be implemented.

6.0 LIMITATIONS OF INVESTIGATION

As indicated, the recommendations presented herein are based on the field exploration, laboratory testing and our geologic and engineering analysis. Following completion of testing, these recommendations will be confirmed and or modified, if necessary, based on the materials exposed and re-worked during grading.

The field evaluation, laboratory testing and geotechnical analysis presented in this report have been conducted according to current engineering practice and the standard of care exercised by reputable geotechnical consultants performing similar tasks in this area. No other warranty, expressed or implied, is made regarding the conclusions, recommendations and opinions expressed in this report.

Variations may exist and conditions not observed or described in this report may be encountered during construction. Our conclusions and recommendations are based on an analysis of the observed conditions. If conditions different from those described in this report are encountered, our office should be notified and additional recommendations, if required, will be provided upon request. We appreciate this opportunity to be of service on this project. If you have any questions regarding this report, please do not hesitate to contact the undersigned.

We appreciate the opportunity to be of service on this project. Should you have any questions or need further information please do not hesitate to contact this office.

Respectfully submitted,

CTE CAL, INC.

Rod Ballard GE 2173
Senior Geotechnical Engineer

Kristin Kohls
Staff Geologist

KEY MAP

SCALE

0 1 2 Miles

N

NOTES:

Location of site is approximate. Base map from Map Data ©2016 Google

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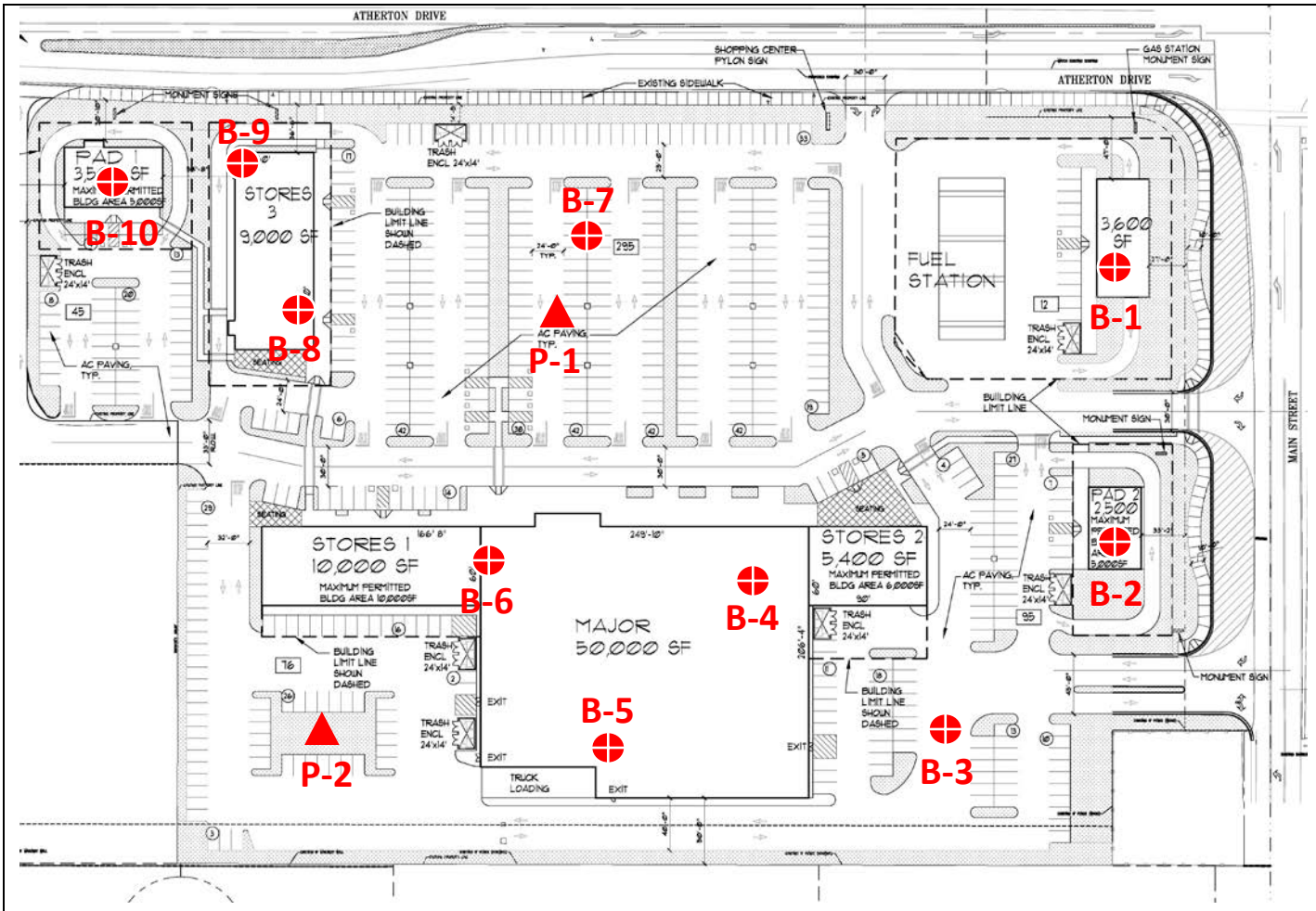
F: 916.331.6037
www.ctecal.com

SITE LOCATION MAP
SWC MAIN ST & ATHERTON DR
1601 S. Main St.
Manteca, CA 95337

CTE JOB NO.	
25-0484G	
SCALE	
As Shown Above	
DATE	FIGURE
3/17/17	1



SCALE

0 80 160 Feet

LEGEND

- **Borehole Locations (B-1 to B-10)**
- **Percolation Test Locations (P-1 & P-2)**

N

NOTES:

Approximate location of test borings and percolation tests (shown as circles or triangles with adjacent boring/percolation test number).

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EXPLORATION MAP
SWC Main St & Atherton Dr.
1601 S. Main St.
Manteca, California

CTE JOB NO.	
25-0484G	
SCALE	
See Scale Above	
DATE	FIGURE
3/17/17	2

APPENDIX A

REFERENCES CITED

1. California Division of Mines and Geology (CDMG), "Geologic Map of the San Francisco – San Jose Quadrangle" (1:250,000; 1991), compiled by Wagner, D.L., Bortugno, E.J., and McJunkin, R.D.

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6. Jennings, Charles W., "Fault Map of California", 2010, CGS.

7. ASTM, "Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort," Volume 04.08.

8. ACI Design Manual, Section 318, Chapter 4.

9. A drawing entitled "Site Plan - Alternate" (sheet SW.1; dated 10/24/2016) by Johnson Lyman Architects, LLP of Walnut Creek, California.

10. Google Earth aerial imagery.

APPENDIX B

DEFINITION OF TERMS, LEGEND, AND BORING LOGS

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DEFINITION OF TERMS

PRIMARY DIVISIONS			SYMBOLS	SECONDARY DIVISIONS
COARSE GRAINED SOILS MORE THAN HALF OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVELS MORE THAN HALF OF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE	CLEAN GRAVELS < 5% FINES	GW	WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES LITTLE OR NO FINES
			GP	POORLY GRADED GRAVELS OR GRAVEL SAND MIXTURES, LITTLE OF NO FINES
		GRAVELS WITH FINES	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES, NON-PLASTIC FINES
			GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES, PLASTIC FINES
	SANDS MORE THAN HALF OF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE	CLEAN SANDS < 5% FINES	SW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
			SP	POORLY GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		SANDS WITH FINES	SM	SILTY SANDS, SAND-SILT MIXTURES, NON-PLASTIC FINES
			SC	CLAYEY SANDS, SAND-CLAY MIXTURES, PLASTIC FINES
FINE GRAINED SOILS MORE THAN HALF OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS LIQUID LIMIT IS LESS THAN 50		ML	INORGANIC SILTS, VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS, SLIGHTLY PLASTIC CLAYEY SILTS
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY, SANDY, SILTS OR LEAN CLAYS
			OL	ORGANIC SILTS AND ORGANIC CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT IS GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTY CLAYS
HIGHLY ORGANIC SOILS			PT	PEAT AND OTHER HIGHLY ORGANIC SOILS

GRAIN SIZES

BOULDERS	COBBLES	GRAVEL		SAND			SILTS AND CLAYS
		COARSE	FINE	COARSE	MEDIUM	FINE	

12" 3" 3/4" 4 10 40 200

CLEAR SQUARE SIEVE OPENING U.S. STANDARD SIEVE SIZE

ADDITIONAL TESTS

(OTHER THAN TEST PIT AND BORING LOG COLUMN HEADINGS)

MAX- Maximum Dry Density
GS- Grain Size Distribution
SE- Sand Equivalent
EI- Expansion Index
CHM- Sulfate and Chloride Content , pH, Resistivity
COR - Corrosivity
SD- Sample Disturbed
PM- Permeability
SG- Specific Gravity
HA- Hydrometer Analysis
AL- Atterberg Limits
RV- R-Value
CN- Consolidation
CP- Collapse Potential
HC- Hydrocollapse
REM- Remolded
PP- Pocket Penetrometer
WA- Wash Analysis
DS- Direct Shear
UC- Unconfined Compression
MD- Moisture/Density
M- Moisture
SC- Swell Compression
OI- Organic Impurities

FIGURE: BL1

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PROJECT:	DRILLER:	SHEET: of
CTE JOB NO:	DRILL METHOD:	DRILLING DATE:
LOGGED BY:	SAMPLE METHOD:	ELEVATION:

Depth (Feet) | Bulk Sample | Driven Type | Blows/Foot | Dry Density (pcf) | Moisture (%) | U.S.C.S. Symbol | Graphic Log

BORING LEGEND

DESCRIPTION

Laboratory Tests

0

Block or Chunk Sample

Bulk Sample

5

Standard Penetration Test

10

Modified Split-Barrel Drive Sampler (Cal Sampler)

Thin Walled Army Corp. of Engineers Sample

15

Groundwater Table

Soil Type or Classification Change

20

? ——— ? ——— ? ——— ? ——— ? ——— ? ——— ? –

Formation Change [(Approximate boundaries queried (?)]

"SM"

Quotes are placed around classifications where the soils exist in situ as bedrock

25

FIGURE: BL2

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PROJECT:	SWC Main St. & Atherton Dr.		DRILLER:	NATS	SHEET:	1 of	10
CTE JOB NO:	25-0484G		DRILL METHOD:	4" Solid StemAuger	DRILLING DATE:		2/27/17
LOGGED BY:	K. Kohls		SAMPLE METHOD:	SPT/Rope & Cathead 350 ft-lb	ELEVATION:		40 +/-

BORING: B-1

Depth (Feet)	Bulk Sample	Driven Type	Blows/6 Inches	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0								Native grass/brush	
		■	2 3 4	106.1	10.0	SM		Loose, moist, brown, fine SAND with silt (15-30%)	MD, GS
5		■	9 10 12	105.9	11.8	SM		Medium dense, moist, brown, SAND with silt (15-30%)	MD, GS
10		■	1 3 8	94.6	26.7	CL		Stiff, moist to wet, brown, silty CLAY	MD, GS
15		■	3 7 6	98.9	26.3	SM		Medium dense, wet, brown, silty SAND Some orange mottling	MD, GS
								Boring terminated at 16.5 feet Groundwater encounterd at 15 feet Boring backfilled with slurry cement and topped with cuttings	
20									
25									

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PROJECT:	SWC Main St. & Atherton Dr.		DRILLER:	NATS	SHEET:	2 of 10	
CTE JOB NO:	25-0484G		DRILL METHOD:	4" Solid StemAuger	DRILLING DATE:	2/27/17	
LOGGED BY:	K. Kohls		SAMPLE METHOD:	SPT/Rope & Cathead 350 ft-lb	ELEVATION:	40 +/-	

BORING: B-2

Depth (Feet)	Sample Bulk	Sample Driven Type	Blows/6 Inches	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0								Native grass/brush	
			1 2 4			SM		Loose, moist, brown, fine SAND with silt (15-30%)	GS
5			30 40 42	109.2	11.0			Very dense, moist, brown, SAND with some silt (5-15%) to Hard, dry, light tan, SILT	MD, GS
						ML			
10			5 6 7	90.4	10.5			Stiff, moist to wet, brown, SILT with some sand (5-15%)	MD, GS
15			4 6 8	94.4	28.2	CL		Stiff, wet, brown, silty CLAY	MD
								Boring terminated at 16.5 feet Groundwater encounterd at 15 feet Boring backfilled with slurry cement and topped with cuttings	
20									
25									

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PROJECT:	SWC Main St. & Atherton Dr.		DRILLER:	NATS	SHEET:	3 of	10
CTE JOB NO:	25-0484G		DRILL METHOD:	4" Solid StemAuger	DRILLING DATE:		2/27/17
LOGGED BY:	K. Kohls		SAMPLE METHOD:	SPT/Rope & Cathead 350 ft-lb	ELEVATION:		40 +/-

BORING: B-3

Depth (Feet)	Sample Bulk	Sample Driven Type	Blows/6 Inches	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0								Native grass/brush	
						SM		Moist, brown, SAND	
5			3 4 4	109.3	6.8			Loose, moist to wet, brown, SAND with some silt (5-15%)	MD, GS
								Boring terminated at 6.5 feet No groundwater encountered. Boring backfilled with cuttings	
10									
15									
20									
25									

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PROJECT:	SWC Main St. & Atherton Dr.		DRILLER:	NATS	SHEET:	4 of 10	
CTE JOB NO:	25-0484G		DRILL METHOD:	4" Solid StemAuger	DRILLING DATE:	2/27/17	
LOGGED BY:	K. Kohls		SAMPLE METHOD:	SPT/Rope & Cathead 350 ft-lb	ELEVATION:	40 +/-	

BORING: B-4

Depth (Feet)	Sample Bulk	Sample Driven Type	Blows/6 Inches	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0								Native grass/brush	
		■	4 10 9	112.5	7.7	SM		Medium dense, moist, brown, SAND with silt (15-30%)	MD, GS
5		■	4 4 15	96.0	8.2	SM		Medium dense, moist, brown, SAND with silt (15-30%)	MD, GS
10		■	6 7 8	97.6	22.6	CL		Stiff, moist, brown, silty CLAY to Medium dense, moist, orange-brown, SAND with some silt (~5%)	MD, GS
						SP			
15		■	17 40 36	107.4	19.8			Very dense, wet, brown, SAND with some clay (~5%)	MD, GS
								Boring terminated at 16.5 feet Groundwater encounterd at 15 feet Boring backfilled with slurry cement and topped with cuttings	
20									
25									

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PROJECT:	SWC Main St. & Atherton Dr.	DRILLER:	NATS	SHEET:	5	of	10
CTE JOB NO:	25-0484G	DRILL METHOD:	4" Solid StemAuger	DRILLING DATE:			2/27/17
LOGGED BY:	K. Kohls	SAMPLE METHOD:	SPT/Rope & Cathead 350 ft-lb	ELEVATION:			42 +/-

BORING: B-5

Depth (Feet)	Bulk Sample	Driven Type	Blows/6 Inches	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0								Native grass/brush	
			4 6 7	114.9	7.4	SM		Medium dense, moist, dark brown, SAND with silt (15-30%)	MD, GS
5			40 50/6"	103.9	20.2			Very dense, moist, dark brown, coarse SAND with silt (15-30%) to Hard, dry, light tan, SILT	MD, GS
						ML			
10			8 13 12	100.0	22.7	CL		Very stiff, moist, orange-brown to SILT to Very stiff, moist, light gray silty CLAY	MD, GS
						ML			
15			6 8 11	98.2	26.2			Very stiff, moist to wet, brown SILT with fine sand (15-30%) some sulfide-rich minerals (pyrite)	MD, GS
								Boring terminated at 16.5 feet No groundwater encounterd Boring backfilled with slurry cement and topped with cuttings	
20									
25									

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PROJECT:	SWC Main St. & Atherton Dr.	DRILLER:	NATS	SHEET:	6	of	10
CTE JOB NO:	25-0484G	DRILL METHOD:	4" Solid StemAuger	DRILLING DATE:			2/27/17
LOGGED BY:	K. Kohls	SAMPLE METHOD:	SPT/Rope & Cathead 350 ft-lb	ELEVATION:			40 +/-

BORING: B-6

Depth (Feet)	Bulk Sample	Driven Type	Blows/6 Inches	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0								Native grass/brush	
			3 3 6	115.0	7.7	SM		Loose, moist, dark brown, SAND with silt (15-30%)	MD, GS
5			5 20 32	110.9	15.6	ML		Medium dense, moist, dark brown, SAND with silt to Hard, dry, light tan, SILT	MD
						SC			
10			8 26 30	102.4	20.5	CL		Medium dense, moist, brown, silty clayey SAND to Hard, dry, light gray/tan, silty CLAY with some orange mottling	MD
15			8 10 16	108.7	17.0	SP		Medium dense, wet, multi-colored, SAND	MD, GS
20			3 25 11					Dense, wet, multi-colored, SAND	
25								Boring terminated at 21.5 feet Groundwater encountered at 15 feet Boring backfilled with slurry cement and topped with cuttings	

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PROJECT:	SWC Main St. & Atherton Dr.	DRILLER:	NATS	SHEET:	7 of 10
CTE JOB NO:	25-0484G	DRILL METHOD:	4" Solid StemAuger	DRILLING DATE:	2/27/17
LOGGED BY:	K. Kohls	SAMPLE METHOD:	SPT/Rope & Cathead 350 ft-lb	ELEVATION:	40 +/-

BORING: B-7

Depth (Feet)	Sample Bulk	Sample Driven Type	Blows/6 Inches	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0								Native grass/brush	
						ML		Slightly moist, brown, SILT with fine sand (15-30%)	RV
5			18 38 32		13.3	SC		Very dense, moist to wet, clayey SAND	GS
								Boring terminated at 6.5 feet No groundwater encountered. Boring backfilled with cuttings	
10									
15									
20									
25									

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PROJECT:	SWC Main St. & Atherton Dr.	DRILLER:	NATS	SHEET:	8	of	10
CTE JOB NO:	25-0484G	DRILL METHOD:	4" Solid StemAuger	DRILLING DATE:			2/27/17
LOGGED BY:	K. Kohls	SAMPLE METHOD:	SPT/Rope & Cathead 350 ft-lb	ELEVATION:			40 +/-

BORING: B-8

Depth (Feet)	Bulk Sample	Driven Type	Blows/6 Inches	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0								Native grass/brush	
			5 10 16	115.6	9.2	SC		Medium dense, moist, brown, SAND with clay and silt (15-30%)	MD, GS
5			11 35 50	94.0	24.3	CL		Medium dense, moist, brown, SAND with clay to Hard, dry, tan to light gray, silty CLAY	MD, GS
10			5 5 10	95.2	19.8	ML		Stiff, moist, brown, SILT with fine sand	MD
15			6 8 10		▼	SC		Medium dense, wet, brown, SAND with clay and silt	
								Boring terminated at 16.5 feet Groundwater encounterd at 15 feet Boring backfilled with slurry cement and topped with cuttings	
20									
25									

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PROJECT:	SWC Main St. & Atherton Dr.	DRILLER:	NATS	SHEET:	9	of	10
CTE JOB NO:	25-0484G	DRILL METHOD:	4" Solid StemAuger	DRILLING DATE:			2/27/17
LOGGED BY:	K. Kohls	SAMPLE METHOD:	SPT/Rope & Cathead 350 ft-lb	ELEVATION:			40 +/-

BORING: B-9

Depth (Feet)	Bulk Sample	Driven Type	Blows/6 Inches	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0								Native grass/brush	
			3 4 6			SM		Loose, moist, brown, fine SAND with silt	
5			15 17 21	99.9	22.8	ML		Medium dense, moist, brown, SAND with silt to Hard, dry, tan, clayey SILT	MD, GS
10			10 20 23			SM		Hard, dry, tan to light gray, clayey SILT to Dense, moist, brown, silty SAND	
								Boring terminated at 11.5 feet No groundwater encountered Boring backfilled with slurry cement and topped with cuttings	
15									
20									
25									

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PROJECT:	SWC Main St. & Atherton Dr.	DRILLER:	NATS	SHEET:	10 of 10
CTE JOB NO:	25-0484G	DRILL METHOD:	4" Solid StemAuger	DRILLING DATE:	2/27/17
LOGGED BY:	K. Kohls	SAMPLE METHOD:	SPT/Rope & Cathead 350 ft-lb	ELEVATION:	40 +/-

BORING: B-10

Depth (Feet)	Bulk Sample	Driven Type	Blows/6 Inches	Dry Density (pcf)	Moisture (%)	U.S.C.S. Symbol	Graphic Log	DESCRIPTION	Laboratory Tests
0								Native grass/brush	
			6 6 7	111.8	7.4	SM		Medium dense, moist, dark brown to brown, fine SAND with silt (15-30%)	MD, GS
5			3 14 20			SM		Dense, moist to damp, brown, SAND with silt	
10			5 10 17	104.9	19.8	ML		Medium dense, moist, brown, silty SAND to Very stiff, dry, tan, clayey SILT	MD
								Boring terminated at 11.5 feet No groundwater encountered Boring backfilled with slurry cement and topped with cuttings	
15									
20									
25									

APPENDIX C

LABORATORY METHODS AND RESULTS

APPENDIX C

LABORATORY METHODS AND RESULTS

Laboratory tests were performed on representative soil samples to detect their relative engineering properties. Tests were performed following test methods of the American Society for Testing Materials or other accepted standards. The following presents a brief description of the various test methods used. The result of the laboratory tests are presented on the test boring logs or following this Appendix section.

Natural Moisture Content

The procedure of ASTM D 2216 was used to measure the moisture content of representative samples.

Classification

Soils were classified visually according to the Unified Soil Classification System. Visual classifications were supplemented by laboratory testing of selected samples according to ASTM D2487.

Atterberg Limits

The procedure of ASTM D4318 was used to measure the liquid limit, plastic limit and plasticity index of representative samples.

Particle-Size Analysis

Particle-size analyses were performed on selected representative samples according to ASTM D422.

R-Value

The procedure of ASTM D2844 was performed to determine the potential strength of subgrade and base materials for use in road pavements.

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CIVIL ENGINEERING | GEOTECHNICAL | ENVIRONMENTAL | CONSTRUCTION INSPECTION AND TESTING

Report of Soil Testing

To: Pacific Development Group
Project Name: S.W.C. Main Str. & Atherton Dr.
Gov. Contract #
Project Number: 25-0484G

Sample Data:

Date Sampled: February 27, 2017

Lab #: 4466

SampleID:	B1 @ 2.5'	B1 @ 5'	B1 @ 10'	B1 @ 15'	
Wet Wt:	272.8	300.5	207.5	261.6	
Dry Wt (before wash):	247.9	268.8	163.8	207.1	
Dry Wt (after wash):	189.5	224.5	52.7	130.9	
In-Place Moisture %:	10.0	11.8	26.7	26.3	
	% Passing	% Passing	% Passing	% Passing	
1 1/2inch					
1inch					
3/4inch					
1/2inch					
3/8inch					
#4					
#8					
#16					
#30					
#50					
#100					
#200	**23.6**	**16.5**	**67.8**	**36.8**	

All Sampling and Testing Done In Accordance With ASTM C117, C136, D1557, D4318, and D2487.

Reviewed By: Kurt Magnusson Date: March 10, 2017

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CIVIL ENGINEERING | GEOTECHNICAL | ENVIRONMENTAL | CONSTRUCTION INSPECTION AND TESTING

Report of Soil Testing

To: Pacific Development Group
Project Name: S.W.C. Main Str. & Atherton Dr.
Gov. Contract #
Project Number: 25-0484G

Sample Data:

Date Sampled: February 27, 2017

Lab #: 4466

SampleID:	B2 @ 2.5'	B2 @ 5'	B2 @ 10'	B3 @ 0-5'	B3 @ 5'
Wet Wt:	187.2	231.2	305.8		295.0
Dry Wt (before wash):	168.6	209.3	238.5		276.3
Dry Wt (after wash):	127.8	180.5	27.8		245.3
In-Place Moisture %:	11.0	10.5	28.2		6.8
	% Passing	% Passing	% Passing		% Passing
1 1/2inch					
1inch					
3/4inch					
1/2inch					
3/8inch					
#4					
#8					
#16					
#30					
#50					
#100					
#200	**24.2**	**13.8**	**88.3**		**11.2**

All Sampling and Testing Done In Accordance With ASTM C117, C136, D1557, D4318, and D2487.

Reviewed By: Kurt Magnusson Date: March 10, 2017

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CIVIL ENGINEERING | GEOTECHNICAL | ENVIRONMENTAL | CONSTRUCTION INSPECTION AND TESTING

Report of Soil Testing

To: Pacific Development Group
Project Name: S.W.C. Main Str. & Atherton Dr.
Gov. Contract #
Project Number: 25-0484G

Sample Data:

Date Sampled: February 27, 2017

Lab #: 4466

SampleID:	B4 @ 2.5'	B4 @ 5'	B4 @ 10'	B4 @ 15'	
Wet Wt:	306.3	239.6	267.8	244.5	
Dry Wt (before wash):	284.4	221.4	218.5	204.1	
Dry Wt (after wash):	236.1	176.3	95.1	192.7	
In-Place Moisture %:	7.7	8.2	22.6	19.8	
	% Passing	% Passing	% Passing	% Passing	
1 1/2inch					
1inch					
3/4inch					
1/2inch					
3/8inch					
#4					
#8					
#16					
#30					
#50					
#100					
#200	**17.0**	**20.4**	**56.5**	**5.6**	

All Sampling and Testing Done In Accordance With ASTM C117, C136, D1557, D4318, and D2487.

Reviewed By: Kurt Magnusson Date: March 10, 2017

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CIVIL ENGINEERING | GEOTECHNICAL | ENVIRONMENTAL | CONSTRUCTION INSPECTION AND TESTING

Report of Soil Testing

To: Pacific Development Group
Project Name: S.W.C. Main Str. & Atherton Dr.
Gov. Contract #
Project Number: 25-0484G

Sample Data:

Date Sampled: February 27, 2017

Lab #: 4466

SampleID:	B5 @ 2.5'	B5 @ 5.5'	B5 @ 10'	B5 @ 15'	
Wet Wt:	311.3	319.1	184.7	278.1	
Dry Wt (before wash):	289.9	265.5	150.5	220.3	
Dry Wt (after wash):	230.4	73.5	73.5	56.6	
In-Place Moisture %:	7.4	20.2	22.7	26.2	
	% Passing	% Passing	% Passing	% Passing	
1 1/2inch					
1inch					
3/4inch					
1/2inch					
3/8inch					
#4					
#8					
#16					
#30					
#50					
#100					
#200	**20.5**	**72.3**	**51.2**	**74.3**	

All Sampling and Testing Done In Accordance With ASTM C117, C136, D1557, D4318, and D2487.

Reviewed By: Kent Magnusson Date: March 10, 2017

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CIVIL ENGINEERING | GEOTECHNICAL | ENVIRONMENTAL | CONSTRUCTION INSPECTION AND TESTING

Report of Soil Testing

To: Pacific Development Group
Project Name: S.W.C. Main Str. & Atherton Dr.
Gov. Contract #
Project Number: 25-0484G

Sample Data:

Date Sampled: February 27, 2017

Lab #: 4466

SampleID:	B6 @ 2.5'	B6 @ 5.5'	B6 @ 10'	B6 @ 15'	
Wet Wt:	312.7		282.9	317.0	
Dry Wt (before wash):	290.3		234.7	270.9	
Dry Wt (after wash):	235.0		66.2		
In-Place Moisture %:	7.7		20.5	17.0	
	% Passing		% Passing	% Passing	
1 1/2inch					
1inch					
3/4inch					
1/2inch					
3/8inch					
#4					
#8					
#16					
#30					
#50					
#100					
#200	**19.0**		**71.8**		

All Sampling and Testing Done In Accordance With ASTM C117, C136, D1557, D4318, and D2487.

Reviewed By: Kurt Magnusson Date: March 10, 2017

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CIVIL ENGINEERING | GEOTECHNICAL | ENVIRONMENTAL | CONSTRUCTION INSPECTION AND TESTING

Report of Soil Testing

To: Pacific Development Group
Project Name: S.W.C. Main Str. & Atherton Dr.
Gov. Contract #
Project Number: 25-0484G

Sample Data:

Date Sampled: February 27, 2017

Lab #: 4466

SampleID:	B7 @ 0-5'	B8 @ 2.5'	B8 @ 5.5'	B8 @ 10'	
Wet Wt:	306.0	319.0	245.5	275.7	
Dry Wt (before wash):	270.0	292.2	197.5	230.1	
Dry Wt (after wash):	168.5	225.3	59.4		
In-Place Moisture %:	13.3	9.2	24.3	19.8	
	% Passing	% Passing	% Passing	% Passing	
1 1/2inch					
1inch					
3/4inch					
1/2inch					
3/8inch					
#4					
#8					
#16					
#30					
#50					
#100					
#200	**37.6**	**22.9**	**69.9**		

All Sampling and Testing Done In Accordance With ASTM C117, C136, D1557, D4318, and D2487.

Reviewed By: Kurt Magnusson Date: March 10, 2017

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CIVIL ENGINEERING | GEOTECHNICAL | ENVIRONMENTAL | CONSTRUCTION INSPECTION AND TESTING

Report of Soil Testing

To: Pacific Development Group
Project Name: S.W.C. Main Str. & Atherton Dr.
Gov. Contract #
Project Number: 25-0484G

Sample Data:

Date Sampled: February 27, 2017

Lab #: 4466

SampleID:	B9 @ 5.5'		B10 @ 2'	B10 @ 10'	
Wet Wt:	273.3		293.1	309.2	
Dry Wt (before wash):	222.5		272.8	258.1	
Dry Wt (after wash):	68.8		216.2		
In-Place Moisture %:	22.8		7.4	19.8	
	% Passing		% Passing	% Passing	
1 1/2inch					
1inch					
3/4inch					
1/2inch					
3/8inch					
#4					
#8					
#16					
#30					
#50					
#100					
#200	**69.1**		**20.7**		

All Sampling and Testing Done In Accordance With ASTM C117, C136, D1557, D4318, and D2487.

Reviewed By: Kurt Magnusson Date: March 10, 2017

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CIVIL ENGINEERING | GEOTECHNICAL | ENVIRONMENTAL | CONSTRUCTION INSPECTION AND TESTING

MOISTURE & DENSITY TEST

Client: Pacific Development Group **Sample Date:** 2/27/2017

Project Name: S.W.C. Main Str. & Atherton **Lab Number:** 4466

Project Number: 25-0484G

Sample No.	B1	B1	B1	B1	
DEPTH FT	2.5'	5'	10'	15'	
SAMPLE HT	5.54	6.00	4.11	4.97	
TUBE DIA.	1.43	1.43	1.43	1.43	
SOIL+RING	399.4	420.4	328.1	380.0	
RING	126.6	120.8	120.4	118.2	
SOIL WT., g	272.8	299.6	207.7	261.8	
SOIL, LB	0.60141	0.66049	0.45789	0.57716	
VOL. SOIL	0.00515	0.00558	0.00382	0.00462	
WET DENS	116.8	118.4	119.9	124.9	
SOIL WET	272.8	300.5	207.5	261.6	
SOIL DRY	247.9	268.8	163.8	207.1	
% MOIST	10.0%	11.8%	26.7%	26.3%	
DRY DENS	106.1	105.9	94.6	98.9	

Reviewed By: Ken Magnuson Date: March 10, 2017

Laboratory Manager

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CIVIL ENGINEERING | GEOTECHNICAL | ENVIRONMENTAL | CONSTRUCTION INSPECTION AND TESTING

MOISTURE & DENSITY TEST

Client: Pacific Development Group **Sample Date:** 2/27/2017

Project Name: S.W.C. Main Str. & Atherton **Lab Number:** 4466

Project Number: 25-0484G

Sample No.	B2	B2	B2	B3	B3
DEPTH FT	5'	10'	15'	0-5'	5'
SAMPLE HT	3.67	5.49	6.00		6.00
TUBE DIA.	1.43	1.43	1.43		1.43
SOIL+RING	310.8	354.2	428.9		416.0
RING	123.2	123.0	122.6		120.7
SOIL WT., g	187.6	231.2	306.3		295.3
SOIL, LB	0.41358	0.50970	0.67526		0.65101
VOL. SOIL	0.00341	0.00510	0.00558		0.00558
WET DENS	121.2	99.9	121.1		116.7
SOIL WET	187.2	231.2	305.8		295.0
SOIL DRY	168.6	209.3	238.5		276.3
% MOIST	11.0%	10.5%	28.2%		6.8%
DRY DENS	109.2	90.4	94.4		109.3

Reviewed By: Ken Magnuson, Laboratory Manager Date: March 10, 2017

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CIVIL ENGINEERING | GEOTECHNICAL | ENVIRONMENTAL | CONSTRUCTION INSPECTION AND TESTING

MOISTURE & DENSITY TEST

Client: Pacific Development Group **Sample Date:** 2/27/2017

Project Name: S.W.C. Main Str. & Atherton **Lab Number:** 4466

Project Number: 25-0484G

Sample No.	B4	B4	B4	B4	
DEPTH FT	2.5'	5'	10'	15'	
SAMPLE HT	5.91	5.47	5.33	4.52	
TUBE DIA.	1.44	1.43	1.43	1.43	
SOIL+RING	417.1	366.9	379.5	364.6	
RING	110.9	127.2	110.8	119.5	
SOIL WT., g	306.2	239.7	268.7	245.1	
SOIL, LB	0.67504	0.52844	0.59237	0.54034	
VOL. SOIL	0.00557	0.00508	0.00495	0.00420	
WET DENS	121.2	103.9	119.6	128.6	
SOIL WET	306.3	239.6	267.8	244.5	
SOIL DRY	284.4	221.4	218.5	204.1	
% MOIST	7.7%	8.2%	22.6%	19.8%	
DRY DENS	112.5	96.0	97.6	107.4	

Reviewed By: Ken Magnuson Date: March 10, 2017
Laboratory Manager

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CIVIL ENGINEERING | GEOTECHNICAL | ENVIRONMENTAL | CONSTRUCTION INSPECTION AND TESTING

MOISTURE & DENSITY TEST

Client: Pacific Development Group **Sample Date:** 2/27/2017

Project Name: S.W.C. Main Str. & Atherton **Lab Number:** 4466

Project Number: 25-0484G

Sample No.	B5	B5	B5	B5	
DEPTH FT	2.5'	5.5'	10'	15'	
SAMPLE HT	5.98	5.99	5.34	5.36	
TUBE DIA.	1.43	1.44	1.43	1.43	
SOIL+RING	436.2	430.7	398.7	403.6	
RING	125.0	110.8	122.3	123.5	
SOIL WT., g	311.2	319.9	276.4	280.1	
SOIL, LB	0.68607	0.70525	0.60935	0.61750	
VOL. SOIL	0.00556	0.00565	0.00496	0.00498	
WET DENS	123.4	124.9	122.8	124.0	
SOIL WET	311.3	319.1	184.7	278.1	
SOIL DRY	289.8	265.5	150.5	220.3	
% MOIST	7.4%	20.2%	22.7%	26.2%	
DRY DENS	114.9	103.9	100.0	98.2	

Reviewed By: Ken Magnuson Date: March 10, 2017

Laboratory Manager

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CIVIL ENGINEERING | GEOTECHNICAL | ENVIRONMENTAL | CONSTRUCTION INSPECTION AND TESTING

MOISTURE & DENSITY TEST

Client: Pacific Development Group **Sample Date:** 2/27/2017

Project Name: S.W.C. Main Str. & Atherton **Lab Number:** 4466

Project Number: 25-0484G

Sample No.	B6	B6	B6	B6	B6
DEPTH FT	2.5'	5'	5.5'	10'	15'
SAMPLE HT	5.99	5.98		5.45	5.92
TUBE DIA.	1.43	1.42		1.43	1.43
SOIL+RING	437.2	487.4		406.5	440.7
RING	124.3	168.8		123.0	123.3
SOIL WT., g	312.9	318.6		283.5	317.4
SOIL, LB	0.68981	0.70238		0.62500	0.69974
VOL. SOIL	0.00557	0.00548		0.00507	0.00550
WET DENS	123.9	128.2		123.4	127.2
SOIL WET	312.7	318.1		282.9	317.0
SOIL DRY	290.3	275.2		234.7	270.9
% MOIST	7.7%	15.6%		20.5%	17.0%
DRY DENS	115.0	110.9		102.4	108.7

Reviewed By: Ken Magnuson, Laboratory Manager Date: March 10, 2017

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CIVIL ENGINEERING | GEOTECHNICAL | ENVIRONMENTAL | CONSTRUCTION INSPECTION AND TESTING

MOISTURE & DENSITY TEST

Client: Pacific Development Group **Sample Date:** 2/27/2017

Project Name: S.W.C. Main Str. & Atherton **Lab Number:** 4466

Project Number: 25-0484G

Sample No.	B7	B8	B8	B8	
DEPTH FT	0-5'	2'	5.5'	10'	
SAMPLE HT		6.00	5.01	5.75	
TUBE DIA.		1.43	1.43	1.43	
SOIL+RING		442.1	365.4	395.5	
RING		123.0	118.7	119.0	
SOIL WT., g		319.1	246.7	276.5	
SOIL, LB		0.70348	0.54387	0.60957	
VOL. SOIL		0.00558	0.00466	0.00534	
WET DENS		126.1	116.8	114.1	
SOIL WET	306.0	319.0	245.5	275.7	
SOIL DRY	270.0	292.2	197.5	230.1	
% MOIST	13.3%	9.2%	24.3%	19.8%	
DRY DENS		115.6	94.0	95.2	

Reviewed By: Ken Magnuson Date: March 10, 2017
Laboratory Manager

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CIVIL ENGINEERING | GEOTECHNICAL | ENVIRONMENTAL | CONSTRUCTION INSPECTION AND TESTING

MOISTURE & DENSITY TEST

Client: Pacific Development Group **Sample Date:** 2/27/2017

Project Name: S.W.C. Main Str. & Atherton **Lab Number:** 4466

Project Number: 25-0484G

Sample No.	B9		B10	B10	
DEPTH FT	5.5'		2'	10'	
SAMPLE HT	5.30		5.79	5.84	
TUBE DIA.	1.43		1.43	1.43	
SOIL+RING	397.1		420.6	420.7	
RING	122.9		127.4	111.2	
SOIL WT., g	274.2		293.2	309.5	
SOIL, LB	0.60450		0.64638	0.68232	
VOL. SOIL	0.00493		0.00538	0.00543	
WET DENS	122.7		120.1	125.7	
SOIL WET	273.3		293.1	309.2	
SOIL DRY	222.5		272.8	258.1	
% MOIST	22.8%		7.4%	19.8%	
DRY DENS	99.9		111.8	104.9	

Reviewed By: Ken Magnuson, Laboratory Manager Date: March 10, 2017

CTE CAL, Inc.
3628 Madison Avenue, Suite 22 | Sacramento, CA 95660 | Office (916) 331-6030 | Fax (916) 331-6037
CONSTRUCTION INSPECTION AND TESTING | GEOTECHNICAL | ENVIRONMENTAL | CIVIL ENGINEERING

REPORT OF RESISTANCE 'R' VALUE-EXPANSION PRESSURE

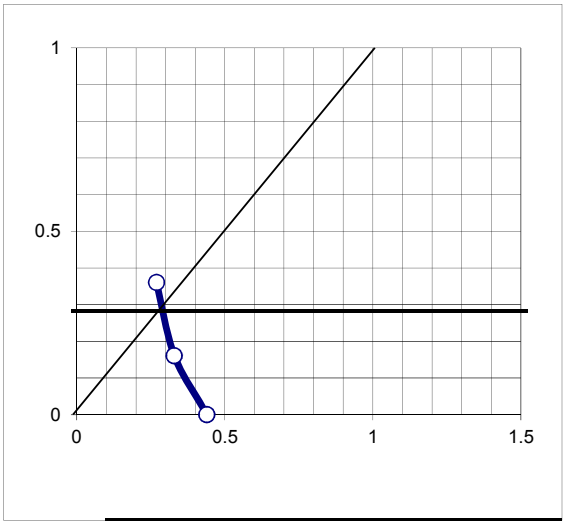
Job Name:	SWC Main Str. & Atherton	**Date:**	3/15/2017
Job No.	25-0484G	**Submitted By:**	KEM
Lab No.	4466	**Tested/ Calc.By:**	KEM
Sample No.	B7 @ 0-3'	**Type of Material:**	SM

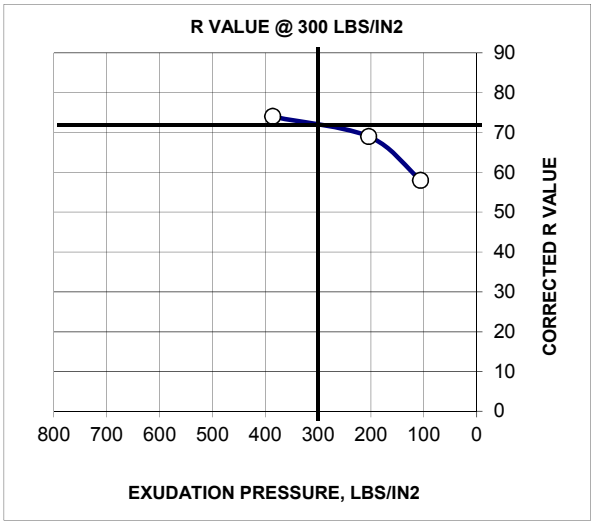
Test Procedure: CTM 301

Specimen/ Mold No.	1	2	3
Compactor Air Pressure, - ft.lbs.	350	350	350
Initial Moisture, - %	13.8%	13.8%	13.8%
Sample Size - g	1110	1100	1080
Water Added, - ml	0	10	20
Moisture at Compaction, - %	13.8%	14.7%	15.7%
Wt. Of Briquette and Mold, - g	3208	3178	3166
Wt. Of Mold, - g	2107	2081	2093
Wt. Of Briquitte, - g	1101	1097	1073
Height of Briquette, - in	2.53	2.51	2.48
Dry Density, - pcf	115.8	115.4	113.3
Stabilometer PH @ 2000 lbs	32	37	43
Displacement	3.48	3.66	4.6
R' Value	74	69	59
Corrected 'R' Value	74	69	58
Exudation Pressure, - lbs	4820	2550	1320
Exudation Pressure, - psi	386	204	106
Stabilometer Thickness - ft	0.27	0.33	0.44
Expansion - in.	0.0011	0.0005	0
Expansion Pressure - Pascals	90.2	41	0
Expansion Press, Thick-ft	0.36	0.16	0

R-value 71

TI	5
Expansion	74





Cover Thickness by Expansion Pressure-Feet

Expansion From Graph:	0.28

Sunland Analytical

11419 Sunrise Gold Circle, #10
Rancho Cordova, CA 95742
(916) 852-8557

Date Reported 03/10/2017
Date Submitted 03/07/2017

To: Ken Magnuson
CTE Cal,Inc.
3628 Madison Ave, Ste 22
Sacramento, Ca 95660

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 25-0484G Site ID : B3-BULK.
Thank you for your business.

* For future reference to this analysis please use SUN # 73749-153799.

EVALUATION FOR SOIL CORROSION

Soil pH	7.35	
Minimum Resistivity	16.88 ohm-cm (x1000)	
Chloride	1.0 ppm	00.00010 %
Sulfate	2.0 ppm	00.00020 %

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

Sunland Analytical

11419 Sunrise Gold Circle, #10
Rancho Cordova, CA 95742
(916) 852-8557

Date Reported 03/10/2017
Date Submitted 03/07/2017

To: Ken Magnuson
CTE Cal,Inc.
3628 Madison Ave, Ste 22
Sacramento, Ca 95660

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following:
Location : 25-0484G Site ID : B3-BULK.
Thank you for your business.

* For future reference to this analysis please use SUN # 73749-153800.

SOIL ANALYSIS

Saturation Percent (SP)	24		Soil Texture Sandy Loam
pH	7.29		
E.C.	0.18	mmho/cm	
Tot.Dissolved Salts	115.2	ppm	
Infiltration Rate (0% Slope)	0.75	in/hr	
% Organic Matter	1.0		
C.E.C.	4.3	meq/100g	
Sodium Absorption Ratio (SAR)	2.4		
Exchangable Sodium Percent (ESP)	2.2		
Gypsum Req. (CaSO4*2H2O)	None Required		
est. Nitrogen Release	0.9	#/1000 sq.ft.	

Nitrate	2.30	ppm	*
Phosphorus	15.95	ppm	**********
Potassium	78.82	ppm	**********
Sulfur	1.80	ppm	***
Chloride	25.82	ppm	**********
Carbonates	56.96	ppm	**********
Sodium	21.79	ppm	
Calcium	621.16	ppm	**********
Magnesium	106.84	ppm	******
Boron	0.36	ppm	**********
Copper	1.22	ppm	**********
Iron	15.22	ppm	**********
Manganese	5.13	ppm	**********
Zinc	0.63	ppm	**********

Very Low	Low	Adequate	Excessive

Sunland Analytical
11419 Sunrise Gold Circle, #10
Rancho Cordova, CA 95742
(916) 852-8557

DATE 03/10/2017
SUN NUMBER 153800

Information requested by:
Ken Magnuson
CTE Cal,Inc.

Information for:
25-0484G
Sample ID: B3-BULK

SOIL RECOMMENDATIONS FOR LANDSCAPE GARDENING

SOIL pH (Acidity and Alkalinity)

The pH of this sample indicates the soil is in a range for normal growth of most plants. No modification is required.

DISSOLVED SALTS (Indicated by E.C. & TDS)

These conditions are in the normal range for plant growth.

SOIL TEXTURE AND RATE OF WATER INFILTRATION

The infiltration rate for all soil textures decreases with increasing ground slope. At 0 to 4%, 5 to 8%, 9 to 12%, 13 to 16% and above 16% the infiltration rate of this sample decreases from 1.06 to 0.85, 0.64, 0.42, 0.27, respectively. Infiltration rate also decreases with percent of ground cover and by compaction.

WATER PENETRATION OF SOIL DUE TO CHEMICAL CHARACTERISTICS

When exchangable Sodium increases in the soil, water penetration decreases. Based on SAR and ESP values this sample has no penetration problem due to soil Sodium. No Gypsum required.

ORGANIC MATTER

Organic matter provides a slow nitrogen release and aids water retention. This sample has a low Organic Matter content.
To maintain moisture and provide sustained nitrogen release a level of 10% organic matter is recommended. Use amending material that is approximately 75% organic matter (i.e. many ground fir barks). Based on the analysis of this soil sample apply 4 yards per 1000 sq.ft. Spread evenly and blend into the top six inches of soil. It is a reasonable practice to apply a top dressing of 3 inches of organic mulches to aid water penetration and retention.

SOIL BORON

Boron concenrations are in a range allowing normal plant growth.

SOIL MICRONUTRIENTS

Micronutrients, Copper, Iron, Manganese and Zinc, in soil are present in small amounts. However, they play a necessary role in plant metabolism. Without appropriate amounts plants will not thrive. Apply the following per 1000/ sq.ft. Do not mix micronutrients during application (use a separate application for each element indicated).

Because copper, manganese and zinc are in very small amounts, dissolve (each) in 2 gallons of water and use a sprayer to obtain an even application.
Apply , 1.0 # Manganese Sulfate, 0.5 # Zinc Sulfate and water.

Sunland Analytical
11419 Sunrise Gold Circle, #10
Rancho Cordova, CA 95742
(916) 852-8557

DATE 03/10/2017
SUN NUMBER 153800

Information requested by:
Ken Magnuson
CTE Cal,Inc.

Information for:
25-0484G
Sample ID: B3-BULK

SOIL RECOMMENDATIONS FOR LANDSCAPE GARDENING

SOIL MACRONUTRIENTS : NITROGEN-PHOSPHORUS-POTASSIUM (N-P-K)
GENERAL N-P-K RECOMMENDATION

Use ONE of these NPK preparations for the first fertilizer application.

Standard NPK Fertilizer Preparations	6-20-20	5-20-10	16-16-16	0-10-10	28-3-4	21-0-0	Customer Choice None
#/1000 sq.ft.	19	23	N/A	N/A	N/A	N/A	**

GRASS OR SOD PREPARATION

Till in organic matter, N,P,K and micro nutrients in addition to any lime gypsum or sulfur as directed above. Smooth soil surface and follow seed or sod producers direction for moisture and product application.

TREES AND SHRUBS

Excavate holes for planting shrubs and trees to at least twice the volume of the container. Prepare backfill for tree and shrub planting holes by mixing three parts of native soil (or imported top soil) with one part organic amendment (preferably nitrogen and iron fortified) and 2.5 pounds of 6-20-20 per yard of mix. For extended fertilization, place slow release fertilizer tablets in each hole per manufacturer's instructions. If 6-20-20 was not directly added to backfill mix, during backfill apply uniformly 1/2 oz of 6-20-20 per gallon containers, 2.5 oz per 5 gallons, 6 oz per 24 inch boxes.

Summary and Suggested Sequence of Soil Improvements (#/1000 Sq.Ft.)

Organic Amendment	4	Yd./1000 Sq.Ft. Bulk organic amendment (nitrofied).
N-P-K Fertilizer	See above chart	
Micro Nutrients		
Manganese	1.0 #	Manganese Sulfate
Zinc	0.5 #	Zinc Sulfate
Magnesium	2 #	Magnesium Sulfate (Epson Salts)
Sulfate-Sulfur	Low sulfate compensated by other soil improvements.	

Maintenance Fertilization

Apply 5 pounds of Ammonium sulfate (21-0-0) per 1000 sq.ft.every month until plants become established. After established, apply 28-3-4 (or similar preparation) to provide desired growth rate and color.

APPENDIX D

STANDARD SPECIFICATIONS FOR GRADING

Section 1 - General

CTE, Cal, Inc. (CTE) presents the following standard recommendations for grading and other associated operations on construction projects. These guidelines should be considered a portion of the project specifications. Recommendations contained in the body of the previously presented soils report shall supersede the recommendations and or requirements as specified herein. The project geotechnical consultant shall interpret disputes arising out of interpretation of the recommendations contained in the soils report or specifications contained herein.

Section 2 - Responsibilities of Project Personnel

The geotechnical consultant should provide observation and testing services sufficient to general conformance with project specifications and standard grading practices. The geotechnical consultant should report any deviations to the client or his authorized representative.

The Client should be chiefly responsible for all aspects of the project. He or his authorized representative has the responsibility of reviewing the findings and recommendations of the geotechnical consultant. He shall authorize or cause to have authorized the Contractor and/or other consultants to perform work and/or provide services. During grading the Client or his authorized representative should remain on-site or should remain reasonably accessible to all concerned parties in order to make decisions necessary to maintain the flow of the project.

The Contractor is responsible for the safety of the project and satisfactory completion of all grading and other associated operations on construction projects, including, but not limited to, earth work in accordance with the project plans, specifications and controlling agency requirements.

Section 3 - Preconstruction Meeting

A preconstruction site meeting should be arranged by the owner and/or client and should include the grading contractor, design engineer, geotechnical consultant, owner's representative and representatives of the appropriate governing authorities.

Section 4 - Site Preparation

The client or contractor should obtain the required approvals from the controlling authorities for the project prior, during and/or after demolition, site preparation and removals, etc. The appropriate approvals should be obtained prior to proceeding with grading operations.

Clearing and grubbing should consist of the removal of vegetation such as brush, grass, woods, stumps, trees, root of trees and otherwise deleterious natural materials from the areas to be graded. Clearing and grubbing should extend to the outside of all proposed excavation and fill areas.

Demolition should include removal of buildings, structures, foundations, reservoirs, utilities (including underground pipelines, septic tanks, leach fields, seepage pits, cisterns, mining shafts, tunnels, etc.) and other man-made surface and subsurface improvements from the areas to be graded. Demolition of utilities should include proper capping and/or rerouting pipelines at the project perimeter and cutoff and capping of wells in accordance with the requirements of the governing authorities and the recommendations of the geotechnical consultant at the time of demolition.

Trees, plants or man-made improvements not planned to be removed or demolished should be protected by the contractor from damage or injury.

Debris generated during clearing, grubbing and/or demolition operations should be wasted from areas to be graded and disposed off-site. Clearing, grubbing and demolition operations should be performed under the observation of the geotechnical consultant.

Section 5 - Site Protection

Protection of the site during the period of grading should be the responsibility of the contractor. Unless other provisions are made in writing and agreed upon among the concerned parties, completion of a portion of the project should not be considered to preclude that portion or adjacent areas from the requirements for site protection until such time as the entire project is complete as identified by the geotechnical consultant, the client and the regulating agencies.

Precautions should be taken during the performance of site clearing, excavations and grading to protect the work site from flooding, ponding or inundation by poor or improper surface drainage. Temporary provisions should be made during the rainy season to adequately direct surface drainage away from and off the work site. Where low areas cannot be avoided, pumps should be kept on hand to continually remove water during periods of rainfall.

Rain related damage should be considered to include, but may not be limited to, erosion, silting, saturation, swelling, structural distress and other adverse conditions as determined by the geotechnical consultant. Soil adversely affected should be classified as unsuitable materials and should be subject to overexcavation and replacement with compacted fill or other remedial grading as recommended by the geotechnical consultant.

The contractor should be responsible for the stability of all temporary excavations. Recommendations by the geotechnical consultant pertaining to temporary excavations (e.g., backcuts) are made in consideration of stability of the completed project and, therefore, should not be considered to preclude the responsibilities of the contractor. Recommendations by the geotechnical consultant should not be considered to preclude requirements that are more restrictive by the regulating agencies. The contractor should provide during periods of extensive rainfall plastic sheeting to prevent unprotected slopes from becoming saturated and unstable. When deemed appropriate by the geotechnical consultant or governing agencies the contractor shall install checkdams, desilting basins, sand bags or other drainage control measures.

In relatively level areas and/or slope areas, where saturated soil and/or erosion gullies exist to depths of greater than 1.0 foot; they should be overexcavated and replaced as compacted fill in accordance with the applicable specifications. Where affected materials exist to depths of 1.0 foot or less below proposed finished grade, remedial grading by moisture conditioning in-place, followed by thorough recompaction in accordance with the applicable grading guidelines herein may be attempted. If the desired results are not achieved, all affected materials should be overexcavated and replaced as compacted fill in accordance with the slope repair recommendations herein. If field conditions dictate, the geotechnical consultant may recommend other slope repair procedures.

Section 6 - Excavations

6.1 Unsuitable Materials

Materials that are unsuitable should be excavated under observation and recommendations of the geotechnical consultant. Unsuitable materials include, but may not be limited to, dry, loose, soft, wet, organic compressible natural soils and fractured, weathered, soft bedrock and nonengineered or otherwise deleterious fill materials.

Material identified by the geotechnical consultant as unsatisfactory due to its moisture conditions should be overexcavated; moisture conditioned as needed, to a uniform at or above optimum moisture condition before placement as compacted fill.

If during the course of grading adverse geotechnical conditions are exposed which were not anticipated in the preliminary soil report as determined by the geotechnical consultant additional exploration, analysis, and treatment of these problems may be recommended.

6.2 Cut Slopes

Unless otherwise recommended by the geotechnical consultant and approved by the regulating agencies, permanent cut slopes should not be steeper than 2:1 (horizontal: vertical).

The geotechnical consultant should observe cut slope excavation and if these excavations expose loose cohesionless, significantly fractured or otherwise unsuitable material, the materials should be overexcavated and replaced with a compacted stabilization fill. If encountered specific cross section details should be obtained from the Geotechnical Consultant.

When extensive cut slopes are excavated or these cut slopes are made in the direction of the prevailing drainage, a non-erodible diversion swale (brow ditch) should be provided at the top of the slope.

6.3 Pad Areas

All lot pad areas, including side yard terrace containing both cut and fill materials, transitions, located less than 3 feet deep should be overexcavated to a depth of 3 feet and replaced with a uniform compacted fill blanket of 3 feet. Actual depth of overexcavation may vary and should be delineated by the geotechnical consultant during grading, especially where deep or drastic transitions are present.

For pad areas created above cut or natural slopes, positive drainage should be established away from the top-of-slope. This may be accomplished utilizing a berm drainage swale and/or an appropriate pad gradient. A gradient in soil areas away from the top-of-slopes of 2 percent or greater is recommended.

Section 7 - Compacted Fill

All fill materials should have fill quality, placement, conditioning and compaction as specified below or as approved by the geotechnical consultant.

7.1 Fill Material Quality

Excavated on-site or import materials which are acceptable to the geotechnical consultant may be utilized as compacted fill, provided trash, vegetation and other deleterious materials are removed prior to placement. All import materials anticipated for use on-site should be sampled tested and approved prior to and placement is in conformance with the requirements outlined.

Rocks 12 inches in maximum and smaller may be utilized within compacted fill provided sufficient fill material is placed and thoroughly compacted over and around all rock to effectively fill rock voids. The amount of rock should not exceed 40 percent by dry weight passing the 3/4-inch sieve. The geotechnical consultant may vary those requirements as field conditions dictate.

Where rocks greater than 12 inches but less than four feet of maximum dimension are generated during grading, or otherwise desired to be placed within an engineered fill, special handling in accordance with the recommendations below. Rocks greater than four feet should be broken down or disposed off-site.

7.2 Placement of Fill

Prior to placement of fill material, the geotechnical consultant should observe and approve the area to receive fill. After observation and approval, the exposed ground surface should be scarified to a depth of 6 to 8 inches. The scarified material should be conditioned (i.e. moisture added or air dried by continued discing) to achieve a moisture content at or slightly above optimum moisture conditions and compacted to a minimum of 90 percent of the maximum density or as otherwise recommended in the soils report or by appropriate government agencies.

Compacted fill should then be placed in thin horizontal lifts not exceeding eight inches in loose thickness prior to compaction. Each lift should be moisture conditioned as needed, thoroughly blended to achieve a consistent moisture content at or slightly above optimum and thoroughly compacted by mechanical methods to a minimum of 90 percent of laboratory maximum dry density. Each lift should be treated in a like manner until the desired finished grades are achieved.

The contractor should have suitable and sufficient mechanical compaction equipment and watering apparatus on the job site to handle the amount of fill being placed in consideration of moisture retention properties of the materials and weather conditions.

When placing fill in horizontal lifts adjacent to areas sloping steeper than 5:1 (horizontal: vertical), horizontal keys and vertical benches should be excavated into the adjacent slope area. Keying and benching should be sufficient to provide at least six-foot wide benches and a minimum of four feet of vertical bench height within the firm natural ground, firm bedrock or engineered compacted fill. No compacted fill should be placed in an area after keying and benching until the geotechnical consultant has reviewed the area. Material generated by the benching operation should be moved sufficiently away from

the bench area to allow for the recommended review of the horizontal bench prior to placement of fill.

Within a single fill area where grading procedures dictate two or more separate fills, temporary slopes (false slopes) may be created. When placing fill adjacent to a false slope, benching should be conducted in the same manner as above described. At least a 3-foot vertical bench should be established within the firm core of adjacent approved compacted fill prior to placement of additional fill. Benching should proceed in at least 3-foot vertical increments until the desired finished grades are achieved.

Prior to placement of additional compacted fill following an overnight or other grading delay, the exposed surface or previously compacted fill should be processed by scarification, moisture conditioning as needed to at or slightly above optimum moisture content, thoroughly blended and recompacted to a minimum of 90 percent of laboratory maximum dry density. Where unsuitable materials exist to depths of greater than one foot, the unsuitable materials should be over-excavated.

Following a period of flooding, rainfall or overwatering by other means, no additional fill should be placed until damage assessments have been made and remedial grading performed as described herein.

Rocks 12 inch in maximum dimension and smaller may be utilized in the compacted fill provided the fill is placed and thoroughly compacted over and around all rock. No oversize material should be used within 3 feet of finished pad grade and within 1 foot of other compacted fill areas. Rocks 12 inches up to four feet maximum dimension should be placed below the upper 10 feet of any fill and should not be closer than 15 feet to any slope face. These recommendations could vary as locations of improvements dictate. Where practical, oversized material should not be placed below areas where structures or deep utilities are proposed. Oversized material should be placed in windrows on a clean, overexcavated or unyielding compacted fill or firm natural ground surface. Select native or imported granular soil (S.E. 30 or higher) should be placed and thoroughly flooded over and around all windrowed rock, such that voids are filled. Windrows of oversized material should be staggered so those successive strata of oversized material are not in the same vertical plane.

It may be possible to dispose of individual larger rock as field conditions dictate and as recommended by the geotechnical consultant at the time of placement.

The contractor should assist the geotechnical consultant and/or his representative by digging test pits for removal determinations and/or for testing compacted fill. The contractor should provide this work at no additional cost to the owner or contractor's client.

Fill should be tested by the geotechnical consultant for compliance with the recommended relative compaction and moisture conditions. Field density testing should conform to ASTM Method of Test D 1556-00, D 2922-04. Tests should be conducted at a minimum of approximately two vertical feet or approximately 1,000 to 2,000 cubic yards of fill placed. Actual test intervals may vary as field conditions dictate. Fill found not to be in conformance with the grading recommendations should be removed or otherwise handled as recommended by the geotechnical consultant.

7.3 Fill Slopes

Unless otherwise recommended by the geotechnical consultant and approved by the regulating agencies, permanent fill slopes should not be steeper than 2:1 (horizontal: vertical).

Except as specifically recommended in these grading guidelines compacted fill slopes should be over-built two to five feet and cut back to grade, exposing the firm, compacted fill inner core. The actual amount of overbuilding may vary as field conditions dictate. If the desired results are not achieved, the existing slopes should be overexcavated and reconstructed under the guidelines of the geotechnical consultant. The degree of overbuilding shall be increased until the desired compacted slope surface condition is achieved. Care should be taken by the contractor to provide thorough mechanical compaction to the outer edge of the overbuilt slope surface.

At the discretion of the geotechnical consultant, slope face compaction may be attempted by conventional construction procedures including backrolling. The procedure must create a firmly compacted material throughout the entire depth of the slope face to the surface of the previously compacted firm fill intercore.

During grading operations, care should be taken to extend compactive effort to the outer edge of the slope. Each lift should extend horizontally to the desired finished slope surface or more as needed to ultimately established desired grades. Grade during construction should not be allowed to roll off at the edge of the slope. It may be helpful to elevate slightly the outer edge of the slope. Slough resulting from the placement of individual lifts should not be allowed to drift down over previous lifts. At intervals not

exceeding four feet in vertical slope height or the capability of available equipment, whichever is less, fill slopes should be thoroughly dozer trackrolled.

For pad areas above fill slopes, positive drainage should be established away from the top-of-slope. This may be accomplished using a berm and pad gradient of at least two percent.

Section 8 - Trench Backfill

Utility and/or other excavation of trench backfill should, unless otherwise recommended, be compacted by mechanical means. Unless otherwise recommended, the degree of compaction should be a minimum of 90 percent of the laboratory maximum density.

Within slab areas, but outside the influence of foundations, trenches up to one foot wide and two feet deep may be backfilled with sand and consolidated by jetting, flooding or by mechanical means. If on-site materials are utilized, they should be wheel-rolled, tamped or otherwise compacted to a firm condition. For minor interior trenches, density testing may be deleted or spot testing may be elected if deemed necessary, based on review of backfill operations during construction.

If utility contractors indicate that it is undesirable to use compaction equipment in close proximity to a buried conduit, the contractor may elect the utilization of light weight mechanical compaction equipment and/or shading of the conduit with clean, granular material, which should be thoroughly jetted in-place above the conduit, prior to initiating mechanical compaction procedures. Other methods of utility trench compaction may also be appropriate, upon review of the geotechnical consultant at the time of construction.

In cases where clean granular materials are proposed for use in lieu of native materials or where flooding or jetting is proposed, the procedures should be considered subject to review by the geotechnical consultant. Clean granular backfill and/or bedding are not recommended in slope areas.

Section 9 - Drainage

Where deemed appropriate by the geotechnical consultant, canyon subdrain systems should be installed in accordance with CTE's recommendations during grading.

Typical subdrains for compacted fill buttresses, slope stabilization or sidehill masses, should be installed in accordance with the specifications.

Roof, pad and slope drainage should be directed away from slopes and areas of structures to suitable disposal areas via non-erodible devices (i.e., gutters, downspouts, and concrete swales).

For drainage in extensively landscaped areas near structures, (i.e., within four feet) a minimum of 5 percent gradient away from the structure should be maintained. Pad drainage of at least 2 percent should be maintained over the remainder of the site.

Drainage patterns established at the time of fine grading should be maintained throughout the life of the project. Property owners should be made aware that altering drainage patterns could be detrimental to slope stability and foundation performance.

Section 10 - Slope Maintenance

10.1 - Landscape Plants

To enhance surficial slope stability, slope planting should be accomplished at the completion of grading. Slope planting should consist of deep-rooting vegetation requiring little watering. Plants native to the southern California area and plants relative to native plants are generally desirable. Plants native to other semi-arid and arid areas may also be appropriate. A Landscape Architect should be the best party to consult regarding actual types of plants and planting configuration.

10.2 - Irrigation

Irrigation pipes should be anchored to slope faces, not placed in trenches excavated into slope faces.

Slope irrigation should be minimized. If automatic timing devices are utilized on irrigation systems, provisions should be made for interrupting normal irrigation during periods of rainfall.

10.3 - Repair

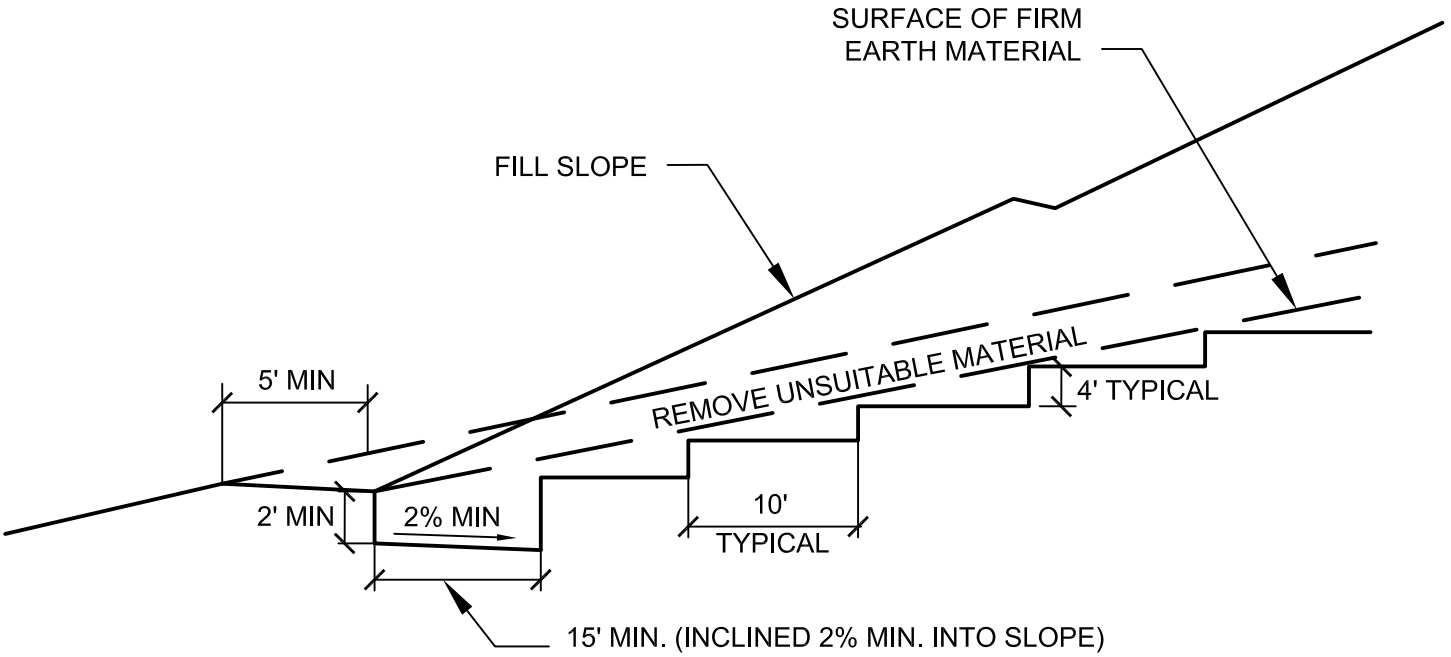
As a precautionary measure, plastic sheeting should be readily available, or kept on hand, to protect all slope areas from saturation by periods of heavy or prolonged rainfall. This measure is strongly recommended, beginning with the period prior to landscape planting.

If slope failures occur, the geotechnical consultant should be contacted for a field review of site conditions and development of recommendations for evaluation and repair.

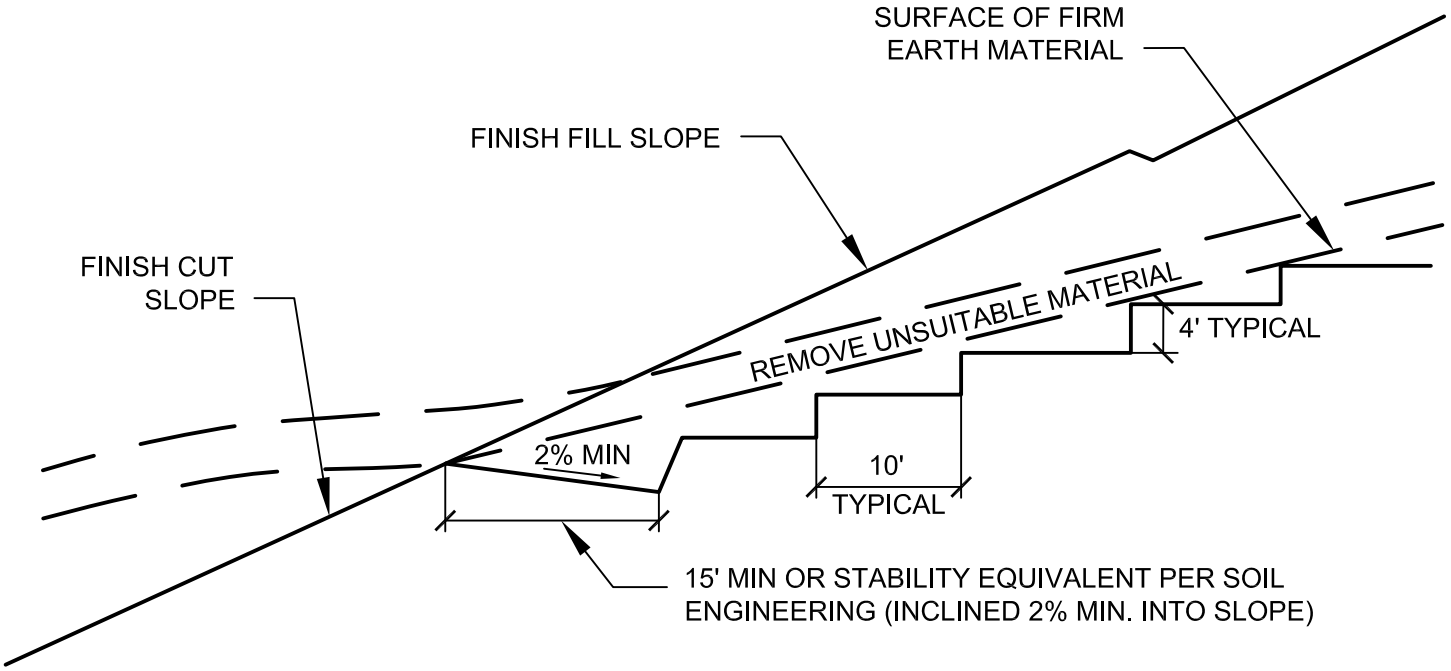
If slope failures occur as a result of exposure to period of heavy rainfall, the failure areas and currently unaffected areas should be covered with plastic sheeting to protect against additional saturation.

In the accompanying Standard Details, appropriate repair procedures are illustrated for superficial slope failures (i.e., occurring typically within the outer one foot to three feet of a slope face).

BENCHING FILL OVER NATURAL

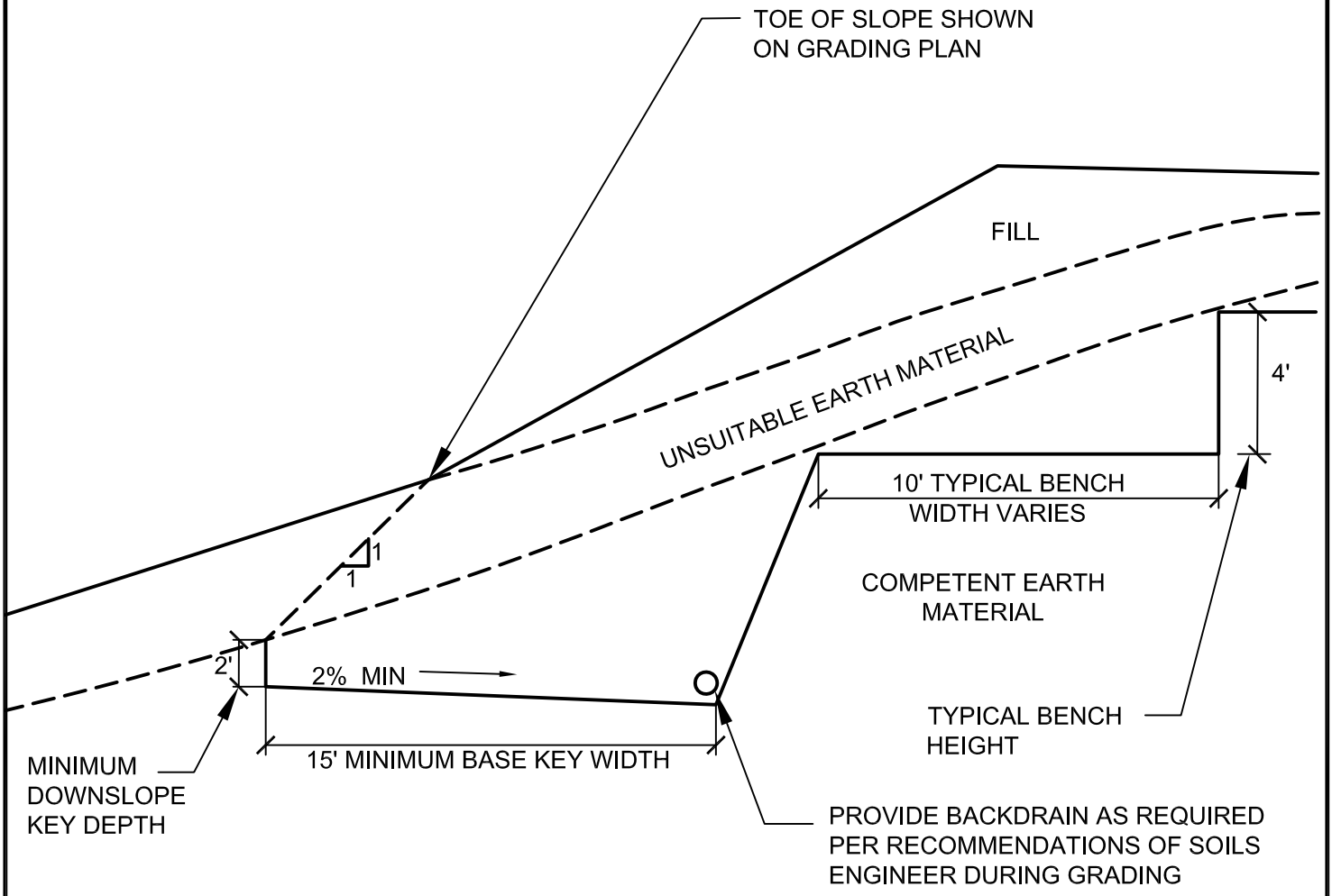


BENCHING FILL OVER CUT



NOT TO SCALE

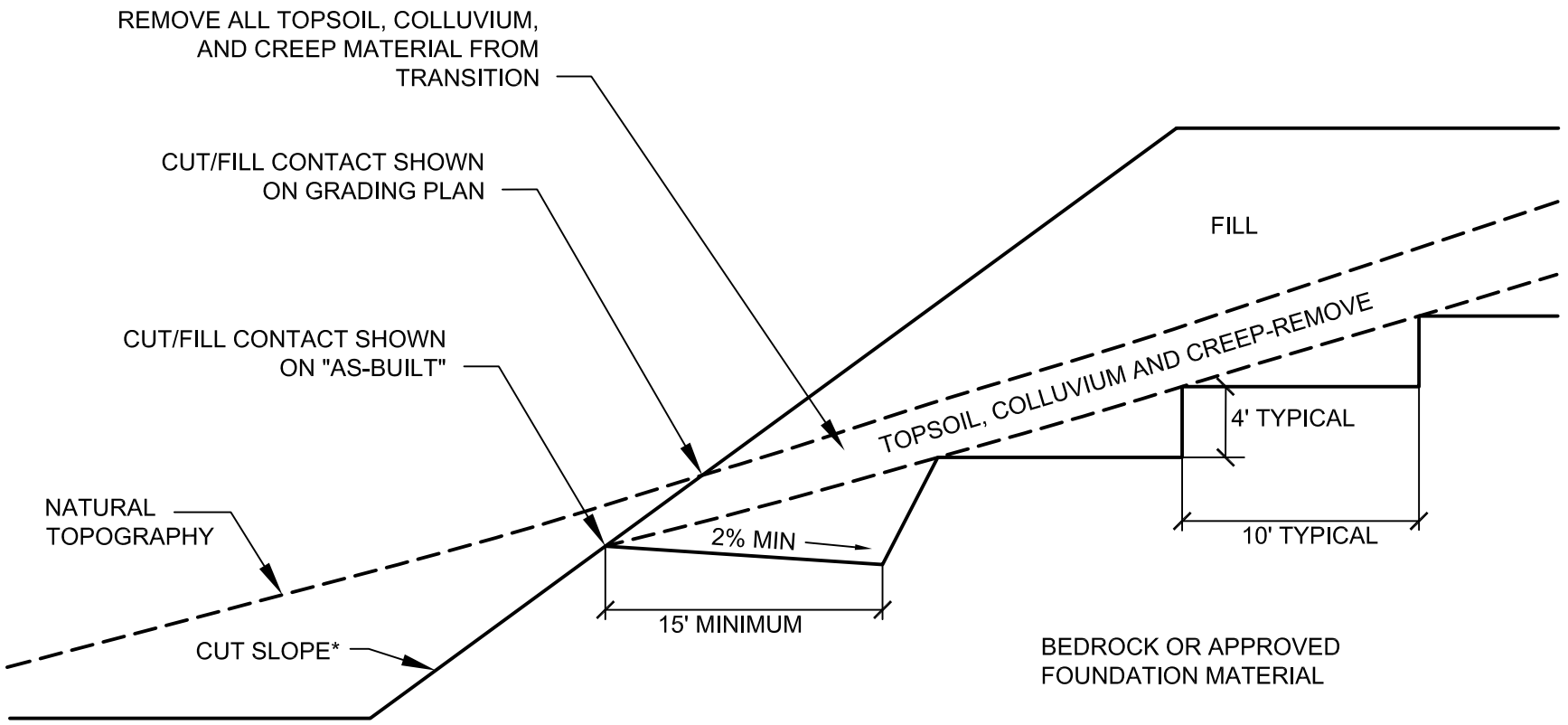
BENCHING FOR COMPACTED FILL DETAIL



WHERE NATURAL SLOPE GRADIENT IS 5:1 OR LESS, BENCHING IS NOT NECESSARY. FILL IS NOT TO BE PLACED ON COMPRESSIBLE OR UNSUITABLE MATERIAL.

NOT TO SCALE

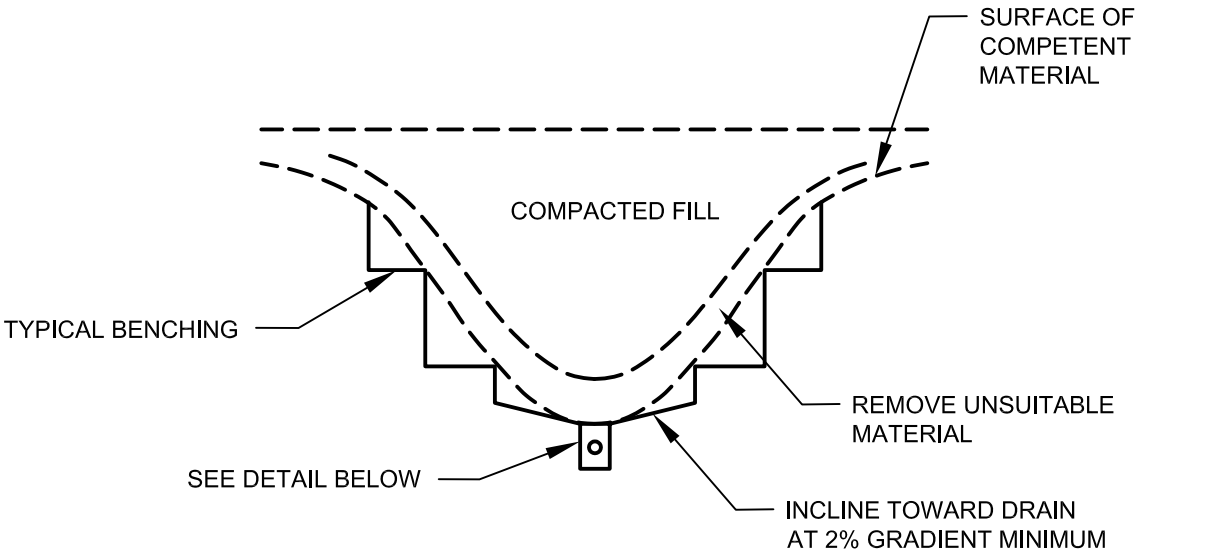
FILL SLOPE ABOVE NATURAL GROUND DETAIL



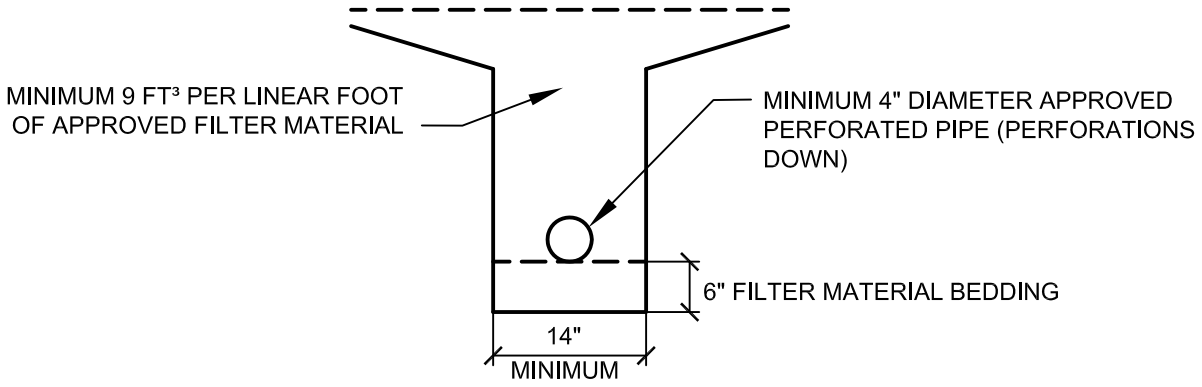
*NOTE: CUT SLOPE PORTION SHOULD BE MADE PRIOR TO PLACEMENT OF FILL

NOT TO SCALE

FILL SLOPE ABOVE CUT SLOPE DETAIL



DETAIL



FILTER MATERIAL TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUAL:

SIEVE SIZE	PERCENTAGE PASSING
1"	100
¾"	90-100
⅜"	40-100
NO. 4	25-40
NO. 30	18-33
NO. 8	5-15
NO. 50	0-7
NO. 200	0-3

APPROVED PIPE TO BE SCHEDULE 40 POLY-VINYL-CHLORIDE (P.V.C.) OR APPROVED EQUAL. MINIMUM CRUSH STRENGTH 1000 psi

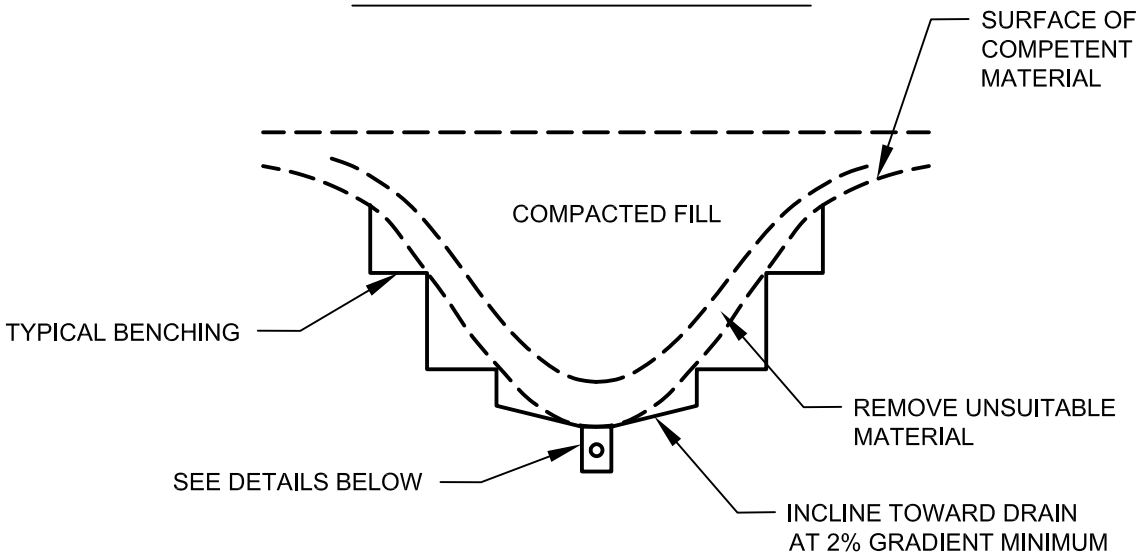
PIPE DIAMETER TO MEET THE FOLLOWING CRITERIA, SUBJECT TO FIELD REVIEW BASED ON ACTUAL GEOTECHNICAL CONDITIONS ENCOUNTERED DURING GRADING

LENGTH OF RUN	PIPE DIAMETER
INITIAL 500'	4"
500' TO 1500'	6"
> 1500'	8"

NOT TO SCALE

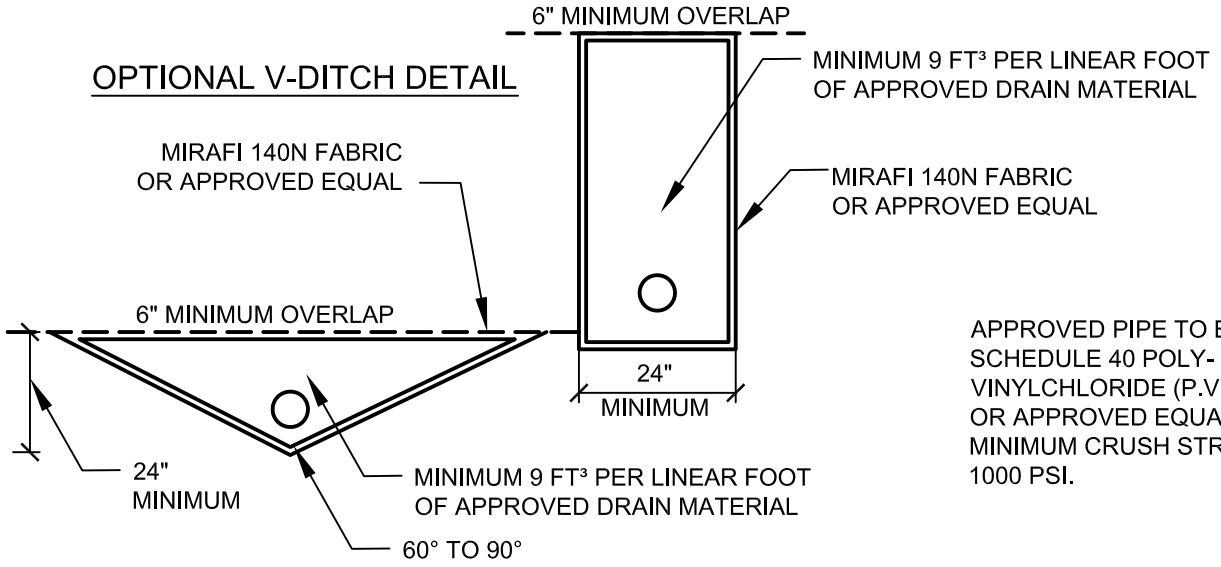
TYPICAL CANYON SUBDRAIN DETAIL

CANYON SUBDRAIN DETAILS



TRENCH DETAILS

OPTIONAL V-DITCH DETAIL



APPROVED PIPE TO BE SCHEDULE 40 POLY-VINYLCHLORIDE (P.V.C.) OR APPROVED EQUAL. MINIMUM CRUSH STRENGTH 1000 PSI.

DRAIN MATERIAL TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUAL:

SIEVE SIZE	PERCENTAGE PASSING
1 ½"	88-100
1"	5-40
¾"	0-17
⅜"	0-7
NO. 200	0-3

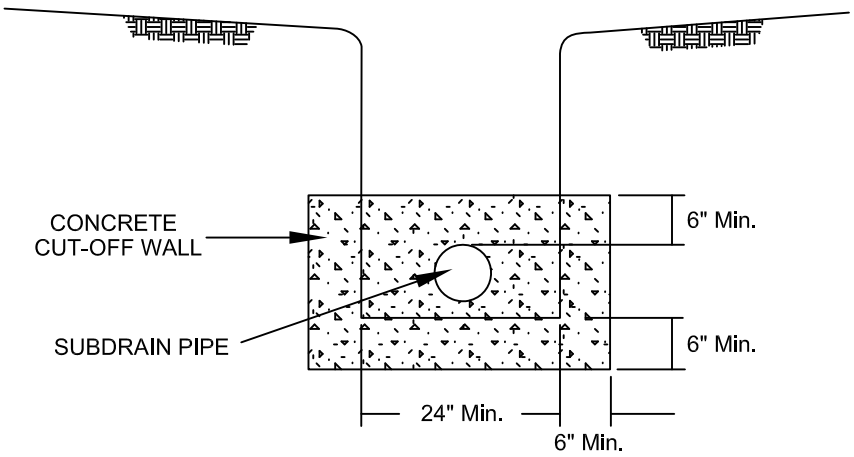
PIPE DIAMETER TO MEET THE FOLLOWING CRITERIA, SUBJECT TO FIELD REVIEW BASED ON ACTUAL GEOTECHNICAL CONDITIONS ENCOUNTERED DURING GRADING

LENGTH OF RUN	PIPE DIAMETER
INITIAL 500'	4"
500' TO 1500'	6"
> 1500'	8"

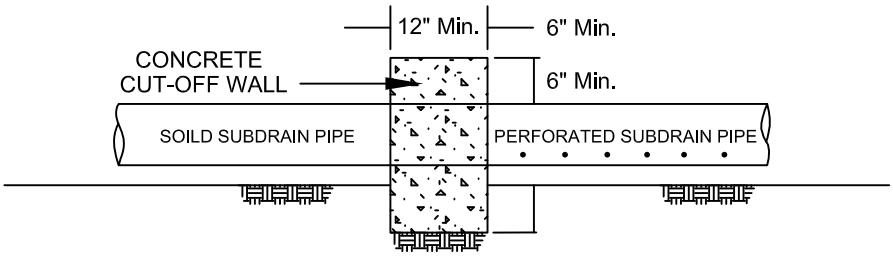
NOT TO SCALE

GEOFABRIC SUBDRAIN

FRONT VIEW



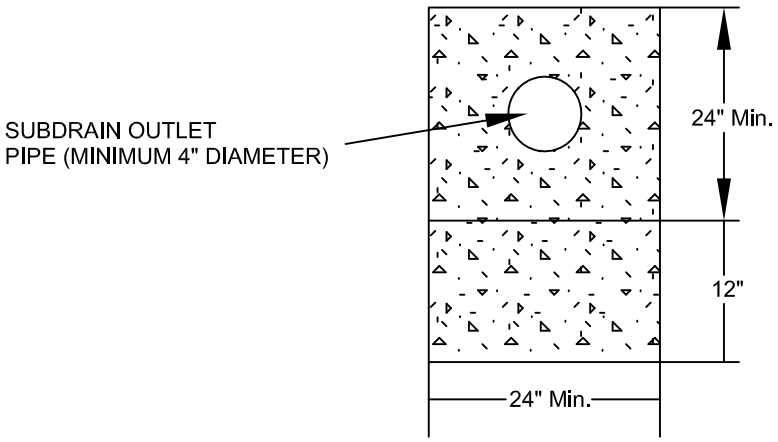
SIDE VIEW



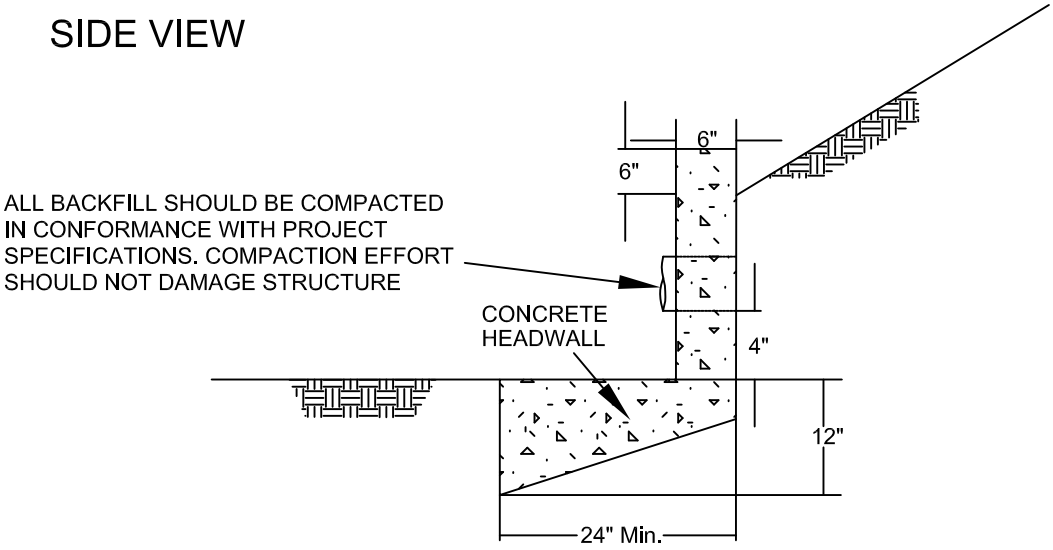
NOT TO SCALE

RECOMMENDED SUBDRAIN CUT-OFF WALL

FRONT VIEW



SIDE VIEW



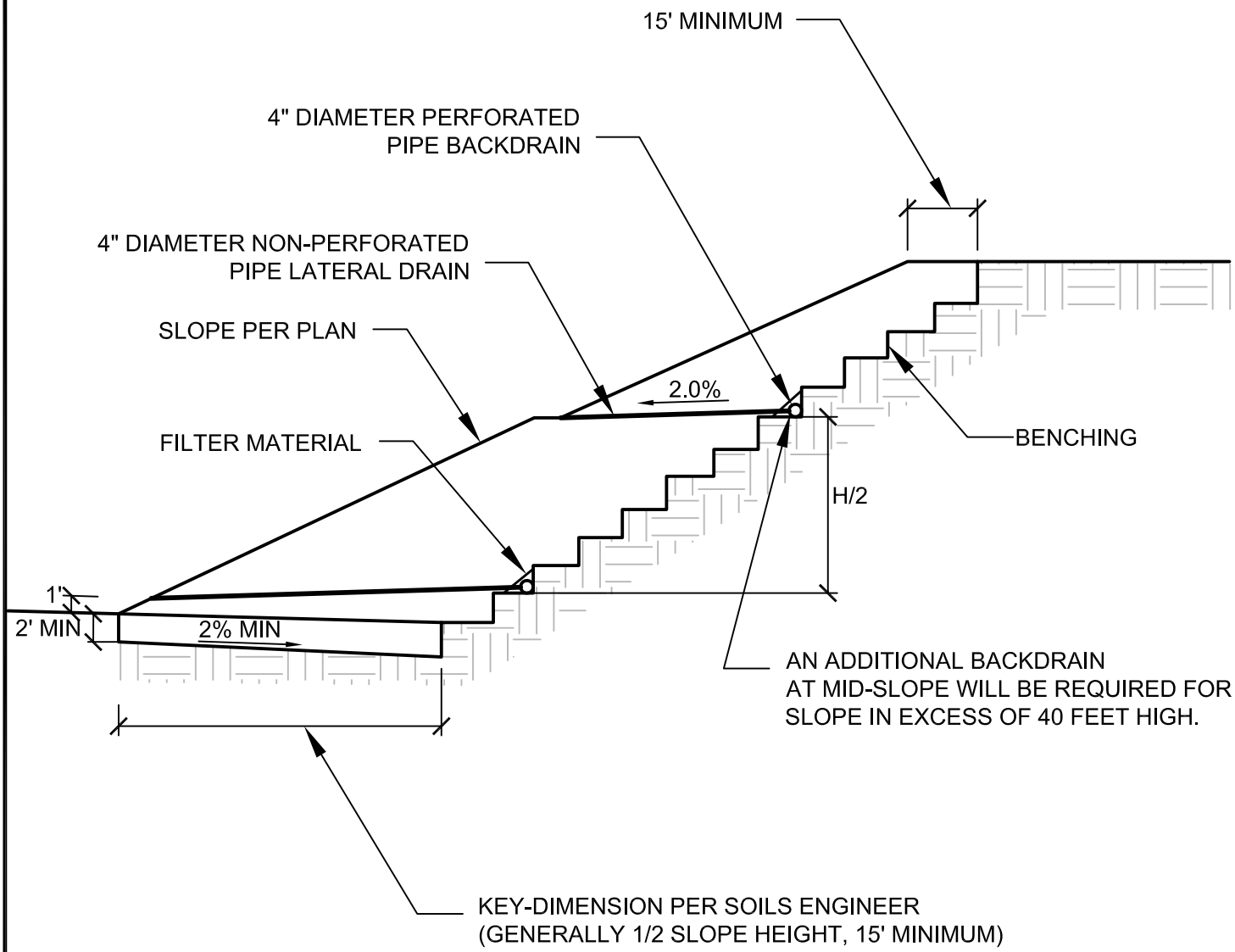
NOTE: HEADWALL SHOULD OUTLET AT TOE OF SLOPE
OR INTO CONTROLLED SURFACE DRAINAGE DEVICE

ALL DISCHARGE SHOULD BE CONTROLLED

THIS DETAIL IS A MINIMUM DESIGN AND MAY BE
MODIFIED DEPENDING UPON ENCOUNTERED
CONDITIONS AND LOCAL REQUIREMENTS

NOT TO SCALE

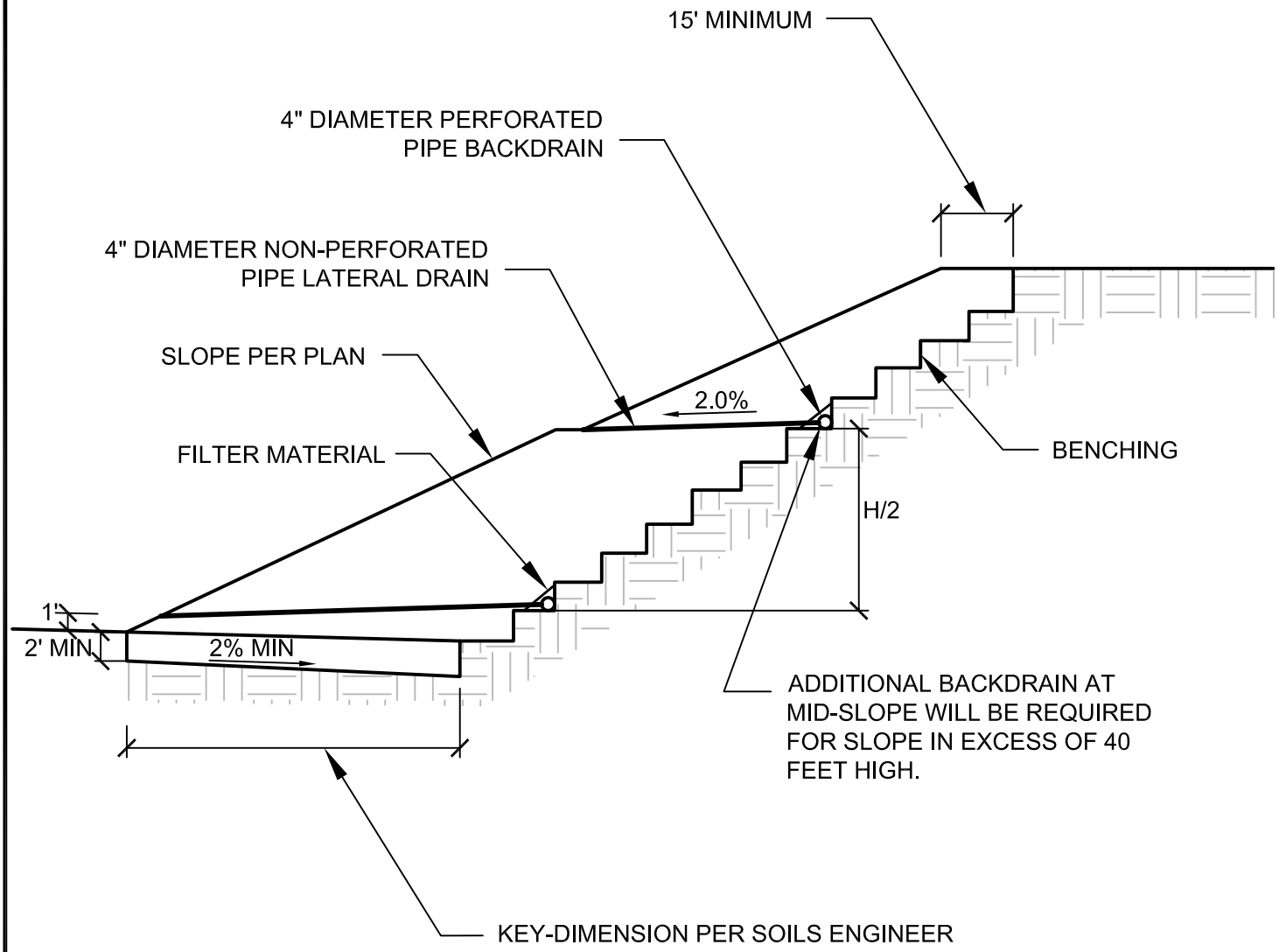
TYPICAL SUBDRAIN OUTLET HEADWALL DETAIL



DIMENSIONS ARE MINIMUM RECOMMENDED

NOT TO SCALE

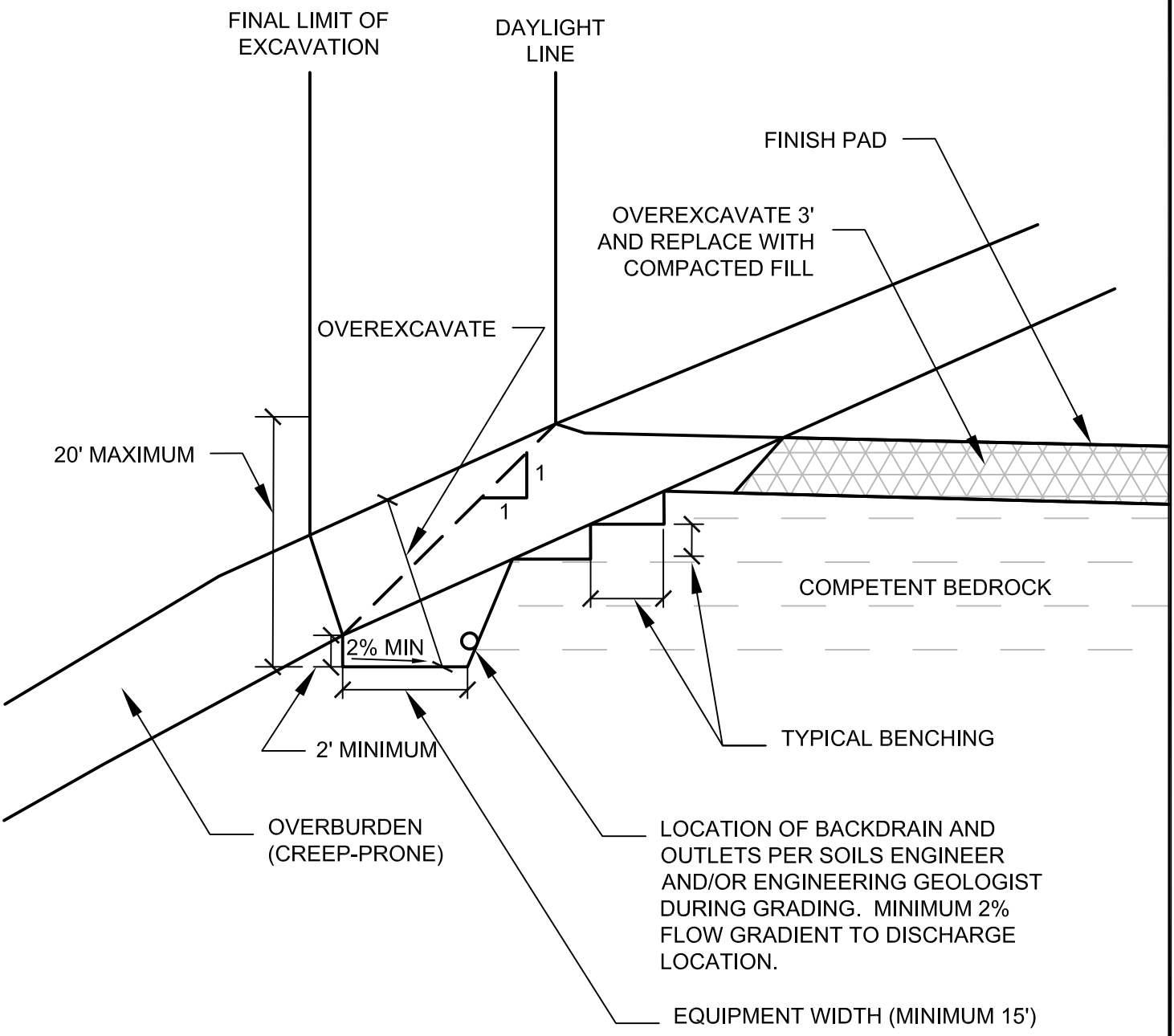
TYPICAL SLOPE STABILIZATION FILL DETAIL



DIMENSIONS ARE MINIMUM RECOMMENDED

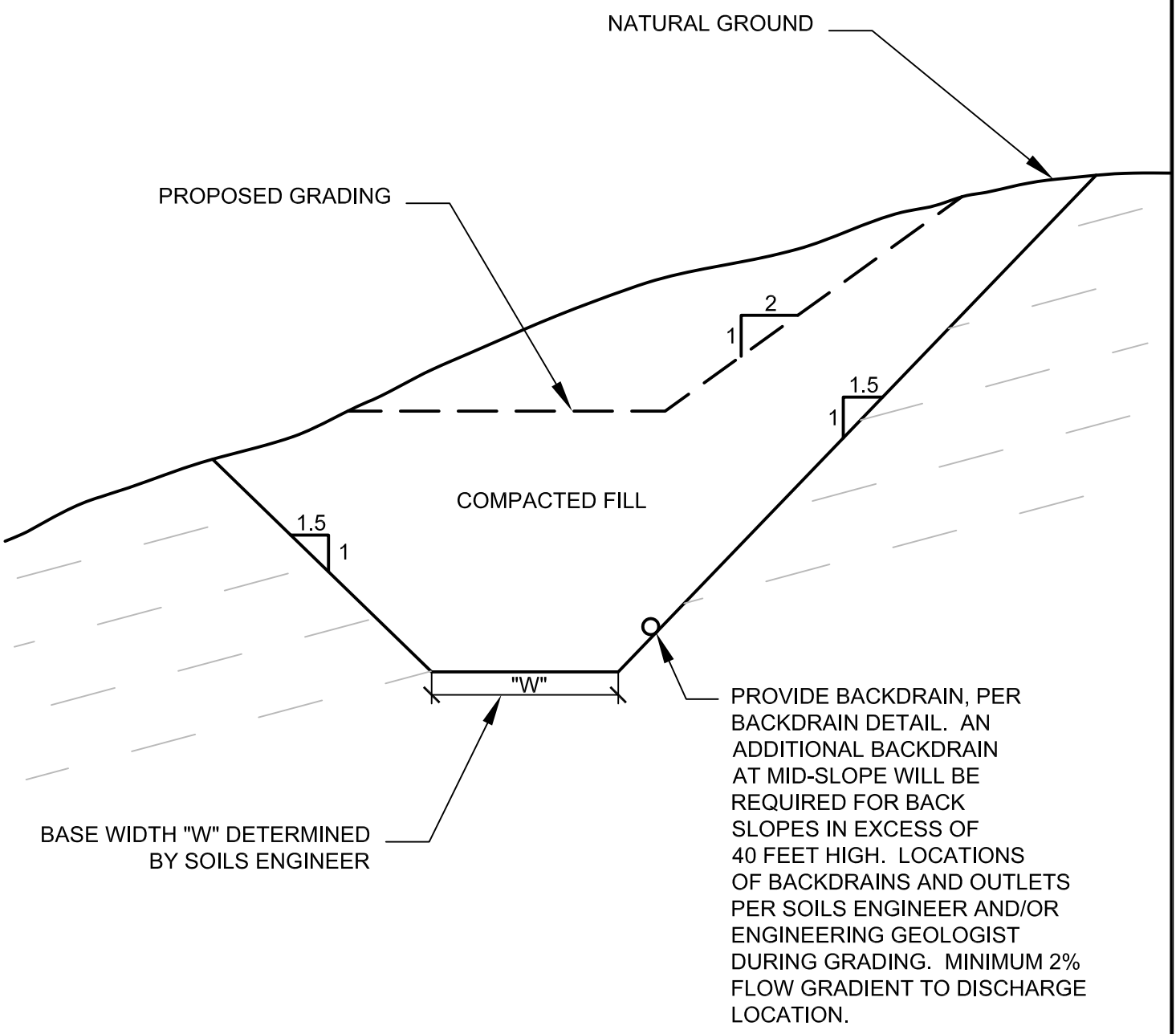
NOT TO SCALE

TYPICAL BUTTRESS FILL DETAIL



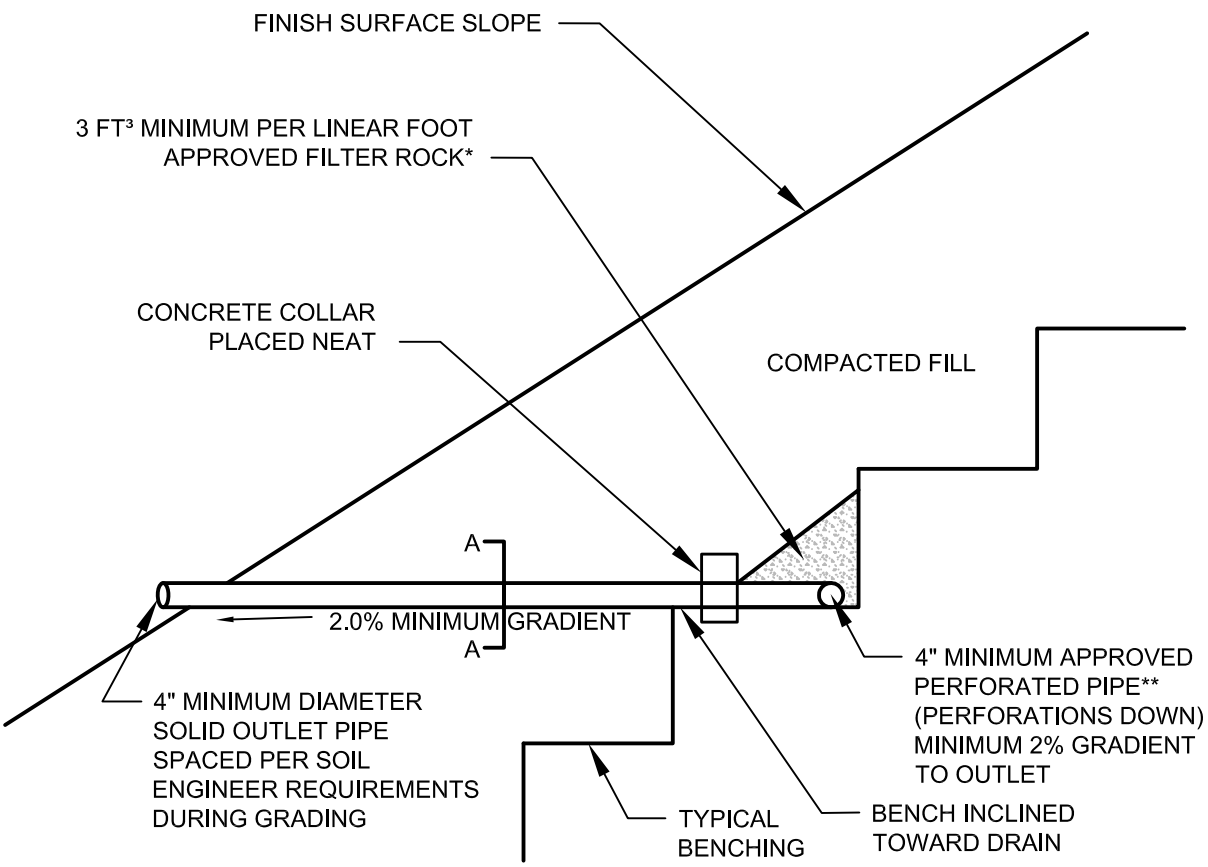
NOT TO SCALE

DAYLIGHT SHEAR KEY DETAIL

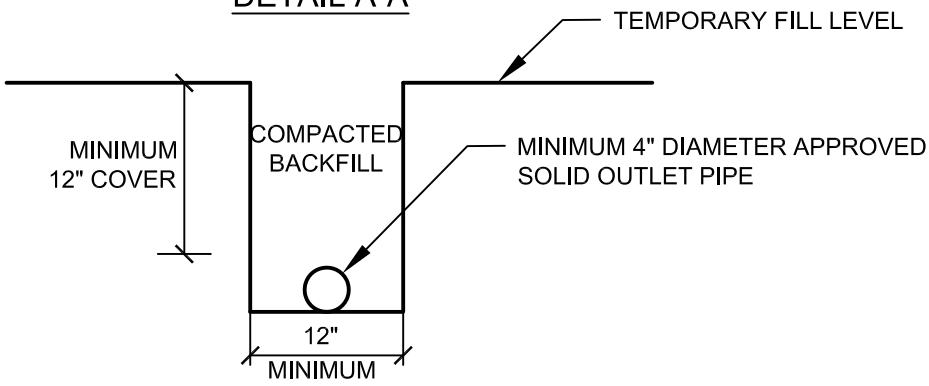


NOT TO SCALE

TYPICAL SHEAR KEY DETAIL



DETAIL A-A



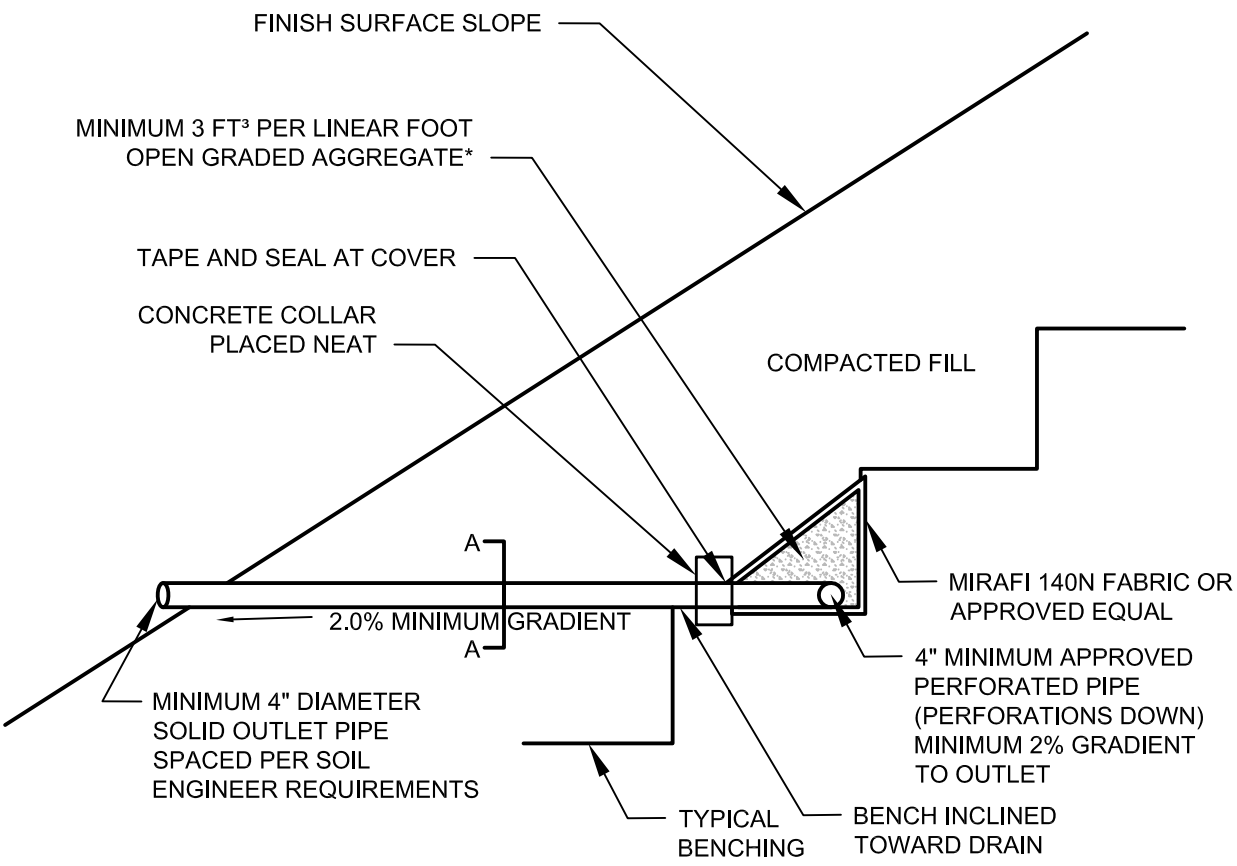
**APPROVED PIPE TYPE:
SCHEDULE 40 POLYVINYL CHLORIDE
(P.V.C.) OR APPROVED EQUAL.
MINIMUM CRUSH STRENGTH 1000 PSI

*FILTER ROCK TO MEET FOLLOWING
SPECIFICATIONS OR APPROVED EQUAL:

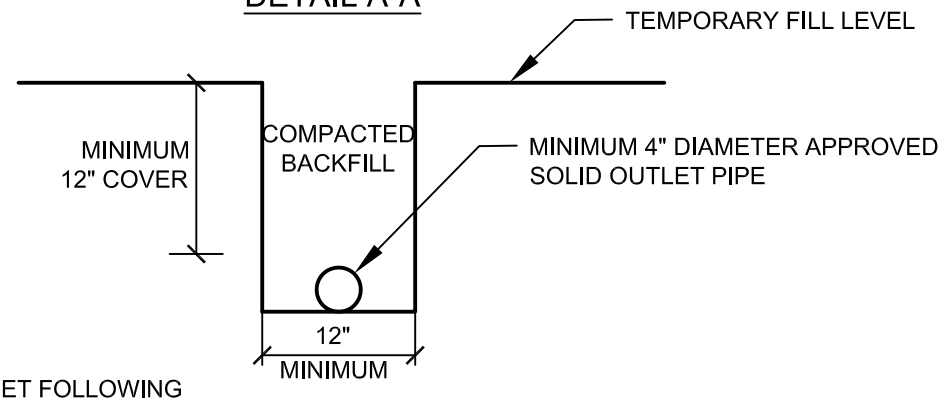
SIEVE SIZE	PERCENTAGE PASSING
1"	100
¾"	90-100
⅜"	40-100
NO. 4	25-40
NO. 30	5-15
NO. 50	0-7
NO. 200	0-3

NOT TO SCALE

TYPICAL BACKDRAIN DETAIL



DETAIL A-A

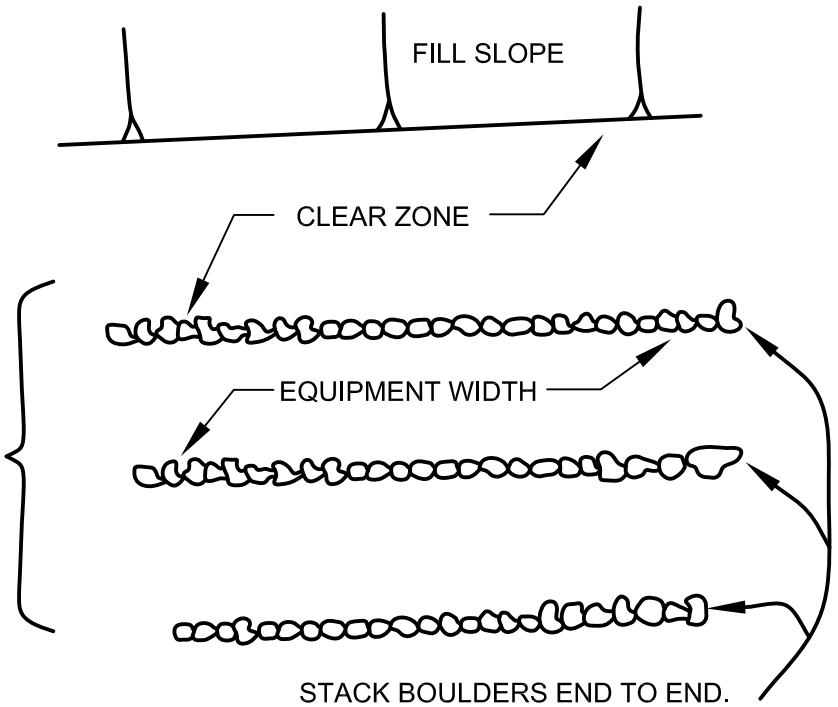


*NOTE: AGGREGATE TO MEET FOLLOWING SPECIFICATIONS OR APPROVED EQUAL:

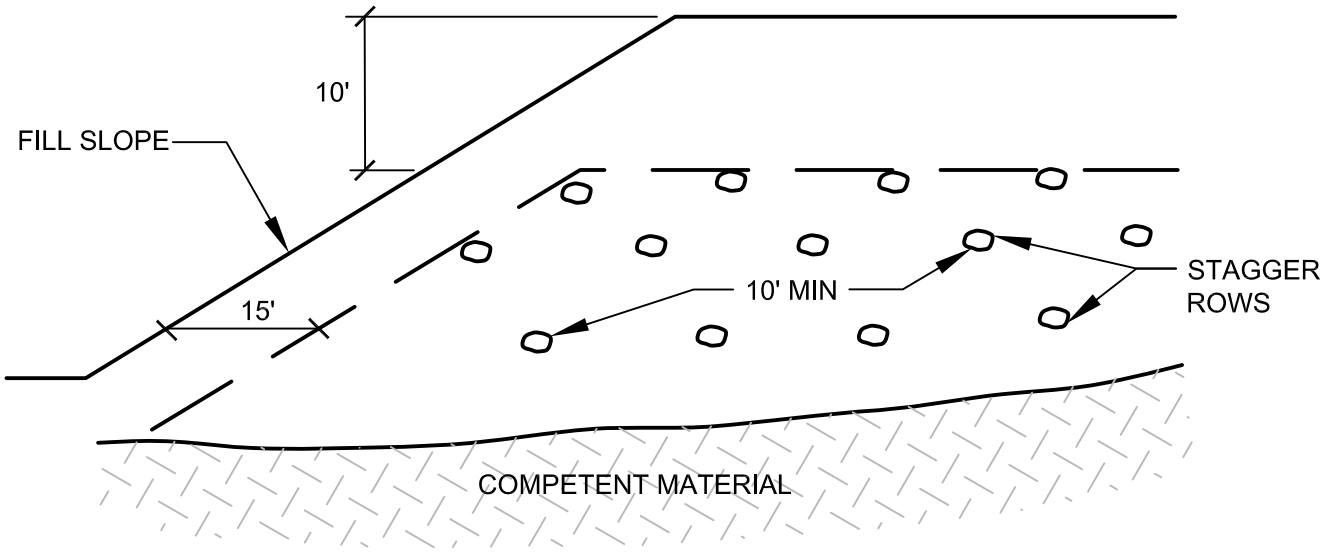
SIEVE SIZE	PERCENTAGE PASSING
1 ½"	100
1"	5-40
¾"	0-17
⅜"	0-7
NO. 200	0-3

NOT TO SCALE

BACKDRAIN DETAIL (GEOFRABIC)

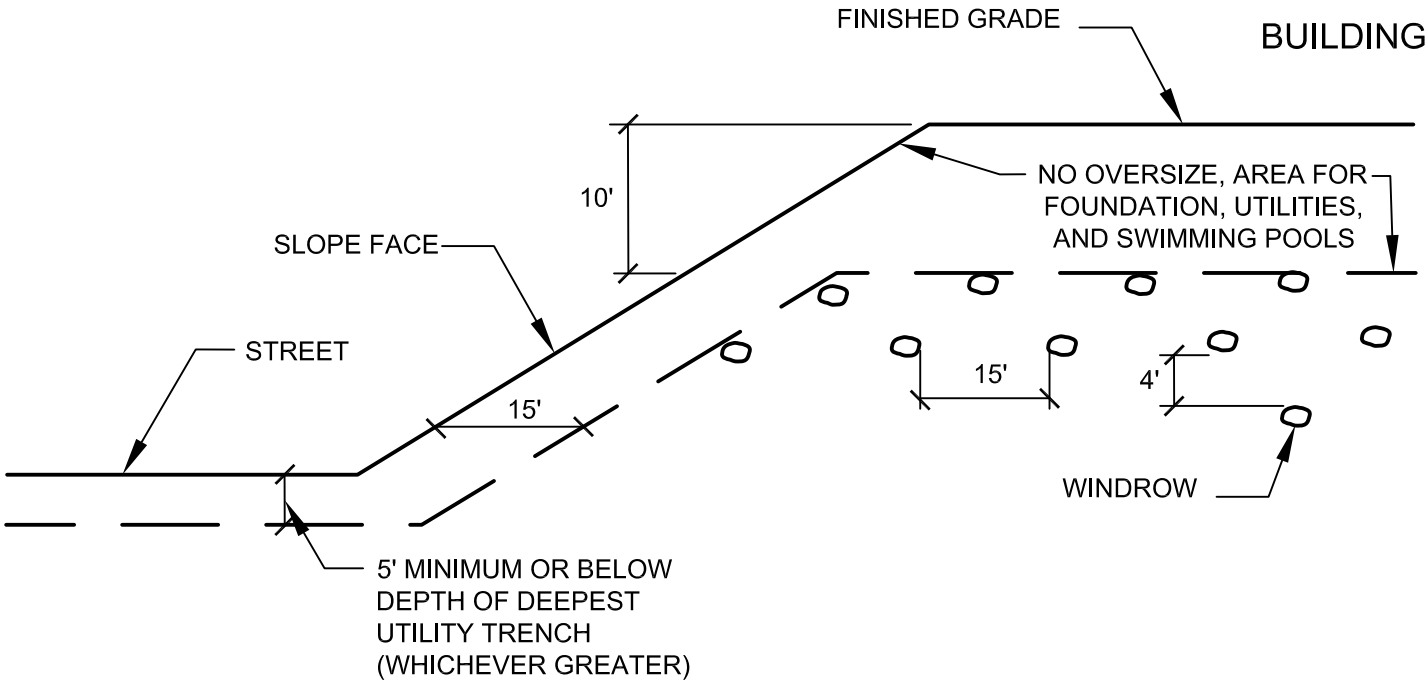


SOIL SHALL BE PUSHED OVER ROCKS AND FLOODED INTO VOIDS. COMPACT AROUND AND OVER EACH WINDROW.

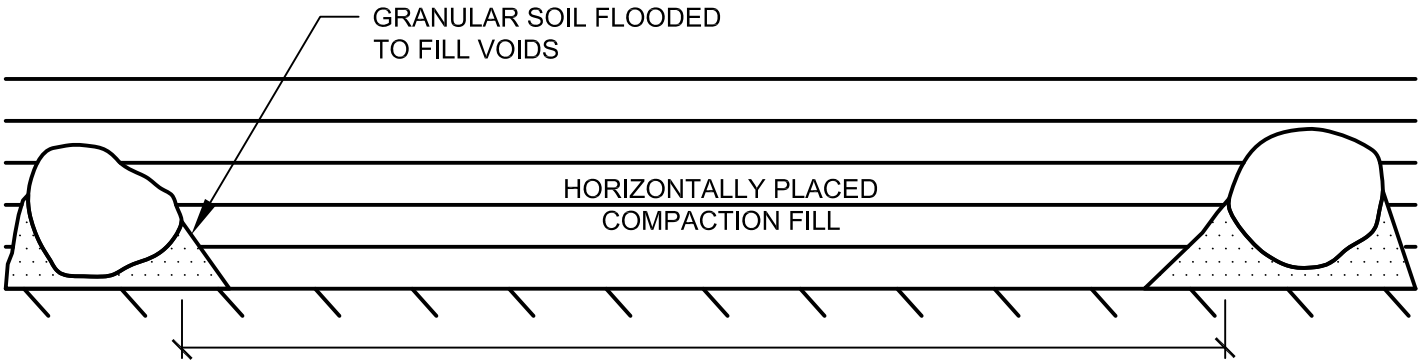


NOT TO SCALE

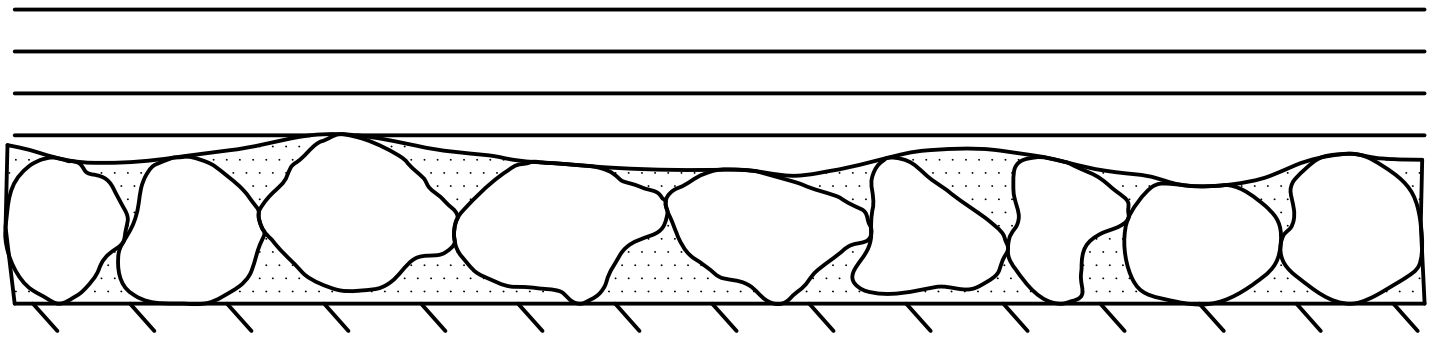
ROCK DISPOSAL DETAIL



TYPICAL WINDROW DETAIL (EDGE VIEW)



PROFILE VIEW

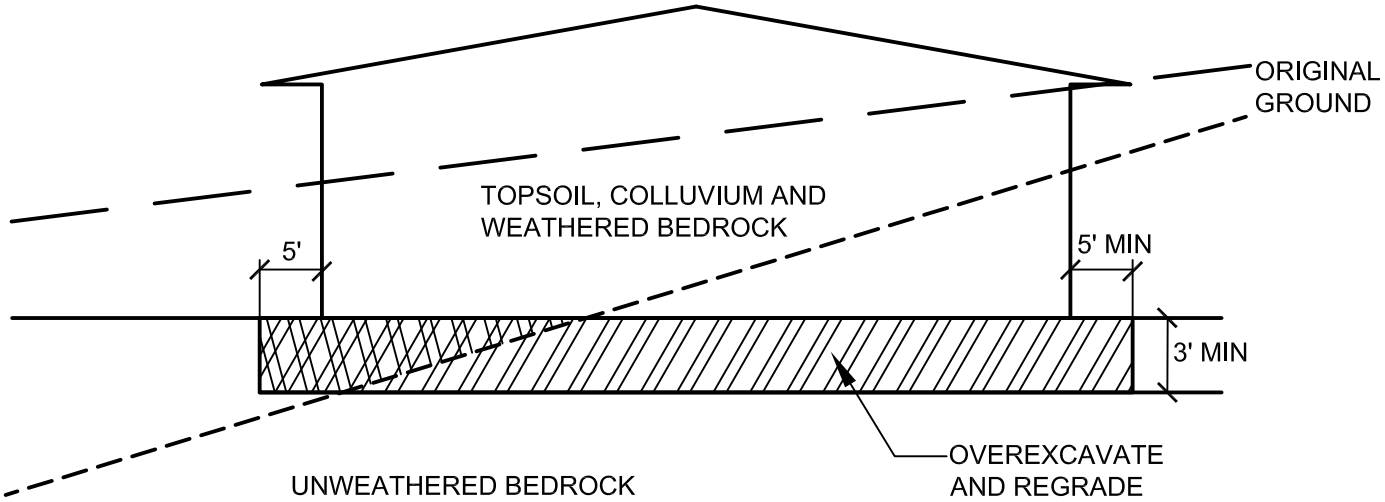


NOT TO SCALE

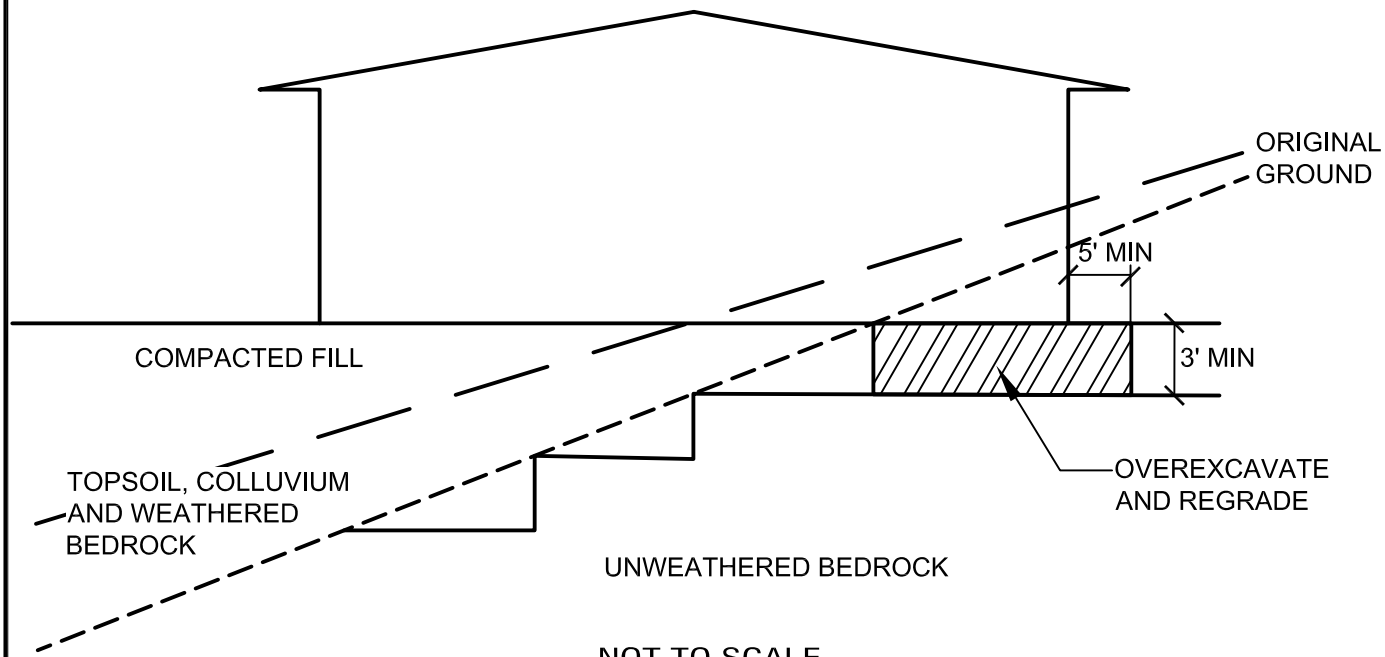
ROCK DISPOSAL DETAIL

GENERAL GRADING RECOMMENDATIONS

CUT LOT



CUT/FILL LOT (TRANSITION)



NOT TO SCALE

TRANSITION LOT DETAIL