# APPENDIX D
## Geotechnical Investigation

Geotechnical
Environmental
Hydrogeology
Material Testing
Construction Inspection

May 8, 2020 Project No. 20-7009

Robert Hoff
Hilltop 3 Development, LLC
3875 Crest Drive
Yorba Linda, CA 92886

Subject: Preliminary Geotechnical Investigation Report, Tentative Parcel Map No. 2020-125, Yorba Linda, California

Robert,

In accordance with your request and authorization, TGR Geotechnical, Inc. (TGR) has performed a preliminary geotechnical investigation for the proposed development at the subject site. This report presents the findings of our limited geotechnical investigation, including site seismicity and provides preliminary design geotechnical recommendations for the proposed development. The work was performed in general accordance with our proposal dated February 5, 2020 and your subsequent authorization to proceed.

It is our understanding that the proposed development will consist of the construction of a single-family residence. The proposed development is suitable from a geotechnical viewpoint provided the recommendations presented in this report are incorporated during design and construction.

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

Respectfully submitted,

***TGR GEOTECHNICAL, INC.***



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Attachments

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Plate 2 – Geotechnical Cross-Section A-A', B-B' and C-C'
Figure 1 – Site Location Map
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Appendix E – Earthwork and Grading Guidelines

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# INTRODUCTION

## Site Description and Proposed Project Development

It is our understanding that the proposed development consists of a single-family residence located off of Fairmont Boulevard, Yorba Linda, California. The subject property is an ascending slope and hilltop. The site is bounded on the north by the Yorba Linda Water District (YLWD) Little Canyon Reservoir; on the south by residential development and Fallen Leaf Road; on the east by residential development and Fairmont Blvd; and on the west by undeveloped land The approximate site location is presented in the Site Location Map (Figure 1).

The proposed residential development will consist of a single building pad at the northeast portion of the site with a pad elevation of 965 feet above mean sea level (amsl). A large fill/cut slope ranging up to approximately 185 feet in height is proposed to the south and west of the building pad. Access to the pad area will be via a road constructed within the slope area. The maximum anticipated cut is approximately 50 feet at the southwest portion of the site. The maximum anticipated fill is approximately 50 feet in the central portion of the site. The maximum proposed cut slope is 185 feet and the maximum proposed fill slope is 150 feet. Fill and cut slope gradients are 2H:1V (horizontal:vertical).

## Reports by Others

A geotechnical investigation report was previously prepared by Converse Ward Davis Dixon, Inc. (Converse, 1981) for the existing YLWD Little Canyon Reservoir which is located directly north of the subject site. TGR reviewed Converse's report in preparing this report.

## Scope of Work

The scope of work for this geotechnical investigation included the following:

- Site reconnaissance.
- Review of readily available geotechnical and geologic reports for nearby properties.
- Sampling and logging three (3) large diameter (24") borings utilizing a bucket auger drill rig to depths ranging from 31 to 75 feet at the subject site to evaluate subsurface soil conditions. The borings were backfilled with cuttings and any excess soil was disposed onsite.
- Laboratory testing of selected samples to include in-situ moisture density, maximum density and optimum moisture content, shear, expansion, and sulfate.
- Engineering analysis including static slope stability, seismic slope stability including evaluation of seismic displacement, foundation and retaining wall design.
- Preparation of this appropriately illustrated report, including geologic cross-sections. The report summarizes the results of the geologic and geotechnical investigation, evaluate subsurface soil condition, site seismicity, and slope stability.

Field Investigation

Field exploration was performed on April 20 and 21, 2020 by a certified engineering geologist from our firm who logged the borings and obtained representative samples, which were subsequently transported to the laboratory for further review and testing. The approximate locations of the borings are indicated on the enclosed Geotechnical Map (Plate 1).

The subsurface conditions were explored by drilling, sampling, and down-hole logging three borings with a truck mounted bucket auger drill rig to approximate depths ranging from thirty-one (31) to seventy-five (75) feet below existing grade. Subsequent to drilling and logging, all borings were backfilled with cuttings. Soil descriptions were entered on the logs in general accordance with the Unified Soil Classification System (USCS). The logs of borings presenting soil conditions and descriptions are given in Appendix B.

The drill rig was equipped with a sampling apparatus to allow for recovery of driven modified California Ring Sampler (CRS), 3-inch outside diameter, and 2.42-inch inside diameter. Driven samples and bulk samples of the earth materials encountered at selected intervals were recovered from the borings.

The samples were driven using a Kelly bar falling freely from a height of 30 inches. The weight of the Kelly bar changed with increasing depth and was 3300 pounds in the upper 25 feet below ground surface, 2200 pounds between 25 and 50 feet below ground surface and 1100 pounds between 50 and 75 feet below ground surface. The locations and depths of the soil samples recovered are indicated on the logs in Appendix B.

Laboratory Testing

Laboratory tests were performed on representative samples to verify the field classification of the recovered samples and to evaluate the geotechnical properties of the subsurface soils. The following tests were performed:

- In-situ moisture content (ASTM D2216) and dry density (ASTM D7263);
- Maximum Dry Density and Optimum Moisture Content (ASTM D1557);
- Direct Shear Strength (ASTM D3080);
- Expansion Potential (ASTM D4829);
- Atterberg (ASTM D423); and
- Soluble Sulfate (CAL.417A)

Laboratory tests for geotechnical characteristics were performed in general accordance with the ASTM procedures. The results of the in-situ moisture content and density tests are shown on the borings logs. The results of the laboratory tests are presented in Appendix C.

## GEOTECHNICAL FINDINGS

Earth Units/Geology

The Bedrock exposed at the surface and underlying the general site area is part of the late Miocene aged Puente Formation. According to the USGS Professional Paper 420-B, Geologic Map of the Prado Dam and Yorba Linda Quadrangles, (Dunham and Yerkes, 1964), the bedrock at the subject site is the La Vida member of the Puente Formation which generally consists of interbedded siltstone and sandstone.

Groundwater

During the field exploration, groundwater was not encountered to the maximum depth drilled (approximately 75 feet). This site is underlain by bedrock and a review of the seismic hazard zone maps for the Yorba Linda quadrangle does not show groundwater mapped beneath the subject site.

Generally, seasonal and long-term fluctuations in the groundwater may occur as a result of variations in subsurface conditions, rainfall, run-off conditions and other factors. Therefore, variations from our observations may occur.

Faulting and Seismicity

We consider the most significant geologic hazard to be the potential for moderate to strong seismic shaking that is likely to occur at the subject site. The subject site is located in the highly seismic Southern California region within the influence of several faults that are considered to be active or potentially active. An active fault is defined by the State of California as a "sufficiently active and well-defined fault" that has exhibited surface displacement within the Holocene time (about the last 11,000 years). A potentially active fault is defined by the State as a fault with a history of movement within Pleistocene time (between 11,000 and 1.6 million years ago).

These active and potentially active faults are capable of producing potentially damaging seismic shaking at the site. It is anticipated that the subject site will periodically experience ground acceleration as a result of small to moderate magnitude earthquakes. Other active faults without surface expression (blind faults) or other potentially active seismic sources that are not currently zoned and may be capable of generating an earthquake are known to be present under the region.

Based on our review of the referenced geologic maps, as well as our field reconnaissance, the subject site is not included within any Earthquake Fault Zones as created by the Alquist-Priolo Earthquake Fault Zoning Act (Hart, 1997). Our review of geologic literature pertaining to the site area indicates that there are no known active or potentially active faults located within or immediately adjacent to the subject property. The nearest fault is the Whittier Fault located approximately 0.5 miles from the subject site. Other faults close to the site are Chino Fault (5.0 miles away), and Peralta Hills Fault (5.5 miles away). The Regional Fault Map (Figure 4) presents the location of the site with respect to the regional faults

Surface Fault Rupture and Ground Shaking

Since no known faults are located within the site, surface fault rupture is not anticipated. However, due to the close proximity of known active and potentially active faults, severe ground shaking should be expected during the life of the proposed structures.

Liquefaction

Liquefaction is a seismic phenomenon in which loose, saturated, fine-grained granular soils behave similarly to a fluid when subjected to high-intensity ground shaking. Liquefaction occurs when these ground conditions exist: 1) Shallow groundwater; 2) Low density, fine, clean sandy soils; and 3) High-intensity ground motion. Effects of liquefaction can include sand boils, settlement, and bearing capacity failures below foundations.

The site is underlain by bedrock. A review of the seismic hazard zone map of the Yorba Linda Quadrangle indicates that the subject site is not located within an area having a potential for earthquake induced liquefaction (Figure 5). As such, the potential for liquefaction at the subject site is considered to be negligible.

Seismically Induced Settlement

Ground accelerations generated from a seismic event can produce settlements in sands or in granular earth materials both above and below the groundwater table. This phenomenon is often referred to as seismic settlement and is most common in relatively clean sands, although it can also occur in other soil materials. Based on the nature of the soils (bedrock) underlying the site the potential for seismically induced settlement is considered negligible.

Lateral Spreading

Seismically induced lateral spreading involves primarily movement of earth materials due to earth shaking. Lateral spreading is demonstrated by near-vertical cracks with predominantly horizontal movement of the soil mass involved. Based on the nature of the soils (bedrock) underlying the site the potential for lateral spreading at the subject site is considered negligible.

Earthquake Induced Landsliding

A review of the seismic hazard zone map of the Yorba Linda Quadrangle indicates that the subject site is not located within an area having a potential for earthquake induced landsliding (Figure 5). The site is underlain by bedrock. The bedrock is overlain by approximately 2 to 3.5 feet of topsoil/colluvium. Evidence of ancient or recent landsliding was not observed on the property at the time of our field study and site visit. In addition, the property did not reveal the presence of past surficial slope failures.

Slope Stability

Slope stability calculations are presented in Appendix D on geologic cross-sections A-A', B-B' and C-C'. Based on the calculations, site slopes are considered grossly stable. Seismic displacement was calculated by evaluating the yield acceleration that corresponds to a safety factor of 1.0 and calculating seismic displacement per Bray and Travasarou (2007; 2009), Rathje and Antonakos (2011) and Song and Marek (2015) and taking the average of the two. The design minimum factors of safety under static loading conditions is 1.5. The acceptable seismic displacement is 5 cm for slide planes going through structures, 15 cm otherwise.

Presented below are the results of our slope stability analyses for cross sections A-A', B-B' and C-C':

| Cross Section | Static Safety Factor | Ky (g) | Displacement (cm) | Seismic Safety Factor |
|---|---|---|---|---|
| A – A' | 1.62 | 0.30 | 3.75 | 1.00 |
| B – B' | 1.70 | 0.36 | 1.22 | 1.01 |
| C-C' | 1.61 | 0.35 | 2.25 | 1.02 |

The soil shear strength parameters utilized in the slope stability calculations are presented below.

| Geologic Unit | Unit Weight (pcf) | Static Stability (Ultimate) | | Seismic Stability (Ultimate) | |
|---|---|---|---|---|---|
| | | Cohesion (Psf) | Friction Angle (degree) | Cohesion (Psf) | Friction Angle (degree) |
| Fill (95%) | 130 | 275 | 28 | 460 | 30 |
| (Tpl) Bedrock: Across Bedding | 130 | 198 | 36 | 428 | 47 |
| (Tpl) Bedrock: Along Bedding | 130 | 336 | 18 | 336 | 18 |

The surficial stability analysis indicated an adequate factor of safety. Calculations are presented in Appendix D.

## DISCUSSIONS AND CONCLUSIONS

### General

Based on our field exploration by others and geotechnical engineering analysis, the proposed development is considered suitable from a geotechnical viewpoint, provided the recommendations contained in this report are incorporated into the design and construction phases of the project. It is our opinion that the proposed development and proposed grading will be safe against hazard from landslide, settlement, or slippage, and the proposed construction will have no adverse effect on the geologic stability of the adjacent properties provided our recommendations presented in this report are followed.

### Conclusions

Based on our findings and analyses, the subject site is likely to be subjected to moderate to severe ground shaking due to the proximity of known active and potentially active faults. This may reasonably be expected during the life of the structure and should be designed accordingly.

The engineering evaluation performed concerning site preparation and the recommendations presented are based on information provided to us and obtained by us during our office and fieldwork. This report is prepared for the proposed residential development at the subject site. In the event that any significant changes are made to the proposed development, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed, and the recommendations of this report are verified or modified in writing by TGR.

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## RECOMMENDATIONS

Seismic Design Parameters

When reviewing the 2019 California Building Code, the following data should be incorporated into the design:

| | |
|---|---|
| Latitude (degree) | 33.908 |
| Longitude (degree) | -117.769 |
| Site Class | C |
| Site Coefficient, $F_a$ | 1.2 |
| Site Coefficient, $F_v$ | 1.4 |
| Mapped Spectral Acceleration at 0.2-sec Period, $S_s$ | 1.986 g |
| Mapped Spectral Acceleration at 1.0-sec Period, $S_1$ | 0.694 g |
| Spectral Acceleration at 0.2-sec Period Adjusted for Site Class, $S_{MS}$ | 2.383 g |
| Spectral Acceleration at 1.0-sec Period Adjusted for Site Class, $S_{M1}$ | 0.972 g |
| Design Spectral Acceleration at 0.2-sec Period, $S_{DS}$ | 1.589 g |
| Design Spectral Acceleration at 1.0-sec Period, $S_{D1}$ | 0.648 g |

The structural consultant should review the above parameters and the 2019 California Building Code to evaluate the seismic design.

Conformance to the criteria presented in the above table for seismic design does not constitute any type of guarantee or assurance that significant structural damage or ground failure will not occur during a large earthquake event. The intent of the code is “life safety” and not to completely prevent damage of the structure, since such design may be economically prohibitive.

Shallow Foundation Design Recommendations

Shallow foundations may be utilized to support the proposed development. Continuous or pad footings shall be supported on a minimum of three feet of engineered fill. It is recommended that the continuous footings be a minimum of 18 inches wide and a minimum of 24 inches deep. An allowable bearing capacity of 2500 psf is recommended for both pad and continuous footings. The minimum horizontal foundation setback for descending slopes is H/3 (maximum 40 feet), where H is the height of the slope. Deepened footings may be required to meet the setback requirement. The minimum horizontal setback for ascending slopes is H/2 (maximum 15 feet).

Fill slopes and pad areas consisting of expansive soils are expected to have some degree of slope creep and lot stretching/lateral fill extension. Slope creep and lot stretching/lateral fill extension are expected to be particularly prevalent within the outer fifteen (15) feet of the slope face. The amount of movement is difficult to determine and is dependent to some extent upon the height and angle of the slope, the degree of the expansion potential, and irrigation practices.

A minimum foundation setback of 15 feet from the outer edge of the top of slope for free-sanding walls to the slope face daylight is recommended.

The total settlement is not expected to exceed 1 inch. The differential settlement between columns is estimated as 1/2 inch.

The above values may be increased by one-third when considering short duration seismic or wind loads. The reinforcement should be designed by the project structural engineer.

Resistance to lateral loads including wind and seismic forces may be provided by frictional resistance between the bottom of concrete and the underlying fill soils and by passive pressure against the sides of the foundations. A coefficient of friction of 0.40 may be used between concrete foundation and underlying soil. The recommended passive pressure of the engineered fill may be taken as an equivalent fluid pressure of 250 pounds per cubic foot (2,500 psf max).

Retaining Wall Design Recommendations

Proposed retaining walls may be supported on shallow foundations or drilled piers as described below. The following soil parameters may be used for the design of retaining walls up to 10 feet high with level backfill or 2:1 backfill:

| Conditions | Equivalent Fluid Pressure (psf/ft) |
|---|---|
| Active (Level) | 45 |
| Active (2:1 Backfill) | 65 |
| At Rest (Level) | 60 |
| Allowable Passive | 275 (maximum 2750) |

- An allowable coefficient of friction between on-site soil and concrete of 0.35 may be used with the dead-load forces.
- Passive pressure and frictional resistance could be combined in determining the total lateral resistance. However, one of them shall be reduced by 50 percent.
- Walls near ascending slopes should be designed for creep loading.
- The passive pressure of the soil within the creep zone shall be ignored in the design.
- Retaining walls over 6 feet high shall be designed for a seismic lateral load of $17H^2$ pounds. The seismic load shall be applied at a distance of 0.6H above the base of the wall.
- Drilled piers should be designed for the passive pressure presented above.

Retaining structures should be provided with a drainage system to prevent buildup of hydrostatic pressure behind the walls unless the wall is designed for the added hydrostatic pressure. Provisions should be made to collect and dispose of excess water away from the wall. Wall drainage may be provided by a perforated pipe encased in gravel or crushed rock and enclosed by geo-synthetic filter fabric. We do not recommend omitting the drains behind walls.

In addition to the above lateral forces due to retained earth, surcharge due to improvements, such as an adjacent walkway, should be considered in the design of the retaining wall. A minimum vertical surcharge load of 300 psf should be used in design of walls due to adjacent traffic unless the traffic is kept at least 10 feet from the walls. Loads applied within a 1:1 projection from any surcharging structure on the stem of the wall shall be considered as lateral surcharge. For uniform lateral surcharge conditions applied to free-to-deflect walls we recommend utilizing a minimum horizontal load equal to 33 percent of the vertical load and should be applied uniformly over the entire height of the wall.

Cement Type and Corrosion

Preliminary testing indicates that concrete used should be designed in accordance with the provisions of ACI 318 for Exposure Class S0. However, due to the presence of gypsum within the bedrock, testing of soils at the completion of grading should be performed to determine sulfate content.

TGR does not practice corrosion engineering. If needed, a qualified specialist should review the site conditions and evaluate the corrosion potential of the site soil to the proposed improvements and to provide the appropriate corrosion mitigations for the project.

Expansive Soils

The near surface site soils have an expansion index of 41-58, which correlates to a low to medium expansion potential.

Shrinkage/Bulking

Removal and recompaction of the near surface soils (topsoil/colluvium) is estimated to result in shrinkage ranging from 10 to 15 percent. Removal and recompaction of the bedrock is estimated to result in bulking ranging from 0 to 5 percent.

Excavatability of Onsite Bedrock

The major portion of the proposed excavation is expected to be within bedrock. This material is expected to be excavatable by conventional earth-moving equipment. It is anticipated that, within the expected depth of excavation, no blasting will be required; However, some well cemented discontinuous zones which might require heavy ripping might be encountered during excavation. Zones of well cemented sandstone were encountered in boring BA-1 at depths ranging from 31 to 32 feet, 38 to 41 feet and 48 to 51 feet.

Slabs on Grade

Interior slabs may be supported on grade. The slab should be a minimum of 5-inches thick and reinforced with a minimum of No. 4 rebars at 12-inches on center. The slabs shall be supported on a minimum of three feet of engineered fill. All the interior slabs should be underlain by a minimum of fifteen- (15) mil thick Visqueen vapor barrier with all laps sealed. Two (2) inches of sand should be placed over the membrane as well as under the membrane. The subgrade material should be compacted to a minimum of 95 percent of the maximum laboratory dry density (ASTM 1557). Prior to placement of concrete, the subgrade soils should be well moistened to at least optimum moisture content to a depth of 18 inches. The slab should also be designed in accordance with 2019 CBC to include the expansive nature of the soil.

The structural details, such as slab thickness, concrete strength, amount and type of reinforcements, joint spacing, etc., should be established by the structural engineer.

Depending on the location of the building footprint, the slab may be underlain by a differential fill thickness. As such, consideration should be given to the use of a post-tensioned slab or interior grade beams to limit differential movement. Geotechnical recommendations can be provided upon request.

Flatwork Design

Flatwork should be a minimum of 4-inches thick should be reinforced with a minimum of No. 3 reinforcing bar on 12-inch centers in two horizontally perpendicular directions. Reinforcing should be properly supported to ensure placement near the vertical midpoint of the slab. "Hooking" of the reinforcement is not considered an acceptable method of positioning the steel. The slab should not be structurally connected to the buildings. The actual thickness, reinforcement, and spacing of control joints of the slab shall be designed by the structural engineer and should include the anticipated loading condition. The subgrade material should be compacted to a minimum of 95 percent of the maximum laboratory dry density (ASTM 1557) to a minimum depth of 12-inches. Prior to placement of concrete, the subgrade soils should be well moistened to at least optimum moisture content and verified by our field representative.

Site Development Recommendations

General

During earthwork construction, all site preparation and the general procedures of the contractor should be observed, and the fill selectively tested by a representative of TGR. If unusual or unexpected conditions are exposed in the field, they should be reviewed by this office and if warranted, modified and/or additional recommendations will be offered.

Grading

All grading should conform to the guidelines presented in the Appendix E, California Building Code (2019 edition), except where specifically superseded in the text of this report. Prior to grading, TGR's representative should be present at the pre-construction meeting to provide grading guidelines, if needed, and review any earthwork.

Site Preparation

Prior to initiating grading operations, any existing vegetation, debris, oversized materials (greater than 4 inches), and other deleterious materials within fill areas should be removed.

Surficial Soil Removals

The existing fill, topsoil, colluvium and weathered bedrock materials should be removed to expose competent bedrock as directed by the project geotechnical engineer or engineering geologist. Based on our subsurface exploration the upper approximately 3 to 9 feet of onsite materials will require removal. The actual removal depths should be determined in the field as conditions are exposed.

Treatment of Removal Bottoms

Soils exposed within areas approved for fill placement should be scarified to a depth of 6 inches, conditioned to near-optimum moisture content, then compacted in-place to project standards.

Fill Placement
The onsite soils may be used as compacted fill provided, they are free or organic materials and debris. Fills should be placed in relatively thin lifts, brought to near optimum moisture content, then compacted to at least 95 percent relative compaction based on laboratory standard ASTM D-1557.

Compaction
Prior to fill placement, the exposed surface should be scarified to a minimum depth of six (6) inches, fill placed in six (6) inches loose lifts, moisture conditioned to at least optimum moisture content, and compacted to a minimum relative compaction of ninety-five (95) percent in accordance with ASTM D 1557.

Fill Slopes
Permanent fill slopes should be constructed no steeper than 2H:1V and keyed and benched into approved bedrock materials. A minimum relative compaction of 95 percent out to the finish slope face for fill slopes is required. This may be achieved by either overbuilding the slope and cutting back to the compacted core, or by direct compaction of the slope face with suitable equipment, or by any other procedure which produces the required compaction.

The fill slopes shall have a subdrain system. Vertical spacing, outlet spacing, pipe and filter material should be in accordance with the recommendations presented in Appendix E – Earthwork and Grading Guidelines, Typical Stabilization and Buttress Fill Subdrain Detail.

Fill Keys and Benching
Fill keys should be constructed at the toe of the fill slope at the southeast portion of the site near the site entrance off Fairmont Blvd. See Plate 1, Geotechnical Map, for proposed fill key locations. The fill keys should have a minimum width of 25 feet and a minimum depth of 5 feet into competent bedrock. All fill keys should be observed and approved by the project geotechnical consultant prior to placing fill. Fills placed on slopes steeper than 5H:1V should be keyed and benched into competent bedrock as the fills are placed. See Appendix E. Earthwork and grading Guidelines (Typical Fill over Natural Slope detail) for benching recommendations.

Cut Slopes
The proposed cut slope located in the west-southwest portion of the site is anticipated to expose bedrock with bedding favorable to slope stability. As such, this slope is anticipated to be grossly stable. The cut slope should be observed during excavation to verify that existing conditions are consistent with those anticipated. If adverse bedrock conditions are encountered, appropriate remedial recommendations shall be provided by the geotechnical consultant.

Cut/Fill Transition
The building pad will have a cut/fill transition. Typical recommendations for over-excavation of the cut portion of the cut/fill transition are presented in Appendix E, Earthwork and grading Guidelines (Typical Overexcavation of Daylight Line detail). However, due to the anticipated differential pad fill thickness, TGR recommends that the cut portion of the cut fill transition be overexcavated a minimum of 10 feet below pad grade.

Trenching
All excavations should conform to CAL-OSHA and local safety codes.

Drainage

Positive site drainage should be maintained at all times. Drainage should not flow uncontrolled down any descending slope or retaining wall. Water should be directed away from foundations and not allowed to pond and/or seep into the ground. Pad drainage should be directed towards the street/parking or other approved area. Roof gutters and down spouts should be utilized to control roof drainage. Down spouts should outlet a minimum of 5 feet from the proposed structure or into an approved subsurface drainage system. We would recommend that any proposed open-bottom planters adjacent to proposed structures be eliminated for a minimum distance of 10 feet. As an alternative, closed-bottom type planters could be utilized. An outlet placed in the bottom of the planter could be installed to direct drainage away from structures or any exterior concrete flatwork.

Utility Trench Backfill

All utility trench backfills in structural areas and beneath hardscape features should be brought to at least optimum moisture content and compacted to a minimum relative compaction of 90 percent of the laboratory standard. Flooding/jetting is not recommended.

Sand backfill, (unless trench excavation material), should not be allowed in parallel exterior trenches adjacent to and within an area extending below a 1:1 plane projected from the outside bottom edge of the footing. All trench excavations should minimally conform to CAL-OSHA and local safety codes. Soils generated from utility trench excavations may be used provided it is moisture conditioned and compacted to 90 percent minimum relative compaction.

Temporary Excavation Recommendations

Soils may be cut vertically without shoring to a depth of approximately four (4) feet below adjacent grade. For deeper cuts, the slopes should be properly shored or sloped back to at least 1H:1V or flatter. The exposed slope face should be kept moist (but not saturated) during construction to reduce local sloughing. No surcharge loads should be permitted within a horizontal distance equal to the height of cut from the toe of excavation unless the cut is properly shored. Excavations that extend below an imaginary plane inclined at 45 degrees below the edge of any nearby adjacent existing site facilities should be properly shored to maintain foundation support for the adjacent structures.

Preventative Slope Maintenance

For the slopes, it is important to reduce the risk of problems relating to slope instability. It is recommended that a program be implemented for aggressive slope maintenance to include; annual cleanout of drains, elimination of burrowing rodents, maintaining drought and fire resistant, deep-rooted ground cover, and proper irrigation.

Hillside properties are typically subject to potential geotechnical hazards including mudslides, spalling of slopes, erosion, and concentrated flows. It must be emphasized that responsible maintenance of these slopes, and the property in general, by the owner, using proper methods, can reduce the risk of these hazards significantly.

Geotechnical Review of Plans

All grading and foundation plans should be reviewed and accepted by the geotechnical consultant prior to construction. If significant time elapses since preparation of this report, the geotechnical consultant should verify the current site conditions, and provide any additional recommendations (if necessary) prior to construction.

Geotechnical Observation/Testing During Construction

Per sections 1705.6 and table 1705.6 of the 2019 California Building Code, periodic special inspection shall be performed to:

- Verify materials below shallow foundations are adequate to achieve the design bearing capacity;
- Verify excavations are extended to the proper depth and have reached proper material;
- Verify classification and test compacted materials; and
- Prior to placement of compacted fill, inspect subgrade and verify that the site has been prepared properly

Per sections 1705.6 and table 1705.6 of the 2019 California Building Code, continuous special inspection shall be performed to:

- Verify use of proper materials, densities and lift thickness during placement and compaction of compacted fill.

The geotechnical consultant should also perform observation and/or testing at the following stages:

- During any grading and fill placement;
- Prior to pouring foundation or flatwork concrete;
- During trench excavation;
- Excavation bottom;
- Placement of bedding material;
- During trench backfill;
- Subgrade for flatwork;
- When any unusual soil conditions are encountered during any construction operation subsequent to issuance of this report.

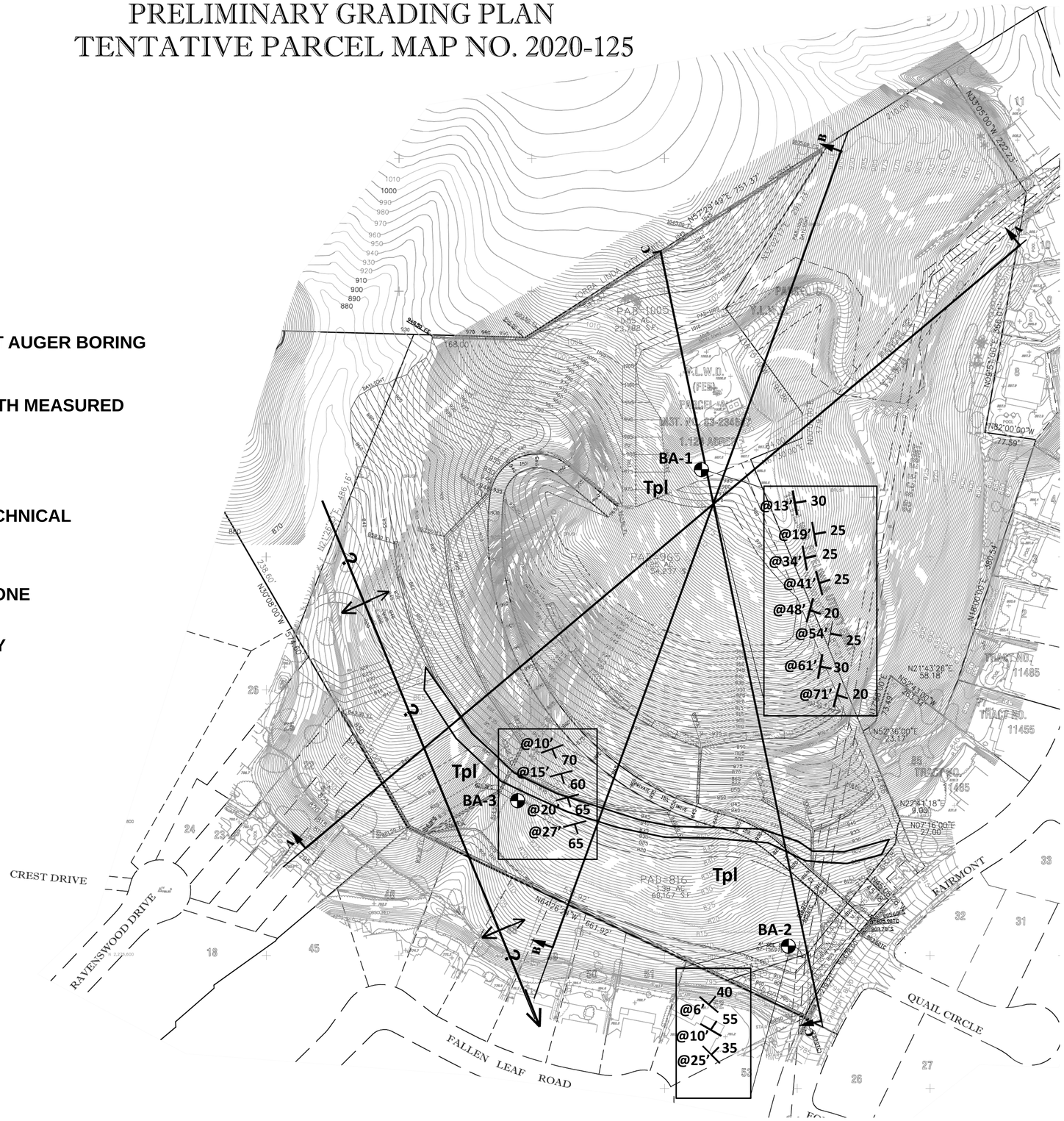
Limitations

This report was prepared for a specific client and a specific project, based on the client's needs, directions and requirements at the time.

This report was necessarily based in part upon data obtained from a limited number of observances, site visits, soil and/or other samples, tests, analyses, histories of occurrences, spaced subsurface exploration and limited information on historical events and observations. Such information is necessarily incomplete. Variations can be experienced within small distances and under various climatic conditions. Changes in subsurface conditions can and do occur over time.

This report is not authorized for use by and is not to be relied upon by any party except the client with whom TGR contracted for the work. Use or reliance on this report by any other party is that party's sole risk. Unauthorized use of or reliance on this report constitutes and agreement to defend and indemnify TGR from and against any liability which may arise as a result of such use or reliance, regardless of any fault, negligence, or strict liability of TGR.

# PRELIMINARY GRADING PLAN
# TENTATIVE PARCEL MAP NO. 2020-125




SCALE: 1"= 60'

0 60' 120'

## EXPLANATION:

BA-1 — APPROXIMATE LOCATION OF BUCKET AUGER BORING BY TGR

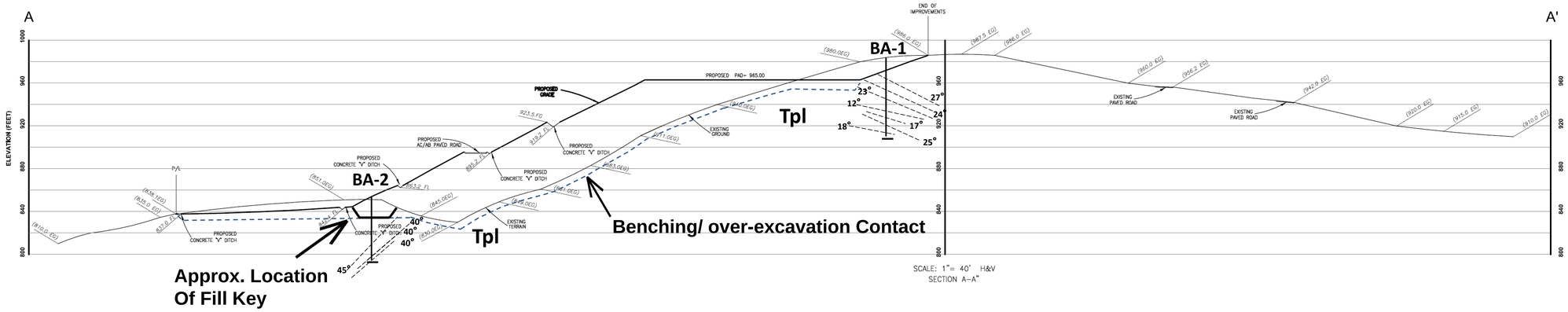
@10' 25 — STRIKE AND DIP OF BEDDING, At DEPTH MEASURED

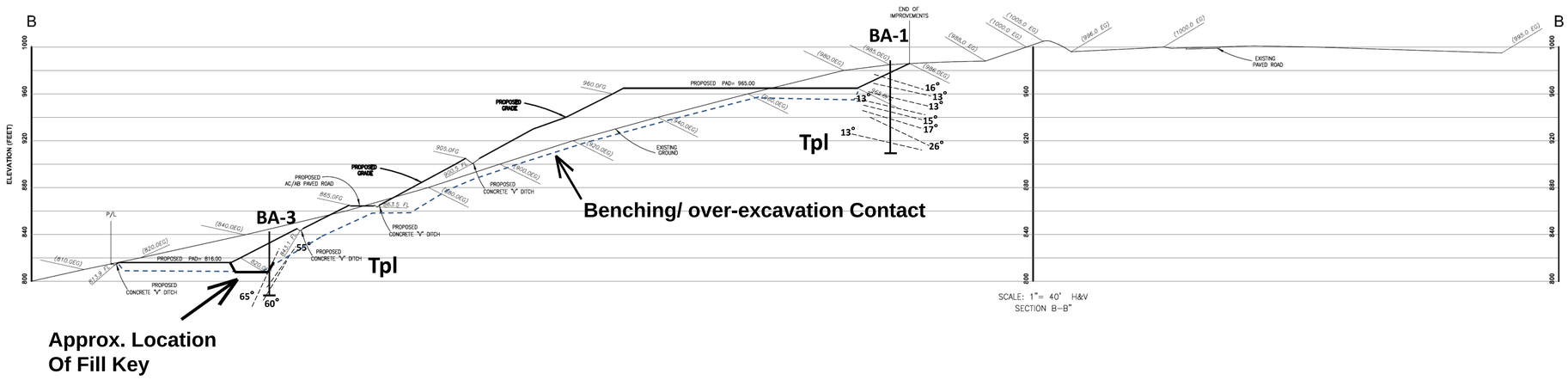
ANTICLINAL FOLD AXIS

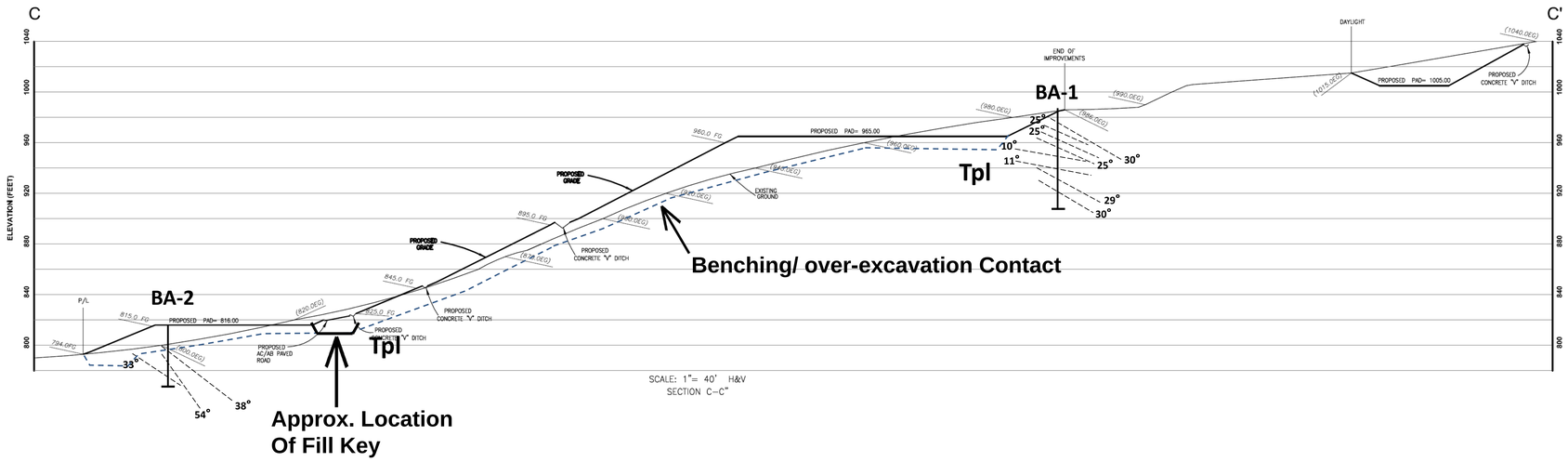
APPROXIMATE LOCATION OF GEOTECHNICAL BORINGS

Tpl — PUENTE FORMATION, SILTY SANDSTONE

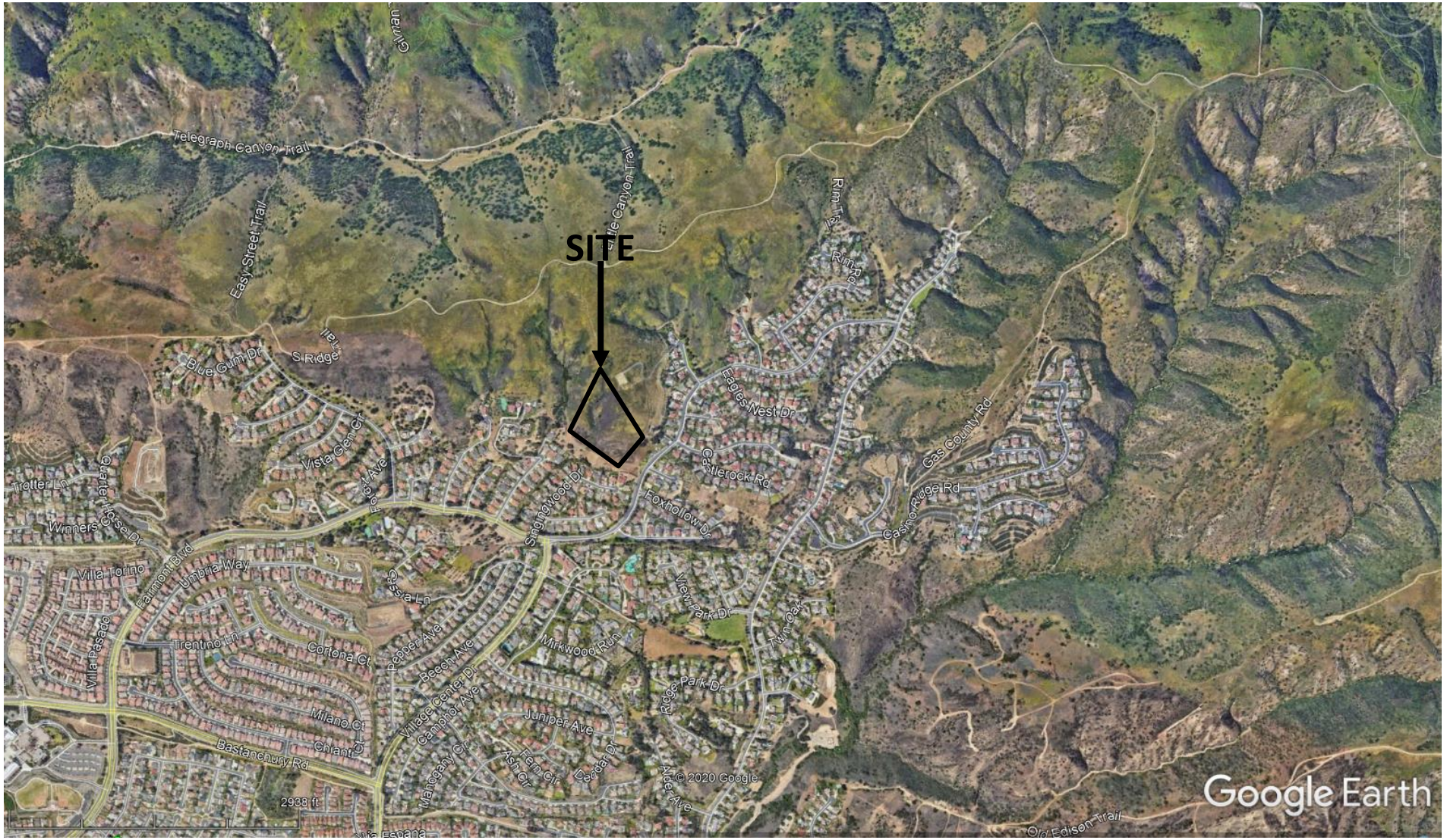
APPROXIMATE LOCATION OF FILL KEY




**SEE PLATE 1 FOR EXPLANATION**

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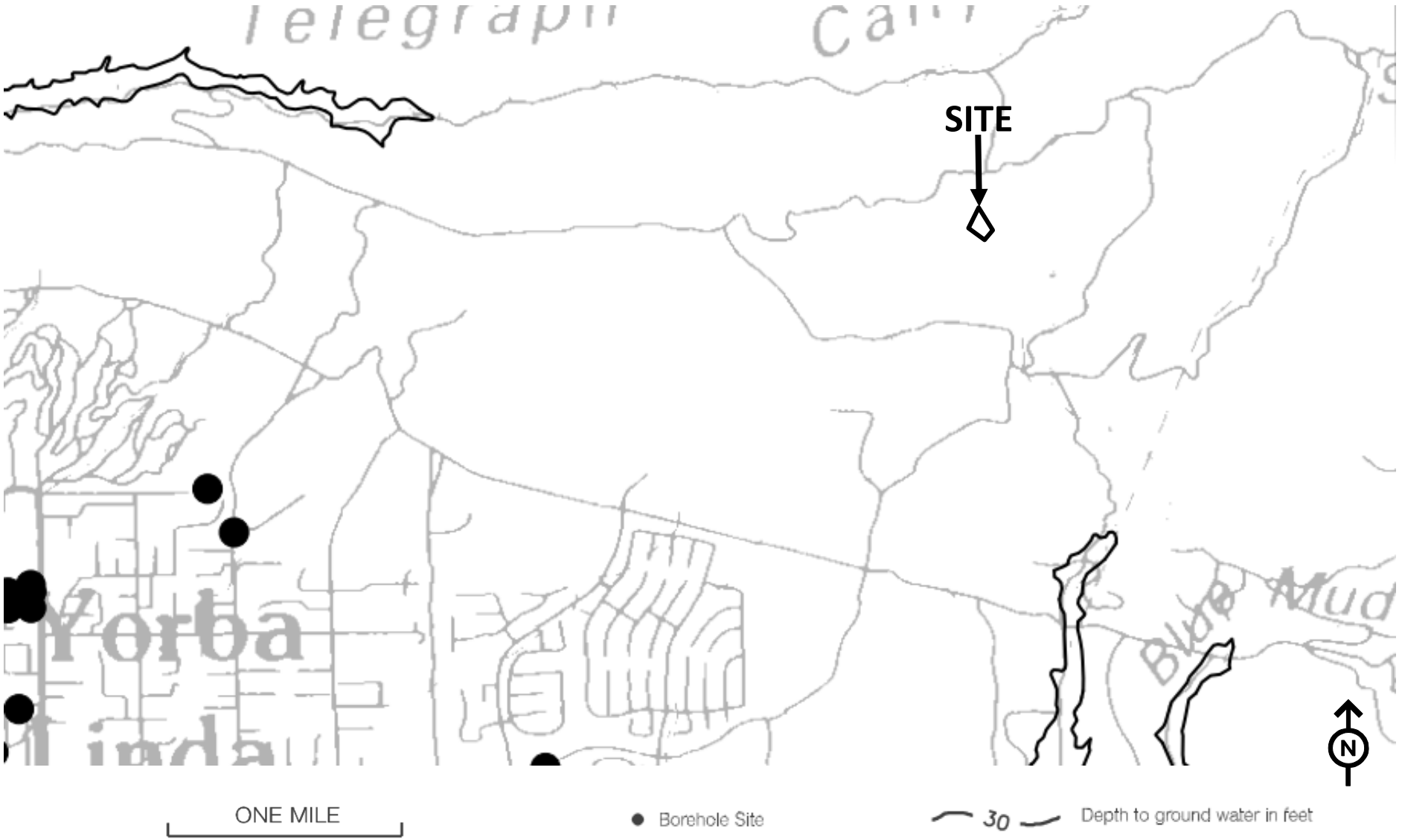
SITE LOCATION MAP
HOFF PROPERTY
FAIRMONT BOULEVARD, YORBA LINDA, CALIFORNIA

PROJECT NO. 20-7009

FIGURE 1



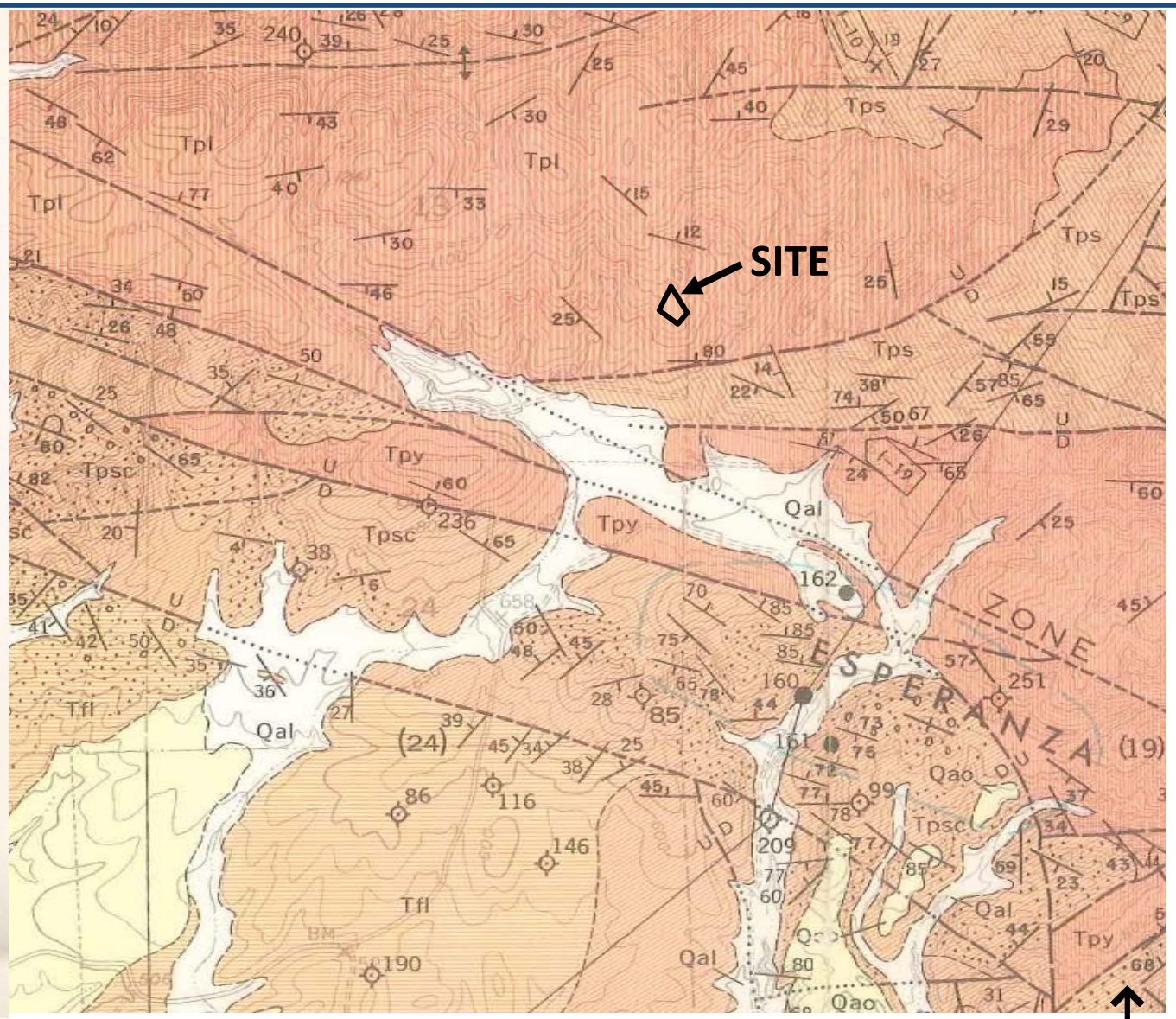

Modified From: California Department of Conservation, Division of Mines and Geology, 2005, Seismic Hazard Zone Report for the Yorba Linda 7.5-Minute Quadrangles, Los Angeles, Orange and San Bernardino Counties, California, Report 010.

TGR Geotechnical Environmental Hydrogeology Material Testing Construction Inspection

# HISTORIC HIGH GROUNDWATER MAP
# HOFF PROPERTY
# FAIRMONT BOULEVARD, YORBA LINDA, CALIFORNIA

PROJECT NO. 20-7009

FIGURE 2




Tpsc

Sycamore Canyon member

*Light-yellowish-brown to brown pebble conglomerate and conglomeratic sandstone; light-yellowish-brown fine- to medium-grained thin-bedded to massive feldspathic sandstone; and light-gray fairly well bedded to massive siltstone. Rapid lateral gradations in lithology. In Prado Dam quadrangle, uppermost part is white sandstone, gravel, and siltstone, possibly of Pliocene age in part. Sandstone and conglomerate units shown by lithologic symbols*

Tpy

Yorba member

*Dark-brown to pinkish-gray poorly bedded siltstone with hackly fracture; light-gray to white platy siltstone; soft brownish-gray paper-thin siltstone; light-gray punky diatomaceous siltstone; locally with brownish-gray medium- to coarse-grained sandstone beds. Sandstone units shown by lithologic symbol*

Tps

Soquel member

*Upper part: light-gray to light-yellowish-brown medium-grained to pebbly feldspathic sandstone with interbedded light-gray to light-yellowish-brown siltstone; numerous 2- to 12-foot rounded boulders of granitic rock along northern border of Yorba Linda quadrangle; lower part: light-gray to light-yellowish-brown thick-bedded to massive medium- to coarse-grained and pebbly feldspathic sandstone, commonly with large concretions; minor amounts of interbedded siltstone. Sandstone and conglomerate units shown by lithologic symbols*

Tpl tu

La Vida member

*Gray to white platy siltstone with white limy concretions and brownish-gray to light-gray soft micaceous siltstone; thin interbedded light-gray sandstone; tan andesitic tuff,* tu. *Sandstone units shown by lithologic symbol*

D.L. Durham and R.F. Yerkes, Geologic map of the Prado Dam and Yorba Linda (eastern Puente Hills), Los Angeles, Orange, Riverside and San Bernardino Counties, California: U.S. Department of the Interior Geological Survey, Professional Paper 420-B, Plate 1, scale 1:24,000.

N

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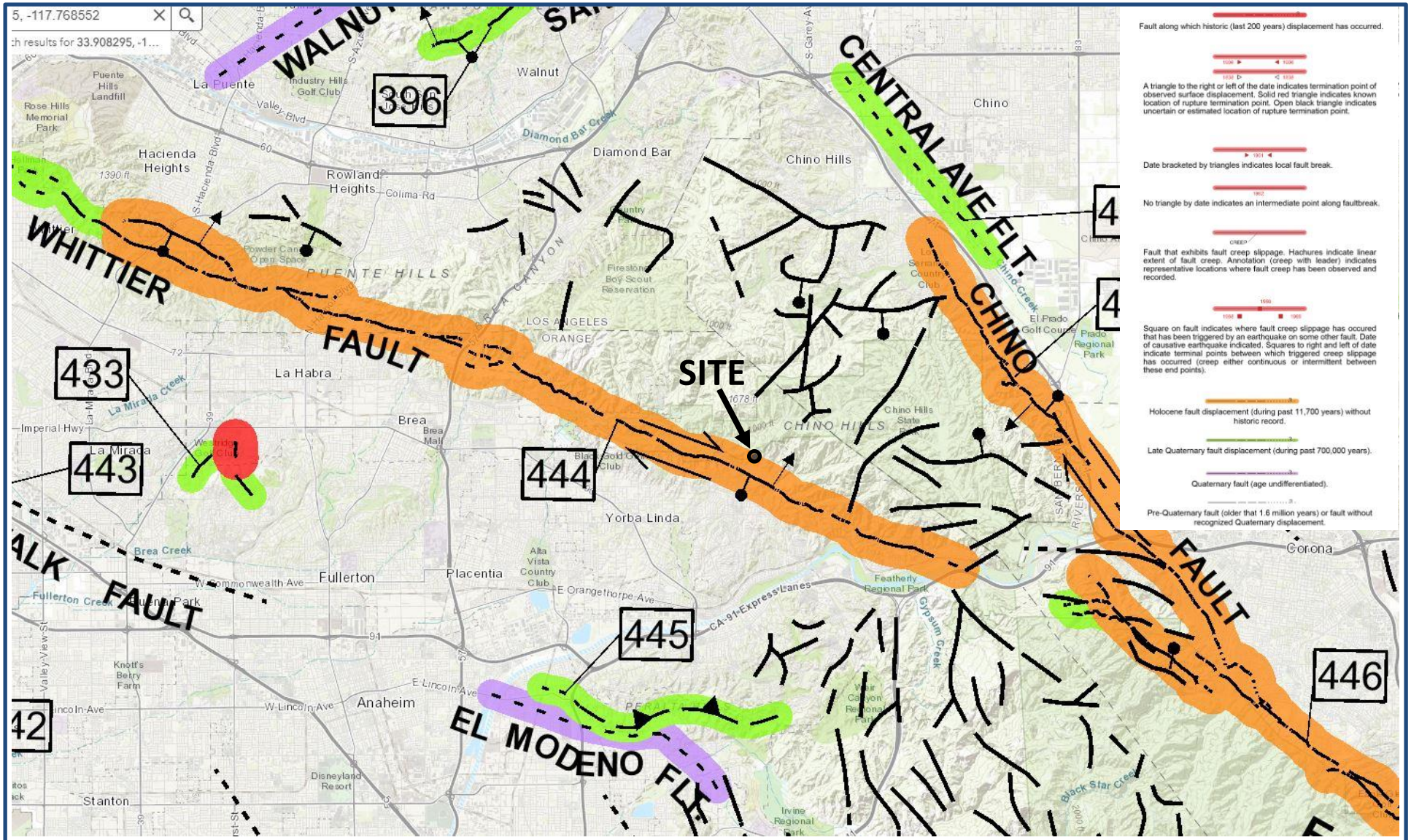
# REGIONAL GEOLOGY MAP
# HOFF PROPERTY
# FAIRMONT BOULEVARD, YORBA LINDA, CALIFORNIA

PROJECT NO. 19-6969

FIGURE 3




Modified From: Jennings, C. W., 2010, Fault Activity Map of California and Adjacent Areas, California Division of Mines and Geology, Geologic Data Map Series, No. 6, Scale 1:750,000.

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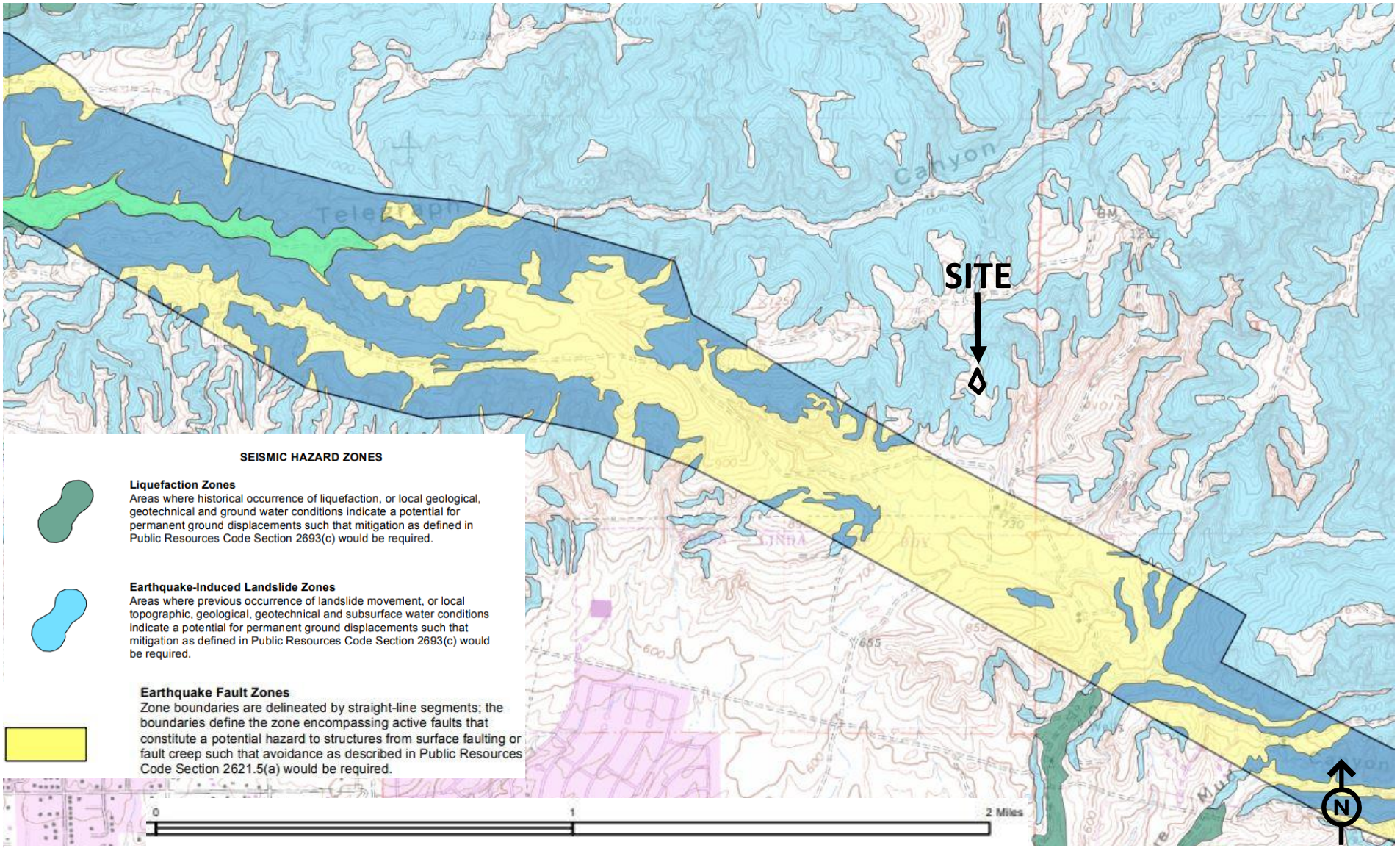
# REGIONAL FAULT MAP
# HOFF PROPERTY
# FAIRMONT BOULEVARD, YORBA LINDA, CALIFORNIA

PROJECT NO. 20-7009

FIGURE 4




Modified From: State of California Division of Mines and Geology, Earthquake Zones of Required Investigation, Yorba Linda Quadrangle Released December 4, 2015, scale 1:24,000

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# SEISMIC HAZARD ZONE MAP
# HOFF PROPERTY
# FAIRMONT BOULEVARD, YORBA LINDA, CALIFORNIA

PROJECT NO. 20-7009

FIGURE 5

# APPENDIX A
# REFERENCES

TGR GEOTECHNICAL
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www.tgrgeotech.com

# APPENDIX A

## References

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International Conference of Building Officials, 2019, California Building Code, Part 1 and 2.

Fault Activity Map of California, 2010, California Geological Survey, Geologic Data Map No. 6 Compilation and Interpretation by: Charles W. Jennings and William A. Bryant, Graphics by: Milind Patel, Ellen Sander, Jim Thompson, Barbara Wanish and Milton Fonseca

# APPENDIX B
# LOG OF BORINGS

TGR GEOTECHNICAL
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THE FOLLOWING DESCRIBES THE TERMS AND SYMBOLS USED ON THE LOG OF BORINGS TO SUMMARIZE THE RESULTS OBTAINED IN THE FIELD INVESTIGATION AND SUBSEQUENT LABORATORY TESTING.

## DENSITY AND CONSISTENCY

The consistency of fine grained soils and the density of coarse grained soils are described on the basis of the Standard Penetration Test as follows:

| COARSE GRAINED SOILS | | Estimated Unconfined Compressive Strength (Tsf) | FINE GRAINED SOILS | |
|---|---|---|---|---|
| Very Loose | < 4 | < 0.25 | Very soft | < 2 |
| Loose | 4 – 10 | 0.35 – 0.50 | Soft | 2 – 4 |
| Medium | 10 – 30 | 0.50 – 1.0 | Firm (medium) | 4 – 8 |
| Dense | 30 – 50 | 1.0 – 2.0 | Stiff | 8 – 15 |
| Very dense | > 50 | 2.0 – 4.0 | Very stiff | 15 – 30 |
| | | > 4.0 | Hard | > 30 |

## PARTICULE SIZE DEFINITION (As per ASTM D2487 And D422)

| | | | |
|---|---|---|---|
| Boulder | ⇒ Larger than 12 inches | Coarse Sands | ⇒ No. 10 to No. 4 sieve |
| Cobbles | ⇒ 3 to 12 inches | Medium Sands | ⇒ No. 40 to No. 10 sieve |
| Coarse Gravel | ⇒ 3/4 to 3 inches | Fine Sands | ⇒ No. 200 to 40 sieve |
| Fine Gravel | ⇒ No. 4 to 3/4 inches | Silt | ⇒ 5μm to No. 200 sieve |
| | | Clay | ⇒ Smaller than 5μm |

## SOIL CLASSIFICATION

Soils and bedrock are classified and described based on their engineering properties and characteristics and using ASTM D2487 and D2488.

Percentage description of minor components

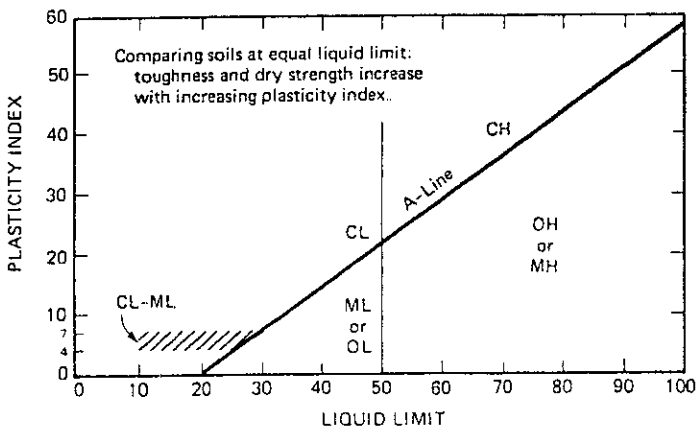
| | | | |
|---|---|---|---|
| Trace | 1-10 % | Some | 20-35 % |
| Little | 10-20 % | And or y | 35-50 % |

Stratified soils description

| | | | |
|---|---|---|---|
| Parting | 0 to 1/16 inch thick | Layer | ½ to 12 inches thick |
| Seam | 1/16 to ½ inch thick | Stratum | > 12 inches thick |

## SOIL CLASSIFICATION CHART

| MAJOR DIVISIONS | | | SYMBOLS GRAPH | SYMBOLS LETTER | TYPICAL DESCRIPTIONS | CLASSIFICATION CRITERIA |
|---|---|---|---|---|---|---|
| COARSE GRAINED SOILS | GRAVEL AND GRAVELLY SOILS | CLEAN GRAVELS (LITTLE OR NO FINES) | | GW | WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES | $C_u = \frac{D_{60}}{D_{10}} > 4$ $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}} = 1$ to 3 |
| | | | | GP | POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES | Not meeting all above requirements |
| | MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE | GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES) | | GM | SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES | Atterberg limits below "A" line or $I_p < 4$ |
| | | | | GC | CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES | Atterberg limits above "A" line or $I_p > 7$ |
| MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE | SAND AND SANDY SOILS | CLEAN SANDS (LITTLE OR NO FINES) | | SW | WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES | $C_u = \frac{D_{60}}{D_{10}} > 6$ $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}} = 1$ to 3 |
| | | | | SP | POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES | Not meeting all above requirements |
| | MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE | SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES) | | SM | SILTY SANDS, SAND - SILT MIXTURES | Atterberg limits below "A" line or $I_p < 4$ |
| | | | | SC | CLAYEY SANDS, SAND - CLAY MIXTURES | Atterberg limits above "A" line or $I_p > 7$ |
| FINE GRAINED SOILS | SILTS AND CLAYS | LIQUID LIMIT LESS THAN 50 | | ML | INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY | $W_L < 50$ |
| | | | | CL | INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS | $W_L < 30$ |
| | | | | OL | ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY | $W_L < 50$ |
| MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE | SILTS AND CLAYS | LIQUID LIMIT GREATER THAN 50 | | MH | INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS | $W_L > 50$ |
| | | | | CH | INORGANIC CLAYS OF HIGH PLASTICITY | $W_L > 50$ |
| | | | | OH | ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS | $W_L > 50$ |
| HIGHLY ORGANIC SOILS | | | | PT | PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS | Strong color or odor and often fibrous texture |



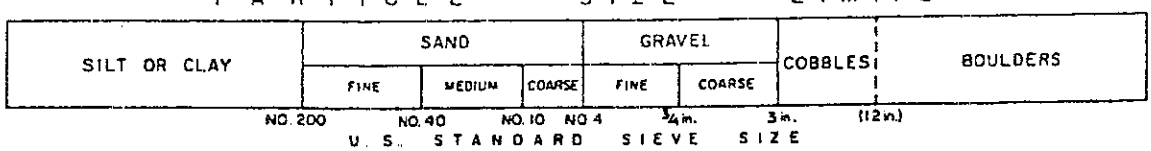

### LABORATORY TEST DESIGNATIONS

| | | | |
|---|---|---|---|
| BR | Bearing Ration | PP | Pocket Penetrometer |
| C | Consolidation | R | R-Value |
| COR | Corrosion Test | S | Direct Shear |
| Chl | Water Soluble Chlorides | SA | Sieve Analysis |
| EI | Expansive Index | SE | Sand Equivalent |
| ER | Electrical Resistivity | Sg | Specific Gravity |
| K | Permeability | $SO_4$ | Water Soluble Sulfates |
| MC | Moisture Content | SV | Shear Vane |
| OC | Organic Content | TC | Triaxial Compression |
| PH | PH Test | UC | Unconfined Compression |

### ADDITIONAL SOIL CLASSIFICATION

| Fill | Ss Sandstone | Ms Siltstone | Bdr Bedrock |
|---|---|---|---|

### PARTICLE SIZE LIMITS




TGR GEOTECHNICAL, INC.

# LOG OF BORING EXPLANATION



PLATE 1

# LOG OF EXPLORATORY BORING BA-1



Project Number: **20-7009**
Project Name: **Hoff Property, Yorba Linda**
Date Drilled: **4/20/20 - 4/20/20**
Ground Elev:

Logged By: **ELB**
Project Engineer: **SG**
Drill Type: **Bucket Auger**
Drive Wt & Drop: **140lbs / 30in**

Shelby Tube | Standard Split Spoon | No recovery | Modified California | Water Table ATD

| Depth (ft) | Graphic Log | FIELD RESULTS: Bulk Sample | Drive Sample | SPT blows/ft (or equivalent N) | Pocket Pen (tsf) | USCS | SUMMARY OF SUBSURFACE CONDITIONS | LAB RESULTS: Moisture Content (%) | Dry Density, (pcf) | Other Tests |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | | Fill/ Slopewash/ Colluvium: Sandy Silt- brown, moist, loose | | | |
| 5 | | | | | | | | | | EI, Sulfate Max, Remolded Shear |
| 10 | | | | 2 | | | BEDROCK: Puente Formation(Tpl)- Silty Sandstone- light brown-tan, slightly moist, medium dense, upper 5 feet highly weathered, bedrock contact N70W, 15SW, moderately fractured, orange oxidation | 20 | 109 | |
| 15 | | | | | | | @13': Sandstone and siltstone beds, bedding attitude- N10W, 30NE<br>@15: increase from medium dense to dense | | | |
| 20 | | | | 2 | | | @19': bedding attitude- N10W, 25NE<br>@20': Silty Sandstone- light brown to tan, slightly moist, dense, moderately fractured, orange oxidation | 20 | 105 | |
| 25 | | | | | | | | | | |
| 30 | | | | 4 | | | @30': bedding attitude- N10E, 20SE<br>@ 31-32'- well cemented sandstone layer<br>@34': Sandstone and siltstone beds- moderately fractured, dense, moderately oxidized, bedding attitude- N10W, 25NE | 21 | 107 | Shear |

LOG OF BORING 20-7009 HOFF PROPERTY, YORBA LINDA.GPJ TGR GEOTECH.GDT 5/8/20

This Boring Log should be evaluated in conjunction with the complete geotechnical report. This Boring Log represents conditions observed at the specific location and date indicated, it is not warranted to be representative of subsurface conditions at other locations and times.

**PLATE 2**

TGR GEOTECHNICAL, INC.

# LOG OF EXPLORATORY BORING BA-1



Project Number: **20-7009**
Project Name: **Hoff Property, Yorba Linda**
Date Drilled: **4/20/20 - 4/20/20**
Ground Elev:

Logged By: **ELB**
Project Engineer: **SG**
Drill Type: **Bucket Auger**
Drive Wt & Drop: **140lbs / 30in**

Shelby Tube | Standard Split Spoon | No recovery | Modified California | Water Table ATD

| Depth (ft) | Graphic Log | FIELD RESULTS: Bulk Sample | Drive Sample | SPT blows/ft (or equivalent N) | Pocket Pen (tsf) | USCS | SUMMARY OF SUBSURFACE CONDITIONS | LAB RESULTS: Moisture Content (%) | Dry Density, (pcf) | Other Tests |
|---|---|---|---|---|---|---|---|---|---|---|
| 40 | | | ■ | 9 | | | @38-41': Sandstone- well cemented<br>@41': bedding attitude- N15W, 25NE | 10 | 125 | |
| 45 | | ▬ | | | | | | | | EI, Max, Remolded Shear |
| 50 | | | ■ | 12 | | | @48-51': Sandstone layer- well cemented, gypsum along fractures, bedding attitude @ 48'- N15E, 20SE | 18 | 117 | Shear |
| 55 | | | | | | | @54': bedding attitude- N10E, 25SE<br>@56': Siltstone- gray to dark gray, slightly moist, hard, minor fracturing, minor oxidation, gypsum along fracture, bedding | | | |
| 60 | | | ■ | 22 | | | @61': bedding attitude- N10W, 30NE | 14 | 115 | Shear |
| 65 | | | | | | | ---increase in hardness | | | |

LOG OF BORING 20-7009 HOFF PROPERTY, YORBA LINDA.GPJ TGR GEOTECH.GDT 5/8/20

This Boring Log should be evaluated in conjunction with the complete geotechnical report. This Boring Log represents conditions observed at the specific location and date indicated, it is not warranted to be representative of subsurface conditions at other locations and times.

**PLATE 3**

TGR GEOTECHNICAL, INC.

# LOG OF EXPLORATORY BORING BA-1



Project Number: **20-7009**
Project Name: **Hoff Property, Yorba Linda**
Date Drilled: **4/20/20 - 4/20/20**
Ground Elev:

Logged By: **ELB**
Project Engineer: **SG**
Drill Type: **Bucket Auger**
Drive Wt & Drop: **140lbs / 30in**

Shelby Tube | Standard Split Spoon | No recovery | Modified California | Water Table ATD

| Depth (ft) | Graphic Log | FIELD RESULTS: Bulk Sample | Drive Sample | SPT blows/ft (or equivalent N) | Pocket Pen (tsf) | USCS | SUMMARY OF SUBSURFACE CONDITIONS | LAB RESULTS: Moisture Content (%) | Dry Density, (pcf) | Other Tests |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | ■ | 23 | | | @71': bedding attitude- N15W, 20NE | 11 | 131 | Shear |
| 75 | | | | | | | Total Depth: 75'<br>No groundwater<br>No caving<br>Hole backfilled with cuttings<br><br>Kelly Weight: 0'-25': 3300lbs, 25'-50': 2200lbs, 50'-75': 1100lbs | | | |

LOG OF BORING 20-7009 HOFF PROPERTY, YORBA LINDA.GPJ TGR GEOTECH.GDT 5/8/20

This Boring Log should be evaluated in conjunction with the complete geotechnical report. This Boring Log represents conditions observed at the specific location and date indicated, it is not warranted to be representative of subsurface conditions at other locations and times.

**PLATE 4**

TGR GEOTECHNICAL, INC.

# LOG OF EXPLORATORY BORING BA-2

Sheet **1** of **1**

| | | | |
|---|---|---|---|
| Project Number: | **20-7009** | Logged By: | **ELB** |
| Project Name: | **Hoff Property, Yorba Linda** | Project Engineer: | **SG** |
| Date Drilled: | **4/21/20 - 4/21/20** | Drill Type: | **Bucket Auger** |
| Ground Elev: | | Drive Wt & Drop: | **140lbs / 30in** |

Shelby Tube | Standard Split Spoon | No recovery | Modified California | Water Table ATD

| Depth (ft) | Graphic Log | FIELD RESULTS: Bulk Sample | Drive Sample | SPT blows/ft (or equivalent N) | Pocket Pen (tsf) | USCS | SUMMARY OF SUBSURFACE CONDITIONS | LAB RESULTS: Moisture Content (%) | Dry Density, (pcf) | Other Tests |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Topsoil: Sandy Silt- light brown, moist, loose | | | |
| | | | | | | | BEDROCK: Puente Formation(Tpl)- Silty Sandstone- light brown-tan, slightly moist, dense, moderately fractured, orange oxidation | | | |
| 5 | | | | | | | @6': bedding attitude- N50W, 40NE | | | |
| 10 | | | | 4 | | | @10': Sandstone and siltstone beds, light brown to dark gray, slightly moist, dense, moderately fractured, orange oxidation, bedding attitude- N60W, 55NE | 12 | 115 | Max, Remolded Shear |
| 15 | | | | | | | | | | |
| 20 | | | | 5 | | | .....Same as above | 13 | 125 | |
| 25 | | | | | | | @25': bedding attitude- N45W, 35NE | | | |
| 30 | | | | 10 | | | | 14 | 117 | |
| | | | | | | | Total Depth: 31'<br>No Groundwater. No caving.<br>Hole backfilled with cuttings<br>Kelly Weight: 0'-25': 3300lbs, 25'-50': 2200lbs, 50'-75': 1100lbs | | | |

LOG OF BORING 20-7009 HOFF PROPERTY, YORBA LINDA.GPJ TGR GEOTECH.GDT 5/8/20

This Boring Log should be evaluated in conjunction with the complete geotechnical report. This Boring Log represents conditions observed at the specific location and date indicated, it is not warranted to be representative of subsurface conditions at other locations and times.

**PLATE 5**

TGR GEOTECHNICAL, INC.

# LOG OF EXPLORATORY BORING BA-3

Sheet **1** of **1**

| | | | |
|---|---|---|---|
| Project Number: | **20-7009** | Logged By: | **ELB** |
| Project Name: | **Hoff Property, Yorba Linda** | Project Engineer: | **SG** |
| Date Drilled: | **4/21/20 - 4/21/20** | Drill Type: | **Bucket Auger** |
| Ground Elev: | | Drive Wt & Drop: | **140lbs / 30in** |

Shelby Tube | Standard Split Spoon | No recovery | Modified California | Water Table ATD

| Depth (ft) | Graphic Log | FIELD RESULTS: Bulk Sample | Drive Sample | SPT blows/ft (or equivalent N) | Pocket Pen (tsf) | USCS | SUMMARY OF SUBSURFACE CONDITIONS | LAB RESULTS: Moisture Content (%) | Dry Density, (pcf) | Other Tests |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Topsoil: Sandy Silt- light brown, moist, loose | | | |
| 5 | | | | | | | BEDROCK: Puente Formation(Tpl)- Silty Sandstone- light brown, slightly moist, dense, moderately fractured, orange oxidation | | | |
| 10 | | | | 3 | | | Sandstone- siltstone beds, light brown/tan- light gray/ gray, slightly moist, moderately fractured, orange oxidation, gypsum along bedding, @10': bedding attitude- N70E, 70SE | 17 | 111 | |
| 15 | | | | | | | @15': bedding attitude- N75E, 60SE | | | |
| 20 | | | | 8/6" | | | @20': Sandstone, light brown- tan, slightly moist, dense, moderately fractured, orange oxidation, bedding attitude- N75E, 65SE | 8 | 106 | |
| 25 | | | | | | | @27': Sandstone- siltstone beds, light brown/tan-gray, slightly moist, moderately fractured, orange oxidation, bedding attitude- N75E, 65SE | | | |
| 30 | | | | 9 | | | | 18 | 116 | |
| | | | | | | | Total Depth: 31 feet<br>No Ground water. No caving.<br>Hole backfilled with cuttings<br>Kelly Weight: 0'-25': 3300lbs, 25'-50': 2200lbs, 50'-75': 1100lbs | | | |

LOG OF BORING 20-7009 HOFF PROPERTY, YORBA LINDA.GPJ TGR GEOTECH.GDT 5/8/20

This Boring Log should be evaluated in conjunction with the complete geotechnical report. This Boring Log represents conditions observed at the specific location and date indicated, it is not warranted to be representative of subsurface conditions at other locations and times.

**PLATE 6**

TGR GEOTECHNICAL, INC.

# APPENDIX C
# LABORATORY TEST RESULTS

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# APPENDIX C

## Laboratory Testing Procedures and Results

Moisture and Density Determination Tests: Moisture content and dry density determinations were performed on relatively undisturbed samples obtained from the test borings. The results of these tests are presented in the boring logs. Where applicable, only moisture content was determined from "undisturbed" or disturbed samples.

Maximum Density Tests: The maximum dry density and optimum moisture content of typical materials were determined in accordance with ASTM Test Method D1557. The results of these tests are presented in the test data and in the table below:

| Sample Location | Sample Description | Maximum Dry Density (Pcf) | Optimum Moisture Content (%) |
|---|---|---|---|
| BA-1 @ 0-5 feet | Sandy Silt | 116.0 | 15.0 |
| BA-1@ 45 feet | Sandstone | 111.0 | 17.5 |
| BA-2 @ 10 feet | Sandstone and siltstone | 108.0 | 20.0 |

Direct Shear Tests: Direct shear test was performed on selected remolded and/or undisturbed sample, which was soaked for a minimum of 24 hours under a surcharge equal to the applied normal force during testing. After transfer of the sample to the shear box, and reloading the sample, pore pressures set up in the sample due to the transfer were allowed to dissipate for a period of approximately 1-hour prior to application of shearing force. The sample was tested under various normal loads, a motor-driven, strain-controlled, direct-shear testing apparatus at a strain rate of less than 0.001 to 0.5 inches per minute (depending upon the soil type). The test results are presented in the test data:

Soluble Sulfates: The soluble sulfate content of selected sample was determined by standard geochemical methods. The test result is presented in the table below:

| Sample Location | Sample Description | Water Soluble Sulfate in Soil, (% by Weight) | Sulfate Content (ppm) | Exposure Class* |
|---|---|---|---|---|
| BA-1 @ 0-5 feet | Sandy Silt | 0.0765 | 765 | S0 |

* Based on the current version of ACI 318-14 Building Code, Table No. 19.3.1.1; Exposure Categories and Classes.

Expansion Index Tests: The expansion potential of selected materials was evaluated by the Expansion Index Test, ASTM D4829. Specimens are molded under a given compactive energy to approximately the optimum moisture content and approximately 50 percent saturation or approximately 90 percent relative compaction. The prepared 1-inch thick by 4-inch diameter

specimens are loaded to an equivalent 144 psf surcharge and are inundated with tap water until volumetric equilibrium is reached. The results of these tests are presented in the table below:

| Sample Location | Sample Description | Expansion Index | Expansion Potential |
|---|---|---|---|
| BA-1 @ 0-5 feet | Sandy Silt | 58 | Medium |
| BA-1 @ 45 feet | Siltstone | 41 | Low |

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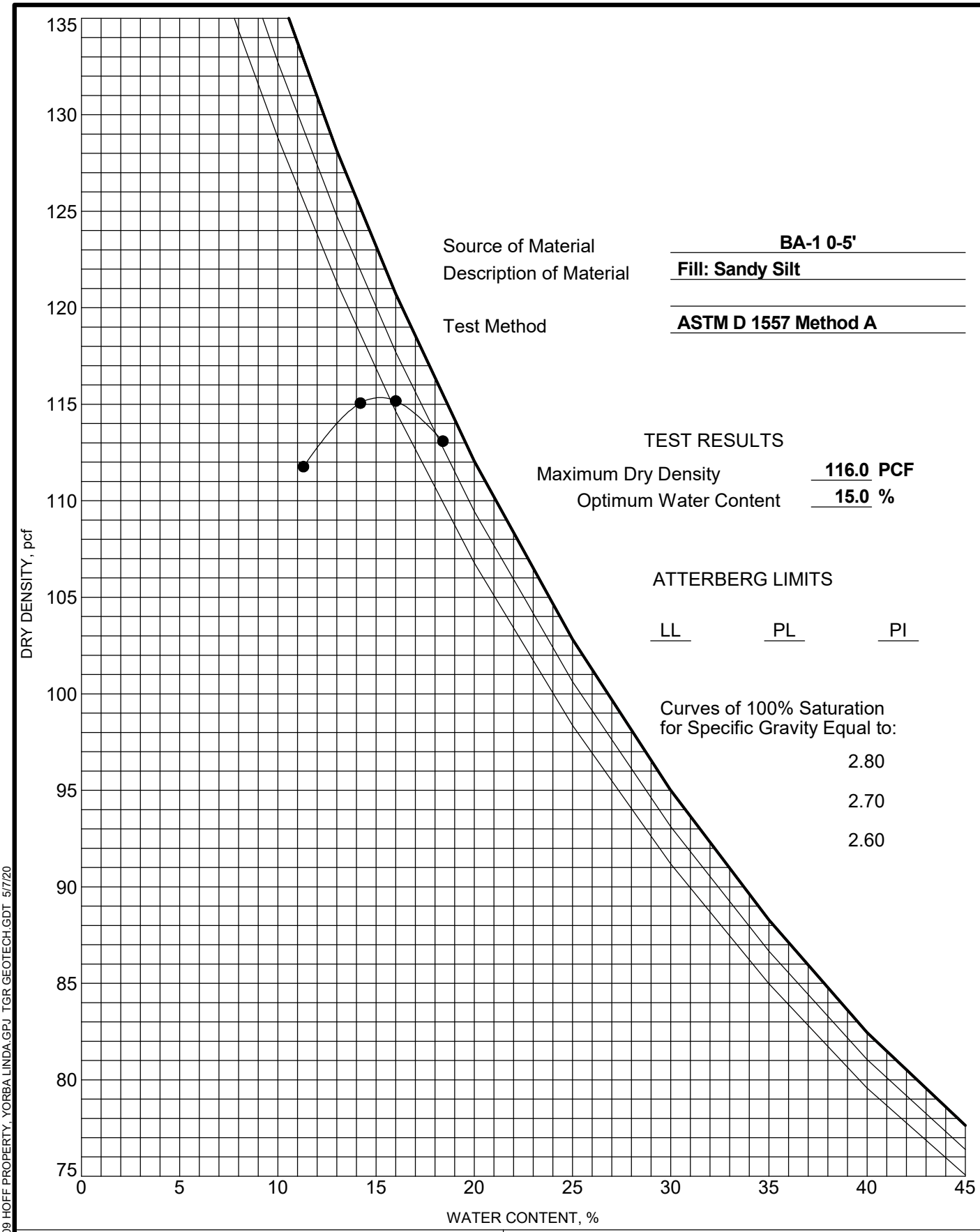


Source of Material: **BA-1 0-5'**

Description of Material: **Fill: Sandy Silt**

Test Method: **ASTM D 1557 Method A**

TEST RESULTS

Maximum Dry Density: **116.0 PCF**

Optimum Water Content: **15.0 %**

ATTERBERG LIMITS

LL PL PI

Curves of 100% Saturation for Specific Gravity Equal to:

2.80

2.70

2.60

# MOISTURE-DENSITY RELATIONSHIP

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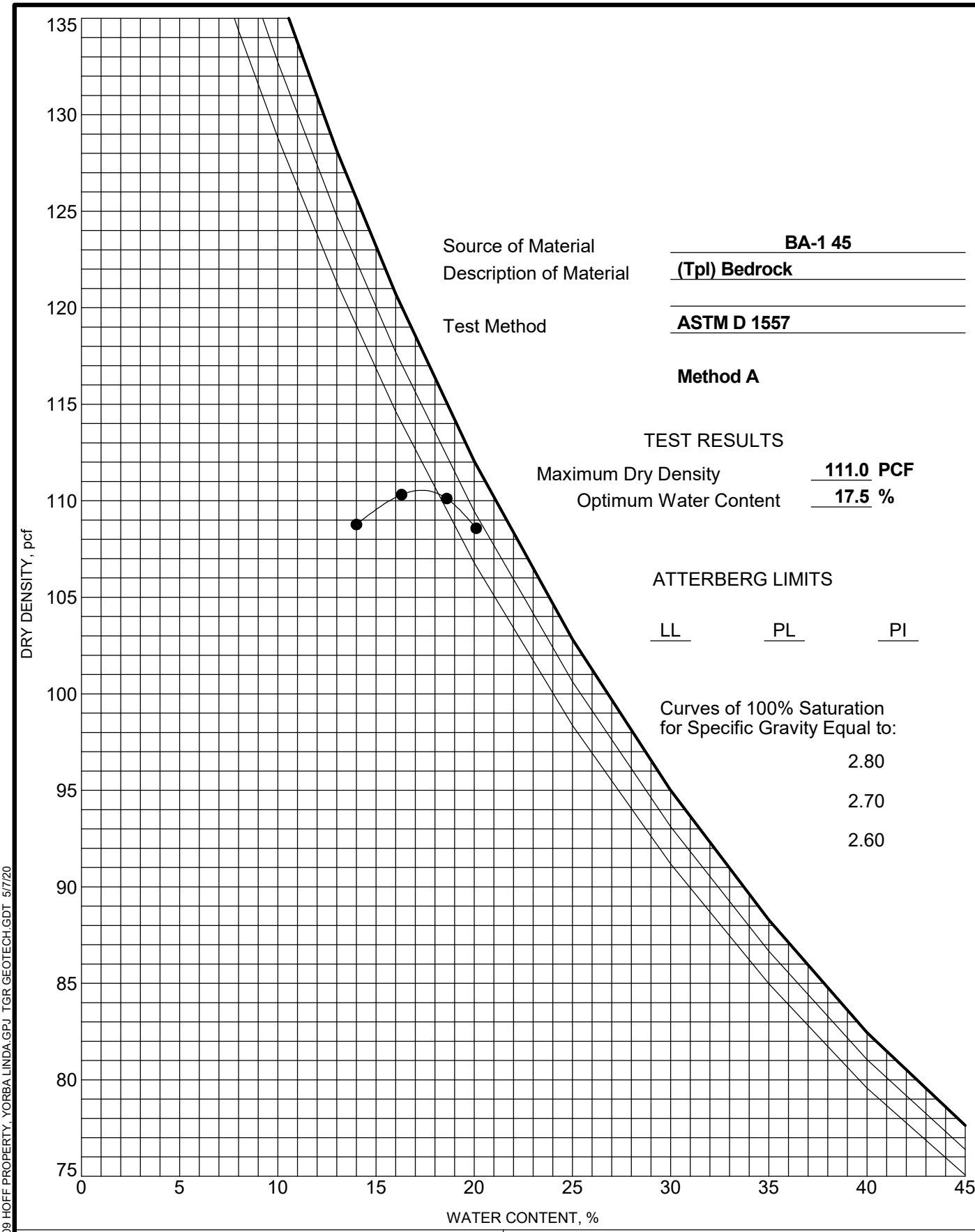
Fax:

Project Number: 20-7009

Project Name: Hoff Property, Yorba Linda

US COMPACTION 20-7009 HOFF PROPERTY, YORBA LINDA.GPJ TGR GEOTECH.GDT 5/7/20




Source of Material **BA-1 45**

Description of Material **(Tpl) Bedrock**

Test Method **ASTM D 1557**

**Method A**

TEST RESULTS

Maximum Dry Density **111.0 PCF**

Optimum Water Content **17.5 %**

ATTERBERG LIMITS

LL PL PI

Curves of 100% Saturation for Specific Gravity Equal to:

2.80

2.70

2.60

# MOISTURE-DENSITY RELATIONSHIP

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Project Number: 20-7009

Project Name: Hoff Property, Yorba Linda

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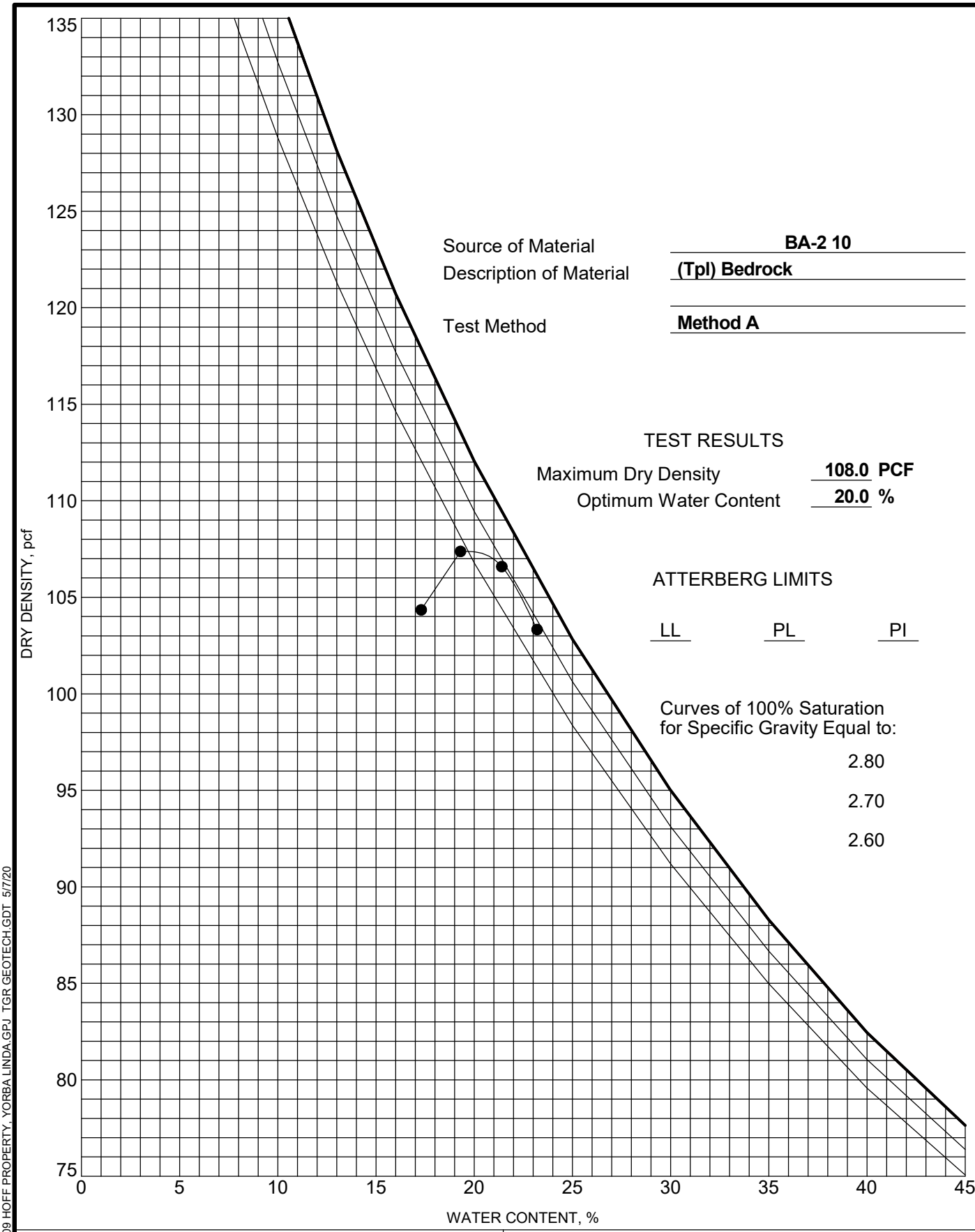


Source of Material: **BA-2 10**

Description of Material: **(Tpl) Bedrock**

Test Method: **Method A**

TEST RESULTS

Maximum Dry Density: **108.0 PCF**

Optimum Water Content: **20.0 %**

ATTERBERG LIMITS

LL PL PI

Curves of 100% Saturation for Specific Gravity Equal to:

2.80

2.70

2.60

# MOISTURE-DENSITY RELATIONSHIP

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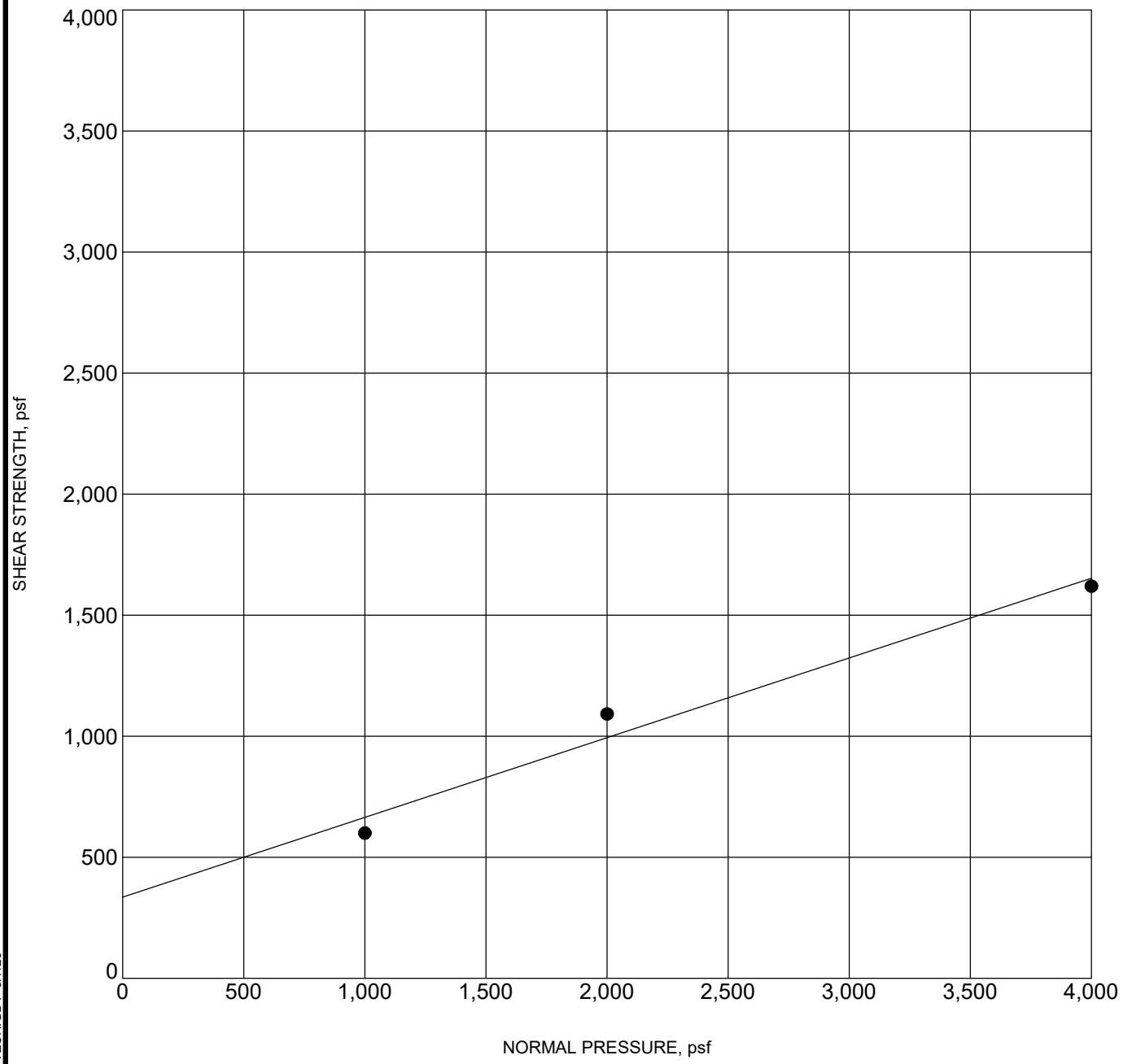
Project Number: 20-7009

Project Name: Hoff Property, Yorba Linda




| Specimen Identification | | Classification | $\gamma_d$ | MC% | c | $\phi$ |
|---|---|---|---|---|---|---|
| ● **BA-1** | **30** | **(Tpl) Bedrock, Resheared, Saturated** | **107** | **21** | **336** | **18** |
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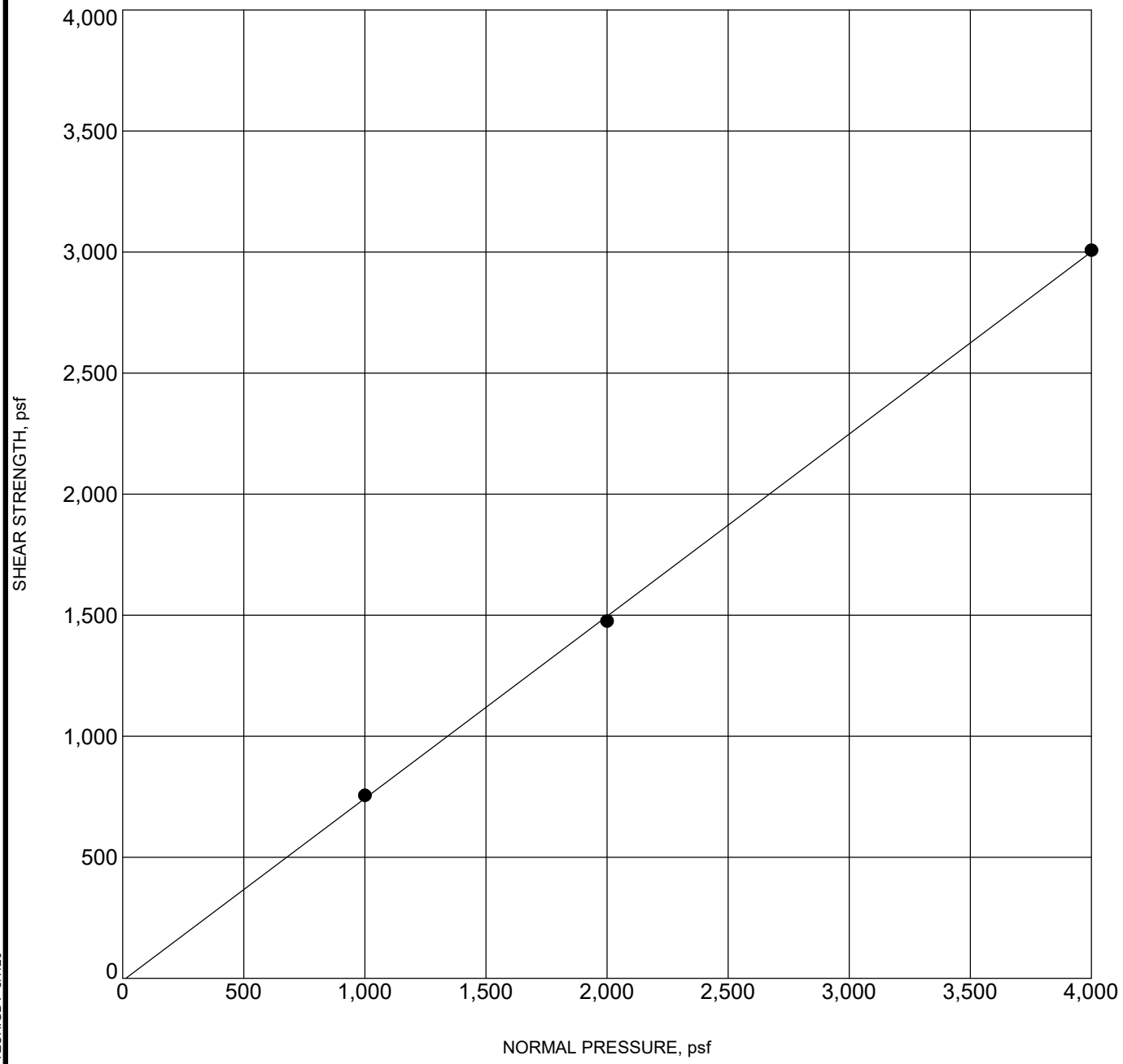


| Specimen Identification | | Classification | $\gamma_d$ | MC% | c | $\phi$ |
|---|---|---|---|---|---|---|
| ● **BA-1** **60** | | **(Tpl) Bedrock, Resheared, Saturated** | **115** | **14** | **0** | **37** |
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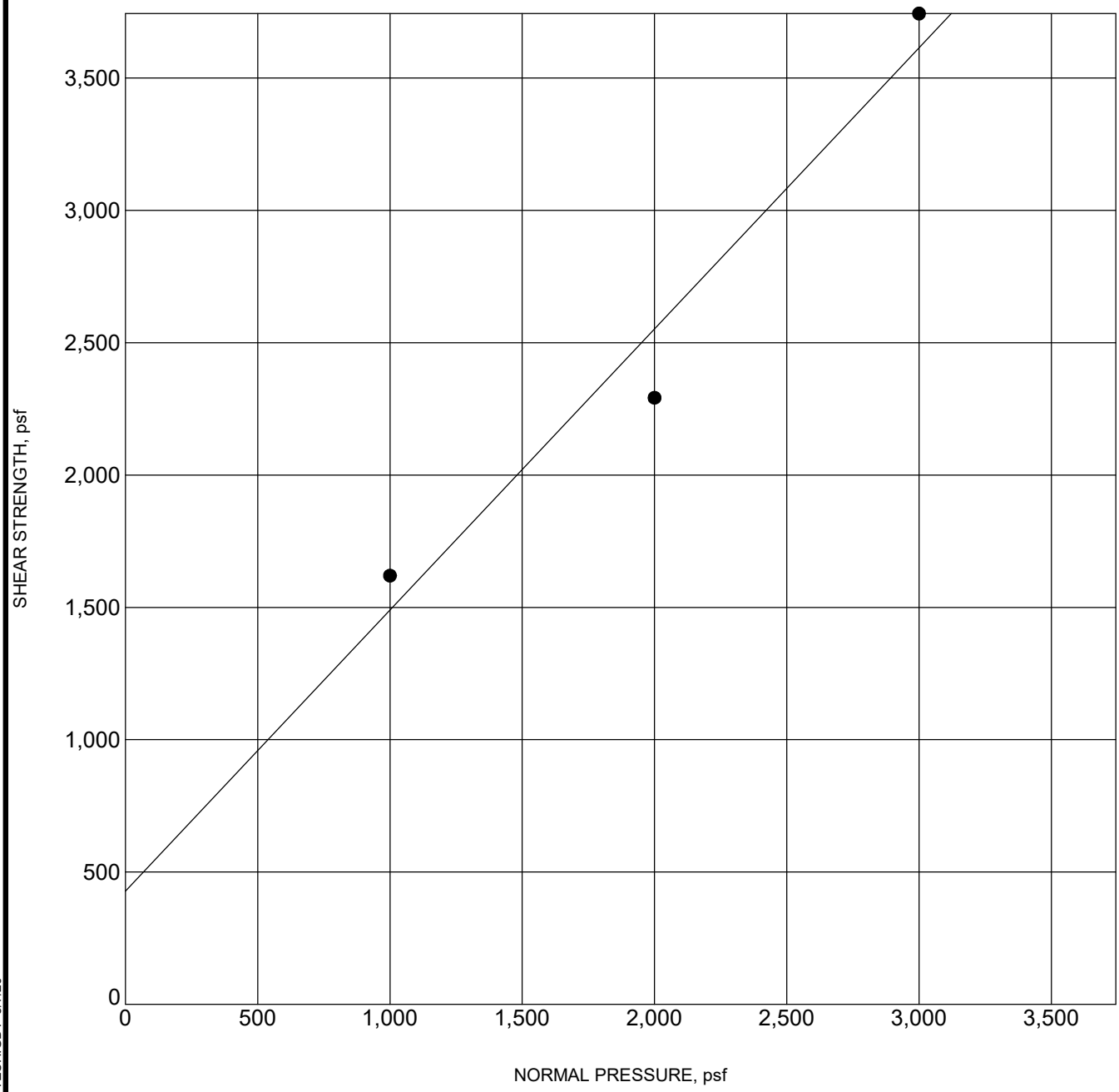


| Specimen Identification | | Classification | $\gamma_d$ | MC% | c | $\phi$ |
|---|---|---|---|---|---|---|
| ● **BA-1** **60** | | **(Tpl) Bedrock, Peak, Saturated** | **115** | **14** | **428** | **47** |
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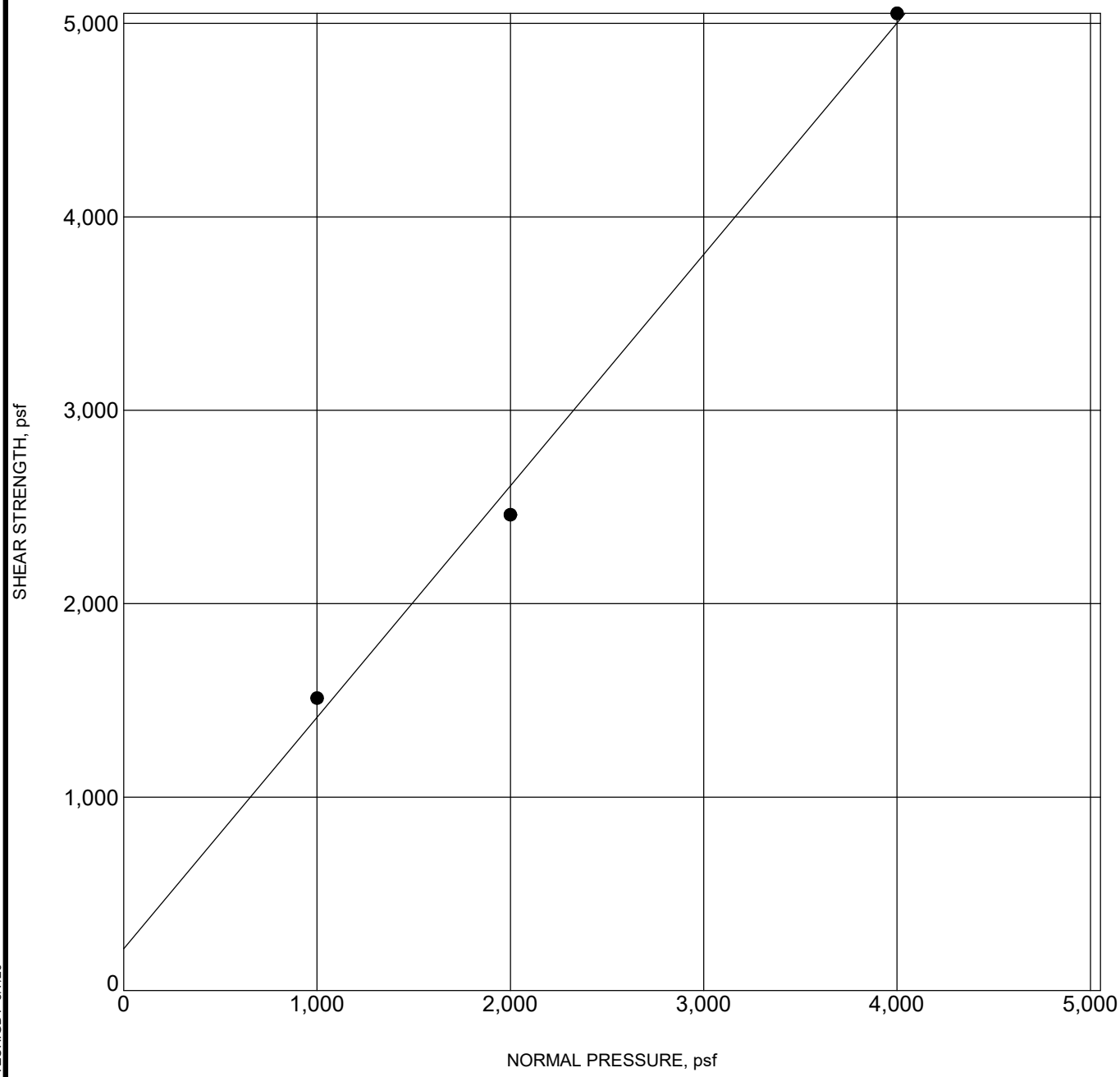


| Specimen Identification | | Classification | $\gamma_d$ | MC% | c | $\phi$ |
|---|---|---|---|---|---|---|
| ● **BA-1** | **30** | **(Tpl) Bedrock, Peak, Saturated** | **107** | **21** | **216** | **50** |
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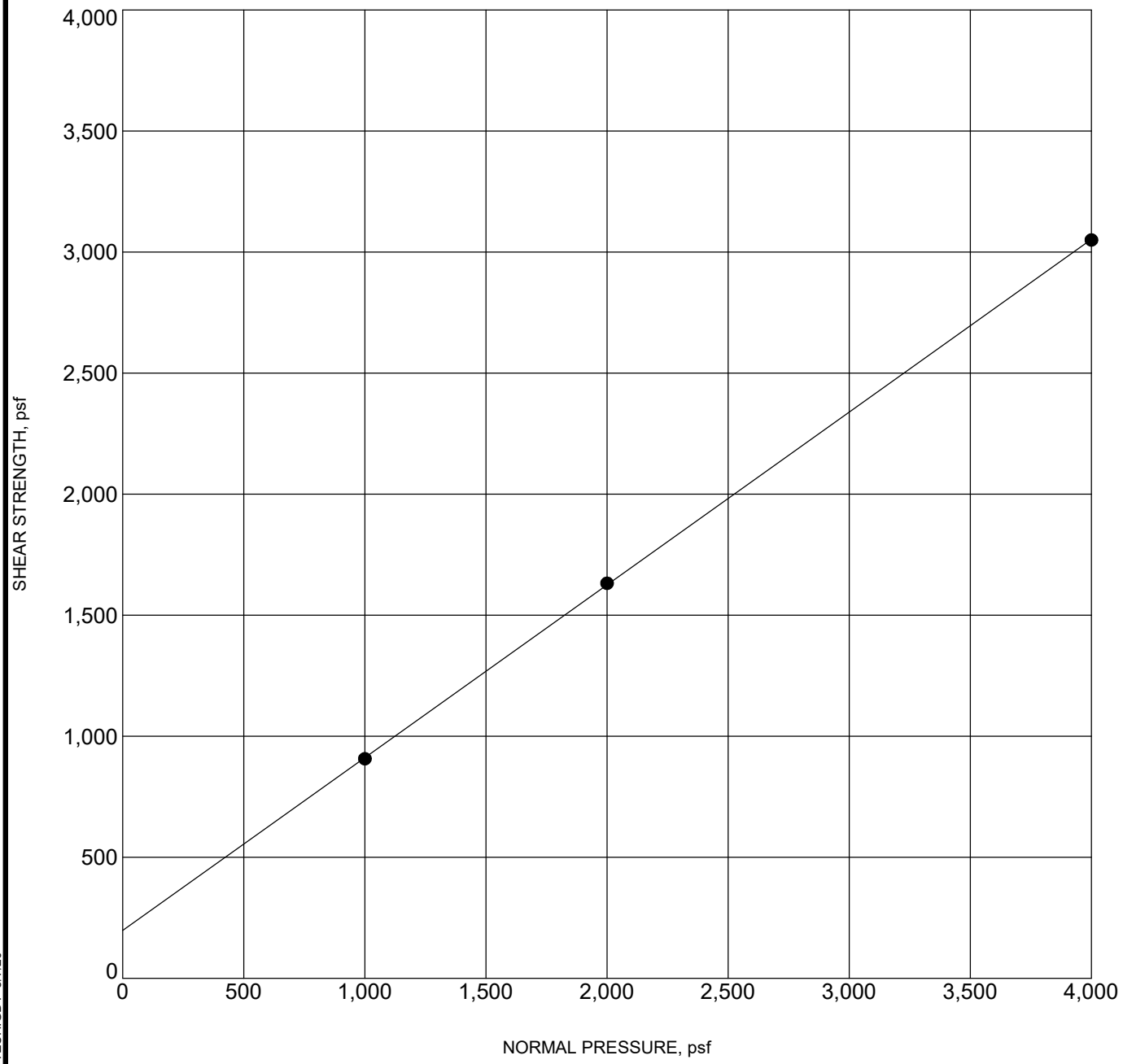


| Specimen Identification | | Classification | $\gamma_d$ | MC% | c | $\phi$ |
|---|---|---|---|---|---|---|
| ● **BA-1** **60** | | **(Tpl) Bedrock, Ultimate, Saturated** | **115** | **14** | **198** | **36** |
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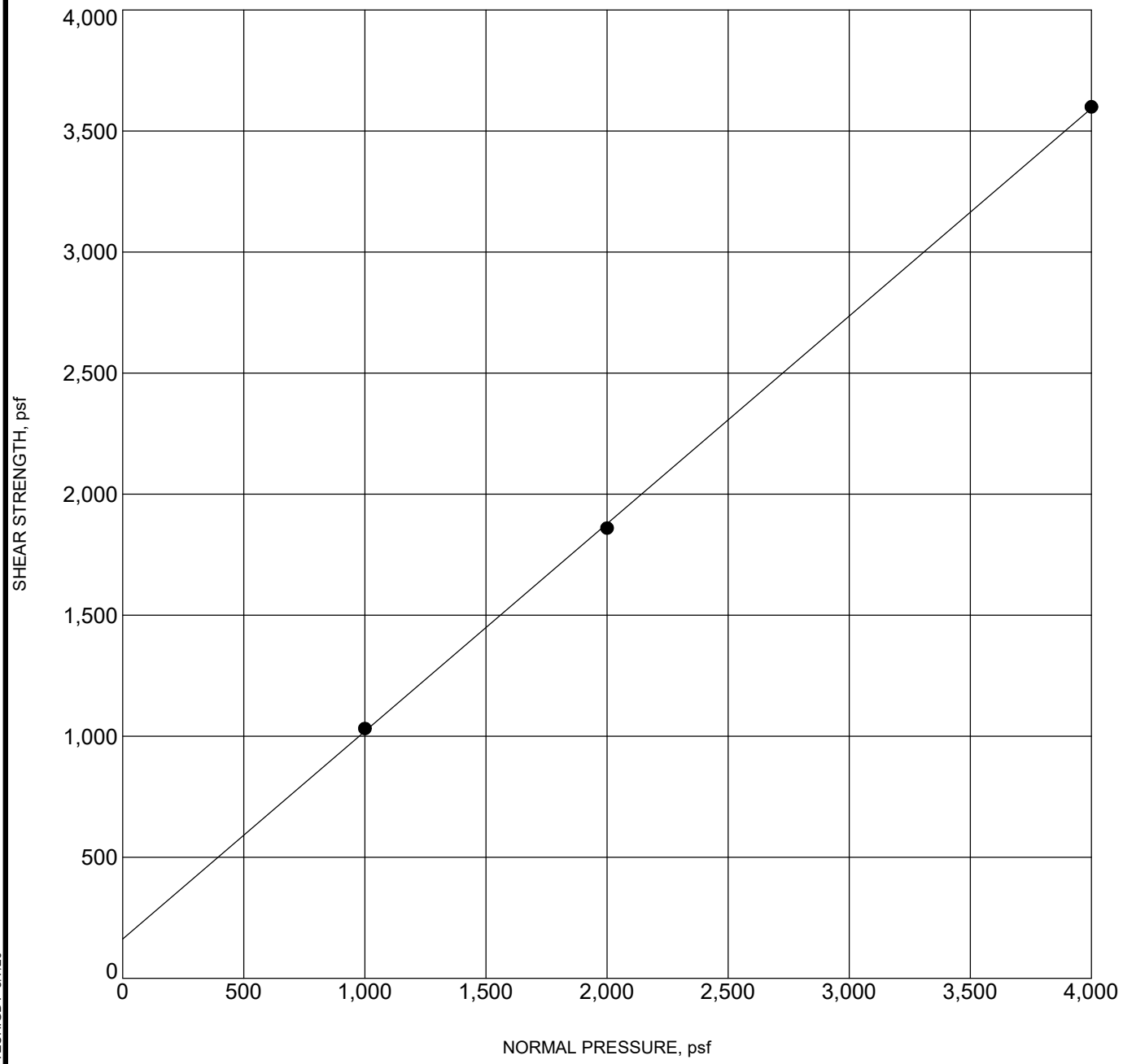


| Specimen Identification | | Classification | $\gamma_d$ | MC% | c | $\phi$ |
|---|---|---|---|---|---|---|
| ● **BA-1** | **30** | **(Tpl) Bedrock, Ultimate, Saturated** | **107** | **21** | **162** | **41** |
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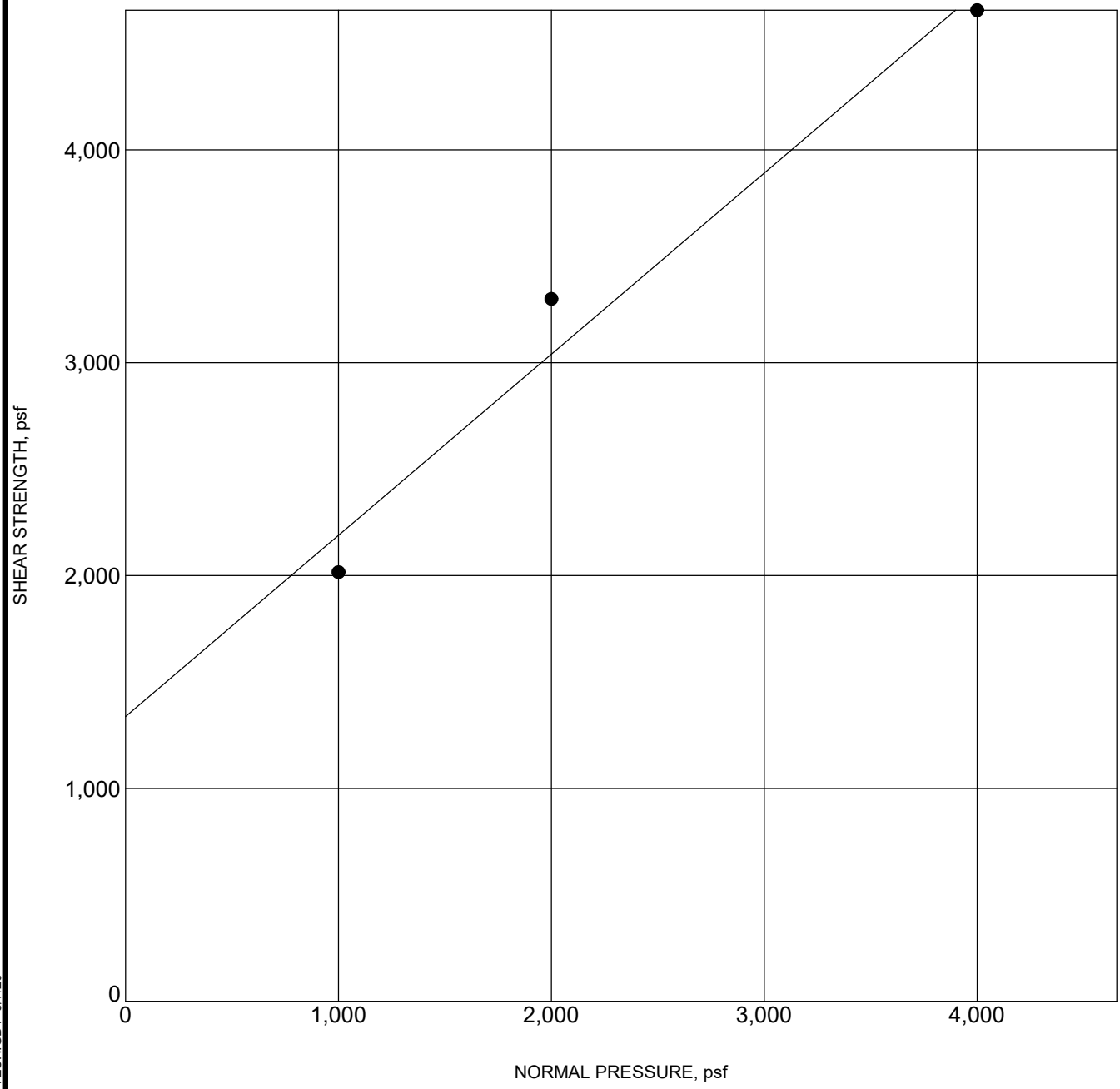


| Specimen Identification | | Classification | $\gamma_d$ | MC% | c | $\phi$ |
|---|---|---|---|---|---|---|
| ● **BA-1** | **50** | **(Tpl) Bedrock, Peak, Natural** | **117** | **10** | **1338** | **40** |
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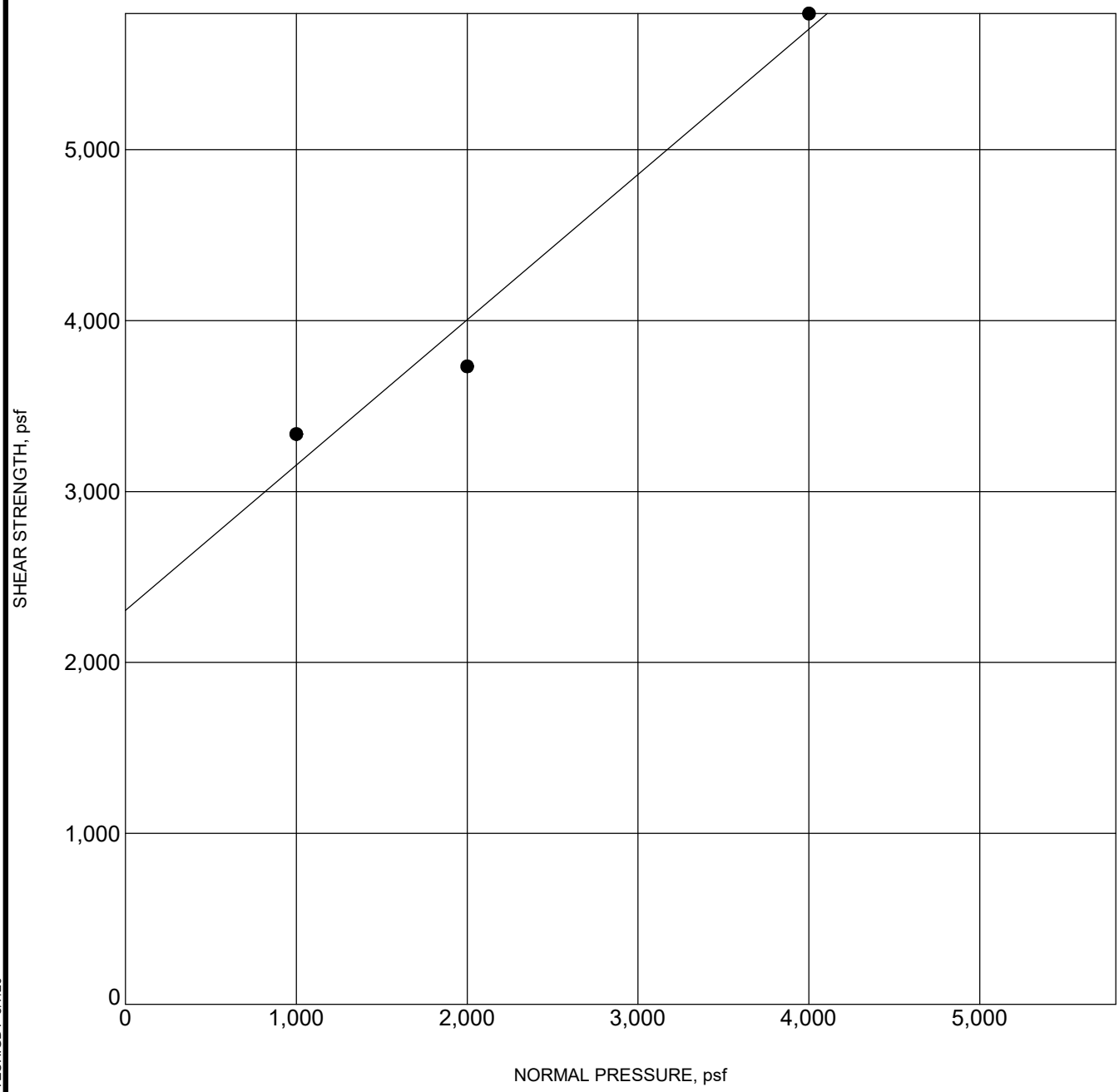


| Specimen Identification | | Classification | $\gamma_d$ | MC% | c | $\phi$ |
|---|---|---|---|---|---|---|
| ● **BA-1** **70** | | **(Tpl) Bedrock, Peak, Natural** | **131** | **11** | **2304** | **40** |
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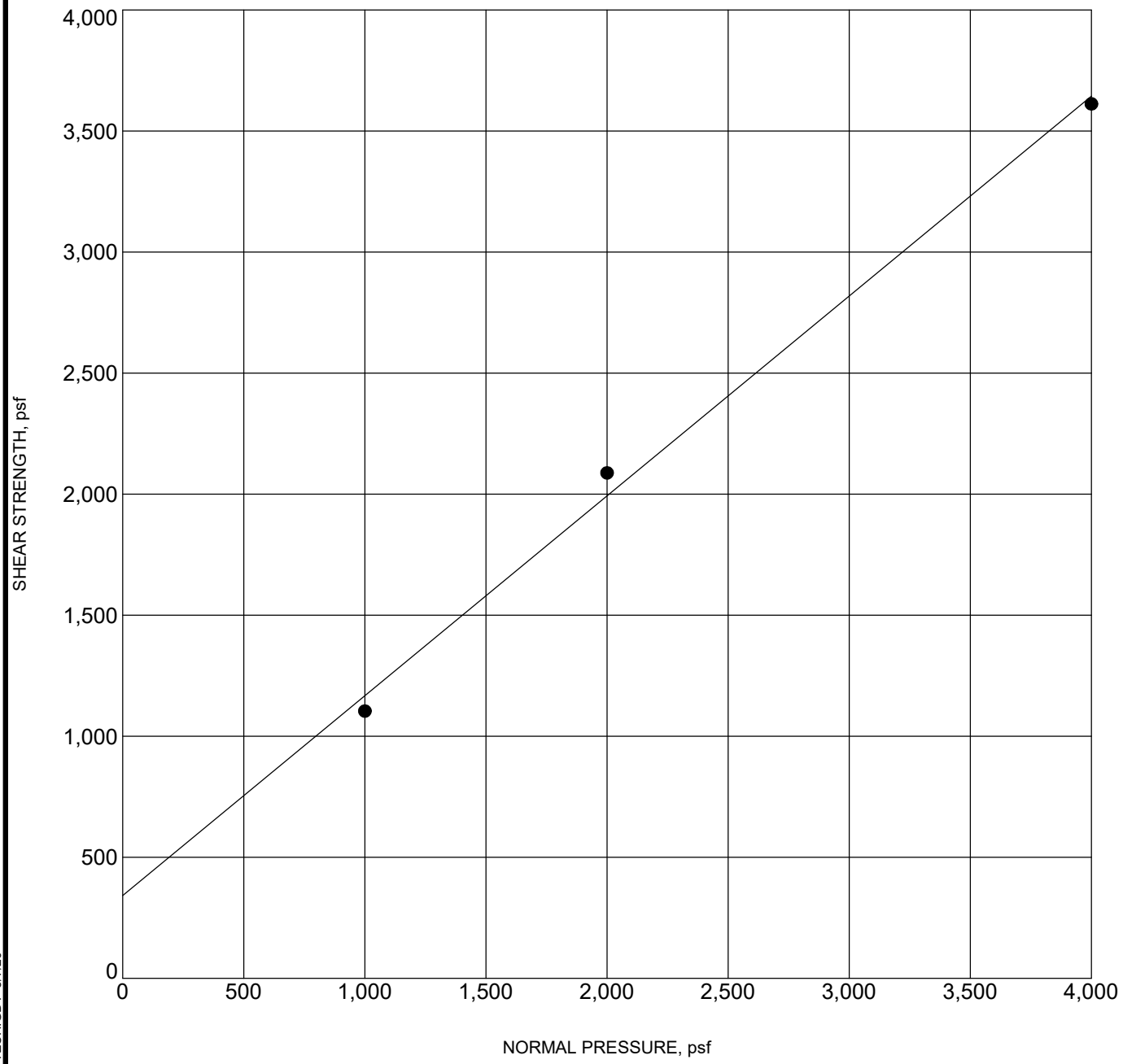


| Specimen Identification | | Classification | $\gamma_d$ | MC% | c | $\phi$ |
|---|---|---|---|---|---|---|
| ● **BA-1** | **50** | **(Tpl) Bedrock, Ultimate, Natural** | **117** | **10** | **342** | **40** |
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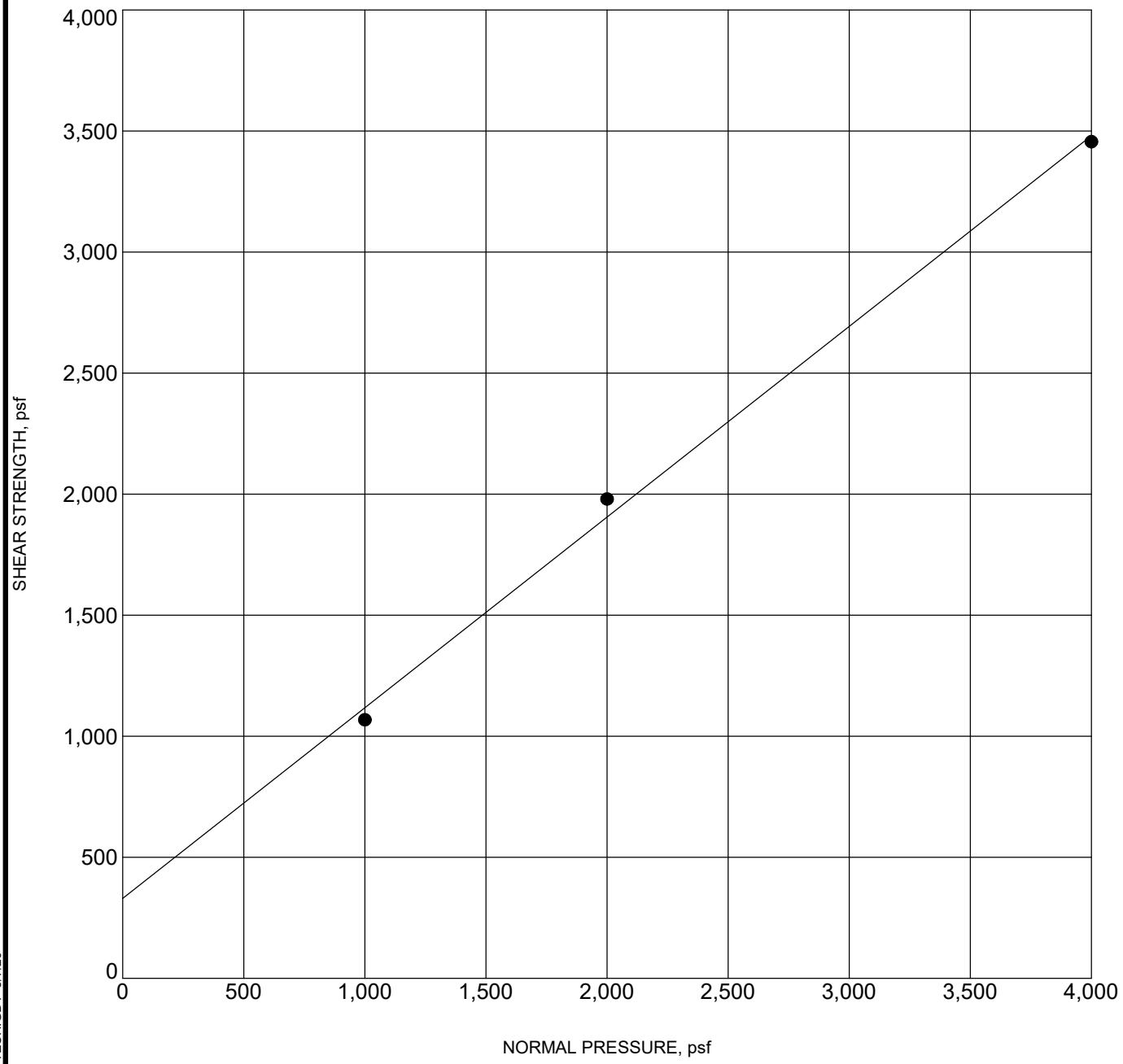


| Specimen Identification | | Classification | $\gamma_d$ | MC% | c | $\phi$ |
|---|---|---|---|---|---|---|
| ● **BA-1** | **70** | **(Tpl) Bedrock, Ultimate, Natural** | **131** | **11** | **330** | **38** |
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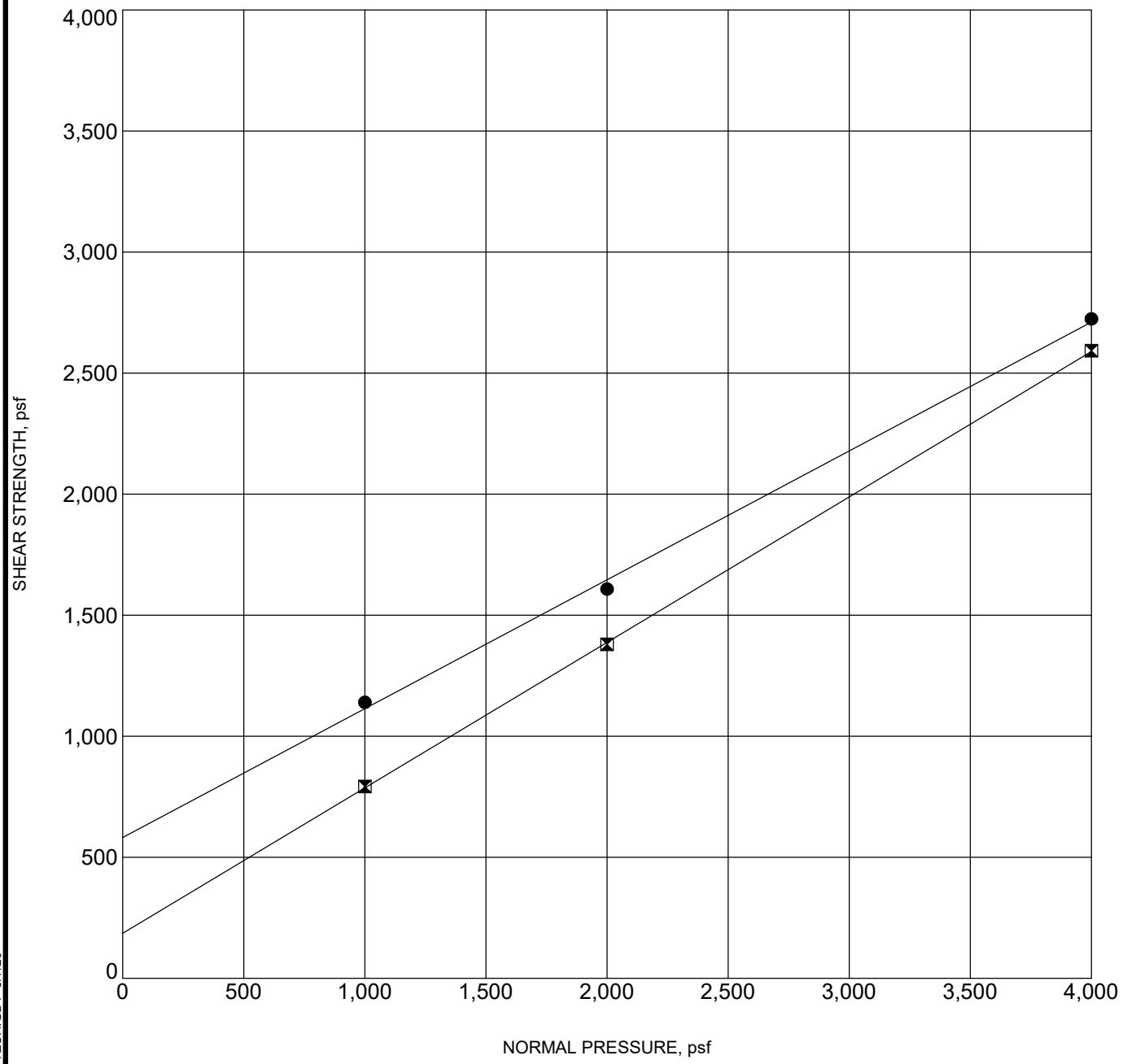


| Specimen Identification | | | Classification | $\gamma_d$ | MC% | c | $\phi$ |
|---|---|---|---|---|---|---|---|
| ● | **BA-1** | **0-5** | **Fill: Sandy Silt- Remolded Peak, 95% Compaction** | **116** | **15** | **582** | **28** |
| ⊠ | **BA-1** | **0-5** | **Fill: Sandy Silt- Remolded Ultimate, 95% Compaction** | **116** | **15** | **186** | **31** |
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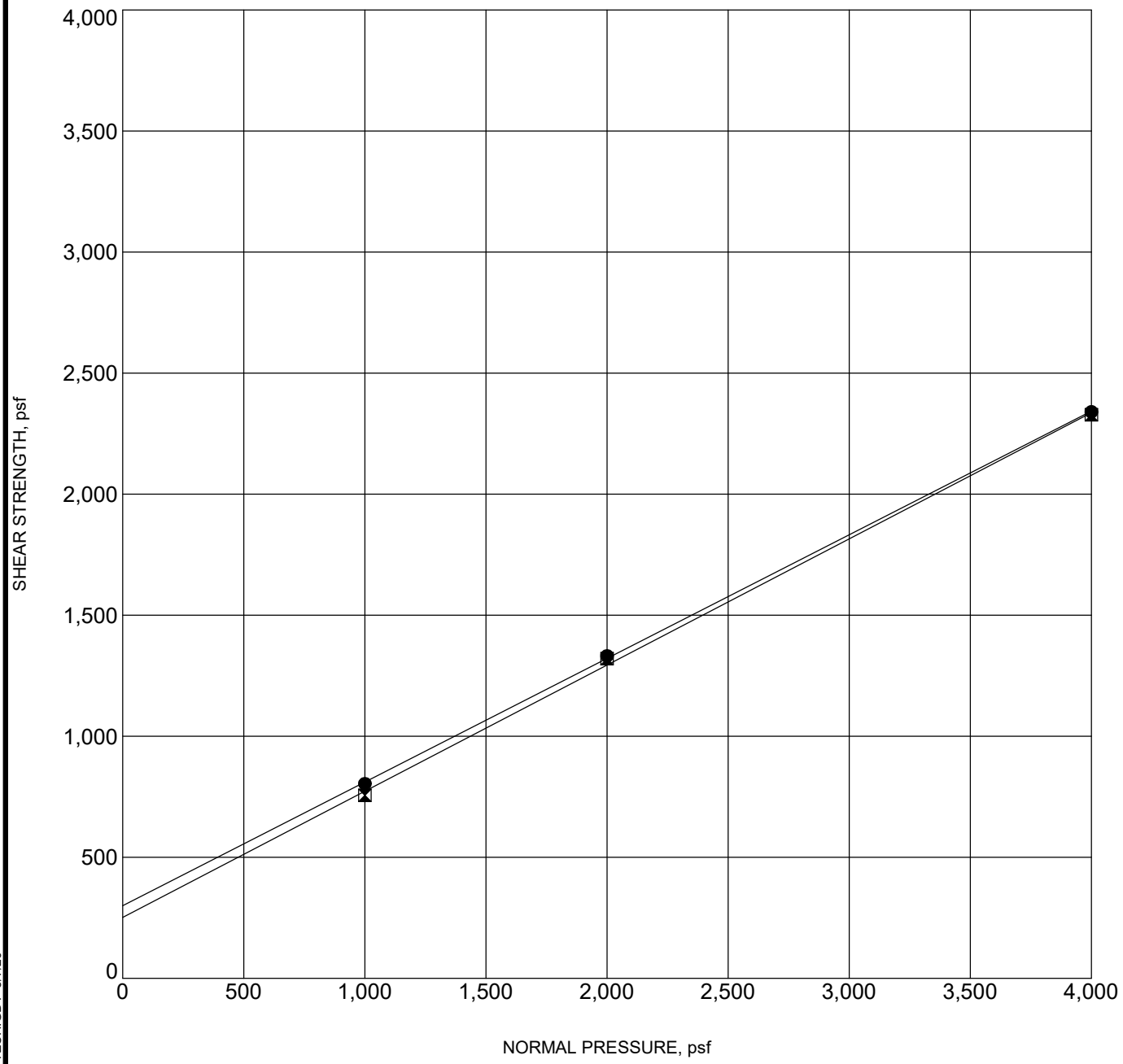


| Specimen Identification | | | Classification | $\gamma_d$ | MC% | c | $\phi$ |
|---|---|---|---|---|---|---|---|
| ● | **BA-1** | **0-5** | **Fill: Sandy Silt- Remolded Peak, 90% Compaction** | **116** | **15** | **300** | **27** |
| ⊠ | **BA-1** | **0-5** | **Fill: Sandy Silt- Remolded Ultimate, 90% Compaction** | **116** | **15** | **252** | **28** |
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Project Number: 20-7009

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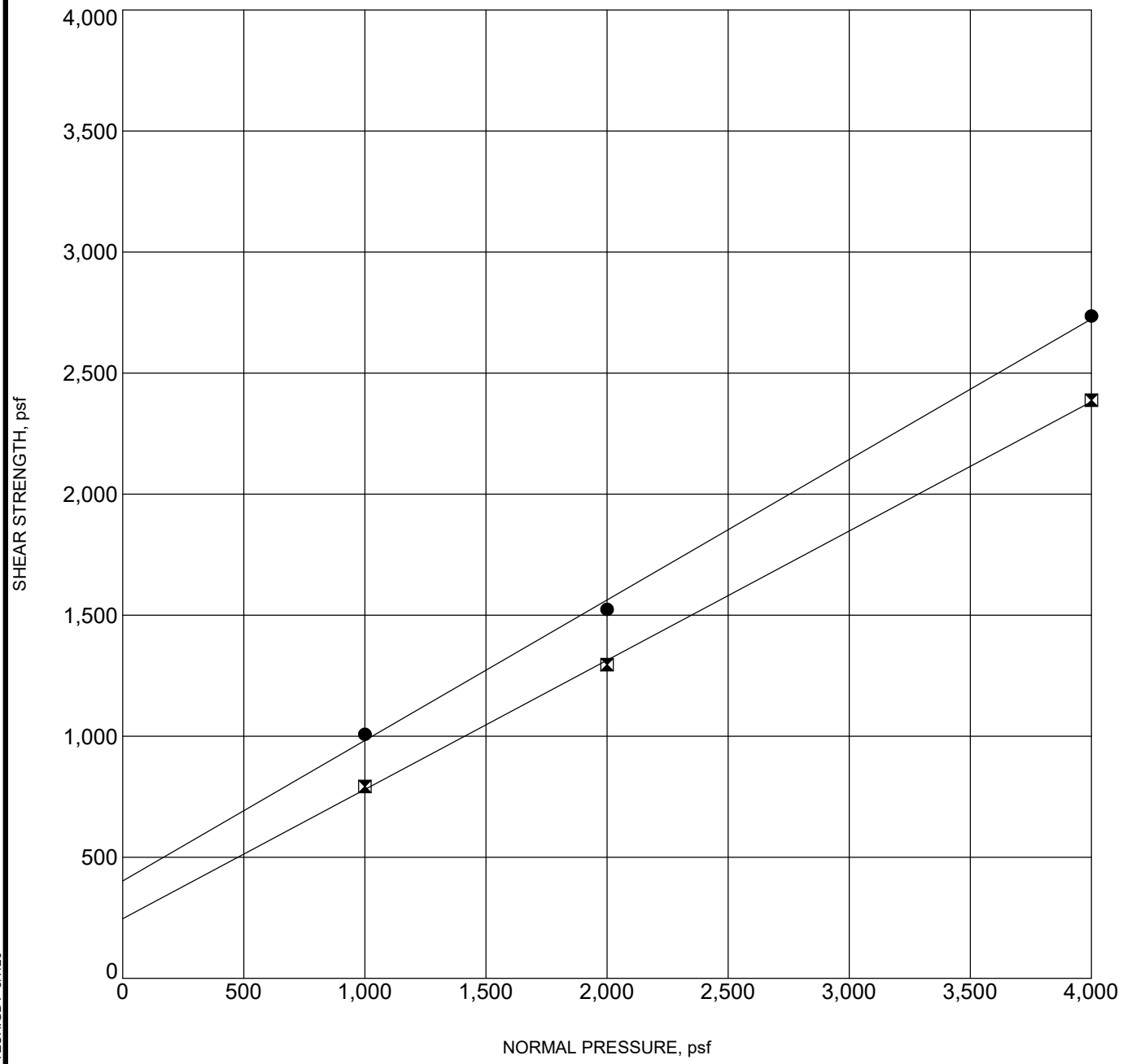


| Specimen Identification | | | Classification | $\gamma_d$ | MC% | c | $\phi$ |
|---|---|---|---|---|---|---|---|
| ● | **BA-1** | **45** | **(Tpl) Bedrock- Remolded Peak, 95% Compaction** | **111** | **18** | **402** | **30** |
| ⊠ | **BA-1** | **45** | **(Tpl) Bedrock- Remolded Ultimate, 95% Compaction** | **111** | **18** | **246** | **28** |
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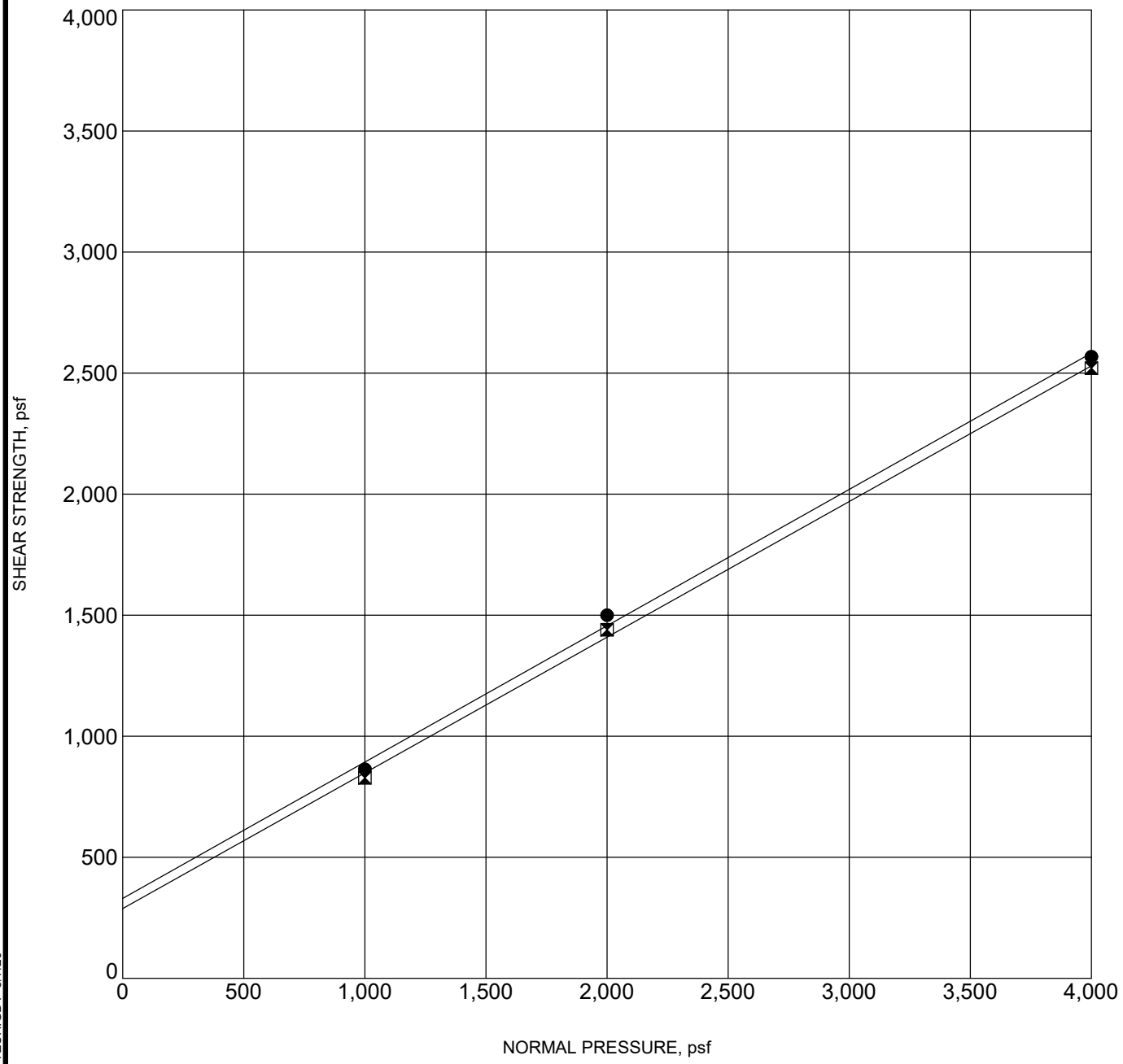
# DIRECT SHEAR TEST

Project Number: 20-7009

Project Name: Hoff Property, Yorba Linda




| Specimen Identification | | | Classification | $\gamma_d$ | MC% | c | $\phi$ |
|---|---|---|---|---|---|---|---|
| ● | **BA-1** | **45** | **(Tpl) Bedrock- Remolded Peak, 90% Compaction** | **111** | **18** | **330** | **29** |
| ⊠ | **BA-1** | **45** | **(Tpl) Bedrock- Remolded Ultimate, 90% Compaction** | **111** | **18** | **288** | **29** |
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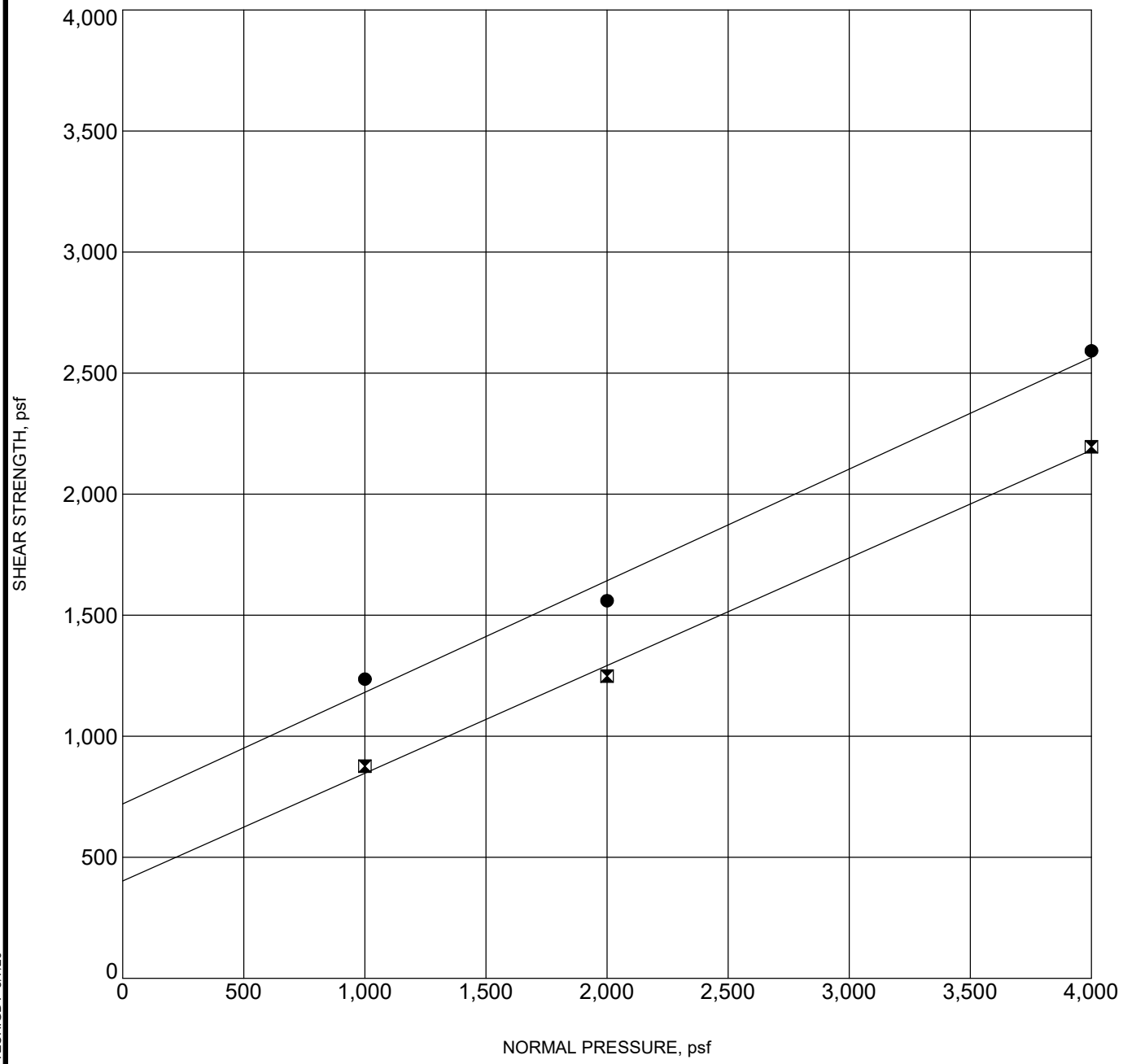


| Specimen Identification | | | Classification | $\gamma_d$ | MC% | c | $\phi$ |
|---|---|---|---|---|---|---|---|
| ● | **BA-2** | **10** | **(Tpl) Bedrock- Remolded Peak, 95% Compaction** | **108** | **20** | **720** | **25** |
| ⊠ | **BA-2** | **10** | **(Tpl) Bedrock- Remolded Ultimate, 95% Compaction** | **108** | **20** | **402** | **24** |
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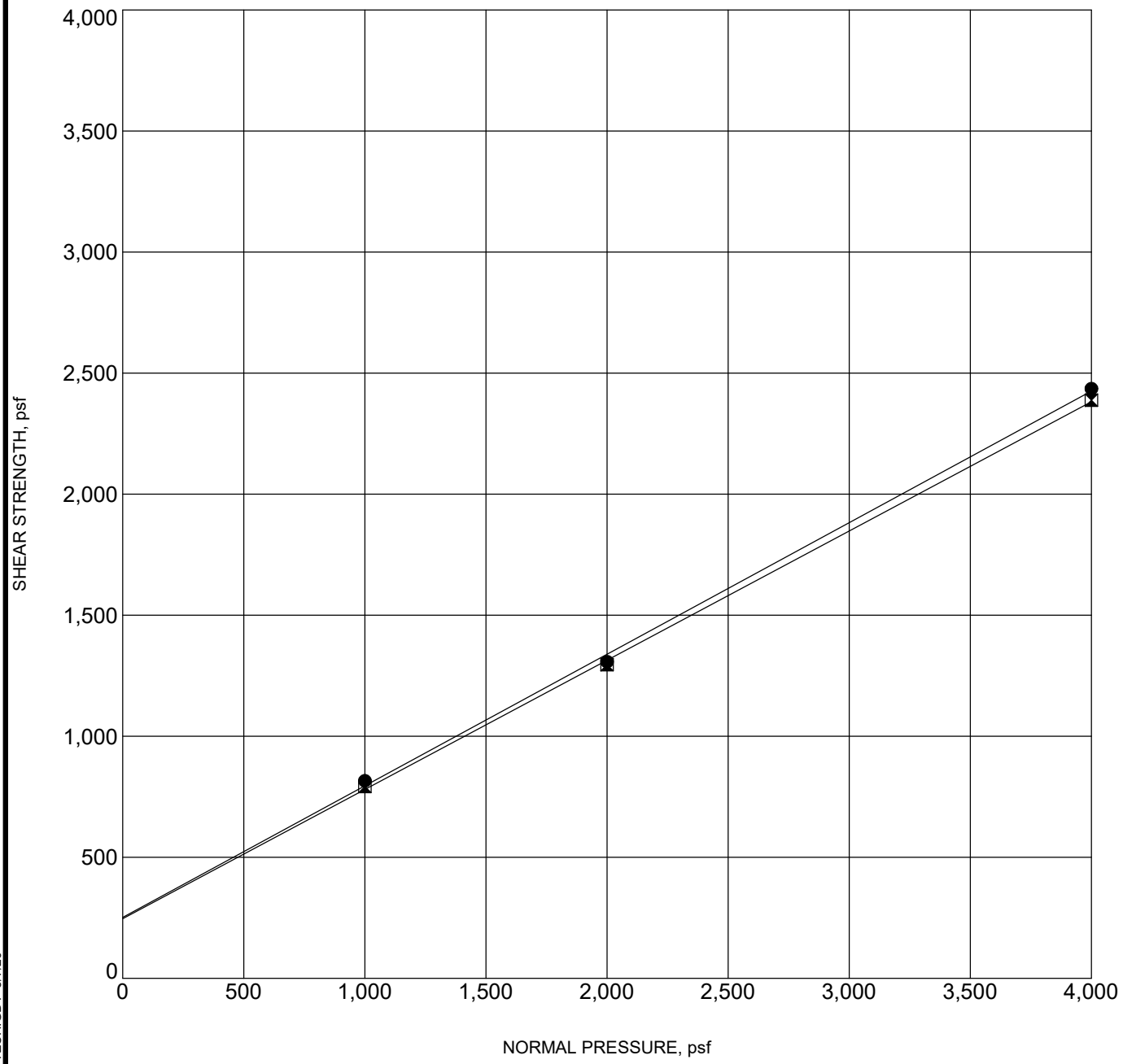


| Specimen Identification | | | Classification | $\gamma_d$ | MC% | c | $\phi$ |
|---|---|---|---|---|---|---|---|
| ● | **BA-2** | **10** | **(Tpl) Bedrock- Remolded Peak, 90% Compaction** | **108** | **20** | **252** | **29** |
| ⊠ | **BA-2** | **10** | **(Tpl) Bedrock- Remolded Ultimate, 90% Compaction** | **108** | **20** | **246** | **28** |
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Fax:

# DIRECT SHEAR TEST

Project Number: 20-7009

Project Name: Hoff Property, Yorba Linda

# ANAHEIM TEST LAB, INC.

196 Technology Drive, Unit D
Irvine, CA 92618
Phone (949)336-6544

TO:

TGR GEOTECHNICAL
3037 S. HARBOR BLVD.
SANTA ANA, CA. 92704

DATE: 04/28/2020

P.O. NO: VERBAL

LAB NO: C-3771

SPECIFICATION: CTM-417

MATERIAL: Soil

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Project No.: 20-7009
Project: Huff Property
Yorba Linda, CA
Sample ID: B-1 @ 0'-5', Bulk

## ANALYTICAL REPORT

SOLUBLE SULFATES
per CT. 417
ppm

765

RESPECTFULLY SUBMITTED

WES BRIDGER LAB MANAGER

# APPENDIX D
# SLOPE STABILITY

TGR GEOTECHNICAL
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# SURFICIAL SLOPE STABILITY ANALYSIS

SLOPE DESCRIPTION: Fill slope @ 2:1

| | | | |
|---|---|---|---|
| Friction Angle (degrees)= | 28 | **FACTORS OF SAFETY(FOS)** | |
| (radians)= | 0.4887 | | |
| Cohesion (psf)= | 275 | Depth of Saturation (ft) | FOS |
| Saturated Unit Weight (pcf)= | 140 | 1.0 | 5.5 |
| Bouyant Unit Weight (pcf)= | 77.6 | 2.0 | 3.0 |
| Slope angle (degrees)= | 26.6 | 3.0 | 2.2 |
| (radians)= | 0.4643 | 4.0 | 1.8 |

## DATA FOR SEISMIC SLOPE DISPLACEMENT ANALYSES

**Project:** 20-7009, HOFF Property, Sec A

**INPUT:**

| | | |
|---|---|---|
| Slide h (ft): | 31.09 | |
| Slide Vs (ft/sec): | 1200 | For slide mass |
| Depth to Rx (km): | 0.02 | (Rx=Vs>5000 ft/s) |
| Site Vs(30) (m/s): | 360 | Material below slide |
| Ave. Site Class: | D | |
| Mean Magnitude: | 6.57 | |
| Mean Dist. (km): | 10.28 | |
| ky: | 0.300 | Insert from slope stability |

| | | |
|---|---|---|
| Average Height Calculation Using CAD Data: | | |
| Slide Mass Area = | 9944.48 | Insert from slope stability |
| Horiz.Lengh of Slide Mas | 319.88 | Insert from slope stability |
| Average Slide H (ft) = | 31.09 | |

Ts: 4h/Vs
Tm: Rathje et al. (2004)
PGV: Watson-Lamprey and Abrahamson (2006)
Duration: Bommer et al. (2009)

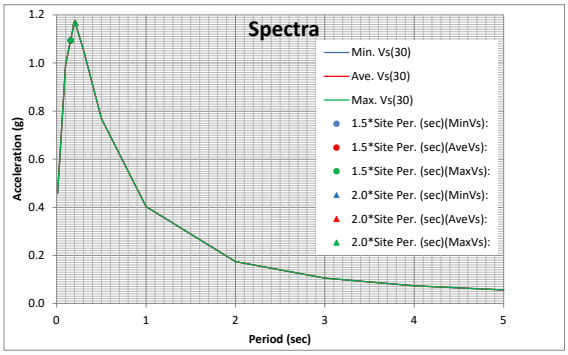
**RESULTS:**

| Based on Min. $Vs_{(30)}$ | | Based on Ave. $Vs_{(30)}$ | | Based on Max. $Vs_{(30)}$ | |
|---|---|---|---|---|---|
| Site Period, Ts (sec): | 0.1036 | Site Period, Ts (sec): | 0.1036 | Site Period, Ts (sec): | 0.1036 |
| 1.5*Site Per. (sec)(MinVs): | 0.1554 | 1.5*Site Per. (sec)(AveVs): | 0.1554 | 1.5*Site Per. (sec)(MaxVs): | 0.1554 |
| 2.0*Site Per. (sec)(MinVs): | 0.2073 | 2.0*Site Per. (sec)(AveVs): | 0.2073 | 2.0*Site Per. (sec)(MaxVs): | 0.2073 |
| EQ Mean Period, Tm (sec): | 0.556 | EQ Mean Period, Tm (sec): | 0.556 | EQ Mean Period, Tm (sec): | 0.556 |
| Ts/Tm: | 0.19 | Ts/Tm: | 0.19 | Ts/Tm: | 0.19 |
| Estimated PGV (cm/sec): | 48.86 | Estimated PGV (cm/sec): | 48.86 | Estimated PGV (cm/sec): | 48.86 |
| Duration ($D_5$-$D_{95}$) (sec): | 12.7 | Duration ($D_5$-$D_{95}$) (sec): | 12.7 | Duration ($D_5$-$D_{95}$) (sec): | 12.7 |
| Sa(1.5Ts) Min $Vs_{(30)}$ | 1.0941 | Sa(1.5Ts) Ave $Vs_{(30)}$ | 1.0941 | Sa(1.5Ts) Max $Vs_{(30)}$ | 1.0941 |
| Sa(2.0Ts) Min $Vs_{(30)}$ | 1.1663 | Sa(2.0Ts) Ave $Vs_{(30)}$ | 1.1663 | Sa(2.0Ts) Max $Vs_{(30)}$ | 1.1663 |
| Mean Mag at Site Per Min | 6.57 | Mean Mag at Site Per Ave | 6.57 | Mean Mag at Site Per Ave | 6.57 |
| Mean Dist at Site Per Min | 10.28 | Mean Dist at Site Per Ave | 10.28 | Mean Dist at Site Per Ave | 10.28 |

| | | |
|---|---|---|
| Largest Sa(1.5Ts): | 1.0941 | These values flow to |
| Corresponding Sa(2.0Ts): | 1.1663 | input table at upper left and |
| Corresponding PGA: | 0.4577 | B&T, R&A, and S&R-M calculations |
| Corresponding PGV: | 48.86 | on next pages. |
| Corresponding Mean Mag: | 6.57 | |
| Corresponding Mean Dist: | 10.28 | |

**5-Percent Damped Spectra**

| $Vs_{(30)}$ | 480 | 480 | 480 |
|---|---|---|---|
| Period | Min. $Vs_{(30)}$ | Ave. $Vs_{(30)}$ | Max. $Vs_{(30)}$ |
| 0.01 | 0.4577 | 0.4577 | 0.4577 |
| 0.1 | 0.9933 | 0.9933 | 0.9933 |
| 0.2 | 1.1751 | 1.1751 | 1.1751 |
| 0.3 | 1.0542 | 1.0542 | 1.0542 |
| 0.5 | 0.7690 | 0.7690 | 0.7690 |
| 1.0 | 0.4031 | 0.4031 | 0.4031 |
| 2.0 | 0.17402 | 0.17402 | 0.17402 |
| 3.0 | 0.10542 | 0.10542 | 0.10542 |
| 4.0 | 0.07383 | 0.07383 | 0.07383 |
| 5.0 | 0.05620 | 0.05620 | 0.05620 |

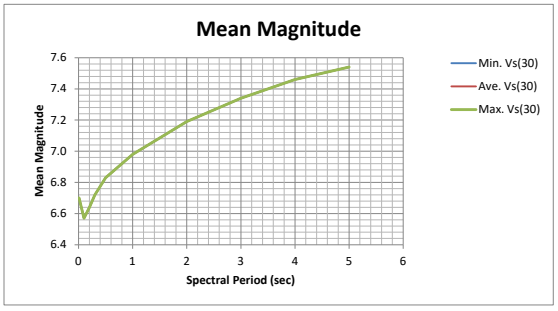



**Mean Distance (km)**

| Period | Min. $Vs_{(30)}$ | Ave. $Vs_{(30)}$ | Max. $Vs_{(30)}$ |
|---|---|---|---|
| 0.01 | 8.4 | 8.4 | 8.4 |
| 0.1 | 10.3 | 10.3 | 10.3 |
| 0.2 | 10.6 | 10.6 | 10.6 |
| 0.3 | 11.0 | 11.0 | 11.0 |
| 0.5 | 12.6 | 12.6 | 12.6 |
| 1.0 | 15.0 | 15.0 | 15.0 |
| 2.0 | 19.7 | 19.7 | 19.7 |
| 3.0 | 23.0 | 23.0 | 23.0 |
| 4.0 | 26.4 | 26.4 | 26.4 |
| 5.0 | 31.0 | 31.0 | 31.0 |


**Mean Magnitude**

| Period | Min. $Vs_{(30)}$ | Ave. $Vs_{(30)}$ | Max. $Vs_{(30)}$ |
|---|---|---|---|
| 0.01 | 6.70 | 6.70 | 6.70 |
| 0.1 | 6.57 | 6.57 | 6.57 |
| 0.2 | 6.64 | 6.64 | 6.64 |
| 0.3 | 6.72 | 6.72 | 6.72 |
| 0.5 | 6.83 | 6.83 | 6.83 |
| 1.0 | 6.98 | 6.98 | 6.98 |
| 2.0 | 7.19 | 7.19 | 7.19 |
| 3.0 | 7.34 | 7.34 | 7.34 |
| 4.0 | 7.46 | 7.46 | 7.46 |
| 5.0 | 7.54 | 7.54 | 7.54 |



**Average Seismic Displacement**

| | | |
|---|---|---|
| Seismic Displacement (Bray and Travasarou) = 50% Probability of Exceedance (D2) | 7.89 cm | 3.11 inch |

1cm = 0.393701 in.

Highlight indicates < 1 cm was estimated

| | | |
|---|---|---|
| Seismic Displacement (Rathje and Antonakos) = [kmax, k-velmax] | 1.20 cm | 0.47 inch |

| | | |
|---|---|---|
| Seismic Displacement (Song and Rodriguez-Marek) = 50% Probability of Exceedance (D2) | 2.16 cm | 0.85 inch |

| | | |
|---|---|---|
| Average Displacement (B&T and R&A) = | 4.55 cm | 1.79 inch |

| | | |
|---|---|---|
| Average Displacement (B&T, R&A, and S&R-A) = | 3.75 cm | 1.48 inch |

## DATA FOR SEISMIC SLOPE DISPLACEMENT ANALYSES

**Project:** 20-7009, HOFF Property, Sec B

**INPUT:**

| | | |
|---|---|---|
| Slide h (ft): | 15.26 | |
| Slide Vs (ft/sec): | 1200 | For slide mass |
| Depth to Rx (km): | 0 | (Rx=Vs>5000 ft/s) |
| Site Vs(30) (m/s): | 760 | Material below slide |
| Ave. Site Class: | C | |
| Mean Magnitude: | 6.64 | |
| Mean Dist. (km): | 9.25 | |
| ky: | 0.360 | Insert from slope stability |

| | | |
|---|---|---|
| Average Height Calculation Using CAD Data: | | |
| Slide Mass Area = | 3693.71 | Insert from slope stability |
| Horiz.Lengh of Slide Mas | 242.04 | Insert from slope stability |
| Average Slide H (ft) = | 15.26 | |

Ts: 4h/Vs
Tm: Rathje et al. (2004)
PGV: Watson-Lamprey and Abrahamson (2006)
Duration: Bommer et al. (2009)

**RESULTS:**

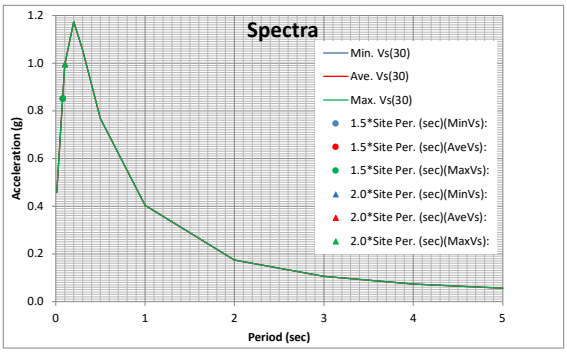
| Based on Min. $Vs_{(30)}$ | | Based on Ave. $Vs_{(30)}$ | | Based on Max. $Vs_{(30)}$ | |
|---|---|---|---|---|---|
| Site Period, Ts (sec): | 0.0509 | Site Period, Ts (sec): | 0.0509 | Site Period, Ts (sec): | 0.0509 |
| 1.5*Site Per. (sec)(MinVs): | 0.0763 | 1.5*Site Per. (sec)(AveVs): | 0.0763 | 1.5*Site Per. (sec)(MaxVs): | 0.0763 |
| 2.0*Site Per. (sec)(MinVs): | 0.1017 | 2.0*Site Per. (sec)(AveVs): | 0.1017 | 2.0*Site Per. (sec)(MaxVs): | 0.1017 |
| EQ Mean Period, Tm (sec): | 0.462 | EQ Mean Period, Tm (sec): | 0.462 | EQ Mean Period, Tm (sec): | 0.462 |
| Ts/Tm: | 0.11 | Ts/Tm: | 0.11 | Ts/Tm: | 0.11 |
| Estimated PGV (cm/sec): | 49.15 | Estimated PGV (cm/sec): | 49.15 | Estimated PGV (cm/sec): | 49.15 |
| Duration ($D_5$-$D_{95}$) (sec): | 9.9 | Duration ($D_5$-$D_{95}$) (sec): | 9.9 | Duration ($D_5$-$D_{95}$) (sec): | 9.9 |
| Sa(1.5Ts) Min $Vs_{(30)}$ | 0.8523 | Sa(1.5Ts) Ave $Vs_{(30)}$ | 0.8523 | Sa(1.5Ts) Max $Vs_{(30)}$ | 0.8523 |
| Sa(2.0Ts) Min $Vs_{(30)}$ | 0.9965 | Sa(2.0Ts) Ave $Vs_{(30)}$ | 0.9965 | Sa(2.0Ts) Max $Vs_{(30)}$ | 0.9965 |
| Mean Mag at Site Per Min | 6.64 | Mean Mag at Site Per Ave | 6.64 | Mean Mag at Site Per Ave | 6.64 |
| Mean Dist at Site Per Min | 9.25 | Mean Dist at Site Per Ave | 9.25 | Mean Dist at Site Per Ave | 9.25 |

| | |
|---|---|
| Largest Sa(1.5Ts): | 0.8523 |
| Corresponding Sa(2.0Ts): | 0.9965 |
| Corresponding PGA: | 0.4577 |
| Corresponding PGV: | 49.15 |
| Corresponding Mean Mag: | 6.64 |
| Corresponding Mean Dist: | 9.25 |

These values flow to input table at upper left and B&T, R&A, and S&R-M calculations on next pages.

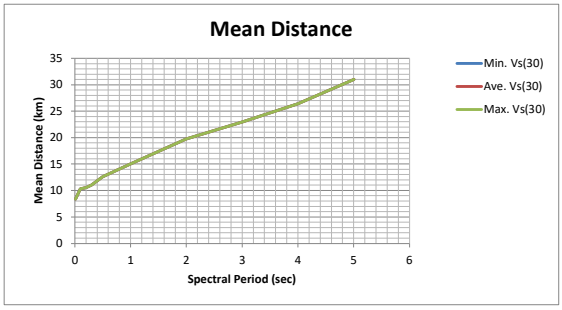
### 5-Percent Damped Spectra

| $Vs_{(30)}$ | 480 | 480 | 480 |
|---|---|---|---|
| Period | Min. $Vs_{(30)}$ | Ave. $Vs_{(30)}$ | Max. $Vs_{(30)}$ |
| 0.01 | 0.4577 | 0.4577 | 0.4577 |
| 0.1 | 0.9933 | 0.9933 | 0.9933 |
| 0.2 | 1.1751 | 1.1751 | 1.1751 |
| 0.3 | 1.0542 | 1.0542 | 1.0542 |
| 0.5 | 0.7690 | 0.7690 | 0.7690 |
| 1.0 | 0.4031 | 0.4031 | 0.4031 |
| 2.0 | 0.17402 | 0.17402 | 0.17402 |
| 3.0 | 0.10542 | 0.10542 | 0.10542 |
| 4.0 | 0.07383 | 0.07383 | 0.07383 |
| 5.0 | 0.05620 | 0.05620 | 0.05620 |



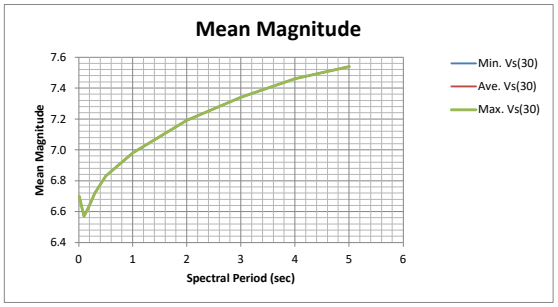

### Mean Distance (km)

| Period | Min. $Vs_{(30)}$ | Ave. $Vs_{(30)}$ | Max. $Vs_{(30)}$ |
|---|---|---|---|
| 0.01 | 8.4 | 8.4 | 8.4 |
| 0.1 | 10.3 | 10.3 | 10.3 |
| 0.2 | 10.6 | 10.6 | 10.6 |
| 0.3 | 11.0 | 11.0 | 11.0 |
| 0.5 | 12.6 | 12.6 | 12.6 |
| 1.0 | 15.0 | 15.0 | 15.0 |
| 2.0 | 19.7 | 19.7 | 19.7 |
| 3.0 | 23.0 | 23.0 | 23.0 |
| 4.0 | 26.4 | 26.4 | 26.4 |
| 5.0 | 31.0 | 31.0 | 31.0 |




### Mean Magnitude

| Period | Min. $Vs_{(30)}$ | Ave. $Vs_{(30)}$ | Max. $Vs_{(30)}$ |
|---|---|---|---|
| 0.01 | 6.70 | 6.70 | 6.70 |
| 0.1 | 6.57 | 6.57 | 6.57 |
| 0.2 | 6.64 | 6.64 | 6.64 |
| 0.3 | 6.72 | 6.72 | 6.72 |
| 0.5 | 6.83 | 6.83 | 6.83 |
| 1.0 | 6.98 | 6.98 | 6.98 |
| 2.0 | 7.19 | 7.19 | 7.19 |
| 3.0 | 7.34 | 7.34 | 7.34 |
| 4.0 | 7.46 | 7.46 | 7.46 |
| 5.0 | 7.54 | 7.54 | 7.54 |



**Average Seismic Displacement**

| | | |
|---|---|---|
| Seismic Displacement (Bray and Travasarou) = 50% Probability of Exceedance (D2) | 2.36 cm | 0.93 inch |

1cm = 0.393701 in.

Highlight indicates < 1 cm was estimated

| | | |
|---|---|---|
| Seismic Displacement (Rathje and Antonakos) = [kmax, k-velmax] | 0.29 cm | 0.11 inch |

| | | |
|---|---|---|
| Seismic Displacement (Song and Rodriguez-Marek) = 50% Probability of Exceedance (D2) | 1.00 cm | 0.39 inch |

| | | |
|---|---|---|
| Average Displacement (B&T and R&A) = | 1.33 cm | 0.52 inch |

| | | |
|---|---|---|
| Average Displacement (B&T, R&A, and S&R-A) = | 1.22 cm | 0.48 inch |

## DATA FOR SEISMIC SLOPE DISPLACEMENT ANALYSES

**Project:** 20-7009, HOFF Property, Sec C

**INPUT:**

| | | |
|---|---|---|
| Slide h (ft): | 14.17 | |
| Slide Vs (ft/sec): | 1200 | For slide mass |
| Depth to Rx (km): | 0 | (Rx=Vs>5000 ft/s) |
| Site Vs(30) (m/s): | 760 | Material below slide |
| Ave. Site Class: | C | |
| Mean Magnitude: | 6.65 | |
| Mean Dist. (km): | 9.17 | |
| ky: | 0.350 | Insert from slope stability |

| | | |
|---|---|---|
| Average Height Calculation Using CAD Data: | | |
| Slide Mass Area = | 3451.00 | Insert from slope stability |
| Horiz.Lengh of Slide Mas | 243.50 | Insert from slope stability |
| Average Slide H (ft) = | 14.17 | |

Ts: 4h/Vs
Tm: Rathje et al. (2004)
PGV: Watson-Lamprey and Abrahamson (2006)
Duration: Bommer et al. (2009)

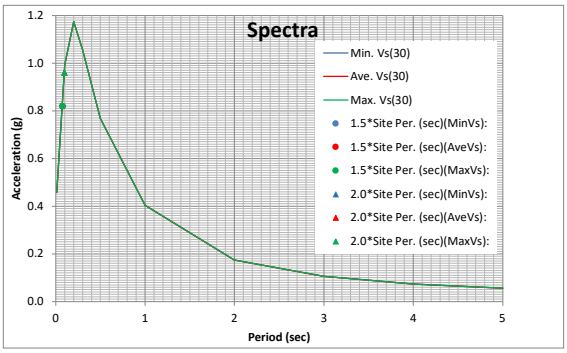
**RESULTS:**

| Based on Min. $Vs_{(30)}$ | | Based on Ave. $Vs_{(30)}$ | | Based on Max. $Vs_{(30)}$ | |
|---|---|---|---|---|---|
| Site Period, Ts (sec): | 0.0472 | Site Period, Ts (sec): | 0.0472 | Site Period, Ts (sec): | 0.0472 |
| 1.5*Site Per. (sec)(MinVs): | 0.0709 | 1.5*Site Per. (sec)(AveVs): | 0.0709 | 1.5*Site Per. (sec)(MaxVs): | 0.0709 |
| 2.0*Site Per. (sec)(MinVs): | 0.0945 | 2.0*Site Per. (sec)(AveVs): | 0.0945 | 2.0*Site Per. (sec)(MaxVs): | 0.0945 |
| EQ Mean Period, Tm (sec): | 0.463 | EQ Mean Period, Tm (sec): | 0.463 | EQ Mean Period, Tm (sec): | 0.463 |
| Ts/Tm: | 0.10 | Ts/Tm: | 0.10 | Ts/Tm: | 0.10 |
| Estimated PGV (cm/sec): | 49.18 | Estimated PGV (cm/sec): | 49.18 | Estimated PGV (cm/sec): | 49.18 |
| Duration ($D_5$-$D_{95}$) (sec): | 9.9 | Duration ($D_5$-$D_{95}$) (sec): | 9.9 | Duration ($D_5$-$D_{95}$) (sec): | 9.9 |
| Sa(1.5Ts) Min $Vs_{(30)}$ | 0.8199 | Sa(1.5Ts) Ave $Vs_{(30)}$ | 0.8199 | Sa(1.5Ts) Max $Vs_{(30)}$ | 0.8199 |
| Sa(2.0Ts) Min $Vs_{(30)}$ | 0.9605 | Sa(2.0Ts) Ave $Vs_{(30)}$ | 0.9605 | Sa(2.0Ts) Max $Vs_{(30)}$ | 0.9605 |
| Mean Mag at Site Per Min | 6.65 | Mean Mag at Site Per Ave | 6.65 | Mean Mag at Site Per Ave | 6.65 |
| Mean Dist at Site Per Min | 9.17 | Mean Dist at Site Per Ave | 9.17 | Mean Dist at Site Per Ave | 9.17 |

| | | |
|---|---|---|
| Largest Sa(1.5Ts): | 0.8199 | These values flow to |
| Corresponding Sa(2.0Ts): | 0.9605 | input table at upper left and |
| Corresponding PGA: | 0.4577 | B&T, R&A, and S&R-M calculations |
| Corresponding PGV: | 49.18 | on next pages. |
| Corresponding Mean Mag: | 6.65 | |
| Corresponding Mean Dist: | 9.17 | |

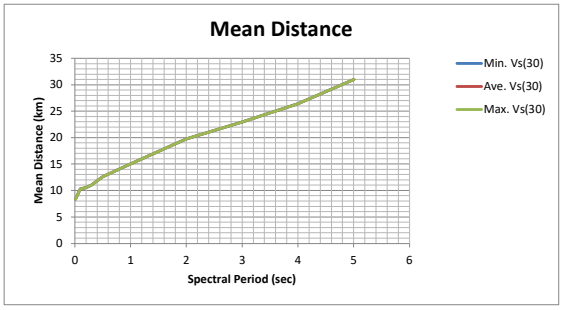
### 5-Percent Damped Spectra

| $Vs_{(30)}$ | 480 | 480 | 480 |
|---|---|---|---|
| Period | Min. $Vs_{(30)}$ | Ave. $Vs_{(30)}$ | Max. $Vs_{(30)}$ |
| 0.01 | 0.4577 | 0.4577 | 0.4577 |
| 0.1 | 0.9933 | 0.9933 | 0.9933 |
| 0.2 | 1.1751 | 1.1751 | 1.1751 |
| 0.3 | 1.0542 | 1.0542 | 1.0542 |
| 0.5 | 0.7690 | 0.7690 | 0.7690 |
| 1.0 | 0.4031 | 0.4031 | 0.4031 |
| 2.0 | 0.17402 | 0.17402 | 0.17402 |
| 3.0 | 0.10542 | 0.10542 | 0.10542 |
| 4.0 | 0.07383 | 0.07383 | 0.07383 |
| 5.0 | 0.05620 | 0.05620 | 0.05620 |



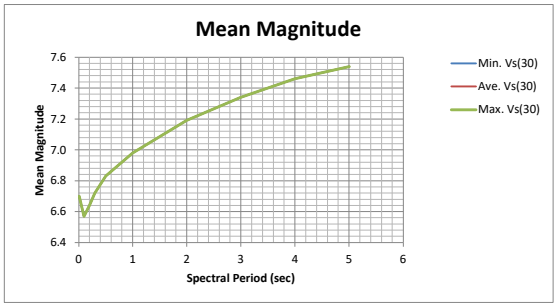

### Mean Distance (km)

| Period | Min. $Vs_{(30)}$ | Ave. $Vs_{(30)}$ | Max. $Vs_{(30)}$ |
|---|---|---|---|
| 0.01 | 8.4 | 8.4 | 8.4 |
| 0.1 | 10.3 | 10.3 | 10.3 |
| 0.2 | 10.6 | 10.6 | 10.6 |
| 0.3 | 11.0 | 11.0 | 11.0 |
| 0.5 | 12.6 | 12.6 | 12.6 |
| 1.0 | 15.0 | 15.0 | 15.0 |
| 2.0 | 19.7 | 19.7 | 19.7 |
| 3.0 | 23.0 | 23.0 | 23.0 |
| 4.0 | 26.4 | 26.4 | 26.4 |
| 5.0 | 31.0 | 31.0 | 31.0 |




### Mean Magnitude

| Period | Min. $Vs_{(30)}$ | Ave. $Vs_{(30)}$ | Max. $Vs_{(30)}$ |
|---|---|---|---|
| 0.01 | 6.70 | 6.70 | 6.70 |
| 0.1 | 6.57 | 6.57 | 6.57 |
| 0.2 | 6.64 | 6.64 | 6.64 |
| 0.3 | 6.72 | 6.72 | 6.72 |
| 0.5 | 6.83 | 6.83 | 6.83 |
| 1.0 | 6.98 | 6.98 | 6.98 |
| 2.0 | 7.19 | 7.19 | 7.19 |
| 3.0 | 7.34 | 7.34 | 7.34 |
| 4.0 | 7.46 | 7.46 | 7.46 |
| 5.0 | 7.54 | 7.54 | 7.54 |



**Average Seismic Displacement**

| | | |
|---|---|---|
| Seismic Displacement (Bray and Travasarou) = 50% Probability of Exceedance (D2) | 5.40 cm | 2.13 inch |

1cm = 0.393701 in.

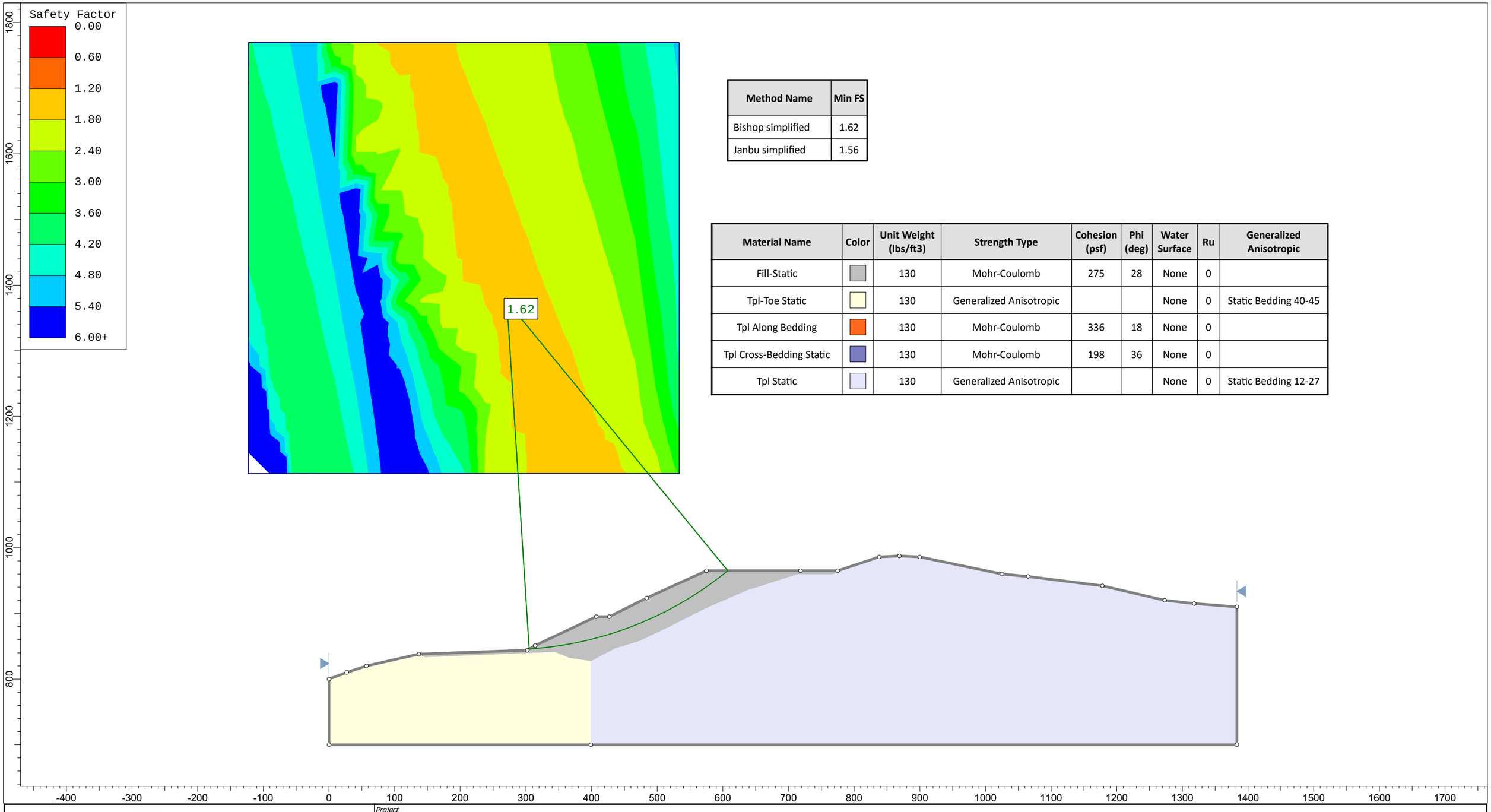
Highlight indicates < 1 cm was estimated

| | | |
|---|---|---|
| Seismic Displacement (Rathje and Antonakos) = [kmax, k-velmax] | 0.35 cm | 0.14 inch |

| | | |
|---|---|---|
| Seismic Displacement (Song and Rodriguez-Marek) = 50% Probability of Exceedance (D2) | 1.00 cm | 0.39 inch |

| | | |
|---|---|---|
| Average Displacement (B&T and R&A) = | 2.88 cm | 1.13 inch |

| | | |
|---|---|---|
| Average Displacement (B&T, R&A, and S&R-A) = | 2.25 cm | 0.89 inch |




| Method Name | Min FS |
|---|---|
| Bishop simplified | 1.62 |
| Janbu simplified | 1.56 |

| Material Name | Color | Unit Weight (lbs/ft3) | Strength Type | Cohesion (psf) | Phi (deg) | Water Surface | Ru | Generalized Anisotropic |
|---|---|---|---|---|---|---|---|---|
| Fill-Static | | 130 | Mohr-Coulomb | 275 | 28 | None | 0 | |
| Tpl-Toe Static | | 130 | Generalized Anisotropic | | | None | 0 | Static Bedding 40-45 |
| Tpl Along Bedding | | 130 | Mohr-Coulomb | 336 | 18 | None | 0 | |
| Tpl Cross-Bedding Static | | 130 | Mohr-Coulomb | 198 | 36 | None | 0 | |
| Tpl Static | | 130 | Generalized Anisotropic | | | None | 0 | Static Bedding 12-27 |

TGR Geotechnical
Environmental
Hydrogeology
Material Testing
Construction Inspection

SLIDEINTERPRET 7.038

| | | | |
|---|---|---|---|
| *Project* | HOFF Property, Yorba Linda, CA | | |
| *Analysis Description* | Cross-section A-A' Static | | |
| *Drawn By* | | *Scale* 1:1644 | *Company* TGR Geotechnical, Inc. |
| *Date* 4/15/20 | | | *File Name* Cross-section A-A' Static.slim |

# Slide Analysis Information

# HOFF Property, Yorba Linda, CA

## Project Summary

| | |
|---|---|
| File Name: | Cross-section A-A' Static |
| Slide Modeler Version: | 7.038 |
| Project Title: | HOFF Property, Yorba Linda, CA |
| Analysis: | Cross-section A-A' Static |
| Company: | TGR Geotechnical, Inc. |
| Date Created: | 4/15/20 |

## General Settings

| | |
|---|---|
| Units of Measurement: | Imperial Units |
| Time Units: | days |
| Permeability Units: | feet/second |
| Failure Direction: | Right to Left |
| Data Output: | Standard |
| Maximum Material Properties: | 20 |
| Maximum Support Properties: | 20 |

## Analysis Options

| | |
|---|---|
| Slices Type: | Vertical |

| Analysis Methods Used |
|---|
| Bishop simplified |
| Janbu simplified |

| | |
|---|---|
| Number of slices: | 50 |
| Tolerance: | 0.005 |
| Maximum number of iterations: | 75 |
| Check malpha < 0.2: | Yes |
| Create Interslice boundaries at intersections with water tables and piezos: | Yes |
| Initial trial value of FS: | 1 |
| Steffensen Iteration: | Yes |

## Groundwater Analysis

| | |
|---|---|
| Groundwater Method: | Water Surfaces |
| Pore Fluid Unit Weight [lbs/ft3]: | 62.4 |
| Use negative pore pressure cutoff: | Yes |
| Maximum negative pore pressure [psf]: | 0 |
| Advanced Groundwater Method: | None |

## Random Numbers

| | |
|---|---|
| Pseudo-random Seed: | 10116 |
| Random Number Generation Method: | Park and Miller v.3 |

## Surface Options

| | |
|---|---|
| Surface Type: | Circular |
| Search Method: | Grid Search |
| Radius Increment: | 10 |
| Composite Surfaces: | Disabled |
| Reverse Curvature: | Invalid Surfaces |
| Minimum Elevation: | Not Defined |
| Minimum Depth: | Not Defined |
| Minimum Area: | Not Defined |
| Minimum Weight: | Not Defined |

## Seismic

| | |
|---|---|
| Advanced seismic analysis: | No |
| Staged pseudostatic analysis: | No |

## Material Properties

| Property | Fill-Static | Tpl-Toe Static | Tpl Static |
|---|---|---|---|
| Color | | | |
| Strength Type | Mohr-Coulomb | Generalized Anisotropic | Generalized Anisotropic |
| Unit Weight [lbs/ft3] | 130 | 130 | 130 |
| Cohesion [psf] | 275 | | |
| Friction Angle [deg] | 28 | | |
| Water Surface | None | None | None |
| Ru Value | 0 | 0 | 0 |

### Generalized Anisotropic Functions

Name: Static Bedding 40-45

| Angle From | Angle To | Material |
|---|---|---|
| 40 | -90 | Tpl Cross-Bedding Static |
| 45 | 40 | Tpl Along Bedding |
| 90 | 45 | Tpl Cross-Bedding Static |

Name: Static Bedding 12-27

| Angle From | Angle To | Material |
|---|---|---|
| -27 | -90 | Tpl Cross-Bedding Static |
| -12 | -27 | Tpl Along Bedding |
| 90 | -12 | Tpl Cross-Bedding Static |

## Global Minimums

### Method: bishop simplified

| FS | 1.618140 |
|---|---|
| Center: | 270.990, 1375.482 |
| Radius: | 530.809 |
| Left Slip Surface Endpoint: | 305.025, 845.765 |
| Right Slip Surface Endpoint: | 607.536, 965.000 |
| Resisting Moment: | 3.08296e+008 lb-ft |
| Driving Moment: | 1.90525e+008 lb-ft |
| Total Slice Area: | 7521.42 ft2 |
| Surface Horizontal Width: | 302.511 ft |
| Surface Average Height: | 24.8633 ft |

### Method: janbu simplified

| FS | 1.562180 |
|---|---|
| Center: | 303.811, 1244.195 |
| Radius: | 404.150 |
| Left Slip Surface Endpoint: | 259.686, 842.461 |
| Right Slip Surface Endpoint: | 596.022, 965.000 |
| Resisting Horizontal Force: | 636385 lb |
| Driving Horizontal Force: | 407369 lb |
| Total Slice Area: | 9099.64 ft2 |
| Surface Horizontal Width: | 336.336 ft |
| Surface Average Height: | 27.0552 ft |

## *Valid / Invalid Surfaces*

### Method: bishop simplified

Number of Valid Surfaces: 4601
Number of Invalid Surfaces: 250

#### Error Codes:

Error Code -103 reported for 232 surfaces
Error Code -106 reported for 7 surfaces
Error Code -1000 reported for 11 surfaces

### Method: janbu simplified

Number of Valid Surfaces: 4596
Number of Invalid Surfaces: 255

#### Error Codes:

Error Code -103 reported for 232 surfaces
Error Code -106 reported for 7 surfaces
Error Code -108 reported for 5 surfaces
Error Code -1000 reported for 11 surfaces

#### Error Codes

The following errors were encountered during the computation:

-103 = Two surface / slope intersections, but one or more surface / nonslope external polygon intersections lie between them. This usually occurs when the slip surface extends past the bottom of the soil region, but may also occur on a benched slope model with two sets of Slope Limits.
-106 = Average slice width is less than 0.0001 * (maximum horizontal extent of soil region). This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-1000 = No valid slip surfaces are generated at a grid center. Unable to draw a surface.

## *Slice Data*

**Global Minimum Query (bishop simplified) - Safety Factor**: 1.61814

| Slice Number | Width [ft] | Weight [lbs] | Angle of Slice Base [degrees] | Base Material | Base Cohesion [psf] | Base Friction Angle [degrees] | Shear Stress [psf] | Shear Strength [psf] | Base Normal Stress [psf] | Pore Pressure [psf] | Effective Normal Stress [psf] | Base Vertical Stress [psf] | Effective Vertical Stress [psf] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 6.05022 | 1221.42 | 4.00363 | Fill-Static | 275 | 28 | 230.975 | 373.75 | 185.722 | 0 | 185.722 | 201.888 | 201.888 |
| 2 | 6.05022 | 3566.92 | 4.65858 | Fill-Static | 275 | 28 | 354.192 | 573.132 | 560.704 | 0 | 560.704 | 589.566 | 589.566 |
| 3 | 6.05022 | 5464.42 | 5.31414 | Fill-Static | 275 | 28 | 452.89 | 732.84 | 861.071 | 0 | 861.071 | 903.197 | 903.197 |
| 4 | 6.05022 | 7245.68 | 5.9704 | Fill-Static | 275 | 28 | 544.757 | 881.493 | 1140.65 | 0 | 1140.65 | 1197.62 | 1197.62 |
| 5 | 6.05022 | 8971.81 | 6.62744 | Fill-Static | 275 | 28 | 633.058 | 1024.38 | 1409.37 | 0 | 1409.37 | 1482.93 | 1482.93 |
| 6 | 6.05022 | 10642.6 | 7.28536 | Fill-Static | 275 | 28 | 717.817 | 1161.53 | 1667.33 | 0 | 1667.33 | 1759.1 | 1759.1 |
| 7 | 6.05022 | 12257.8 | 7.94425 | Fill-Static | 275 | 28 | 799.059 | 1292.99 | 1914.55 | 0 | 1914.55 | 2026.06 | 2026.06 |
| 8 | 6.05022 | 13817.2 | 8.6042 | Fill-Static | 275 | 28 | 876.797 | 1418.78 | 2151.14 | 0 | 2151.14 | 2283.81 | 2283.81 |
| 9 | 6.05022 | 15320.4 | 9.2653 | Fill-Static | 275 | 28 | 951.055 | 1538.94 | 2377.13 | 0 | 2377.13 | 2532.28 | 2532.28 |
| 10 | 6.05022 | 16767.2 | 9.92765 | Fill-Static | 275 | 28 | 1021.85 | 1653.5 | 2592.58 | 0 | 2592.58 | 2771.43 | 2771.43 |
| 11 | 6.05022 | 18157.3 | 10.5913 | Fill-Static | 275 | 28 | 1089.2 | 1762.47 | 2797.52 | 0 | 2797.52 | 3001.19 | 3001.19 |
| 12 | 6.05022 | 19490.2 | 11.2565 | Fill-Static | 275 | 28 | 1153.11 | 1865.89 | 2992.03 | 0 | 2992.03 | 3221.53 | 3221.53 |
| 13 | 6.05022 | 20765.7 | 11.9231 | Fill-Static | 275 | 28 | 1213.59 | 1963.76 | 3176.1 | 0 | 3176.1 | 3432.35 | 3432.35 |
| 14 | 6.05022 | 21983.2 | 12.5915 | Fill-Static | 275 | 28 | 1270.66 | 2056.11 | 3349.77 | 0 | 3349.77 | 3633.6 | 3633.6 |
| 15 | 6.05022 | 23142.4 | 13.2615 | Fill-Static | 275 | 28 | 1324.32 | 2142.94 | 3513.09 | 0 | 3513.09 | 3825.21 | 3825.21 |
| 16 | 6.05022 | 24242.7 | 13.9334 | Fill-Static | 275 | 28 | 1374.59 | 2224.28 | 3666.06 | 0 | 3666.06 | 4007.09 | 4007.09 |
| 17 | 6.05022 | 25260 | 14.6073 | Fill-Static | 275 | 28 | 1420.28 | 2298.21 | 3805.1 | 0 | 3805.1 | 4175.25 | 4175.25 |
| 18 | 6.05022 | 24812.2 | 15.2832 | Fill-Static | 275 | 28 | 1392.55 | 2253.34 | 3720.72 | 0 | 3720.72 | 4101.24 | 4101.24 |
| 19 | 6.05022 | 23481.5 | 15.9614 | Fill-Static | 275 | 28 | 1321.15 | 2137.81 | 3503.43 | 0 | 3503.43 | 3881.3 | 3881.3 |
| 20 | 6.05022 | 22089.8 | 16.6418 | Fill-Static | 275 | 28 | 1247.23 | 2018.19 | 3278.47 | 0 | 3278.47 | 3651.27 | 3651.27 |
| 21 | 6.05022 | 21475 | 17.3247 | Fill-Static | 275 | 28 | 1212.1 | 1961.34 | 3171.55 | 0 | 3171.55 | 3549.65 | 3549.65 |
| 22 | 6.05022 | 22307.9 | 18.0101 | Fill-Static | 275 | 28 | 1248.23 | 2019.81 | 3281.51 | 0 | 3281.51 | 3687.33 | 3687.33 |
| 23 | 6.05022 | 23108.4 | 18.6982 | Fill-Static | 275 | 28 | 1282.44 | 2075.17 | 3385.62 | 0 | 3385.62 | 3819.65 | 3819.65 |
| 24 | 6.05022 | 23845.1 | 19.3891 | Fill-Static | 275 | 28 | 1313.21 | 2124.95 | 3479.26 | 0 | 3479.26 | 3941.43 | 3941.43 |
| 25 | 6.05022 | 24517.1 | 20.0829 | Fill-Static | 275 | 28 | 1340.53 | 2169.17 | 3562.41 | 0 | 3562.41 | 4052.52 | 4052.52 |
| 26 | 6.05022 | 25123.7 | 20.7798 | Fill-Static | 275 | 28 | 1364.4 | 2207.79 | 3635.05 | 0 | 3635.05 | 4152.78 | 4152.78 |
| 27 | 6.05022 | 25663.9 | 21.48 | Fill-Static | 275 | 28 | 1384.81 | 2240.81 | 3697.16 | 0 | 3697.16 | 4242.09 | 4242.09 |
| 28 | 6.05022 | 26136.7 | 22.1835 | Fill-Static | 275 | 28 | 1401.74 | 2268.21 | 3748.69 | 0 | 3748.69 | 4320.25 | 4320.25 |
| 29 | 6.05022 | 26541.3 | 22.8906 | Fill- | 275 | 28 | 1415.19 | 2289.97 | 3789.61 | 0 | 3789.61 | 4387.13 | 4387.13 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30 | 6.05022 | 26858.1 | 23.6014 | Fill-Static | 275 | 28 | 1424.26 | 2304.65 | 3817.22 | 0 | 3817.22 | 4439.5 | 4439.5 |
| 31 | 6.05022 | 26949 | 24.3161 | Fill-Static | 275 | 28 | 1422.47 | 2301.76 | 3811.78 | 0 | 3811.78 | 4454.54 | 4454.54 |
| 32 | 6.05022 | 26932.8 | 25.0348 | Fill-Static | 275 | 28 | 1415.56 | 2290.57 | 3790.73 | 0 | 3790.73 | 4451.87 | 4451.87 |
| 33 | 6.05022 | 26843.6 | 25.7577 | Fill-Static | 275 | 28 | 1405.18 | 2273.77 | 3759.13 | 0 | 3759.13 | 4437.14 | 4437.14 |
| 34 | 6.05022 | 26680.2 | 26.4851 | Fill-Static | 275 | 28 | 1391.3 | 2251.32 | 3716.91 | 0 | 3716.91 | 4410.14 | 4410.14 |
| 35 | 6.05022 | 26441.1 | 27.2171 | Fill-Static | 275 | 28 | 1373.92 | 2223.19 | 3664.02 | 0 | 3664.02 | 4370.64 | 4370.64 |
| 36 | 6.05022 | 26124.9 | 27.954 | Fill-Static | 275 | 28 | 1353 | 2189.35 | 3600.37 | 0 | 3600.37 | 4318.38 | 4318.38 |
| 37 | 6.05022 | 25730 | 28.6959 | Fill-Static | 275 | 28 | 1328.53 | 2149.74 | 3525.88 | 0 | 3525.88 | 4253.1 | 4253.1 |
| 38 | 6.05022 | 25254.7 | 29.4431 | Fill-Static | 275 | 28 | 1300.47 | 2104.34 | 3440.49 | 0 | 3440.49 | 4174.55 | 4174.55 |
| 39 | 6.05022 | 24697.2 | 30.1959 | Fill-Static | 275 | 28 | 1268.79 | 2053.08 | 3344.08 | 0 | 3344.08 | 4082.41 | 4082.41 |
| 40 | 6.05022 | 24055.7 | 30.9544 | Fill-Static | 275 | 28 | 1233.47 | 1995.92 | 3236.57 | 0 | 3236.57 | 3976.38 | 3976.38 |
| 41 | 6.05022 | 23328.2 | 31.7191 | Fill-Static | 275 | 28 | 1194.46 | 1932.8 | 3117.88 | 0 | 3117.88 | 3856.14 | 3856.14 |
| 42 | 6.05022 | 22512.6 | 32.4901 | Fill-Static | 275 | 28 | 1151.74 | 1863.67 | 2987.86 | 0 | 2987.86 | 3721.32 | 3721.32 |
| 43 | 6.05022 | 21606.5 | 33.2677 | Fill-Static | 275 | 28 | 1105.26 | 1788.47 | 2846.42 | 0 | 2846.42 | 3571.55 | 3571.55 |
| 44 | 6.05022 | 20607.6 | 34.0524 | Fill-Static | 275 | 28 | 1055 | 1707.13 | 2693.45 | 0 | 2693.45 | 3406.45 | 3406.45 |
| 45 | 6.05022 | 19358.5 | 34.8444 | Fill-Static | 275 | 28 | 994.049 | 1608.51 | 2507.96 | 0 | 2507.96 | 3199.99 | 3199.99 |
| 46 | 6.05022 | 16416.2 | 35.644 | Fill-Static | 275 | 28 | 859.178 | 1390.27 | 2097.52 | 0 | 2097.52 | 2713.63 | 2713.63 |
| 47 | 6.05022 | 12952.5 | 36.4518 | Fill-Static | 275 | 28 | 702.89 | 1137.37 | 1621.9 | 0 | 1621.9 | 2141.09 | 2141.09 |
| 48 | 6.05022 | 9384.45 | 37.2681 | Fill-Static | 275 | 28 | 543.743 | 879.852 | 1137.56 | 0 | 1137.56 | 1551.3 | 1551.3 |
| 49 | 6.05022 | 5708.79 | 38.0933 | Fill-Static | 275 | 28 | 381.721 | 617.678 | 644.483 | 0 | 644.483 | 943.719 | 943.719 |
| 50 | 6.05022 | 1921.8 | 38.928 | Fill-Static | 275 | 28 | 216.81 | 350.828 | 142.612 | 0 | 142.612 | 317.73 | 317.73 |

**Global Minimum Query (janbu simplified) - Safety Factor**: 1.56218

| Slice Number | Width [ft] | Weight [lbs] | Angle of Slice Base [degrees] | Base Material | Base Cohesion [psf] | Base Friction Angle [degrees] | Shear Stress [psf] | Shear Strength [psf] | Base Normal Stress [psf] | Pore Pressure [psf] | Effective Normal Stress [psf] | Base Vertical Stress [psf] | Effective Vertical Stress [psf] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 6.72673 | 405.127 | -5.78885 | Fill-Static | 275 | 28 | 203.551 | 317.983 | 80.8387 | 0 | 80.8387 | 60.2028 | 60.2028 |
| 2 | 6.72673 | 1165.79 | -4.83105 | Fill-Static | 275 | 28 | 241.977 | 378.011 | 193.735 | 0 | 193.735 | 173.284 | 173.284 |
| 3 | 6.72673 | 1827.48 | -3.87461 | Fill-Static | 275 | 28 | 274.832 | 429.337 | 290.267 | 0 | 290.267 | 271.653 | 271.653 |
| 4 | 6.72673 | 2390.56 | -2.91925 | Fill-Static | 275 | 28 | 302.235 | 472.146 | 370.777 | 0 | 370.777 | 355.365 | 355.365 |
| 5 | 6.72673 | 2855.35 | -1.9647 | Fill-Static | 275 | 28 | 324.295 | 506.607 | 435.59 | 0 | 435.59 | 424.466 | 424.466 |
| 6 | 6.72673 | 3222.03 | -1.01069 | Fill-Static | 275 | 28 | 341.112 | 532.879 | 485 | 0 | 485 | 478.982 | 478.982 |
| 7 | 6.72673 | 4300.64 | -0.0569686 | Fill-Static | 275 | 28 | 393.776 | 615.149 | 639.727 | 0 | 639.727 | 639.335 | 639.335 |
| 8 | 6.72673 | 7553.17 | 0.89674 | Fill-Static | 275 | 28 | 555.262 | 867.419 | 1114.18 | 0 | 1114.18 | 1122.87 | 1122.87 |
| 9 | 6.72673 | 10565.7 | 1.8507 | Fill- | 275 | 28 | 702.927 | 1098.1 | 1548.03 | 0 | 1548.03 | 1570.74 | 1570.74 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Static | | | | | | | | | | |
| 10 | 6.72673 | 13111.4 | 2.80517 | Fill-Static | 275 | 28 | 825.705 | 1289.9 | 1908.74 | 0 | 1908.74 | 1949.2 | 1949.2 |
| 11 | 6.72673 | 15557.1 | 3.76042 | Fill-Static | 275 | 28 | 942.151 | 1471.81 | 2250.88 | 0 | 2250.88 | 2312.8 | 2312.8 |
| 12 | 6.72673 | 17904.1 | 4.71672 | Fill-Static | 275 | 28 | 1052.44 | 1644.1 | 2574.9 | 0 | 2574.9 | 2661.73 | 2661.73 |
| 13 | 6.72673 | 20152.3 | 5.67434 | Fill-Static | 275 | 28 | 1156.65 | 1806.89 | 2881.05 | 0 | 2881.05 | 2995.98 | 2995.98 |
| 14 | 6.72673 | 22301 | 6.63355 | Fill-Static | 275 | 28 | 1254.82 | 1960.26 | 3169.52 | 0 | 3169.52 | 3315.45 | 3315.45 |
| 15 | 6.72673 | 24349.9 | 7.59464 | Fill-Static | 275 | 28 | 1347.05 | 2104.33 | 3440.47 | 0 | 3440.47 | 3620.07 | 3620.07 |
| 16 | 6.72673 | 26298.2 | 8.55787 | Fill-Static | 275 | 28 | 1433.36 | 2239.16 | 3694.06 | 0 | 3694.06 | 3909.75 | 3909.75 |
| 17 | 6.72673 | 28145.2 | 9.52356 | Fill-Static | 275 | 28 | 1513.81 | 2364.84 | 3930.41 | 0 | 3930.41 | 4184.38 | 4184.38 |
| 18 | 6.72673 | 29890.1 | 10.492 | Fill-Static | 275 | 28 | 1588.43 | 2481.41 | 4149.66 | 0 | 4149.66 | 4443.83 | 4443.83 |
| 19 | 6.72673 | 31532 | 11.4634 | Fill-Static | 275 | 28 | 1657.26 | 2588.94 | 4351.88 | 0 | 4351.88 | 4687.96 | 4687.96 |
| 20 | 6.72673 | 33069.9 | 12.4383 | Fill-Static | 275 | 28 | 1720.33 | 2687.47 | 4537.19 | 0 | 4537.19 | 4916.63 | 4916.63 |
| 21 | 6.72673 | 34502.7 | 13.4168 | Fill-Static | 275 | 28 | 1777.66 | 2777.03 | 4705.63 | 0 | 4705.63 | 5129.68 | 5129.68 |
| 22 | 6.72673 | 35815 | 14.3992 | Fill-Static | 275 | 28 | 1828.62 | 2856.63 | 4855.35 | 0 | 4855.35 | 5324.84 | 5324.84 |
| 23 | 6.72673 | 35377.3 | 15.3861 | Fill-Static | 275 | 28 | 1797.88 | 2808.61 | 4765.04 | 0 | 4765.04 | 5259.79 | 5259.79 |
| 24 | 6.72673 | 33703.5 | 16.3776 | Fill-Static | 275 | 28 | 1710.49 | 2672.09 | 4508.28 | 0 | 4508.28 | 5010.98 | 5010.98 |
| 25 | 6.72673 | 31942.6 | 17.3742 | Fill-Static | 275 | 28 | 1619.97 | 2530.68 | 4242.32 | 0 | 4242.32 | 4749.19 | 4749.19 |
| 26 | 6.72673 | 31865.5 | 18.3763 | Fill-Static | 275 | 28 | 1606.91 | 2510.28 | 4203.96 | 0 | 4203.96 | 4737.77 | 4737.77 |
| 27 | 6.72673 | 32794.8 | 19.3842 | Fill-Static | 275 | 28 | 1639.32 | 2560.91 | 4299.17 | 0 | 4299.17 | 4875.96 | 4875.96 |
| 28 | 6.72673 | 33607.4 | 20.3984 | Fill-Static | 275 | 28 | 1665.92 | 2602.46 | 4377.32 | 0 | 4377.32 | 4996.81 | 4996.81 |
| 29 | 6.72673 | 34301.1 | 21.4194 | Fill-Static | 275 | 28 | 1686.68 | 2634.9 | 4438.33 | 0 | 4438.33 | 5100 | 5100 |
| 30 | 6.72673 | 34873.4 | 22.4475 | Fill-Static | 275 | 28 | 1701.58 | 2658.18 | 4482.11 | 0 | 4482.11 | 5185.1 | 5185.1 |
| 31 | 6.72673 | 35321.6 | 23.4833 | Fill-Static | 275 | 28 | 1710.6 | 2672.26 | 4508.59 | 0 | 4508.59 | 5251.79 | 5251.79 |
| 32 | 6.72673 | 35642.9 | 24.5273 | Fill-Static | 275 | 28 | 1713.68 | 2677.07 | 4517.64 | 0 | 4517.64 | 5299.59 | 5299.59 |
| 33 | 6.72673 | 35834.1 | 25.5801 | Fill-Static | 275 | 28 | 1710.78 | 2672.54 | 4509.13 | 0 | 4509.13 | 5328.07 | 5328.07 |
| 34 | 6.72673 | 35836.6 | 26.6422 | Fill-Static | 275 | 28 | 1699.46 | 2654.87 | 4475.88 | 0 | 4475.88 | 5328.47 | 5328.47 |
| 35 | 6.72673 | 35514.1 | 27.7143 | Fill-Static | 275 | 28 | 1674.03 | 2615.14 | 4401.16 | 0 | 4401.16 | 5280.57 | 5280.57 |
| 36 | 6.72673 | 35034.9 | 28.797 | Fill-Static | 275 | 28 | 1641.92 | 2564.98 | 4306.82 | 0 | 4306.82 | 5209.37 | 5209.37 |
| 37 | 6.72673 | 34410.2 | 29.8911 | Fill-Static | 275 | 28 | 1603.74 | 2505.33 | 4194.64 | 0 | 4194.64 | 5116.5 | 5116.5 |
| 38 | 6.72673 | 33635.1 | 30.9974 | Fill-Static | 275 | 28 | 1559.41 | 2436.08 | 4064.41 | 0 | 4064.41 | 5001.3 | 5001.3 |
| 39 | 6.72673 | 32704.5 | 32.1166 | Fill-Static | 275 | 28 | 1508.85 | 2357.1 | 3915.85 | 0 | 3915.85 | 4862.96 | 4862.96 |
| 40 | 6.72673 | 31612.6 | 33.2498 | Fill-Static | 275 | 28 | 1451.96 | 2268.22 | 3748.71 | 0 | 3748.71 | 4700.64 | 4700.64 |
| 41 | 6.72673 | 30353.2 | 34.3978 | Fill-Static | 275 | 28 | 1388.64 | 2169.31 | 3562.67 | 0 | 3562.67 | 4513.42 | 4513.42 |
| 42 | 6.72673 | 28919.4 | 35.5618 | Fill- | 275 | 28 | 1318.79 | 2060.18 | 3357.43 | 0 | 3357.43 | 4300.26 | 4300.26 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Static | | | | | | | | | |
| 43 | 6.72673 | 27303.6 | 36.743 | Fill-Static | 275 | 28 | 1242.27 | 1940.65 | 3132.63 | 0 | 3132.63 | 4060.04 | 4060.04 |
| 44 | 6.72673 | 25497.3 | 37.9427 | Fill-Static | 275 | 28 | 1158.96 | 1810.51 | 2887.87 | 0 | 2887.87 | 3791.49 | 3791.49 |
| 45 | 6.72673 | 23491.2 | 39.1623 | Fill-Static | 275 | 28 | 1068.72 | 1669.54 | 2622.75 | 0 | 2622.75 | 3493.21 | 3493.21 |
| 46 | 6.72673 | 21274.8 | 40.4035 | Fill-Static | 275 | 28 | 971.412 | 1517.52 | 2336.84 | 0 | 2336.84 | 3163.68 | 3163.68 |
| 47 | 6.72673 | 18815.4 | 41.668 | Fill-Static | 275 | 28 | 866.04 | 1352.91 | 2027.26 | 0 | 2027.26 | 2798 | 2798 |
| 48 | 6.72673 | 14485.8 | 42.9578 | Fill-Static | 275 | 28 | 690.433 | 1078.58 | 1511.31 | 0 | 1511.31 | 2154.2 | 2154.2 |
| 49 | 6.72673 | 8879.41 | 44.2753 | Fill-Static | 275 | 28 | 469.646 | 733.671 | 862.635 | 0 | 862.635 | 1320.55 | 1320.55 |
| 50 | 6.72673 | 3005.85 | 45.6231 | Fill-Static | 275 | 28 | 243.519 | 380.42 | 198.266 | 0 | 198.266 | 447.14 | 447.14 |

## *Interslice Data*

**Global Minimum Query (bishop simplified) - Safety Factor**: 1.61814

| Slice Number | X coordinate [ft] | Y coordinate - Bottom [ft] | Interslice Normal Force [lbs] | Interslice Shear Force [lbs] | Interslice Force Angle [degrees] |
|---|---|---|---|---|---|
| 1 | 305.025 | 845.765 | 0 | 0 | 0 |
| 2 | 311.075 | 846.188 | 1318.09 | 0 | 0 |
| 3 | 317.125 | 846.681 | 3183.51 | 0 | 0 |
| 4 | 323.176 | 847.244 | 5437.62 | 0 | 0 |
| 5 | 329.226 | 847.877 | 8010.11 | 0 | 0 |
| 6 | 335.276 | 848.579 | 10847.6 | 0 | 0 |
| 7 | 341.326 | 849.353 | 13898.7 | 0 | 0 |
| 8 | 347.376 | 850.197 | 17114.2 | 0 | 0 |
| 9 | 353.427 | 851.113 | 20447.1 | 0 | 0 |
| 10 | 359.477 | 852.1 | 23852 | 0 | 0 |
| 11 | 365.527 | 853.159 | 27285.9 | 0 | 0 |
| 12 | 371.577 | 854.29 | 30707.5 | 0 | 0 |
| 13 | 377.628 | 855.494 | 34077.6 | 0 | 0 |
| 14 | 383.678 | 856.772 | 37358.8 | 0 | 0 |
| 15 | 389.728 | 858.123 | 40515.7 | 0 | 0 |
| 16 | 395.778 | 859.549 | 43514.7 | 0 | 0 |
| 17 | 401.828 | 861.05 | 46324.2 | 0 | 0 |
| 18 | 407.879 | 862.627 | 48913 | 0 | 0 |
| 19 | 413.929 | 864.28 | 51182.6 | 0 | 0 |
| 20 | 419.979 | 866.011 | 53109.3 | 0 | 0 |
| 21 | 426.029 | 867.819 | 54722.5 | 0 | 0 |
| 22 | 432.08 | 869.706 | 56066.6 | 0 | 0 |
| 23 | 438.13 | 871.673 | 57160 | 0 | 0 |
| 24 | 444.18 | 873.721 | 57982.5 | 0 | 0 |
| 25 | 450.23 | 875.85 | 58515.2 | 0 | 0 |
| 26 | 456.28 | 878.062 | 58741.4 | 0 | 0 |
| 27 | 462.331 | 880.358 | 58646.7 | 0 | 0 |
| 28 | 468.381 | 882.739 | 58218.7 | 0 | 0 |
| 29 | 474.431 | 885.206 | 57447.1 | 0 | 0 |
| 30 | 480.481 | 887.761 | 56324.2 | 0 | 0 |
| 31 | 486.532 | 890.404 | 54846.3 | 0 | 0 |
| 32 | 492.582 | 893.138 | 53027.4 | 0 | 0 |
| 33 | 498.632 | 895.964 | 50875.9 | 0 | 0 |
| 34 | 504.682 | 898.883 | 48399.2 | 0 | 0 |
| 35 | 510.732 | 901.897 | 45607.7 | 0 | 0 |
| 36 | 516.783 | 905.009 | 42514.8 | 0 | 0 |
| 37 | 522.833 | 908.22 | 39136.8 | 0 | 0 |
| 38 | 528.883 | 911.532 | 35493.5 | 0 | 0 |
| 39 | 534.933 | 914.947 | 31607.9 | 0 | 0 |
| 40 | 540.984 | 918.468 | 27506.9 | 0 | 0 |
| 41 | 547.034 | 922.096 | 23220.9 | 0 | 0 |
| 42 | 553.084 | 925.836 | 18784.8 | 0 | 0 |
| 43 | 559.134 | 929.689 | 14237.5 | 0 | 0 |
| 44 | 565.184 | 933.658 | 9622.63 | 0 | 0 |
| 45 | 571.235 | 937.747 | 4988.91 | 0 | 0 |
| 46 | 577.285 | 941.959 | 436.6 | 0 | 0 |
| 47 | 583.335 | 946.298 | -3468.06 | 0 | 0 |
| 48 | 589.385 | 950.767 | -6465.9 | 0 | 0 |
| 49 | 595.436 | 955.37 | -8414.81 | 0 | 0 |
| 50 | 601.486 | 960.113 | -9163.17 | 0 | 0 |
| 51 | 607.536 | 965 | 0 | 0 | 0 |

**Global Minimum Query (janbu simplified) - Safety Factor**: 1.56218

| Slice Number | X coordinate [ft] | Y coordinate - Bottom [ft] | Interslice Normal Force [lbs] | Interslice Shear Force [lbs] | Interslice Force Angle [degrees] |
|---|---|---|---|---|---|
| 1 | 259.686 | 842.461 | 0 | 0 | 0 |
| 2 | 266.412 | 841.779 | 1422.78 | 0 | 0 |
| 3 | 273.139 | 841.211 | 3158.75 | 0 | 0 |
| 4 | 279.866 | 840.755 | 5137.58 | 0 | 0 |
| 5 | 286.593 | 840.412 | 7295.47 | 0 | 0 |
| 6 | 293.319 | 840.181 | 9574.91 | 0 | 0 |
| 7 | 300.046 | 840.063 | 11924.4 | 0 | 0 |
| 8 | 306.773 | 840.056 | 14574.4 | 0 | 0 |
| 9 | 313.5 | 840.161 | 18187.9 | 0 | 0 |
| 10 | 320.226 | 840.379 | 22574.4 | 0 | 0 |
| 11 | 326.953 | 840.708 | 27493.1 | 0 | 0 |
| 12 | 333.68 | 841.15 | 32828.3 | 0 | 0 |
| 13 | 340.406 | 841.705 | 38470.5 | 0 | 0 |
| 14 | 347.133 | 842.374 | 44316.3 | 0 | 0 |
| 15 | 353.86 | 843.156 | 50267.9 | 0 | 0 |
| 16 | 360.587 | 844.053 | 56232.9 | 0 | 0 |
| 17 | 367.313 | 845.065 | 62124.2 | 0 | 0 |
| 18 | 374.04 | 846.194 | 67859.9 | 0 | 0 |
| 19 | 380.767 | 847.44 | 73363.1 | 0 | 0 |
| 20 | 387.494 | 848.804 | 78561.7 | 0 | 0 |
| 21 | 394.22 | 850.287 | 83388.9 | 0 | 0 |
| 22 | 400.947 | 851.892 | 87782.2 | 0 | 0 |
| 23 | 407.674 | 853.619 | 91683.3 | 0 | 0 |
| 24 | 414.4 | 855.47 | 94942.6 | 0 | 0 |
| 25 | 421.127 | 857.447 | 97522.8 | 0 | 0 |
| 26 | 427.854 | 859.552 | 99478.5 | 0 | 0 |
| 27 | 434.581 | 861.786 | 100881 | 0 | 0 |
| 28 | 441.307 | 864.153 | 101720 | 0 | 0 |
| 29 | 448.034 | 866.655 | 101964 | 0 | 0 |
| 30 | 454.761 | 869.293 | 101585 | 0 | 0 |
| 31 | 461.488 | 872.072 | 100562 | 0 | 0 |
| 32 | 468.214 | 874.995 | 98878.6 | 0 | 0 |
| 33 | 474.941 | 878.064 | 96526.2 | 0 | 0 |
| 34 | 481.668 | 881.284 | 93501.4 | 0 | 0 |
| 35 | 488.394 | 884.659 | 89815.3 | 0 | 0 |
| 36 | 495.121 | 888.193 | 85510.4 | 0 | 0 |
| 37 | 501.848 | 891.89 | 80617.6 | 0 | 0 |
| 38 | 508.575 | 895.757 | 75173.9 | 0 | 0 |
| 39 | 515.301 | 899.798 | 69225.6 | 0 | 0 |
| 40 | 522.028 | 904.021 | 62829.2 | 0 | 0 |
| 41 | 528.755 | 908.431 | 56052.4 | 0 | 0 |
| 42 | 535.482 | 913.037 | 48974.7 | 0 | 0 |
| 43 | 542.208 | 917.846 | 41689.3 | 0 | 0 |
| 44 | 548.935 | 922.867 | 34304.6 | 0 | 0 |
| 45 | 555.662 | 928.112 | 26945.7 | 0 | 0 |
| 46 | 562.389 | 933.591 | 19756.8 | 0 | 0 |
| 47 | 569.115 | 939.317 | 12903.8 | 0 | 0 |
| 48 | 575.842 | 945.303 | 6586.46 | 0 | 0 |
| 49 | 582.569 | 951.567 | 1759.3 | 0 | 0 |
| 50 | 589.295 | 958.125 | -742.923 | 0 | 0 |
| 51 | 596.022 | 965 | 0 | 0 | 0 |

## *List Of Coordinates*

### External Boundary

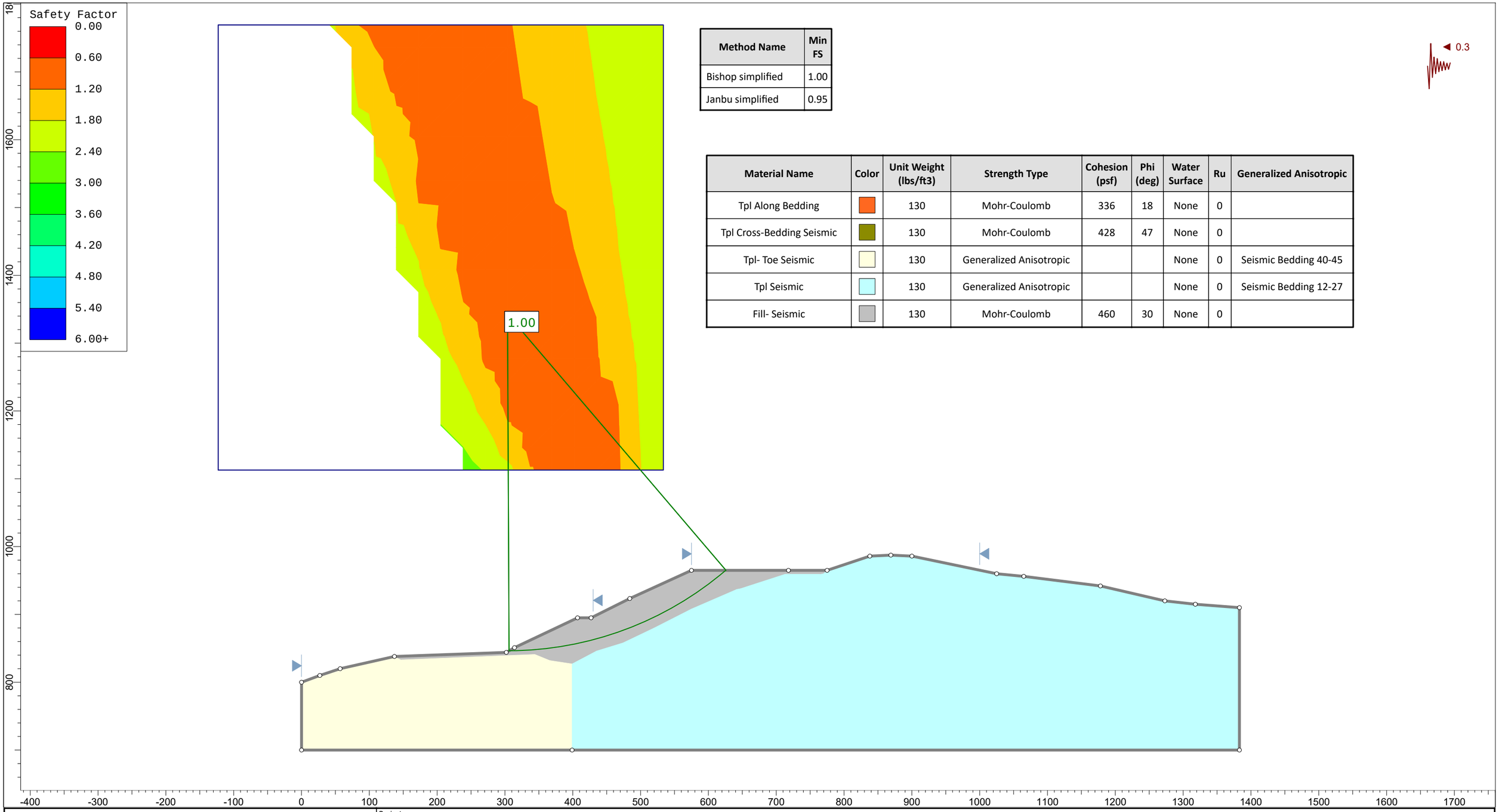
| X | Y |
|---|---|
| 0 | 700 |
| 399 | 700 |
| 1383 | 700 |
| 1383 | 910 |
| 1318 | 915 |
| 1273 | 920 |
| 1178 | 942 |
| 1065 | 956.2 |
| 1025 | 960 |
| 900 | 986 |
| 869 | 987.5 |
| 838 | 986 |
| 775 | 965 |
| 718 | 965 |
| 575 | 965 |
| 484 | 923.5 |
| 427 | 895 |
| 407 | 895 |
| 314 | 851 |
| 302 | 844 |
| 137 | 838 |
| 57 | 820 |
| 27 | 810 |
| 0 | 800 |

## Material Boundary

| X | Y |
|---|---|
| 137 | 838 |
| 148 | 833 |
| 344 | 841 |
| 366 | 832 |
| 399 | 827 |
| 435 | 846 |
| 474 | 858 |
| 520 | 880 |
| 575 | 908 |
| 642 | 937 |
| 713 | 960 |
| 770 | 960 |
| 775 | 965 |

## Material Boundary

| X | Y |
|---|---|
| 399 | 700 |
| 399 | 827 |




| Method Name | Min FS |
|---|---|
| Bishop simplified | 1.00 |
| Janbu simplified | 0.95 |

| Material Name | Color | Unit Weight (lbs/ft3) | Strength Type | Cohesion (psf) | Phi (deg) | Water Surface | Ru | Generalized Anisotropic |
|---|---|---|---|---|---|---|---|---|
| Tpl Along Bedding | | 130 | Mohr-Coulomb | 336 | 18 | None | 0 | |
| Tpl Cross-Bedding Seismic | | 130 | Mohr-Coulomb | 428 | 47 | None | 0 | |
| Tpl- Toe Seismic | | 130 | Generalized Anisotropic | | | None | 0 | Seismic Bedding 40-45 |
| Tpl Seismic | | 130 | Generalized Anisotropic | | | None | 0 | Seismic Bedding 12-27 |
| Fill- Seismic | | 130 | Mohr-Coulomb | 460 | 30 | None | 0 | |

TGR Geotechnical Environmental Hydrogeology Material Testing Construction Inspection

SLIDEINTERPRET 7.038

| | | | |
|---|---|---|---|
| *Project* | HOFF Property, Yorba Linda, CA | | |
| *Analysis Description* | Cross-section A-A', Seismic | | |
| *Drawn By* | | *Scale* 1:1600 | *Company* TGR Geotechnical, Inc. |
| *Date* | 4/15/20 | | *File Name* Cross-section A-A' Seismic.slim |

# Slide Analysis Information

# HOFF Property, Yorba Linda, CA

## Project Summary

| | |
|---|---|
| File Name: | Cross-section A-A' Seismic |
| Slide Modeler Version: | 7.038 |
| Project Title: | HOFF Property, Yorba Linda, CA |
| Analysis: | Cross-section A-A', Seismic |
| Company: | TGR Geotechnical, Inc. |
| Date Created: | 4/15/20 |

## General Settings

| | |
|---|---|
| Units of Measurement: | Imperial Units |
| Time Units: | days |
| Permeability Units: | feet/second |
| Failure Direction: | Right to Left |
| Data Output: | Standard |
| Maximum Material Properties: | 20 |
| Maximum Support Properties: | 20 |

## Analysis Options

| | |
|---|---|
| Slices Type: | Vertical |
| **Analysis Methods Used** | |
| | Bishop simplified |
| | Janbu simplified |
| Number of slices: | 50 |
| Tolerance: | 0.005 |
| Maximum number of iterations: | 75 |
| Check malpha < 0.2: | Yes |
| Create Interslice boundaries at intersections with water tables and piezos: | Yes |
| Initial trial value of FS: | 1 |
| Steffensen Iteration: | Yes |

## Groundwater Analysis

| | |
|---|---|
| Groundwater Method: | Water Surfaces |
| Pore Fluid Unit Weight [lbs/ft3]: | 62.4 |
| Use negative pore pressure cutoff: | Yes |
| Maximum negative pore pressure [psf]: | 0 |
| Advanced Groundwater Method: | None |

## Random Numbers

| | |
|---|---|
| Pseudo-random Seed: | 10116 |
| Random Number Generation Method: | Park and Miller v.3 |

## Surface Options

| | |
|---|---|
| Surface Type: | Circular |
| Search Method: | Grid Search |
| Radius Increment: | 10 |
| Composite Surfaces: | Disabled |
| Reverse Curvature: | Invalid Surfaces |
| Minimum Elevation: | Not Defined |
| Minimum Depth: | Not Defined |
| Minimum Area: | Not Defined |
| Minimum Weight: | Not Defined |

## Seismic

| | |
|---|---|
| Advanced seismic analysis: | No |
| Staged pseudostatic analysis: | No |

## Loading

Seismic Load Coefficient (Horizontal): 0.3

## Material Properties

| Property | Tpl- Toe Seismic | Tpl Seismic | Fill- Seismic |
|---|---|---|---|
| Color | | | |
| Strength Type | Generalized Anisotropic | Generalized Anisotropic | Mohr-Coulomb |
| Unit Weight [lbs/ft3] | 130 | 130 | 130 |
| Cohesion [psf] | | | 460 |
| Friction Angle [deg] | | | 30 |
| Water Surface | None | None | None |
| Ru Value | 0 | 0 | 0 |

### Generalized Anisotropic Functions

Name: Seismic Bedding 40-45

| Angle From | Angle To | Material |
|---|---|---|
| 40 | -90 | Tpl Cross-Bedding Seismic |
| 45 | 40 | Tpl Along Bedding |
| 90 | 45 | Tpl Cross-Bedding Seismic |

Name: Seismic Bedding 12-27

| Angle From | Angle To | Material |
|---|---|---|
| -27 | -90 | Tpl Cross-Bedding Seismic |
| -12 | -27 | Tpl Along Bedding |
| 90 | -12 | Tpl Cross-Bedding Seismic |

## Global Minimums

### Method: bishop simplified

| FS | 1.000960 |
|---|---|
| Center: | 303.811, 1342.660 |
| Radius: | 496.336 |
| Left Slip Surface Endpoint: | 305.991, 846.328 |
| Right Slip Surface Endpoint: | 625.872, 965.000 |
| Resisting Moment: | 3.95434e+008 lb-ft |
| Driving Moment: | 3.95056e+008 lb-ft |
| Total Slice Area: | 9944.48 ft2 |
| Surface Horizontal Width: | 319.88 ft |
| Surface Average Height: | 31.0882 ft |

### Method: janbu simplified

| FS | 0.954049 |
|---|---|
| Center: | 369.455, 1145.730 |
| Radius: | 296.930 |
| Left Slip Surface Endpoint: | 318.617, 853.184 |
| Right Slip Surface Endpoint: | 605.048, 965.000 |
| Resisting Horizontal Force: | 751235 lb |
| Driving Horizontal Force: | 787418 lb |
| Total Slice Area: | 10438.4 ft2 |
| Surface Horizontal Width: | 286.43 ft |
| Surface Average Height: | 36.4432 ft |

## *Valid / Invalid Surfaces*

### Method: bishop simplified

Number of Valid Surfaces: 2783
Number of Invalid Surfaces: 2068

**Error Codes:**

Error Code -101 reported for 46 surfaces
Error Code -103 reported for 141 surfaces
Error Code -1000 reported for 1881 surfaces

### Method: janbu simplified

Number of Valid Surfaces: 2783
Number of Invalid Surfaces: 2068

**Error Codes:**

Error Code -101 reported for 46 surfaces
Error Code -103 reported for 141 surfaces
Error Code -1000 reported for 1881 surfaces

**Error Codes**

The following errors were encountered during the computation:

-101 = Only one (or zero) surface / slope intersections.
-103 = Two surface / slope intersections, but one or more surface / nonslope external polygon intersections lie between them. This usually occurs when the slip surface extends past the bottom of the soil region, but may also occur on a benched slope model with two sets of Slope Limits.
-1000 = No valid slip surfaces are generated at a grid center. Unable to draw a surface.

## *Slice Data*

**Global Minimum Query (bishop simplified) - Safety Factor**: 1.00096

| Slice Number | Width [ft] | Weight [lbs] | Angle of Slice Base [degrees] | Base Material | Base Cohesion [psf] | Base Friction Angle [degrees] | Shear Stress [psf] | Shear Strength [psf] | Base Normal Stress [psf] | Pore Pressure [psf] | Effective Normal Stress [psf] | Base Vertical Stress [psf] | Effective Vertical Stress [psf] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 6.3976 | 1523.07 | 0.620949 | Fill-Seismic | 460 | 30 | 593.165 | 593.734 | 231.634 | 0 | 231.634 | 238.063 | 238.063 |
| 2 | 6.3976 | 4370.77 | 1.3596 | Fill-Seismic | 460 | 30 | 842.081 | 842.889 | 663.183 | 0 | 663.183 | 683.169 | 683.169 |
| 3 | 6.3976 | 6746.11 | 2.09848 | Fill-Seismic | 460 | 30 | 1045.66 | 1046.66 | 1016.12 | 0 | 1016.12 | 1054.44 | 1054.44 |
| 4 | 6.3976 | 9034.13 | 2.83771 | Fill-Seismic | 460 | 30 | 1238.61 | 1239.8 | 1350.66 | 0 | 1350.66 | 1412.05 | 1412.05 |
| 5 | 6.3976 | 11253.3 | 3.57741 | Fill-Seismic | 460 | 30 | 1422.78 | 1424.15 | 1669.96 | 0 | 1669.96 | 1758.91 | 1758.91 |
| 6 | 6.3976 | 13403.5 | 4.31771 | Fill-Seismic | 460 | 30 | 1598.33 | 1599.86 | 1974.29 | 0 | 1974.29 | 2094.97 | 2094.97 |
| 7 | 6.3976 | 15484.5 | 5.05874 | Fill-Seismic | 460 | 30 | 1765.39 | 1767.08 | 2263.94 | 0 | 2263.94 | 2420.21 | 2420.21 |
| 8 | 6.3976 | 17496.1 | 5.80061 | Fill-Seismic | 460 | 30 | 1924.12 | 1925.97 | 2539.14 | 0 | 2539.14 | 2734.6 | 2734.6 |
| 9 | 6.3976 | 19438.1 | 6.54346 | Fill-Seismic | 460 | 30 | 2074.67 | 2076.66 | 2800.13 | 0 | 2800.13 | 3038.1 | 3038.1 |
| 10 | 6.3976 | 21310.1 | 7.28741 | Fill-Seismic | 460 | 30 | 2217.14 | 2219.27 | 3047.15 | 0 | 3047.15 | 3330.68 | 3330.68 |
| 11 | 6.3976 | 23111.8 | 8.03261 | Fill-Seismic | 460 | 30 | 2351.67 | 2353.93 | 3280.38 | 0 | 3280.38 | 3612.25 | 3612.25 |
| 12 | 6.3976 | 24842.9 | 8.77917 | Fill-Seismic | 460 | 30 | 2478.37 | 2480.75 | 3500.04 | 0 | 3500.04 | 3882.79 | 3882.79 |
| 13 | 6.3976 | 26502.9 | 9.52724 | Fill-Seismic | 460 | 30 | 2597.34 | 2599.83 | 3706.29 | 0 | 3706.29 | 4142.2 | 4142.2 |
| 14 | 6.3976 | 28091.4 | 10.277 | Fill-Seismic | 460 | 30 | 2708.68 | 2711.28 | 3899.33 | 0 | 3899.33 | 4390.45 | 4390.45 |
| 15 | 6.3976 | 29607.9 | 11.0285 | Fill-Seismic | 460 | 30 | 2812.48 | 2815.18 | 4079.3 | 0 | 4079.3 | 4627.44 | 4627.44 |
| 16 | 6.3976 | 30995.5 | 11.7819 | Fill-Seismic | 460 | 30 | 2904.31 | 2907.1 | 4238.5 | 0 | 4238.5 | 4844.28 | 4844.28 |
| 17 | 6.3976 | 30631.6 | 12.5374 | Fill-Seismic | 460 | 30 | 2854.73 | 2857.47 | 4152.53 | 0 | 4152.53 | 4787.36 | 4787.36 |
| 18 | 6.3976 | 29411.3 | 13.2951 | Fill-Seismic | 460 | 30 | 2737.73 | 2740.36 | 3949.7 | 0 | 3949.7 | 4596.62 | 4596.62 |
| 19 | 6.3976 | 28126.3 | 14.0552 | Fill-Seismic | 460 | 30 | 2617.1 | 2619.61 | 3740.57 | 0 | 3740.57 | 4395.76 | 4395.76 |
| 20 | 6.3976 | 28304 | 14.8178 | Fill-Seismic | 460 | 30 | 2612.39 | 2614.9 | 3732.39 | 0 | 3732.39 | 4423.49 | 4423.49 |
| 21 | 6.3976 | 29518.7 | 15.5831 | Fill-Seismic | 460 | 30 | 2688.08 | 2690.66 | 3863.62 | 0 | 3863.62 | 4613.3 | 4613.3 |
| 22 | 6.3976 | 30656.6 | 16.3513 | Fill-Seismic | 460 | 30 | 2756.56 | 2759.21 | 3982.35 | 0 | 3982.35 | 4791.1 | 4791.1 |
| 23 | 6.3976 | 31716.8 | 17.1225 | Fill-Seismic | 460 | 30 | 2817.88 | 2820.59 | 4088.66 | 0 | 4088.66 | 4956.77 | 4956.77 |
| 24 | 6.3976 | 32698.5 | 17.897 | Fill-Seismic | 460 | 30 | 2872.1 | 2874.86 | 4182.66 | 0 | 4182.66 | 5110.16 | 5110.16 |
| 25 | 6.3976 | 33600.6 | 18.6748 | Fill-Seismic | 460 | 30 | 2919.27 | 2922.07 | 4264.43 | 0 | 4264.43 | 5251.11 | 5251.11 |
| 26 | 6.3976 | 34422 | 19.4562 | Fill-Seismic | 460 | 30 | 2959.4 | 2962.24 | 4334.01 | 0 | 4334.01 | 5379.44 | 5379.44 |
| 27 | 6.3976 | 35161.6 | 20.2414 | Fill-Seismic | 460 | 30 | 2992.56 | 2995.43 | 4391.49 | 0 | 4391.49 | 5495 | 5495 |
| 28 | 6.3976 | 35814.5 | 21.0306 | Fill-Seismic | 460 | 30 | 3018.49 | 3021.39 | 4436.45 | 0 | 4436.45 | 5596.99 | 5596.99 |
| 29 | 6.3976 | 36232.2 | 21.824 | Fill-Seismic | 460 | 30 | 3026.46 | 3029.37 | 4450.27 | 0 | 4450.27 | 5662.24 | 5662.24 |
| 30 | 6.3976 | 36484.7 | 22.6218 | Fill-Seismic | 460 | 30 | 3021.93 | 3024.83 | 4442.41 | 0 | 4442.41 | 5701.66 | 5701.66 |
| 31 | 6.3976 | 36650.1 | 23.4243 | Fill- | 460 | 30 | 3010.77 | 3013.66 | 4423.07 | 0 | 4423.07 | 5727.46 | 5727.46 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Seismic | | | | | | | | | |
| 32 | 6.3976 | 36726.6 | 24.2316 | Fill-Seismic | 460 | 30 | 2993.02 | 2995.89 | 4392.28 | 0 | 4392.28 | 5739.39 | 5739.39 |
| 33 | 6.3976 | 36712.7 | 25.0442 | Fill-Seismic | 460 | 30 | 2968.66 | 2971.51 | 4350.07 | 0 | 4350.07 | 5737.17 | 5737.17 |
| 34 | 6.3976 | 36606.5 | 25.8621 | Fill-Seismic | 460 | 30 | 2937.73 | 2940.55 | 4296.45 | 0 | 4296.45 | 5720.53 | 5720.53 |
| 35 | 6.3976 | 36406.1 | 26.6858 | Fill-Seismic | 460 | 30 | 2900.23 | 2903.01 | 4231.43 | 0 | 4231.43 | 5689.19 | 5689.19 |
| 36 | 6.3976 | 36109.6 | 27.5154 | Fill-Seismic | 460 | 30 | 2856.16 | 2858.9 | 4155.01 | 0 | 4155.01 | 5642.81 | 5642.81 |
| 37 | 6.3976 | 35714.7 | 28.3514 | Fill-Seismic | 460 | 30 | 2805.51 | 2808.2 | 4067.21 | 0 | 4067.21 | 5581.07 | 5581.07 |
| 38 | 6.3976 | 35219.2 | 29.194 | Fill-Seismic | 460 | 30 | 2748.29 | 2750.93 | 3968 | 0 | 3968 | 5503.59 | 5503.59 |
| 39 | 6.3976 | 34620.6 | 30.0435 | Fill-Seismic | 460 | 30 | 2684.48 | 2687.06 | 3857.39 | 0 | 3857.39 | 5410 | 5410 |
| 40 | 6.3976 | 33916.2 | 30.9005 | Fill-Seismic | 460 | 30 | 2614.1 | 2616.61 | 3735.36 | 0 | 3735.36 | 5299.89 | 5299.89 |
| 41 | 6.3976 | 33103.2 | 31.7651 | Fill-Seismic | 460 | 30 | 2537.1 | 2539.54 | 3601.87 | 0 | 3601.87 | 5172.8 | 5172.8 |
| 42 | 6.3976 | 32178.5 | 32.6379 | Fill-Seismic | 460 | 30 | 2453.48 | 2455.84 | 3456.91 | 0 | 3456.91 | 5028.27 | 5028.27 |
| 43 | 6.3976 | 30040.2 | 33.5194 | Fill-Seismic | 460 | 30 | 2291.58 | 2293.78 | 3176.2 | 0 | 3176.2 | 4694.08 | 4694.08 |
| 44 | 6.3976 | 26458.5 | 34.4099 | Fill-Seismic | 460 | 30 | 2038.75 | 2040.71 | 2737.87 | 0 | 2737.87 | 4134.35 | 4134.35 |
| 45 | 6.3976 | 22751.9 | 35.31 | Fill-Seismic | 460 | 30 | 1782.07 | 1783.78 | 2292.85 | 0 | 2292.85 | 3555.09 | 3555.09 |
| 46 | 6.3976 | 18918.9 | 36.2202 | Fill-Seismic | 460 | 30 | 1521.75 | 1523.21 | 1841.55 | 0 | 1841.55 | 2956.12 | 2956.12 |
| 47 | 6.3976 | 14955.3 | 37.1412 | Fill-Seismic | 460 | 30 | 1257.85 | 1259.05 | 1384.01 | 0 | 1384.01 | 2336.73 | 2336.73 |
| 48 | 6.3976 | 10856.2 | 38.0735 | Fill-Seismic | 460 | 30 | 990.406 | 991.357 | 920.337 | 0 | 920.337 | 1696.17 | 1696.17 |
| 49 | 6.3976 | 6616.46 | 39.0178 | Fill-Seismic | 460 | 30 | 719.49 | 720.181 | 450.647 | 0 | 450.647 | 1033.65 | 1033.65 |
| 50 | 6.3976 | 2230.37 | 39.975 | Fill-Seismic | 460 | 30 | 445.171 | 445.598 | -24.9445 | 0 | -24.9445 | 348.267 | 348.267 |

**Global Minimum Query (janbu simplified) - Safety Factor**: 0.954049

| Slice Number | Width [ft] | Weight [lbs] | Angle of Slice Base [degrees] | Base Material | Base Cohesion [psf] | Base Friction Angle [degrees] | Shear Stress [psf] | Shear Strength [psf] | Base Normal Stress [psf] | Pore Pressure [psf] | Effective Normal Stress [psf] | Base Vertical Stress [psf] | Effective Vertical Stress [psf] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 5.72861 | 1358.45 | -9.29815 | Fill-Seismic | 460 | 30 | 694.457 | 662.546 | 350.819 | 0 | 350.819 | 237.12 | 237.12 |
| 2 | 5.72861 | 4032.72 | -8.17969 | Fill-Seismic | 460 | 30 | 994.675 | 948.969 | 846.92 | 0 | 846.92 | 703.945 | 703.945 |
| 3 | 5.72861 | 6622.1 | -7.06437 | Fill-Seismic | 460 | 30 | 1277.49 | 1218.79 | 1314.26 | 0 | 1314.26 | 1155.95 | 1155.95 |
| 4 | 5.72861 | 9127.24 | -5.95173 | Fill-Seismic | 460 | 30 | 1543.72 | 1472.78 | 1754.18 | 0 | 1754.18 | 1593.25 | 1593.25 |
| 5 | 5.72861 | 11548.7 | -4.84135 | Fill-Seismic | 460 | 30 | 1794.08 | 1711.64 | 2167.91 | 0 | 2167.91 | 2015.96 | 2015.96 |
| 6 | 5.72861 | 13887 | -3.73278 | Fill-Seismic | 460 | 30 | 2029.26 | 1936.01 | 2556.51 | 0 | 2556.51 | 2424.12 | 2424.12 |
| 7 | 5.72861 | 16142.4 | -2.62561 | Fill-Seismic | 460 | 30 | 2249.83 | 2146.45 | 2921.01 | 0 | 2921.01 | 2817.84 | 2817.84 |
| 8 | 5.72861 | 18315.2 | -1.51942 | Fill-Seismic | 460 | 30 | 2456.36 | 2343.49 | 3262.3 | 0 | 3262.3 | 3197.14 | 3197.14 |
| 9 | 5.72861 | 20405.6 | -0.413799 | Fill-Seismic | 460 | 30 | 2649.34 | 2527.6 | 3581.18 | 0 | 3581.18 | 3562.04 | 3562.04 |
| 10 | 5.72861 | 22413.7 | 0.691669 | Fill-Seismic | 460 | 30 | 2829.23 | 2699.22 | 3878.44 | 0 | 3878.44 | 3912.6 | 3912.6 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11 | 5.72861 | 24339.4 | 1.79739 | Fill-Seismic | 460 | 30 | 2996.42 | 2858.73 | 4154.72 | 0 | 4154.72 | 4248.75 | 4248.75 |
| 12 | 5.72861 | 26182.7 | 2.90379 | Fill-Seismic | 460 | 30 | 3151.32 | 3006.51 | 4410.69 | 0 | 4410.69 | 4570.54 | 4570.54 |
| 13 | 5.72861 | 27943.3 | 4.01127 | Fill-Seismic | 460 | 30 | 3294.24 | 3142.87 | 4646.87 | 0 | 4646.87 | 4877.88 | 4877.88 |
| 14 | 5.72861 | 29621 | 5.12026 | Fill-Seismic | 460 | 30 | 3425.53 | 3268.12 | 4863.81 | 0 | 4863.81 | 5170.75 | 5170.75 |
| 15 | 5.72861 | 31215.4 | 6.23117 | Fill-Seismic | 460 | 30 | 3545.45 | 3382.53 | 5061.97 | 0 | 5061.97 | 5449.08 | 5449.08 |
| 16 | 5.72861 | 32396.2 | 7.34444 | Fill-Seismic | 460 | 30 | 3621.94 | 3455.51 | 5188.37 | 0 | 5188.37 | 5655.2 | 5655.2 |
| 17 | 5.72861 | 31989.1 | 8.46051 | Fill-Seismic | 460 | 30 | 3542.56 | 3379.78 | 5057.21 | 0 | 5057.21 | 5584.15 | 5584.15 |
| 18 | 5.72861 | 31311.8 | 9.57982 | Fill-Seismic | 460 | 30 | 3438.69 | 3280.68 | 4885.56 | 0 | 4885.56 | 5465.93 | 5465.93 |
| 19 | 5.72861 | 30555.5 | 10.7028 | Fill-Seismic | 460 | 30 | 3329.23 | 3176.25 | 4704.69 | 0 | 4704.69 | 5333.93 | 5333.93 |
| 20 | 5.72861 | 30936.8 | 11.83 | Fill-Seismic | 460 | 30 | 3328.4 | 3175.46 | 4703.32 | 0 | 4703.32 | 5400.48 | 5400.48 |
| 21 | 5.72861 | 32132.1 | 12.9619 | Fill-Seismic | 460 | 30 | 3402.63 | 3246.28 | 4825.98 | 0 | 4825.98 | 5609.15 | 5609.15 |
| 22 | 5.72861 | 33238.5 | 14.0989 | Fill-Seismic | 460 | 30 | 3466.56 | 3307.27 | 4931.62 | 0 | 4931.62 | 5802.29 | 5802.29 |
| 23 | 5.72861 | 34254.6 | 15.2416 | Fill-Seismic | 460 | 30 | 3520.33 | 3358.57 | 5020.48 | 0 | 5020.48 | 5979.69 | 5979.69 |
| 24 | 5.72861 | 35179.1 | 16.3906 | Fill-Seismic | 460 | 30 | 3564.06 | 3400.29 | 5092.74 | 0 | 5092.74 | 6141.07 | 6141.07 |
| 25 | 5.72861 | 36010.3 | 17.5464 | Fill-Seismic | 460 | 30 | 3597.86 | 3432.53 | 5148.57 | 0 | 5148.57 | 6286.18 | 6286.18 |
| 26 | 5.72861 | 36746.5 | 18.7096 | Fill-Seismic | 460 | 30 | 3621.78 | 3455.36 | 5188.12 | 0 | 5188.12 | 6414.71 | 6414.71 |
| 27 | 5.72861 | 37385.8 | 19.8809 | Fill-Seismic | 460 | 30 | 3635.93 | 3468.86 | 5211.5 | 0 | 5211.5 | 6526.32 | 6526.32 |
| 28 | 5.72861 | 37926.1 | 21.0609 | Fill-Seismic | 460 | 30 | 3640.35 | 3473.07 | 5218.79 | 0 | 5218.79 | 6620.63 | 6620.63 |
| 29 | 5.72861 | 38363.5 | 22.2504 | Fill-Seismic | 460 | 30 | 3634.95 | 3467.92 | 5209.88 | 0 | 5209.88 | 6697 | 6697 |
| 30 | 5.72861 | 38582 | 23.45 | Fill-Seismic | 460 | 30 | 3610.28 | 3444.38 | 5169.11 | 0 | 5169.11 | 6735.16 | 6735.16 |
| 31 | 5.72861 | 38623 | 24.6607 | Fill-Seismic | 460 | 30 | 3570.34 | 3406.28 | 5103.1 | 0 | 5103.1 | 6742.3 | 6742.3 |
| 32 | 5.72861 | 38554.2 | 25.8832 | Fill-Seismic | 460 | 30 | 3521.15 | 3359.35 | 5021.81 | 0 | 5021.81 | 6730.31 | 6730.31 |
| 33 | 5.72861 | 38372.3 | 27.1185 | Fill-Seismic | 460 | 30 | 3462.68 | 3303.57 | 4925.22 | 0 | 4925.22 | 6698.57 | 6698.57 |
| 34 | 5.72861 | 38073.7 | 28.3676 | Fill-Seismic | 460 | 30 | 3394.95 | 3238.95 | 4813.29 | 0 | 4813.29 | 6646.45 | 6646.45 |
| 35 | 5.72861 | 37654.1 | 29.6316 | Fill-Seismic | 460 | 30 | 3317.9 | 3165.44 | 4685.96 | 0 | 4685.96 | 6573.21 | 6573.21 |
| 36 | 5.72861 | 37109.1 | 30.9117 | Fill-Seismic | 460 | 30 | 3231.5 | 3083.01 | 4543.19 | 0 | 4543.19 | 6478.09 | 6478.09 |
| 37 | 5.72861 | 36433.7 | 32.2091 | Fill-Seismic | 460 | 30 | 3135.68 | 2991.59 | 4384.85 | 0 | 4384.85 | 6360.19 | 6360.19 |
| 38 | 5.72861 | 35622.3 | 33.5254 | Fill-Seismic | 460 | 30 | 3030.39 | 2891.14 | 4210.85 | 0 | 4210.85 | 6218.55 | 6218.55 |
| 39 | 5.72861 | 34668.7 | 34.862 | Fill-Seismic | 460 | 30 | 2915.53 | 2781.56 | 4021.06 | 0 | 4021.06 | 6052.09 | 6052.09 |
| 40 | 5.72861 | 33565.9 | 36.2207 | Fill-Seismic | 460 | 30 | 2791.02 | 2662.77 | 3815.32 | 0 | 3815.32 | 5859.59 | 5859.59 |
| 41 | 5.72861 | 32306.2 | 37.6035 | Fill-Seismic | 460 | 30 | 2656.76 | 2534.68 | 3593.45 | 0 | 3593.45 | 5639.69 | 5639.69 |
| 42 | 5.72861 | 30880.7 | 39.0124 | Fill-Seismic | 460 | 30 | 2512.62 | 2397.16 | 3355.27 | 0 | 3355.27 | 5390.85 | 5390.85 |
| 43 | 5.72861 | 29279.6 | 40.4501 | Fill- | 460 | 30 | 2358.48 | 2250.11 | 3100.56 | 0 | 3100.56 | 5111.35 | 5111.35 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Seismic | | | | | | | | | |
| 44 | 5.72861 | 27491.3 | 41.9192 | Fill-Seismic | 460 | 30 | 2194.21 | 2093.38 | 2829.1 | 0 | 2829.1 | 4799.18 | 4799.18 |
| 45 | 5.72861 | 25444.4 | 43.423 | Fill-Seismic | 460 | 30 | 2015.71 | 1923.09 | 2534.15 | 0 | 2534.15 | 4441.86 | 4441.86 |
| 46 | 5.72861 | 21849.3 | 44.9652 | Fill-Seismic | 460 | 30 | 1739.19 | 1659.27 | 2077.19 | 0 | 2077.19 | 3814.27 | 3814.27 |
| 47 | 5.72861 | 17467 | 46.5501 | Fill-Seismic | 460 | 30 | 1420.19 | 1354.93 | 1550.07 | 0 | 1550.07 | 3049.27 | 3049.27 |
| 48 | 5.72861 | 12831 | 48.1828 | Fill-Seismic | 460 | 30 | 1096.19 | 1045.82 | 1014.67 | 0 | 1014.67 | 2239.95 | 2239.95 |
| 49 | 5.72861 | 7916.28 | 49.8693 | Fill-Seismic | 460 | 30 | 767.509 | 732.241 | 471.536 | 0 | 471.536 | 1381.99 | 1381.99 |
| 50 | 5.72861 | 2692.95 | 51.617 | Fill-Seismic | 460 | 30 | 434.625 | 414.653 | -78.5428 | 0 | -78.5428 | 470.151 | 470.151 |

## *Interslice Data*

**Global Minimum Query (bishop simplified) - Safety Factor**: 1.00096

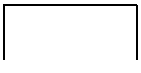
| Slice Number | X coordinate [ft] | Y coordinate - Bottom [ft] | Interslice Normal Force [lbs] | Interslice Shear Force [lbs] | Interslice Force Angle [degrees] |
|---|---|---|---|---|---|
| 1 | 305.991 | 846.328 | 0 | 0 | 0 |
| 2 | 312.389 | 846.398 | 3325.49 | 0 | 0 |
| 3 | 318.787 | 846.549 | 7306.03 | 0 | 0 |
| 4 | 325.184 | 846.784 | 11740.1 | 0 | 0 |
| 5 | 331.582 | 847.101 | 16533.3 | 0 | 0 |
| 6 | 337.979 | 847.501 | 21600.5 | 0 | 0 |
| 7 | 344.377 | 847.984 | 26861.1 | 0 | 0 |
| 8 | 350.775 | 848.55 | 32238.7 | 0 | 0 |
| 9 | 357.172 | 849.2 | 37661.3 | 0 | 0 |
| 10 | 363.57 | 849.934 | 43060.7 | 0 | 0 |
| 11 | 369.967 | 850.752 | 48372.7 | 0 | 0 |
| 12 | 376.365 | 851.655 | 53537 | 0 | 0 |
| 13 | 382.763 | 852.643 | 58496.9 | 0 | 0 |
| 14 | 389.16 | 853.717 | 63199.2 | 0 | 0 |
| 15 | 395.558 | 854.877 | 67594.3 | 0 | 0 |
| 16 | 401.955 | 856.124 | 71636 | 0 | 0 |
| 17 | 408.353 | 857.458 | 75279.9 | 0 | 0 |
| 18 | 414.751 | 858.881 | 78463.6 | 0 | 0 |
| 19 | 421.148 | 860.392 | 81201 | 0 | 0 |
| 20 | 427.546 | 861.994 | 83531.3 | 0 | 0 |
| 21 | 433.943 | 863.687 | 85452.3 | 0 | 0 |
| 22 | 440.341 | 865.471 | 86917 | 0 | 0 |
| 23 | 446.739 | 867.348 | 87897.4 | 0 | 0 |
| 24 | 453.136 | 869.319 | 88369 | 0 | 0 |
| 25 | 459.534 | 871.385 | 88310.3 | 0 | 0 |
| 26 | 465.931 | 873.547 | 87703.3 | 0 | 0 |
| 27 | 472.329 | 875.807 | 86533 | 0 | 0 |
| 28 | 478.727 | 878.166 | 84788.1 | 0 | 0 |
| 29 | 485.124 | 880.626 | 82460.9 | 0 | 0 |
| 30 | 491.522 | 883.188 | 79570.5 | 0 | 0 |
| 31 | 497.92 | 885.854 | 76133.6 | 0 | 0 |
| 32 | 504.317 | 888.625 | 72159.3 | 0 | 0 |
| 33 | 510.715 | 891.505 | 67660.5 | 0 | 0 |
| 34 | 517.112 | 894.494 | 62653.8 | 0 | 0 |
| 35 | 523.51 | 897.595 | 57159.9 | 0 | 0 |
| 36 | 529.908 | 900.811 | 51203.5 | 0 | 0 |
| 37 | 536.305 | 904.144 | 44813.9 | 0 | 0 |
| 38 | 542.703 | 907.596 | 38024.6 | 0 | 0 |
| 39 | 549.1 | 911.17 | 30874.1 | 0 | 0 |
| 40 | 555.498 | 914.871 | 23405.8 | 0 | 0 |
| 41 | 561.896 | 918.7 | 15668.5 | 0 | 0 |
| 42 | 568.293 | 922.661 | 7716.45 | 0 | 0 |
| 43 | 574.691 | 926.758 | -389.943 | 0 | 0 |
| 44 | 581.088 | 930.996 | -8186.75 | 0 | 0 |
| 45 | 587.486 | 935.378 | -15066.4 | 0 | 0 |
| 46 | 593.884 | 939.909 | -20870 | 0 | 0 |
| 47 | 600.281 | 944.595 | -25429.8 | 0 | 0 |
| 48 | 606.679 | 949.441 | -28568 | 0 | 0 |
| 49 | 613.076 | 954.453 | -30094.9 | 0 | 0 |
| 50 | 619.474 | 959.637 | -29808.5 | 0 | 0 |
| 51 | 625.872 | 965 | 0 | 0 | 0 |

**Global Minimum Query (janbu simplified) - Safety Factor**: 0.954049

| Slice Number | X coordinate [ft] | Y coordinate - Bottom [ft] | Interslice Normal Force [lbs] | Interslice Shear Force [lbs] | Interslice Force Angle [degrees] |
|---|---|---|---|---|---|
| 1 | 318.617 | 853.184 | 0 | 0 | 0 |
| 2 | 324.346 | 852.247 | 3899.31 | 0 | 0 |
| 3 | 330.074 | 851.423 | 9084.32 | 0 | 0 |
| 4 | 335.803 | 850.713 | 15348.1 | 0 | 0 |
| 5 | 341.532 | 850.116 | 22499.9 | 0 | 0 |
| 6 | 347.26 | 849.631 | 30363.6 | 0 | 0 |
| 7 | 352.989 | 849.257 | 38776.4 | 0 | 0 |
| 8 | 358.717 | 848.994 | 47588 | 0 | 0 |
| 9 | 364.446 | 848.842 | 56659 | 0 | 0 |
| 10 | 370.175 | 848.801 | 65860.7 | 0 | 0 |
| 11 | 375.903 | 848.87 | 75074 | 0 | 0 |
| 12 | 381.632 | 849.05 | 84188.6 | 0 | 0 |
| 13 | 387.36 | 849.34 | 93102.7 | 0 | 0 |
| 14 | 393.089 | 849.742 | 101722 | 0 | 0 |
| 15 | 398.818 | 850.256 | 109961 | 0 | 0 |
| 16 | 404.546 | 850.881 | 117738 | 0 | 0 |
| 17 | 410.275 | 851.619 | 124934 | 0 | 0 |
| 18 | 416.003 | 852.471 | 131320 | 0 | 0 |
| 19 | 421.732 | 853.438 | 136899 | 0 | 0 |
| 20 | 427.461 | 854.521 | 141709 | 0 | 0 |
| 21 | 433.189 | 855.721 | 145849 | 0 | 0 |
| 22 | 438.918 | 857.039 | 149336 | 0 | 0 |
| 23 | 444.647 | 858.478 | 152125 | 0 | 0 |
| 24 | 450.375 | 860.039 | 154177 | 0 | 0 |
| 25 | 456.104 | 861.724 | 155456 | 0 | 0 |
| 26 | 461.832 | 863.536 | 155936 | 0 | 0 |
| 27 | 467.561 | 865.476 | 155592 | 0 | 0 |
| 28 | 473.29 | 867.547 | 154406 | 0 | 0 |
| 29 | 479.018 | 869.753 | 152368 | 0 | 0 |
| 30 | 484.747 | 872.097 | 149469 | 0 | 0 |
| 31 | 490.475 | 874.582 | 145729 | 0 | 0 |
| 32 | 496.204 | 877.212 | 141171 | 0 | 0 |
| 33 | 501.933 | 879.991 | 135815 | 0 | 0 |
| 34 | 507.661 | 882.925 | 129688 | 0 | 0 |
| 35 | 513.39 | 886.019 | 122823 | 0 | 0 |
| 36 | 519.118 | 889.277 | 115263 | 0 | 0 |
| 37 | 524.847 | 892.707 | 107056 | 0 | 0 |
| 38 | 530.576 | 896.316 | 98263.2 | 0 | 0 |
| 39 | 536.304 | 900.111 | 88952.8 | 0 | 0 |
| 40 | 542.033 | 904.102 | 79205.4 | 0 | 0 |
| 41 | 547.761 | 908.298 | 69113.8 | 0 | 0 |
| 42 | 553.49 | 912.71 | 58784.8 | 0 | 0 |
| 43 | 559.219 | 917.351 | 48340.9 | 0 | 0 |
| 44 | 564.947 | 922.235 | 37923 | 0 | 0 |
| 45 | 570.676 | 927.379 | 27692.5 | 0 | 0 |
| 46 | 576.405 | 932.8 | 17865.8 | 0 | 0 |
| 47 | 582.133 | 938.522 | 9388 | 0 | 0 |
| 48 | 587.862 | 944.569 | 2908.97 | 0 | 0 |
| 49 | 593.59 | 950.972 | -1158.55 | 0 | 0 |
| 50 | 599.319 | 957.768 | -2341.53 | 0 | 0 |
| 51 | 605.048 | 965 | 0 | 0 | 0 |

## *List Of Coordinates*

### External Boundary



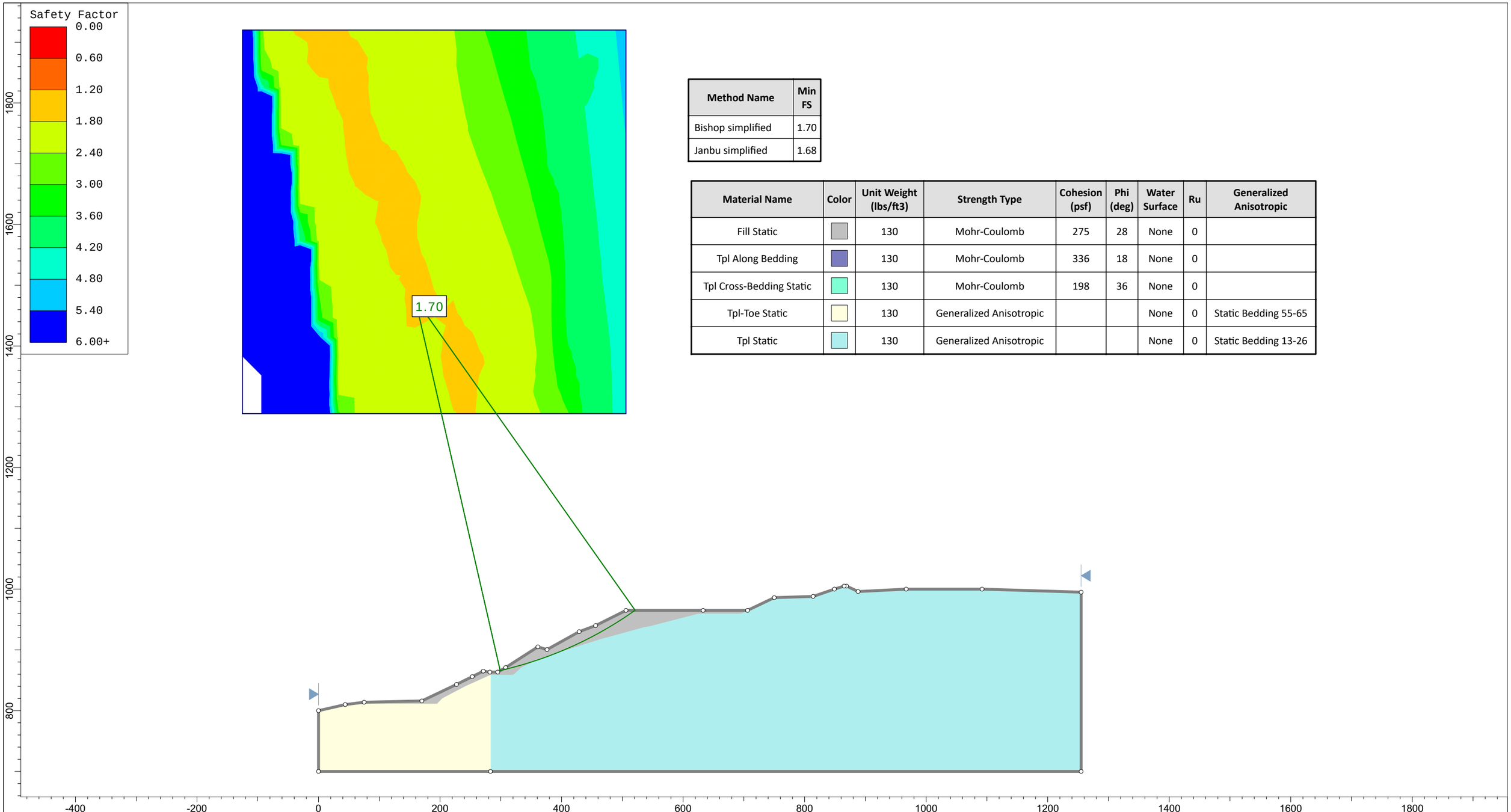
| X | Y |
|---|---|
| 0 | 700 |
| 399 | 700 |
| 1383 | 700 |
| 1383 | 910 |
| 1318 | 915 |
| 1273 | 920 |
| 1178 | 942 |
| 1065 | 956.2 |
| 1025 | 960 |
| 900 | 986 |
| 869 | 987.5 |
| 838 | 986 |
| 775 | 965 |
| 718 | 965 |
| 575 | 965 |
| 484 | 923.5 |
| 427 | 895 |
| 407 | 895 |
| 314 | 851 |
| 302 | 844 |
| 137 | 838 |
| 57 | 820 |
| 27 | 810 |
| 0 | 800 |

## Material Boundary

| X | Y |
|---|---|
| 137 | 838 |
| 148 | 833 |
| 344 | 841 |
| 366 | 832 |
| 399 | 827 |
| 435 | 846 |
| 474 | 858 |
| 520 | 880 |
| 575 | 908 |
| 642 | 937 |
| 713 | 960 |
| 770 | 960 |
| 775 | 965 |

## Material Boundary

| X | Y |
|---|---|
| 399 | 700 |
| 399 | 827 |




| Method Name | Min FS |
|---|---|
| Bishop simplified | 1.70 |
| Janbu simplified | 1.68 |

| Material Name | Color | Unit Weight (lbs/ft3) | Strength Type | Cohesion (psf) | Phi (deg) | Water Surface | Ru | Generalized Anisotropic |
|---|---|---|---|---|---|---|---|---|
| Fill Static | | 130 | Mohr-Coulomb | 275 | 28 | None | 0 | |
| Tpl Along Bedding | | 130 | Mohr-Coulomb | 336 | 18 | None | 0 | |
| Tpl Cross-Bedding Static | | 130 | Mohr-Coulomb | 198 | 36 | None | 0 | |
| Tpl-Toe Static | | 130 | Generalized Anisotropic | | | None | 0 | Static Bedding 55-65 |
| Tpl Static | | 130 | Generalized Anisotropic | | | None | 0 | Static Bedding 13-26 |

TGR Geotechnical Environmental Hydrogeology Material Testing Construction Inspection

SLIDEINTERPRET 7.038

| | | | |
|---|---|---|---|
| *Project* | HOFF Property, Yorba Linda | | |
| *Analysis Description* | Cross-section B-B', Static | | |
| *Drawn By* | | *Scale* 1:1800 | *Company* TGR Geotechnical, Inc. |
| *Date* 4/15/20 | | | *File Name* Cross-section B-B' Static.slim |

# Slide Analysis Information

# HOFF Property, Yorba Linda

## Project Summary

| | |
|---|---|
| File Name: | Cross-section B-B' Static |
| Slide Modeler Version: | 7.038 |
| Project Title: | HOFF Property, Yorba Linda |
| Analysis: | Cross-section B-B', Static |
| Company: | TGR Geotechnical, Inc. |
| Date Created: | 4/15/20 |

## General Settings

| | |
|---|---|
| Units of Measurement: | Imperial Units |
| Time Units: | days |
| Permeability Units: | feet/second |
| Failure Direction: | Right to Left |
| Data Output: | Standard |
| Maximum Material Properties: | 20 |
| Maximum Support Properties: | 20 |

## Analysis Options

| | |
|---|---|
| Slices Type: | Vertical |
| **Analysis Methods Used** | |
| | Bishop simplified |
| | Janbu simplified |
| Number of slices: | 50 |
| Tolerance: | 0.005 |
| Maximum number of iterations: | 75 |
| Check malpha < 0.2: | Yes |
| Create Interslice boundaries at intersections with water tables and piezos: | Yes |
| Initial trial value of FS: | 1 |
| Steffensen Iteration: | Yes |

## Groundwater Analysis

| | |
|---|---|
| Groundwater Method: | Water Surfaces |
| Pore Fluid Unit Weight [lbs/ft3]: | 62.4 |
| Use negative pore pressure cutoff: | Yes |
| Maximum negative pore pressure [psf]: | 0 |
| Advanced Groundwater Method: | None |

## Random Numbers

| | |
|---|---|
| Pseudo-random Seed: | 10116 |
| Random Number Generation Method: | Park and Miller v.3 |

## Surface Options

| | |
|---|---|
| Surface Type: | Circular |
| Search Method: | Grid Search |
| Radius Increment: | 10 |
| Composite Surfaces: | Disabled |
| Reverse Curvature: | Invalid Surfaces |
| Minimum Elevation: | Not Defined |
| Minimum Depth: | Not Defined |
| Minimum Area: | Not Defined |
| Minimum Weight: | Not Defined |

## Seismic

| | |
|---|---|
| Advanced seismic analysis: | No |
| Staged pseudostatic analysis: | No |

## Material Properties

| Property | Fill Static | Tpl-Toe Static | Tpl Static |
|---|---|---|---|
| Color | | | |
| Strength Type | Mohr-Coulomb | Generalized Anisotropic | Generalized Anisotropic |
| Unit Weight [lbs/ft3] | 130 | 130 | 130 |
| Cohesion [psf] | 275 | | |
| Friction Angle [deg] | 28 | | |
| Water Surface | None | None | None |
| Ru Value | 0 | 0 | 0 |

### Generalized Anisotropic Functions

Name: Static Bedding 13-26

| Angle From | Angle To | Material |
|---|---|---|
| -26 | -90 | Tpl Cross-Bedding Static |
| -13 | -26 | Tpl Along Bedding |
| 90 | -13 | Tpl Cross-Bedding Static |

Name: Static Bedding 55-65

| Angle From | Angle To | Material |
|---|---|---|
| 55 | -90 | Tpl Cross-Bedding Static |
| 65 | 55 | Tpl Along Bedding |
| 90 | 65 | Tpl Cross-Bedding Static |

## Global Minimums

### Method: bishop simplified

| FS | 1.701430 |
|---|---|
| Center: | 158.893, 1478.144 |
| Radius: | 628.153 |
| Left Slip Surface Endpoint: | 299.023, 865.821 |
| Right Slip Surface Endpoint: | 521.190, 965.000 |
| Resisting Moment: | 1.67715e+008 lb-ft |
| Driving Moment: | 9.85731e+007 lb-ft |
| Total Slice Area: | 2995.4 ft2 |
| Surface Horizontal Width: | 222.168 ft |
| Surface Average Height: | 13.4826 ft |

### Method: janbu simplified

| FS | 1.681820 |
|---|---|
| Center: | 222.008, 1383.472 |
| Radius: | 515.895 |
| Left Slip Surface Endpoint: | 316.173, 876.243 |
| Right Slip Surface Endpoint: | 523.718, 965.000 |
| Resisting Horizontal Force: | 218059 lb |
| Driving Horizontal Force: | 129656 lb |
| Total Slice Area: | 2755.33 ft2 |
| Surface Horizontal Width: | 207.545 ft |
| Surface Average Height: | 13.2758 ft |

## *Valid / Invalid Surfaces*

### Method: bishop simplified

Number of Valid Surfaces: 4696
Number of Invalid Surfaces: 155

**Error Codes:**

Error Code -102 reported for 11 surfaces
Error Code -103 reported for 84 surfaces
Error Code -106 reported for 37 surfaces
Error Code -108 reported for 1 surface
Error Code -1000 reported for 22 surfaces

### Method: janbu simplified

Number of Valid Surfaces: 4687
Number of Invalid Surfaces: 164

**Error Codes:**

Error Code -102 reported for 11 surfaces
Error Code -103 reported for 84 surfaces
Error Code -106 reported for 37 surfaces
Error Code -108 reported for 10 surfaces
Error Code -1000 reported for 22 surfaces

**Error Codes**

The following errors were encountered during the computation:

-102 = Two surface / slope intersections, but resulting arc is actually outside soil region.
-103 = Two surface / slope intersections, but one or more surface / nonslope external polygon intersections lie between them. This usually occurs when the slip surface extends past the bottom of the soil region, but may also occur on a benched slope model with two sets of Slope Limits.
-106 = Average slice width is less than 0.0001 * (maximum horizontal extent of soil region). This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very

small (0.1 is an arbitrary number).
-1000 = No valid slip surfaces are generated at a grid center. Unable to draw a surface.

## *Slice Data*

**Global Minimum Query (bishop simplified) - Safety Factor**: 1.70143

| Slice Number | Width [ft] | Weight [lbs] | Angle of Slice Base [degrees] | Base Material | Base Cohesion [psf] | Base Friction Angle [degrees] | Shear Stress [psf] | Shear Strength [psf] | Base Normal Stress [psf] | Pore Pressure [psf] | Effective Normal Stress [psf] | Base Vertical Stress [psf] | Effective Vertical Stress [psf] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.37257 | 427.894 | 13.0949 | Fill Static | 275 | 28 | 179.195 | 304.888 | 56.2118 | 0 | 56.2118 | 97.8949 | 97.8949 |
| 2 | 4.37257 | 1274.3 | 13.5047 | Fill Static | 275 | 28 | 235.075 | 399.963 | 235.022 | 0 | 235.022 | 291.478 | 291.478 |
| 3 | 4.37257 | 2173.84 | 13.9152 | Fill Static | 275 | 28 | 294.232 | 500.615 | 424.319 | 0 | 424.319 | 497.217 | 497.217 |
| 4 | 4.37257 | 3142.81 | 14.3265 | Fill Static | 275 | 28 | 357.72 | 608.636 | 627.477 | 0 | 627.477 | 718.835 | 718.835 |
| 5 | 4.37257 | 4092.98 | 14.7385 | Fill Static | 275 | 28 | 419.682 | 714.06 | 825.752 | 0 | 825.752 | 936.155 | 936.155 |
| 6 | 4.37257 | 5024.02 | 15.1513 | Fill Static | 275 | 28 | 480.104 | 816.863 | 1019.1 | 0 | 1019.1 | 1149.1 | 1149.1 |
| 7 | 4.37257 | 5935.82 | 15.5649 | Fill Static | 275 | 28 | 538.985 | 917.046 | 1207.51 | 0 | 1207.51 | 1357.64 | 1357.64 |
| 8 | 4.37257 | 6828.27 | 15.9794 | Fill Static | 275 | 28 | 596.327 | 1014.61 | 1391 | 0 | 1391 | 1561.76 | 1561.76 |
| 9 | 4.37257 | 7701.24 | 16.3947 | Fill Static | 275 | 28 | 652.129 | 1109.55 | 1569.56 | 0 | 1569.56 | 1761.43 | 1761.43 |
| 10 | 4.37257 | 8554.62 | 16.8109 | Fill Static | 275 | 28 | 706.39 | 1201.87 | 1743.2 | 0 | 1743.2 | 1956.61 | 1956.61 |
| 11 | 4.37257 | 9388.27 | 17.228 | Fill Static | 275 | 28 | 759.109 | 1291.57 | 1911.9 | 0 | 1911.9 | 2147.29 | 2147.29 |
| 12 | 4.37257 | 10202.1 | 17.646 | Fill Static | 275 | 28 | 810.289 | 1378.65 | 2075.66 | 0 | 2075.66 | 2333.42 | 2333.42 |
| 13 | 4.74962 | 11980.3 | 18.0832 | Tpl Cross-Bedding Static | 198 | 36 | 1047.53 | 1782.3 | 2180.61 | 0 | 2180.61 | 2522.65 | 2522.65 |
| 14 | 4.74962 | 12891 | 18.5395 | Tpl Cross-Bedding Static | 198 | 36 | 1115.71 | 1898.31 | 2340.27 | 0 | 2340.27 | 2714.44 | 2714.44 |
| 15 | 4.74962 | 12399.5 | 18.9971 | Tpl Cross-Bedding Static | 198 | 36 | 1073.49 | 1826.46 | 2241.38 | 0 | 2241.38 | 2610.94 | 2610.94 |
| 16 | 4.74962 | 10496.9 | 19.4559 | Tpl Cross-Bedding Static | 198 | 36 | 921.254 | 1567.45 | 1884.89 | 0 | 1884.89 | 2210.33 | 2210.33 |
| 17 | 4.74962 | 8567.84 | 19.916 | Tpl Cross-Bedding Static | 198 | 36 | 767.96 | 1306.63 | 1525.9 | 0 | 1525.9 | 1804.14 | 1804.14 |
| 18 | 4.74962 | 7499.05 | 20.3775 | Tpl Cross-Bedding Static | 198 | 36 | 682.431 | 1161.11 | 1325.6 | 0 | 1325.6 | 1579.09 | 1579.09 |
| 19 | 4.41247 | 7412.28 | 20.8239 | Fill Static | 275 | 28 | 613.711 | 1044.19 | 1446.63 | 0 | 1446.63 | 1680.05 | 1680.05 |
| 20 | 4.41247 | 7847.48 | 21.2551 | Fill Static | 275 | 28 | 639.719 | 1088.44 | 1529.85 | 0 | 1529.85 | 1778.69 | 1778.69 |
| 21 | 4.41247 | 8260.72 | 21.6876 | Fill Static | 275 | 28 | 664.205 | 1130.1 | 1608.21 | 0 | 1608.21 | 1872.36 | 1872.36 |
| 22 | 4.41247 | 8651.8 | 22.1214 | Fill Static | 275 | 28 | 687.164 | 1169.16 | 1681.67 | 0 | 1681.67 | 1961 | 1961 |
| 23 | 4.41247 | 9020.51 | 22.5565 | Fill Static | 275 | 28 | 708.593 | 1205.62 | 1750.25 | 0 | 1750.25 | 2044.57 | 2044.57 |
| 24 | 4.41247 | 9366.64 | 22.993 | Fill Static | 275 | 28 | 728.489 | 1239.47 | 1813.91 | 0 | 1813.91 | 2123.03 | 2123.03 |
| 25 | 4.41247 | 9689.99 | 23.431 | Fill Static | 275 | 28 | 746.847 | 1270.71 | 1872.65 | 0 | 1872.65 | 2196.32 | 2196.32 |
| 26 | 4.41247 | 9990.31 | 23.8703 | Fill Static | 275 | 28 | 763.664 | 1299.32 | 1926.46 | 0 | 1926.46 | 2264.4 | 2264.4 |
| 27 | 4.41247 | 10267.4 | 24.3112 | Fill Static | 275 | 28 | 778.933 | 1325.3 | 1975.32 | 0 | 1975.32 | 2327.2 | 2327.2 |
| 28 | 4.41247 | 10521 | 24.7536 | Fill Static | 275 | 28 | 792.645 | 1348.63 | 2019.21 | 0 | 2019.21 | 2384.68 | 2384.68 |
| 29 | 4.41247 | 10750.8 | 25.1976 | Fill Static | 275 | 28 | 804.805 | 1369.32 | 2058.12 | 0 | 2058.12 | 2436.79 | 2436.79 |
| 30 | 4.41247 | 10768.6 | 25.6433 | Fill Static | 275 | 28 | 803.818 | 1367.64 | 2054.96 | 0 | 2054.96 | 2440.83 | 2440.83 |
| 31 | 4.41247 | 10481.5 | 26.0906 | Fill Static | 275 | 28 | 784.082 | 1334.06 | 1991.8 | 0 | 1991.8 | 2375.76 | 2375.76 |
| 32 | 4.41247 | 10167.2 | 26.5396 | Fill Static | 275 | 28 | 762.758 | 1297.78 | 1923.56 | 0 | 1923.56 | 2304.52 | 2304.52 |
| 33 | 4.41247 | 9827.98 | 26.9903 | Fill Static | 275 | 28 | 740.002 | 1259.06 | 1850.75 | 0 | 1850.75 | 2227.64 | 2227.64 |
| 34 | 4.41247 | 9463.66 | 27.4429 | Fill Static | 275 | 28 | 715.813 | 1217.91 | 1773.35 | 0 | 1773.35 | 2145.07 | 2145.07 |
| 35 | 4.41247 | 9073.9 | 27.8974 | Fill Static | 275 | 28 | 690.185 | 1174.3 | 1691.34 | 0 | 1691.34 | 2056.73 | 2056.73 |
| 36 | 4.41247 | 8756.69 | 28.3538 | Fill Static | 275 | 28 | 669.07 | 1138.38 | 1623.77 | 0 | 1623.77 | 1984.84 | 1984.84 |
| 37 | 4.41247 | 8634.82 | 28.8121 | Fill Static | 275 | 28 | 659.854 | 1122.7 | 1594.29 | 0 | 1594.29 | 1957.22 | 1957.22 |
| 38 | 4.41247 | 8494.88 | 29.2725 | Fill Static | 275 | 28 | 649.577 | 1105.21 | 1561.4 | 0 | 1561.4 | 1925.51 | 1925.51 |
| 39 | 4.41247 | 8328.16 | 29.7349 | Fill Static | 275 | 28 | 637.722 | 1085.04 | 1523.46 | 0 | 1523.46 | 1887.73 | 1887.73 |
| 40 | 4.41247 | 8134.28 | 30.1995 | Fill Static | 275 | 28 | 624.281 | 1062.17 | 1480.45 | 0 | 1480.45 | 1843.79 | 1843.79 |
| 41 | 4.41247 | 7912.85 | 30.6663 | Fill Static | 275 | 28 | 609.247 | 1036.59 | 1432.34 | 0 | 1432.34 | 1793.6 | 1793.6 |
| 42 | 4.41247 | 7663.49 | 31.1354 | Fill Static | 275 | 28 | 592.609 | 1008.28 | 1379.1 | 0 | 1379.1 | 1737.09 | 1737.09 |
| 43 | 4.41247 | 7385.77 | 31.6068 | Fill Static | 275 | 28 | 574.358 | 977.23 | 1320.7 | 0 | 1320.7 | 1674.14 | 1674.14 |
| 44 | 4.41247 | 7079.26 | 32.0806 | Fill Static | 275 | 28 | 554.485 | 943.417 | 1257.11 | 0 | 1257.11 | 1604.67 | 1604.67 |
| 45 | 4.41247 | 6743.52 | 32.5568 | Fill Static | 275 | 28 | 532.979 | 906.826 | 1188.29 | 0 | 1188.29 | 1528.58 | 1528.58 |
| 46 | 4.41247 | 6378.09 | 33.0356 | Fill Static | 275 | 28 | 509.829 | 867.439 | 1114.22 | 0 | 1114.22 | 1445.75 | 1445.75 |
| 47 | 4.41247 | 5858.52 | 33.517 | Fill Static | 275 | 28 | 477.752 | 812.861 | 1011.57 | 0 | 1011.57 | 1327.99 | 1327.99 |
| 48 | 4.41247 | 4363.28 | 34.0012 | Fill Static | 275 | 28 | 388.771 | 661.466 | 726.836 | 0 | 726.836 | 989.077 | 989.077 |
| 49 | 4.41247 | 2640.22 | 34.488 | Fill Static | 275 | 28 | 287.047 | 488.391 | 401.331 | 0 | 401.331 | 598.525 | 598.525 |
| 50 | 4.41247 | 885.414 | 34.9778 | Fill Static | 275 | 28 | 184.117 | 313.261 | 71.9592 | 0 | 71.9592 | 200.773 | 200.773 |

**Global Minimum Query (janbu simplified) - Safety Factor**: 1.68182

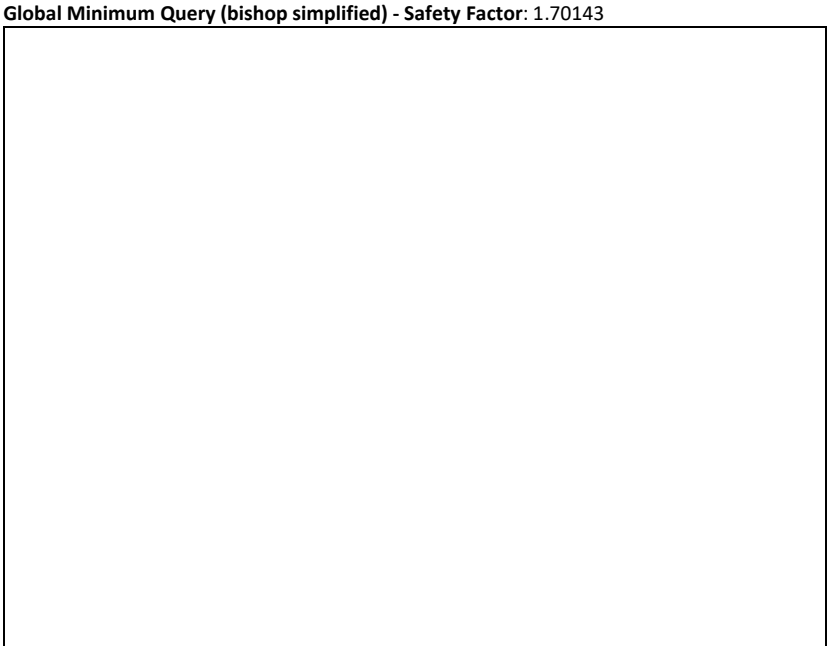
| | | | Angle | | Base | Base | Shear | Shear | Base | Pore | Effective | Base | Effective |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

| Number | [ft] | [lbs] | of Slice Base [degrees] | Material | Cohesion [psf] | Friction Angle [degrees] | Stress [psf] | Strength [psf] | Normal Stress [psf] | Pressure [psf] | Normal Stress [psf] | Vertical Stress [psf] | Vertical Stress [psf] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.1509 | 505.795 | 10.7517 | Fill Static | 275 | 28 | 190.61 | 320.572 | 85.7088 | 0 | 85.7088 | 121.903 | 121.903 |
| 2 | 4.1509 | 1507.86 | 11.2213 | Fill Static | 275 | 28 | 261.952 | 440.556 | 311.366 | 0 | 311.366 | 363.335 | 363.335 |
| 3 | 4.1509 | 2490.82 | 11.6917 | Fill Static | 275 | 28 | 331.564 | 557.631 | 531.553 | 0 | 531.553 | 600.166 | 600.166 |
| 4 | 4.1509 | 3454.6 | 12.1629 | Fill Static | 275 | 28 | 399.451 | 671.805 | 746.281 | 0 | 746.281 | 832.374 | 832.374 |
| 5 | 4.1509 | 4399.08 | 12.6349 | Fill Static | 275 | 28 | 465.615 | 783.081 | 955.562 | 0 | 955.562 | 1059.94 | 1059.94 |
| 6 | 4.1509 | 5324.16 | 13.1078 | Fill Static | 275 | 28 | 530.06 | 891.465 | 1159.4 | 0 | 1159.4 | 1282.83 | 1282.83 |
| 7 | 4.1509 | 6229.73 | 13.5816 | Fill Static | 275 | 28 | 592.786 | 996.96 | 1357.81 | 0 | 1357.81 | 1501.02 | 1501.02 |
| 8 | 4.1509 | 7115.68 | 14.0563 | Fill Static | 275 | 28 | 653.797 | 1099.57 | 1550.79 | 0 | 1550.79 | 1714.48 | 1714.48 |
| 9 | 4.1509 | 7981.88 | 14.5321 | Fill Static | 275 | 28 | 713.094 | 1199.3 | 1738.35 | 0 | 1738.35 | 1923.19 | 1923.19 |
| 10 | 4.1509 | 8828.22 | 15.0088 | Fill Static | 275 | 28 | 770.677 | 1296.14 | 1920.48 | 0 | 1920.48 | 2127.11 | 2127.11 |
| 11 | 4.1509 | 9612.05 | 15.4866 | Fill Static | 275 | 28 | 823.572 | 1385.1 | 2087.79 | 0 | 2087.79 | 2315.98 | 2315.98 |
| 12 | 4.1509 | 8982.93 | 15.9656 | Fill Static | 275 | 28 | 777.473 | 1307.57 | 1941.98 | 0 | 1941.98 | 2164.41 | 2164.41 |
| 13 | 4.1509 | 7659.96 | 16.4457 | Fill Static | 275 | 28 | 683.257 | 1149.12 | 1643.97 | 0 | 1643.97 | 1845.66 | 1845.66 |
| 14 | 4.1509 | 6316.56 | 16.9269 | Fill Static | 275 | 28 | 588.106 | 989.088 | 1343 | 0 | 1343 | 1521.99 | 1521.99 |
| 15 | 4.1509 | 5283.23 | 17.4094 | Fill Static | 275 | 28 | 514.934 | 866.026 | 1111.56 | 0 | 1111.56 | 1273.02 | 1273.02 |
| 16 | 4.1509 | 5653.64 | 17.8932 | Fill Static | 275 | 28 | 539.164 | 906.777 | 1188.2 | 0 | 1188.2 | 1362.27 | 1362.27 |
| 17 | 4.1509 | 6166.7 | 18.3783 | Fill Static | 275 | 28 | 573.087 | 963.829 | 1295.5 | 0 | 1295.5 | 1485.9 | 1485.9 |
| 18 | 4.1509 | 6658.67 | 18.8648 | Fill Static | 275 | 28 | 605.365 | 1018.12 | 1397.6 | 0 | 1397.6 | 1604.45 | 1604.45 |
| 19 | 4.1509 | 7129.37 | 19.3527 | Fill Static | 275 | 28 | 635.997 | 1069.63 | 1494.49 | 0 | 1494.49 | 1717.87 | 1717.87 |
| 20 | 4.1509 | 7578.61 | 19.8421 | Fill Static | 275 | 28 | 664.979 | 1118.38 | 1586.16 | 0 | 1586.16 | 1826.12 | 1826.12 |
| 21 | 4.1509 | 8006.2 | 20.3329 | Fill Static | 275 | 28 | 692.31 | 1164.34 | 1672.61 | 0 | 1672.61 | 1929.15 | 1929.15 |
| 22 | 4.1509 | 8411.93 | 20.8254 | Fill Static | 275 | 28 | 717.985 | 1207.52 | 1753.82 | 0 | 1753.82 | 2026.92 | 2026.92 |
| 23 | 4.1509 | 8795.58 | 21.3194 | Fill Static | 275 | 28 | 742.002 | 1247.91 | 1829.78 | 0 | 1829.78 | 2119.37 | 2119.37 |
| 24 | 4.1509 | 9156.93 | 21.8151 | Fill Static | 275 | 28 | 764.356 | 1285.51 | 1900.49 | 0 | 1900.49 | 2206.45 | 2206.45 |
| 25 | 4.1509 | 9495.77 | 22.3126 | Fill Static | 275 | 28 | 785.042 | 1320.3 | 1965.93 | 0 | 1965.93 | 2288.1 | 2288.1 |
| 26 | 4.1509 | 9811.84 | 22.8118 | Fill Static | 275 | 28 | 804.058 | 1352.28 | 2026.08 | 0 | 2026.08 | 2364.26 | 2364.26 |
| 27 | 4.1509 | 10104.9 | 23.3128 | Fill Static | 275 | 28 | 821.396 | 1381.44 | 2080.92 | 0 | 2080.92 | 2434.89 | 2434.89 |
| 28 | 4.1509 | 10234.9 | 23.8158 | Fill Static | 275 | 28 | 827.71 | 1392.06 | 2100.88 | 0 | 2100.88 | 2466.21 | 2466.21 |
| 29 | 4.1509 | 10070.8 | 24.3207 | Fill Static | 275 | 28 | 814.356 | 1369.6 | 2058.65 | 0 | 2058.65 | 2426.7 | 2426.7 |
| 30 | 4.1509 | 9876.09 | 24.8276 | Fill Static | 275 | 28 | 799.015 | 1343.8 | 2010.12 | 0 | 2010.12 | 2379.79 | 2379.79 |
| 31 | 4.1509 | 9657.27 | 25.3366 | Fill Static | 275 | 28 | 782.141 | 1315.42 | 1956.74 | 0 | 1956.74 | 2327.07 | 2327.07 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 32 | 4.1509 | 9414.03 | 25.8478 | Fill Static | 275 | 28 | 763.72 | 1284.44 | 1898.49 | 0 | 1898.49 | 2268.47 | 2268.47 |
| 33 | 4.1509 | 9146.06 | 26.3612 | Fill Static | 275 | 28 | 743.758 | 1250.87 | 1835.34 | 0 | 1835.34 | 2203.91 | 2203.91 |
| 34 | 4.1509 | 8867.36 | 26.8768 | Fill Static | 275 | 28 | 723.18 | 1216.26 | 1770.25 | 0 | 1770.25 | 2136.77 | 2136.77 |
| 35 | 4.1509 | 8771.01 | 27.3949 | Fill Static | 275 | 28 | 714.633 | 1201.88 | 1743.22 | 0 | 1743.22 | 2113.57 | 2113.57 |
| 36 | 4.1509 | 8717.19 | 27.9154 | Fill Static | 275 | 28 | 708.883 | 1192.21 | 1725.03 | 0 | 1725.03 | 2100.61 | 2100.61 |
| 37 | 4.1509 | 8637.25 | 28.4383 | Fill Static | 275 | 28 | 701.438 | 1179.69 | 1701.48 | 0 | 1701.48 | 2081.35 | 2081.35 |
| 38 | 4.1509 | 8530.8 | 28.9639 | Fill Static | 275 | 28 | 692.289 | 1164.31 | 1672.54 | 0 | 1672.54 | 2055.71 | 2055.71 |
| 39 | 4.1509 | 8397.44 | 29.4922 | Fill Static | 275 | 28 | 681.425 | 1146.03 | 1638.18 | 0 | 1638.18 | 2023.59 | 2023.59 |
| 40 | 4.1509 | 8236.74 | 30.0232 | Fill Static | 275 | 28 | 668.837 | 1124.86 | 1598.36 | 0 | 1598.36 | 1984.88 | 1984.88 |
| 41 | 4.1509 | 8048.28 | 30.5571 | Fill Static | 275 | 28 | 654.514 | 1100.77 | 1553.06 | 0 | 1553.06 | 1939.47 | 1939.47 |
| 42 | 4.1509 | 7831.59 | 31.094 | Fill Static | 275 | 28 | 638.443 | 1073.75 | 1502.22 | 0 | 1502.22 | 1887.27 | 1887.27 |
| 43 | 4.1509 | 7586.19 | 31.6339 | Fill Static | 275 | 28 | 620.615 | 1043.76 | 1445.83 | 0 | 1445.83 | 1828.14 | 1828.14 |
| 44 | 4.1509 | 7311.59 | 32.177 | Fill Static | 275 | 28 | 601.016 | 1010.8 | 1383.84 | 0 | 1383.84 | 1761.98 | 1761.98 |
| 45 | 4.1509 | 7007.26 | 32.7233 | Fill Static | 275 | 28 | 579.634 | 974.84 | 1316.21 | 0 | 1316.21 | 1688.66 | 1688.66 |
| 46 | 4.1509 | 6632.26 | 33.273 | Fill Static | 275 | 28 | 553.906 | 931.571 | 1234.83 | 0 | 1234.83 | 1598.31 | 1598.31 |
| 47 | 4.1509 | 5446.44 | 33.8261 | Fill Static | 275 | 28 | 477.354 | 802.823 | 992.69 | 0 | 992.69 | 1312.57 | 1312.57 |
| 48 | 4.1509 | 3929.61 | 34.3829 | Fill Static | 275 | 28 | 380.592 | 640.087 | 686.629 | 0 | 686.629 | 947.059 | 947.059 |
| 49 | 4.1509 | 2380.71 | 34.9434 | Fill Static | 275 | 28 | 282.518 | 475.144 | 376.416 | 0 | 376.416 | 573.821 | 573.821 |
| 50 | 4.1509 | 799.08 | 35.5077 | Fill Static | 275 | 28 | 183.125 | 307.984 | 62.0338 | 0 | 62.0338 | 192.693 | 192.693 |

## *Interslice Data*

**Global Minimum Query (bishop simplified) - Safety Factor**: 1.70143



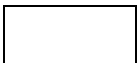
| Slice Number | X coordinate [ft] | Y coordinate - Bottom [ft] | Interslice Normal Force [lbs] | Interslice Shear Force [lbs] | Interslice Force Angle [degrees] |
|---|---|---|---|---|---|
| 1 | 299.023 | 865.821 | 0 | 0 | 0 |
| 2 | 303.395 | 866.838 | 725.694 | 0 | 0 |
| 3 | 307.768 | 867.888 | 1505.88 | 0 | 0 |
| 4 | 312.14 | 868.971 | 2331.64 | 0 | 0 |
| 5 | 316.513 | 870.088 | 3193.74 | 0 | 0 |
| 6 | 320.885 | 871.238 | 4077.41 | 0 | 0 |
| 7 | 325.258 | 872.422 | 4968.26 | 0 | 0 |
| 8 | 329.631 | 873.64 | 5852.28 | 0 | 0 |
| 9 | 334.003 | 874.892 | 6715.82 | 0 | 0 |
| 10 | 338.376 | 876.179 | 7545.64 | 0 | 0 |
| 11 | 342.748 | 877.5 | 8328.84 | 0 | 0 |
| 12 | 347.121 | 878.856 | 9052.95 | 0 | 0 |
| 13 | 351.493 | 880.247 | 9705.84 | 0 | 0 |
| 14 | 356.243 | 881.798 | 11295.1 | 0 | 0 |
| 15 | 360.993 | 883.39 | 12862.1 | 0 | 0 |
| 16 | 365.742 | 885.026 | 14291.3 | 0 | 0 |
| 17 | 370.492 | 886.703 | 15500.6 | 0 | 0 |
| 18 | 375.242 | 888.424 | 16519.2 | 0 | 0 |
| 19 | 379.991 | 890.188 | 17419 | 0 | 0 |
| 20 | 384.404 | 891.867 | 17696.8 | 0 | 0 |
| 21 | 388.816 | 893.583 | 17891.4 | 0 | 0 |
| 22 | 393.229 | 895.338 | 17997.5 | 0 | 0 |
| 23 | 397.641 | 897.132 | 18010.7 | 0 | 0 |
| 24 | 402.054 | 898.964 | 17926.7 | 0 | 0 |
| 25 | 406.466 | 900.837 | 17742.1 | 0 | 0 |
| 26 | 410.878 | 902.749 | 17453.7 | 0 | 0 |
| 27 | 415.291 | 904.702 | 17058.8 | 0 | 0 |
| 28 | 419.703 | 906.695 | 16555.4 | 0 | 0 |
| 29 | 424.116 | 908.729 | 15941.8 | 0 | 0 |
| 30 | 428.528 | 910.806 | 15217 | 0 | 0 |
| 31 | 432.941 | 912.924 | 14407.9 | 0 | 0 |
| 32 | 437.353 | 915.085 | 13560.9 | 0 | 0 |
| 33 | 441.766 | 917.288 | 12684.5 | 0 | 0 |
| 34 | 446.178 | 919.536 | 11787.7 | 0 | 0 |
| 35 | 450.591 | 921.827 | 10880 | 0 | 0 |
| 36 | 455.003 | 924.163 | 9971.77 | 0 | 0 |
| 37 | 459.416 | 926.544 | 9054.92 | 0 | 0 |
| 38 | 463.828 | 928.971 | 8094.68 | 0 | 0 |
| 39 | 468.241 | 931.445 | 7096.53 | 0 | 0 |
| 40 | 472.653 | 933.965 | 6068.3 | 0 | 0 |
| 41 | 477.066 | 936.533 | 5018.64 | 0 | 0 |
| 42 | 481.478 | 939.15 | 3956.98 | 0 | 0 |
| 43 | 485.891 | 941.815 | 2893.61 | 0 | 0 |
| 44 | 490.303 | 944.53 | 1839.67 | 0 | 0 |
| 45 | 494.716 | 947.296 | 807.227 | 0 | 0 |
| 46 | 499.128 | 950.113 | -190.717 | 0 | 0 |
| 47 | 503.54 | 952.983 | -1140.18 | 0 | 0 |
| 48 | 507.953 | 955.905 | -1990.18 | 0 | 0 |
| 49 | 512.365 | 958.882 | -2439.56 | 0 | 0 |
| 50 | 516.778 | 961.913 | -2390.6 | 0 | 0 |
| 51 | 521.19 | 965 | 0 | 0 | 0 |

**Global Minimum Query (janbu simplified) - Safety Factor**: 1.68182

| Slice Number | X coordinate [ft] | Y coordinate - Bottom [ft] | Interslice Normal Force [lbs] | Interslice Shear Force [lbs] | Interslice Force Angle [degrees] |
|---|---|---|---|---|---|
| 1 | 316.173 | 876.243 | 0 | 0 | 0 |
| 2 | 320.324 | 877.032 | 722.525 | 0 | 0 |
| 3 | 324.475 | 877.855 | 1551.91 | 0 | 0 |
| 4 | 328.626 | 878.714 | 2469.65 | 0 | 0 |
| 5 | 332.777 | 879.609 | 3457.72 | 0 | 0 |
| 6 | 336.928 | 880.539 | 4498.56 | 0 | 0 |
| 7 | 341.079 | 881.506 | 5575.06 | 0 | 0 |
| 8 | 345.23 | 882.508 | 6670.55 | 0 | 0 |
| 9 | 349.381 | 883.548 | 7768.86 | 0 | 0 |
| 10 | 353.532 | 884.624 | 8854.22 | 0 | 0 |
| 11 | 357.682 | 885.737 | 9911.34 | 0 | 0 |
| 12 | 361.833 | 886.887 | 10923.9 | 0 | 0 |
| 13 | 365.984 | 888.074 | 11840.3 | 0 | 0 |
| 14 | 370.135 | 889.3 | 12658.1 | 0 | 0 |
| 15 | 374.286 | 890.563 | 13399.2 | 0 | 0 |
| 16 | 378.437 | 891.864 | 14086.8 | 0 | 0 |
| 17 | 382.588 | 893.205 | 14729.3 | 0 | 0 |
| 18 | 386.739 | 894.584 | 15318.2 | 0 | 0 |
| 19 | 390.89 | 896.002 | 15845.2 | 0 | 0 |
| 20 | 395.041 | 897.46 | 16302.5 | 0 | 0 |
| 21 | 399.191 | 898.958 | 16683 | 0 | 0 |
| 22 | 403.342 | 900.496 | 16979.9 | 0 | 0 |
| 23 | 407.493 | 902.075 | 17186.9 | 0 | 0 |
| 24 | 411.644 | 903.695 | 17298.2 | 0 | 0 |
| 25 | 415.795 | 905.356 | 17308.8 | 0 | 0 |
| 26 | 419.946 | 907.06 | 17213.9 | 0 | 0 |
| 27 | 424.097 | 908.806 | 17009.5 | 0 | 0 |
| 28 | 428.248 | 910.594 | 16691.9 | 0 | 0 |
| 29 | 432.399 | 912.427 | 16273.7 | 0 | 0 |
| 30 | 436.55 | 914.303 | 15787.1 | 0 | 0 |
| 31 | 440.7 | 916.223 | 15238.8 | 0 | 0 |
| 32 | 444.851 | 918.188 | 14635 | 0 | 0 |
| 33 | 449.002 | 920.199 | 13983 | 0 | 0 |
| 34 | 453.153 | 922.256 | 13290.6 | 0 | 0 |
| 35 | 457.304 | 924.36 | 12564 | 0 | 0 |
| 36 | 461.455 | 926.511 | 11776.2 | 0 | 0 |
| 37 | 465.606 | 928.71 | 10920.8 | 0 | 0 |
| 38 | 469.757 | 930.958 | 10003.4 | 0 | 0 |
| 39 | 473.908 | 933.256 | 9030.33 | 0 | 0 |
| 40 | 478.059 | 935.604 | 8008.85 | 0 | 0 |
| 41 | 482.209 | 938.002 | 6947.09 | 0 | 0 |
| 42 | 486.36 | 940.453 | 5854.06 | 0 | 0 |
| 43 | 490.511 | 942.956 | 4739.76 | 0 | 0 |
| 44 | 494.662 | 945.513 | 3615.16 | 0 | 0 |
| 45 | 498.813 | 948.125 | 2492.3 | 0 | 0 |
| 46 | 502.964 | 950.792 | 1384.28 | 0 | 0 |
| 47 | 507.115 | 953.516 | 316.76 | 0 | 0 |
| 48 | 511.266 | 956.298 | -465.802 | 0 | 0 |
| 49 | 515.417 | 959.138 | -838.52 | 0 | 0 |
| 50 | 519.568 | 962.038 | -759.233 | 0 | 0 |
| 51 | 523.718 | 965 | 0 | 0 | 0 |

## *List Of Coordinates*

### External Boundary



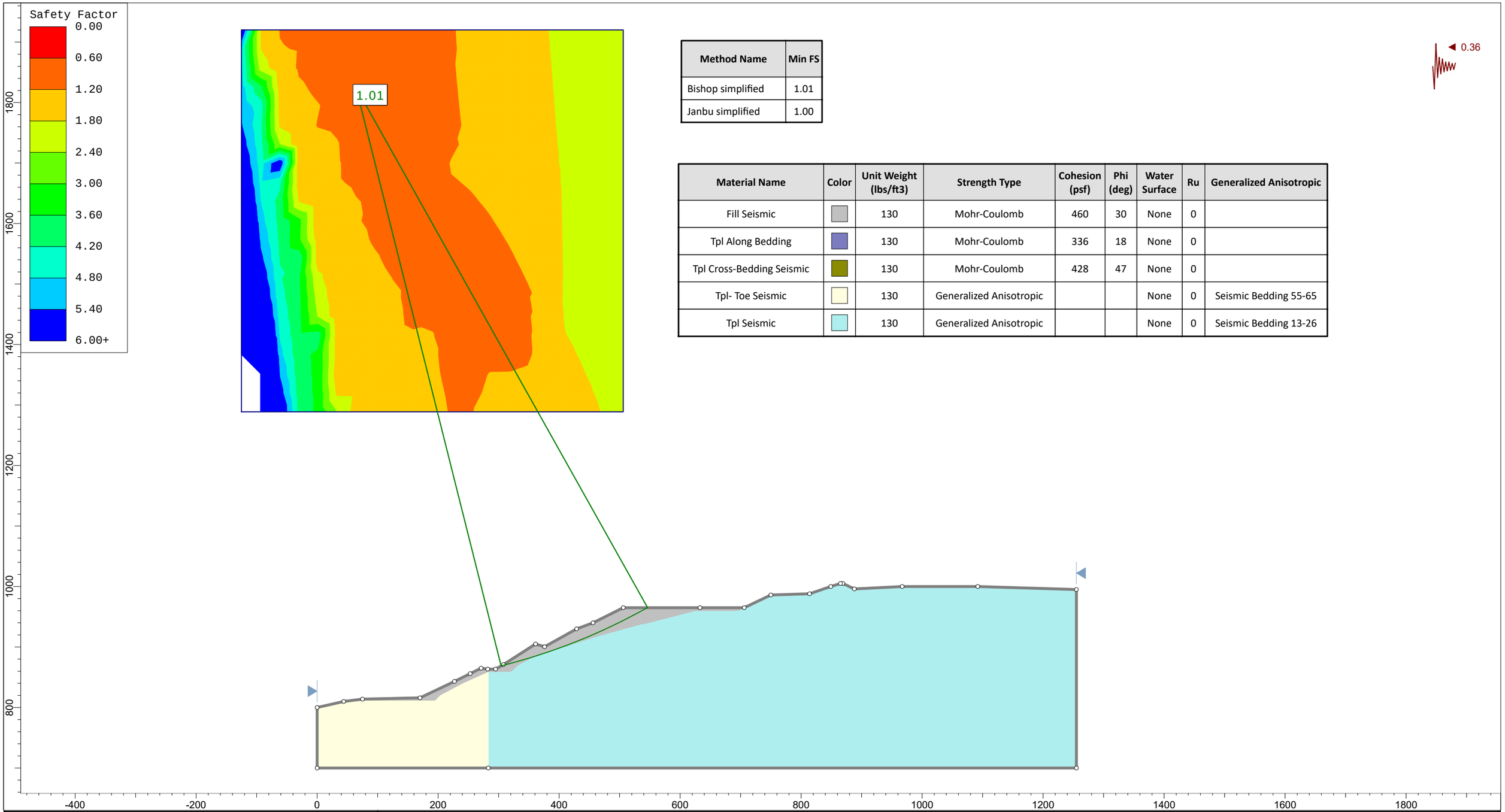
| X | Y |
|---|---|
| 0 | 700 |
| 283 | 700 |
| 1255 | 700 |
| 1255 | 995 |
| 1092 | 1000 |
| 967 | 1000 |
| 888 | 996 |
| 869 | 1005 |
| 865 | 1005 |
| 849 | 1000 |
| 814 | 988 |
| 750 | 986 |
| 706 | 965 |
| 633 | 965 |
| 506 | 965 |
| 456 | 940 |
| 429 | 930 |
| 376 | 900.5 |
| 361 | 905 |
| 308 | 871 |
| 295 | 863.5 |
| 282 | 863.5 |
| 271 | 865 |
| 253 | 856 |
| 227 | 843.1 |
| 170 | 816 |
| 75 | 813.9 |
| 44 | 810 |
| 0 | 800 |

## Material Boundary

| X | Y |
|---|---|
| 75 | 813.9 |
| 81 | 811 |
| 195 | 811 |
| 204 | 820 |
| 242 | 840 |
| 283 | 858.5 |
| 320 | 858.5 |
| 324.266 | 863.03 |
| 333 | 871 |
| 353 | 881 |
| 400 | 897 |
| 463 | 917 |
| 536 | 937 |
| 625 | 960 |
| 698 | 960 |
| 706 | 965 |

## Material Boundary

| X | Y |
|---|---|
| 283 | 700 |
| 283 | 858.5 |




| Method Name | Min FS |
|---|---|
| Bishop simplified | 1.01 |
| Janbu simplified | 1.00 |

| Material Name | Color | Unit Weight (lbs/ft3) | Strength Type | Cohesion (psf) | Phi (deg) | Water Surface | Ru | Generalized Anisotropic |
|---|---|---|---|---|---|---|---|---|
| Fill Seismic | | 130 | Mohr-Coulomb | 460 | 30 | None | 0 | |
| Tpl Along Bedding | | 130 | Mohr-Coulomb | 336 | 18 | None | 0 | |
| Tpl Cross-Bedding Seismic | | 130 | Mohr-Coulomb | 428 | 47 | None | 0 | |
| Tpl- Toe Seismic | | 130 | Generalized Anisotropic | | | None | 0 | Seismic Bedding 55-65 |
| Tpl Seismic | | 130 | Generalized Anisotropic | | | None | 0 | Seismic Bedding 13-26 |

Geotechnical
Environmental
Hydrogeology
Material Testing
Construction Inspection

SLIDEINTERPRET 7.038

| | | | |
|---|---|---|---|
| *Project* | HOFF Property, Yorba Linda | | |
| *Analysis Description* | Cross-section B-B', Seismic | | |
| *Drawn By* | | *Scale* 1:1800 | *Company* TGR Geotechnical, Inc. |
| *Date* | 4/15/20 | | *File Name* Cross-section B-B' Seismic.slim |

# Slide Analysis Information

# HOFF Property, Yorba Linda

## Project Summary

| | |
|---|---|
| File Name: | Cross-section B-B' Seismic |
| Slide Modeler Version: | 7.038 |
| Project Title: | HOFF Property, Yorba Linda |
| Analysis: | Cross-section B-B', Seismic |
| Company: | TGR Geotechnical, Inc. |
| Date Created: | 4/15/20 |

## General Settings

| | |
|---|---|
| Units of Measurement: | Imperial Units |
| Time Units: | days |
| Permeability Units: | feet/second |
| Failure Direction: | Right to Left |
| Data Output: | Standard |
| Maximum Material Properties: | 20 |
| Maximum Support Properties: | 20 |

## Analysis Options

| | |
|---|---|
| Slices Type: | Vertical |
| **Analysis Methods Used** | |
| | Bishop simplified |
| | Janbu simplified |
| Number of slices: | 50 |
| Tolerance: | 0.005 |
| Maximum number of iterations: | 75 |
| Check malpha < 0.2: | Yes |
| Create Interslice boundaries at intersections with water tables and piezos: | Yes |
| Initial trial value of FS: | 1 |
| Steffensen Iteration: | Yes |

## Groundwater Analysis

| | |
|---|---|
| Groundwater Method: | Water Surfaces |
| Pore Fluid Unit Weight [lbs/ft3]: | 62.4 |
| Use negative pore pressure cutoff: | Yes |
| Maximum negative pore pressure [psf]: | 0 |
| Advanced Groundwater Method: | None |

## Random Numbers

| | |
|---|---|
| Pseudo-random Seed: | 10116 |
| Random Number Generation Method: | Park and Miller v.3 |

## Surface Options

| | |
|---|---|
| Surface Type: | Circular |
| Search Method: | Grid Search |
| Radius Increment: | 10 |
| Composite Surfaces: | Disabled |
| Reverse Curvature: | Invalid Surfaces |
| Minimum Elevation: | Not Defined |
| Minimum Depth: | Not Defined |
| Minimum Area: | Not Defined |
| Minimum Weight: | Not Defined |

## Seismic

| | |
|---|---|
| Advanced seismic analysis: | No |
| Staged pseudostatic analysis: | No |

## Loading

Seismic Load Coefficient (Horizontal): 0.36

## Material Properties

| Property | Fill Seismic | Tpl- Toe Seismic | Tpl Seismic |
|---|---|---|---|
| Color | | | |
| Strength Type | Mohr-Coulomb | Generalized Anisotropic | Generalized Anisotropic |
| Unit Weight [lbs/ft3] | 130 | 130 | 130 |
| Cohesion [psf] | 460 | | |
| Friction Angle [deg] | 30 | | |
| Water Surface | None | None | None |
| Ru Value | 0 | 0 | 0 |

### Generalized Anisotropic Functions

Name: Seismic Bedding 55-65

| Angle From | Angle To | Material |
|---|---|---|
| 55 | -90 | Tpl Cross-Bedding Seismic |
| 65 | 55 | Tpl Along Bedding |
| 90 | 65 | Tpl Cross-Bedding Seismic |

Name: Seismic Bedding 13-26

| Angle From | Angle To | Material |
|---|---|---|
| -26 | -90 | Tpl Cross-Bedding Seismic |
| -13 | -26 | Tpl Along Bedding |
| 90 | -13 | Tpl Cross-Bedding Seismic |

## Global Minimums

### Method: bishop simplified

| FS | 1.009140 |
|---|---|
| Center: | 64.221, 1825.277 |
| Radius: | 986.114 |
| Left Slip Surface Endpoint: | 304.203, 868.810 |
| Right Slip Surface Endpoint: | 546.242, 965.000 |
| Resisting Moment: | 3.36486e+008 lb-ft |
| Driving Moment: | 3.3344e+008 lb-ft |
| Total Slice Area: | 3693.71 ft2 |
| Surface Horizontal Width: | 242.039 ft |
| Surface Average Height: | 15.2608 ft |

### Method: janbu simplified

| FS | 0.995778 |
|---|---|
| Center: | 253.565, 1383.472 |
| Radius: | 507.219 |
| Left Slip Surface Endpoint: | 323.806, 881.140 |
| Right Slip Surface Endpoint: | 540.188, 965.000 |
| Resisting Horizontal Force: | 294087 lb |
| Driving Horizontal Force: | 295334 lb |
| Total Slice Area: | 3477.65 ft2 |
| Surface Horizontal Width: | 216.382 ft |
| Surface Average Height: | 16.0718 ft |

## *Valid / Invalid Surfaces*

### Method: bishop simplified

Number of Valid Surfaces: 4697
Number of Invalid Surfaces: 154

**Error Codes:**

Error Code -102 reported for 11 surfaces
Error Code -103 reported for 84 surfaces
Error Code -106 reported for 37 surfaces
Error Code -1000 reported for 22 surfaces

### Method: janbu simplified

Number of Valid Surfaces: 4690
Number of Invalid Surfaces: 161

**Error Codes:**

Error Code -102 reported for 11 surfaces
Error Code -103 reported for 84 surfaces
Error Code -106 reported for 37 surfaces
Error Code -108 reported for 7 surfaces
Error Code -1000 reported for 22 surfaces

**Error Codes**

The following errors were encountered during the computation:

-102 = Two surface / slope intersections, but resulting arc is actually outside soil region.
-103 = Two surface / slope intersections, but one or more surface / nonslope external polygon intersections lie between them. This usually occurs when the slip surface extends past the bottom of the soil region, but may also occur on a benched slope model with two sets of Slope Limits.
-106 = Average slice width is less than 0.0001 * (maximum horizontal extent of soil region). This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).

-1000 = No valid slip surfaces are generated at a grid center. Unable to draw a surface.

## *Slice Data*

**Global Minimum Query (bishop simplified) - Safety Factor**: 1.00914

| Slice Number | Width [ft] | Weight [lbs] | Angle of Slice Base [degrees] | Base Material | Base Cohesion [psf] | Base Friction Angle [degrees] | Shear Stress [psf] | Shear Strength [psf] | Base Normal Stress [psf] | Pore Pressure [psf] | Effective Normal Stress [psf] | Base Vertical Stress [psf] | Effective Vertical Stress [psf] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.84078 | 497.05 | 14.2301 | Fill Seismic | 460 | 30 | 449.297 | 453.404 | -11.4254 | 0 | -11.4254 | 102.516 | 102.516 |
| 2 | 4.84078 | 1610.01 | 14.5205 | Fill Seismic | 460 | 30 | 562.628 | 567.77 | 186.663 | 0 | 186.663 | 332.383 | 332.383 |
| 3 | 4.84078 | 2766.99 | 14.8112 | Fill Seismic | 460 | 30 | 679.86 | 686.074 | 391.572 | 0 | 391.572 | 571.341 | 571.341 |
| 4 | 4.84078 | 3907.43 | 15.1024 | Fill Seismic | 460 | 30 | 794.76 | 802.024 | 592.403 | 0 | 592.403 | 806.881 | 806.881 |
| 5 | 4.84078 | 5031.24 | 15.3939 | Fill Seismic | 460 | 30 | 907.334 | 915.627 | 789.17 | 0 | 789.17 | 1038.99 | 1038.99 |
| 6 | 4.84078 | 6138.38 | 15.6858 | Fill Seismic | 460 | 30 | 1017.59 | 1026.89 | 981.884 | 0 | 981.884 | 1267.64 | 1267.64 |
| 7 | 4.84078 | 7228.75 | 15.9782 | Fill Seismic | 460 | 30 | 1125.54 | 1135.82 | 1170.56 | 0 | 1170.56 | 1492.84 | 1492.84 |
| 8 | 4.84078 | 8302.29 | 16.271 | Fill Seismic | 460 | 30 | 1231.18 | 1242.43 | 1355.21 | 0 | 1355.21 | 1714.56 | 1714.56 |
| 9 | 4.84078 | 9358.93 | 16.5642 | Fill Seismic | 460 | 30 | 1334.53 | 1346.72 | 1535.85 | 0 | 1535.85 | 1932.78 | 1932.78 |
| 10 | 4.84078 | 10398.6 | 16.8578 | Fill Seismic | 460 | 30 | 1435.58 | 1448.7 | 1712.49 | 0 | 1712.49 | 2147.5 | 2147.5 |
| 11 | 4.84078 | 11421.2 | 17.152 | Fill Seismic | 460 | 30 | 1534.36 | 1548.38 | 1885.13 | 0 | 1885.13 | 2358.69 | 2358.69 |
| 12 | 4.84078 | 12324.4 | 17.4466 | Fill Seismic | 460 | 30 | 1620.62 | 1635.43 | 2035.9 | 0 | 2035.9 | 2545.22 | 2545.22 |
| 13 | 4.84078 | 11214.9 | 17.7416 | Fill Seismic | 460 | 30 | 1505.35 | 1519.11 | 1834.43 | 0 | 1834.43 | 2316.06 | 2316.06 |
| 14 | 4.84078 | 9317.67 | 18.0372 | Fill Seismic | 460 | 30 | 1312.24 | 1324.24 | 1496.9 | 0 | 1496.9 | 1924.21 | 1924.21 |
| 15 | 4.84078 | 7440.05 | 18.3332 | Fill Seismic | 460 | 30 | 1122.12 | 1132.38 | 1164.59 | 0 | 1164.59 | 1536.42 | 1536.42 |
| 16 | 4.84078 | 7215.08 | 18.6298 | Fill Seismic | 460 | 30 | 1096.73 | 1106.76 | 1120.22 | 0 | 1120.22 | 1489.95 | 1489.95 |
| 17 | 4.84078 | 7874.89 | 18.9269 | Fill Seismic | 460 | 30 | 1158.87 | 1169.47 | 1228.83 | 0 | 1228.83 | 1626.21 | 1626.21 |
| 18 | 4.84078 | 8517.04 | 19.2245 | Fill Seismic | 460 | 30 | 1218.91 | 1230.05 | 1333.77 | 0 | 1333.77 | 1758.82 | 1758.82 |
| 19 | 4.84078 | 9141.43 | 19.5226 | Fill Seismic | 460 | 30 | 1276.85 | 1288.52 | 1435.05 | 0 | 1435.05 | 1887.77 | 1887.77 |
| 20 | 4.84078 | 9747.95 | 19.8213 | Fill Seismic | 460 | 30 | 1332.7 | 1344.88 | 1532.66 | 0 | 1532.66 | 2013.02 | 2013.02 |
| 21 | 4.84078 | 10336.5 | 20.1206 | Fill Seismic | 460 | 30 | 1386.46 | 1399.14 | 1626.63 | 0 | 1626.63 | 2134.57 | 2134.57 |
| 22 | 4.84078 | 10907 | 20.4204 | Fill Seismic | 460 | 30 | 1438.14 | 1451.29 | 1716.96 | 0 | 1716.96 | 2252.38 | 2252.38 |
| 23 | 4.84078 | 11459.3 | 20.7208 | Fill Seismic | 460 | 30 | 1487.74 | 1501.34 | 1803.65 | 0 | 1803.65 | 2366.44 | 2366.44 |
| 24 | 4.84078 | 11993.4 | 21.0218 | Fill Seismic | 460 | 30 | 1535.27 | 1549.3 | 1886.72 | 0 | 1886.72 | 2476.73 | 2476.73 |
| 25 | 4.84078 | 12509.1 | 21.3235 | Fill Seismic | 460 | 30 | 1580.72 | 1595.17 | 1966.16 | 0 | 1966.16 | 2583.21 | 2583.21 |
| 26 | 4.84078 | 12992.5 | 21.6257 | Fill Seismic | 460 | 30 | 1622.79 | 1637.62 | 2039.71 | 0 | 2039.71 | 2683.06 | 2683.06 |
| 27 | 4.84078 | 13076.5 | 21.9286 | Fill Seismic | 460 | 30 | 1626.22 | 1641.08 | 2045.69 | 0 | 2045.69 | 2700.37 | 2700.37 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 28 | 4.84078 | 12969 | 22.2321 | Fill Seismic | 460 | 30 | 1611.26 | 1625.99 | 2019.56 | 0 | 2019.56 | 2678.16 | 2678.16 |
| 29 | 4.84078 | 12842.6 | 22.5363 | Fill Seismic | 460 | 30 | 1594.57 | 1609.14 | 1990.37 | 0 | 1990.37 | 2652.04 | 2652.04 |
| 30 | 4.84078 | 12697.2 | 22.8411 | Fill Seismic | 460 | 30 | 1576.13 | 1590.54 | 1958.15 | 0 | 1958.15 | 2622.03 | 2622.03 |
| 31 | 4.84078 | 12532.8 | 23.1467 | Fill Seismic | 460 | 30 | 1555.95 | 1570.17 | 1922.87 | 0 | 1922.87 | 2588.04 | 2588.04 |
| 32 | 4.84078 | 12430.5 | 23.4529 | Fill Seismic | 460 | 30 | 1541.75 | 1555.84 | 1898.04 | 0 | 1898.04 | 2566.91 | 2566.91 |
| 33 | 4.84078 | 12597.1 | 23.7599 | Fill Seismic | 460 | 30 | 1552.97 | 1567.16 | 1917.65 | 0 | 1917.65 | 2601.29 | 2601.29 |
| 34 | 4.84078 | 12769.4 | 24.0675 | Fill Seismic | 460 | 30 | 1564.63 | 1578.93 | 1938.05 | 0 | 1938.05 | 2636.88 | 2636.88 |
| 35 | 4.84078 | 12922.1 | 24.376 | Fill Seismic | 460 | 30 | 1574.35 | 1588.74 | 1955.04 | 0 | 1955.04 | 2668.4 | 2668.4 |
| 36 | 4.84078 | 13055 | 24.6851 | Fill Seismic | 460 | 30 | 1582.13 | 1596.59 | 1968.64 | 0 | 1968.64 | 2695.84 | 2695.84 |
| 37 | 4.84078 | 13168 | 24.9951 | Fill Seismic | 460 | 30 | 1587.97 | 1602.48 | 1978.83 | 0 | 1978.83 | 2719.14 | 2719.14 |
| 38 | 4.84078 | 13260.8 | 25.3058 | Fill Seismic | 460 | 30 | 1591.86 | 1606.41 | 1985.65 | 0 | 1985.65 | 2738.32 | 2738.32 |
| 39 | 4.84078 | 13333.5 | 25.6173 | Fill Seismic | 460 | 30 | 1593.83 | 1608.4 | 1989.09 | 0 | 1989.09 | 2753.32 | 2753.32 |
| 40 | 4.84078 | 13385.7 | 25.9296 | Fill Seismic | 460 | 30 | 1593.85 | 1608.42 | 1989.14 | 0 | 1989.14 | 2764.09 | 2764.09 |
| 41 | 4.84078 | 13417.4 | 26.2428 | Fill Seismic | 460 | 30 | 1591.95 | 1606.5 | 1985.8 | 0 | 1985.8 | 2770.62 | 2770.62 |
| 42 | 4.84078 | 13353.6 | 26.5568 | Fill Seismic | 460 | 30 | 1581.25 | 1595.7 | 1967.08 | 0 | 1967.08 | 2757.42 | 2757.42 |
| 43 | 4.84078 | 12179.8 | 26.8717 | Fill Seismic | 460 | 30 | 1468.89 | 1482.32 | 1770.71 | 0 | 1770.71 | 2515.01 | 2515.01 |
| 44 | 4.84078 | 10625.6 | 27.1874 | Fill Seismic | 460 | 30 | 1322.46 | 1334.55 | 1514.76 | 0 | 1514.76 | 2194.04 | 2194.04 |
| 45 | 4.84078 | 9050.19 | 27.5041 | Fill Seismic | 460 | 30 | 1174.96 | 1185.7 | 1256.94 | 0 | 1256.94 | 1868.69 | 1868.69 |
| 46 | 4.84078 | 7453.35 | 27.8217 | Fill Seismic | 460 | 30 | 1026.39 | 1035.77 | 997.269 | 0 | 997.269 | 1538.92 | 1538.92 |
| 47 | 4.84078 | 5834.88 | 28.1401 | Fill Seismic | 460 | 30 | 876.768 | 884.782 | 735.744 | 0 | 735.744 | 1204.68 | 1204.68 |
| 48 | 4.84078 | 4194.6 | 28.4596 | Fill Seismic | 460 | 30 | 726.09 | 732.726 | 472.376 | 0 | 472.376 | 865.948 | 865.948 |
| 49 | 4.84078 | 2532.32 | 28.78 | Fill Seismic | 460 | 30 | 574.361 | 579.611 | 207.171 | 0 | 207.171 | 522.668 | 522.668 |
| 50 | 4.84078 | 847.826 | 29.1014 | Fill Seismic | 460 | 30 | 421.586 | 425.439 | -59.8606 | 0 | -59.8606 | 174.805 | 174.805 |

**Global Minimum Query (janbu simplified) - Safety Factor**: 0.995778

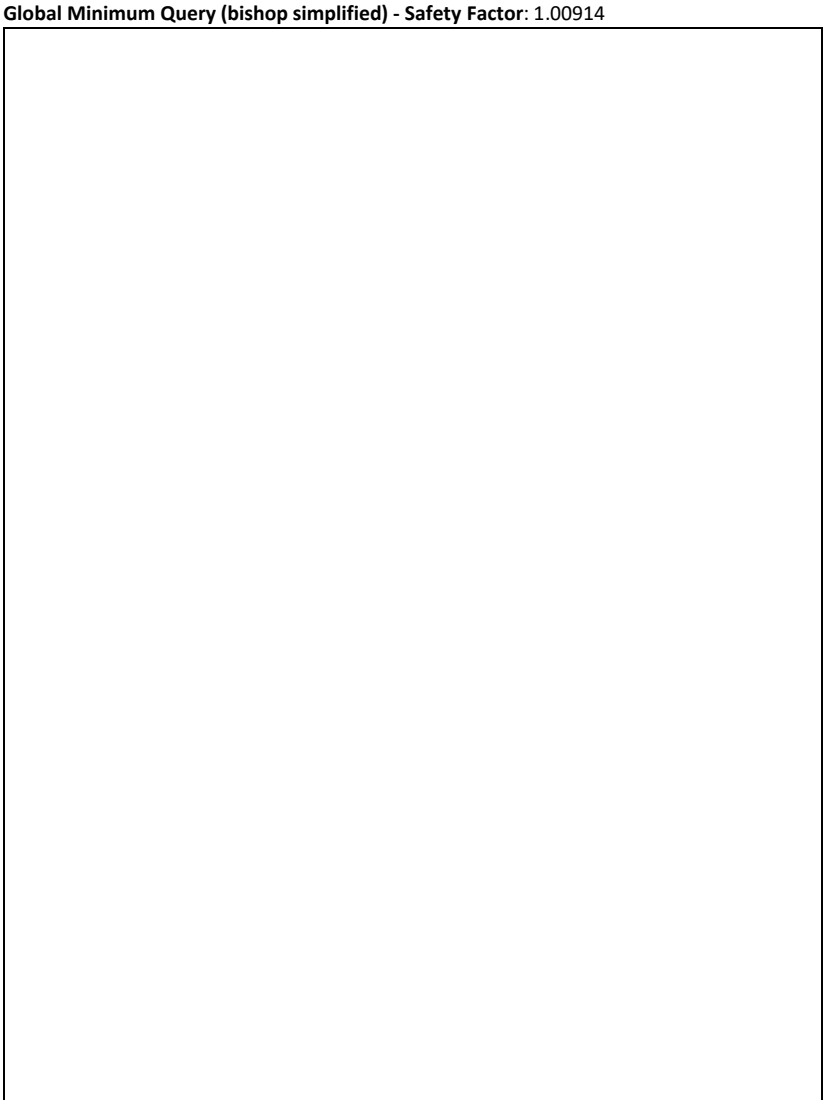
| Slice Number | Width [ft] | Weight [lbs] | Angle of Slice Base [degrees] | Base Material | Base Cohesion [psf] | Base Friction Angle [degrees] | Shear Stress [psf] | Shear Strength [psf] | Base Normal Stress [psf] | Pore Pressure [psf] | Effective Normal Stress [psf] | Base Vertical Stress [psf] | Effective Vertical Stress [psf] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.32764 | 605.367 | 8.20698 | Fill Seismic | 460 | 30 | 501.311 | 499.195 | 67.8869 | 0 | 67.8869 | 140.189 | 140.189 |
| 2 | 4.32764 | 1805.37 | 8.7012 | Fill Seismic | 460 | 30 | 646.685 | 643.955 | 318.618 | 0 | 318.618 | 417.589 | 417.589 |
| 3 | 4.32764 | 2983.86 | 9.19609 | Fill Seismic | 460 | 30 | 788.056 | 784.729 | 562.447 | 0 | 562.447 | 690.029 | 690.029 |
| 4 | 4.32764 | 4140.76 | 9.69166 | Fill Seismic | 460 | 30 | 925.459 | 921.552 | 799.431 | 0 | 799.431 | 957.484 | 957.484 |
| 5 | 4.32764 | 5275.97 | 10.188 | Fill Seismic | 460 | 30 | 1058.93 | 1054.46 | 1029.63 | 0 | 1029.63 | 1219.94 | 1219.94 |
| 6 | 4.32764 | 6389.39 | 10.6851 | Fill Seismic | 460 | 30 | 1188.5 | 1183.48 | 1253.11 | 0 | 1253.11 | 1477.36 | 1477.36 |
| 7 | 4.32764 | 7480.91 | 11.183 | Fill | 460 | 30 | 1314.21 | 1308.66 | 1469.92 | 0 | 1469.92 | 1729.73 | 1729.73 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Seismic | | | | | | | | | | |
| 8 | 4.32764 | 8550.43 | 11.6817 | Fill Seismic | 460 | 30 | 1436.07 | 1430.01 | 1680.11 | 0 | 1680.11 | 1977.03 | 1977.03 |
| 9 | 4.32764 | 9409.36 | 12.1814 | Fill Seismic | 460 | 30 | 1531.68 | 1525.21 | 1845.01 | 0 | 1845.01 | 2175.64 | 2175.64 |
| 10 | 4.32764 | 8547.29 | 12.682 | Fill Seismic | 460 | 30 | 1422.29 | 1416.29 | 1656.34 | 0 | 1656.34 | 1976.4 | 1976.4 |
| 11 | 4.32764 | 7257.78 | 13.1835 | Fill Seismic | 460 | 30 | 1263.45 | 1258.11 | 1382.37 | 0 | 1382.37 | 1678.33 | 1678.33 |
| 12 | 4.32764 | 5945.77 | 13.6862 | Fill Seismic | 460 | 30 | 1103.4 | 1098.75 | 1106.34 | 0 | 1106.34 | 1375.04 | 1375.04 |
| 13 | 4.32764 | 5531.37 | 14.1898 | Fill Seismic | 460 | 30 | 1049.77 | 1045.34 | 1013.84 | 0 | 1013.84 | 1279.27 | 1279.27 |
| 14 | 4.32764 | 6255.66 | 14.6947 | Fill Seismic | 460 | 30 | 1129.1 | 1124.34 | 1150.66 | 0 | 1150.66 | 1446.76 | 1446.76 |
| 15 | 4.32764 | 6960.82 | 15.2006 | Fill Seismic | 460 | 30 | 1205.43 | 1200.35 | 1282.32 | 0 | 1282.32 | 1609.84 | 1609.84 |
| 16 | 4.32764 | 7642.86 | 15.7078 | Fill Seismic | 460 | 30 | 1278.34 | 1272.94 | 1408.06 | 0 | 1408.06 | 1767.57 | 1767.57 |
| 17 | 4.32764 | 8301.61 | 16.2163 | Fill Seismic | 460 | 30 | 1347.84 | 1342.15 | 1527.93 | 0 | 1527.93 | 1919.93 | 1919.93 |
| 18 | 4.32764 | 8936.9 | 16.7261 | Fill Seismic | 460 | 30 | 1413.96 | 1407.99 | 1641.96 | 0 | 1641.96 | 2066.87 | 2066.87 |
| 19 | 4.32764 | 9548.53 | 17.2372 | Fill Seismic | 460 | 30 | 1476.69 | 1470.46 | 1750.18 | 0 | 1750.18 | 2208.34 | 2208.34 |
| 20 | 4.32764 | 10136.3 | 17.7498 | Fill Seismic | 460 | 30 | 1536.09 | 1529.6 | 1852.61 | 0 | 1852.61 | 2344.31 | 2344.31 |
| 21 | 4.32764 | 10700.1 | 18.2638 | Fill Seismic | 460 | 30 | 1592.14 | 1585.42 | 1949.28 | 0 | 1949.28 | 2474.72 | 2474.72 |
| 22 | 4.32764 | 11239.6 | 18.7794 | Fill Seismic | 460 | 30 | 1644.86 | 1637.92 | 2040.22 | 0 | 2040.22 | 2599.52 | 2599.52 |
| 23 | 4.32764 | 11754.6 | 19.2965 | Fill Seismic | 460 | 30 | 1694.28 | 1687.13 | 2125.45 | 0 | 2125.45 | 2718.66 | 2718.66 |
| 24 | 4.32764 | 12244.9 | 19.8153 | Fill Seismic | 460 | 30 | 1740.4 | 1733.05 | 2205 | 0 | 2205 | 2832.11 | 2832.11 |
| 25 | 4.32764 | 12601.5 | 20.3358 | Fill Seismic | 460 | 30 | 1771.23 | 1763.75 | 2258.16 | 0 | 2258.16 | 2914.62 | 2914.62 |
| 26 | 4.32764 | 12609.6 | 20.8581 | Fill Seismic | 460 | 30 | 1763.41 | 1755.96 | 2244.67 | 0 | 2244.67 | 2916.58 | 2916.58 |
| 27 | 4.32764 | 12570.9 | 21.3821 | Fill Seismic | 460 | 30 | 1750.45 | 1743.06 | 2222.32 | 0 | 2222.32 | 2907.68 | 2907.68 |
| 28 | 4.32764 | 12506.4 | 21.9081 | Fill Seismic | 460 | 30 | 1734.72 | 1727.4 | 2195.2 | 0 | 2195.2 | 2892.84 | 2892.84 |
| 29 | 4.32764 | 12415.9 | 22.436 | Fill Seismic | 460 | 30 | 1716.25 | 1709 | 2163.33 | 0 | 2163.33 | 2871.98 | 2871.98 |
| 30 | 4.32764 | 12299.1 | 22.9659 | Fill Seismic | 460 | 30 | 1695.03 | 1687.87 | 2126.73 | 0 | 2126.73 | 2845.03 | 2845.03 |
| 31 | 4.32764 | 12188.2 | 23.4979 | Fill Seismic | 460 | 30 | 1674.54 | 1667.47 | 2091.4 | 0 | 2091.4 | 2819.44 | 2819.44 |
| 32 | 4.32764 | 12286.4 | 24.032 | Fill Seismic | 460 | 30 | 1676.44 | 1669.36 | 2094.68 | 0 | 2094.68 | 2842.2 | 2842.2 |
| 33 | 4.32764 | 12404.4 | 24.5684 | Fill Seismic | 460 | 30 | 1680.31 | 1673.22 | 2101.37 | 0 | 2101.37 | 2869.55 | 2869.55 |
| 34 | 4.32764 | 12494.7 | 25.1071 | Fill Seismic | 460 | 30 | 1681.13 | 1674.03 | 2102.76 | 0 | 2102.76 | 2890.51 | 2890.51 |
| 35 | 4.32764 | 12557.1 | 25.6482 | Fill Seismic | 460 | 30 | 1678.89 | 1671.8 | 2098.9 | 0 | 2098.9 | 2905.03 | 2905.03 |
| 36 | 4.32764 | 12591.2 | 26.1917 | Fill Seismic | 460 | 30 | 1673.59 | 1666.52 | 2089.75 | 0 | 2089.75 | 2912.95 | 2912.95 |
| 37 | 4.32764 | 12596.5 | 26.7378 | Fill Seismic | 460 | 30 | 1665.23 | 1658.2 | 2075.35 | 0 | 2075.35 | 2914.26 | 2914.26 |
| 38 | 4.32764 | 12572.6 | 27.2865 | Fill Seismic | 460 | 30 | 1653.83 | 1646.85 | 2055.68 | 0 | 2055.68 | 2908.79 | 2908.79 |
| 39 | 4.32764 | 12519.1 | 27.838 | Fill Seismic | 460 | 30 | 1639.37 | 1632.45 | 2030.75 | 0 | 2030.75 | 2896.48 | 2896.48 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 40 | 4.32764 | 12435.6 | 28.3922 | Fill Seismic | 460 | 30 | 1621.88 | 1615.03 | 2000.57 | 0 | 2000.57 | 2877.23 | 2877.23 |
| 41 | 4.32764 | 12321.6 | 28.9494 | Fill Seismic | 460 | 30 | 1601.33 | 1594.57 | 1965.13 | 0 | 1965.13 | 2850.92 | 2850.92 |
| 42 | 4.32764 | 12176.5 | 29.5096 | Fill Seismic | 460 | 30 | 1577.74 | 1571.08 | 1924.44 | 0 | 1924.44 | 2817.43 | 2817.43 |
| 43 | 4.32764 | 11507 | 30.0729 | Fill Seismic | 460 | 30 | 1501.6 | 1495.26 | 1793.12 | 0 | 1793.12 | 2662.62 | 2662.62 |
| 44 | 4.32764 | 10087.1 | 30.6395 | Fill Seismic | 460 | 30 | 1351.27 | 1345.56 | 1533.84 | 0 | 1533.84 | 2334.24 | 2334.24 |
| 45 | 4.32764 | 8628.51 | 31.2093 | Fill Seismic | 460 | 30 | 1198.68 | 1193.62 | 1270.67 | 0 | 1270.67 | 1996.88 | 1996.88 |
| 46 | 4.32764 | 7136.7 | 31.7827 | Fill Seismic | 460 | 30 | 1044.46 | 1040.05 | 1004.68 | 0 | 1004.68 | 1651.83 | 1651.83 |
| 47 | 4.32764 | 5611.07 | 32.3596 | Fill Seismic | 460 | 30 | 888.618 | 884.866 | 735.89 | 0 | 735.89 | 1298.95 | 1298.95 |
| 48 | 4.32764 | 4050.97 | 32.9402 | Fill Seismic | 460 | 30 | 731.168 | 728.081 | 464.329 | 0 | 464.329 | 938.071 | 938.071 |
| 49 | 4.32764 | 2455.72 | 33.5246 | Fill Seismic | 460 | 30 | 572.123 | 569.707 | 190.018 | 0 | 190.018 | 569.052 | 569.052 |
| 50 | 4.32764 | 824.613 | 34.1131 | Fill Seismic | 460 | 30 | 411.497 | 409.76 | -87.0188 | 0 | -87.0188 | 191.723 | 191.723 |

## *Interslice Data*

**Global Minimum Query (bishop simplified) - Safety Factor**: 1.00914



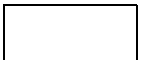
| Slice Number | X coordinate [ft] | Y coordinate - Bottom [ft] | Interslice Normal Force [lbs] | Interslice Shear Force [lbs] | Interslice Force Angle [degrees] |
|---|---|---|---|---|---|
| 1 | 304.203 | 868.81 | 0 | 0 | 0 |
| 2 | 309.044 | 870.037 | 2013.17 | 0 | 0 |
| 3 | 313.885 | 871.291 | 3927.01 | 0 | 0 |
| 4 | 318.726 | 872.571 | 5725.47 | 0 | 0 |
| 5 | 323.566 | 873.877 | 7397.7 | 0 | 0 |
| 6 | 328.407 | 875.21 | 8933.15 | 0 | 0 |
| 7 | 333.248 | 876.57 | 10321.6 | 0 | 0 |
| 8 | 338.089 | 877.956 | 11553.1 | 0 | 0 |
| 9 | 342.93 | 879.369 | 12617.9 | 0 | 0 |
| 10 | 347.77 | 880.808 | 13506.8 | 0 | 0 |
| 11 | 352.611 | 882.275 | 14210.7 | 0 | 0 |
| 12 | 357.452 | 883.769 | 14720.8 | 0 | 0 |
| 13 | 362.293 | 885.291 | 15043.1 | 0 | 0 |
| 14 | 367.133 | 886.839 | 15462.2 | 0 | 0 |
| 15 | 371.974 | 888.416 | 16109.7 | 0 | 0 |
| 16 | 376.815 | 890.02 | 17002.9 | 0 | 0 |
| 17 | 381.656 | 891.652 | 17894.1 | 0 | 0 |
| 18 | 386.497 | 893.311 | 18637.3 | 0 | 0 |
| 19 | 391.337 | 895 | 19228.7 | 0 | 0 |
| 20 | 396.178 | 896.716 | 19664.6 | 0 | 0 |
| 21 | 401.019 | 898.461 | 19941.7 | 0 | 0 |
| 22 | 405.86 | 900.234 | 20057 | 0 | 0 |
| 23 | 410.7 | 902.036 | 20007.9 | 0 | 0 |
| 24 | 415.541 | 903.868 | 19791.9 | 0 | 0 |
| 25 | 420.382 | 905.728 | 19407 | 0 | 0 |
| 26 | 425.223 | 907.618 | 18851.3 | 0 | 0 |
| 27 | 430.064 | 909.537 | 18126.4 | 0 | 0 |
| 28 | 434.904 | 911.485 | 17315.8 | 0 | 0 |
| 29 | 439.745 | 913.464 | 16462 | 0 | 0 |
| 30 | 444.586 | 915.473 | 15570.6 | 0 | 0 |
| 31 | 449.427 | 917.512 | 14647.7 | 0 | 0 |
| 32 | 454.268 | 919.581 | 13699.5 | 0 | 0 |
| 33 | 459.108 | 921.681 | 12712.4 | 0 | 0 |
| 34 | 463.949 | 923.812 | 11619.3 | 0 | 0 |
| 35 | 468.79 | 925.974 | 10417 | 0 | 0 |
| 36 | 473.631 | 928.168 | 9108.9 | 0 | 0 |
| 37 | 478.471 | 930.393 | 7698.68 | 0 | 0 |
| 38 | 483.312 | 932.65 | 6190.47 | 0 | 0 |
| 39 | 488.153 | 934.938 | 4588.73 | 0 | 0 |
| 40 | 492.994 | 937.26 | 2898.28 | 0 | 0 |
| 41 | 497.835 | 939.613 | 1124.32 | 0 | 0 |
| 42 | 502.675 | 942 | -727.581 | 0 | 0 |
| 43 | 507.516 | 944.419 | -2628.82 | 0 | 0 |
| 44 | 512.357 | 946.872 | -4236.02 | 0 | 0 |
| 45 | 517.198 | 949.358 | -5416.71 | 0 | 0 |
| 46 | 522.038 | 951.879 | -6146.87 | 0 | 0 |
| 47 | 526.879 | 954.433 | -6402 | 0 | 0 |
| 48 | 531.72 | 957.023 | -6157.12 | 0 | 0 |
| 49 | 536.561 | 959.646 | -5386.76 | 0 | 0 |
| 50 | 541.402 | 962.306 | -4064.91 | 0 | 0 |
| 51 | 546.242 | 965 | 0 | 0 | 0 |

**Global Minimum Query (janbu simplified) - Safety Factor**: 0.995778

| Slice Number | X coordinate [ft] | Y coordinate - Bottom [ft] | Interslice Normal Force [lbs] | Interslice Shear Force [lbs] | Interslice Force Angle [degrees] |
|---|---|---|---|---|---|
| 1 | 323.806 | 881.14 | 0 | 0 | 0 |
| 2 | 328.134 | 881.764 | 1900.03 | 0 | 0 |
| 3 | 332.461 | 882.426 | 3825.87 | 0 | 0 |
| 4 | 336.789 | 883.127 | 5753.64 | 0 | 0 |
| 5 | 341.117 | 883.866 | 7660.26 | 0 | 0 |
| 6 | 345.444 | 884.644 | 9523.46 | 0 | 0 |
| 7 | 349.772 | 885.46 | 11321.7 | 0 | 0 |
| 8 | 354.1 | 886.316 | 13034.4 | 0 | 0 |
| 9 | 358.427 | 887.211 | 14641.5 | 0 | 0 |
| 10 | 362.755 | 888.145 | 16131.1 | 0 | 0 |
| 11 | 367.083 | 889.119 | 17570.3 | 0 | 0 |
| 12 | 371.41 | 890.132 | 19000.8 | 0 | 0 |
| 13 | 375.738 | 891.186 | 20449.4 | 0 | 0 |
| 14 | 380.065 | 892.28 | 21872.5 | 0 | 0 |
| 15 | 384.393 | 893.415 | 23180.3 | 0 | 0 |
| 16 | 388.721 | 894.591 | 24361.3 | 0 | 0 |
| 17 | 393.048 | 895.808 | 25405 | 0 | 0 |
| 18 | 397.376 | 897.067 | 26301.6 | 0 | 0 |
| 19 | 401.704 | 898.367 | 27042.2 | 0 | 0 |
| 20 | 406.031 | 899.71 | 27618.4 | 0 | 0 |
| 21 | 410.359 | 901.095 | 28022.6 | 0 | 0 |
| 22 | 414.687 | 902.524 | 28247.7 | 0 | 0 |
| 23 | 419.014 | 903.995 | 28287.6 | 0 | 0 |
| 24 | 423.342 | 905.51 | 28136.7 | 0 | 0 |
| 25 | 427.669 | 907.07 | 27790.2 | 0 | 0 |
| 26 | 431.997 | 908.674 | 27264.6 | 0 | 0 |
| 27 | 436.325 | 910.323 | 26623 | 0 | 0 |
| 28 | 440.652 | 912.017 | 25875.3 | 0 | 0 |
| 29 | 444.98 | 913.757 | 25028 | 0 | 0 |
| 30 | 449.308 | 915.544 | 24088.5 | 0 | 0 |
| 31 | 453.635 | 917.378 | 23065 | 0 | 0 |
| 32 | 457.963 | 919.26 | 21958.5 | 0 | 0 |
| 33 | 462.291 | 921.189 | 20717.7 | 0 | 0 |
| 34 | 466.618 | 923.168 | 19335.8 | 0 | 0 |
| 35 | 470.946 | 925.196 | 17818.2 | 0 | 0 |
| 36 | 475.274 | 927.274 | 16171.1 | 0 | 0 |
| 37 | 479.601 | 929.402 | 14402 | 0 | 0 |
| 38 | 483.929 | 931.583 | 12518.8 | 0 | 0 |
| 39 | 488.256 | 933.815 | 10530.6 | 0 | 0 |
| 40 | 492.584 | 936.1 | 8447.32 | 0 | 0 |
| 41 | 496.912 | 938.439 | 6280.06 | 0 | 0 |
| 42 | 501.239 | 940.833 | 4040.77 | 0 | 0 |
| 43 | 505.567 | 943.283 | 1742.52 | 0 | 0 |
| 44 | 509.895 | 945.789 | -422.46 | 0 | 0 |
| 45 | 514.222 | 948.352 | -2162.53 | 0 | 0 |
| 46 | 518.55 | 950.974 | -3434.76 | 0 | 0 |
| 47 | 522.878 | 953.655 | -4196.99 | 0 | 0 |
| 48 | 527.205 | 956.397 | -4405.5 | 0 | 0 |
| 49 | 531.533 | 959.201 | -4014.95 | 0 | 0 |
| 50 | 535.86 | 962.069 | -2978.32 | 0 | 0 |
| 51 | 540.188 | 965 | 0 | 0 | 0 |

## *List Of Coordinates*

### External Boundary



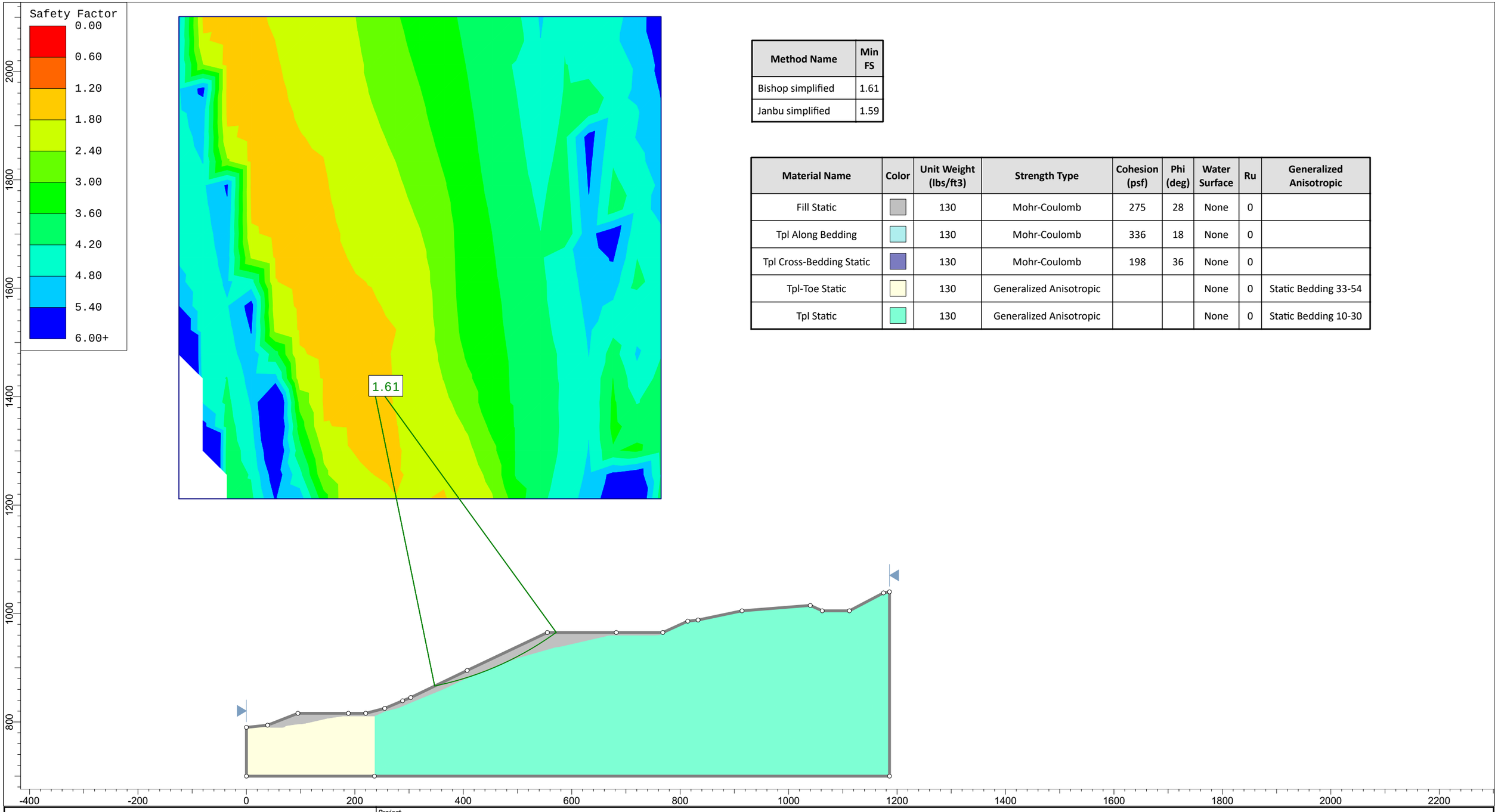
| X | Y |
|---|---|
| 0 | 700 |
| 283 | 700 |
| 1255 | 700 |
| 1255 | 995 |
| 1092 | 1000 |
| 967 | 1000 |
| 888 | 996 |
| 869 | 1005 |
| 865 | 1005 |
| 849 | 1000 |
| 814 | 988 |
| 750 | 986 |
| 706 | 965 |
| 633 | 965 |
| 506 | 965 |
| 456 | 940 |
| 429 | 930 |
| 376 | 900.5 |
| 361 | 905 |
| 308 | 871 |
| 295 | 863.5 |
| 282 | 863.5 |
| 271 | 865 |
| 253 | 856 |
| 227 | 843.1 |
| 170 | 816 |
| 75 | 813.9 |
| 44 | 810 |
| 0 | 800 |

## Material Boundary

| X | Y |
|---|---|
| 75 | 813.9 |
| 81 | 811 |
| 195 | 811 |
| 204 | 820 |
| 242 | 840 |
| 283 | 858.5 |
| 320 | 858.5 |
| 324.266 | 863.03 |
| 333 | 871 |
| 353 | 881 |
| 400 | 897 |
| 463 | 917 |
| 536 | 937 |
| 625 | 960 |
| 698 | 960 |
| 706 | 965 |

## Material Boundary

| X | Y |
|---|---|
| 283 | 700 |
| 283 | 858.5 |




| Method Name | Min FS |
|---|---|
| Bishop simplified | 1.61 |
| Janbu simplified | 1.59 |

| Material Name | Color | Unit Weight (lbs/ft3) | Strength Type | Cohesion (psf) | Phi (deg) | Water Surface | Ru | Generalized Anisotropic |
|---|---|---|---|---|---|---|---|---|
| Fill Static | | 130 | Mohr-Coulomb | 275 | 28 | None | 0 | |
| Tpl Along Bedding | | 130 | Mohr-Coulomb | 336 | 18 | None | 0 | |
| Tpl Cross-Bedding Static | | 130 | Mohr-Coulomb | 198 | 36 | None | 0 | |
| Tpl-Toe Static | | 130 | Generalized Anisotropic | | | None | 0 | Static Bedding 33-54 |
| Tpl Static | | 130 | Generalized Anisotropic | | | None | 0 | Static Bedding 10-30 |

Geotechnical
Environmental
Hydrogeology
Material Testing
Construction Inspection

SLIDEINTERPRET 7.038

| | | | |
|---|---|---|---|
| *Project* | HOFF Property, Yorba Linda | | |
| *Analysis Description* | Cross-section C-C' Static | | |
| *Drawn By* | *Scale* 1:2000 | *Company* | TGR Geotechnical, Inc. |
| *Date* 4/15/20 | | *File Name* | Cross-section C-C' Static.slim |

# Slide Analysis Information

# HOFF Property, Yorba Linda

## Project Summary

| | |
|---|---|
| File Name: | Cross-section C-C' Static |
| Slide Modeler Version: | 7.038 |
| Project Title: | HOFF Property, Yorba Linda |
| Analysis: | Cross-section C-C' Static |
| Company: | TGR Geotechnical, Inc. |
| Date Created: | 4/15/20 |

## General Settings

| | |
|---|---|
| Units of Measurement: | Imperial Units |
| Time Units: | days |
| Permeability Units: | feet/second |
| Failure Direction: | Right to Left |
| Data Output: | Standard |
| Maximum Material Properties: | 20 |
| Maximum Support Properties: | 20 |

## Analysis Options

| | |
|---|---|
| Slices Type: | Vertical |
| **Analysis Methods Used** | |
| | Bishop simplified |
| | Janbu simplified |
| Number of slices: | 50 |
| Tolerance: | 0.005 |
| Maximum number of iterations: | 75 |
| Check malpha < 0.2: | Yes |
| Create Interslice boundaries at intersections with water tables and piezos: | Yes |
| Initial trial value of FS: | 1 |
| Steffensen Iteration: | Yes |

## Groundwater Analysis

| | |
|---|---|
| Groundwater Method: | Water Surfaces |
| Pore Fluid Unit Weight [lbs/ft3]: | 62.4 |
| Use negative pore pressure cutoff: | Yes |
| Maximum negative pore pressure [psf]: | 0 |
| Advanced Groundwater Method: | None |

## Random Numbers

| | |
|---|---|
| Pseudo-random Seed: | 10116 |
| Random Number Generation Method: | Park and Miller v.3 |

## Surface Options

| | |
|---|---|
| Surface Type: | Circular |
| Search Method: | Grid Search |
| Radius Increment: | 10 |
| Composite Surfaces: | Disabled |
| Reverse Curvature: | Invalid Surfaces |
| Minimum Elevation: | Not Defined |
| Minimum Depth: | Not Defined |
| Minimum Area: | Not Defined |
| Minimum Weight: | Not Defined |

## Seismic

| | |
|---|---|
| Advanced seismic analysis: | No |
| Staged pseudostatic analysis: | No |

## Material Properties

| Property | Fill Static | Tpl-Toe Static | Tpl Static |
|---|---|---|---|
| Color | | | |
| Strength Type | Mohr-Coulomb | Generalized Anisotropic | Generalized Anisotropic |
| Unit Weight [lbs/ft3] | 130 | 130 | 130 |
| Cohesion [psf] | 275 | | |
| Friction Angle [deg] | 28 | | |
| Water Surface | None | None | None |
| Ru Value | 0 | 0 | 0 |

### Generalized Anisotropic Functions

Name: Static Bedding 33-54

| Angle From | Angle To | Material |
|---|---|---|
| 33 | -90 | Tpl Cross-Bedding Static |
| 54 | 33 | Tpl Along Bedding |
| 90 | 54 | Tpl Cross-Bedding Static |

Name: Static Bedding 10-30

| Angle From | Angle To | Material |
|---|---|---|
| -30 | -90 | Tpl Cross-Bedding Static |
| -10 | -30 | Tpl Along Bedding |
| 90 | -10 | Tpl Cross-Bedding Static |

## Global Minimums

### Method: bishop simplified

| FS | 1.612850 |
|---|---|
| Center: | 231.114, 1433.951 |
| Radius: | 579.453 |
| Left Slip Surface Endpoint: | 347.182, 866.242 |
| Right Slip Surface Endpoint: | 571.483, 965.000 |
| Resisting Moment: | 1.49473e+008 lb-ft |
| Driving Moment: | 9.26766e+007 lb-ft |
| Total Slice Area: | 2993.65 ft2 |
| Surface Horizontal Width: | 224.3 ft |
| Surface Average Height: | 13.3466 ft |

### Method: janbu simplified

| FS | 1.593630 |
|---|---|
| Center: | 231.114, 1433.951 |
| Radius: | 579.453 |
| Left Slip Surface Endpoint: | 347.182, 866.242 |
| Right Slip Surface Endpoint: | 571.483, 965.000 |
| Resisting Horizontal Force: | 233586 lb |
| Driving Horizontal Force: | 146575 lb |
| Total Slice Area: | 2993.65 ft2 |
| Surface Horizontal Width: | 224.3 ft |
| Surface Average Height: | 13.3466 ft |

## *Valid / Invalid Surfaces*

### Method: bishop simplified

Number of Valid Surfaces: 4640
Number of Invalid Surfaces: 211

**Error Codes:**

Error Code -103 reported for 89 surfaces
Error Code -106 reported for 43 surfaces
Error Code -108 reported for 2 surfaces
Error Code -1000 reported for 77 surfaces

### Method: janbu simplified

Number of Valid Surfaces: 4640
Number of Invalid Surfaces: 211

**Error Codes:**

Error Code -103 reported for 89 surfaces
Error Code -106 reported for 43 surfaces
Error Code -108 reported for 2 surfaces
Error Code -1000 reported for 77 surfaces

**Error Codes**

The following errors were encountered during the computation:

-103 = Two surface / slope intersections, but one or more surface / nonslope external polygon intersections lie between them. This usually occurs when the slip surface extends past the bottom of the soil region, but may also occur on a benched slope model with two sets of Slope Limits.
-106 = Average slice width is less than 0.0001 * (maximum horizontal extent of soil region). This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-1000 = No valid slip surfaces are generated at a grid center. Unable to draw a surface.

## *Slice Data*

**Global Minimum Query (bishop simplified) - Safety Factor**: 1.61285

| Slice Number | Width [ft] | Weight [lbs] | Angle of Slice Base [degrees] | Base Material | Base Cohesion [psf] | Base Friction Angle [degrees] | Shear Stress [psf] | Shear Strength [psf] | Base Normal Stress [psf] | Pore Pressure [psf] | Effective Normal Stress [psf] | Base Vertical Stress [psf] | Effective Vertical Stress [psf] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.48601 | 356.054 | 11.7814 | Fill Static | 275 | 28 | 184.027 | 296.807 | 41.0137 | 0 | 41.0137 | 79.3966 | 79.3966 |
| 2 | 4.48601 | 1057.34 | 12.2349 | Fill Static | 275 | 28 | 231.659 | 373.631 | 185.498 | 0 | 185.498 | 235.732 | 235.732 |
| 3 | 4.48601 | 1736.92 | 12.6892 | Fill Static | 275 | 28 | 277.561 | 447.664 | 324.734 | 0 | 324.734 | 387.23 | 387.23 |
| 4 | 4.48601 | 2394.7 | 13.1443 | Fill Static | 275 | 28 | 321.737 | 518.913 | 458.734 | 0 | 458.734 | 533.867 | 533.867 |
| 5 | 4.48601 | 3030.53 | 13.6003 | Fill Static | 275 | 28 | 364.189 | 587.382 | 587.506 | 0 | 587.506 | 675.615 | 675.615 |
| 6 | 4.48601 | 3644.31 | 14.0571 | Fill Static | 275 | 28 | 404.92 | 653.076 | 711.058 | 0 | 711.058 | 812.444 | 812.444 |
| 7 | 4.48601 | 4235.9 | 14.5148 | Fill Static | 275 | 28 | 443.933 | 715.998 | 829.395 | 0 | 829.395 | 944.326 | 944.326 |
| 8 | 4.48601 | 4805.16 | 14.9735 | Fill Static | 275 | 28 | 481.23 | 776.151 | 942.528 | 0 | 942.528 | 1071.23 | 1071.23 |
| 9 | 4.48601 | 5351.96 | 15.4332 | Fill Static | 275 | 28 | 516.811 | 833.539 | 1050.46 | 0 | 1050.46 | 1193.13 | 1193.13 |
| 10 | 4.48601 | 5876.15 | 15.8938 | Fill Static | 275 | 28 | 550.679 | 888.163 | 1153.19 | 0 | 1153.19 | 1309.99 | 1309.99 |
| 11 | 4.48601 | 6377.56 | 16.3556 | Fill Static | 275 | 28 | 582.835 | 940.025 | 1250.73 | 0 | 1250.73 | 1421.78 | 1421.78 |
| 12 | 4.48601 | 6856.05 | 16.8184 | Fill Static | 275 | 28 | 613.278 | 989.125 | 1343.07 | 0 | 1343.07 | 1528.45 | 1528.45 |
| 13 | 4.48601 | 7311.45 | 17.2824 | Fill Static | 275 | 28 | 642.009 | 1035.47 | 1430.23 | 0 | 1430.23 | 1629.97 | 1629.97 |
| 14 | 4.48601 | 7739.06 | 17.7475 | Fill Static | 275 | 28 | 668.729 | 1078.56 | 1511.27 | 0 | 1511.27 | 1725.3 | 1725.3 |
| 15 | 4.48601 | 8128.48 | 18.2139 | Fill Static | 275 | 28 | 692.76 | 1117.32 | 1584.17 | 0 | 1584.17 | 1812.12 | 1812.12 |
| 16 | 4.48601 | 8493.14 | 18.6815 | Fill Static | 275 | 28 | 715.009 | 1153.2 | 1651.66 | 0 | 1651.66 | 1893.42 | 1893.42 |
| 17 | 4.48601 | 8833.97 | 19.1504 | Fill Static | 275 | 28 | 735.553 | 1186.34 | 1713.97 | 0 | 1713.97 | 1969.41 | 1969.41 |
| 18 | 4.48601 | 9150.77 | 19.6206 | Fill Static | 275 | 28 | 754.387 | 1216.71 | 1771.1 | 0 | 1771.1 | 2040.04 | 2040.04 |
| 19 | 4.48601 | 9443.34 | 20.0923 | Fill Static | 275 | 28 | 771.511 | 1244.33 | 1823.05 | 0 | 1823.05 | 2105.26 | 2105.26 |
| 20 | 4.48601 | 9711.45 | 20.5653 | Fill Static | 275 | 28 | 786.923 | 1269.19 | 1869.8 | 0 | 1869.8 | 2165.04 | 2165.04 |
| 21 | 4.48601 | 9954.89 | 21.0398 | Fill Static | 275 | 28 | 800.62 | 1291.28 | 1911.34 | 0 | 1911.34 | 2219.31 | 2219.31 |
| 22 | 4.48601 | 10173.4 | 21.5158 | Fill Static | 275 | 28 | 812.599 | 1310.6 | 1947.68 | 0 | 1947.68 | 2268.03 | 2268.03 |
| 23 | 4.48601 | 10366.8 | 21.9934 | Fill Static | 275 | 28 | 822.86 | 1327.15 | 1978.8 | 0 | 1978.8 | 2311.14 | 2311.14 |
| 24 | 4.48601 | 10534.7 | 22.4726 | Fill Static | 275 | 28 | 831.392 | 1340.91 | 2004.68 | 0 | 2004.68 | 2348.59 | 2348.59 |
| 25 | 4.48601 | 10677 | 22.9535 | Fill Static | 275 | 28 | 838.199 | 1351.89 | 2025.33 | 0 | 2025.33 | 2380.32 | 2380.32 |
| 26 | 4.48601 | 10793.4 | 23.4361 | Fill Static | 275 | 28 | 843.271 | 1360.07 | 2040.71 | 0 | 2040.71 | 2406.26 | 2406.26 |
| 27 | 4.48601 | 10883.5 | 23.9204 | Fill Static | 275 | 28 | 846.607 | 1365.45 | 2050.83 | 0 | 2050.83 | 2426.36 | 2426.36 |
| 28 | 4.48601 | 10947.1 | 24.4066 | Fill Static | 275 | 28 | 848.194 | 1368.01 | 2055.67 | 0 | 2055.67 | 2440.54 | 2440.54 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 29 | 4.48601 | 10983.8 | 24.8947 | Fill Static | 275 | 28 | 848.039 | 1367.76 | 2055.19 | 0 | 2055.19 | 2448.74 | 2448.74 |
| 30 | 4.48601 | 10993.5 | 25.3847 | Fill Static | 275 | 28 | 846.136 | 1364.69 | 2049.39 | 0 | 2049.39 | 2450.89 | 2450.89 |
| 31 | 4.48601 | 10975.7 | 25.8767 | Fill Static | 275 | 28 | 842.465 | 1358.77 | 2038.28 | 0 | 2038.28 | 2446.94 | 2446.94 |
| 32 | 4.48601 | 10930 | 26.3707 | Fill Static | 275 | 28 | 837.028 | 1350 | 2021.79 | 0 | 2021.79 | 2436.76 | 2436.76 |
| 33 | 4.48601 | 10856.2 | 26.8669 | Fill Static | 275 | 28 | 829.823 | 1338.38 | 1999.91 | 0 | 1999.91 | 2420.3 | 2420.3 |
| 34 | 4.48601 | 10753.9 | 27.3652 | Fill Static | 275 | 28 | 820.833 | 1323.88 | 1972.65 | 0 | 1972.65 | 2397.5 | 2397.5 |
| 35 | 4.48601 | 10622.6 | 27.8659 | Fill Static | 275 | 28 | 810.051 | 1306.49 | 1939.96 | 0 | 1939.96 | 2368.24 | 2368.24 |
| 36 | 4.48601 | 10462 | 28.3688 | Fill Static | 275 | 28 | 797.477 | 1286.21 | 1901.81 | 0 | 1901.81 | 2332.45 | 2332.45 |
| 37 | 4.48601 | 10271.7 | 28.8741 | Fill Static | 275 | 28 | 783.097 | 1263.02 | 1858.19 | 0 | 1858.19 | 2290.02 | 2290.02 |
| 38 | 4.48601 | 10051.2 | 29.3819 | Fill Static | 275 | 28 | 766.902 | 1236.9 | 1809.07 | 0 | 1809.07 | 2240.88 | 2240.88 |
| 39 | 4.48601 | 9800.14 | 29.8923 | Fill Static | 275 | 28 | 748.884 | 1207.84 | 1754.41 | 0 | 1754.41 | 2184.9 | 2184.9 |
| 40 | 4.48601 | 9517.97 | 30.4052 | Fill Static | 275 | 28 | 729.031 | 1175.82 | 1694.19 | 0 | 1694.19 | 2122 | 2122 |
| 41 | 4.48601 | 9204.21 | 30.9209 | Fill Static | 275 | 28 | 707.334 | 1140.82 | 1628.38 | 0 | 1628.38 | 2052.06 | 2052.06 |
| 42 | 4.48601 | 8858.38 | 31.4394 | Fill Static | 275 | 28 | 683.781 | 1102.84 | 1556.93 | 0 | 1556.93 | 1974.96 | 1974.96 |
| 43 | 4.48601 | 8479.93 | 31.9608 | Fill Static | 275 | 28 | 658.362 | 1061.84 | 1479.83 | 0 | 1479.83 | 1890.59 | 1890.59 |
| 44 | 4.48601 | 8068.31 | 32.4851 | Fill Static | 275 | 28 | 631.065 | 1017.81 | 1397.03 | 0 | 1397.03 | 1798.83 | 1798.83 |
| 45 | 4.48601 | 7622.94 | 33.0125 | Fill Static | 275 | 28 | 601.877 | 970.737 | 1308.49 | 0 | 1308.49 | 1699.54 | 1699.54 |
| 46 | 4.48601 | 7143.21 | 33.5431 | Fill Static | 275 | 28 | 570.786 | 920.592 | 1214.18 | 0 | 1214.18 | 1592.59 | 1592.59 |
| 47 | 4.48601 | 6347.22 | 34.077 | Fill Static | 275 | 28 | 520.875 | 840.093 | 1062.79 | 0 | 1062.79 | 1415.14 | 1415.14 |
| 48 | 4.48601 | 4625.13 | 34.6142 | Fill Static | 275 | 28 | 415.843 | 670.693 | 744.189 | 0 | 744.189 | 1031.21 | 1031.21 |
| 49 | 4.48601 | 2801.06 | 35.155 | Fill Static | 275 | 28 | 305.479 | 492.691 | 409.418 | 0 | 409.418 | 624.55 | 624.55 |
| 50 | 4.48601 | 939.927 | 35.6994 | Fill Static | 275 | 28 | 193.721 | 312.444 | 70.4213 | 0 | 70.4213 | 209.621 | 209.621 |

**Global Minimum Query (janbu simplified) - Safety Factor**: 1.59363

| Slice Number | Width [ft] | Weight [lbs] | Angle of Slice Base [degrees] | Base Material | Base Cohesion [psf] | Base Friction Angle [degrees] | Shear Stress [psf] | Shear Strength [psf] | Base Normal Stress [psf] | Pore Pressure [psf] | Effective Normal Stress [psf] | Base Vertical Stress [psf] | Effective Vertical Stress [psf] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.48601 | 356.054 | 11.7814 | Fill Static | 275 | 28 | 186.107 | 296.586 | 40.5975 | 0 | 40.5975 | 79.4144 | 79.4144 |
| 2 | 4.48601 | 1057.34 | 12.2349 | Fill Static | 275 | 28 | 234.272 | 373.342 | 184.955 | 0 | 184.955 | 235.756 | 235.756 |
| 3 | 4.48601 | 1736.92 | 12.6892 | Fill Static | 275 | 28 | 280.684 | 447.306 | 324.06 | 0 | 324.06 | 387.259 | 387.259 |
| 4 | 4.48601 | 2394.7 | 13.1443 | Fill Static | 275 | 28 | 325.347 | 518.483 | 457.926 | 0 | 457.926 | 533.902 | 533.902 |
| 5 | 4.48601 | 3030.53 | 13.6003 | Fill Static | 275 | 28 | 368.266 | 586.879 | 586.559 | 0 | 586.559 | 675.654 | 675.654 |
| 6 | 4.48601 | 3644.31 | 14.0571 | Fill Static | 275 | 28 | 409.442 | 652.499 | 709.972 | 0 | 709.972 | 812.491 | 812.491 |
| 7 | 4.48601 | 4235.9 | 14.5148 | Fill Static | 275 | 28 | 448.878 | 715.345 | 828.169 | 0 | 828.169 | 944.381 | 944.381 |
| 8 | 4.48601 | 4805.16 | 14.9735 | Fill | 275 | 28 | 486.576 | 775.422 | 941.159 | 0 | 941.159 | 1071.29 | 1071.29 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Static | | | | | | | | | | |
| 9 | 4.48601 | 5351.96 | 15.4332 | Fill Static | 275 | 28 | 522.538 | 832.733 | 1048.94 | 0 | 1048.94 | 1193.2 | 1193.2 |
| 10 | 4.48601 | 5876.15 | 15.8938 | Fill Static | 275 | 28 | 556.767 | 887.28 | 1151.53 | 0 | 1151.53 | 1310.07 | 1310.07 |
| 11 | 4.48601 | 6377.56 | 16.3556 | Fill Static | 275 | 28 | 589.261 | 939.064 | 1248.92 | 0 | 1248.92 | 1421.85 | 1421.85 |
| 12 | 4.48601 | 6856.05 | 16.8184 | Fill Static | 275 | 28 | 620.023 | 988.087 | 1341.12 | 0 | 1341.12 | 1528.53 | 1528.53 |
| 13 | 4.48601 | 7311.45 | 17.2824 | Fill Static | 275 | 28 | 649.052 | 1034.35 | 1428.13 | 0 | 1428.13 | 1630.07 | 1630.07 |
| 14 | 4.48601 | 7739.06 | 17.7475 | Fill Static | 275 | 28 | 676.045 | 1077.37 | 1509.03 | 0 | 1509.03 | 1725.4 | 1725.4 |
| 15 | 4.48601 | 8128.48 | 18.2139 | Fill Static | 275 | 28 | 700.32 | 1116.05 | 1581.79 | 0 | 1581.79 | 1812.23 | 1812.23 |
| 16 | 4.48601 | 8493.14 | 18.6815 | Fill Static | 275 | 28 | 722.793 | 1151.86 | 1649.14 | 0 | 1649.14 | 1893.53 | 1893.53 |
| 17 | 4.48601 | 8833.97 | 19.1504 | Fill Static | 275 | 28 | 743.538 | 1184.92 | 1711.32 | 0 | 1711.32 | 1969.52 | 1969.52 |
| 18 | 4.48601 | 9150.77 | 19.6206 | Fill Static | 275 | 28 | 762.555 | 1215.23 | 1768.32 | 0 | 1768.32 | 2040.16 | 2040.16 |
| 19 | 4.48601 | 9443.34 | 20.0923 | Fill Static | 275 | 28 | 779.843 | 1242.78 | 1820.13 | 0 | 1820.13 | 2105.39 | 2105.39 |
| 20 | 4.48601 | 9711.45 | 20.5653 | Fill Static | 275 | 28 | 795.398 | 1267.57 | 1866.75 | 0 | 1866.75 | 2165.17 | 2165.17 |
| 21 | 4.48601 | 9954.89 | 21.0398 | Fill Static | 275 | 28 | 809.222 | 1289.6 | 1908.18 | 0 | 1908.18 | 2219.46 | 2219.46 |
| 22 | 4.48601 | 10173.4 | 21.5158 | Fill Static | 275 | 28 | 821.301 | 1308.85 | 1944.4 | 0 | 1944.4 | 2268.18 | 2268.18 |
| 23 | 4.48601 | 10366.8 | 21.9934 | Fill Static | 275 | 28 | 831.649 | 1325.34 | 1975.4 | 0 | 1975.4 | 2311.3 | 2311.3 |
| 24 | 4.48601 | 10534.7 | 22.4726 | Fill Static | 275 | 28 | 840.252 | 1339.05 | 2001.18 | 0 | 2001.18 | 2348.75 | 2348.75 |
| 25 | 4.48601 | 10677 | 22.9535 | Fill Static | 275 | 28 | 847.104 | 1349.97 | 2021.72 | 0 | 2021.72 | 2380.48 | 2380.48 |
| 26 | 4.48601 | 10793.4 | 23.4361 | Fill Static | 275 | 28 | 852.205 | 1358.1 | 2037.01 | 0 | 2037.01 | 2406.43 | 2406.43 |
| 27 | 4.48601 | 10883.5 | 23.9204 | Fill Static | 275 | 28 | 855.55 | 1363.43 | 2047.04 | 0 | 2047.04 | 2426.54 | 2426.54 |
| 28 | 4.48601 | 10947.1 | 24.4066 | Fill Static | 275 | 28 | 857.131 | 1365.95 | 2051.79 | 0 | 2051.79 | 2440.72 | 2440.72 |
| 29 | 4.48601 | 10983.8 | 24.8947 | Fill Static | 275 | 28 | 856.949 | 1365.66 | 2051.25 | 0 | 2051.25 | 2448.93 | 2448.93 |
| 30 | 4.48601 | 10993.5 | 25.3847 | Fill Static | 275 | 28 | 854.998 | 1362.55 | 2045.39 | 0 | 2045.39 | 2451.09 | 2451.09 |
| 31 | 4.48601 | 10975.7 | 25.8767 | Fill Static | 275 | 28 | 851.264 | 1356.6 | 2034.19 | 0 | 2034.19 | 2447.11 | 2447.11 |
| 32 | 4.48601 | 10930 | 26.3707 | Fill Static | 275 | 28 | 845.748 | 1347.81 | 2017.66 | 0 | 2017.66 | 2436.95 | 2436.95 |
| 33 | 4.48601 | 10856.2 | 26.8669 | Fill Static | 275 | 28 | 838.438 | 1336.16 | 1995.75 | 0 | 1995.75 | 2420.51 | 2420.51 |
| 34 | 4.48601 | 10753.9 | 27.3652 | Fill Static | 275 | 28 | 829.327 | 1321.64 | 1968.45 | 0 | 1968.45 | 2397.69 | 2397.69 |
| 35 | 4.48601 | 10622.6 | 27.8659 | Fill Static | 275 | 28 | 818.415 | 1304.25 | 1935.73 | 0 | 1935.73 | 2368.44 | 2368.44 |
| 36 | 4.48601 | 10462 | 28.3688 | Fill Static | 275 | 28 | 805.683 | 1283.96 | 1897.58 | 0 | 1897.58 | 2332.64 | 2332.64 |
| 37 | 4.48601 | 10271.7 | 28.8741 | Fill Static | 275 | 28 | 791.13 | 1260.77 | 1853.96 | 0 | 1853.96 | 2290.22 | 2290.22 |
| 38 | 4.48601 | 10051.2 | 29.3819 | Fill Static | 275 | 28 | 774.745 | 1234.66 | 1804.85 | 0 | 1804.85 | 2241.08 | 2241.08 |
| 39 | 4.48601 | 9800.14 | 29.8923 | Fill Static | 275 | 28 | 756.518 | 1205.61 | 1750.22 | 0 | 1750.22 | 2185.1 | 2185.1 |
| 40 | 4.48601 | 9517.97 | 30.4052 | Fill Static | 275 | 28 | 736.438 | 1173.61 | 1690.04 | 0 | 1690.04 | 2122.2 | 2122.2 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 41 | 4.48601 | 9204.21 | 30.9209 | Fill Static | 275 | 28 | 714.498 | 1138.65 | 1624.28 | 0 | 1624.28 | 2052.25 | 2052.25 |
| 42 | 4.48601 | 8858.38 | 31.4394 | Fill Static | 275 | 28 | 690.684 | 1100.7 | 1552.91 | 0 | 1552.91 | 1975.15 | 1975.15 |
| 43 | 4.48601 | 8479.93 | 31.9608 | Fill Static | 275 | 28 | 664.986 | 1059.74 | 1475.89 | 0 | 1475.89 | 1890.78 | 1890.78 |
| 44 | 4.48601 | 8068.31 | 32.4851 | Fill Static | 275 | 28 | 637.393 | 1015.77 | 1393.18 | 0 | 1393.18 | 1799.02 | 1799.02 |
| 45 | 4.48601 | 7622.94 | 33.0125 | Fill Static | 275 | 28 | 607.892 | 968.755 | 1304.76 | 0 | 1304.76 | 1699.72 | 1699.72 |
| 46 | 4.48601 | 7143.21 | 33.5431 | Fill Static | 275 | 28 | 576.471 | 918.681 | 1210.59 | 0 | 1210.59 | 1592.77 | 1592.77 |
| 47 | 4.48601 | 6347.22 | 34.077 | Fill Static | 275 | 28 | 526.044 | 838.32 | 1059.45 | 0 | 1059.45 | 1415.3 | 1415.3 |
| 48 | 4.48601 | 4625.13 | 34.6142 | Fill Static | 275 | 28 | 419.956 | 669.254 | 741.483 | 0 | 741.483 | 1031.35 | 1031.35 |
| 49 | 4.48601 | 2801.06 | 35.155 | Fill Static | 275 | 28 | 308.489 | 491.617 | 407.397 | 0 | 407.397 | 624.649 | 624.649 |
| 50 | 4.48601 | 939.927 | 35.6994 | Fill Static | 275 | 28 | 195.623 | 311.751 | 69.119 | 0 | 69.119 | 209.685 | 209.685 |

## *Interslice Data*

**Global Minimum Query (bishop simplified) - Safety Factor**: 1.61285

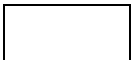
| Slice Number | X coordinate [ft] | Y coordinate - Bottom [ft] | Interslice Normal Force [lbs] | Interslice Shear Force [lbs] | Interslice Force Angle [degrees] |
|---|---|---|---|---|---|
| 1 | 347.182 | 866.242 | 0 | 0 | 0 |
| 2 | 351.668 | 867.177 | 786.595 | 0 | 0 |
| 3 | 356.154 | 868.15 | 1644.65 | 0 | 0 |
| 4 | 360.64 | 869.16 | 2560.91 | 0 | 0 |
| 5 | 365.126 | 870.208 | 3522.66 | 0 | 0 |
| 6 | 369.612 | 871.293 | 4517.65 | 0 | 0 |
| 7 | 374.099 | 872.416 | 5534.18 | 0 | 0 |
| 8 | 378.585 | 873.578 | 6561.02 | 0 | 0 |
| 9 | 383.071 | 874.777 | 7587.47 | 0 | 0 |
| 10 | 387.557 | 876.016 | 8603.34 | 0 | 0 |
| 11 | 392.043 | 877.293 | 9598.94 | 0 | 0 |
| 12 | 396.529 | 878.61 | 10565.1 | 0 | 0 |
| 13 | 401.015 | 879.966 | 11493.2 | 0 | 0 |
| 14 | 405.501 | 881.361 | 12375 | 0 | 0 |
| 15 | 409.987 | 882.797 | 13203 | 0 | 0 |
| 16 | 414.473 | 884.273 | 13970.1 | 0 | 0 |
| 17 | 418.959 | 885.79 | 14670.2 | 0 | 0 |
| 18 | 423.445 | 887.348 | 15297.5 | 0 | 0 |
| 19 | 427.931 | 888.947 | 15846.9 | 0 | 0 |
| 20 | 432.417 | 890.588 | 16314 | 0 | 0 |
| 21 | 436.903 | 892.271 | 16694.6 | 0 | 0 |
| 22 | 441.389 | 893.997 | 16985.5 | 0 | 0 |
| 23 | 445.875 | 895.765 | 17183.8 | 0 | 0 |
| 24 | 450.361 | 897.577 | 17287.2 | 0 | 0 |
| 25 | 454.847 | 899.433 | 17294.3 | 0 | 0 |
| 26 | 459.333 | 901.333 | 17203.9 | 0 | 0 |
| 27 | 463.819 | 903.277 | 17015.7 | 0 | 0 |
| 28 | 468.305 | 905.267 | 16730.1 | 0 | 0 |
| 29 | 472.791 | 907.303 | 16348.1 | 0 | 0 |
| 30 | 477.277 | 909.385 | 15871.2 | 0 | 0 |
| 31 | 481.763 | 911.513 | 15301.8 | 0 | 0 |
| 32 | 486.249 | 913.689 | 14643.2 | 0 | 0 |
| 33 | 490.735 | 915.913 | 13899 | 0 | 0 |
| 34 | 495.221 | 918.186 | 13073.9 | 0 | 0 |
| 35 | 499.707 | 920.508 | 12173.4 | 0 | 0 |
| 36 | 504.193 | 922.88 | 11203.5 | 0 | 0 |
| 37 | 508.679 | 925.302 | 10171.5 | 0 | 0 |
| 38 | 513.165 | 927.776 | 9085.35 | 0 | 0 |
| 39 | 517.651 | 930.302 | 7953.81 | 0 | 0 |
| 40 | 522.137 | 932.88 | 6786.75 | 0 | 0 |
| 41 | 526.623 | 935.513 | 5594.99 | 0 | 0 |
| 42 | 531.109 | 938.2 | 4390.37 | 0 | 0 |
| 43 | 535.595 | 940.942 | 3185.77 | 0 | 0 |
| 44 | 540.081 | 943.741 | 1995.24 | 0 | 0 |
| 45 | 544.567 | 946.598 | 833.949 | 0 | 0 |
| 46 | 549.053 | 949.512 | -281.693 | 0 | 0 |
| 47 | 553.539 | 952.486 | -1334 | 0 | 0 |
| 48 | 558.025 | 955.521 | -2224.14 | 0 | 0 |
| 49 | 562.511 | 958.617 | -2664.23 | 0 | 0 |
| 50 | 566.997 | 961.777 | -2588.26 | 0 | 0 |
| 51 | 571.483 | 965 | 0 | 0 | 0 |

**Global Minimum Query (janbu simplified) - Safety Factor**: 1.59363

| Slice Number | X coordinate [ft] | Y coordinate - Bottom [ft] | Interslice Normal Force [lbs] | Interslice Shear Force [lbs] | Interslice Force Angle [degrees] |
|---|---|---|---|---|---|
| 1 | 347.182 | 866.242 | 0 | 0 | 0 |
| 2 | 351.668 | 867.177 | 795.936 | 0 | 0 |
| 3 | 356.154 | 868.15 | 1665.76 | 0 | 0 |
| 4 | 360.64 | 869.16 | 2596.13 | 0 | 0 |
| 5 | 365.126 | 870.208 | 3574.26 | 0 | 0 |
| 6 | 369.612 | 871.293 | 4587.81 | 0 | 0 |
| 7 | 374.099 | 872.416 | 5625 | 0 | 0 |
| 8 | 378.585 | 873.578 | 6674.53 | 0 | 0 |
| 9 | 383.071 | 874.777 | 7725.61 | 0 | 0 |
| 10 | 387.557 | 876.016 | 8767.97 | 0 | 0 |
| 11 | 392.043 | 877.293 | 9791.86 | 0 | 0 |
| 12 | 396.529 | 878.61 | 10788 | 0 | 0 |
| 13 | 401.015 | 879.966 | 11747.7 | 0 | 0 |
| 14 | 405.501 | 881.361 | 12662.8 | 0 | 0 |
| 15 | 409.987 | 882.797 | 13525.4 | 0 | 0 |
| 16 | 414.473 | 884.273 | 14328.5 | 0 | 0 |
| 17 | 418.959 | 885.79 | 15065.8 | 0 | 0 |
| 18 | 423.445 | 887.348 | 15731.6 | 0 | 0 |
| 19 | 427.931 | 888.947 | 16320.5 | 0 | 0 |
| 20 | 432.417 | 890.588 | 16828.1 | 0 | 0 |
| 21 | 436.903 | 892.271 | 17250.3 | 0 | 0 |
| 22 | 441.389 | 893.997 | 17583.6 | 0 | 0 |
| 23 | 445.875 | 895.765 | 17825 | 0 | 0 |
| 24 | 450.361 | 897.577 | 17972.4 | 0 | 0 |
| 25 | 454.847 | 899.433 | 18023.9 | 0 | 0 |
| 26 | 459.333 | 901.333 | 17978.6 | 0 | 0 |
| 27 | 463.819 | 903.277 | 17836 | 0 | 0 |
| 28 | 468.305 | 905.267 | 17596.3 | 0 | 0 |
| 29 | 472.791 | 907.303 | 17260.5 | 0 | 0 |
| 30 | 477.277 | 909.385 | 16830 | 0 | 0 |
| 31 | 481.763 | 911.513 | 16307.3 | 0 | 0 |
| 32 | 486.249 | 913.689 | 15695.2 | 0 | 0 |
| 33 | 490.735 | 915.913 | 14997.6 | 0 | 0 |
| 34 | 495.221 | 918.186 | 14218.9 | 0 | 0 |
| 35 | 499.707 | 920.508 | 13364.5 | 0 | 0 |
| 36 | 504.193 | 922.88 | 12440.5 | 0 | 0 |
| 37 | 508.679 | 925.302 | 11454 | 0 | 0 |
| 38 | 513.165 | 927.776 | 10412.7 | 0 | 0 |
| 39 | 517.651 | 930.302 | 9325.35 | 0 | 0 |
| 40 | 522.137 | 932.88 | 8201.8 | 0 | 0 |
| 41 | 526.623 | 935.513 | 7052.69 | 0 | 0 |
| 42 | 531.109 | 938.2 | 5889.74 | 0 | 0 |
| 43 | 535.595 | 940.942 | 4725.75 | 0 | 0 |
| 44 | 540.081 | 943.741 | 3574.61 | 0 | 0 |
| 45 | 544.567 | 946.598 | 2451.38 | 0 | 0 |
| 46 | 549.053 | 949.512 | 1372.34 | 0 | 0 |
| 47 | 553.539 | 952.486 | 355.044 | 0 | 0 |
| 48 | 558.025 | 955.521 | -502.862 | 0 | 0 |
| 49 | 562.511 | 958.617 | -916.979 | 0 | 0 |
| 50 | 566.997 | 961.777 | -821.754 | 0 | 0 |
| 51 | 571.483 | 965 | 0 | 0 | 0 |

## *List Of Coordinates*

### External Boundary



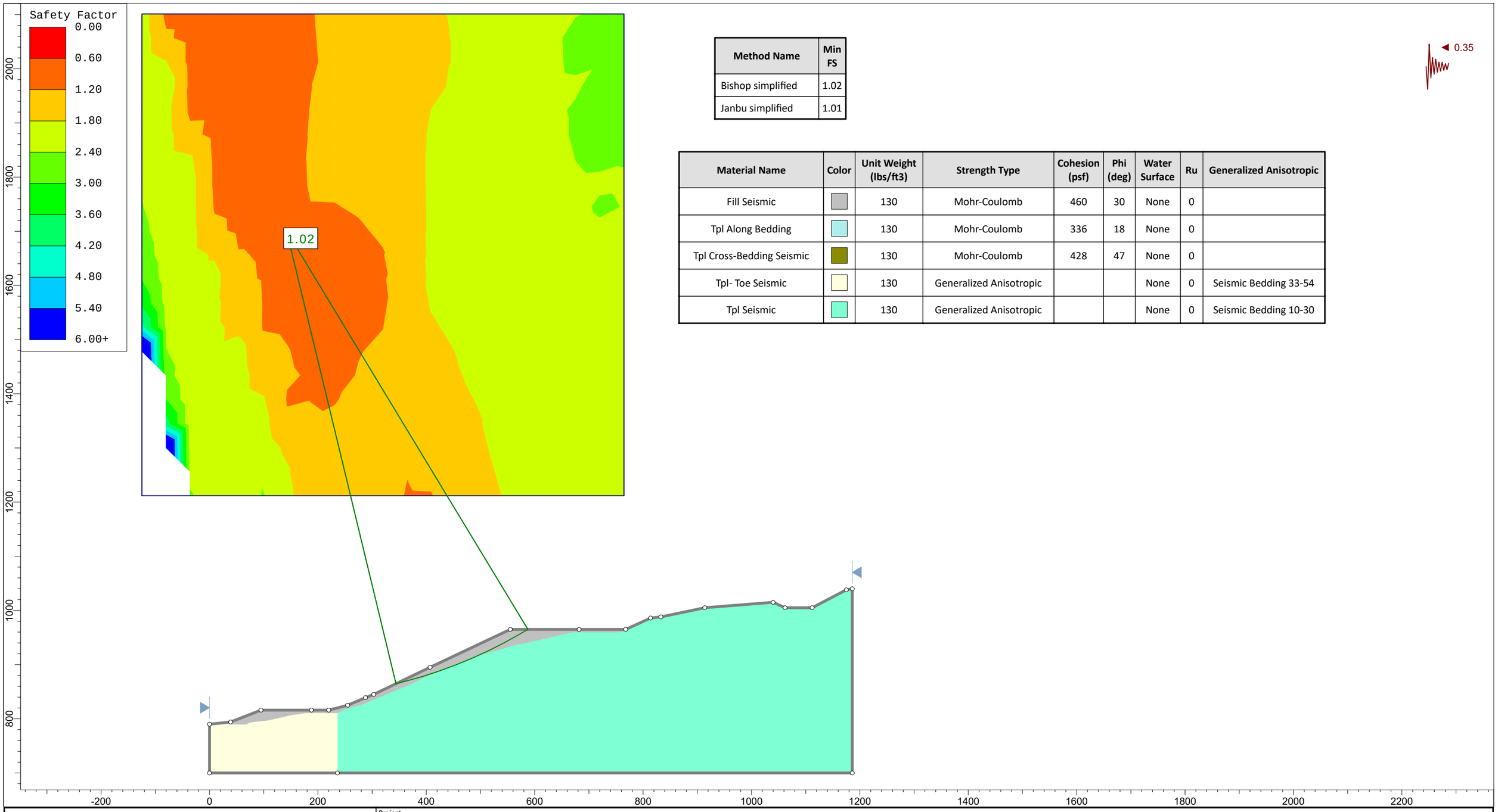
| X | Y |
|---|---|
| 0 | 700 |
| 236 | 700 |
| 1186 | 700 |
| 1186 | 1040 |
| 1175 | 1038 |
| 1112 | 1005 |
| 1062 | 1005 |
| 1040 | 1015 |
| 914 | 1005 |
| 833 | 988 |
| 814 | 986 |
| 768 | 965 |
| 682 | 965 |
| 555 | 965 |
| 407 | 895 |
| 303 | 845 |
| 288 | 839 |
| 255 | 825 |
| 220 | 816 |
| 188 | 816 |
| 95 | 816 |
| 39 | 794 |
| 0 | 790 |

## Material Boundary

| X | Y |
|---|---|
| 39 | 794 |
| 44 | 789 |
| 67 | 789 |
| 73 | 793 |
| 93 | 796 |
| 111 | 797 |
| 150 | 806 |
| 178 | 810 |
| 236 | 810 |
| 256 | 819 |
| 280 | 825 |
| 313 | 839 |
| 364 | 860 |
| 404 | 879 |
| 449 | 897 |
| 500 | 917 |
| 570 | 937 |
| 657 | 957 |
| 669 | 960 |
| 763 | 960 |
| 768 | 965 |

## Material Boundary

| X | Y |
|---|---|
| 236 | 700 |
| 236 | 810 |




| Method Name | Min FS |
|---|---|
| Bishop simplified | 1.02 |
| Janbu simplified | 1.01 |

| Material Name | Color | Unit Weight (lbs/ft3) | Strength Type | Cohesion (psf) | Phi (deg) | Water Surface | Ru | Generalized Anisotropic |
|---|---|---|---|---|---|---|---|---|
| Fill Seismic | | 130 | Mohr-Coulomb | 460 | 30 | None | 0 | |
| Tpl Along Bedding | | 130 | Mohr-Coulomb | 336 | 18 | None | 0 | |
| Tpl Cross-Bedding Seismic | | 130 | Mohr-Coulomb | 428 | 47 | None | 0 | |
| Tpl- Toe Seismic | | 130 | Generalized Anisotropic | | | None | 0 | Seismic Bedding 33-54 |
| Tpl Seismic | | 130 | Generalized Anisotropic | | | None | 0 | Seismic Bedding 10-30 |

TGR Geotechnical Environmental Hydrogeology Material Testing Construction Inspection

SLIDEINTERPRET 7.038

| | | | |
|---|---|---|---|
| *Project* | HOFF Property, Yorba Linda | | |
| *Analysis Description* | Cross-section C-C' Seismic | | |
| *Drawn By* | *Scale* 1:2000 | *Company* | TGR Geotechnical, Inc. |
| *Date* 4/15/20 | | *File Name* | Cross-section C-C' Seismic.slim |

# Slide Analysis Information

# HOFF Property, Yorba Linda

## Project Summary

| | |
|---|---|
| File Name: | Cross-section C-C' Seismic |
| Slide Modeler Version: | 7.038 |
| Project Title: | HOFF Property, Yorba Linda |
| Analysis: | Cross-section C-C' Seismic |
| Company: | TGR Geotechnical, Inc. |
| Date Created: | 4/15/20 |

## General Settings

| | |
|---|---|
| Units of Measurement: | Imperial Units |
| Time Units: | days |
| Permeability Units: | feet/second |
| Failure Direction: | Right to Left |
| Data Output: | Standard |
| Maximum Material Properties: | 20 |
| Maximum Support Properties: | 20 |

## Analysis Options

| | |
|---|---|
| Slices Type: | Vertical |
| **Analysis Methods Used** | |
| | Bishop simplified |
| | Janbu simplified |
| Number of slices: | 50 |
| Tolerance: | 0.005 |
| Maximum number of iterations: | 75 |
| Check malpha < 0.2: | Yes |
| Create Interslice boundaries at intersections with water tables and piezos: | Yes |
| Initial trial value of FS: | 1 |
| Steffensen Iteration: | Yes |

## Groundwater Analysis

| | |
|---|---|
| Groundwater Method: | Water Surfaces |
| Pore Fluid Unit Weight [lbs/ft3]: | 62.4 |
| Use negative pore pressure cutoff: | Yes |
| Maximum negative pore pressure [psf]: | 0 |
| Advanced Groundwater Method: | None |

## Random Numbers

| | |
|---|---|
| Pseudo-random Seed: | 10116 |
| Random Number Generation Method: | Park and Miller v.3 |

## Surface Options

| | |
|---|---|
| Surface Type: | Circular |
| Search Method: | Grid Search |
| Radius Increment: | 10 |
| Composite Surfaces: | Disabled |
| Reverse Curvature: | Invalid Surfaces |
| Minimum Elevation: | Not Defined |
| Minimum Depth: | Not Defined |
| Minimum Area: | Not Defined |
| Minimum Weight: | Not Defined |

## Seismic

| | |
|---|---|
| Advanced seismic analysis: | No |
| Staged pseudostatic analysis: | No |

## Loading

Seismic Load Coefficient (Horizontal): 0.35

## Material Properties

| Property | Fill Seismic | Tpl- Toe Seismic | Tpl Seismic |
|---|---|---|---|
| Color | | | |
| Strength Type | Mohr-Coulomb | Generalized Anisotropic | Generalized Anisotropic |
| Unit Weight [lbs/ft3] | 130 | 130 | 130 |
| Cohesion [psf] | 460 | | |
| Friction Angle [deg] | 30 | | |
| Water Surface | None | None | None |
| Ru Value | 0 | 0 | 0 |

### Generalized Anisotropic Functions

Name: Seismic Bedding 33-54

| Angle From | Angle To | Material |
|---|---|---|
| 33 | -90 | Tpl Cross-Bedding Seismic |
| 54 | 33 | Tpl Along Bedding |
| 90 | 54 | Tpl Cross-Bedding Seismic |

Name: Seismic Bedding 10-30

| Angle From | Angle To | Material |
|---|---|---|
| -30 | -90 | Tpl Cross-Bedding Seismic |
| -10 | -30 | Tpl Along Bedding |
| 90 | -10 | Tpl Cross-Bedding Seismic |

## Global Minimums

### Method: bishop simplified

| FS | 1.022610 |
|---|---|
| Center: | 142.164, 1700.801 |
| Radius: | 860.104 |
| Left Slip Surface Endpoint: | 344.011, 864.717 |
| Right Slip Surface Endpoint: | 587.558, 965.000 |
| Resisting Moment: | 2.80396e+008 lb-ft |
| Driving Moment: | 2.74198e+008 lb-ft |
| Total Slice Area: | 3451.05 ft2 |
| Surface Horizontal Width: | 243.548 ft |
| Surface Average Height: | 14.1699 ft |

### Method: janbu simplified

| FS | 1.008500 |
|---|---|
| Center: | 231.114, 1433.951 |
| Radius: | 579.453 |
| Left Slip Surface Endpoint: | 347.182, 866.242 |
| Right Slip Surface Endpoint: | 571.483, 965.000 |
| Resisting Horizontal Force: | 261244 lb |
| Driving Horizontal Force: | 259042 lb |
| Total Slice Area: | 2993.65 ft2 |
| Surface Horizontal Width: | 224.3 ft |
| Surface Average Height: | 13.3466 ft |

## *Valid / Invalid Surfaces*

### Method: bishop simplified

Number of Valid Surfaces: 4642
Number of Invalid Surfaces: 209

**Error Codes:**

Error Code -103 reported for 89 surfaces
Error Code -106 reported for 43 surfaces
Error Code -1000 reported for 77 surfaces

### Method: janbu simplified

Number of Valid Surfaces: 4640
Number of Invalid Surfaces: 211

**Error Codes:**

Error Code -103 reported for 89 surfaces
Error Code -106 reported for 43 surfaces
Error Code -108 reported for 2 surfaces
Error Code -1000 reported for 77 surfaces

**Error Codes**

The following errors were encountered during the computation:

-103 = Two surface / slope intersections, but one or more surface / nonslope external polygon intersections lie between them. This usually occurs when the slip surface extends past the bottom of the soil region, but may also occur on a benched slope model with two sets of Slope Limits.
-106 = Average slice width is less than 0.0001 * (maximum horizontal extent of soil region). This limitation is imposed to avoid numerical errors which may result from too many slices, or too small a slip region.
-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).
-1000 = No valid slip surfaces are generated at a grid center. Unable to draw a surface.

## *Slice Data*

**Global Minimum Query (bishop simplified) - Safety Factor**: 1.02261

| Slice Number | Width [ft] | Weight [lbs] | Angle of Slice Base [degrees] | Base Material | Base Cohesion [psf] | Base Friction Angle [degrees] | Shear Stress [psf] | Shear Strength [psf] | Base Normal Stress [psf] | Pore Pressure [psf] | Effective Normal Stress [psf] | Base Vertical Stress [psf] | Effective Vertical Stress [psf] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.87095 | 364.365 | 13.7396 | Fill Seismic | 460 | 30 | 432.184 | 441.956 | -31.253 | 0 | -31.253 | 74.4187 | 74.4187 |
| 2 | 4.87095 | 1083.55 | 14.0739 | Fill Seismic | 460 | 30 | 503.847 | 515.239 | 95.6772 | 0 | 95.6772 | 221.991 | 221.991 |
| 3 | 4.87095 | 1783.59 | 14.4086 | Fill Seismic | 460 | 30 | 573.127 | 586.085 | 218.385 | 0 | 218.385 | 365.631 | 365.631 |
| 4 | 4.87095 | 2464.4 | 14.7439 | Fill Seismic | 460 | 30 | 640.033 | 654.504 | 336.891 | 0 | 336.891 | 505.325 | 505.325 |
| 5 | 4.87095 | 3125.9 | 15.0797 | Fill Seismic | 460 | 30 | 704.577 | 720.507 | 451.211 | 0 | 451.211 | 641.053 | 641.053 |
| 6 | 4.87095 | 3768 | 15.416 | Fill Seismic | 460 | 30 | 766.766 | 784.103 | 561.362 | 0 | 561.362 | 772.796 | 772.796 |
| 7 | 4.87095 | 4390.6 | 15.7529 | Fill Seismic | 460 | 30 | 826.611 | 845.301 | 667.361 | 0 | 667.361 | 900.535 | 900.535 |
| 8 | 4.87095 | 4993.6 | 16.0903 | Fill Seismic | 460 | 30 | 884.122 | 904.112 | 769.225 | 0 | 769.225 | 1024.25 | 1024.25 |
| 9 | 4.87095 | 5576.92 | 16.4283 | Fill Seismic | 460 | 30 | 939.306 | 960.544 | 866.968 | 0 | 866.968 | 1143.92 | 1143.92 |
| 10 | 4.87095 | 6140.43 | 16.7669 | Fill Seismic | 460 | 30 | 992.173 | 1014.61 | 960.606 | 0 | 960.606 | 1259.54 | 1259.54 |
| 11 | 4.87095 | 6684.05 | 17.1061 | Fill Seismic | 460 | 30 | 1042.73 | 1066.3 | 1050.15 | 0 | 1050.15 | 1371.06 | 1371.06 |
| 12 | 4.87095 | 7207.66 | 17.4459 | Fill Seismic | 460 | 30 | 1090.98 | 1115.65 | 1135.62 | 0 | 1135.62 | 1478.47 | 1478.47 |
| 13 | 4.87095 | 7711.1 | 17.7863 | Fill Seismic | 460 | 30 | 1136.94 | 1162.65 | 1217.02 | 0 | 1217.02 | 1581.75 | 1581.75 |
| 14 | 4.87095 | 8180.74 | 18.1274 | Fill Seismic | 460 | 30 | 1179.28 | 1205.95 | 1292.02 | 0 | 1292.02 | 1678.09 | 1678.09 |
| 15 | 4.87095 | 8619.6 | 18.4692 | Fill Seismic | 460 | 30 | 1218.34 | 1245.88 | 1361.19 | 0 | 1361.19 | 1768.11 | 1768.11 |
| 16 | 4.87095 | 9037.99 | 18.8116 | Fill Seismic | 460 | 30 | 1255.13 | 1283.51 | 1426.36 | 0 | 1426.36 | 1853.93 | 1853.93 |
| 17 | 4.87095 | 9435.78 | 19.1548 | Fill Seismic | 460 | 30 | 1289.68 | 1318.84 | 1487.55 | 0 | 1487.55 | 1935.52 | 1935.52 |
| 18 | 4.87095 | 9812.86 | 19.4986 | Fill Seismic | 460 | 30 | 1321.98 | 1351.87 | 1544.76 | 0 | 1544.76 | 2012.86 | 2012.86 |
| 19 | 4.87095 | 10169.1 | 19.8432 | Fill Seismic | 460 | 30 | 1352.04 | 1382.61 | 1598 | 0 | 1598 | 2085.92 | 2085.92 |
| 20 | 4.87095 | 10504.3 | 20.1886 | Fill Seismic | 460 | 30 | 1379.87 | 1411.06 | 1647.29 | 0 | 1647.29 | 2154.67 | 2154.67 |
| 21 | 4.87095 | 10818.4 | 20.5347 | Fill Seismic | 460 | 30 | 1405.47 | 1437.24 | 1692.63 | 0 | 1692.63 | 2219.09 | 2219.09 |
| 22 | 4.87095 | 11111.2 | 20.8816 | Fill Seismic | 460 | 30 | 1428.84 | 1461.15 | 1734.04 | 0 | 1734.04 | 2279.14 | 2279.14 |
| 23 | 4.87095 | 11382.6 | 21.2293 | Fill Seismic | 460 | 30 | 1450.01 | 1482.79 | 1771.52 | 0 | 1771.52 | 2334.79 | 2334.79 |
| 24 | 4.87095 | 11632.5 | 21.5778 | Fill Seismic | 460 | 30 | 1468.95 | 1502.16 | 1805.08 | 0 | 1805.08 | 2386.02 | 2386.02 |
| 25 | 4.87095 | 11860.6 | 21.9271 | Fill Seismic | 460 | 30 | 1485.69 | 1519.28 | 1834.73 | 0 | 1834.73 | 2432.79 | 2432.79 |
| 26 | 4.87095 | 12066.8 | 22.2774 | Fill Seismic | 460 | 30 | 1500.22 | 1534.14 | 1860.47 | 0 | 1860.47 | 2475.06 | 2475.06 |
| 27 | 4.87095 | 12251 | 22.6285 | Fill Seismic | 460 | 30 | 1512.56 | 1546.76 | 1882.32 | 0 | 1882.32 | 2512.82 | 2512.82 |
| 28 | 4.87095 | 12413 | 22.9804 | Fill Seismic | 460 | 30 | 1522.7 | 1557.13 | 1900.28 | 0 | 1900.28 | 2546.02 | 2546.02 |
| 29 | 4.87095 | 12552.6 | 23.3334 | Fill | 460 | 30 | 1530.65 | 1565.26 | 1914.36 | 0 | 1914.36 | 2574.62 | 2574.62 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Seismic | | | | | | | | | |
| 30 | 4.87095 | 12669.6 | 23.6872 | Fill Seismic | 460 | 30 | 1536.41 | 1571.15 | 1924.57 | 0 | 1924.57 | 2598.59 | 2598.59 |
| 31 | 4.87095 | 12763.9 | 24.042 | Fill Seismic | 460 | 30 | 1539.99 | 1574.81 | 1930.91 | 0 | 1930.91 | 2617.91 | 2617.91 |
| 32 | 4.87095 | 12835.3 | 24.3978 | Fill Seismic | 460 | 30 | 1541.39 | 1576.24 | 1933.39 | 0 | 1933.39 | 2632.53 | 2632.53 |
| 33 | 4.87095 | 12883.5 | 24.7546 | Fill Seismic | 460 | 30 | 1540.61 | 1575.44 | 1931.99 | 0 | 1931.99 | 2642.37 | 2642.37 |
| 34 | 4.87095 | 12908.4 | 25.1125 | Fill Seismic | 460 | 30 | 1537.64 | 1572.41 | 1926.75 | 0 | 1926.75 | 2647.44 | 2647.44 |
| 35 | 4.87095 | 12909.7 | 25.4714 | Fill Seismic | 460 | 30 | 1532.51 | 1567.16 | 1917.66 | 0 | 1917.66 | 2647.69 | 2647.69 |
| 36 | 4.87095 | 12887.4 | 25.8313 | Fill Seismic | 460 | 30 | 1525.21 | 1559.69 | 1904.73 | 0 | 1904.73 | 2643.07 | 2643.07 |
| 37 | 4.87095 | 12841 | 26.1924 | Fill Seismic | 460 | 30 | 1515.74 | 1550.01 | 1887.94 | 0 | 1887.94 | 2633.53 | 2633.53 |
| 38 | 4.87095 | 12770.5 | 26.5545 | Fill Seismic | 460 | 30 | 1504.09 | 1538.1 | 1867.32 | 0 | 1867.32 | 2619.02 | 2619.02 |
| 39 | 4.87095 | 12675.6 | 26.9179 | Fill Seismic | 460 | 30 | 1490.29 | 1523.99 | 1842.88 | 0 | 1842.88 | 2599.53 | 2599.53 |
| 40 | 4.87095 | 12556 | 27.2824 | Fill Seismic | 460 | 30 | 1474.32 | 1507.65 | 1814.59 | 0 | 1814.59 | 2574.97 | 2574.97 |
| 41 | 4.87095 | 12411.6 | 27.6481 | Fill Seismic | 460 | 30 | 1456.19 | 1489.11 | 1782.47 | 0 | 1782.47 | 2545.31 | 2545.31 |
| 42 | 4.87095 | 12242 | 28.015 | Fill Seismic | 460 | 30 | 1435.89 | 1468.36 | 1746.53 | 0 | 1746.53 | 2510.49 | 2510.49 |
| 43 | 4.87095 | 12047.1 | 28.3832 | Fill Seismic | 460 | 30 | 1413.44 | 1445.4 | 1706.76 | 0 | 1706.76 | 2470.47 | 2470.47 |
| 44 | 4.87095 | 11485 | 28.7526 | Fill Seismic | 460 | 30 | 1358.64 | 1389.36 | 1609.69 | 0 | 1609.69 | 2355.14 | 2355.14 |
| 45 | 4.87095 | 9852.41 | 29.1234 | Fill Seismic | 460 | 30 | 1209.86 | 1237.22 | 1346.18 | 0 | 1346.18 | 2020.23 | 2020.23 |
| 46 | 4.87095 | 8120.83 | 29.4955 | Fill Seismic | 460 | 30 | 1053.44 | 1077.26 | 1069.13 | 0 | 1069.13 | 1665.02 | 1665.02 |
| 47 | 4.87095 | 6362.76 | 29.869 | Fill Seismic | 460 | 30 | 895.809 | 916.063 | 789.923 | 0 | 789.923 | 1304.39 | 1304.39 |
| 48 | 4.87095 | 4577.9 | 30.2439 | Fill Seismic | 460 | 30 | 736.97 | 753.633 | 508.588 | 0 | 508.588 | 938.271 | 938.271 |
| 49 | 4.87095 | 2765.94 | 30.6202 | Fill Seismic | 460 | 30 | 576.934 | 589.978 | 225.128 | 0 | 225.128 | 566.601 | 566.601 |
| 50 | 4.87095 | 926.575 | 30.998 | Fill Seismic | 460 | 30 | 415.703 | 425.102 | -60.4451 | 0 | -60.4451 | 189.315 | 189.315 |

**Global Minimum Query (janbu simplified) - Safety Factor**: 1.0085

| Slice Number | Width [ft] | Weight [lbs] | Angle of Slice Base [degrees] | Base Material | Base Cohesion [psf] | Base Friction Angle [degrees] | Shear Stress [psf] | Shear Strength [psf] | Base Normal Stress [psf] | Pore Pressure [psf] | Effective Normal Stress [psf] | Base Vertical Stress [psf] | Effective Vertical Stress [psf] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 4.48601 | 356.054 | 11.7814 | Fill Seismic | 460 | 30 | 448.047 | 451.856 | -14.1066 | 0 | -14.1066 | 79.3439 | 79.3439 |
| 2 | 4.48601 | 1057.34 | 12.2349 | Fill Seismic | 460 | 30 | 525.768 | 530.237 | 121.655 | 0 | 121.655 | 235.665 | 235.665 |
| 3 | 4.48601 | 1736.92 | 12.6892 | Fill Seismic | 460 | 30 | 600.371 | 605.474 | 251.968 | 0 | 251.968 | 387.149 | 387.149 |
| 4 | 4.48601 | 2394.7 | 13.1443 | Fill Seismic | 460 | 30 | 671.876 | 677.587 | 376.873 | 0 | 376.873 | 533.771 | 533.771 |
| 5 | 4.48601 | 3030.53 | 13.6003 | Fill Seismic | 460 | 30 | 740.304 | 746.597 | 496.401 | 0 | 496.401 | 675.503 | 675.503 |
| 6 | 4.48601 | 3644.31 | 14.0571 | Fill Seismic | 460 | 30 | 805.675 | 812.523 | 610.586 | 0 | 610.586 | 812.316 | 812.316 |
| 7 | 4.48601 | 4235.9 | 14.5148 | Fill Seismic | 460 | 30 | 868.005 | 875.383 | 719.464 | 0 | 719.464 | 944.185 | 944.185 |
| 8 | 4.48601 | 4805.16 | 14.9735 | Fill Seismic | 460 | 30 | 927.314 | 935.196 | 823.063 | 0 | 823.063 | 1071.08 | 1071.08 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9 | 4.48601 | 5351.96 | 15.4332 | Fill Seismic | 460 | 30 | 983.617 | 991.978 | 921.414 | 0 | 921.414 | 1192.96 | 1192.96 |
| 10 | 4.48601 | 5876.15 | 15.8938 | Fill Seismic | 460 | 30 | 1036.93 | 1045.75 | 1014.54 | 0 | 1014.54 | 1309.8 | 1309.8 |
| 11 | 4.48601 | 6377.56 | 16.3556 | Fill Seismic | 460 | 30 | 1087.28 | 1096.52 | 1102.48 | 0 | 1102.48 | 1421.57 | 1421.57 |
| 12 | 4.48601 | 6856.05 | 16.8184 | Fill Seismic | 460 | 30 | 1134.66 | 1144.3 | 1185.25 | 0 | 1185.25 | 1528.22 | 1528.22 |
| 13 | 4.48601 | 7311.45 | 17.2824 | Fill Seismic | 460 | 30 | 1179.1 | 1189.12 | 1262.88 | 0 | 1262.88 | 1629.73 | 1629.73 |
| 14 | 4.48601 | 7739.06 | 17.7475 | Fill Seismic | 460 | 30 | 1220.13 | 1230.5 | 1334.54 | 0 | 1334.54 | 1725.05 | 1725.05 |
| 15 | 4.48601 | 8128.48 | 18.2139 | Fill Seismic | 460 | 30 | 1256.65 | 1267.34 | 1398.34 | 0 | 1398.34 | 1811.85 | 1811.85 |
| 16 | 4.48601 | 8493.14 | 18.6815 | Fill Seismic | 460 | 30 | 1290.17 | 1301.14 | 1456.9 | 0 | 1456.9 | 1893.13 | 1893.13 |
| 17 | 4.48601 | 8833.97 | 19.1504 | Fill Seismic | 460 | 30 | 1320.82 | 1332.04 | 1510.43 | 0 | 1510.43 | 1969.1 | 1969.1 |
| 18 | 4.48601 | 9150.77 | 19.6206 | Fill Seismic | 460 | 30 | 1348.6 | 1360.06 | 1558.95 | 0 | 1558.95 | 2039.71 | 2039.71 |
| 19 | 4.48601 | 9443.34 | 20.0923 | Fill Seismic | 460 | 30 | 1373.53 | 1385.2 | 1602.5 | 0 | 1602.5 | 2104.93 | 2104.93 |
| 20 | 4.48601 | 9711.45 | 20.5653 | Fill Seismic | 460 | 30 | 1395.61 | 1407.47 | 1641.07 | 0 | 1641.07 | 2164.69 | 2164.69 |
| 21 | 4.48601 | 9954.89 | 21.0398 | Fill Seismic | 460 | 30 | 1414.86 | 1426.89 | 1674.7 | 0 | 1674.7 | 2218.95 | 2218.95 |
| 22 | 4.48601 | 10173.4 | 21.5158 | Fill Seismic | 460 | 30 | 1431.29 | 1443.46 | 1703.39 | 0 | 1703.39 | 2267.65 | 2267.65 |
| 23 | 4.48601 | 10366.8 | 21.9934 | Fill Seismic | 460 | 30 | 1444.9 | 1457.18 | 1727.17 | 0 | 1727.17 | 2310.75 | 2310.75 |
| 24 | 4.48601 | 10534.7 | 22.4726 | Fill Seismic | 460 | 30 | 1455.7 | 1468.07 | 1746.03 | 0 | 1746.03 | 2348.18 | 2348.18 |
| 25 | 4.48601 | 10677 | 22.9535 | Fill Seismic | 460 | 30 | 1463.7 | 1476.14 | 1760 | 0 | 1760 | 2379.9 | 2379.9 |
| 26 | 4.48601 | 10793.4 | 23.4361 | Fill Seismic | 460 | 30 | 1468.89 | 1481.38 | 1769.08 | 0 | 1769.08 | 2405.83 | 2405.83 |
| 27 | 4.48601 | 10883.5 | 23.9204 | Fill Seismic | 460 | 30 | 1471.3 | 1483.81 | 1773.29 | 0 | 1773.29 | 2425.91 | 2425.91 |
| 28 | 4.48601 | 10947.1 | 24.4066 | Fill Seismic | 460 | 30 | 1470.93 | 1483.43 | 1772.64 | 0 | 1772.64 | 2440.08 | 2440.08 |
| 29 | 4.48601 | 10983.8 | 24.8947 | Fill Seismic | 460 | 30 | 1467.77 | 1480.25 | 1767.13 | 0 | 1767.13 | 2448.28 | 2448.28 |
| 30 | 4.48601 | 10993.5 | 25.3847 | Fill Seismic | 460 | 30 | 1461.84 | 1474.27 | 1756.77 | 0 | 1756.77 | 2450.42 | 2450.42 |
| 31 | 4.48601 | 10975.7 | 25.8767 | Fill Seismic | 460 | 30 | 1453.15 | 1465.5 | 1741.57 | 0 | 1741.57 | 2446.45 | 2446.45 |
| 32 | 4.48601 | 10930 | 26.3707 | Fill Seismic | 460 | 30 | 1441.67 | 1453.93 | 1721.53 | 0 | 1721.53 | 2436.27 | 2436.27 |
| 33 | 4.48601 | 10856.2 | 26.8669 | Fill Seismic | 460 | 30 | 1427.44 | 1439.57 | 1696.67 | 0 | 1696.67 | 2419.81 | 2419.81 |
| 34 | 4.48601 | 10753.9 | 27.3652 | Fill Seismic | 460 | 30 | 1410.44 | 1422.43 | 1666.98 | 0 | 1666.98 | 2397 | 2397 |
| 35 | 4.48601 | 10622.6 | 27.8659 | Fill Seismic | 460 | 30 | 1390.69 | 1402.51 | 1632.47 | 0 | 1632.47 | 2367.74 | 2367.74 |
| 36 | 4.48601 | 10462 | 28.3688 | Fill Seismic | 460 | 30 | 1368.17 | 1379.8 | 1593.14 | 0 | 1593.14 | 2331.94 | 2331.94 |
| 37 | 4.48601 | 10271.7 | 28.8741 | Fill Seismic | 460 | 30 | 1342.9 | 1354.31 | 1548.99 | 0 | 1548.99 | 2289.52 | 2289.52 |
| 38 | 4.48601 | 10051.2 | 29.3819 | Fill Seismic | 460 | 30 | 1314.87 | 1326.04 | 1500.03 | 0 | 1500.03 | 2240.37 | 2240.37 |
| 39 | 4.48601 | 9800.14 | 29.8923 | Fill Seismic | 460 | 30 | 1284.08 | 1294.99 | 1446.25 | 0 | 1446.25 | 2184.4 | 2184.4 |
| 40 | 4.48601 | 9517.97 | 30.4052 | Fill Seismic | 460 | 30 | 1250.54 | 1261.17 | 1387.66 | 0 | 1387.66 | 2121.5 | 2121.5 |
| 41 | 4.48601 | 9204.21 | 30.9209 | Fill | 460 | 30 | 1214.24 | 1224.56 | 1324.25 | 0 | 1324.25 | 2051.56 | 2051.56 |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Seismic | | | | | | | | | | |
| 42 | 4.48601 | 8858.38 | 31.4394 | Fill Seismic | 460 | 30 | 1175.18 | 1185.17 | 1256.03 | 0 | 1256.03 | 1974.47 | 1974.47 |
| 43 | 4.48601 | 8479.93 | 31.9608 | Fill Seismic | 460 | 30 | 1133.36 | 1143 | 1182.98 | 0 | 1182.98 | 1890.11 | 1890.11 |
| 44 | 4.48601 | 8068.31 | 32.4851 | Fill Seismic | 460 | 30 | 1088.79 | 1098.04 | 1105.12 | 0 | 1105.12 | 1798.36 | 1798.36 |
| 45 | 4.48601 | 7622.94 | 33.0125 | Fill Seismic | 460 | 30 | 1041.45 | 1050.3 | 1022.43 | 0 | 1022.43 | 1699.08 | 1699.08 |
| 46 | 4.48601 | 7143.21 | 33.5431 | Fill Seismic | 460 | 30 | 991.348 | 999.774 | 934.918 | 0 | 934.918 | 1592.15 | 1592.15 |
| 47 | 4.48601 | 6347.22 | 34.077 | Fill Seismic | 460 | 30 | 912.607 | 920.364 | 797.374 | 0 | 797.374 | 1414.72 | 1414.72 |
| 48 | 4.48601 | 4625.13 | 34.6142 | Fill Seismic | 460 | 30 | 749.945 | 756.32 | 513.241 | 0 | 513.241 | 1030.87 | 1030.87 |
| 49 | 4.48601 | 2801.06 | 35.155 | Fill Seismic | 460 | 30 | 579.771 | 584.699 | 215.985 | 0 | 215.985 | 624.287 | 624.287 |
| 50 | 4.48601 | 939.927 | 35.6994 | Fill Seismic | 460 | 30 | 408.135 | 411.604 | -83.8249 | 0 | -83.8249 | 209.443 | 209.443 |

## *Interslice Data*

**Global Minimum Query (bishop simplified) - Safety Factor**: 1.02261

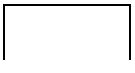
| Slice Number | X coordinate [ft] | Y coordinate - Bottom [ft] | Interslice Normal Force [lbs] | Interslice Shear Force [lbs] | Interslice Force Angle [degrees] |
|---|---|---|---|---|---|
| 1 | 344.011 | 864.717 | 0 | 0 | 0 |
| 2 | 348.882 | 865.908 | 2022.51 | 0 | 0 |
| 3 | 353.753 | 867.129 | 3989.59 | 0 | 0 |
| 4 | 358.624 | 868.38 | 5893.88 | 0 | 0 |
| 5 | 363.495 | 869.662 | 7728.42 | 0 | 0 |
| 6 | 368.365 | 870.975 | 9486.63 | 0 | 0 |
| 7 | 373.236 | 872.318 | 11162.3 | 0 | 0 |
| 8 | 378.107 | 873.692 | 12749.7 | 0 | 0 |
| 9 | 382.978 | 875.097 | 14243.4 | 0 | 0 |
| 10 | 387.849 | 876.533 | 15638.3 | 0 | 0 |
| 11 | 392.72 | 878.001 | 16929.8 | 0 | 0 |
| 12 | 397.591 | 879.5 | 18113.7 | 0 | 0 |
| 13 | 402.462 | 881.03 | 19186.2 | 0 | 0 |
| 14 | 407.333 | 882.593 | 20143.7 | 0 | 0 |
| 15 | 412.204 | 884.188 | 20985.3 | 0 | 0 |
| 16 | 417.075 | 885.814 | 21710 | 0 | 0 |
| 17 | 421.946 | 887.474 | 22315.9 | 0 | 0 |
| 18 | 426.817 | 889.166 | 22801.4 | 0 | 0 |
| 19 | 431.688 | 890.89 | 23165.3 | 0 | 0 |
| 20 | 436.559 | 892.648 | 23406.8 | 0 | 0 |
| 21 | 441.43 | 894.439 | 23525.6 | 0 | 0 |
| 22 | 446.301 | 896.264 | 23521.8 | 0 | 0 |
| 23 | 451.172 | 898.122 | 23395.8 | 0 | 0 |
| 24 | 456.043 | 900.014 | 23148.5 | 0 | 0 |
| 25 | 460.914 | 901.941 | 22781.1 | 0 | 0 |
| 26 | 465.784 | 903.901 | 22295.5 | 0 | 0 |
| 27 | 470.655 | 905.897 | 21693.7 | 0 | 0 |
| 28 | 475.526 | 907.927 | 20978.4 | 0 | 0 |
| 29 | 480.397 | 909.993 | 20152.5 | 0 | 0 |
| 30 | 485.268 | 912.094 | 19219.7 | 0 | 0 |
| 31 | 490.139 | 914.231 | 18183.8 | 0 | 0 |
| 32 | 495.01 | 916.404 | 17049.1 | 0 | 0 |
| 33 | 499.881 | 918.613 | 15820.7 | 0 | 0 |
| 34 | 504.752 | 920.859 | 14503.7 | 0 | 0 |
| 35 | 509.623 | 923.142 | 13104.1 | 0 | 0 |
| 36 | 514.494 | 925.463 | 11628 | 0 | 0 |
| 37 | 519.365 | 927.821 | 10082.4 | 0 | 0 |
| 38 | 524.236 | 930.217 | 8474.48 | 0 | 0 |
| 39 | 529.107 | 932.651 | 6812.12 | 0 | 0 |
| 40 | 533.978 | 935.124 | 5103.64 | 0 | 0 |
| 41 | 538.849 | 937.636 | 3357.93 | 0 | 0 |
| 42 | 543.72 | 940.188 | 1584.43 | 0 | 0 |
| 43 | 548.591 | 942.78 | -206.882 | 0 | 0 |
| 44 | 553.462 | 945.411 | -2005.44 | 0 | 0 |
| 45 | 558.333 | 948.084 | -3685.27 | 0 | 0 |
| 46 | 563.204 | 950.798 | -4872.16 | 0 | 0 |
| 47 | 568.074 | 953.553 | -5510.31 | 0 | 0 |
| 48 | 572.945 | 956.351 | -5567.68 | 0 | 0 |
| 49 | 577.816 | 959.19 | -5011.49 | 0 | 0 |
| 50 | 582.687 | 962.073 | -3808.16 | 0 | 0 |
| 51 | 587.558 | 965 | 0 | 0 | 0 |

**Global Minimum Query (janbu simplified) - Safety Factor**: 1.0085

| Slice Number | X coordinate [ft] | Y coordinate - Bottom [ft] | Interslice Normal Force [lbs] | Interslice Shear Force [lbs] | Interslice Force Angle [degrees] |
|---|---|---|---|---|---|
| 1 | 347.182 | 866.242 | 0 | 0 | 0 |
| 2 | 351.668 | 867.177 | 1899.08 | 0 | 0 |
| 3 | 356.154 | 868.15 | 3769.92 | 0 | 0 |
| 4 | 360.64 | 869.16 | 5601.51 | 0 | 0 |
| 5 | 365.126 | 870.208 | 7383.44 | 0 | 0 |
| 6 | 369.612 | 871.293 | 9105.94 | 0 | 0 |
| 7 | 374.099 | 872.416 | 10759.9 | 0 | 0 |
| 8 | 378.585 | 873.578 | 12336.7 | 0 | 0 |
| 9 | 383.071 | 874.777 | 13828.4 | 0 | 0 |
| 10 | 387.557 | 876.016 | 15227.9 | 0 | 0 |
| 11 | 392.043 | 877.293 | 16528.3 | 0 | 0 |
| 12 | 396.529 | 878.61 | 17723.6 | 0 | 0 |
| 13 | 401.015 | 879.966 | 18808.3 | 0 | 0 |
| 14 | 405.501 | 881.361 | 19777.6 | 0 | 0 |
| 15 | 409.987 | 882.797 | 20627.8 | 0 | 0 |
| 16 | 414.473 | 884.273 | 21357.6 | 0 | 0 |
| 17 | 418.959 | 885.79 | 21964.5 | 0 | 0 |
| 18 | 423.445 | 887.348 | 22446.5 | 0 | 0 |
| 19 | 427.931 | 888.947 | 22802.1 | 0 | 0 |
| 20 | 432.417 | 890.588 | 23030.7 | 0 | 0 |
| 21 | 436.903 | 892.271 | 23132.1 | 0 | 0 |
| 22 | 441.389 | 893.997 | 23106.9 | 0 | 0 |
| 23 | 445.875 | 895.765 | 22956.2 | 0 | 0 |
| 24 | 450.361 | 897.577 | 22682.1 | 0 | 0 |
| 25 | 454.847 | 899.433 | 22287 | 0 | 0 |
| 26 | 459.333 | 901.333 | 21774.2 | 0 | 0 |
| 27 | 463.819 | 903.277 | 21147.6 | 0 | 0 |
| 28 | 468.305 | 905.267 | 20411.9 | 0 | 0 |
| 29 | 472.791 | 907.303 | 19572.6 | 0 | 0 |
| 30 | 477.277 | 909.385 | 18635.6 | 0 | 0 |
| 31 | 481.763 | 911.513 | 17608.1 | 0 | 0 |
| 32 | 486.249 | 913.689 | 16497.5 | 0 | 0 |
| 33 | 490.735 | 915.913 | 15312.4 | 0 | 0 |
| 34 | 495.221 | 918.186 | 14062.1 | 0 | 0 |
| 35 | 499.707 | 920.508 | 12756.8 | 0 | 0 |
| 36 | 504.193 | 922.88 | 11407.3 | 0 | 0 |
| 37 | 508.679 | 925.302 | 10025.7 | 0 | 0 |
| 38 | 513.165 | 927.776 | 8624.68 | 0 | 0 |
| 39 | 517.651 | 930.302 | 7218.01 | 0 | 0 |
| 40 | 522.137 | 932.88 | 5820.4 | 0 | 0 |
| 41 | 526.623 | 935.513 | 4447.6 | 0 | 0 |
| 42 | 531.109 | 938.2 | 3116.39 | 0 | 0 |
| 43 | 535.595 | 940.942 | 1844.61 | 0 | 0 |
| 44 | 540.081 | 943.741 | 651.268 | 0 | 0 |
| 45 | 544.567 | 946.598 | -443.493 | 0 | 0 |
| 46 | 549.053 | 949.512 | -1418.3 | 0 | 0 |
| 47 | 553.539 | 952.486 | -2250.51 | 0 | 0 |
| 48 | 558.025 | 955.521 | -2796.68 | 0 | 0 |
| 49 | 562.511 | 958.617 | -2639.44 | 0 | 0 |
| 50 | 566.997 | 961.777 | -1700.59 | 0 | 0 |
| 51 | 571.483 | 965 | 0 | 0 | 0 |

## *List Of Coordinates*

### External Boundary



| X | Y |
|---|---|
| 0 | 700 |
| 236 | 700 |
| 1186 | 700 |
| 1186 | 1040 |
| 1175 | 1038 |
| 1112 | 1005 |
| 1062 | 1005 |
| 1040 | 1015 |
| 914 | 1005 |
| 833 | 988 |
| 814 | 986 |
| 768 | 965 |
| 682 | 965 |
| 555 | 965 |
| 407 | 895 |
| 303 | 845 |
| 288 | 839 |
| 255 | 825 |
| 220 | 816 |
| 188 | 816 |
| 95 | 816 |
| 39 | 794 |
| 0 | 790 |

## Material Boundary

| X | Y |
|---|---|
| 39 | 794 |
| 44 | 789 |
| 67 | 789 |
| 73 | 793 |
| 93 | 796 |
| 111 | 797 |
| 150 | 806 |
| 178 | 810 |
| 236 | 810 |
| 256 | 819 |
| 280 | 825 |
| 313 | 839 |
| 364 | 860 |
| 404 | 879 |
| 449 | 897 |
| 500 | 917 |
| 570 | 937 |
| 657 | 957 |
| 669 | 960 |
| 763 | 960 |
| 768 | 965 |

## Material Boundary

| X | Y |
|---|---|
| 236 | 700 |
| 236 | 810 |

# APPENDIX E
# EARTHWORK AND GRADING GUIDELINES

TGR GEOTECHNICAL
DBE & 8(a) firm
3037 S. HARBOR BLVD
SANTA ANA, CA 92704
P 714.641.7189 F 714.641.7190
www.tgrgeotech.com

# STANDARD GRADING SPECIFICATIONS

These specifications present the usual and minimum requirements for grading operations performed under the observation and testing of TGR Geotechnical, Inc.

No deviation from these specifications will be allowed, except where specifically superseded in the Preliminary Geotechnical Investigation report, or in other written communication signed by the Soils Engineer or Engineering Geologist.

## 1.0 GENERAL

- The Soils Engineer and Engineering Geologist are the Owner's or Builder's representatives on the project. For the purpose of these specifications, observation and testing by the Soils Engineer includes that observation and testing performed by any person or persons employed by, and responsible to, the licensed Geotechnical Engineer or Geologist signing the grading report.

- All clearing, site preparation or earthwork performed on the project shall be conducted by the Contractor under the observation of the Geotechnical Engineer.

- It is the Contractor's responsibility to prepare the ground surface to receive the fills to the satisfaction of the Geotechnical Engineer and to place, spread, mix, water and compact the fill in accordance with the specifications of the Geotechnical Engineer. The Contractor shall also remove all material considered unsatisfactory by the Geotechnical Engineer.

- It is also the Contractor's responsibility to have suitable and sufficient compaction equipment on the job site to handle the amount of fill being placed. If necessary, excavation equipment will be shut down to permit completion of Compaction. Sufficient watering apparatus will also be provided by the Contractor, with due consideration for the fill material, rate of placement and time of year.

- A final report will be issued by the Geotechnical Engineer and Engineering Geologist attesting to the Contractor's conformance with these specifications.

## 2.0 SITE PREPARATION

- All vegetation and deleterious material such as rubbish shall be disposed of off-site. The removal must be concluded prior to placing fill.

- The Civil Engineer shall locate all houses, sheds, sewage disposal systems, large trees or structures on the site, or on the grading plan to the best of his knowledge prior to preparing the ground surface.

- Soil, alluvium or rock materials determined by the Geotechnical Engineer as being unsuitable for placement in compacted fills shall be removed and wasted from the site. Any material incorporated as part of a compacted fill must be approved by the Geotechnical Engineer.

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

  The scarified ground surface shall then be brought to optimum moisture content, mixed as required, and compacted as specified. If the scarified zone is greater than twelve inches in depth, the excess shall be removed and placed in lifts restricted to six inches. Prior to placing fill, the ground surface to receive fill shall be inspected, tested and approved by the Geotechnical Engineer.

- Any underground structures such as cesspools, cisterns, mining shafts, tunnels, septic tanks, wells, pipe lines or others not located prior to grading are to be removed or treated in a manner prescribed by the Geotechnical Engineer.

## 3.0 COMPACTED FILLS

- Any material imported or excavated on the property may be utilized in the fill, provided each material has been determined to be suitable by the Geotechnical Engineer. Roots, tree branches and other matter missed during clearing shall be removed from the fill as directed by the Geotechnical Engineer.
- Rock fragments less than six inches in diameter may be utilized in the fill, provided:

- They are not placed in concentrated pockets.
- There is a sufficient percentage of fine-grained material to surround the rocks.
- The distribution of the rocks is observed by the Geotechnical Engineer.

- Rocks greater than six inches in diameter shall be taken off-site, or placed in accordance with the recommendations of the Geotechnical Engineer in areas designated as suitable for rock disposal. Details for rock disposal such as location, moisture control, percentage of the rock placed, etc., will be referred to in the "Conclusions and Recommendations" section of the Geotechnical Report, if applicable.

  If rocks greater than six inches in diameter were not anticipated in the Preliminary Geotechnical report, rock disposal recommendations may not have been made in the "Conclusions and Recommendations" section. In this case, the Contractor shall notify the Geotechnical Engineer if rocks greater than six inches in diameter are encountered. The Geotechnical Engineer will then prepare a rock disposal recommendation or request that such rocks be taken off-site.

- Material that is spongy, subject to decay, or otherwise considered unsuitable shall not be used in the compacted fill.

- Representative samples of materials to be utilized as compacted fill shall be analyzed in the laboratory by the Geotechnical Engineer to determine their physical properties. If any material other than that previously tested is encountered during grading, the appropriate analysis of this material shall be conducted by the Geotechnical Engineer as soon as possible.

- Material used in the compacting process shall be evenly spread, watered or dried, processed and compacted in thin lifts not to exceed six inches in thickness to obtain a uniformly dense layer. The fill shall be placed and compacted on a horizontal plane, unless otherwise approved by the Geotechnical Engineer.

- If the moisture content or relative compaction varies from that required by the Geotechnical Engineer, the Contractor shall rework the fill until it is approved by the Geotechnical Engineer.

- Each layer shall be compacted to 90 percent of the maximum dry density in compliance with the testing method specified by the controlling governmental agency; (in general, ASTM D1557 will be used.)

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

- All fill shall be keyed and benched through all topsoil, colluvium, alluvium or creep material, into sound bedrock or firm material where the slope receiving fill exceeds a ratio of five horizontal to one vertical, in accordance with the recommendations of the Geotechnical Engineer.

- The key for side hill fills shall be a minimum of 15 feet within bedrock or firm materials, unless otherwise specified in the Preliminary report. (See details)

- Drainage terraces and subdrainage devices shall be constructed in compliance with the ordinances of the controlling governmental agency, or with the recommendation of the Geotechnical Engineer and Engineer Geologist.

- The Contractor will be required to obtain a minimum relative compaction of 90 percent out to the finish slope face of fill slopes, buttresses and stabilization fills. This may be achieved by either overbuilding the slope and cutting back to the compacted core, or by direct compaction of the slope face with suitable equipment, or by any other procedure which produces the required compaction.

The Contractor shall prepare a written detailed description of the method or methods he will employ to obtain the required slope compaction. Such documents shall be submitted to the Geotechnical Engineer for review and comments prior to the start of grading.

If a method other than overbuilding and cutting back to the compacted core is to be employed, slope tests will be made by the Geotechnical Engineer during construction of the slopes to determine if the required compaction is being achieved. Where failing tests occur or other field problems arise, the contractor will be notified by the Geotechnical Engineer.

If the method of achieving the required slope compaction selected by the Contractor fails to produce the necessary results, the Contractor shall rework or rebuild such slopes until the required degree of compaction is obtained, at no additional cost to the Owner or Geotechnical Engineer.

- All fill slopes should be planted or protected from erosion by methods specified in the preliminary report or by means approved by the governing authorities.

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

## 4.0 CUT SLOPES

- The Engineering Geologist shall inspect all cut slopes excavated in rock, lithified or formation material at vertical intervals not exceeding ten feet.

- If any conditions not anticipated in the preliminary report such as perched water, seepage, lenticular or confined strata of a potentially adverse nature, unfavorably inclined bedding, joints or fault planes are encountered during grading, these

conditions shall be analyzed by the Engineering Geologist and Geotechnical Engineer; and recommendations shall be made to treat these problems.

- Cut slopes that face in the same direction as the prevailing drainage shall be protected from slope wash by a non-erosive interceptor swale placed at the top of the slope.

- Unless otherwise specified in the soils and geological report, no cut slopes shall be excavated higher or steeper than that allowed by the ordinances of controlling governmental agencies.

- Drainage terraces shall be constructed in compliance with the ordinances of controlling governmental agencies, or with the recommendations of the Geotechnical Engineer or Engineering Geologist.

## 5.0 GRADING CONTROL

- Inspection of the fill placement shall be provided by the Geotechnical Engineer during the progress of grading.

- In general, density tests should be made at intervals not exceeding two feet of fill height or every 500 cubic yards of fill placed. This criteria will vary depending on soil conditions and the size of the job. In any event, an adequate number of field density tests shall be made to verify that the required compaction of being achieved.
- Density tests should be made on the surface material to receive fill as required by the Geotechnical Engineer.

- All cleanout, processed ground to receive fill, key excavations, subdrains and rock disposal must be inspected and approved by the Geotechnical Engineer (and often by the governing authorities) prior to placing any fill. It shall be the Contractor's responsibility to notify the Geotechnical Engineer and governing authorities when such areas are ready for inspection.

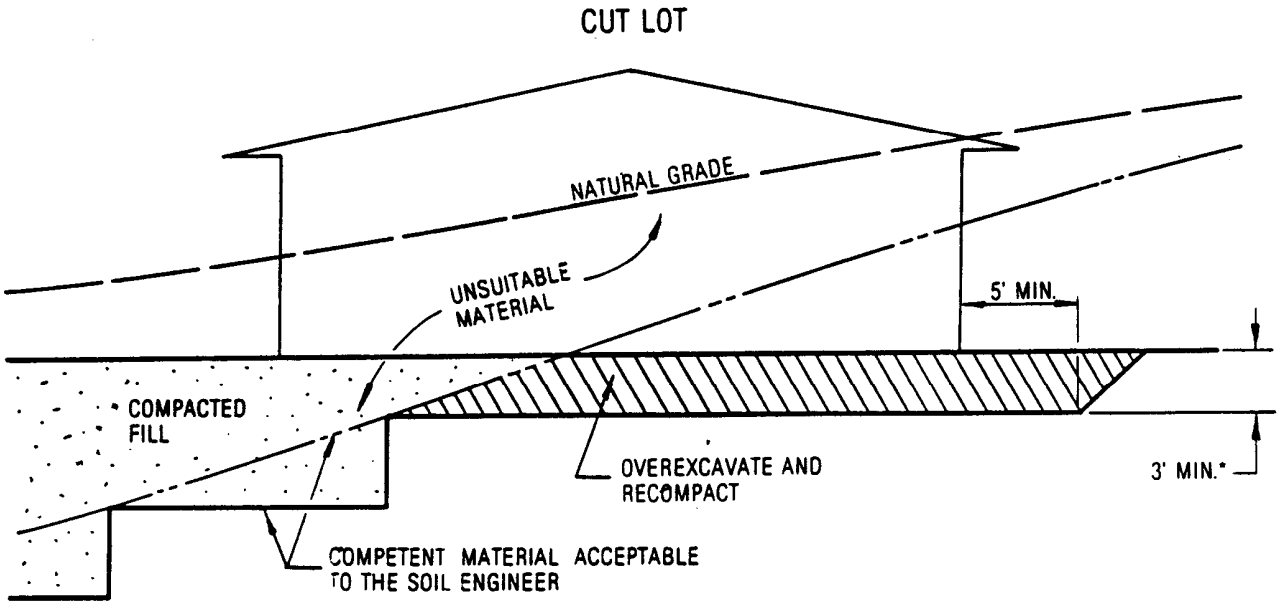
## 6.0 CONSTRUCTION CONSIDERATIONS

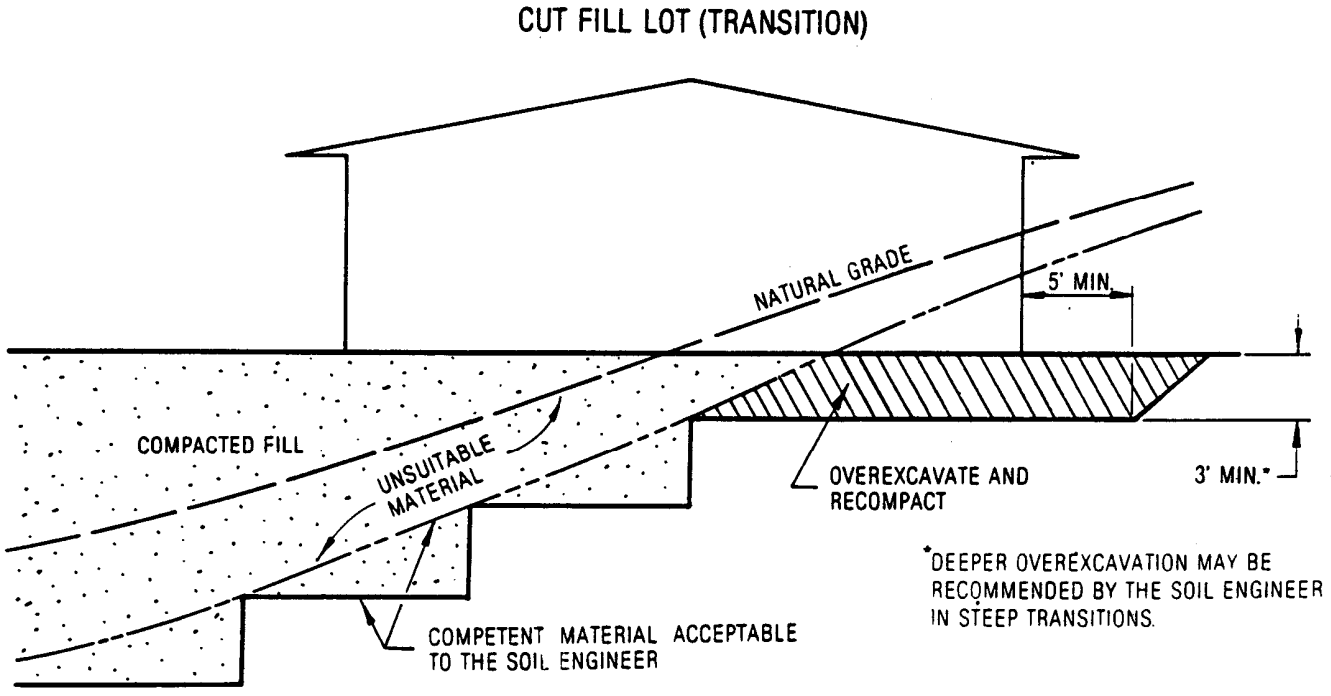
- Erosion control measures, when necessary, shall be provided by the Contractor during grading and prior to the completion and construction of permanent drainage controls.

- Upon completion of grading and termination of observations by the Geotechnical Engineer, no further filling or excavating, including that necessary for footings, foundations, large tree wells, retaining walls, or other features shall be performed without the approval of the Geotechnical Engineer or Engineering Geologist.

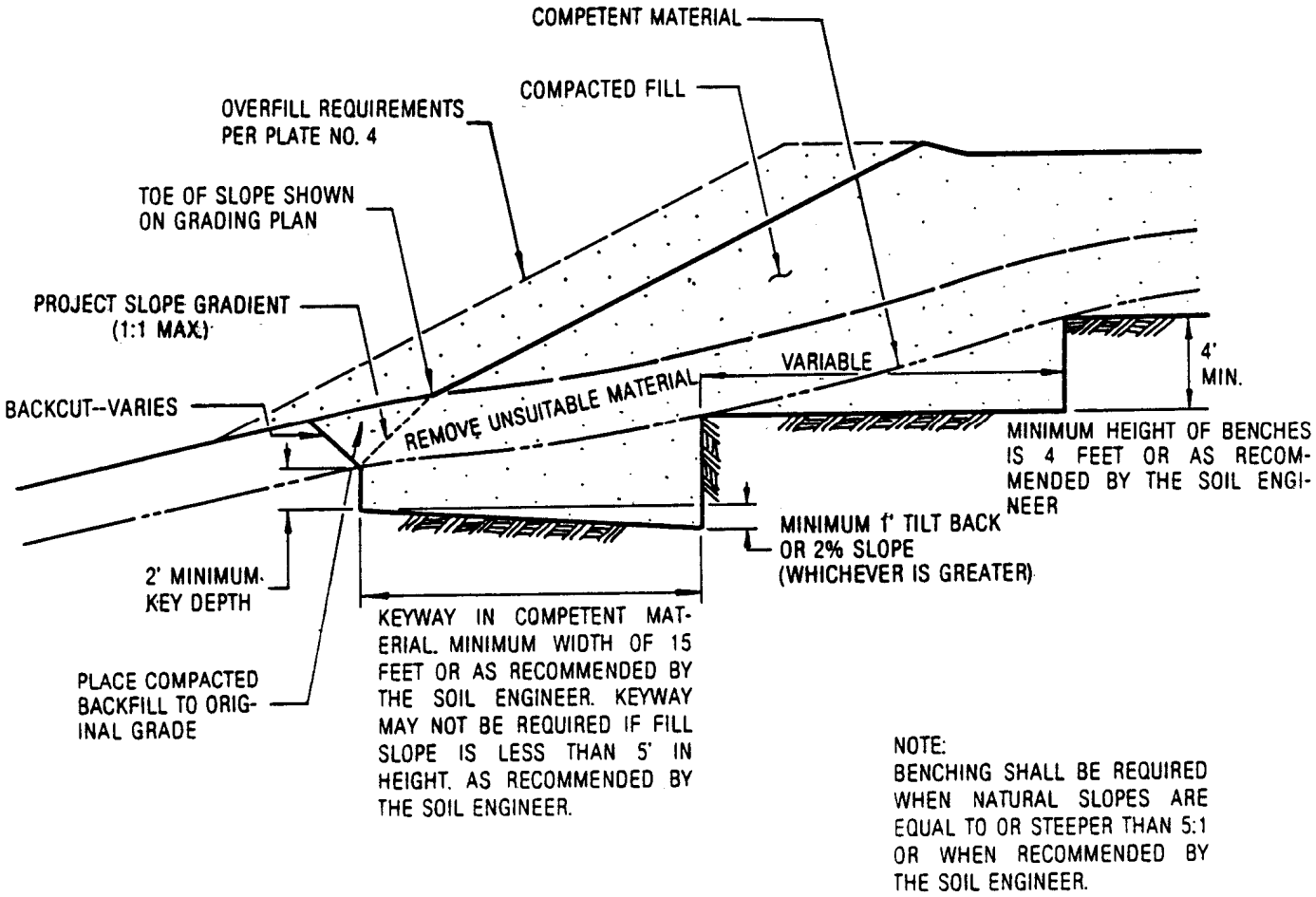
- Care shall be taken by the Contractor during final grading to preserve any berms, drainage terraces, interceptor swales, or other devices of a permanent nature on or adjacent to the property.

# TYPICAL OVEREXCAVATION OF DAYLIGHT LINE



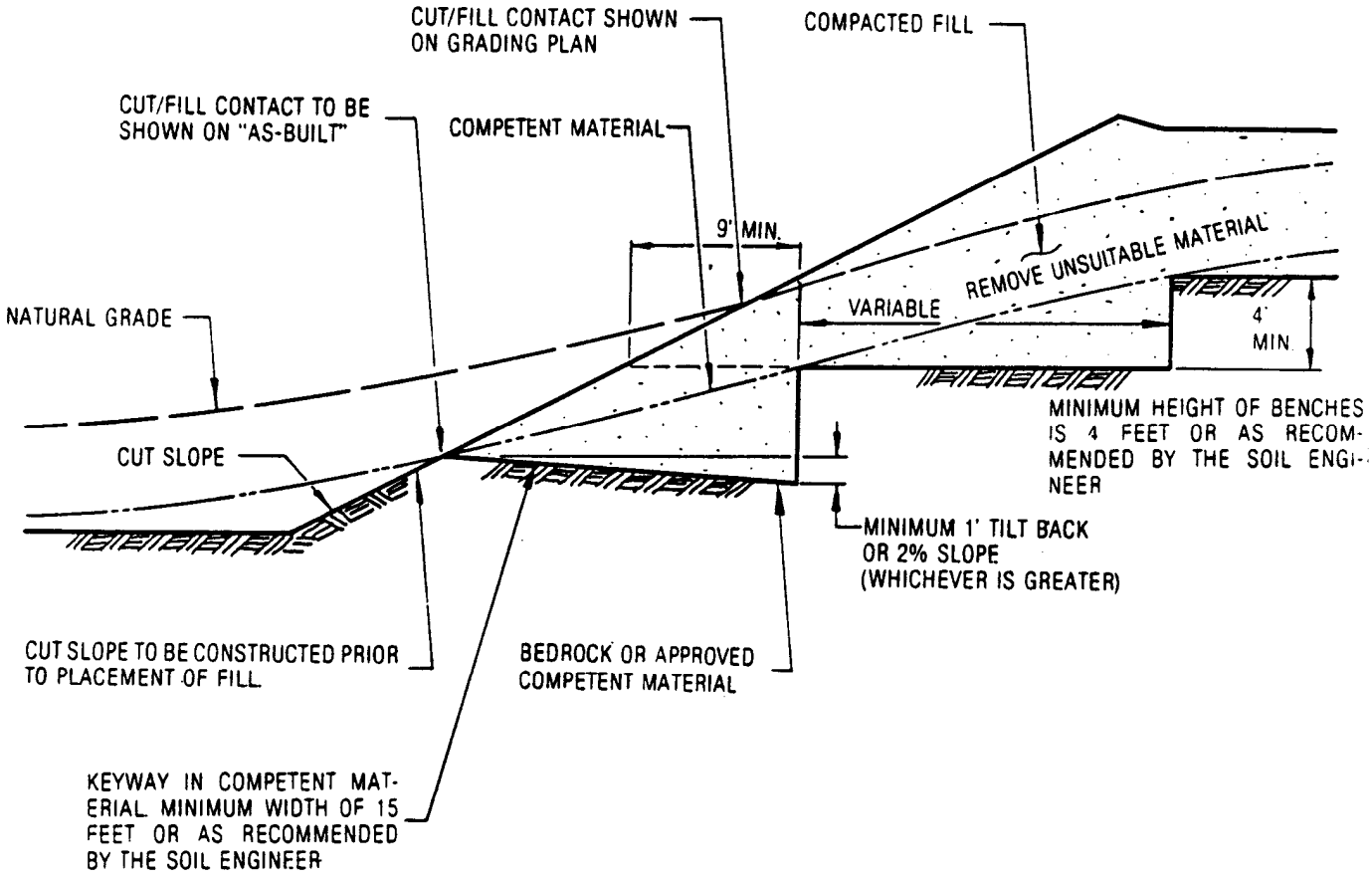



# TYPICAL FILL OVER NATURAL SLOPE

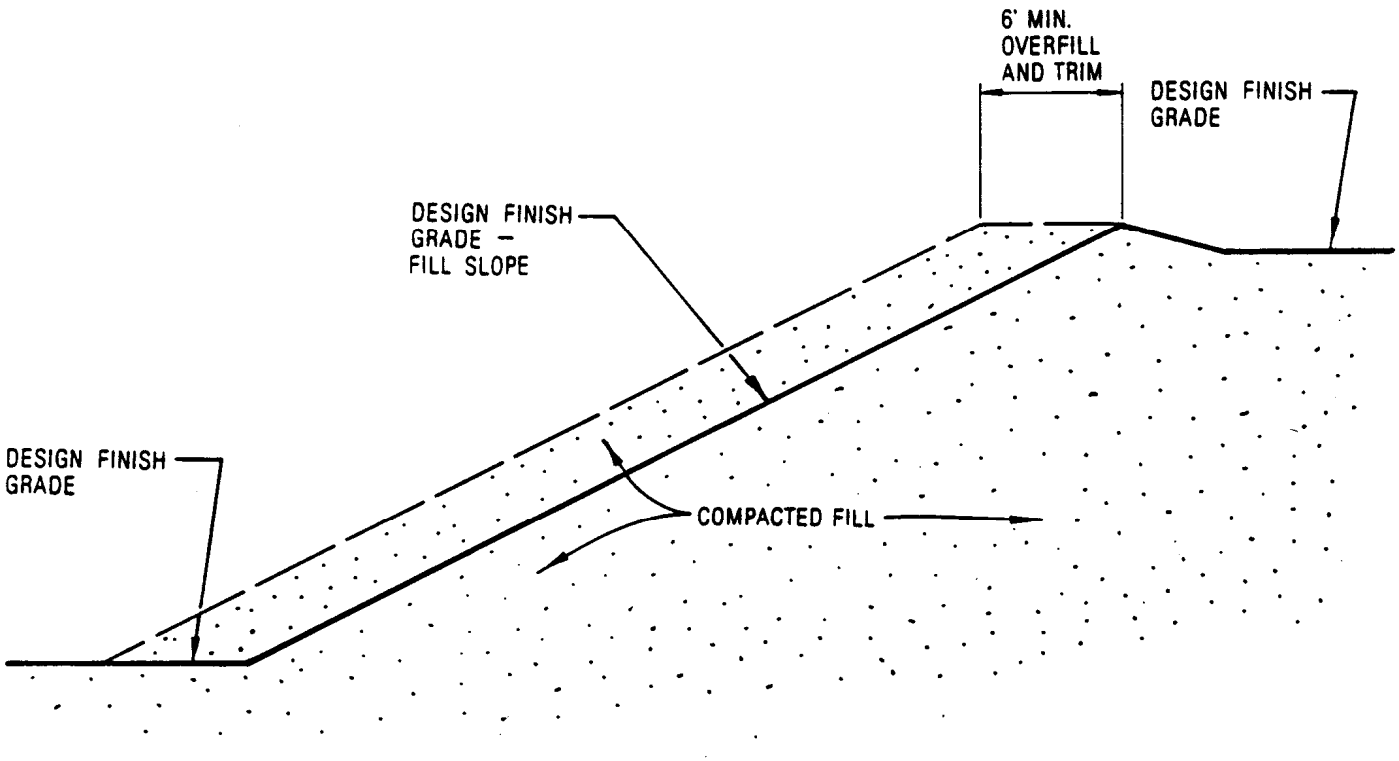



NOTE:
BENCHING SHALL BE REQUIRED WHEN NATURAL SLOPES ARE EQUAL TO OR STEEPER THAN 5:1 OR WHEN RECOMMENDED BY THE SOIL ENGINEER.

# TYPICAL FILL-OVER-CUT SLOPE



# TYPICAL FILL SLOPE CONSTRUCTION




NOTES:

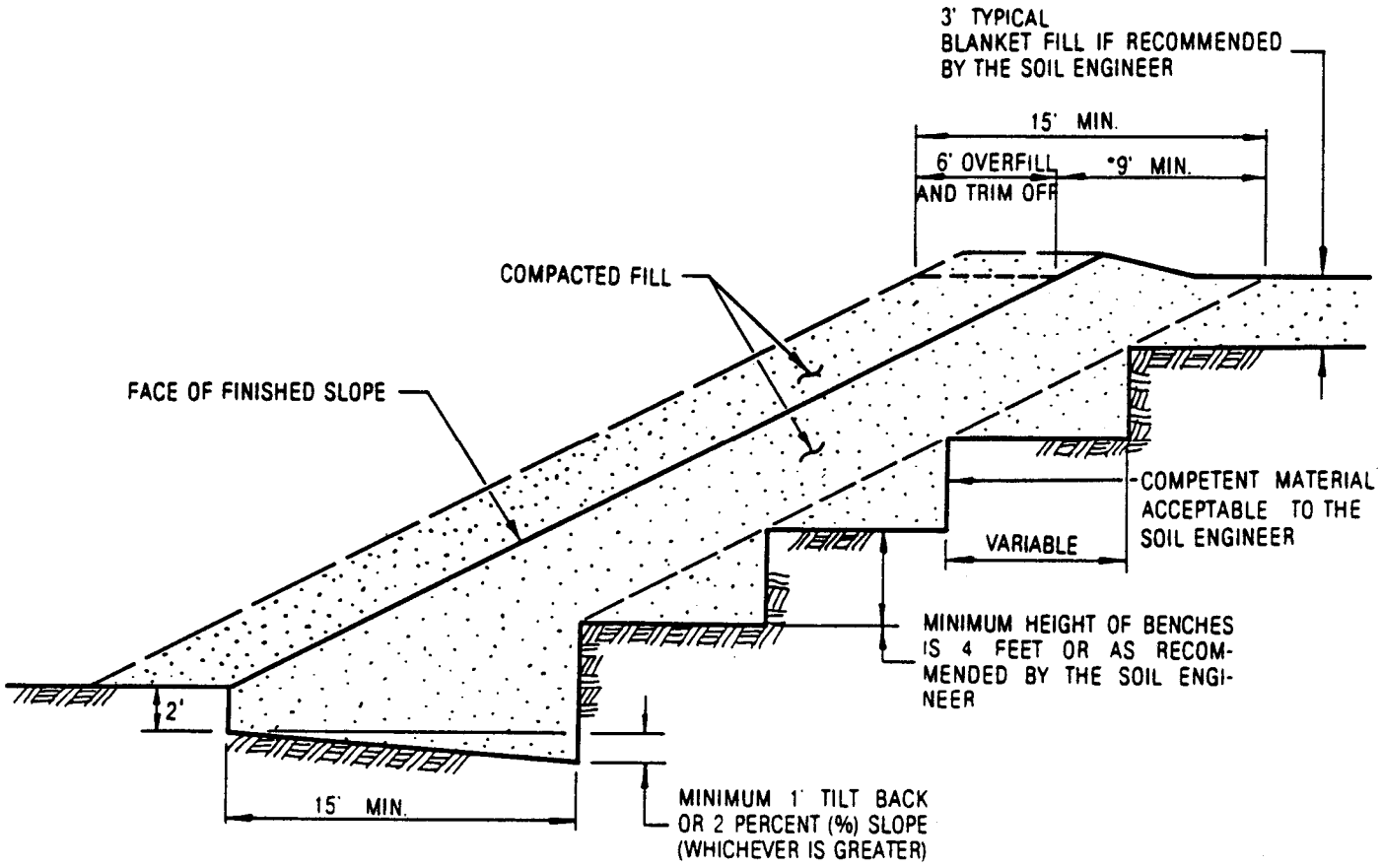
1. ALL FILL SLOPES, INCLUDING BUTTRESS AND STABILIZATION FILLS, SHALL BE OVERFILLED A MINIMUM OF SIX FEET HORIZONTALLY WITH COMPACTED FILL AND TRIMMED TO THE DESIGN FINISH GRADE.

   EXCEPTIONS:

   A. FILL SLOPE OVER CUT SLOPE.
   B. FILL SLOPE ADJACENT TO EXISTING IMPROVEMENTS.

2. THE EXCEPTIONS ABOVE WHICH DO NOT HAVE THE 6 FOOT SLOPE OVERFILL AND TRIM SHALL BE COMPACTED AS STATED IN THE PROJECT SPECIFICATIONS.

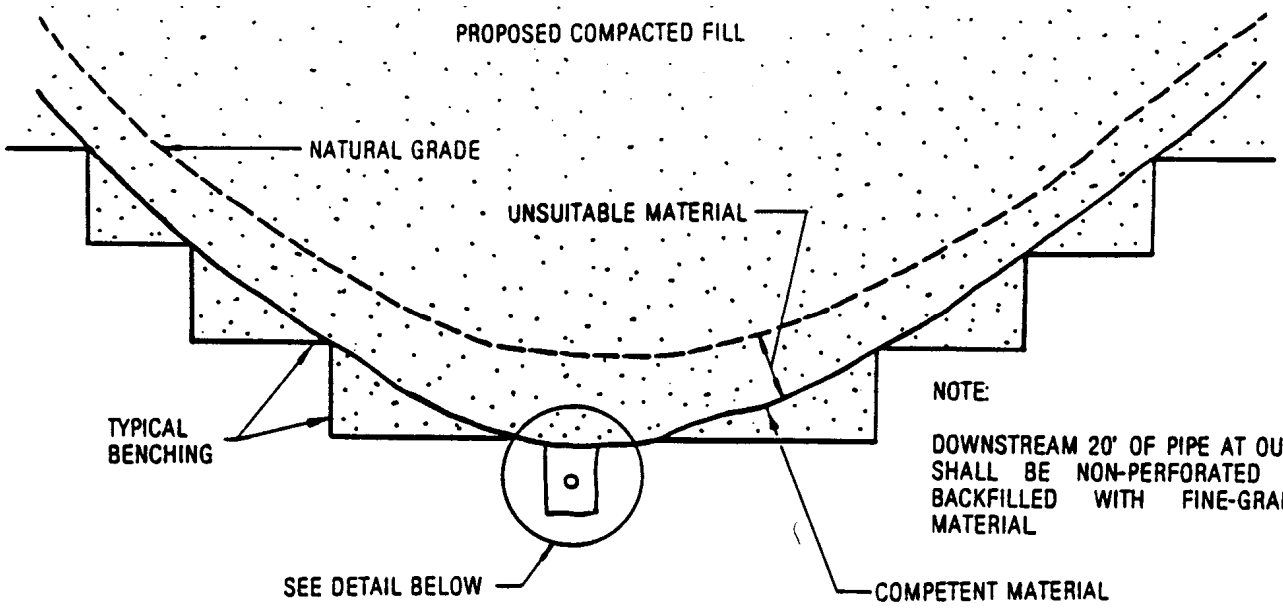
# TYPICAL STABILIZATION FILL




NOTE:
SEE PLATE 6 FOR TYPICAL SUBDRAIN DETAILS FOR STABILIZATION FILLS. IF RECOMMENDED BY THE SOIL ENGINEER.

*GREATER THAN 9' IF RECOMMENDED BY THE SOIL ENGINEER: 15' WHERE NO 6' OVERFILL

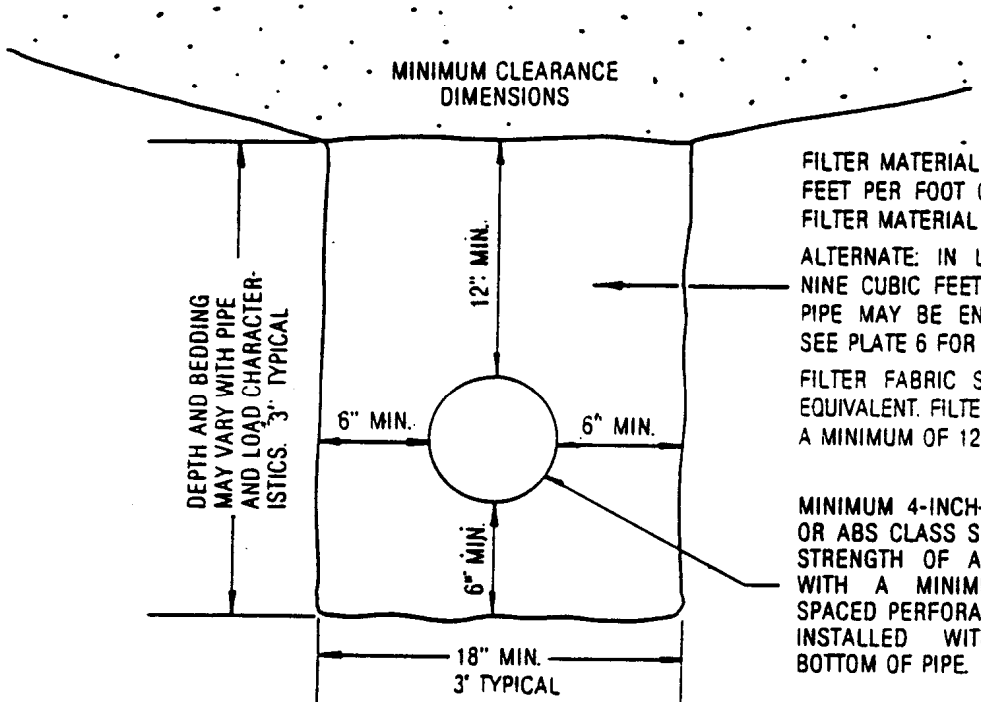
# TYPICAL CANYON SUBDRAIN




NOTE:

DOWNSTREAM 20' OF PIPE AT OUTLET SHALL BE NON-PERFORATED AND BACKFILLED WITH FINE-GRAINED MATERIAL

NOTES:
PIPE SHALL BE A MINIMUM OF 4 INCHES DIAMETER AND RUNS OF 500 FEET OR MORE USE 6-INCH DIAMETER PIPE, OR AS RECOMMENDED BY THE SOIL ENGINEER



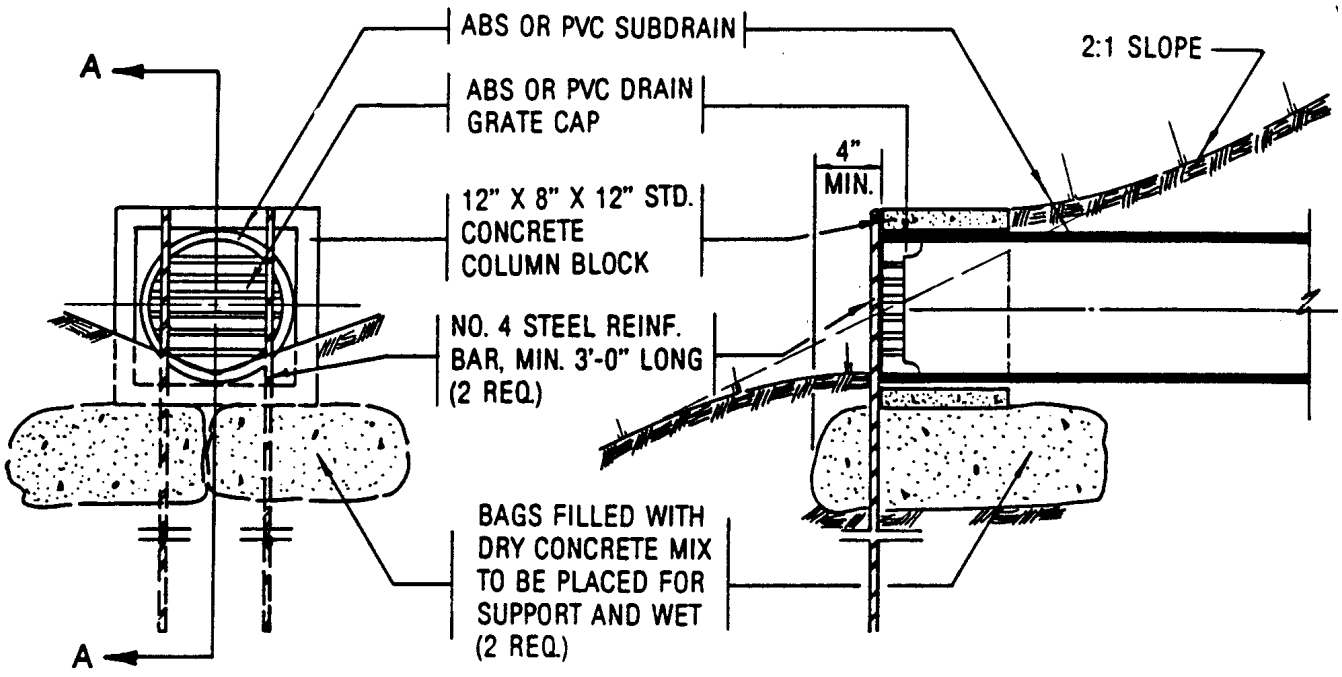

FILTER MATERIAL – MINIMUM OF NINE CUBIC FEET PER FOOT OF PIPE. SEE PLATE 6 FOR FILTER MATERIAL SPECIFICATION.

ALTERNATE: IN LIEU OF FILTER MATERIAL NINE CUBIC FEET OF GRAVEL PER FOOT OF PIPE MAY BE ENCASED IN FILTER FABRIC. SEE PLATE 6 FOR GRAVEL SPECIFICATIONS.

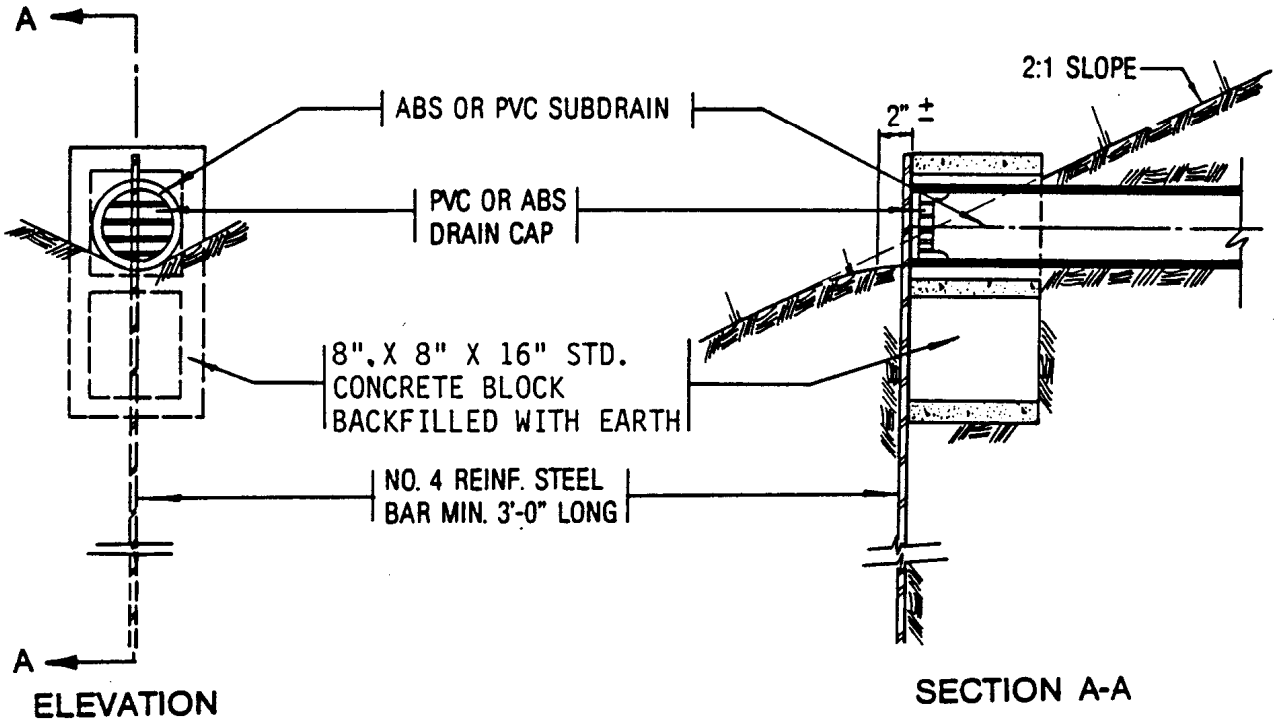
FILTER FABRIC SHALL BE MIRAFI 140 OR EQUIVALENT. FILTER FABRIC SHALL BE LAPPED A MINIMUM OF 12 INCHES ON ALL JOINTS.

MINIMUM 4-INCH-DIAMETER, PVC SCH. 40 OR ABS CLASS SDR-35 WITH A CRUSHING STRENGTH OF AT LEAST 1000 POUNDS, WITH A MINIMUM OF 8 UNIFORMLY SPACED PERFORATIONS PER FOOT OF PIPE, INSTALLED WITH PERFORATIONS ON BOTTOM OF PIPE.

# SUBDRAIN OUTLET MARKER

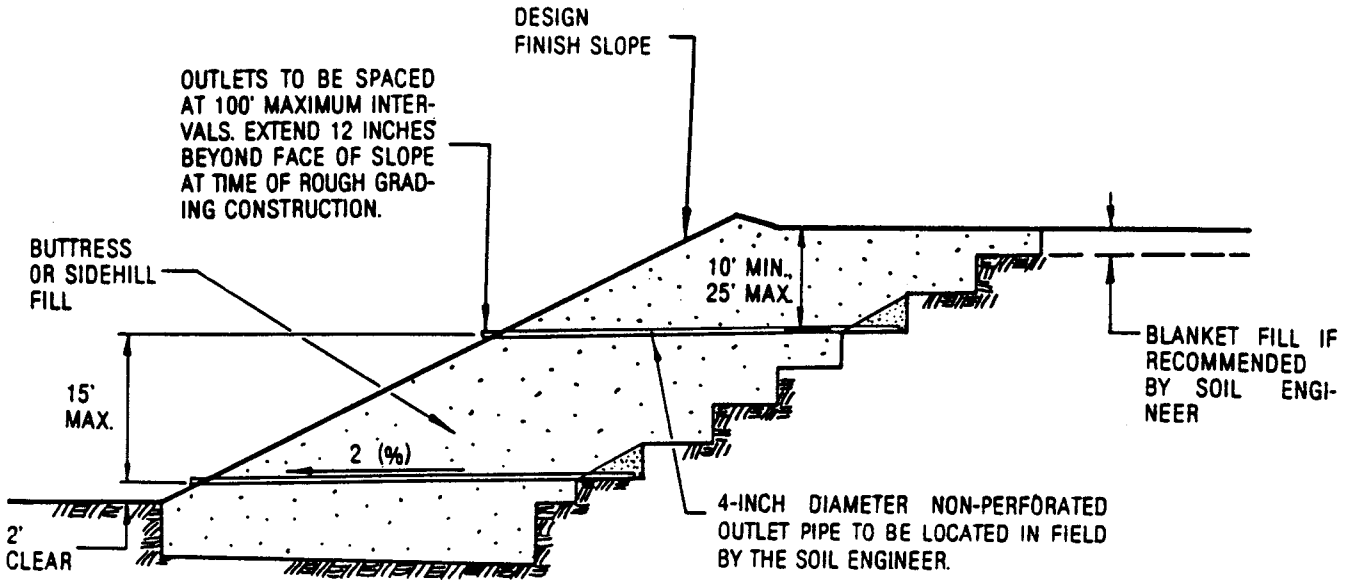



## SUBDRAIN OUTLET MARKER FOR 6" AND 8" PIPES




## SUBDRAIN OUTLET MARKER – 4" PIPE

# TYPICAL STABILIZATION AND BUTTRESS FILL SUBDRAIN




FILTER MATERIAL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT: (CONFORMS TO MA STD. PLAN 323)

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

"GRAVEL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT:

| SIEVE SIZE | MAXIMUM PERCENTAGE PASSING |
|---|---|
| 1½" | 100 |
| NO. 4 | 50 |
| NO. 200 | 8 |

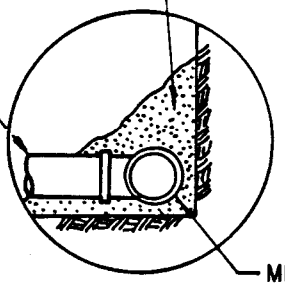
SAND EQUIVALENT = MINIMUM OF 50

FILTER MATERIAL – MINIMUM OF FIVE CUBIC FEET PER FOOT OF PIPE. SEE ABOVE FOR FILTER MATERIAL SPECIFICATION.

ALTERNATIVE: IN LIEU OF FILTER MATERIAL, FIVE CUBIC FEET OF GRAVEL PER FOOT OF PIPE MAY BE ENCASED IN FILTER FABRIC. SEE ABOVE FOR GRAVEL SPECIFICATION.

FILTER FABRIC SHALL BE MIRAFI 140 OR EQUIVALENT. FILTER FABRIC SHALL BE LAPPED A MINIMUM OF 12 INCHES ON ALL JOINTS.

OUTLET PIPE TO BE CONNECTED TO SUBDRAIN PIPE WITH TEE OR ELBOW



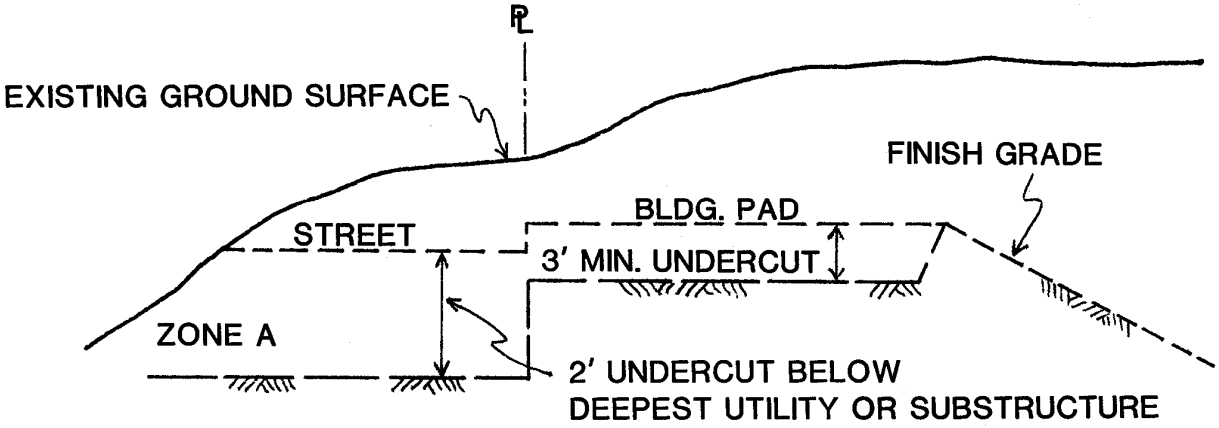
MINIMUM 4-INCH DIAMETER PVC SCH 40 OR ABS CLASS SDR 35 WITH A CRUSHING STRENGTH OF AT LEASE 1,000 POUNDS, WITH A MINIMUM OF 8 UNIFORMLY SPACED PERFORATIONS PER FOOT OF PIPE INSTALLED WITH PERFORATIONS ON BOTTOM OF PIPE. PROVIDE CAP AT UPSTREAM END OF PIPE. SLOPE AT 2 PERCENT TO OUTLET PIPE.

NOTES:

1. TRENCH FOR OUTLET PIPES TO BE BACKFILLED WITH ON-SITE SOIL.

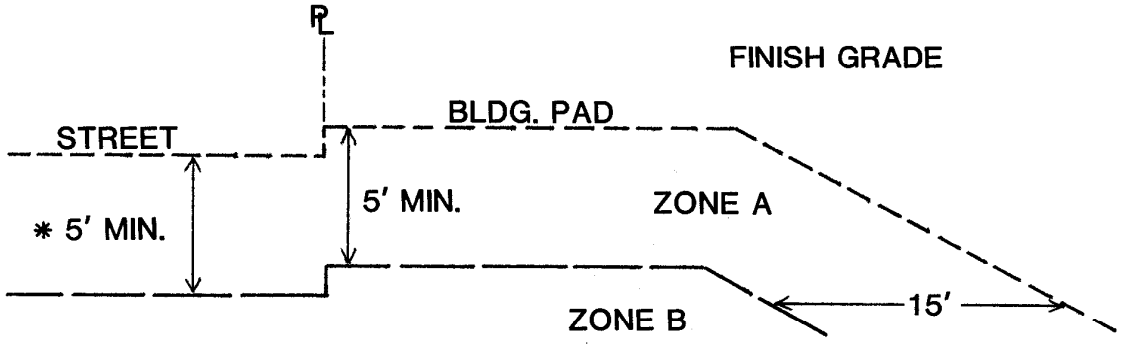
# TYPICAL CUT AND FILL GRADING DETAILS

TYPICAL GRADING WITHIN PROPOSED DEEP BEDROCK CUT AREAS




NO SCALE

TYPICAL GRADING WITHIN PROPOSED FILL AREAS



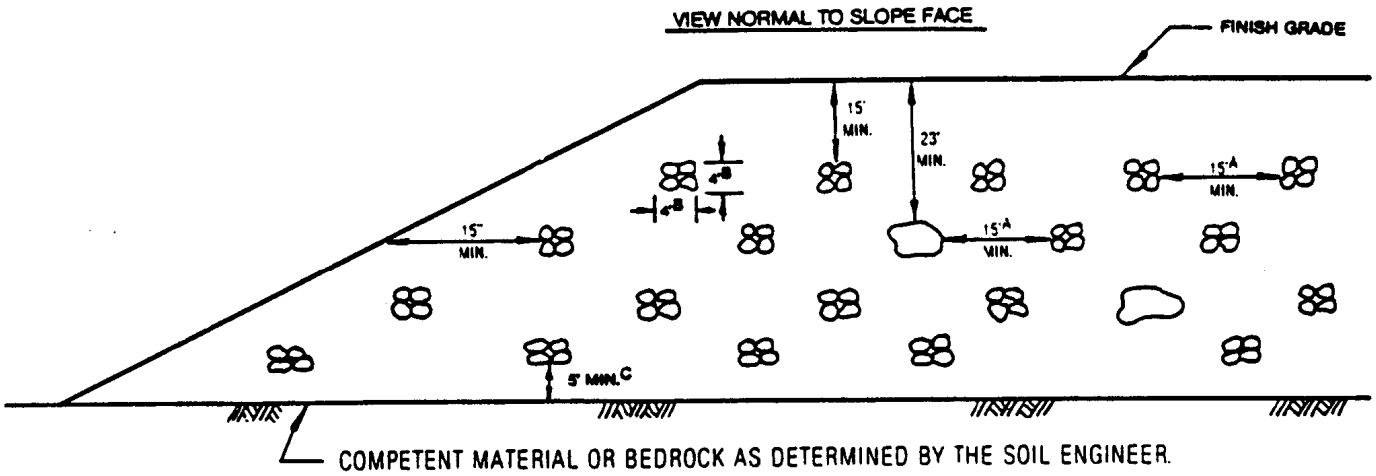

LEGEND

ZONE A ....."SOIL" FILL PLACED IN ACCORDANCE WITH THE RECOMMENDATIONS PRESENTED IN SECTION 11.2.3 OF THIS REPORT

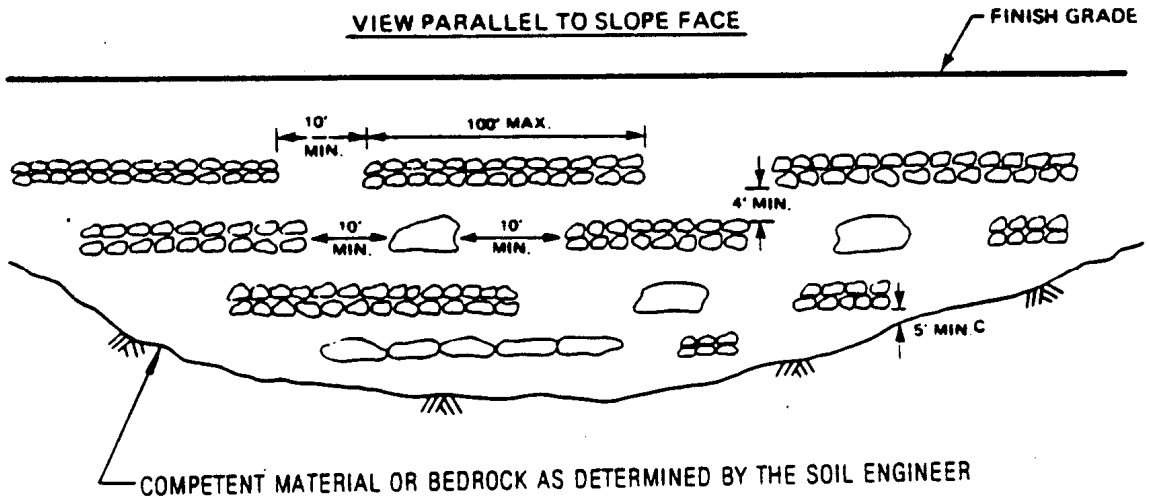
ZONE B ....."SOIL-ROCK" AND/OR "ROCK" FILL PLACED IN ACCORDANCE WITH THE RECOMMENDATIONS PRESENTED IN SECTION 11.2.3 OF THIS REPORT

* 5′ OR 1′ BELOW DEEPEST UTILITY, WHICHEVER IS GREATER

# TYPICAL OVERSIZE ROCK DISPOSAL – "SOIL-ROCK" FILL




NOTE:
ORIENTATION OF WINDROWS MAY VARY BUT SHALL BE AS RECOMMENDED BY SOIL ENGINEER.




NOTES:

A. ONE EQUIPMENT WIDTH OR A MINIMUM OF 15 FEET.
B. HEIGHT AND WIDTH MAY VARY DEPENDING ON ROCK SIZE AND TYPE OF EQUIPMENT.
C. IF APPROVED BY THE SOIL ENGINEER, WINDROWS MAY BE PLACED DIRECTLY ON COMPETENT MATERIALS OR BEDROCK PROVIDING ADEQUATE SPACE IS AVAILABLE FOR COMPACTION.
D. VOIDS IN WINDROW TO BE FILLED BY FLOODING GRANULAR SOIL INTO PLACE. GRANULAR SOIL SHALL MEAN ANY SOIL WHICH HAS A UNIFIED SOIL CLASSIFICATION SYSTEM (UBC 29-1) DESIGNATION OF SM, SP, SW, GM, GP, OR GW.
E. AFTER FILL BETWEEN WINDROWS IS PLACED AND COMPACTED WITH THE LIFT OF FILL COVERING WINDROW, WINDROW SHALL BE PROOF-ROLLED WITH D-9 DOZER OR EQUIVALENT.
F. OVERSIZED ROCK IS DEFINED AS LARGER THAN 12" IN SIZE.