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January 29, 2020
PW 1912-01
Report No. 1912-01-B-2

Attention: **Duncan Budinger**
Director of Retail Development

Subject: ***Preliminary Geotechnical Investigation and Design Recommendations***
6.3 Acre Site Located at 555 Hollister Street, City of San Diego, California

References: See Appendix A

Gentlemen:

Pursuant to your request, presented herein are the results of Advanced Geotechnical Solutions, Inc.'s (AGS) preliminary geotechnical investigation and design recommendations for the proposed multi-family residential development located at 555 Hollister Street in the City of San Diego, California. The purpose of this geotechnical investigation is to evaluate the proposed development relative to the near-site and on-site geologic and geotechnical conditions, as well as to provide conclusions and recommendation to aid in the design and construction of the proposed multi-family residential development and associated improvements. In preparing this report AGS utilized the Conceptual Site Plan prepared by Summa Architecture dated February 11, 2019.

Advanced Geotechnical Solutions, Inc., appreciates the opportunity to provide you with geotechnical consulting services and professional opinions. If you have any questions, please contact the undersigned at (619) 867-0487.

Respectfully submitted,
Advanced Geotechnical Solutions, Inc.

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ATTACHMENTS:

Preliminary Geotechnical Investigation and Design Recommendations Proposed Multi-Family Residential Development 555 Hollister Street, City of San Diego, California

1.0 INTRODUCTION

This study is aimed at providing geologic and geotechnical information and recommendations for the development of the proposed multi-family residential structures relative to: 1) existing site soil and geologic conditions; 2) engineering characteristics of the onsite earth materials; 3) earthwork recommendations; 4) seismic design parameters for use in the geotechnical analysis; and 5) preliminary foundation design parameters.

1.1. Scope of Work

The scope of our study included the following tasks:

- Review of pertinent published and unpublished geologic and geotechnical literature, maps, and aerial photographs readily available to this firm.
- Excavate, log, and sample thirteen (13) test pits (TP-1 through TP-13) within the limits of the project. Each test pit was logged for soil identification. The test pit locations can be found on Figure 2 and test pit logs are presented in Appendix B.
- Conduct laboratory testing of samples of the onsite soils obtained during the subsurface investigation including: remolded shear; expansion indices; and maximum density and optimum moisture content. Results of laboratory testing are presented in Appendix C.
- Utilize the Conceptual Site Plan to prepare Figure 2, Exploratory Test Pit Location Plan which depicts the proposed project limits, exploratory test pit locations, abbreviate logs for each test pit, and approximate geologic contacts.
- Conduct a geotechnical engineering and geologic hazard analysis of the site.
- Conduct a limited seismicity analysis.
- Prepare a preliminary geotechnical investigation report with exhibits summarizing our findings, suitable for design and regulatory review.

1.2. Geotechnical Study Limitations

The conclusions and recommendations in this report are professional opinions based on the data developed during our investigation. Detailed development plans were not available at the time of this report. The conclusions presented herein are based upon the current proposed development as depicted on the Conceptual Site Plan provided. When detailed plans become available, further review by AGS will be necessary.

The materials immediately adjacent to or beneath those observed may have different characteristics than those observed. No representations are made as to the quality or extent of materials not observed. Any evaluation regarding the presence or absence of hazardous material is beyond the scope of this firm's services.

2.0 SITE DESCRIPTION AND PROPOSED DEVELOPMENT

The rectangular shaped property covers approximately 6.3 acres and currently supports a residential structure the south central portion of the site along with several outbuildings. The majority of the site is currently covered by a light growth of grasses and weeds. The site is bounded on the north and east by active nursery facilities, on the west by Metropolitan Transit System trolley tracks and associated embankment fills, and to the south by a mix of unimproved property, a playing field, asphalt paved parking lot and a mobile home park. Elevations onsite ranges from a high of 54 msl at the southeast corner to a low of elevation 23 msl in the northwest corner. Drainage across the site generally flows to the north and west (See Figure 1, Site Location Map).

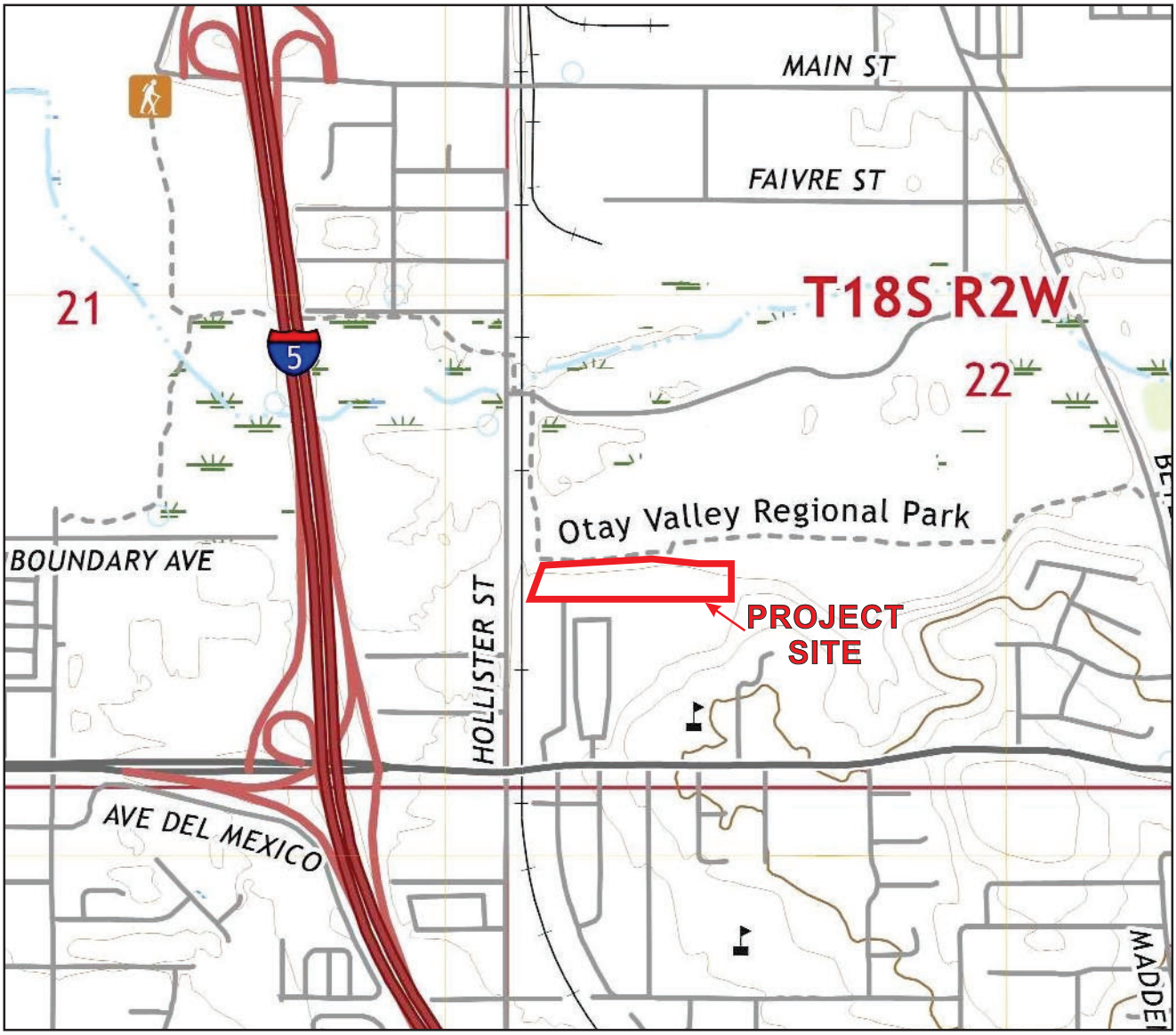
It is our understanding that the proposed development will be limited to the southern more level portions of the property with the northerly descending slope to be left undeveloped. It is anticipated that cut-fill grading techniques will be utilized to develop 11 to 12 relatively level pads and an access road on the southern portion of the property. The pads will support 3- to 4-story wood frame apartment buildings supported by conventional slab-on-grade foundations. At this time grading plans are not available; however, it is our understandings that design cuts and fills will likely be on the order of a few feet to as much as 15 feet.

3.0 FIELD AND LABORATORY INVESTIGATION

3.1. Subsurface Investigation

Our subsurface investigation was performed on December 19, 2019 and consisted of excavating, logging and sampling thirteen (13) exploratory test pits (TP-1 through TP-13) with a rubber tire backhoe to a maximum depth of 15.0 feet below existing ground surface (bgs). The approximate locations of the exploratory test pits are shown on Figure 2, Exploratory Test Pit Location Map. Logs of the test pits are presented in Appendix B.

Bulk samples were obtained from the test pits at predetermined intervals, as well as at significant lithologic changes. The samples were transported to AGS's approved laboratory for testing. Laboratory testing including: remolded shear; expansion indices; and maximum density and optimum moisture content. The laboratory test results are presented in Appendix C.



SITE LOCATION MAP
555 HOLLISTER STREET,
SAN DIEGO, CALIFORNIA

P/W 1912-01

FIGURE 1

SOURCE MAP - U.S.G.S. TOPOGRAPHIC MAP OF THE IMPERIAL BEACH 7.5 MINUTE QUADRANGLE, SAN DIEGO COUNTY, CALIFORNIA (2018)

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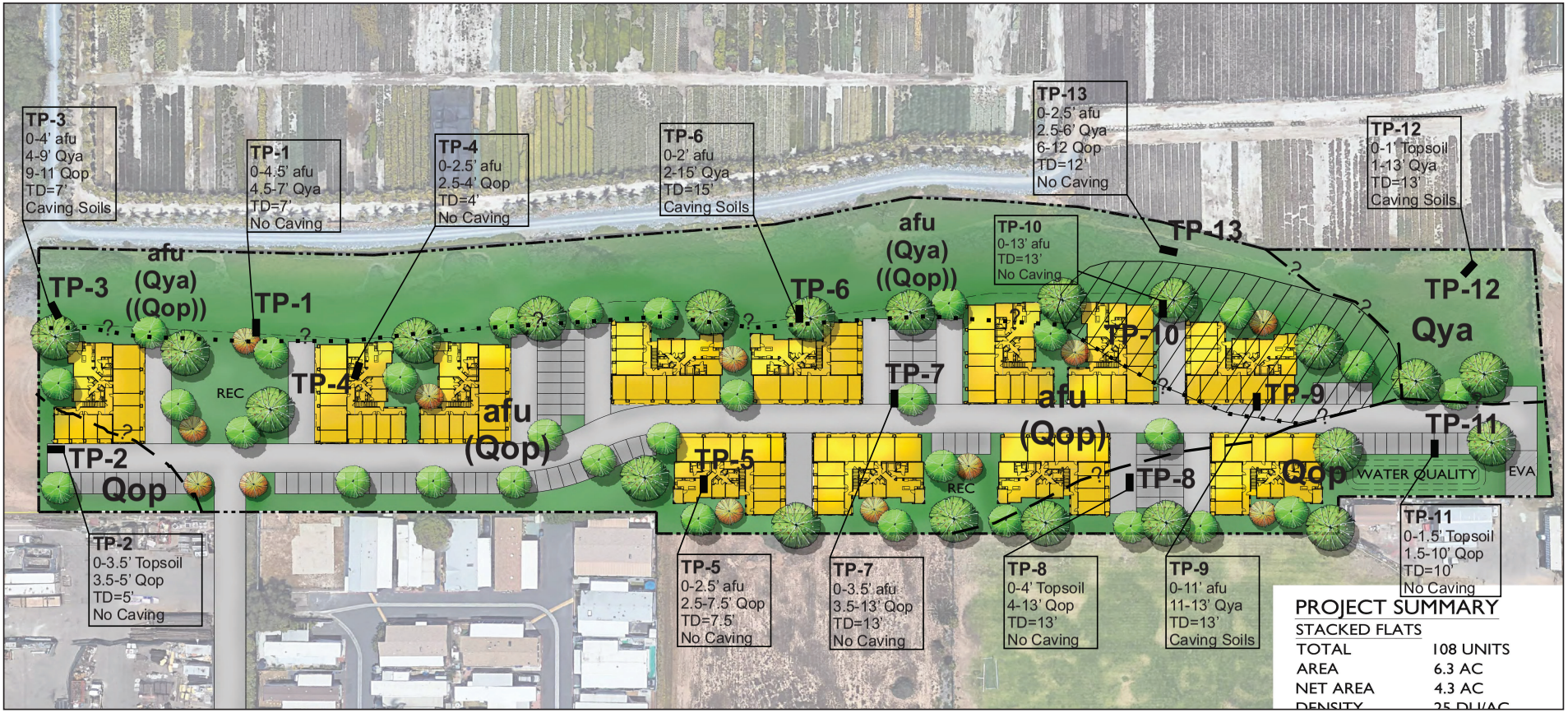

LEGEND:

TP-13 — Approximate exploratory test pit locations (AGS 2019)

— — —?— Approximate location of geologic contact (Queried where uncertain, dotted where buried)

Approximate location of deep undocumented fill

afu — Artificial fill - undocumented

Qya — Young alluvial flood-plain deposits

Qop — Old paralic deposits

EXPLORATORY TEST PIT LOCATION MAP
555 HOLLISTER STREET
SAN DIEGO, CA 92154

P/W 1912-01

FIGURE 2

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4.0 ENGINEERING GEOLOGY

4.1. Regional Geologic and Geomorphic Setting

The subject site is situated within the western portion of the Peninsular Ranges Geomorphic Province. The Peninsular Ranges province occupies the southwestern portion of California, extending southward from the Transverse Ranges and Los Angeles Basin to the southern tip of Baja California. In general, the province consists of young, steeply sloped, northwest trending mountain ranges underlain by metamorphosed Late Jurassic to Early Cretaceous-aged extrusive volcanic rock and Cretaceous-aged igneous plutonic rock of the Peninsular Ranges Batholith. The westernmost portion of the province is predominantly underlain by younger marine and non-marine sedimentary rocks. The Peninsular Ranges' dominant structural feature is northwest-southeast trending crustal blocks bounded by active faults of the San Andreas transform system.

4.2. Site Geology

The site has been mapped as being underlain by Young Alluvial Flood-Plain Deposits and Old Paralic Deposits (See Figure 3, Regional Geologic Map). A brief description of the earth materials encountered onsite is presented in the following sections. More detailed description of these materials is provided in the test pit logs included in Appendix B.

4.2.1. Topsoil (No map symbol)

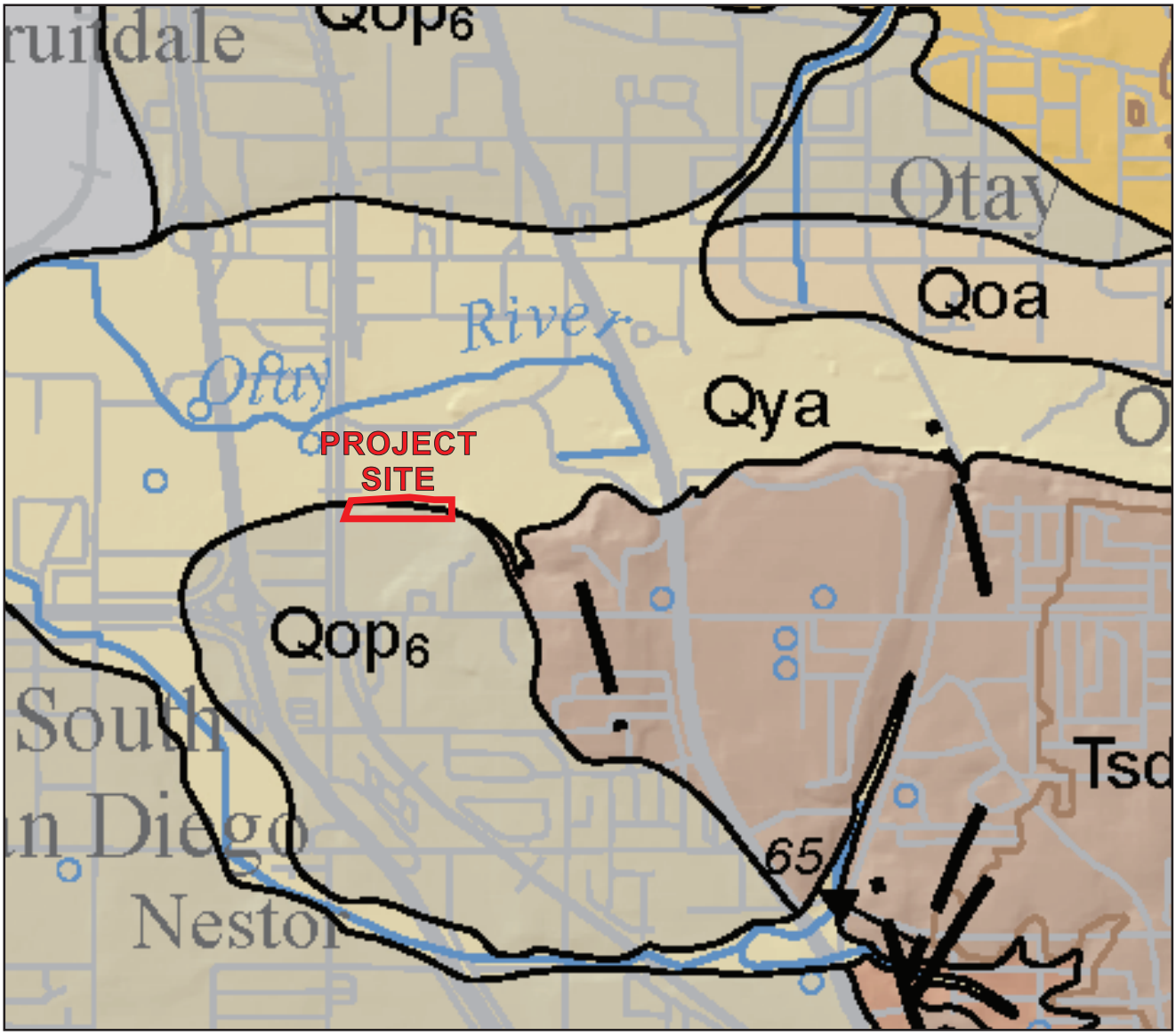
A relatively thin veneer of topsoil ranging in thickness from approximately 1 to 4 feet was observed within several test pits. As encountered, the topsoil generally consisted of brown to dark red brown silty to clayey fine-grained sand in a moist and loose condition.

4.2.2. Artificial Fill – Undocumented (Map symbol afu)

Artificial fill was encountered in the majority of test pits and anticipated across the site with locally deeper deposits within the northeasterly portion of the site. Generally, the fill ranged in depth from approximately 2 to 4.5 feet below existing ground surface (bgs). However, deeper undocumented fill materials were encountered within the northeasterly portion of the site. Within this area fills were encountered to a depth of 13 feet but are anticipated to be locally deeper. Approximate area of suspected deep fill is shown on Figure 2. As encountered, the fill materials can generally be described as gray brown clayey sand with gravel and cobble in a moist and loose condition. Abundant trash and construction debris were encountered including piping, plastic, glass, metal, wood, and concrete.

4.2.3. Young Alluvial Flood-Plain Deposits (Map symbol Qya)

Holocene and late Pleistocene young alluvial flood-plain deposits were encountered primarily within the northern portion of the site. The young alluvium was found to underlie the fill or topsoil and ranged in thickness from a few feet to 12+ feet. As encountered, the young alluvial deposits can generally be described as dark yellow brown to gray brown silty to clayey fine- to coarse-grained sand with abundant sub-rounded gravel and cobble in a moist to very moist and loose condition. Caving within these materials was observed in several trench excavations.



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REGIONAL GEOLOGIC MAP
555 HOLLISTER STREET,
SAN DIEGO, CALIFORNIA

Qya	Young alluvial flood-plain deposits (Holocene and late Pleistocene)
Qop_6	Old paralic deposits, unit 6 (late to middle Pleistocene)
Tsd	San Diego Formation (early Pleistocene and late Pliocene)

P/W 1912-01

FIGURE 3

SOURCE MAP - GEOLOGIC MAP OF THE SAN DIEGO 30'X60' QUADRANGLE, CALIFORNIA. KENNEDY & TAN 2008.

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4.2.4. Old Paralic Deposits (Map symbol Qop_6)

Late to middle Pleistocene aged old paralic deposits (Unit 6), formerly known as the Baypoint Formation, were generally encountered beneath the artificial fill, topsoil and young alluvium to the depths explored. These materials predominantly consist of silty fine-grained micaceous sand interbedded with coarser grained gravel and cobble rich lenses. The old paralic deposits were generally yellow brown to dark gray brown with common iron oxide development in a slightly moist and dense and weakly to moderately cemented condition. Carbonate nodules and stringers were commonly observed.

4.3. Geologic Structure

The old paralic deposits underlie the project site at depth. Young alluvial deposits unconformably overlie old paralic deposits in the lower, northerly portion of the site. The old paralic deposits are thinly to thickly bedded, marine terrace deposits that are flat lying to very shallowly dipping to the southwest. The geologic structure is considered neutral to favorable with respect to the proposed development.

4.4. Groundwater

Groundwater was not encountered during our subsurface exploration. According to our review, no natural groundwater condition is known to exist in the upper, southern portion of the site that would impact the proposed development. If develop extends into the lower, northern portion of the site, shallow groundwater may be encountered during remedial grading activities. It should be noted that localized perched groundwater may develop at a later date, most likely at or near fill/bedrock contacts, due to fluctuations in precipitation, irrigation practices, or factors not evident at the time of our field exploration.

4.5. Seismic Hazards

The site is located in the tectonically active Southern California area, and will therefore likely experience shaking effects from earthquakes. The type and severity of seismic hazards affecting the site are to a large degree dependent upon the distance to the causative fault, the intensity of the seismic event, and the underlying soil characteristics. The seismic hazard may be primary, such as surface rupture and/or ground shaking, or secondary, such as liquefaction or dynamic settlement. The following is a site-specific discussion of ground motion parameters, earthquake-induced landslide hazards, settlement, and liquefaction. The purpose of this analysis is to identify potential seismic hazards and propose mitigations, if necessary, to reduce the hazard to an acceptable level of risk. The following seismic hazards discussion is guided by the California Building Code (2016), CDMG (2008), and Martin and Lew (1998).

4.5.1. Surface Fault Rupture

No known active faults have been mapped within the project site. The nearest known active surface fault is the Silver Strand section of Newport-Inglewood-Rose Canyon fault zone which is approximately 4.15 miles west of the project site. Accordingly, the potential

for surface fault rupture on the subject site is very low. This conclusion is based on literature review and aerial photographic analysis.

4.5.2. Seismicity

As noted, the site is within the tectonically active southern California area and is approximately 4.15 miles east from the active Newport-Inglewood-Rose Canyon fault zone. The potential exists for strong ground motion that may affect future improvements.

4.5.3. Seismic Design Parameters

The materials beneath the site consist of loose to medium dense fill and young alluvium within the northern portion of the site to depths of 13+ feet deep. Shallow dense formational materials were encountered within the southern portion of the site. Based on the results of our field investigation, the site may be classified as Site Class D, consisting of a stiff soil profile with average SPT (N) values between 15 and 50 blows per foot. Site coordinates of Latitude 32.5867˚N and Longitude 117.0814˚W were utilized to determine the seismic design parameters presented in Table 4.5.3 in accordance with 2016 CBC and mapped spectral acceleration values (United States Geological Survey, 2018).

TABLE 4.5.3
2016 CALIFORNIA BUILDING CODE DESIGN PARAMETERS

Design Parameter	Value
Site Class	D
Mapped Spectral Acceleration Parameter at Period of 0.2-Second, S_s	1.005g
Mapped Spectral Acceleration Parameter at Period 1-Second, S_1	0.380g
Site Coefficient, F_a	1.098
Site Coefficient, F_v	1.641
Adjusted MCE_R[1] Spectral Response Acceleration Parameter at Short Period, S_{MS}	1.103g
1-Second Period Adjusted MCE_R[1] Spectral Response Acceleration Parameter, S_{M1}	0.623g
Short Period Design Spectral Response Acceleration Parameter, S_{DS}	0.735g
1-Second Period Design Spectral Response Acceleration Parameter, S_{D1}	0.415g
Peak Ground Acceleration, PGA_M[2]	0.456g
Seismic Design Category	D

Notes: [1] Risk-Targeted Maximum Considered Earthquake
[2] Peak Ground Acceleration adjusted for site effects

4.5.4. Liquefaction

Liquefaction is the phenomenon where seismic agitation of loose, saturated sands and silty sands can result in a buildup of pore pressures that, if sufficient to overcome overburden stresses, can produce a temporary quick condition. City of San Diego has mapped the northern portion of the site as having a “high liquefaction potential”. Due to the shallow

dense formational materials within the southern portion of the site, where development is planned, the potential for liquefaction to affect the proposed development is considered "low". However, when more detailed plans become available, further investigation of the liquefaction potential within the northern portion of the site may be needed.

4.5.5. Dynamic Settlement

Dynamic settlement occurs in loose sandy earth materials in response to an earthquake event. Loose alluvial soils were encountered within the northern portion of the site and are considered potentially susceptible to dynamic settlement. At this time detailed development plans are not available. Pending the final location of the proposed structures further investigation may be needed.

4.5.6. Seismically Induced Landsliding

Seismically induced landsliding is considered very low due to the remedial grading proposed herein to mitigate this hazard to an acceptable level of risk.

4.5.7. City of San Diego Seismic Safety Study

The project site is located within Grid Tile 6 of the San Diego Seismic Safety Study and is mapped as Geologic Hazard Category 53 within the southern portion of the site and Geologic Hazard Category 31 within the northern. Geologic Hazard Category 53 is identified as 'Level or sloping terrain, unfavorable geologic structure, low to moderate risk'. Geologic Hazard Category 31 is identified as 'High Liquefaction Potential – shallow groundwater, major drainages, hydraulic fill'. (See Figure 4, Seismic Hazard Map).

5.0 GEOTECHNICAL ENGINEERING

Presented herein is a general discussion of the geotechnical properties of the various soil types and the analytic methods used in this report.

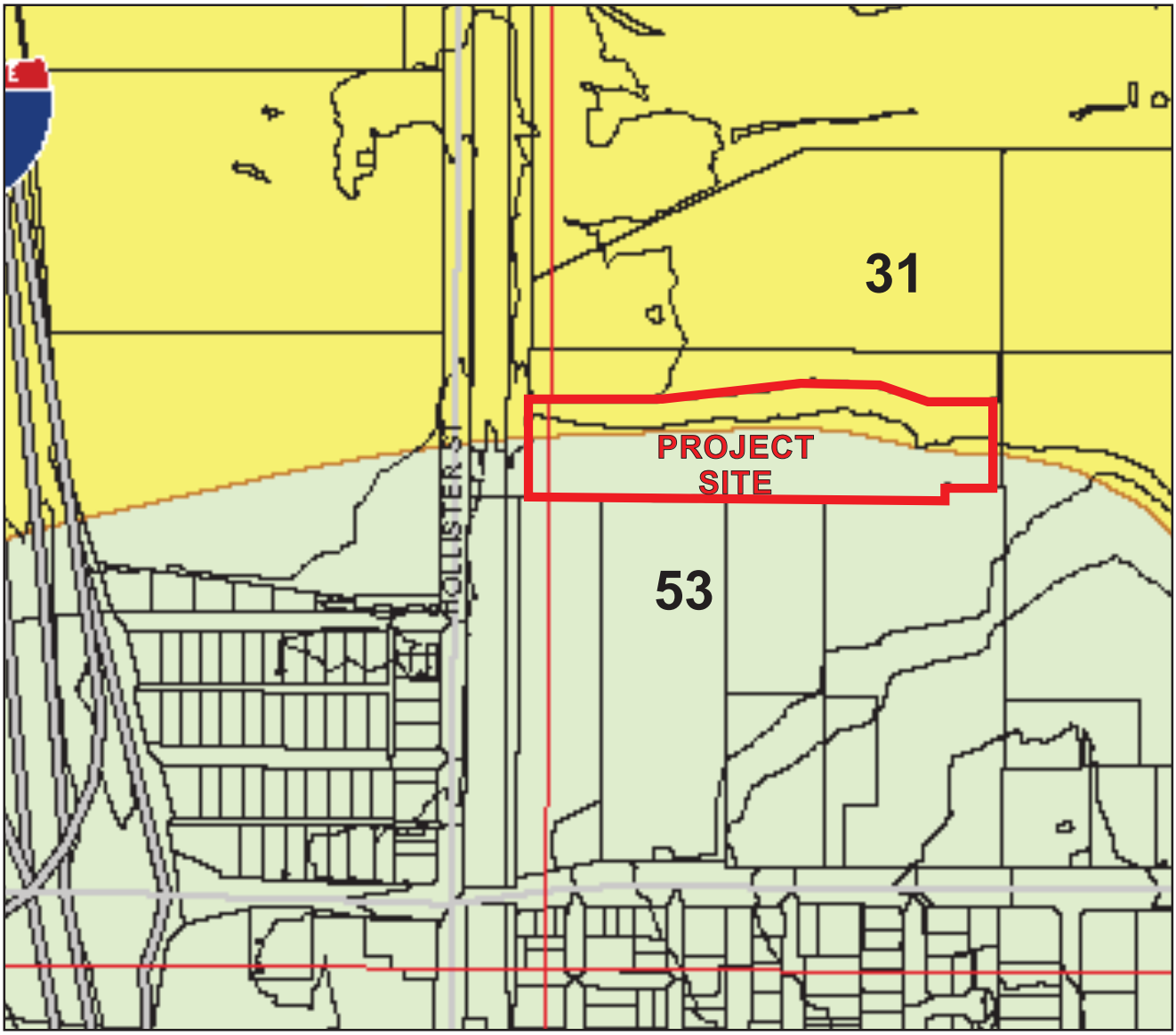
5.1. Material Properties

5.1.1. Excavation Characteristics

Based on our previous experience near the subject site and the information gathered during our investigation, it is our opinion that the topsoil, artificial fill and young alluvial flood-plain deposit materials are readily excavatable with conventional earthmoving equipment. Portions of the old paralic deposits may be cemented and contain cobble lenses that could be difficult to excavate with conventional equipment.

5.1.2. Compressibility

The existing topsoil, fill and young alluvial flood-plain deposit materials are considered moderately compressible in their present condition. Compressibility of topsoil, undocumented fill and young alluvial deposit materials will be mitigated by removal and recompaction.



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CITY OF SAN DIEGO
SEISMIC SAFETY STUDY
555 HOLLISTER STREET,
SAN DIEGO, CALIFORNIA

31 High Liquefaction Potential – shallow groundwater major drainages, hydraulic fills

53 Level or sloping terrain, unfavorable geologic structure, Low to moderate risk.

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FIGURE 4

SOURCE MAP - CITY OF SAN DIEGO
SEISMIC SAFETY STUDY
GRID TILE 6, 2008.

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5.1.3. Expansion Potential

The expansion potential of the upper topsoil and fill soils is "very low" to "low" when classified in accordance with ASTM D 4829. It is our anticipation that the majority of the fills derived primarily from onsite materials will exhibit "very low" to "low" expansion potential. Excavations extending into old paralic deposits may encounter "low" to "medium" expansion potential materials depending on the amount of clay present in the deposits.

5.1.4. Shear Strength Characteristics

Based upon the results of shear strength testing conducted on the onsite soils and our previous experience in the general area with similar soils the following are assumed shear strengths for young alluvial flood-plain deposits, compacted fill soils, old paralic deposits.

TABLE 5.1.4
SHEAR STRENGTH

Material	*Cohesion (psf)*	*Friction Angle (degrees)*
Young Alluvial Flood-Plain Deposits (Qya)	100	29
Compacted Fill (afc)	150	30
Old Paralic Deposits (Qop)	200	32

5.1.5. Earthwork Adjustments

It is anticipated that the onsite undocumented fill and young alluvial flood plain deposits will shrink on the order of 8 to 12 percent when re-compacted. The unweathered old paralic deposits are anticipated to bulk on the order of 2 to 4 percent when used to make compacted fill.

These values may be used in an effort to balance the earthwork quantities. As is the case with every project, contingencies should be made to adjust the earthwork balance when grading is in progress and actual conditions are better defined.

5.2. Analytical Methods

5.2.1. Bearing Capacity and Lateral Earth Pressures

Ultimate bearing capacity values were obtained using the graphs and formulas presented in *NAVFAC DM-7.1*. Allowable bearing was determined by applying a factor of safety of at least three (3) to the ultimate bearing capacity.

Static lateral earth pressures were calculated using *Rankine* methods for active and passive cases. If it is desired to use *Coulomb* forces, a separate analysis specific to the application can be conducted.

6.0 GRADING RECOMMENDATIONS

Construction of the proposed multi-family residential structures and associated improvements is considered feasible, from a geotechnical standpoint, provided that the conclusions and recommendations presented herein are incorporated into the design and construction of the project. Presented below are specific issues identified by this study as possibly affecting site development. Recommendations to mitigate these issues are presented in the text of this report.

6.1. Earthwork Recommendations

All grading should be accomplished under the observation and testing of the project soils engineer and engineering geologist or their authorized representative in accordance with the recommendations contained in the approved geotechnical reports, the Grading Specifications contained in Appendix D, the project specifications, and the Building Code. Prior to fill placement, the bottoms of all removal areas should be observed and approved by the engineering geologist/soils engineer or their authorized representative.

6.1.1. Site Preparation

Existing vegetation, trash, debris, and other deleterious materials should be removed and wasted from the site prior to commencing removal of unsuitable soils and placement of compacted fill materials. Additionally, all pre-existing utility conduits and foundations should be removed and wasted off-site. Abandoned utilities should be removed and/or abandoned in accordance with local regulations.

6.1.2. Removals/Overexcavation

Grading should be accomplished under the observation and testing of the project soils engineer and engineering geologist or their authorized representative in accordance with the recommendations contained herein, the current grading ordinance of the City of San Diego, and AGS's Earthwork Specifications (Appendix D). Topsoil, undocumented fill, young alluvial deposits and highly weathered formational material should be removed in areas planned to receive fill or where exposed at final grade. If encountered, any existing utility lines and/or subterranean structures should be removed prior to fill placement. Removals should expose competent formational materials and be observed and mapped by the engineering geologist prior to fill placement. It is anticipated that the upper 2 to 20 feet of the onsite soils will require removal and recompaction for the support of settlement sensitive structures. Localized areas may require deeper removals. The resulting undercuts should be replaced with engineered fill. The extent of removals can best be determined in the field during grading when observation and evaluation can be performed by the soil engineer and/or engineering geologist. In general, soils removed during remedial grading will be suitable for reuse in compacted fills, provided they are properly mixed and moisture conditioned and do not contain deleterious materials.

6.1.2.1. Artificial Fill – Undocumented (Map Symbol afu)

Undocumented fill soil will require complete removal and recompaction to project specifications. Estimated depths of removal are anticipated to be on the order of 2 to 20 feet. Locally deeper areas may be encountered.

6.1.2.2. Young Alluvial Flood-Plain Deposits (Qya)

Young alluvial deposits will require removal and recompaction prior to fill placement in structural fill areas and where exposed at design grade. Estimated depths of removal are anticipated of be on the order of 5 to 20 feet.

6.1.2.3. Old Paralic Deposits (Qop)

The Old Paralic Deposits commonly exhibits a weathered profile. The weathered profile is generally one to three feet thick. The upper weathered portions of the unit will require removal prior to fill placement in structural fill areas and where exposed at design grade.

6.1.3. Materials for Fill

On-site soils with an organic content of less than 3 percent by volume (or 1 percent by weight) are suitable for use as fill. Soil material to be used as fill should not contain contaminated materials. Oversize materials (greater than 8 inches), if generated during excavation, may be broken into acceptably sized pieces, may be disposed offsite, or placed in deeper fills in accordance with the recommendations in Section 6.1.4 below. Any imported fill material should be a granular soil with a “low” expansion potential (that is, expansion index of 50 or less). Import material should also have low corrosion potential. Materials to be used as fill should be evaluated by an AGS representative prior to importing or filling.

6.1.4. Oversize Materials

Oversized rock material [i.e., rock fragments greater than eight (8) inches] will be produced during the excavation of the design cuts and undercuts. Provided that the procedure is acceptable to the developer and governing agency, this rock may be incorporated into the compacted fill section to within three (3) feet of finish grade within residential areas and to two (2) foot below the deepest utility in street and house utility connection areas. Maximum rock size in the upper portion of the hold-down zone is restricted to eight (8) inches. The upper five (5) feet in the streets should have a maximum particle size of six (6) inches or less. Disclosure of the above rock hold-down zone should be made to prospective homebuyers explaining that excavations to accommodate swimming pools, spas, and other appurtenances will likely encounter oversize rock [i.e., rocks greater than eight (8) inches] below three (3) feet. Rock disposal details are presented on Detail 10, Appendix D. Rocks in excess of eight (8) inches in maximum dimension may be placed within the deeper fills, provided rock fills are handled in a manner described below. In order to separate oversized materials from the rock hold-down zones, the use of a rock rake may be necessary.

6.1.4.1. Rock Blankets

Rock blankets consisting of a mixture of gravel, sand and rock to a maximum dimension of two (2) feet may be constructed. The rocks should be placed on prepared grade, mixed with sand and gravel, watered and worked forward with bulldozers and pneumatic compaction equipment such that the resulting fill is comprised of a mixture of the various particle sizes, contains no significant voids, and forms a dense, compact, fill matrix.

Rock blankets may be extended to the slope face provided the following additional conditions are met: 1) no rocks greater than twelve (12) inches in diameter are allowed within six (6) horizontal feet of the slope face; 2) 50 percent (by volume) of the material is three-quarter- (3/4) inch minus; and 3) back rolling of the slope face is conducted at four- (4) foot vertical intervals and satisfies project compaction specifications.

6.1.4.2. Rock Windrows

Rocks to maximum dimension of four (4) feet may be placed in windrows in deeper fill areas in accordance with the details on Detail 10 (Appendix D). The base of the windrow should be excavated an equipment-width into the compacted fill core with rocks placed in single file within the excavation. Sands and gravels should be added and thoroughly flooded and tracked until voids are filled. Windrows should be separated horizontally by at least fifteen (15) feet of compacted fill, be staggered vertically, and separated by at least four (4) vertical feet of compacted fill. Windrows should not be placed within ten (10) feet of finish grade, within two (2) vertical feet of the lowest buried utility conduit in structural fills, or within fifteen (15) feet of the finish slope surface unless specifically approved by the developer, geotechnical consultant, and governing agency.

6.1.4.3. Individual Rock Burial

Rocks in excess of four (4) feet, but no greater than eight (8) feet may be buried in the compacted fill mass on an individual basis. Rocks of this size may be buried separately within the compacted fill by excavating a trench and covering the rock with sand/gravel, and compacting the fines surrounding the rock. Distances from slope face, utilities, and building pad areas (i.e., hold-down depth) should be the same as windrows.

6.1.4.4. Rock Disposal Logistics

The grading contractor should consider the amount of available rock disposal volume afforded by the design when excavation techniques and grading logistics are formulated. Rock disposal techniques should be discussed and approved by the geotechnical consultant and developer prior to implementation.

6.2. Compacted Fill

Fill and processed natural ground shall be compacted to at least 90 percent of the maximum dry density determined by ASTM D 1557. Compaction shall be achieved at or slightly above the optimum moisture content and as generally discussed in the attached Earthwork Specifications (Appendix D).

At the completion of unsuitable soil removals, the exposed bottom should be scarified to a minimum depth of eight inches, moisture conditioned to above optimum moisture and compacted in-place to the standards set forth in this report.

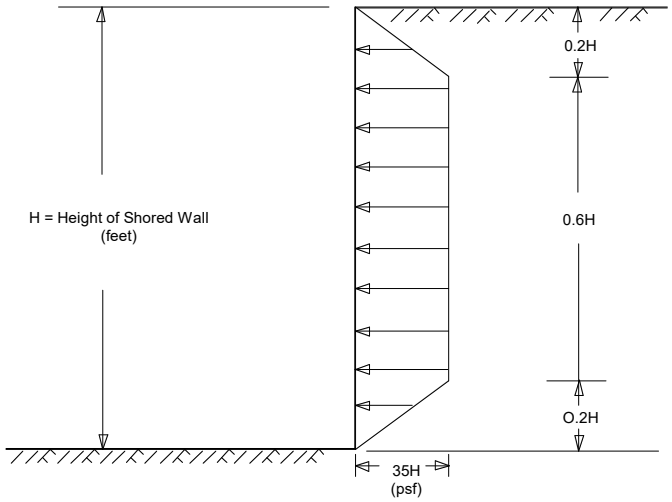
Fill should be placed in thin lifts (eight-inch bulk), moisture conditioned to at or slightly above the optimum moisture content, uniformly mixed, and compacted by the use of wheel rolling or kneading type (sheep's foot) compaction equipment until the designed grades are achieved.

6.3. Excavations and Shoring

CalOSHA regulations provide sloping and shoring design parameters for excavations up to 20 feet deep based on a description of the soil types encountered. For planning purposes, we recommend that OSHA Type C soil classification be used for excavations. For trenches or other temporary excavations, OSHA requirements regarding personnel safety should be met by laying back the slopes to a gradient no steeper than 1.5:1 (horizontal:vertical) for fill materials and 1:1 (H:V) for old paralic deposit materials.

For vertical excavations less than approximately 15 feet in height, cantilevered or braced shoring may be used. For design of cantilevered shoring with drained soils and a level surface behind, a triangular distribution of lateral earth pressure with an equivalent fluid pressure of 55 pcf is recommended.

Braced or tied-back shoring should be designed to resist a trapezoidal distribution of lateral earth pressure. The recommended pressure distribution, for the case where the grade is level behind the shoring, is illustrated in the following diagram with the maximum pressure equal to 35H in psf, where H is the height of the shored wall in feet.



Any surcharge (live, including traffic, or dead load) located within a 1:1 plane drawn upward from the base of the shored excavation, including adjacent structures, should be added to the lateral earth pressures. The lateral contribution of a uniform surcharge load located immediately behind the temporary shoring may be calculated by multiplying the vertical surcharge pressure by 0.35. Lateral load contributions of surcharges located at a distance behind the shored wall may be provided once the load configurations and layouts are known. As a minimum, a 300 psf vertical uniform surcharge is recommended to account for nominal construction and/or traffic loads.

6.4. Utility Trench Excavation and Backfill

All utility trenches should be shored or laid back in accordance with applicable Cal/OSHA standards. Onsite soils will not be suitable for use as bedding material but will be suitable for use as trench backfill provided oversized materials are removed. Utility trench backfill should be compacted to at least 90 percent of maximum dry density as determined by ASTM D 1557. Compaction should be accomplished by mechanical means. Jetting of native soils will not be acceptable.

No surcharge loads should be imposed above excavations. This includes spoil piles, lumber, concrete trucks or other construction materials and equipment. Drainage above excavations should be directed away from the banks. Care should be taken to avoid saturation of the soils.

6.5. Flatwork Subgrade Preparation

If native soils are used, the upper one foot of subgrade below exterior slabs, sidewalks, patios, etc. should be compacted to a minimum of 90 percent of the maximum dry density as determined by ASTM D1557. The subgrade below exterior slabs, sidewalks, driveways, patios, etc. should be moisture conditioned to a minimum of optimum moisture content prior to concrete placement.

7.0 DESIGN RECOMMENDATIONS

Construction of the proposed multi-family structures is considered feasible, from a geotechnical standpoint, provided that the conclusions and recommendations presented herein are incorporated into the design and construction of the project.

7.1. Foundation Design Recommendations

Detailed foundation plans are not currently available; however, it is our understanding that the proposed multi-family three- and four-story residential structures will be wood framed and supported by a conventional shallow foundation system. For preliminary design of shallow foundations supported on compacted fill, the values presented below may be used.

7.1.1. Foundation Design

Residential structures can be supported on conventional shallow foundations and slab-on-grade or post-tensioned slab/foundation systems, as discussed above. The design of foundation systems should be based on as-graded conditions as determined after grading completion. The following values may be used in preliminary foundation design:

Allowable Bearing: 3000 psf. Bearing Capacity can increase 250 psf for each additional foot of width, and 500 psf for each additional foot of depth to a maximum allowable capacity of 3,500 psf.

Sliding Coefficient: 0.35

Lateral Bearing: 300 psf/foot of depth to a maximum of 3,000 psf

The above values may be increased as allowed by Code to resist transient loads such as wind or seismic. Building code and structural design considerations may govern. Depth and reinforcement requirements and should be evaluated by a qualified engineer.

7.1.2. Conventional Slab Recommendations

Conventional foundations and slabs-on grade can be considered for “very low” and “low” expansion conditions on shallow fill areas (<50 feet). Final foundation design should be provided by the project geotechnical engineer.

7.1.3. Footing Excavations

Footing excavations should be observed by the geotechnical consultant. Footings should be excavated into competent engineered fill. Excavations should be free of all loose and sloughed materials, be neatly trimmed, and moisture conditioned at the time of concrete placement.

7.1.4. Moisture and Vapor Barrier

A moisture and vapor retarding system should be placed below the slabs-on-grade in portions of the structure considered to be moisture sensitive. The retarder should be of suitable composition, thickness, strength and low permeance to effectively prevent the migration of water and reduce the transmission of water vapor to acceptable levels.

Historically, a 10-mil plastic membrane, such as *Visqueen*, placed between one to four inches of clean sand, has been used for this purpose. More recently, 15-mil polyolefin membrane underlayments (Stego® Wrap or similar material) have been used to lower permeance to effectively prevent the migration of water and reduce the transmission of water vapor to acceptable levels. The use of this system or other systems, materials or techniques can be considered, at the discretion of the designer.

7.2. Retaining Walls

The following earth pressures are recommended for the design of conventional retaining walls onsite. These earth pressures assume that a select backfill will be used behind the walls:

Static Case

Level Backfill	Rankine Coefficients	Equivalent Fluid Pressure (psf/lin.ft.)
Coefficient of Active Pressure:	$K_a = 0.33$	42
Coefficient of Passive Pressure:	$K_p = 3.00$	375
Coefficient of at Rest Pressure:	$K_o = 0.50$	63

2 : 1 Backfill	Rankine Coefficients	Equivalent Fluid Pressure (psf/lin.ft.)
Coefficient of Active Pressure:	$K_a = 0.54$	67
Coefficient of At Rest Pressure:	$K_o = 0.72$	90

Seismic Case

In addition to the above static pressures, unrestrained retaining walls located should be designed to resist seismic loading as required by the 2016 CBC. The seismic load can be modeled as a thrust load applied at a point 0.6H above the base of the wall, where H is equal to the height of the wall. This seismic load (in pounds per lineal foot of wall) is represented by the following equation:

$$Pe = \tfrac{3}{8} * \gamma * H^2 * k_h$$

Where:

Pe = Seismic thrust load

H = Height of the wall (feet)

γ = soil density = 125 pounds per cubic foot (pcf)

k_h = seismic pseudostatic coefficient = 0.5 * peak horizontal ground acceleration / g

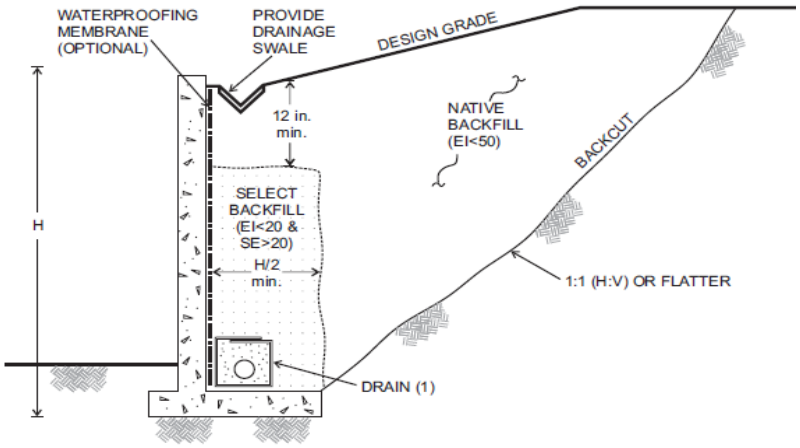
The peak horizontal ground accelerations are provided in Section 4.4.3. Walls should be designed to resist the combined effects of static pressures and the above seismic thrust load.

The foundations for retaining walls of appurtenant structures structurally separated from the building structures, may bear on properly compacted fill. A bearing value of 2,000 psf may be used for design of retaining walls. Retaining wall footings should be designed to

resist the lateral forces by passive soil resistance and/or base friction as recommended for foundation lateral resistance. To relieve the potential for hydrostatic pressure wall backfill should consist of a free draining backfill (sand equivalent "SE" >20) and a heel drain should be constructed. The heel drain should be place at the heel of the wall and should consist of a 4-inch diameter perforated pipe (SDR35 or SCHD 40) surrounded by 4 cubic feet of crushed rock (3/4-inch) per lineal foot, wrapped in filter fabric (Mirafi® 140N or equivalent).

Proper drainage devices should be installed along the top of the wall backfill, which should be properly sloped to prevent surface water ponding adjacent to the wall. In addition to the wall drainage system, for building perimeter walls extending below the finished grade, the wall should be waterproofed and/or damp-proofed to effectively seal the wall from moisture infiltration through the wall section to the interior wall face.

The wall should be backfilled with granular soils placed in loose lifts no greater than 8-inches thick, at or near optimum moisture content, and mechanically compacted to a minimum 90 percent relative compaction as determined by ASTM Test Method D1557. Flooding or jetting of backfill materials generally do not result in the required degree and uniformity of compaction and, therefore, is not recommended. The soils engineer or his representative should observe the retaining wall footings, backdrain installation and be present during placement of the wall backfill to confirm that the walls are properly backfilled and compacted.



NOTES: (1) DRAIN: 4-INCH PERFORATED ABS OR PVC PIPE OR APPROVED EQUIVALENT SUBSTITUTE PLACED PERFORATIONS DOWN AND SURROUNDED BY A MINIMUM OF 1 CUBIC FEET OF 3/4 INCH ROCK OR APPROVED EQUIVALENT SUBSTITUTE AND WRAPPED IN MIRAFI 140 FILTER FABRIC OR APPROVED EQUIVALENT SUBSTITUTE

7.3. Corrosion

The onsite soils are expected to be "corrosive" to buried metallic materials. AGS recommends minimally that the current standard of care be employed for protection of metallic construction materials in contact with onsite soils or that consultation with an engineer specializing in corrosion

to determine specifications for protection of the construction materials. Steel reinforcement in contact with onsite soils should be protected with an epoxy coating, adequate concrete cover, or other approved methods as detailed by the structural engineer.

7.4. Civil Design Recommendations

7.4.1. Drainage

Roof and pad drainage should be collected and directed away from structures and slopes and toward approved disposal areas. Design fine-grade elevations should be maintained through the life of the structure or if design fine grade elevations are altered, adequate area drains should be installed in order to provide rapid discharge of water, away from structures and slopes. Residents should be made aware that they are responsible for maintenance and cleaning of all drainage terraces, down drains and other devices that have been installed to promote structure and slope stability

7.4.2. Exterior Flatwork

7.4.2.1. Slab Thickness

Concrete flatwork should be designed utilizing 4-inch minimum thickness.

7.4.2.2. Control Joints

Weakened plane joints should be installed on walkways at intervals of approximately 6 to 8 feet. Exterior slabs should be designed to withstand shrinkage of the concrete.

7.4.2.3. Flatwork Reinforcement

Consideration should be given to reinforcing any exterior flatwork.

7.4.2.4. Thickened Edge

Consideration should be given to construct a thickened edge (scoop footing) at the perimeter of slabs and walkways adjacent to landscape areas to minimize moisture variation below these improvements. The thickened edge (scoop footing) should extend approximately 8 inches below concrete slabs and should be a minimum of 6 inches wide.

8.0 FUTURE STUDY NEEDS

8.1. Construction Plans

Construction plans have not yet been developed. The recommendations provided herein are considered preliminary and subject to change based on the actual design. When available, the geotechnical engineer should review detailed construction plans. The following plans should be reviewed:

- Grading and improvement plans

- Structural plans including foundation and wall plans and calculations.

If the project description or final design varies from that described in this report, AGS must be consulted regarding the applicability of, and the necessity for, any revisions to the recommendations presented herein. AGS accepts no liability for any use of its recommendations if the project description or final design varies and AGS is not consulted regarding the changes.

9.0 CLOSURE

9.1. Geotechnical Review

AGS should review the final project plans and project specifications to evaluate conformance with the intent of the recommendations contained in this report. Our recommendations may be modified if conditions encountered in the field differ significantly from those assumed in this report.

Continuous geologic and geotechnical observations, testing, and mapping should be provided throughout site development. Additional soil samples should be collected by the geotechnical consultant during grading and subjected to laboratory testing. Final design recommendations should be provided in a grading report based on the observation and test results collected during grading.

9.2. Limitations

The findings and recommendations in this report are based on the specific excavations, observations, and tests results obtained during this investigation. The findings are based on the review and interpretation of the field and laboratory data combined with an interpolation and extrapolation of conditions between and beyond the exploratory excavations. Services performed by AGS have been conducted in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions. No other representation, either expressed or implied, and no warranty or guarantee is included or intended.

The recommendations presented in this report are based on the assumption that an appropriate level of field review will be provided by geotechnical engineers and engineering geologists who are familiar with the design and site geologic conditions. That field review shall be sufficient to confirm that geotechnical and geologic conditions exposed during grading are consistent with the geologic representations and corresponding recommendations presented in this report. If the project description varies from what is described in this report, AGS must be consulted regarding the applicability of, and the necessity for, any revisions to the recommendations presented herein. AGS accepts no liability for use of its recommendations if AGS is not consulted regarding any project changes.

The data, opinions, and recommendations of this report are applicable to the specific design of this project as discussed in this report. They have no applicability to any other project or to any other location, and any and all subsequent users accept any and all liability resulting from any use or reuse of the data, opinions, and recommendations without the prior written consent of AGS.

AGS has no responsibility for construction means, methods, techniques, sequences, or procedures, or for safety precautions or programs in connection with the construction, for the acts or omissions of the CONTRACTOR, or any other person performing any of the construction, or for failure of any of them to carry out the construction in accordance with the final design drawings and specifications.

APPENDIX A

REFERENCES

APPENDIX A

REFERENCES

Advanced Geotechnical Solutions, Inc., 2019, "Proposal and Cost Estimate for Preliminary Geotechnical Investigation, 6.3 Acre Site Located at 555 Hollister Street, City of San Diego, California", dated December 6, 2019, Report No. 1912-01-A-1.

California Building Standards Commission. (2016). *California Building Code*.

City of San Diego Development Services Department. (2008). City of San Diego Seismic Safety Geologic Hazards and Faults Grid Tile 6, April 3, 2008.

Kennedy, M.P., and Tan, S.S., 2008, Geologic Map of the San Diego 30' x 60' Quadrangle, California Regional Geologic Map Series, Scale 1:100,000, Map No. 2, Sheet 1 of 2.

SEAOC/OSHPD, 2019, ASCE 7-10 Seismic Design Maps, https://seismicmaps.org/

United States Geological Survey, 2019, Unified Hazards Tool, https://earthquake.usgs.gov/hazards/interactive/

APPENDIX B

SUBSURFACE EXPLORATION

Project 555 Hollister Street
Date Excavated 12/19/2019
Logged by SS
Equipment Cat 420F/24" Bucket

LOG OF TEST PITS

Test Pit No.	Depth (ft.)	USCS	Description
TP-1	0.0 – 4.5	SC	**Artificial Fill – Undocumented (afu):** Clayey SAND with sub-rounded Gravel to Cobble, red brown, moist, loose; construction debris: asphalt and concrete
	4.5 – 7.0	SM	**Young Alluvial Flood-Plain Deposits (Qya)** Silty fine- to coarse-grained SAND with abundant sub-rounded Gravel to Cobble, yellow brown, slightly moist, loose
			TOTAL DEPTH 7.0 FT. NO WATER, NO CAVING

Test Pit No.	Depth (ft.)	USCS	Description
TP-2	0.0 – 3.5	SC/CL	**Topsoil:** Clayey SAND to Sandy Clay, red brown, moist, loose
	3.5 – 5.0	SM	**Old Paralic Deposits (Qop_6)** Silty fine-grained SAND with abundant sub-rounded Gravel to Cobble, yellow brown to gray brown, dense; weakly cemented, minor iron oxide staining
			TOTAL DEPTH 5.0 FT. NO WATER, NO CAVING

Test Pit No.	Depth (ft.)	USCS	Description
TP-3	0.0 – 4.0	SC	**Artificial Fill – Undocumented (afu):** Clayey SAND with sub-rounded Gravel to Cobble, red brown, very moist; mixed with some light gray brown Clayey SAND
	4.0 – 9.0	SP	**Young Alluvial Flood-Plain Deposits (Qya)** Coarse-grained SAND with abundant Gravel to Cobble, moist, loose; trace Silt and Clay (CAVING from 4' – 9')
	9.0 – 11.0	SC	**Old Paralic Deposits (Qop_6)** Clayey fine- to coarse-grained SAND with common Gravel, dark gray brown to red brown, moist, dense; weakly cemented
			TOTAL DEPTH 11.0 FT. NO WATER, CAVING SOILS

Test Pit No.	Depth (ft.)	USCS	Description
TP-4	0.0 – 2.5	SC/SM	**Artificial Fill – Undocumented (afu):** Silty to Clayey fine- to medium-grained SAND with some Gravel to Cobble, very moist, loose
	2.5 – 4.0	SM	**Old Paralic Deposits (Qop_6)** Silty fine- to coarse-grained SAND with some sub-rounded Gravel to Cobble, dark gray brown to dark red brown, dense; weakly cemented TOTAL DEPTH 4.0 FT. NO WATER, NO CAVING
TP-5	0.0 – 2.5	SC	**Artificial Fill – Undocumented (afu):** Clayey fine-grained SAND with some Gravel to Cobble, red brown, very moist, loose
	2.5 – 7.5	SM	**Old Paralic Deposits (Qop_6)** Silty fine-grained SAND with small rounded Gravel, dark gray brown to dark orange brown, moist, dense; trace Clay, weakly cemented, carbonate stringers, slightly micaceous @ 6.5 ft., yellow brown to dark yellow brown, slightly moist, dense; moderately cemented, carbonate nodules, minor iron oxide staining TOTAL DEPTH 7.5 FT. NO WATER, NO CAVING

Test Pit No.	Depth (ft.)	USCS	Description
TP-6	0.0 – 2.0	SC	**Artificial Fill – Undocumented (afu):** Clayey fine- to coarse-grained SAND with some Gravel to Cobble, red brown, loose; abundance of organics @ 1.0 ft., encountered a 2" steel pipe (moved trench 5' north)
	2.0 – 15.0	SP	**Young Alluvial Flood-Plain Deposits (Qya)** Coarse-grained SAND with abundant sub-rounded Gravel to Cobble, dark yellow brown to dark orange brown, very moist to wet, loose (CAVING from 2' – 15') @ 3.5 ft., moist, occasional boulders @ 10.0 ft., becomes slightly moist
			TOTAL DEPTH 15.0 FT. NO WATER, CAVING SOILS

Test Pit No.	Depth (ft.)	USCS	Description
TP-7	0.0 – 3.5	SC	**Artificial Fill – Undocumented (afu):** Clayey fine- to coarse-grained SAND with some Gravel to Cobble, red brown, very moist, loose
	3.5 – 13.0	SM	**Old Paralic Deposits (Qop6)** Silty fine- to medium-grained SAND, dark gray brown to red brown, moist, dense; weakly cemented, slightly micaceous
		SP	@ 5.5 ft., Coarse-grained SAND with abundant sub-rounded Gravel to Cobble, dark yellow brown, moist
			@ 7.0 ft., slightly moist
			TOTAL DEPTH 13.0 FT. NO WATER, NO CAVING

Test Pit No.	Depth (ft.)	USCS	Description
TP-8	0.0 – 4.0	SC/CL	**Topsoil:** Clayey SAND to Sandy CLAY, fine- to coarse-grained, dark red brown, very moist to wet, loose to soft; occasional sub-rounded Gravel to Cobble
	4.0 – 13.0	SM	**Old Paralic Deposits (Qop_6)** Silty fine-grained SAND, dark yellow brown to gray brown, slightly moist to moist, dense; moderately cemented, carbonate nodules, slightly micaceous, minor porosity
		SW	@ 7.0 ft., Fine- to coarse SAND with sub-rounded Gravel to Cobble, light yellow brown, slightly moist
		SP	@ 10.0 ft., Coarse-grained SAND with abundant sub-rounded Gravel to Cobble
			TOTAL DEPTH 13.0 FT. NO WATER, NO CAVING

Test Pit No.	Depth (ft.)	USCS	Description
TP-9	0.0 – 11.0	SC	**Artificial Fill – Undocumented (afu):** Clayey SAND with Gravel to Cobble, yellow brown to gray brown, very moist, loose; trash debris: PVC pipe, plastic, glass, metal, wood, concrete etc. (CAVING from 0' – 11')
	11.0 – 13.0	SP	**Young Alluvial Flood-Plain Deposits (Qya)** Coarse-grained SAND with abundant sub-rounded Gravel to Cobble, dark yellow brown to gray brown, moist, loose

TOTAL DEPTH 13.0 FT.
NO WATER, CAVING SOILS

Test Pit No.	Depth (ft.)	USCS	Description
TP-10	0.0 – 13.0	SC	**Artificial Fill – Undocumented (afu):** Clayey SAND with Gravel to Cobble, gray brown, moist, loose; trash debris: PVC pipe, plastic, glass, metal, wood, concrete etc. TOTAL DEPTH 13.0 FT. NO WATER, NO CAVING

Test Pit No.	Depth (ft.)	USCS	Description
TP-11	0.0 – 1.5	SM/SC	**Topsoil:** Silty to Clayey SAND, fine-grained, red brown to dark gray brown, moist, loose
	1.5 – 10.0	SM	**Old Paralic Deposits (Qop_6)** Silty fine- to coarse-grained SAND, dark gray brown to dark blueish brown, slightly moist, dense; moderately cemented, slightly micaceous, minor porosity
			@ 3.0 ft., non-porous
		CL/ML	@ 7.0 ft., Silty CLAY to Clayey SILT
		SM	@ 8.0 ft., grades back to Silty SAND
			TOTAL DEPTH 10.0 FT. NO WATER, NO CAVING

Test Pit No.	Depth (ft.)	USCS	Description
TP-12	0.0 – 1.0	SM	**Topsoil:** Silty to Clayey fine- to coarse-grained SAND with some Gravel, red brown, moist to very moist loose
	1.0 – 13.0	SM-SC	**Young Alluvial Flood-Plain Deposits (Qya)** Silty to Clayey fine- to coarse-grained SAND with sub-rounded Gravel to Cobble, gray brown to dark yellow brown, moist to very moist, loose (CAVING from 1' – 13')
		SP	Coarse-grained SAND with abundant sub-rounded Gravel to Cobble, yellow brown to gray brown, moist to very moist, loose; occasional boulder
			TOTAL DEPTH 13.0 FT. NO WATER, CAVING SOILS

Test Pit No.	Depth (ft.)	USCS	Description
TP-13	0.0 – 2.5.	SC	**Artificial Fill – Undocumented (afu):** Clayey SAND with sub-rounded Gravel to Cobble, dark brown, very moist, loose
	2.5 – 6.0	SM/SC	**Young Alluvial Flood-Plain Deposits (Qya)** Silty to Clayey fine- to coarse-grained SAND with abundant sub-rounded Gravel to Cobble, dark yellow brown, to gray brown, moist, loose
	6.0 – 12.0	SM	**Old Paralic Deposits (Qop_6)** Silty fine-grained SAND with abundant Gravel to Cobble, yellow brown, slightly moist to moist, dense; moderately cemented, abundant carbonate stringers, slightly micaceous TOTAL DEPTH 12.0 FT. NO WATER, NO CAVING

APPENDIX C

LABORATORY TESTING RESULTS

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

DIRECT SHEAR - ASTM D3080

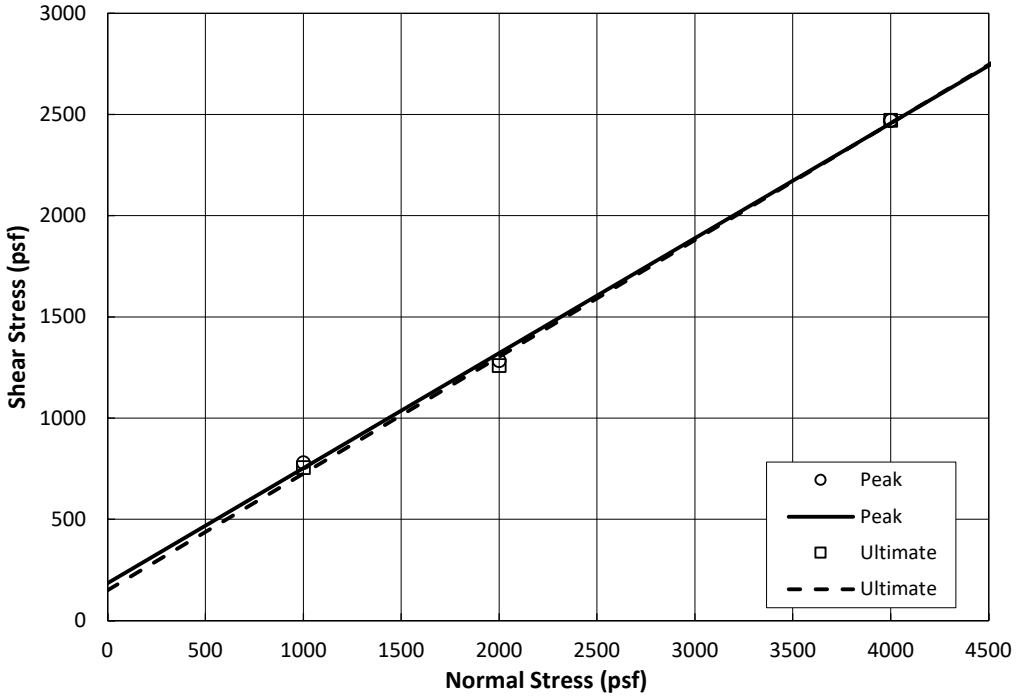
Project Name: 555 Hollister St
Location: San Diego
Project No.: 1912-01
Date: 1/23/2020

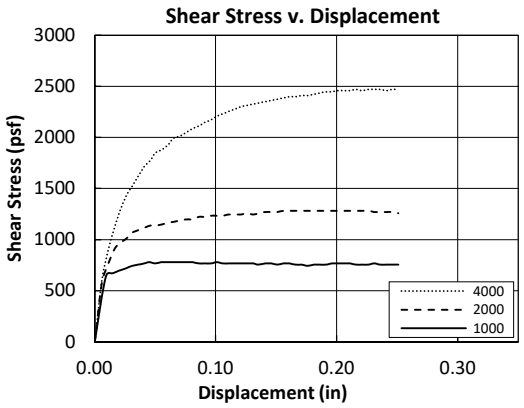
Excavation: TP-11
Depth: 1.5-2.5 ft
Tested by: FV
Reviewed by: JC

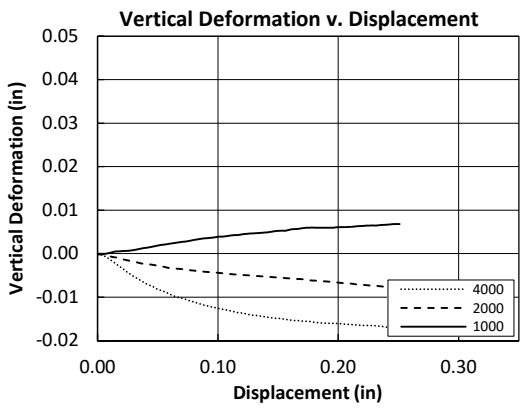
Samples Tested	1	2	3
Intial Moisture (%)	8.5	8.5	8.5
Initial Dry Density (pcf)	114.7	114.7	114.7
Normal Stress (psf)	1000	2000	4000
Peak Shear Stress (psf)	780	1284	2472
Ult. Shear Stress (psf)	756	1260	2472

Soil Type: Brown SC-SM
Test: Remolded 90%
Method: Drained
Consolidation: Yes
Saturation: Yes
Shear Rate ($^{in}/_{min}$): 0.01

Strength Parameters	Peak	Ultimate
Friction Angle, phi (deg)	30	30
Cohesion (psf)	186	150







ADVANCED GEOTECHNICAL SOLUTIONS, INC.

DIRECT SHEAR - ASTM D3080

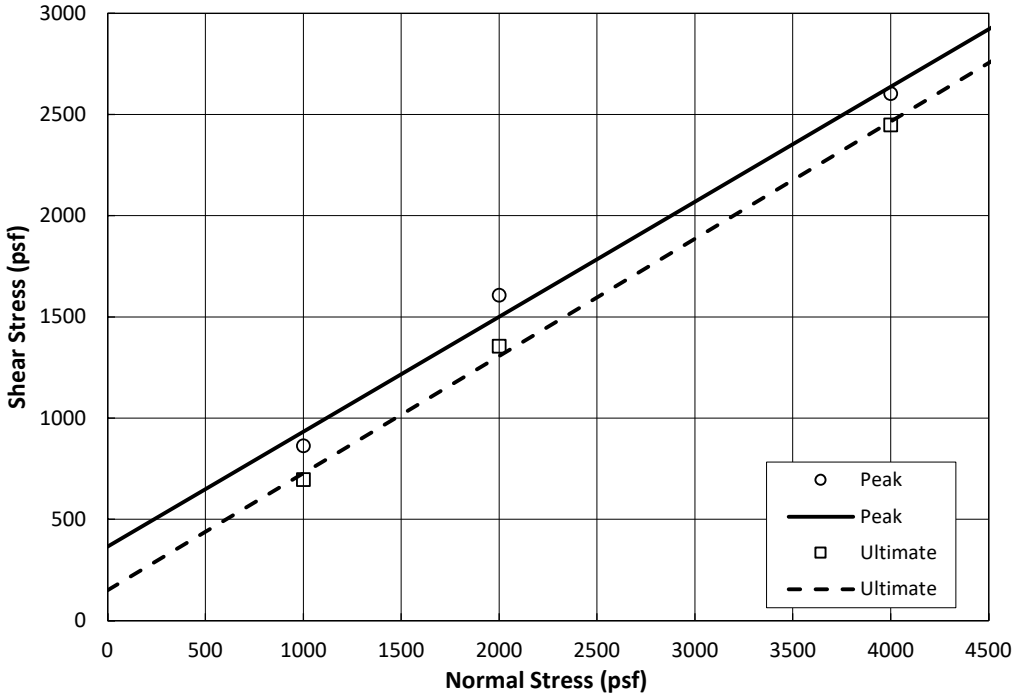
Project Name: 555 Hollister St
Location: San Deigo
Project No.: 1912-01
Date: 1/20/2020

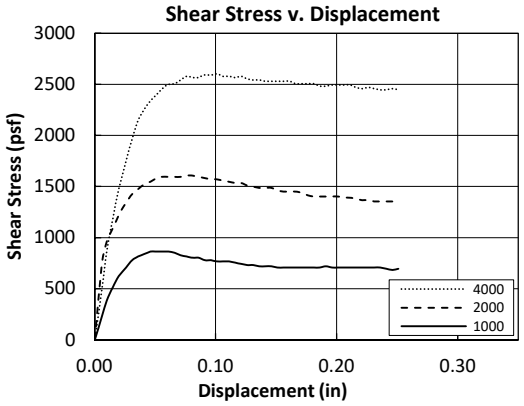
Excavation: TP-3
Depth: 4-5 FT
Tested by: FV
Reviewed by: JC

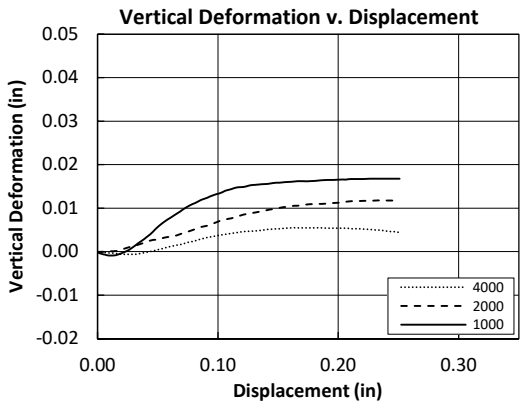
Samples Tested	1	2	3
Intial Moisture (%)	7.5	7.5	7.5
Initial Dry Density (pcf)	108.3	108.3	108.3
Normal Stress (psf)	1000	2000	4000
Peak Shear Stress (psf)	864	1608	2604
Ult. Shear Stress (psf)	696	1356	2448

Soil Type: Reddish Brn SC-SM
Test: Remolded 90%
Method: Drained
Consolidation: Yes
Saturation: Yes
Shear Rate ($^{in}/_{min}$): 0.01

Strength Parameters	Peak	Ultimate
Friction Angle, phi (deg)	30	30
Cohesion (psf)	366	150







ADVANCED GEOTECHNICAL SOLUTIONS, INC.

EXPANSION INDEX - ASTM D4829

AGS FORM E-6

Project Name: 555 Hollister St
Location: San Diego
P/W: 1912-01
Date: 1/22/20

Excavation/Tract: TP-4
Depth/Lot: 0.0-2.0 ft
Description: Reddish Brn SM
Tested by: FV
Checked by: SS

Expansion Index - ASTM D4829	
Initial Dry Density (pcf):	103.3
Initial Moisture Content (%):	11.5
Initial Saturation (%):	49.2
Final Dry Density (pcf):	99.9
Final Moisture Content (%):	25.3
Final Saturation (%):	99.7
Expansion Index:	34
Potential Expansion:	Low

ASTM D4829 - Table 5.3	
Expansion Index	Potential Expansion
0 - 20	Very Low
21 - 50	Low
51 - 90	Medium
91 - 130	High
>130	Very High

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

EXPANSION INDEX - ASTM D4829

AGS FORM E-6

Project Name: 555 Hollister St
Location: San Diego
P/W: 1912-01
Date: 1/23/20

Excavation/Tract: TP-8
Depth/Lot: 1-3 ft
Description: Brown SC-SM
Tested by: FV
Checked by: SS

Expansion Index - ASTM D4829	
Initial Dry Density (pcf):	120.0
Initial Moisture Content (%):	7.7
Initial Saturation (%):	51.4
Final Dry Density (pcf):	120.8
Final Moisture Content (%):	12.8
Final Saturation (%):	87.3
Expansion Index:	0
Potential Expansion:	Very Low

ASTM D4829 - Table 5.3	
Expansion Index	Potential Expansion
0 - 20	Very Low
21 - 50	Low
51 - 90	Medium
91 - 130	High
>130	Very High

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

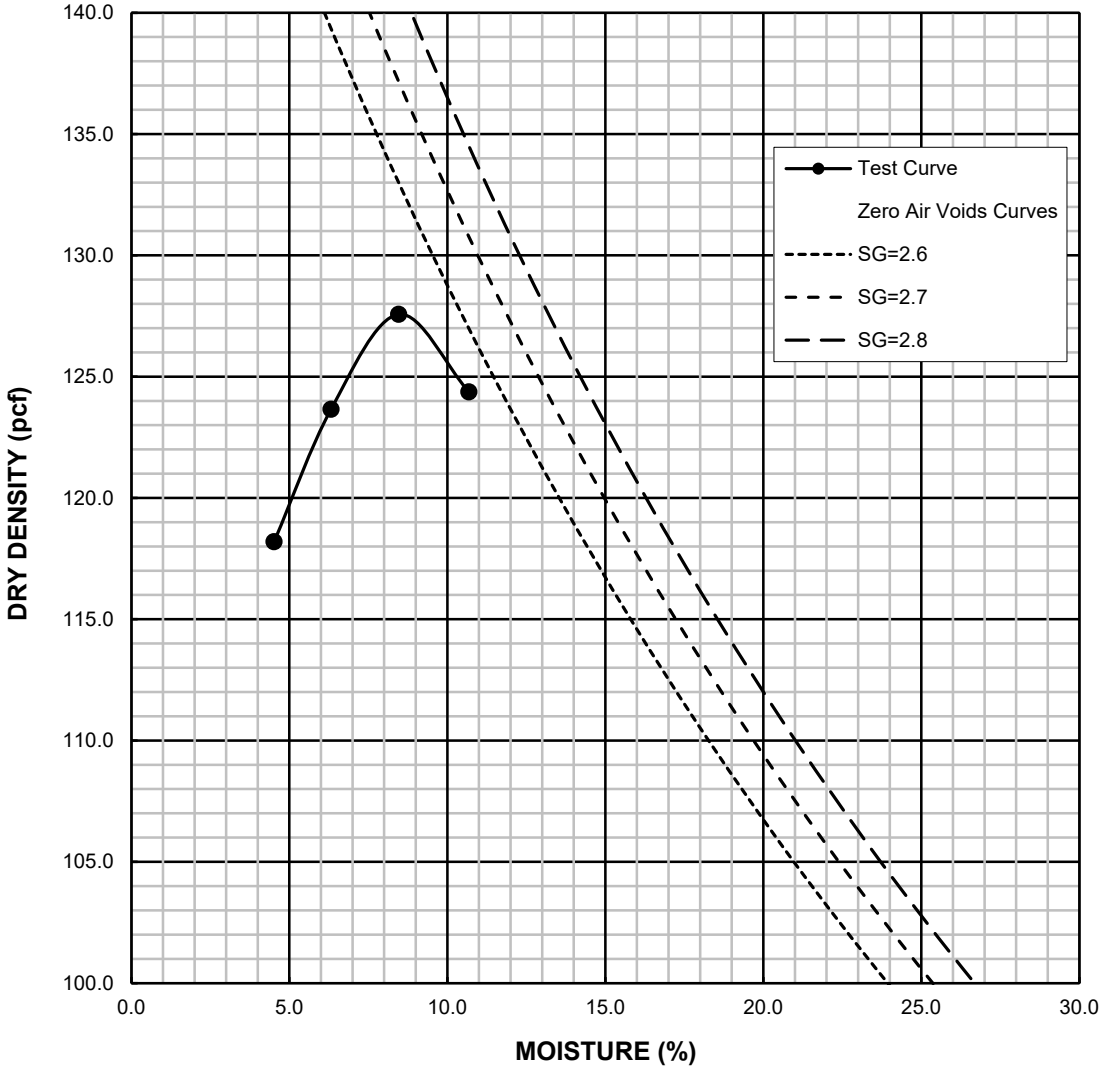
MAXIMUM DENSITY - ASTM D1557

AGS FORM E-8

Project Name:	555 Hollister St	Excavation:	TP-11
Location:	San Diego	Depth:	1.5-2.5 ft
P/W No.:	1912-01	Soil Type:	Brown SC-SM
Date:	01-2020	Tested by:	FV
		Checked by:	JC

Method:	A	Oversize Retained: 0 %		
Point No.	1	2	3	4
Dry Density (pcf)	118.2	123.7	127.6	124.4
Moisture Content (%)	4.5	6.3	8.5	10.7

MAXIMUM DENSITY CURVE



Corrected Max. Dry Density	**127.5 pcf**	Corrected Moisture	**8.5** %
Max. Dry Density	**127.5 pcf**	Optimum Moisture	**8.5** %

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

MAXIMUM DENSITY - ASTM D1557

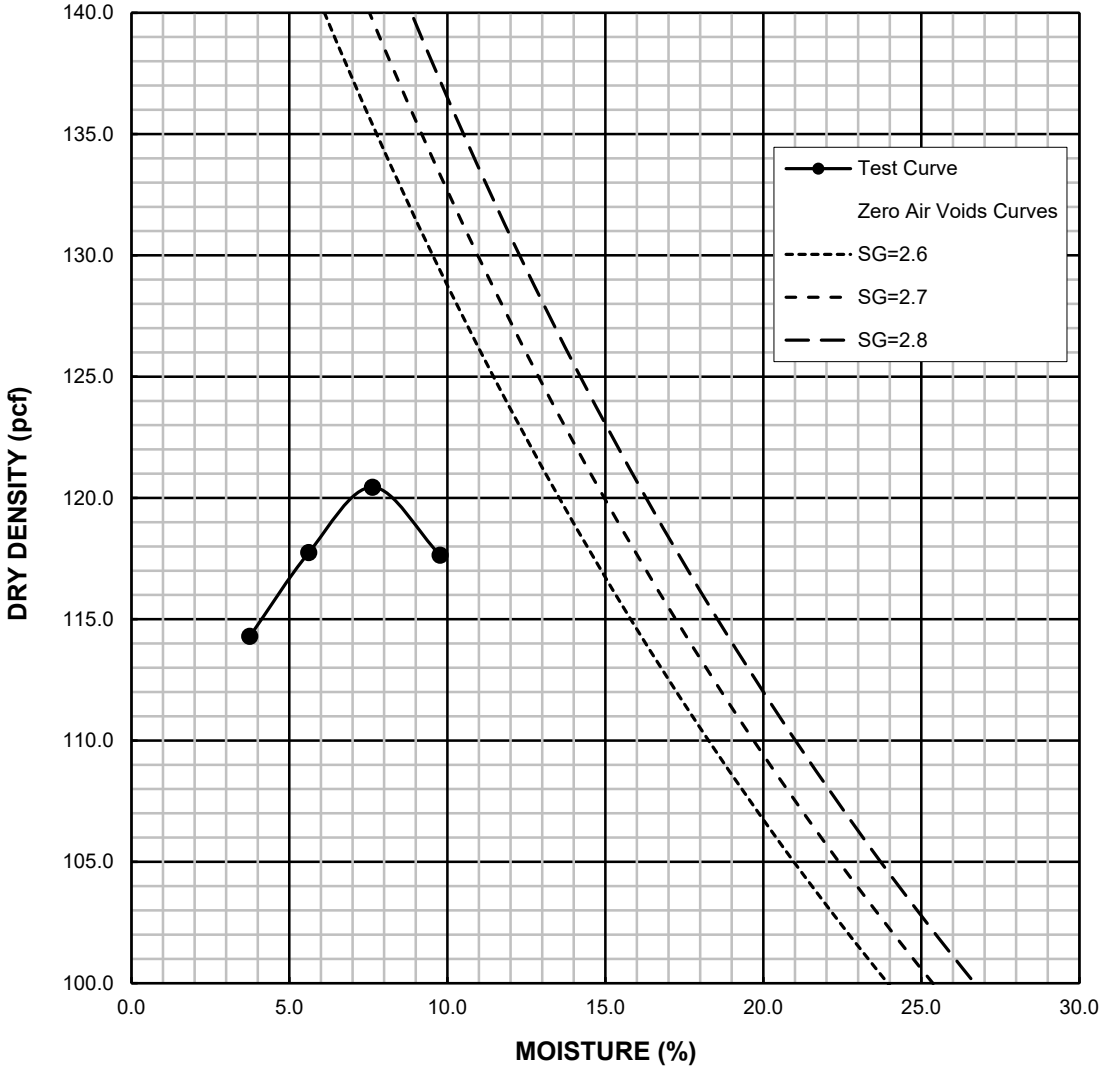
AGS FORM E-8

Project Name: 555 Holister St
Location: San Diego
P/W No.: 1912-01
Date: 01-2020

Excavation: TP-3
Depth: 4-5 ft
Soil Type: Reddish Brn. SC-SM
Tested by: FV
Checked by: JC

Method:	A	Oversize Retained: 0 %		
Point No.	1	2	3	4
Dry Density (pcf)	114.3	117.8	120.4	117.6
Moisture Content (%)	3.7	5.6	7.6	9.8

MAXIMUM DENSITY CURVE



Corrected Max. Dry Density **120.5 pcf**
Max. Dry Density **120.5 pcf**

Corrected Moisture **7.5** %
Optimum Moisture **7.5** %

APPENDIX D

EARTHWORK SPECIFICATIONS

GENERAL EARTHWORK SPECIFICATIONS

I. General

A. General procedures and requirements for earthwork and grading are presented herein. The earthwork and grading recommendations provided in the geotechnical report are considered part of these specifications, and where the general specifications provided herein conflict with those provided in the geotechnical report, the recommendations in the geotechnical report shall govern. Recommendations provided herein and in the geotechnical report may need to be modified depending on the conditions encountered during grading.

B. The contractor is responsible for the satisfactory completion of all earthwork in accordance with the project plans, specifications, applicable building codes, and local governing agency requirements. Where these requirements conflict, the stricter requirements shall govern.

C. It is the contractor's responsibility to read and understand the guidelines presented herein and in the geotechnical report as well as the project plans and specifications. Information presented in the geotechnical report is subject to verification during grading. The information presented on the exploration logs depicts conditions at the particular time of excavation and at the location of the excavation. Subsurface conditions present at other locations may differ, and the passage of time may result in different subsurface conditions being encountered at the locations of the exploratory excavations. The contractor shall perform an independent investigation and evaluate the nature of the surface and subsurface conditions to be encountered and the procedures and equipment to be used in performing his work.

D. The contractor shall have the responsibility to provide adequate equipment and procedures to accomplish the earthwork in accordance with applicable requirements. When the quality of work is less than that required, the Geotechnical Consultant may reject the work and may recommend that the operations be suspended until the conditions are corrected.

E. Prior to the start of grading, a qualified Geotechnical Consultant should be employed to observe grading procedures and provide testing of the fills for conformance with the project specifications, approved grading plan, and guidelines presented herein. All remedial removals, clean-outs, removal bottoms, keyways, and subdrain installations should be observed and documented by the Geotechnical Consultant prior to placing fill. It is the contractor's responsibility to apprise the Geotechnical Consultant of their schedules and notify the Geotechnical Consultant when those areas are ready for observation.

F. The contractor is responsible for providing a safe environment for the Geotechnical Consultant to observe grading and conduct tests.

II. Site Preparation

A. Clearing and Grubbing: Excessive vegetation and other deleterious material shall be sufficiently removed as required by the Geotechnical Consultant, and such materials shall be properly disposed of offsite in a method acceptable to the owner and governing agencies. Where applicable, the contractor may obtain permission from the Geotechnical Consultant, owner, and governing agencies to dispose of vegetation and other deleterious materials in designated areas onsite.

B. Unsuitable Soils Removals: Earth materials that are deemed unsuitable for the support of fill shall be removed as necessary to the satisfaction of the Geotechnical Consultant.

C. Any underground structures such as cesspools, cisterns, mining shafts, tunnels, septic tanks, wells, pipelines, other utilities, or other structures located within the limits of grading shall be removed and/or abandoned in accordance with the requirements of the governing agency and to the satisfaction of the Geotechnical Consultant.

D. Preparation of Areas to Receive Fill: After removals are completed, the exposed surfaces shall be scarified to a depth of approximately 8 inches, watered or dried, as needed, to achieve a generally uniform moisture content that is at or near optimum moisture content. The scarified materials shall then be compacted to the project requirements and tested as specified.

E. All areas receiving fill shall be observed and approved by the Geotechnical Consultant prior to the placement of fill. A licensed surveyor shall provide survey control for determining elevations of processed areas and keyways.

III. Placement of Fill

A. Suitability of fill materials: Any materials, derived onsite or imported, may be utilized as fill provided that the materials have been determined to be suitable by the Geotechnical Consultant. Such materials shall be essentially free of organic matter and other deleterious materials, and be of a gradation, expansion potential, and/or strength that is acceptable to the Geotechnical Consultant. Fill materials shall be tested in a laboratory approved by the Geotechnical Consultant, and import materials shall be tested and approved prior to being imported.

B. Generally, different fill materials shall be thoroughly mixed to provide a relatively uniform blend of materials and prevent abrupt changes in material type. Fill materials derived from benching should be dispersed throughout the fill area instead of placing the materials within only an equipment-width from the cut/fill contact.

C. Oversize Materials: Rocks greater than 8 inches in largest dimension shall be disposed of offsite or be placed in accordance with the recommendations by the Geotechnical Consultant in the areas that are designated as suitable for oversize rock placement. Rocks that are smaller than 8 inches in largest dimension may be utilized in the fill provided that they are not nested and are their quantity and distribution are acceptable to the Geotechnical Consultant.

D. The fill materials shall be placed in thin, horizontal layers such that, when compacted, shall not exceed 6 inches. Each layer shall be spread evenly and shall be thoroughly mixed to obtain near uniform moisture content and uniform blend of materials.

E. Moisture Content: Fill materials shall be placed at or above the optimum moisture content or as recommended by the geotechnical report. Where the moisture content of the engineered fill is less than recommended, water shall be added, and the fill materials shall be blended so that near uniform moisture content is achieved. If the moisture content is above the limits specified by the Geotechnical Consultant, the fill materials shall be aerated by discing, blading, or other methods until the moisture content is acceptable.

F. Each layer of fill shall be compacted to the project standards in accordance to the project specifications and recommendations of the Geotechnical Consultant. Unless otherwise specified by the Geotechnical Consultant, the fill shall be compacted to a minimum of 90 percent of the maximum dry density as determined by ASTM Test Method: D1557-09.

G. Benching: Where placing fill on a slope exceeding a ratio of 5 to 1 (horizontal to vertical), the ground should be keyed or benched. The keyways and benches shall extend through all unsuitable materials into suitable materials such as firm materials or sound bedrock or as recommended by the Geotechnical Consultant. The minimum keyway width shall be 15 feet and extend into suitable materials, or as recommended by the geotechnical report and approved by the Geotechnical Consultant. The minimum keyway width for fill over cut slopes is also 15 feet, or as recommended by the geotechnical report and approved by the Geotechnical Consultant. As a general rule, unless otherwise recommended by the Geotechnical Consultant, the minimum width of the keyway shall be equal to 1/2 the height of the fill slope.

H. Slope Face: The specified minimum relative compaction shall be maintained out to the finish face of fill and stabilization fill slopes. Generally, this may be achieved by overbuilding the slope and cutting back to the compacted core. The actual amount of overbuilding may vary as field conditions dictate. Alternately, this may be achieved by back rolling the slope face with suitable equipment or other methods that produce the designated result. Loose soil should not be allowed to build up on the slope face. If present, loose soils shall be trimmed to expose the compacted slope face.

I. Slope Ratio: Unless otherwise approved by the Geotechnical Consultant and governing agencies, permanent fill slopes shall be designed and constructed no steeper than 2 to 1 (horizontal to vertical).

J. Natural Ground and Cut Areas: Design grades that are in natural ground or in cuts should be evaluated by the Geotechnical Consultant to determine whether scarification and processing of the ground and/or overexcavation is needed.

K. Fill materials shall not be placed, spread, or compacted during unfavorable weather conditions. When grading is interrupted by rain, filing operations shall not resume until the Geotechnical Consultant approves the moisture and density of the previously placed compacted fill.

IV. Cut Slopes

A. The Geotechnical Consultant shall inspect all cut slopes, including fill over cut slopes, and shall be notified by the contractor when cut slopes are started.

B. If adverse or potentially adverse conditions are encountered during grading; the Geotechnical Consultant shall investigate, evaluate, and make recommendations to mitigate the adverse conditions.

C. Unless otherwise stated in the geotechnical report, cut slopes shall not be excavated higher or steeper than the requirements of the local governing agencies. Short-term stability of the cut slopes and other excavations is the contractor's responsibility.

V. Drainage

A. Back drains and Subdrains: Back drains and subdrains shall be provided in fill as recommended by the Geotechnical Consultant and shall be constructed in accordance with the governing agency and/or recommendations of the Geotechnical Consultant. The location of subdrains, especially outlets, shall be surveyed and recorded by the Civil Engineer.

B. Top-of-slope Drainage: Positive drainage shall be established away from the top of slope. Site drainage shall not be permitted to flow over the tops of slopes.

C. Drainage terraces shall be constructed in compliance with the governing agency requirements and/or in accordance with the recommendations of the Geotechnical Consultant.

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

VI. Erosion Control

A. All finish cut and fill slopes shall be protected from erosion and/or planted in accordance with the project specifications and/or landscape architect's recommendations. Such measures to protect the slope face shall be undertaken as soon as practical after completion of grading.

B. During construction, the contractor shall maintain proper drainage and prevent the ponding of water. The contractor shall take remedial measures to prevent the erosion of graded areas until permanent drainage and erosion control measures have been installed.

VII. Trench Excavation and Backfill

A. Safety: The contractor shall follow all OSHA requirements for safety of trench excavations. Knowing and following these requirements is the contractor's responsibility. All trench excavations or open cuts in excess of 5 feet in depth shall be shored or laid back. Trench excavations and open cuts exposing adverse geologic conditions may require further evaluation by the Geotechnical Consultant. If a contractor fails to provide safe access for compaction testing, backfill not tested due to safety concerns may be subject to removal.

B. Bedding: Bedding materials shall be non-expansive and have a Sand Equivalent greater than 30. Where permitted by the Geotechnical Consultant, the bedding materials can be densified by jetting.

C. Backfill: Jetting of backfill materials is generally not acceptable. Where permitted by the Geotechnical Consultant, the bedding materials can be densified by jetting provided the backfill materials are granular, free-draining and have a Sand Equivalent greater than 30.

VIII. Geotechnical Observation and Testing During Grading

A. Compaction Testing: Fill shall be tested by the Geotechnical Consultant for evaluation of general compliance with the recommended compaction and moisture conditions. The tests shall be taken in the compacted soils beneath the surface if the surficial materials are disturbed. The contractor shall assist the Geotechnical Consultant by excavating suitable test pits for testing of compacted fill.

B. Where tests indicate that the density of a layer of fill is less than required, or the moisture content not within specifications, the Geotechnical Consultant shall notify the contractor of the unsatisfactory conditions of the fill. The portions of the fill that are not within specifications shall be reworked until the required density and/or moisture content has been attained. No additional fill shall be placed until the last lift of fill is tested and found to meet the project specifications and approved by the Geotechnical Consultant.

C. If, in the opinion of the Geotechnical Consultant, unsatisfactory conditions, such as adverse weather, excessive rock or deleterious materials being placed in the fill, insufficient equipment, excessive rate of fill placement, results in a quality of work that is unacceptable, the consultant shall notify the contractor, and the contractor shall rectify the conditions, and if necessary, stop work until conditions are satisfactory.

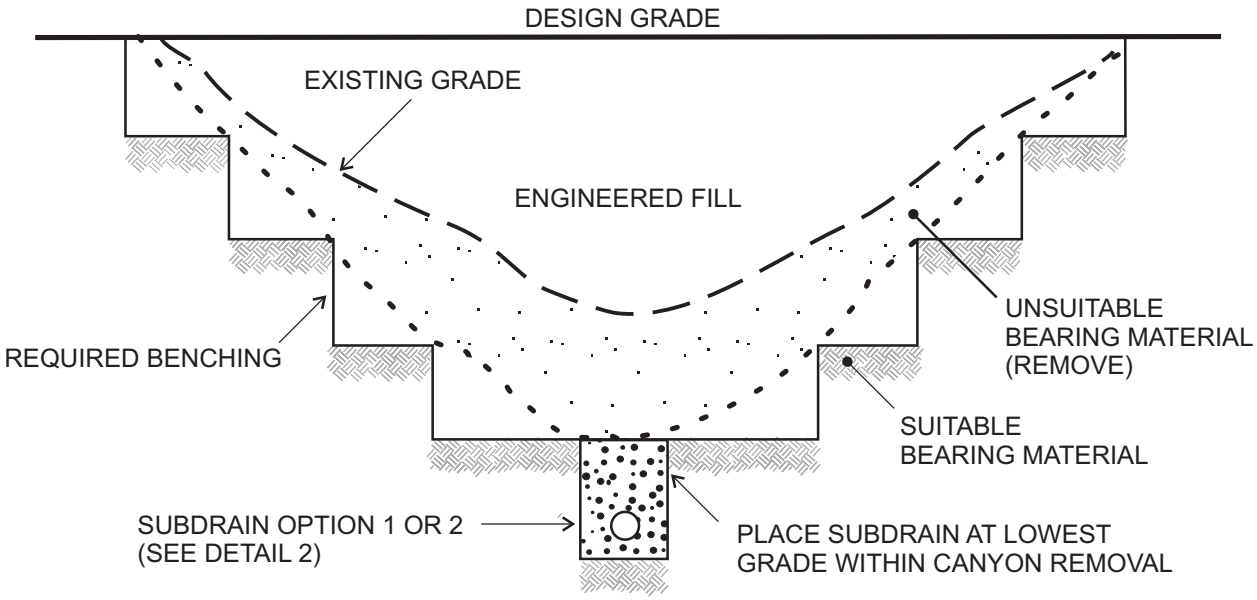
D. Frequency of Compaction Testing: The location and frequency of tests shall be at the Geotechnical Consultant's discretion. Generally, compaction tests shall be taken at intervals not exceeding two feet in fill height and 1,000 cubic yards of fill materials placed.

E. Compaction Test Locations: The Geotechnical Consultant shall document the approximate elevation and horizontal coordinates of the compaction test locations. The contractor shall coordinate with the surveyor to assure that sufficient grade stakes are established so that the Geotechnical Consultant can determine the test locations. Alternately, the test locations can be surveyed and the results provided to the Geotechnical Consultant.

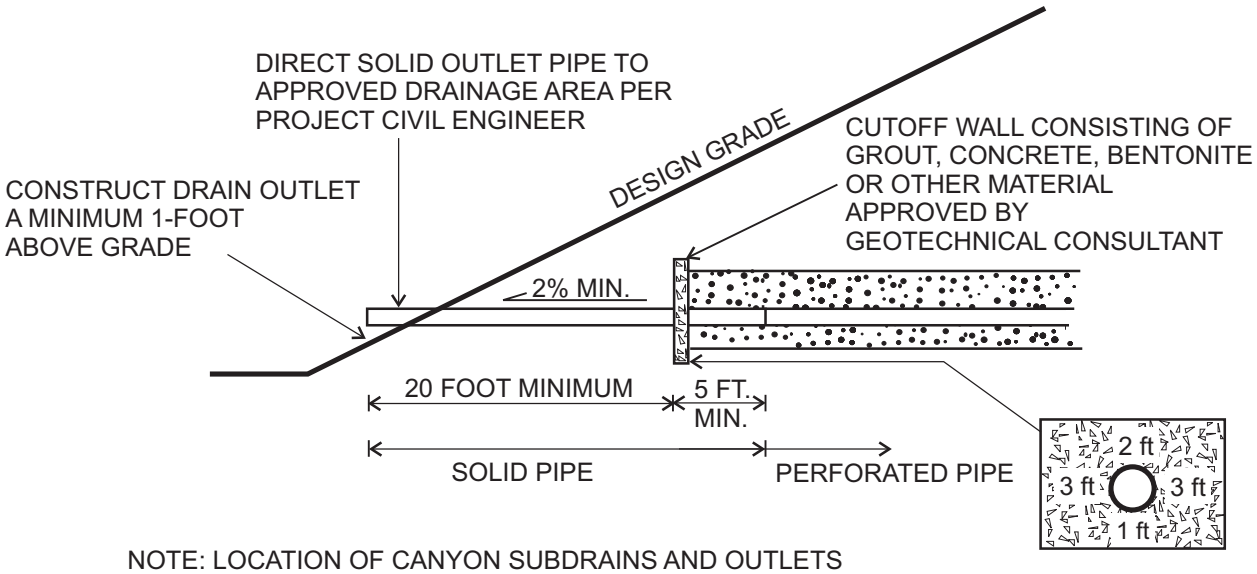
F. Areas of fill that have not been observed or tested by the Geotechnical Consultant may have to be removed and recompacted at the contractor's expense. The depth and extent of removals will be determined by the Geotechnical Consultant.

G. Observation and testing by the Geotechnical Consultant shall be conducted during grading in order for the Geotechnical Consultant to state that, in his opinion, grading has been completed in accordance with the approved geotechnical report and project specifications.

H. Reporting of Test Results: After completion of grading operations, the Geotechnical Consultant shall submit reports documenting their observations during construction and test results. These reports may be subject to review by the local governing agencies.



CANYON SUBDRAIN PROFILE



NOTE: LOCATION OF CANYON SUBDRAINS AND OUTLETS SHOULD BE DOCUMENTED BY PROJECT CIVIL ENGINEER. OUTLETS MUST BE KEPT UNOBSTRUCTED AT ALL TIMES.

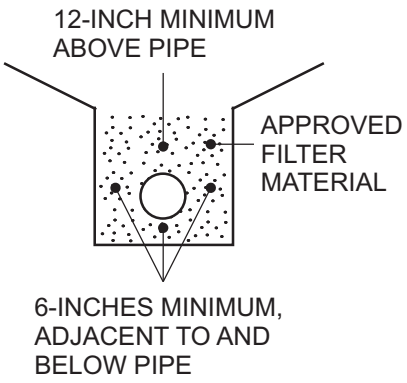
CUTOFF WALL DIMENSIONS

CANYON SUBDRAIN TERMINUS

VER 1.0

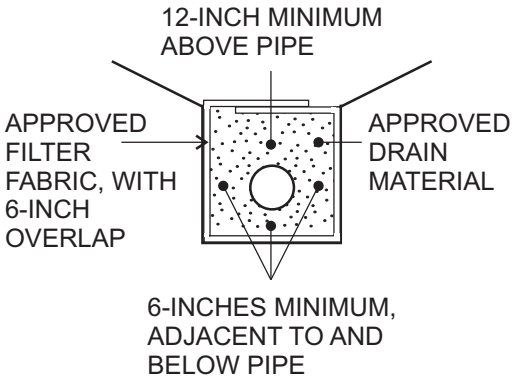
NTS

AGS ADVANCED GEOTECHNICAL SOLUTIONS	CANYON SUBDRAIN	DETAIL 1



OPTION 1

FILTER MATERIAL: MINIMUM VOLUME OF 9 CUBIC FEET PER LINEAL FOOT OF CALTRANS CLASS 2 PERMEABLE MATERIAL



OPTION 2

DRAIN MATERIAL: MINIMUM VOLUME OF 9 CUBIC FEET PER LINEAL FOOT OF 3/4-INCH MAX ROCK OR APPROVED EQUIVALENT SUBSTITUTE

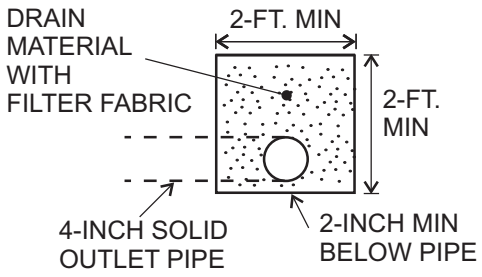
FILTER FABRIC: MIRAFI 140 FILTER FABRIC OR APPROVED EQUIVALENT SUBSTITUTE

PIPE: 6 OR 8-INCH ABS OR PVC PIPE OR APPROVED SUBSTITUTE WITH A MINIMUM OF 8 PERFORATIONS (1/4-INCH DIAMETER) PER LINEAL FOOT IN BOTTOM HALF OF PIPE

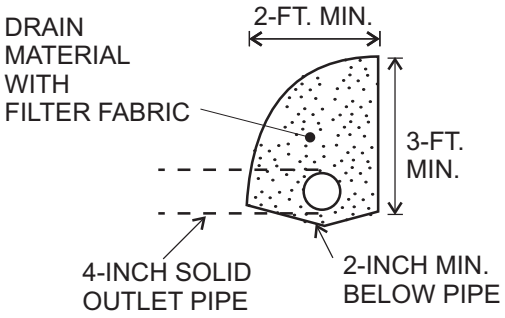
(ASTM D2751, SDR-35 OR ASTM D3034, SDR-35
ASTM D1527, SCHD. 40 OR ASTM D1785, SCHD. 40)

NOTE: CONTINUOUS RUN IN EXCESS OF 5OO FEET REQUIRES 8-INCH DIAMETER PIPE (ASTM D3034, SDR-35, OR ASTM D1785, SCHD. 40)

CANYON SUBDRAIN



OPTION 1



OPTION 2

DRAIN MATERIAL: GRAVEL TRENCH TO BE FILLED WITH 3/4-INCH MAX ROCK OR APPROVED EQUIVALENT SUBSTITUTE

FILTER FABRIC: MIRAFI 140 FILTER FABRIC OR EQUIVALENT SUBSTITUTE WITH A MINIMUM 6-INCH OVERLAP

PIPE: 4-INCH ABS OR PVC PIPE OR APPROVED EQUIVALENT SUBSTITUTE WITH A MINIMUM OF 8 PERFORATIONS (1/4-INCH DIAMETER) PER LINEAL FOOT IN BOTTOM HALF OF PIPE

(ASTM D2751, SDR-35 OR ASTM D3034, SDR-35
ASTM D1527, SCHD. 40 OR ASTM D1785, SCHD. 40)

BUTTRESS/STABILIZATION DRAIN

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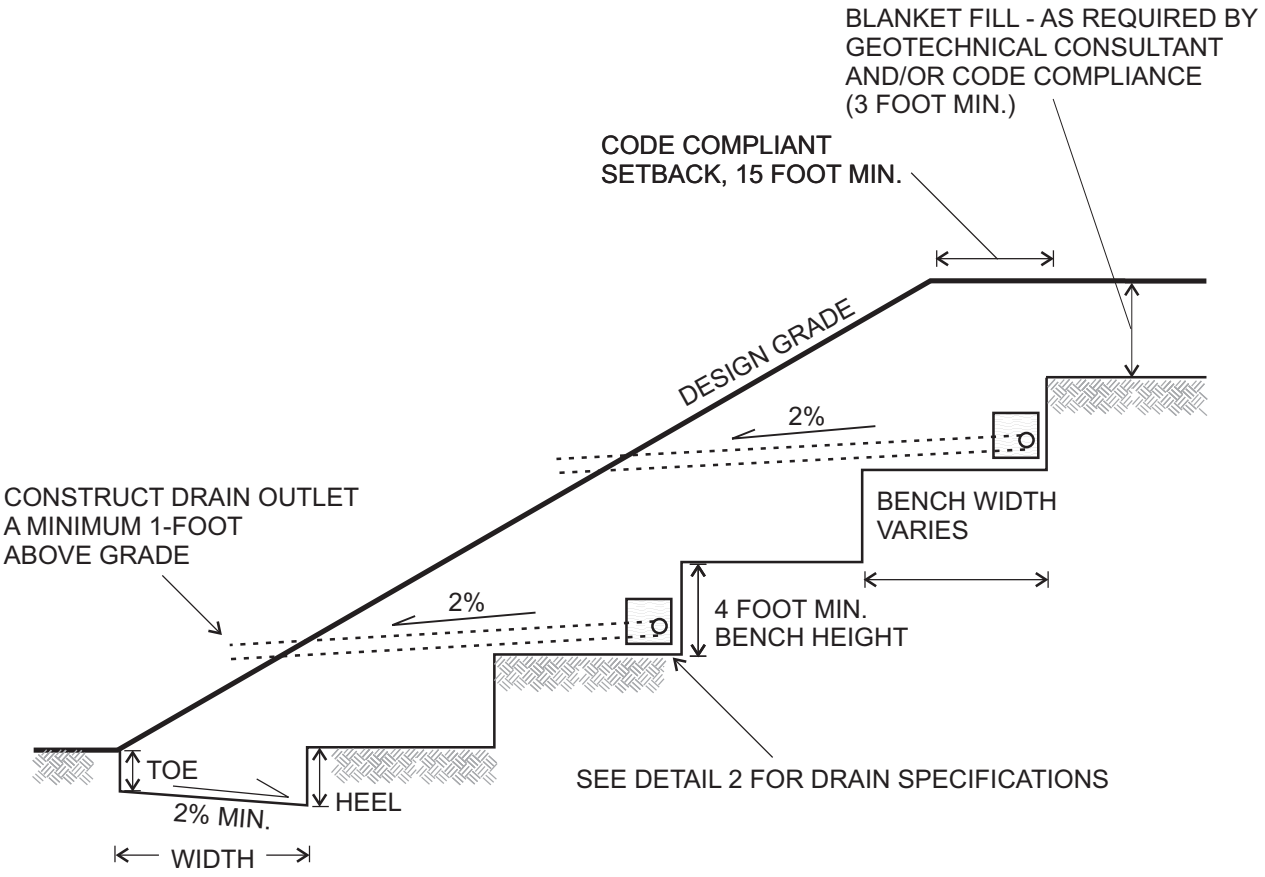
DRAIN SPECIFICATIONS

DETAIL 2



CODE COMPLIANT KEYWAY WITH MINIMUM DIMENSIONS:

TOE 2 FOOT MIN.
HEEL 3 FOOT MIN.
WIDTH 15 FOOT MIN.

NOTES:

1. DRAIN OUTLETS TO BE PROVIDED EVERY 100 FEET CONNECT TO PERFORATED DRAIN PIPE BY “L” OR “T” AT A MINIMUM 2% GRADIENT.

2. THE NECESSITY AND LOCATION OF ADDITIONAL DRAINS SHALL BE DETERMINED IN THE FIELD BY THE GEOTECHNICAL CONSULTANT. UPPER STAGE OUTLETS SHOULD BE EMPTIED ONTO CONCRETE TERRACE DRAINS.

3. DRAIN PIPE TO EXTEND FULL LENGTH OF STABILIZATION/BUTTRESS WITH A MINIMUM GRADIENT OF 2% TO SOLID OUTLET PIPES.

4. LOCATION OF DRAINS AND OUTLETS SHOULD BE DOCUMENTED BY PROJECT CIVIL ENGINEER. OUTLETS MUST BE KEPT UNOBSTRUCTED AT ALL TIMES.

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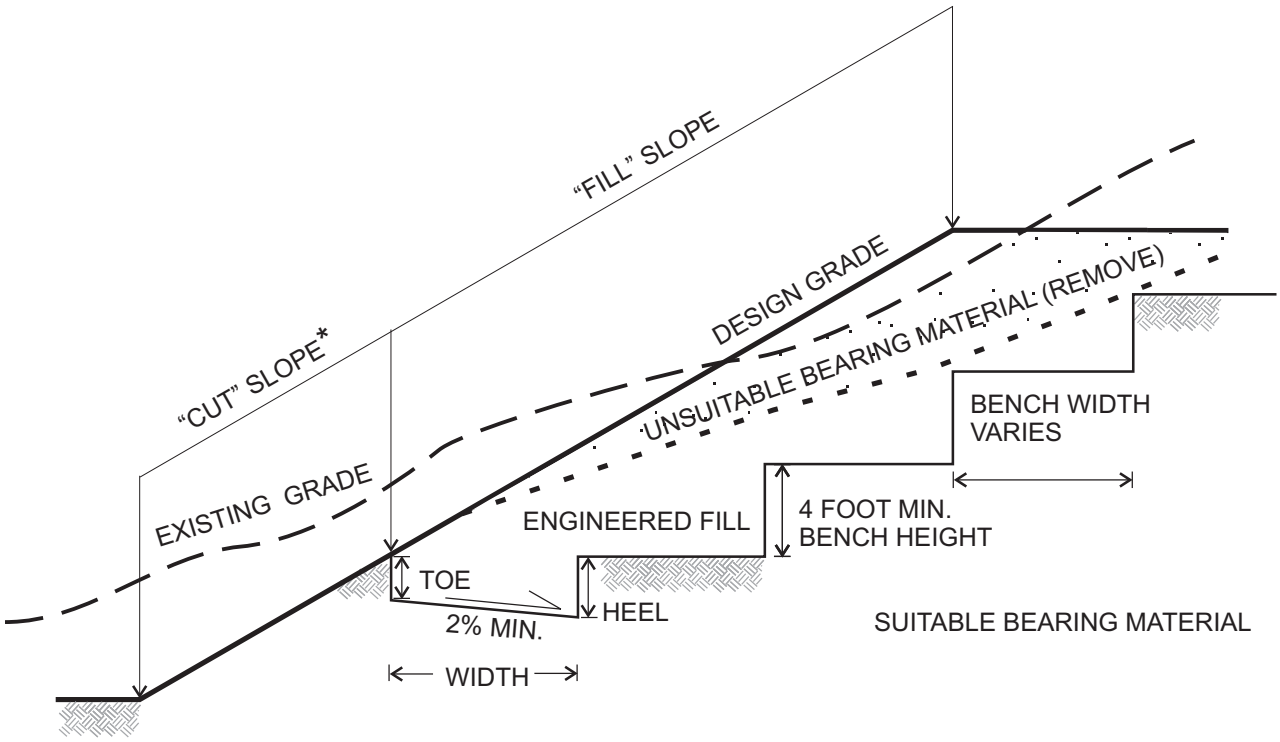
STABILIZATION/BUTTRESS FILL

DETAIL 3

* THE “CUT” PORTION OF THE SLOPE SHALL BE EXCAVATED AND EVALUATED BY THE GEOTECHNICAL CONSULTANT PRIOR TO CONSTRUCTING THE “FILL” PORTION



CODE COMPLIANT KEYWAY
WITH MINIMUM DIMENSIONS:

TOE: 2 FOOT MIN.
HEEL: 3 FOOT MIN.
WIDTH: 15 FOOT MIN.

NOTES:

1. THE NECESSITY AND LOCATION OF DRAINS SHALL BE DETERMINED IN THE FIELD BY THE GEOTECHNICAL CONSULTANT

2. SEE DETAIL 2 FOR DRAIN SPECIFICATIONS

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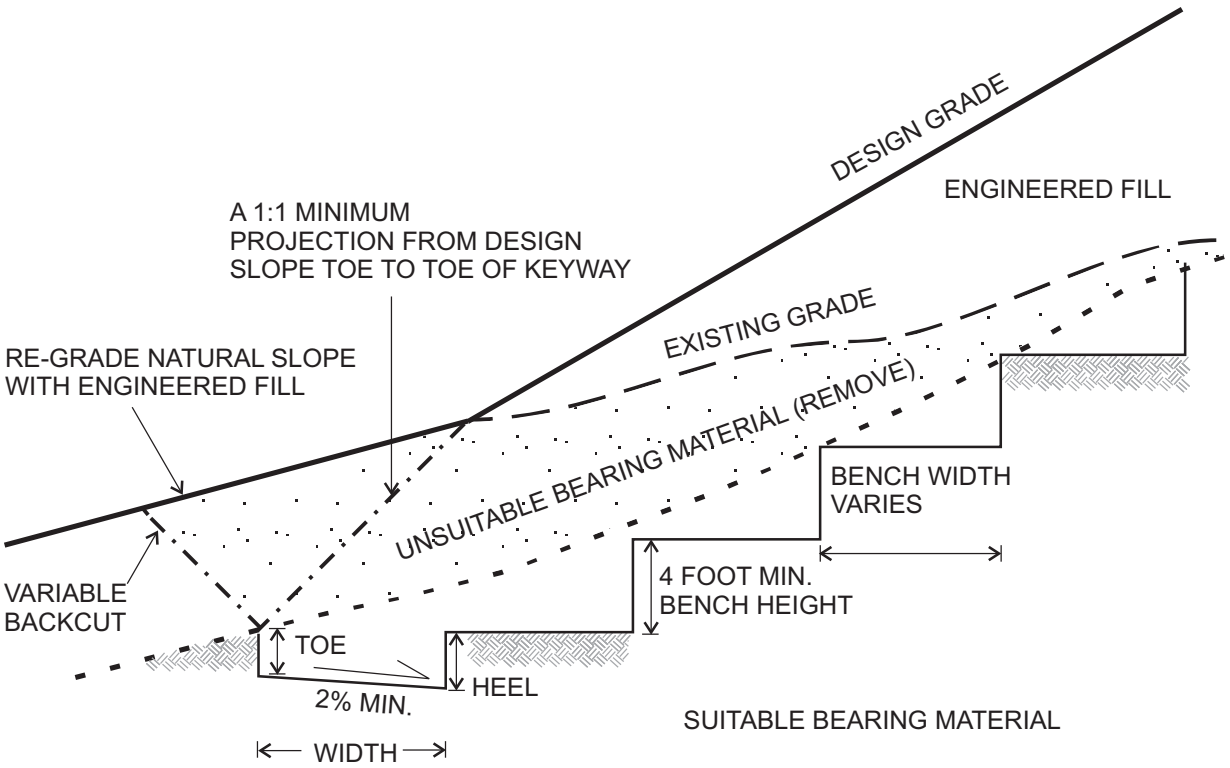
ADVANCED GEOTECHNICAL SOLUTIONS

FILL OVER CUT SLOPE

DETAIL 4



CODE COMPLIANT KEYWAY
WITH MINIMUM DIMENSIONS:

TOE: 2 FOOT MIN.
HEEL: 3 FOOT MIN.
WIDTH: 15 FOOT MIN.

NOTES:

1. WHEN THE NATURAL SLOPE APPROACHES OR EXCEEDS THE DESIGN GRADE SLOPE RATIO, SPECIAL RECOMMENDATIONS ARE NECESSARY BY THE GEOTECHNICAL CONSULTANT

2. THE GEOTECHNICAL CONSULTANT WILL DETERMINE THE REQUIREMENT FOR AND LOCATION OF SUBSURFACE DRAINAGE SYSTEMS.

3. MAINTAIN MINIMUM 15 FOOT HORIZONTAL WIDTH FROM FACE OF SLOPE TO BENCH/BACKCUT

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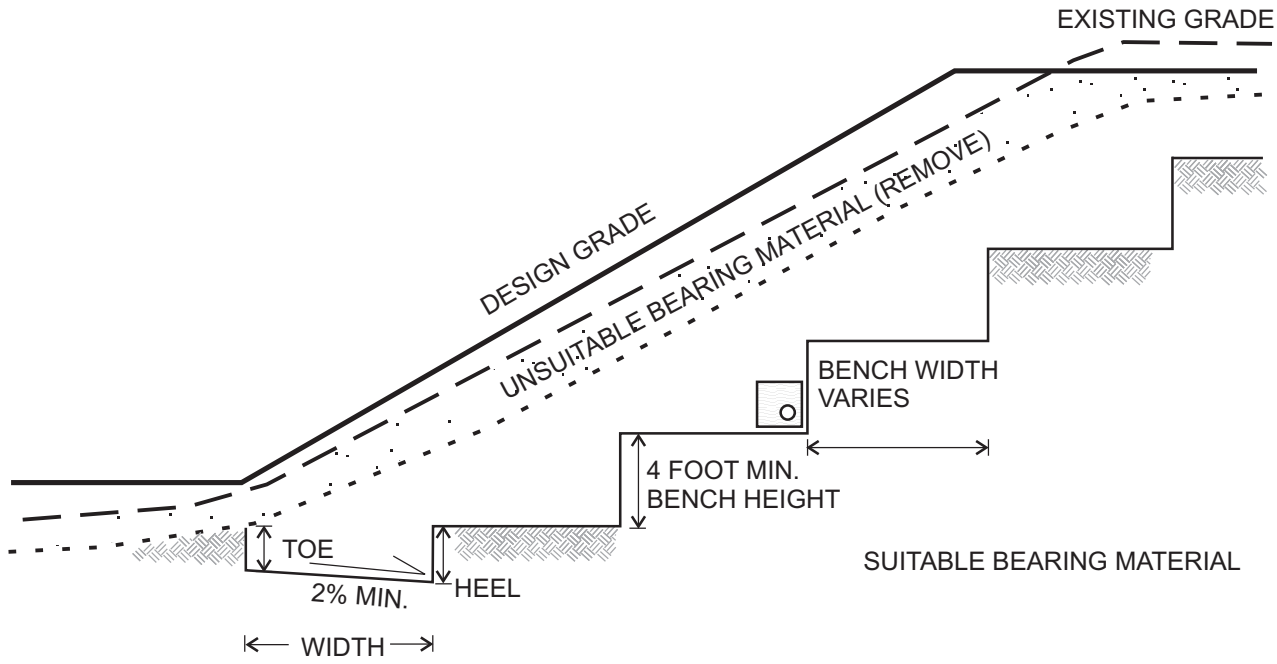
ADVANCED GEOTECHNICAL SOLUTIONS

FILL OVER NATURAL SLOPE

DETAIL 5



CODE COMPLIANT KEYWAY
WITH MINIMUM DIMENSIONS:

TOE: 2 FOOT MIN.
HEEL: 3 FOOT MIN.
WIDTH: 15 FOOT MIN.

NOTES:

1. MAINTAIN MINIMUM 15 FOOT HORIZONTAL WIDTH FROM FACE OF SLOPE TO BENCH/BACKCUT

2. SEE DETAIL 2 FOR DRAIN SPECIFICATIONS

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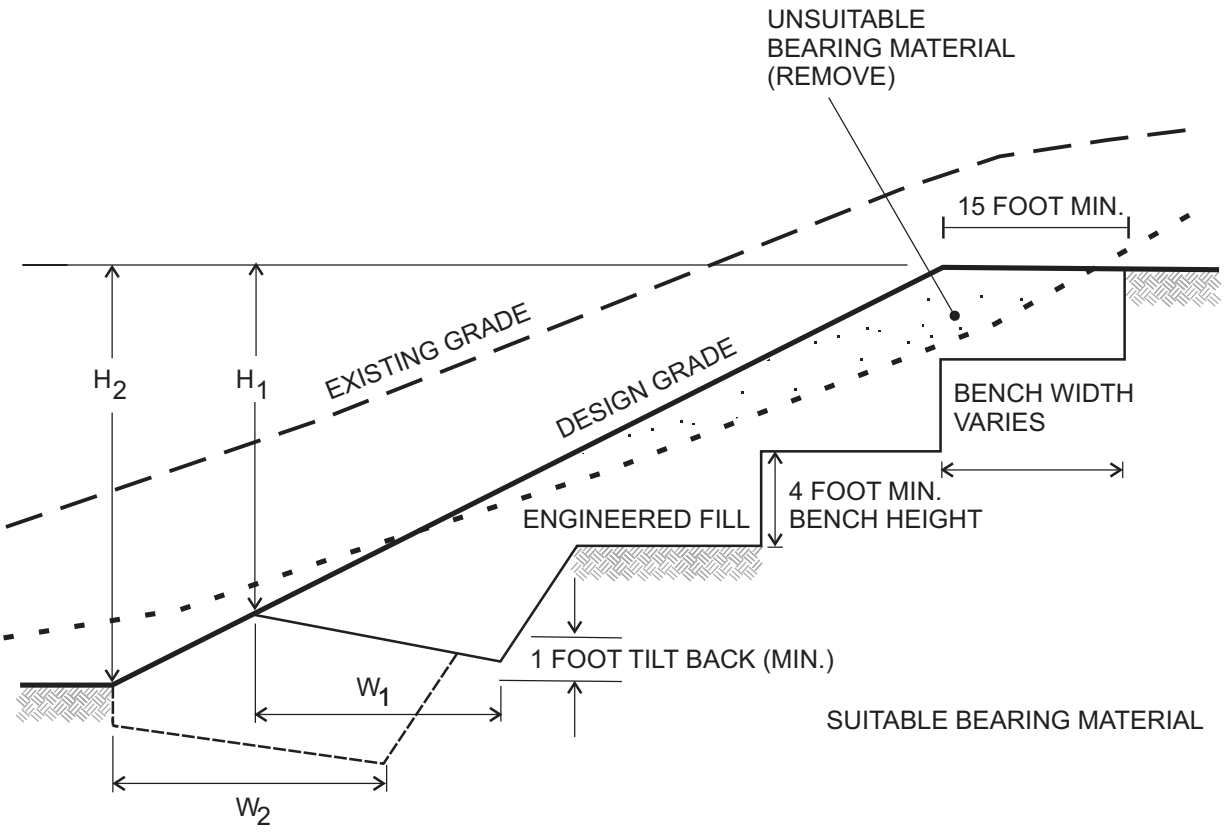
ADVANCED GEOTECHNICAL SOLUTIONS

SKIN FILL CONDITION

DETAIL 6



NOTES:

1. IF RECOMMENDED BY THE GEOTECHNICAL CONSULTANT, THE REMAINING CUT PORTION OF THE SLOPE MAY REQUIRE REMOVAL AND REPLACEMENT WITH AN ENGINEERED FILL

2. "W" SHALL BE EQUIPMENT WIDTH (15 FEET) FOR SLOPE HEIGHT LESS THAN 25 FEET. FOR SLOPES GREATER THAN 25 FEET, "W" SHALL BE DETERMINED BY THE GEOTECHNICAL CONSULTANT. AT NO TIME SHALL "W" BE LESS THAN H/2

3. DRAINS WILL BE REQUIRED (SEE DETAIL 2)

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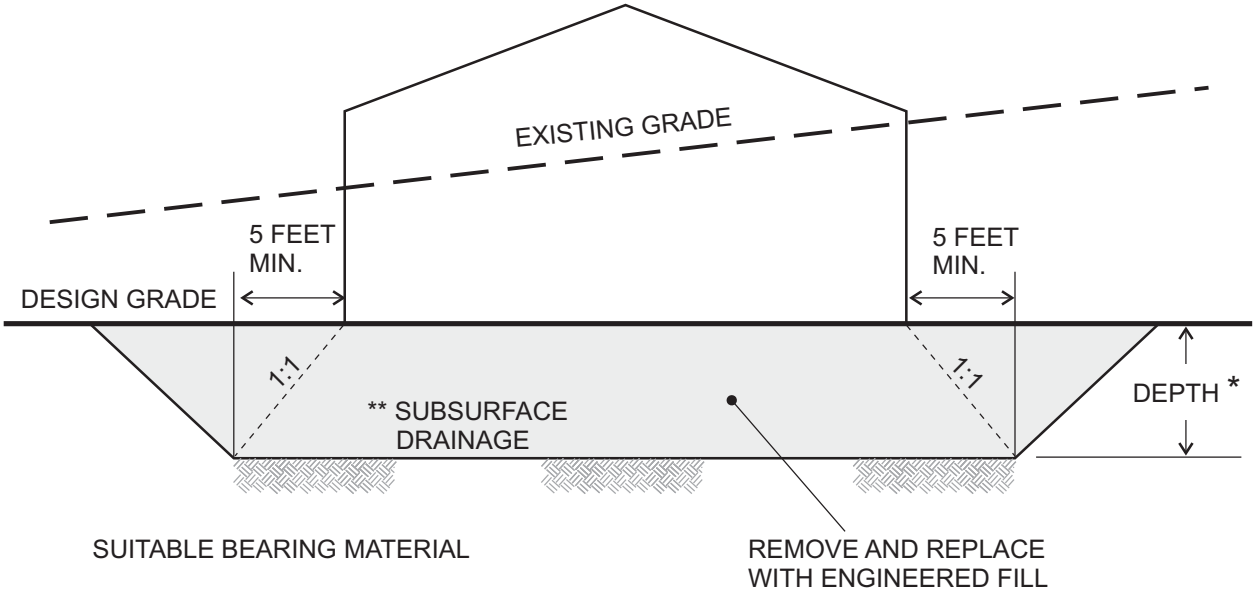
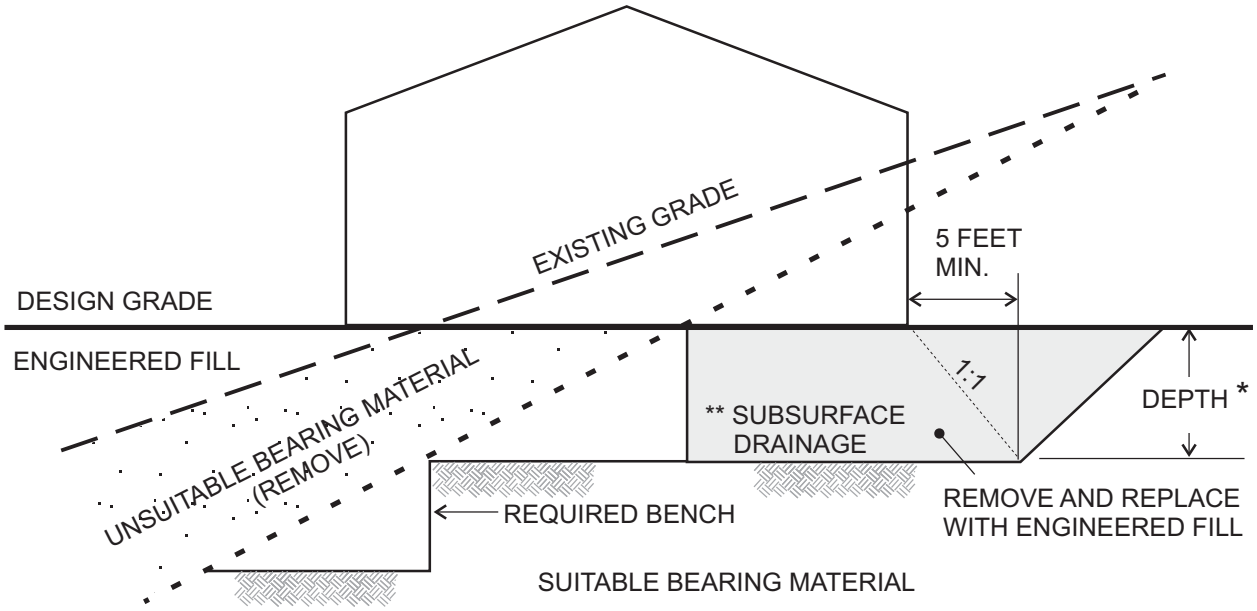
ADVANCED GEOTECHNICAL SOLUTIONS

PARTIAL CUT SLOPE STABILIZATION

DETAIL 7



CUT LOT OVEREXCAVATION



CUT-FILL LOT OVEREXCAVATION

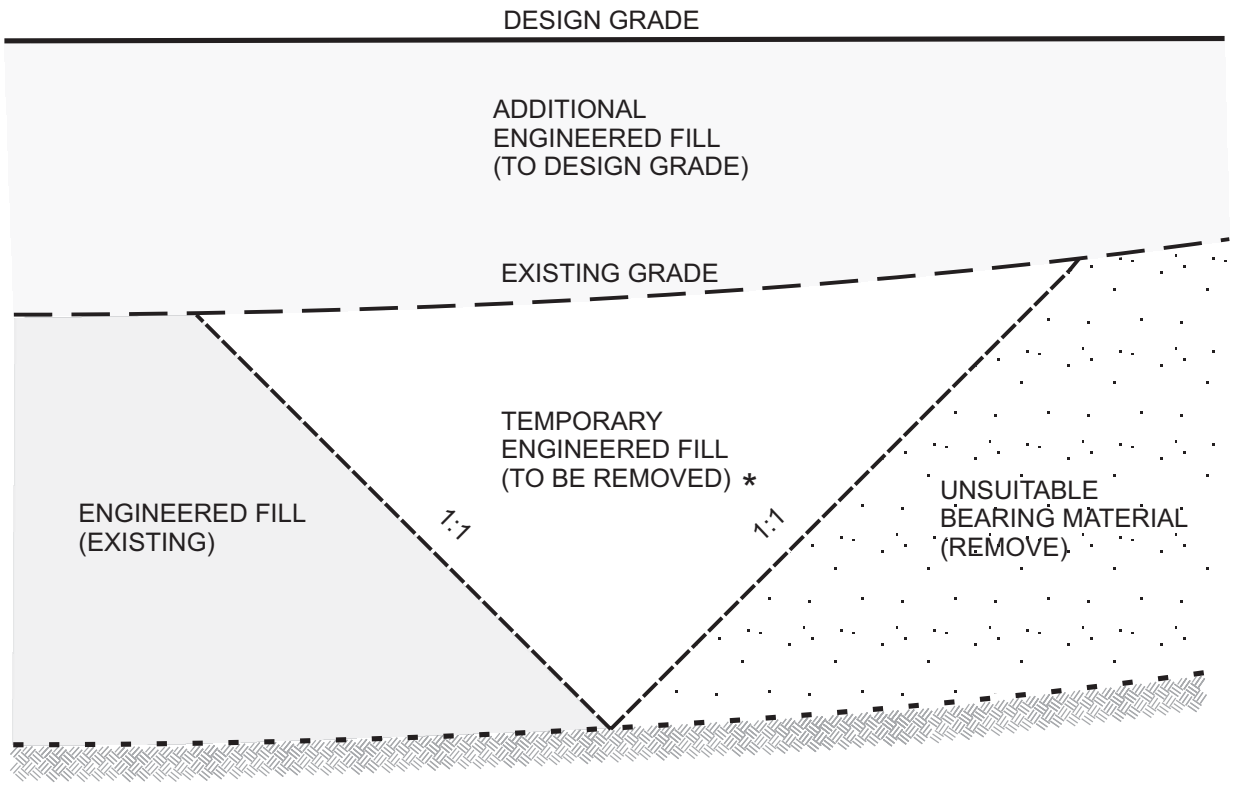
NOTES:

* SEE REPORT FOR RECOMMENDED DEPTHS, DEEPER OVEREXCAVATION MAY BE REQUIRED BY THE GEOTECHNICAL CONSULTANT BASED ON EXPOSED FIELD CONDITIONS

** CONSTRUCT EXCAVATION TO PROVIDE FOR POSITIVE DRAINAGE TOWARDS STREETS, DEEPER FILL AREAS OR APPROVED DRAINAGE DEVICES BASED ON FIELD CONDITIONS

VER 1.0 NTS

AGS ADVANCED GEOTECHNICAL SOLUTIONS	CUT & CUT-FILL LOT OVEREXCAVATION	DETAIL 8



* REMOVE BEFORE PLACING ADDITIONAL ENGINEERED FILL

TYPICAL UP-CANYON PROFILE

VER 1.0

NTS

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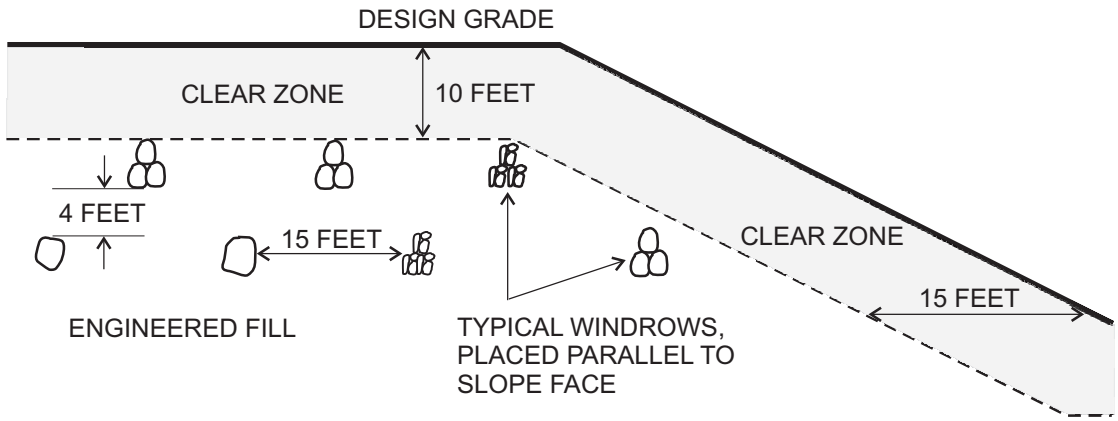
ADVANCED GEOTECHNICAL SOLUTIONS

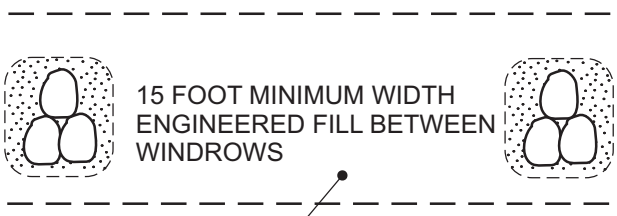
REMOVAL ADJACENT TO EXISTING FILL

DETAIL 9



CLEAR ZONE DIMENSIONS FOR REFERENCE ONLY, ACTUAL DEPTH, WIDTH, WINDROW LENGTH, ETC. TO BE BASED ON ELEVATIONS OF FOUNDATIONS, UTILITIES OR OTHER STRUCTURES PER THE GEOTECHNICAL CONSULTANT OR GOVERNING AGENCY APPROVAL

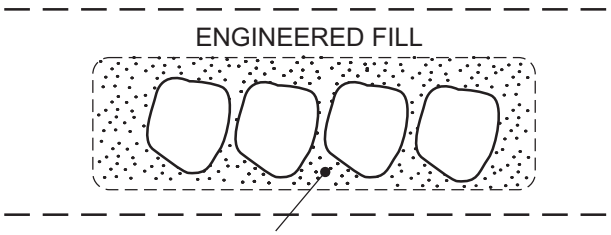
OVERSIZED MATERIAL DISPOSAL PROFILE



HORIZONTALLY PLACED ENGINEERED FILL, FREE OF OVERSIZED MATERIALS AND COMPACTED TO MINIMUM PROJECT STANDARDS

COMPACT ENGINEERED FILL ABOVE OVERSIZED MATERIALS TO FACILITATE "TRENCH" CONDITION PRIOR TO FLOODING GRANULAR MATERIALS

WINDROW CROSS-SECTION



WINDROW PROFILE

VER 1.0

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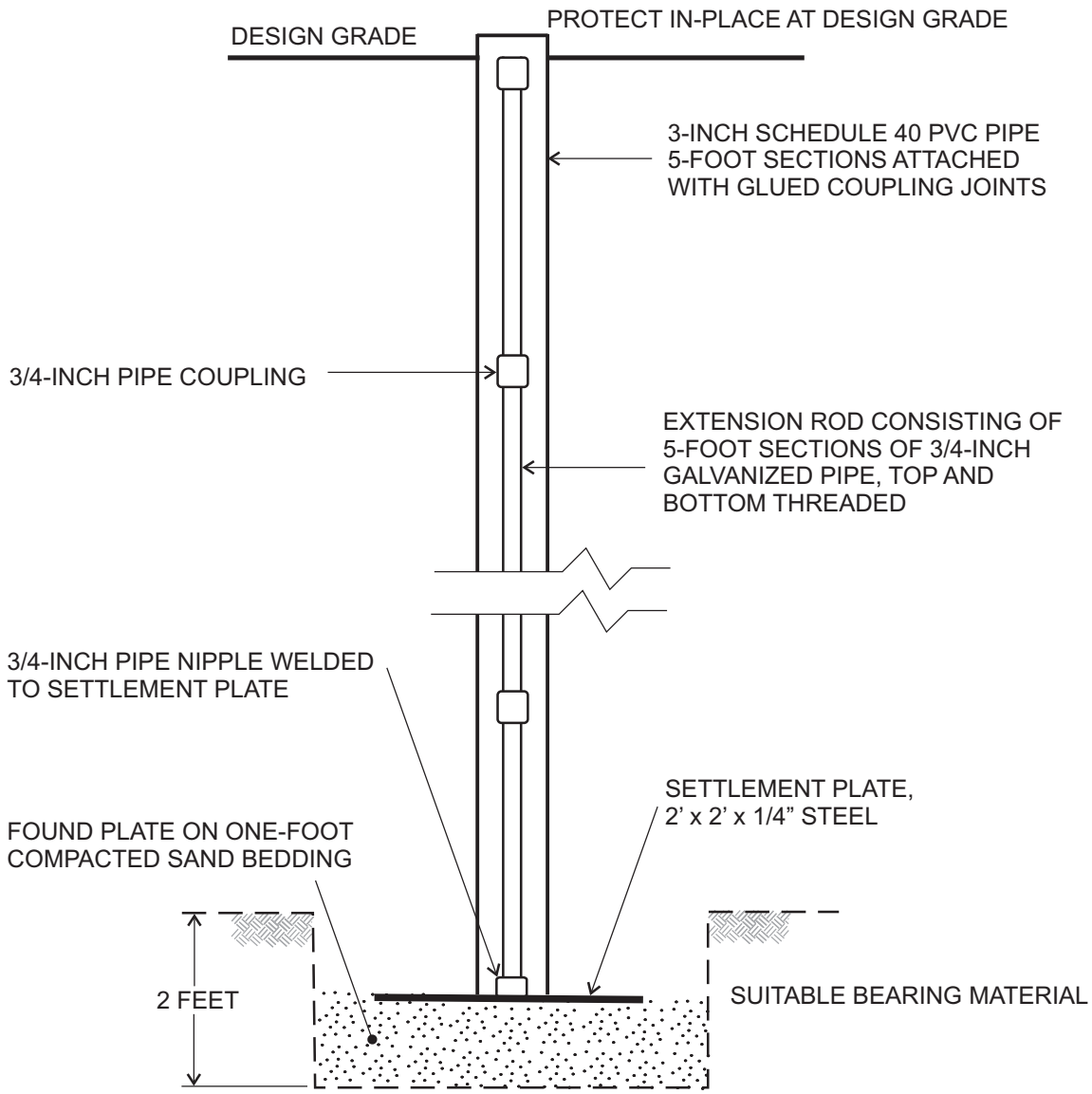
ADVANCED GEOTECHNICAL SOLUTIONS

OVERSIZED MATERIAL DISPOSAL CRITERIA

DETAIL 10



NOTES:

1. SETTLEMENT PLATE LOCATIONS SHALL BE SUFFICIENTLY IDENTIFIED BY THE CONTRACTOR AND BE READILY VISIBLE TO EQUIPMENT OPERATORS.

2. CONTRACTOR SHALL MAINTAIN ADEQUATE HORIZONTAL CLEARANCE FOR EQUIPMENT OPERATION AND SHALL BE RESPONSIBLE FOR REPAIRING ANY DAMAGE TO SETTLEMENT PLATE DURING SITE CONSTRUCTION.

3. A MINIMUM 5-FOOT ZONE ADJACENT TO SETTLEMENT PLATE/EXTENSION RODS SHALL BE ESTABLISHED FOR HAND-HELD MECHANICAL COMPACTION OF ENGINEERED FILL. ENGINEERED FILL SHALL BE COMPACTED TO MINIMUM PROJECT STANDARD.

4. ELEVATIONS OF SETTLEMENT PLATE AND ALL EXTENSION ROD PLACEMENT SHALL BE DOCUMENTED BY PROJECT CIVIL ENGINEER OR SURVEYOR.

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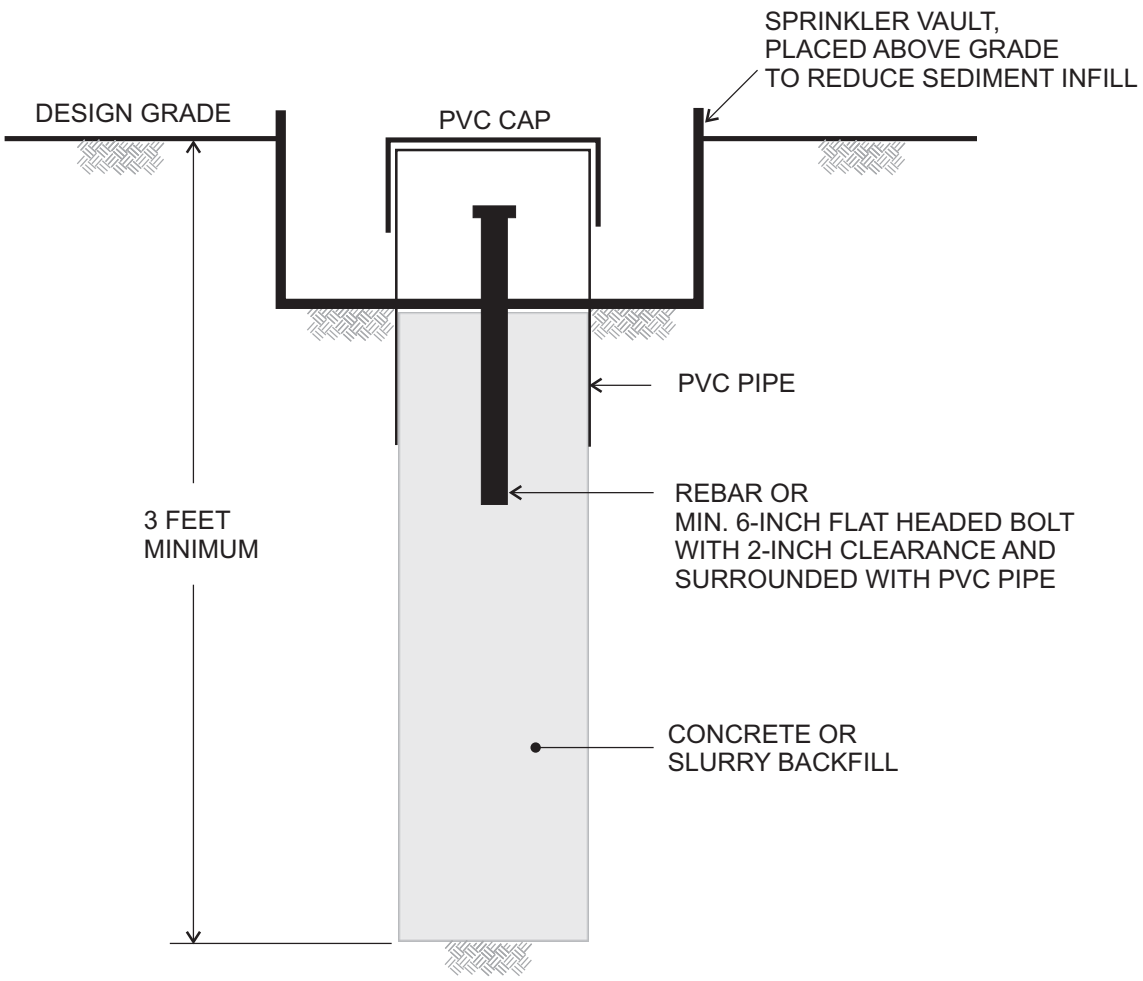
SETTLEMENT PLATE

DETAIL 11



NOTES:

1. SETTLEMENT MONUMENT LOCATIONS SHALL BE SUFFICIENTLY IDENTIFIED AND BE READILY VISIBLE TO EQUIPMENT OPERATORS.

2. ELEVATIONS OF SURFACE MONUMENTS SHALL BE DOCUMENTED BY PROJECT CIVIL ENGINEER OR SURVEYOR.

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SETTLEMENT MONUMENT

DETAIL 12