REPORT OF PRELIMINARY GEOTECHNICAL INVESTIGATION

PROPOSED RESIENTIAL DEVELOPMENT

1389 LIETA STREET

SAN DIEGO, CALIFORNIA

PREPARED FOR

ALMERIA INVESTMENTS, LP

P O BOX 232628

ENCINITAS, CALIFORNIA 92023

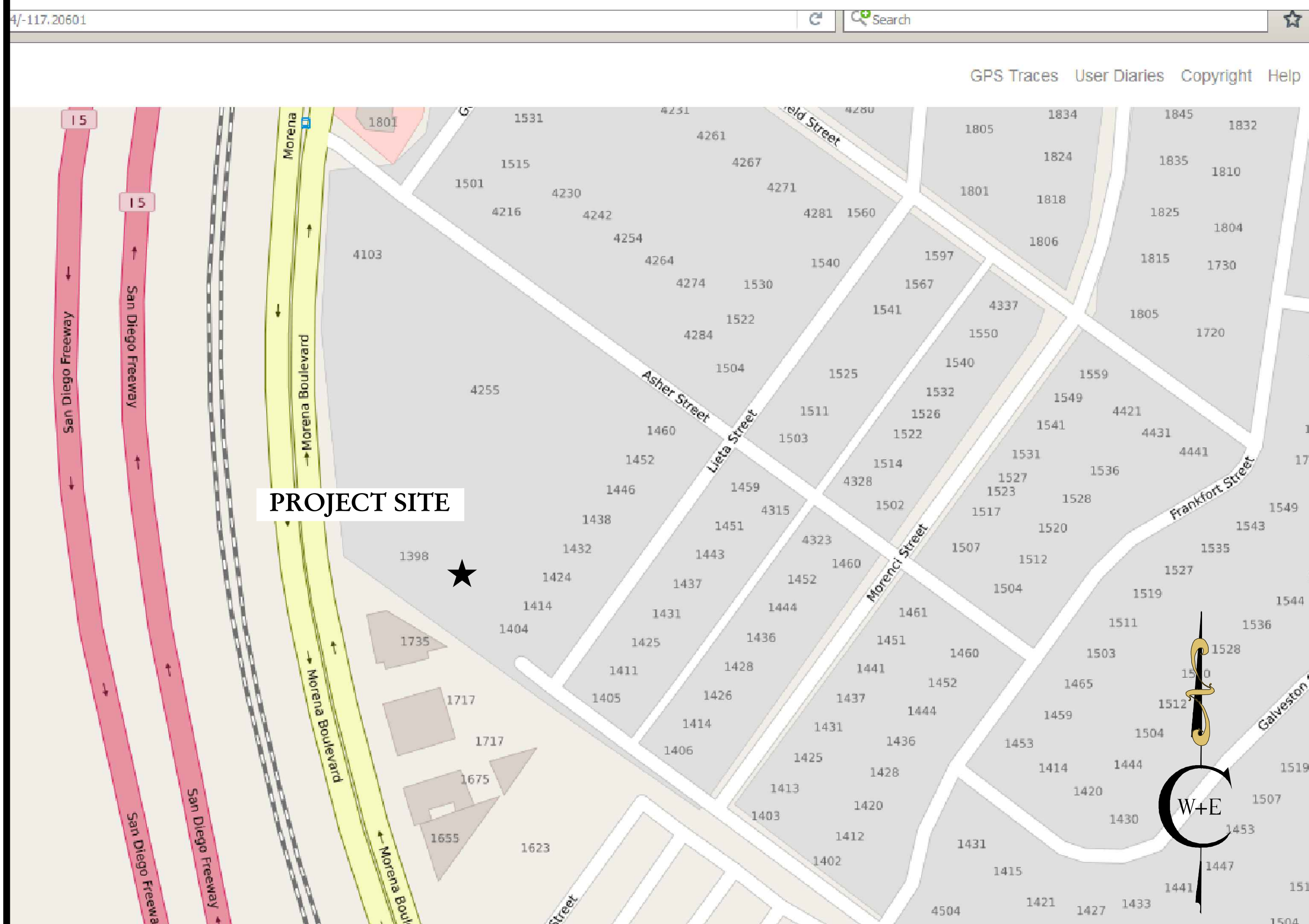
PREPARED BY

CHRISTIAN WHEELER ENGINEERING

3980 HOME AVENUE

SAN DIEGO, CALIFORNIA 92105

SITE VICINITY



PROPOSED RESIDENTIAL DEVELOPMENT **1389 LIETA STREET** **SAN DIEGO, CALIFORNIA**			
DATE:	JULY 2016	JOB NO.:	2150433.01
BY:	SRD	FIGURE NO.:	1

CHRISTIAN WHEELER
ENGINEERING

July 31, 2016

Almeria Investments, L.P. CWE 2150433.01
P.O. Box 232628
Encinitas, California 92023
Attention: Mr. Michael Fulton, General Partner

Subject: Report of Preliminary Geotechnical Investigation
Proposed Residnetial Development, 1389 Lieta Street, San Diego, California

Ladies and Gentlemen

In accordance with your request and our proposal dated July 28, 2015, we have completed a preliminary geotechnical investigation for a proposed mixed-use development to be constructed at the subject property. We are presenting herewith a report of our findings and recommendations.

It is our opinion and judgment that no geotechnical conditions exist at or in the vicinity of the subject property that would preclude the construction of the subject project as presently proposed.

If you have any questions after reviewing this report, please do not hesitate to contact our office. This opportunity to be of professional service is sincerely appreciated.

Respectfully submitted,
CHRISTIAN WHEELER ENGINEERING

Daniel B. Adler, RCE #36037 David R. Russell, CEG #2215

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PRELIMINARY GEOTECHNICAL INVESTIGATION

PROPOSED RESIDENTIAL DEVELOPMENT
1389 LIETA STREET
SAN DIEGO, CALIFORNIA

INTRODUCTION AND PROJECT DESCRIPTION

This report presents the results of a preliminary geotechnical investigation performed for a proposed residential development to be constructed at 1389 Lieta Street, San Diego, California. The following Figure No. 1 presents a vicinity map showing the location of the property.

We understand that it is proposed to develop the site to support a 13-unit residential development consisting of two separate three-story buildings. The structures will consist of on-grade parking and storage levels with two stories of residential space above. The structures are anticipated to be of wood-frame construction with on-grade, concrete floor slabs. The proposed improvements are expected to be supported by conventional shallow foundations. Site retaining walls of up to about 5 feet in height are expected and grading is expected to be limited to cuts and fills of up to about 5 feet from existing grades.

To assist in the preparation of this report, we were provided with a preliminary grading plan prepared by Civil Landworks, dated July 19, 2016. A copy of the map was used as a base map for our Site Plan and Geologic Map, and is included herein as Plate No. 1. That map was also used to prepare geologic cross sections of the site, included herein as Plates No. 2, 3, 4 and 5.

This report has been prepared for the exclusive use of Almeria Investments, LP, and its design consultants, for specific application to the project described herein. Should the project be modified, the conclusions and recommendations presented in this report should be reviewed by Christian Wheeler Engineering for conformance with our recommendations and to determine whether any additional subsurface investigation, laboratory testing and/or recommendations are necessary. Our professional services have been performed, our findings obtained and our recommendations prepared in accordance with generally accepted engineering principles and practices. This warranty is in lieu of all other warranties, expressed or implied.

SCOPE OF SERVICES

Our preliminary geotechnical investigation consisted of surface reconnaissance, subsurface exploration, obtaining representative soil samples, laboratory testing, analysis of the field and laboratory data, and review of relevant geologic literature. Our scope of service did not include assessment of hazardous substance contamination, recommendations to prevent floor slab moisture intrusion or the formation of mold within the structures, evaluation or design of storm water infiltration facilities, or any other services not specifically described in the scope of services presented below.

More specifically, the intent of our proposed investigation was to:

- Drill five exploratory borings with a truck mounted drill rig to explore the existing soil conditions.
- Backfill the boring holes using a grout or a grout/bentonite mix as required by the County of San Diego Department of Environmental Health.
- Evaluate, by laboratory tests and our past experience with similar soil types, the engineering properties of the various soil strata that may influence the proposed construction, including bearing capacities, expansive characteristics and settlement potential.
- Describe the general geology at the site, including possible geologic hazards that could have an effect on the proposed construction, and provide the seismic design parameters as required by the 2013 edition of the California Building Code.
- Quantitatively address the gross and surficial stabilities of the proposed site configuration.
- Address potential construction difficulties that may be encountered due to soil conditions, groundwater or geologic hazards, and provide geotechnical recommendations to deal with these difficulties.
- Provide site preparation and grading recommendations for the anticipated work.
- Provide foundation recommendations for the type of construction anticipated and develop soil engineering design criteria for the recommended foundation designs.

- Provide recommendations for temporary cut slopes and shoring design.
- Provide design parameters for unrestrained retaining walls.
- Provide a preliminary geotechnical report presenting the results of our investigation, including a plot plan showing the location of our subsurface explorations, excavation logs, laboratory test results, and our conclusions and recommendations for the proposed project. The report will be provided as an electronic document in Portable Document Format (PDF).

Although a test for the presence of soluble sulfates within the soils that may be in contact with reinforced concrete was performed as part of the scope of our services, it should be understood Christian Wheeler Engineering does not practice corrosion engineering. If a corrosivity analysis is considered necessary, we recommend that the client retain an engineering firm that specializes in this field to consult with them on this matter. The results of our sulfate testing should only be used as a guideline to determine if additional testing and analysis is necessary.

FINDINGS

SITE DESCRIPTION

The subject site is an irregular-shaped parcel of land located at the western terminus of Lieta Street in the Bay Park area of San Diego, California. The property is about 0.6 acres in area and is identified as Assessor's Parcel Number 430-680-09. Topographically, the majority of the site is relatively level with an elevation of about 45 feet. Relatively steep, descending slopes of up to about 20 to 25 feet in height bound the site to the south and west. Existing improvements on-site are limited to a single-story, single family residence, multiple storage sheds, and on-grade concrete slabs within the eastern portion of the site.

GENERAL GEOLOGY AND SUBSURFACE CONDITIONS

GEOLOGIC SETTING AND SOIL DESCRIPTION: The subject site is located in the Coastal Plains Physiographic Province of San Diego County. Based upon the findings of our subsurface explorations and review of readily available, pertinent geologic and geotechnical literature, it was determined that the project area is underlain by undifferentiated artificial fil/topsoil and Quaternary-age sedimentary old paralic deposits. These materials are described below. A Site Plan and Geotechnical Map depicting site geology as well geologic cross sections are presented in Plate Nos. 1 through 5.

ARTIFICIAL FILL/TOPSOIL: The majority of the site was found to be underlain by a thin layer of undifferentiated fill/topsoil extending to a maximum depth of about 2 feet from existing site grade. As encountered in the borings, these materials generally consisted of brown, dark brown, and orangish-brown, dry to moist, loose, silty sand (SM). The artificial fill/topsoil was judged to have a low expansion potential (EI between 21 and 50).

OLD PARALIC DEPOSITS (Qop): Quaternary-age old paralic deposits were encountered underlying the surficial soils. As encountered in our explorations, the old paralic generally consisted of light brown, orangish-brown, and light grayish-brown, damp to moist, medium dense to very dense, silty sand (SM), well graded sand with silt (SW-SM), and poorly graded sand (SP). The old paralic deposits were judged to have a very low to low expansion potential (EI <50).

GEOLOGIC STRUCTURE: Based on our review of the referenced geologic maps and our experience in the vicinity of the subject site, the bedding of the old paralic deposits that underlie the site is considered to be generally massive with faint bedding that dips gently ($<4°$) to the southwest.

GROUNDWATER: No groundwater was encountered in the borings, which extended to a maximum depth of 20 feet below existing site grades. However, it should be recognized that minor groundwater seepage problems might occur after construction and landscaping are completed. These are usually minor phenomena and are often the result of an alteration in drainage patterns and/or an increase in irrigation water. Based on the anticipated construction and the permeability of the on-site soils, it is our opinion that any seepage problems that may occur will be minor in extent. It is further our opinion that these problems can be most effectively corrected on an individual basis if and when they occur.

TECTONIC SETTING: Much of Southern California, including the San Diego County area, is characterized by a series of Quaternary-age fault zones that consist of several individual, en echelon faults that generally strike in a northerly to northwesterly direction. Some of these fault zones (and the individual faults within the zone) are classified as "active" according to the criteria of the California Division of Mines and Geology. Active fault zones are those that have shown conclusive evidence of faulting during the Holocene Epoch (the most recent 11,000 years). The Division of Mines and Geology used the term "potentially active" on Earthquake Fault Zone maps until 1988 to refer to all Quaternary-age (last 1.6 million years) faults for the purpose of evaluation for possible zonation in accordance with the Alquist-Priolo Earthquake Fault Zoning Act and identified all Quaternary-age faults as "potentially active" except for certain faults that were presumed to be inactive based on direct geologic evidence of inactivity during all of Holocene time or longer. Some faults considered to be "potentially active" would be considered to be "active" but lack specific criteria used by the State Geologist, such as *sufficiently active* and *well-defined*. Faults older than Quaternary-age are not specifically defined in Special Publication 42, Fault Rupture Hazard Zones in California, published by the California Division of Mines and Geology. However, it is generally accepted that faults showing no movement during the Quaternary period may be considered to be "inactive". The City of San Diego guidelines indicate that since the beginning of the Pleistocene Epoch marks the boundary between "potentially active" and "inactive" faults, unfaulted Pleistocene-age deposits are accepted as evidence that a fault may be considered to be "inactive".

A review of available geologic maps indicates that the nearest active fault zone is the Rose Canyon Fault Zone, located approximately 600 feet to the east. Other active fault zones in the region that could possibly affect the site include the Coronado Bank, San Diego Trough, and San Clemente Fault Zones to the southwest, the Newport-Inglewood and Palos Verdes Fault Zones to the northwest, and the Elsinore, Earthquake Valley, San Jacinto, and San Andreas Fault Zones to the northeast.

GEOLOGIC HAZARDS

GENERAL: The site is located in an area where the risks due to significant geologic hazards are relatively low. No geologic hazards of sufficient magnitude to preclude use of the site for residential purposes are known to exist. In our professional opinion and to the best of our knowledge, the site is suitable for the proposed improvements.

CITY OF SAN DIEGO SEISMIC SAFETY STUDY: As part of our services, we have reviewed the City of San Diego Seismic Safety Study. This study is the result of a comprehensive investigation of the City that rates areas according to geological risk potential (nominal, low, moderate, and high) and identifies potential geotechnical hazards and/or describes geomorphic conditions.

According to the San Diego Seismic Safety Map No. 20, the site is located within Geologic Hazard Category 53. Hazard Category 53 is assigned to areas of level to sloping terrain with unfavorable geologic structure, where the potential risks are classified as "low to moderate." A description of the anticipated geologic structure within the vicinity of the site is presented above in the "Geologic Structure" section of this report.

SLOPE STABILITY: As part of our study we reviewed the publication, "Landslide Hazards in the Southern Part of the San Diego Metropolitan Area" by Tan, 1995. This reference is a comprehensive study that classifies San Diego County into areas of relative landslide susceptibility. According to this publication, the site is located in within Relative Landslide Susceptibility Area 2. Area 2 is considered to be "marginally susceptible" to slope failures; Area 2 includes gentle to moderately sloping terrain, where slope failure and landsliding occurrences are rare.

Based on the proximity of the above described 20- to 25-foot-high slopes in close proximity to the southern and western boundaries of the site, we have performed a series of quantitative slope stability analyses to address the stability of the proposed site topography. These analyses are discussed in the following section of this report.

GROSS STABILITY ANALYSES

GEOLOGIC CONSIDERATIONS: The site was found to be underlain by Quaternary-age old paralic deposits that are overlain by a thin veneer of surficial soils consisting of man-placed fill and topsoil. These materials are described in the "Geologic Setting and Soil Description" section of this report. The old paralic deposit that underlie the site are generally massive. Based on this, the proposed topographies along geologic cross sections A-A', B-B', C-C', and D-D' (see Plate Nos. 2-5 of this report), were analyzed for circular-type failures mechanisms.

STRENGTH PARAMETERS: The strength parameters and unit weights for the old paralic deposits that underlie the site and crop out along the adjacent sloping areas were modeled in our analyses based on the results of direct shear testing and moisture density testing of relatively undisturbed samples and our previous experience with similar soil types in the vicinity of the subject site. It should be noted that, based on the results of our testing and experience with similar soils, the shear strengths of the materials modeled in our analyses are, in our professional opinion and judgment, appropriately conservative. In consideration of the generally massive nature of the old paralic deposits beneath the site and the level of conservatism applied in modeling the shear strengths of such materials, the use of anisotropic soil strength parameters to model localized tectonic fractures or shear zones or across and along bedding strengths of said materials was not considered necessary. The following strength parameters were used in our analysis of the global stability of the existing slope.

Soil Type	Unit Weight, g	Phi, f	Cohesion, c
Old Paralic Deposits (Qop)	120 pcf	32°	200 psf

METHOD OF GROSS STABILITY ANALYSIS: The analyses of the global stability of the prosed site topography and adjacent sloping areas was performed using Version 2 of the GSTABL7© computer program developed by Garry H. Gregory, PE. The program analyzes circular, block, specified, and randomly shaped failure surfaces using the Modified Bishop, Janbu, or Spencer's Methods. The STEDwin© computer program, developed by Harald W. Van Aller, P. E., was used in conjunction with this program for data entry and graphics display. Our analyses modeled block- and circular-type failure mechanisms. Each individual analysis was programmed to run at least 2,000 random failure surfaces. The most critical failure surfaces were then accumulated for each failure type and sorted by value of the factor-of-safety. After the specified number of failure surfaces were successfully generated and analyzed, the ten most critical surfaces were plotted so that the pattern could be studied.

Following the completion of our analysis described above along geologic cross section D-D', we performed a subsequent analysis to model the installation of a row of shear pins along the eastern portion of the site's southern boundary, which is above an existing 0.6:1 (H:V) slope of up to about 18 feet in height.

SHEAR PIN LOAD REQUIREMENTS: In order to determine the load required to "stabilize" the existing off-site slope modelled in our analyses along geologic cross section D-D', shear pin loads were input into our slope stability analysis (see Appendix E) until a factor-of-safety of at least 1.5 was obtained. Using this methodology, it was determined that the row of shear pins would need to resist a load of 5,000 pounds per linear foot of slope (plf) along the top of the adjacent (off-site) ±18-foot-high cut slope demonstrating an approximate inclination of 06.1:1 (H:V). The location of the proposed row of shear pins is shown on the Plate Number 1 of this report.

RESULTS OF GROSS STABILITY ANALYSIS: Computer printouts of our quantitative, gross stability analyses are included in Appendix E of this report. The results of our stability analyses indicate that the minimum factors-of-safety against gross, slope failures affecting the site and proposed improvements will be 1.5 or greater, provided slope the slope stabilization procedures recommended herein are implemented. A factor-of-safety of 1.5 is the minimum that is generally considered to be stable.

LIQUEFACTION: The earth materials underlying the site are not considered subject to liquefaction due to such factors as soil density, grain-size distribution, and the absence of an unconfined, free groundwater table within the undifferentiated artificial fill/alluvium.

FLOODING: As delineated on the Flood Insurance Rate Map (FIRM) prepared by the Federal Emergency Management Agency, the site is not located within either the 100-year flood zone or the 500-year flood zone.

TSUNAMIS: Tsunamis are great sea waves produced by submarine earthquakes or volcanic eruptions. The site is not within the projected tsunami inundation area presented on the La Jolla Quadrangle of the Tsunami Inundation Map for Emergency Planning (CEMA, 2009). Furthermore, due to the site's setback from the ocean and elevation, it is not considered directly susceptible from damage from tsunamis.

SEICHES: Seiches are periodic oscillations in large bodies of water such as lakes, harbors, bays or reservoirs. Due to the site's location, it is considered to have a negligible risk potential for seiches.

CONCLUSIONS AND DISCUSSION

In general, it is our professional opinion and judgment that the subject property is suitable for the construction of the subject project and associated improvements provided the recommendations presented herein are implemented. The main geotechnical conditions encountered affecting the proposed project include potentially compressible fill soils and topsoils, soils collapsible upon saturation, and existing steep slopes at property lines. These conditions are discussed hereinafter.

As encountered in our subsurface explorations, the site is underlain by a relatively thin layer of potentially compressible artificial soils/topsoil extending to a maximum depth of about 2 feet below existing grade. These deposits are considered unsuitable, in their present condition, for the support of settlement sensitive improvements. In addition, the old paralic deposits were found to be moderately potentially collapsible upon saturation. It is recommended that these conditions be mitigated by the removal of the artificial fill/topsoil and the partial removal of the old paralic deposits. The soils removed may be replaced as compacted fill.

Relatively steep slopes exist adjacent to the southern and western property lines. The soils are primarily comprised of sandy old paralic deposits with a high erosion potential. For the most part, our calculations indicate that the slopes to have an acceptable theoretical gross stability factor of safety (FS > 1.5). The portion of the slope represented by section D-D' has, in its current condition, a gross stability calculated factor-of-safety of 1.2. In order to increase the factor of safety to at least 1.5, it is recommended that a row of shear pins be constructed in the general location shown in Plate No. 1. It is further our opinion that it will be prudent to locate the proposed structures no closer than 20 feet from the top of existing slopes. If the structures are located closer than 20 feet from the top of existing slopes, their foundations should be deepened to achieve this setback.

The site is located in an area that is relatively free of geologic hazards that will have a significant effect on the proposed construction. The most likely geologic hazard that could affect the site is ground shaking due to seismic activity along one of the regional active faults. However, construction in accordance with the requirements of the most recent edition of the California Building Code and the local governmental agencies should provide a level of life-safety suitable for the type of development proposed.

RECOMMENDATIONS

GRADING AND EARTHWORK

GENERAL: All grading should conform to the guidelines presented in the current edition of the California Building Code, the minimum requirements of the City of San Diego, and the recommended Grading Specifications and Special Provisions attached hereto, except where specifically superseded in the text of this report.

PREGRADE MEETING: It is recommended that a pregrade meeting including the grading contractor, the client, and a representative from Christian Wheeler Engineering be performed, to discuss the recommendations of this report and address any issues that may affect grading operations.

CLEARING AND GRUBBING: Site preparation should begin with the removal of existing structures and associated improvements slated for demolition. The resulting debris, any existing vegetation, and other deleterious materials in areas to receive proposed improvements or new fill soils should be removed from the site.

SITE PREPARATION: It is recommended that existing artificial fill/topsoil underlying proposed structures, associated improvements, and new fills should be removed in its entirety. In addition, old paralic deposits within 4 feet from finish or existing grade, whichever is deeper, should be removed. Deeper removals may be necessary in areas of the site not investigated or due to unforeseen conditions. Lateral removals limits should extend at least 5 feet from the perimeter of the structures, any settlement sensitive improvements, and new fills or equal to removal depth, whichever is more. No removals are recommended beyond property lines. All excavated areas should be approved by the geotechnical engineer or his representative prior to replacing any of the excavated soils. The excavated materials can be replaced as properly compacted fill in accordance with the recommendations presented in the "Compaction and Method of Filling" section of this report.

PROCESSING OF FILL AREAS: Prior to placing any new fill soils or constructing any new improvements in areas that have been cleaned out to receive fill, the exposed soils should be scarified to a depth of 12 inches, moisture-conditioned, and compacted to at least 90 percent relative compaction.

COMPACTION AND METHOD OF FILLING: In general, all structural fill placed at the site should be compacted to a relative compaction of at least 90 percent of its maximum laboratory dry density as determined by ASTM Laboratory Test D1557. Fills should be placed at or slightly above optimum moisture content, in lifts six to eight inches thick, with each lift compacted by mechanical means. Fills should consist of approved earth material, free of trash or debris, roots, vegetation, or other materials determined to be unsuitable by the Geotechnical Consultant. Fill material should be free of rocks or lumps of soil in excess of 6 inches in maximum dimension.

Utility trench backfill within 5 feet of the proposed structures and beneath all concrete flatwork or pavements should be compacted to a minimum of 90 percent of its maximum dry density.

SURFACE DRAINAGE: The drainage around the proposed improvements should be designed to collect and direct surface water away from proposed improvements and the top of slopes toward appropriate drainage facilities. Rain gutters with downspouts that discharge runoff away from the structure into controlled drainage devices are recommended.

The ground around the proposed improvements should be graded so that surface water flows rapidly away from the improvements without ponding. In general, we suggest that the ground adjacent to structures be sloped away at a minimum gradient of 2 percent. In densely vegetated areas where runoff can be impaired we suggest a minimum gradient of 5 percent for the first 5 feet from the structure. It is essential that new and existing drainage patterns be coordinated to produce proper drainage. Pervious hardscape surfaces adjacent to structures should be similarly graded.

Drainage patterns provided at the time of construction should be maintained throughout the life of the proposed improvements. Site irrigation should be limited to the minimum necessary to sustain landscape growth. Over watering should be avoided. Should excessive irrigation, impaired drainage, or unusually high rainfall occur, zones of wet or saturated soil may develop.

TEMPORARY CONSTRUCTION SLOPES: Temporary cut slopes up to about 10 feet in height may be necessary for the construction of the proposed underground utilities. Temporary slopes should be constructed at a continuous 1:1 (horizontal to vertical) inclination or flatter. However, any unshored temporary excavations exposing cohesionless sands should be constructed at a continuous 2:1 (horizontal to vertical) inclination. All temporary slopes should be observed by the engineering geologist during grading to ascertain that no unforeseen adverse conditions exist. No surcharge loads such as adjacent building foundations, soil or equipment stockpiles, vehicles, etc. should be allowed within a distance from the top of temporary slopes equal to half the slope height.

It should be noted that the contractor is solely responsible for designing and constructing stable, temporary excavations and may need to shore, slope, or bench the sides of trench excavations as required to maintain the stability of the excavation sides. The contractor's "competent person", as defined in the OSHA Construction Standards for Excavations, 29 CFR, Part 1926, should evaluate the soil exposed in the excavations as part of the contractor's safety process. Temporary cut slopes should be constructed in accordance with the recommendations presented in this section. In no other case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations.

SHEAR PINS

GENERAL: As indicated by the results of our slope stability analyses presented in Appendix E of this report, we have determined that a single row of shear pins, installed along and adjacent to the steep (±0.6:1 (H:V)) off-site slope along the east side of the site's southern boundary will increase the minimum factor-of-safety against gross slope failures to 1.7, provided the shear pins are designed to resist a force of 5,000 pounds for each linear foot of slope between the shear pins.

LATERAL LOADS ON SHEAR PINS: The shear pins should be designed to resist forces of 5 kips for each linear foot of slope between the shear pins. This load may be assumed to act at depth equal to the elevation of the toe of the adjacent slope.

MINIMUM SHEAR PIN DIMENSIONS: As a minimum, the shear pins should be embedded at least 20 feet below proposed site grades. However, the depth may be greater to satisfy the required lateral capacities of the proposed shear pins. Shear pins should have a minimum diameter of 24 inches. The project structural engineer should design all shear pin locations, dimensions, and pier reinforcing using the recommendations and design parameters herein. However, the shear pins should be spaced no farther than three pier diameters.

SHEAR PIN REINFORCING: Piers should be reinforced in accordance with the recommendations of the project structural engineer. The reinforcing cages should extend the full depth of the shear pins.

SHEAR PIN LATERAL CAPACITY: The passive pressure for the competent formational materials below the elevation of the toe of the adjacent slope may be considered to be 400 pounds per square foot per foot of depth, up to a maximum value of 4,000 psf. This value may be assumed to act on an area equal to twice the pier diameter.

SHEAR PIN EXCAVATION OBSERVATION: All pier excavations should be observed by the Geotechnical Consultant prior to placing the reinforcing steel cage to determine if the soil and geologic conditions are similar to the conditions anticipated in the preparation of this report. It should be recognized that downhole logging of some of the shear pin excavations by an engineering geologist may be necessary.

FOUNDATIONS

GENERAL: Based on our findings and engineering judgment, the proposed structures may be supported by conventional shallow continuous and isolated spread footings. Deepened conventional foundations or drilled cast-in-place concrete piers may be needed to support portions of the structures if the recommended structural setback of 20 feet is unfeasible. The following recommendations are considered the minimum based on the anticipated soil conditions after site preparation as recommended in this report is performed, and are not intended to be lieu of structural considerations. All foundations should be designed by a qualified professional.

SHALLOW FOUNDATIONS

GENERAL: Spread footings supporting the proposed structures should be embedded at 24 inches below lowest adjacent finish pad grade. For light miscellaneous exterior improvements, the minimum embedment may be reduced to 12 inches. Continuous and isolated footings should have a minimum width of 12 inches and 24 inches, respectively. Retaining wall footings should be at least 18 inches deep and 24 inches wide.

BEARING CAPACITY: Spread footings supporting the proposed structures with a minimum embedment depth of 24 inches and minimum width of 12 inches may be designed for an allowable soil bearing pressure of 2,000 pounds per square foot (psf). This value may be increased by 600 psf for each additional foot of embedment depth and 400 psf for each additional foot of width, up to a maximum of 4,000 psf. The bearing values may also be increased by one-third for combinations of temporary loads such as those due to wind or seismic loads.

FOOTING REINFORCING: Reinforcement requirements for foundations should be provided by a structural designer. However, based on the expected soil conditions, we recommend that the minimum reinforcing for continuous footings consist of at least 2 No. 5 bars positioned near the bottom of the footing and 2 No. 5 bars positioned near the top of the footing.

LATERAL LOAD RESISTANCE: Lateral loads against foundations may be resisted by friction between the bottom of the footing and the supporting soil, and by the passive pressure against the footing. The coefficient of friction between concrete and soil may be considered to be 0.30 for the underground portion of the structure. The passive resistance may be considered to be equal to an equivalent fluid weight of 300 pounds per cubic foot (pcf). These values are based on the assumption that the footings are poured tight against undisturbed soil. If a combination of the passive pressure and friction is used, the friction value should be reduced by one-third.

CAST-IN-PLACE CONCRETE PIERS

MINIMUM PIER DIMENSIONS: Cast-in-place concrete pier foundations should have a minimum diameter of 24 inches. The piers should extend to a minimum depth of 10 feet below finish grade. At this depth, a bearing capacity of 5,000 pounds per square foot (psf) may be assumed for said piers. This bearing pressure may be increased by 800 psf for each additional foot of depth, and 600 psf for each additional foot of width, up to a maximum bearing pressure of 15,000 psf. This value may be increased by one-third when considering wind and/or seismic loads.

PIER REINFORCING: The reinforcing steel for the piers should be specified by the project structural engineer. As a minimum, we recommend that the pier reinforcing extend the full depth of the pier excavation.

LATERAL BEARING CAPACITY: The allowable lateral bearing resistance to lateral loads may be assumed to be 400 pounds per square foot per foot of depth up to a maximum of 4,000 pounds per square foot. This value may be assumed to start at a depth such that a minimum horizontal distance of 10 feet exists between the face of the slope and the pier, and may be assumed to act on an area equal to twice the pier diameter.

EXCAVATION CHARACTERISTICS: It is anticipated that the proposed piers may be drilled utilizing conventional drilling equipment in good working condition. Caving conditions may occur due to the cohesionless nature of some of the old paralic deposits.

PIER EXCAVATION OBSERVATION AND CLEANING: All pier excavations should be observed by Christian Wheeler Engineering during drilling to determine whether the minimum pier depth recommended has been achieved and that the foundation soils are as anticipated in the preparation of this report. Prior to placing the steel reinforcing cages, all loose or disturbed soils at the bottom of the pier excavations should be removed. The cleanout of the pier excavations should be approved by the geotechnical engineer.

SETTLEMENT CHARACTERISTICS: The anticipated total and differential footing static settlement is expected to be less than about 1 inch and 1 inch in 40 feet, respectively, provided the recommendations presented in this report are followed. It should be recognized that minor cracks normally occur in concrete slabs and foundations due to concrete shrinkage during curing or redistribution of stresses, therefore some cracks should be anticipated. Such cracks are not necessarily an indication of excessive vertical movements.

EXPANSIVE CHARACTERISTICS: The anticipated foundation soils underlying the proposed structure and associated improvements are expected to have a very low expansion potential ($EI < 20$). The recommendations presented in this report reflect this condition.

FOUNDATION PLAN REVIEW: The final foundation plan and accompanying details and notes should be submitted to this office for review. The intent of our review will be to verify that the plans used for construction reflect the minimum dimensioning and reinforcing criteria presented in this section and that no additional criteria are required due to changes in the foundation type or layout. It is not our intent to review structural plans, notes, details, or calculations to verify that the design engineer has correctly applied the geotechnical design values. It is the responsibility of the design engineer to properly design/specify the foundations and other structural elements based on the requirements of the structure and considering the information presented in this report.

FOUNDATION EXCAVATION OBSERVATION: All foundation excavations should be observed by the Geotechnical Consultant prior to constructing forms or placing reinforcing steel to determine if the foundation recommendations presented herein are complied with. All footing excavations should be excavated neat, level and square. All loose or unsuitable material should be removed prior to the placement of concrete.

SOLUBLE SULFATES: The water soluble sulfate content of selected soil samples from the site was determined in accordance with California Test Method 417. The results of these tests indicate a soluble sulfate content of 0.005 percent. Soils with a soluble sulfate content of less than 0.1 percent are considered to be negligible.

SEISMIC DESIGN FACTORS

The seismic design factors applicable to the subject site are provided below. The seismic design factors were determined in accordance with the 2013 California Building Code. The site coefficients and adjusted maximum considered earthquake spectral response acceleration parameters are presented in the following Table I.

TABLE I: SEISMIC DESIGN FACTORS

Site Coordinates: Latitude Longitude	32.778° -117.207°
Site Class	D
Site Coefficient F_a	1.0
Site Coefficient F_v	1.508
Spectral Response Acceleration at Short Periods S_s	1.272 g
Spectral Response Acceleration at 1 Second Period S_1	0.492 g
$S_{MS}=F_aS_s$	1.272 g
$S_{M1}=F_vS_1$	0.742 g
$S_{DS}=2/3*S_{MS}$	0848 g
$S_{D1}=2/3*S_{M1}$	0.494 g

Probable ground shaking levels at the site could range from slight to moderate, depending on such factors as the magnitude of the seismic event and the distance to the epicenter. It is likely that the site will experience the effects of at least one moderate to large earthquake during the life of the proposed improvements.

ON-GRADE SLABS

GENERAL: It is our understanding that the floor system of the proposed structures will consist of a concrete slab. The following recommendations are considered the minimum slab requirements based on the soil conditions and are not intended in lieu of structural considerations.

CONVENTIONAL CONCRETE SLABS: The minimum slab thickness should be 5 inches (actual) and the slab should be reinforced with at least No. 4 bars spaced at 18 inches on center each way. Slab reinforcement should be supported on chairs such that the reinforcing bars are positioned at midheight in the floor slab. The slab reinforcement should extend down into the perimeter footings at least 12 inches.

UNDER-SLAB VAPOR RETARDERS: Steps should be taken to minimize the transmission of moisture vapor from the subsoil through the interior slabs where it can potentially damage the interior floor coverings. Local industry standards typically include the placement of a vapor retarder, such as plastic, in a layer of coarse sand placed directly beneath the concrete slab. In this case 2 inches of sand above and below the plastic are suggested. The vapor retarder should be at least 15-mil Stegowrap® or similar material with sealed seams and should extend at least 12 inches down the sides of the interior and perimeter footings. The sand should have a sand equivalent of at least 30, and contain less than 10% passing the Number 100 sieve and less than 5% passing the Number 200 sieve. The membrane should be placed in accordance with the recommendation and consideration of ACI 302, "Guide for Concrete Floor and Slab Construction" and ASTM E1643, "Standards Practice for Installation of Water Vapor Retarder Used in Contact with Earth or Granular Fill Under Concrete Slabs." It is the flooring contractor's responsibility to place floor coverings in accordance with the flooring manufacturer specifications.

EXTERIOR CONCRETE FLATWORK: Exterior concrete slabs-on-grade should have a minimum thickness of 4 inches and be reinforced with at least No. 3 bars placed at 18 inches on center each way (ocew). Exterior concrete slabs adjacent to the structure should be doweled to perimeter footings as recommended by the structural engineer. Driveway slabs should have a minimum thickness of 5 inches and be reinforced with at least No. 4 bars placed at 12 inches ocew. Driveway slabs should be provided with a thickened edge a least 18 inches deep and 6 inches wide. All slabs should be provided with weakened plane joints in accordance with the American Concrete Institute (ACI) guidelines. Special attention should be paid to the method of concrete curing to reduce the potential for excessive shrinkage cracking. It should be recognized that minor cracks occur normally in concrete slabs due to shrinkage. Some shrinkage cracks should be expected and are not necessarily an indication of excessive movement or structural distress.

EARTH RETAINING WALLS

FOUNDATIONS: Foundations for any proposed retaining walls should be constructed in accordance with the foundation recommendations presented previously in this report.

PASSIVE PRESSURE: The passive pressure for the anticipated foundation soils may be considered to be 300 pounds per square foot per foot of depth. The coefficient of friction for concrete to soil may be assumed to be 0.30 for the resistance to lateral movement. This pressure may be increased by one-third for seismic loading. When combining frictional and passive resistance, the friction should be reduced by one-third. The upper one foot of soil should be neglected in passive pressure calculations where the footing is abutted by landscaping.

ACTIVE PRESSURE: The active soil pressure for the design of unrestrained and restrained earth retaining structures with level backfill may be assumed to be equivalent to the pressure of a fluid weighing 39 and 60 pounds per cubic foot, respectively. This pressure does not consider any surcharges. If any are anticipated, this office should be contacted for the necessary increase in soil pressure. These values assume a drained backfill condition.

Seismic lateral earth pressures may be assumed to equal an inverted triangle starting at the bottom of the wall with the maximum pressure equal to 11H pounds per square foot (where H = wall height in feet) occurring at the top of the wall.

WATERPROOFING AND WALL DRAINAGE SYSTEMS: Due to the anticipated high moisture content of the underground garage foundation soils special waterproofing measures should be implemented. Waterproofing recommendations should be provided by a project's waterproofing consultant. The project architect should provide (or coordinate) waterproofing details for the retaining walls. The design values presented above are based on a drained backfill condition and do not consider hydrostatic pressures. Unless hydrostatic pressures are incorporated into the design, the retaining wall designer should provide a detail for a wall drainage system. Typical retaining wall drain system details are presented as Plate No. 6 of this report for informational purposes. Additionally, outlets points for the retaining wall drain system should be coordinated with the project civil engineer. It is assumed that sump pumps will be necessary to discharge retaining wall subdrains.

BACKFILL: All backfill soils should be compacted to at least 90 percent relative compaction. Expansive or clayey soils should not be used for backfill material. The wall should not be backfilled until the masonry has reached an adequate strength.

LIMITATIONS

REVIEW, OBSERVATION AND TESTING

The recommendations presented in this report are contingent upon our review of final plans and specifications. Such plans and specifications should be made available to the geotechnical engineer and engineering geologist so that they may review and verify their compliance with this report and with the California Building Code.

It is recommended that Christian Wheeler Engineering be retained to provide continuous soil engineering services during the earthwork operations. This is to verify compliance with the design concepts, specifications or recommendations and to allow design changes in the event that subsurface conditions differ from those anticipated prior to start of construction.

UNIFORMITY OF CONDITIONS

The recommendations and opinions expressed in this report reflect our best estimate of the project requirements based on an evaluation of the subsurface soil conditions encountered at the subsurface exploration locations and on the assumption that the soil conditions do not deviate appreciably from those encountered. It should be recognized that the performance of the foundations and/or cut and fill slopes may be influenced by undisclosed or unforeseen variations in the soil conditions that may occur in the intermediate and unexplored areas. Any unusual conditions not covered in this report that may be encountered during site development should be brought to the attention of the geotechnical engineer so that he may make modifications if necessary.

CHANGE IN SCOPE

This office should be advised of any changes in the project scope or proposed site grading so that we may determine if the recommendations contained herein are appropriate. This should be verified in writing or modified by a written addendum.

TIME LIMITATIONS

The findings of this report are valid as of this date. Changes in the condition of a property can, however, occur with the passage of time, whether they be due to natural processes or the work of man on this or adjacent properties. In addition, changes in the Standards-of-Practice and/or Government Codes may occur. Due to such changes, the findings of this report may be invalidated wholly or in part by changes beyond our control. Therefore, this report should not be relied upon after a period of two years without a review by us verifying the suitability of the conclusions and recommendations.

PROFESSIONAL STANDARD

In the performance of our professional services, we comply with that level of care and skill ordinarily exercised by members of our profession currently practicing under similar conditions and in the same locality. The client recognizes that subsurface conditions may vary from those encountered at the locations where our borings, surveys, and explorations are made, and that our data, interpretations, and recommendations be based solely on the information obtained by us. We will be responsible for those data, interpretations, and recommendations, but shall not be responsible for the interpretations by others of the information developed. Our services consist of professional consultation and observation only, and no warranty of any kind whatsoever, express or implied, is made or intended in connection with the work performed or to be performed by us, or by our proposal for consulting or other services, or by our furnishing of oral or written reports or findings.

CLIENT'S RESPONSIBILITY

It is the responsibility of the Client, or its representatives, to ensure that the information and recommendations contained herein are brought to the attention of the structural engineer and architect for the project and incorporated into the project's plans and specifications. It is further their responsibility to take the necessary measures to insure that the contractor and his subcontractors carry out such recommendations during construction.

FIELD EXPLORATIONS

Five subsurface explorations were made on December 18, 2015 at the locations indicated on the Site Plan and Geotechnical Map included herewith as Plate No. 1. These explorations consisted of small diameter borings utilizing a truck mounted drill rig (Deidrich D50). The fieldwork was conducted under the observation and direction of our engineering geology personnel.

The explorations were carefully logged when made. The logs are presented on Appendix A. The soils are described in accordance with the Unified Soils Classification. In addition, a verbal textural description, the wet color, the apparent moisture, and the density or consistency is provided. The density of granular soils is given as very loose, loose, medium dense, dense or very dense. The consistency of silts or clays is given as either very soft, soft, medium stiff, stiff, very stiff, or hard.

Relatively undisturbed drive samples were collected using a modified California sampler. The sampler, with an external diameter of 3.0 inches, is lined with 1-inch long, thin, brass rings with inside diameters of approximately 2.4 inches. The sample barrel was driven into the ground with the weight of a 140-pound hammer falling 30 inches in general accordance with ASTM D 3550-84. The driving weight is permitted to fall freely. The number of blows per foot of driving, or as indicated, are presented on the boring logs as an index to the relative resistance of the sampled materials. The samples were removed from the sample barrel in the brass rings, and sealed. Bulk samples of the earth materials encountered were also collected. Samples were transported to our laboratory for testing.

LABORATORY TESTING

Laboratory tests were performed in accordance with the generally accepted American Society for Testing and Materials (ASTM) test methods or suggested procedures. A brief description of the tests performed and the subsequent results are presented in Appendix B.

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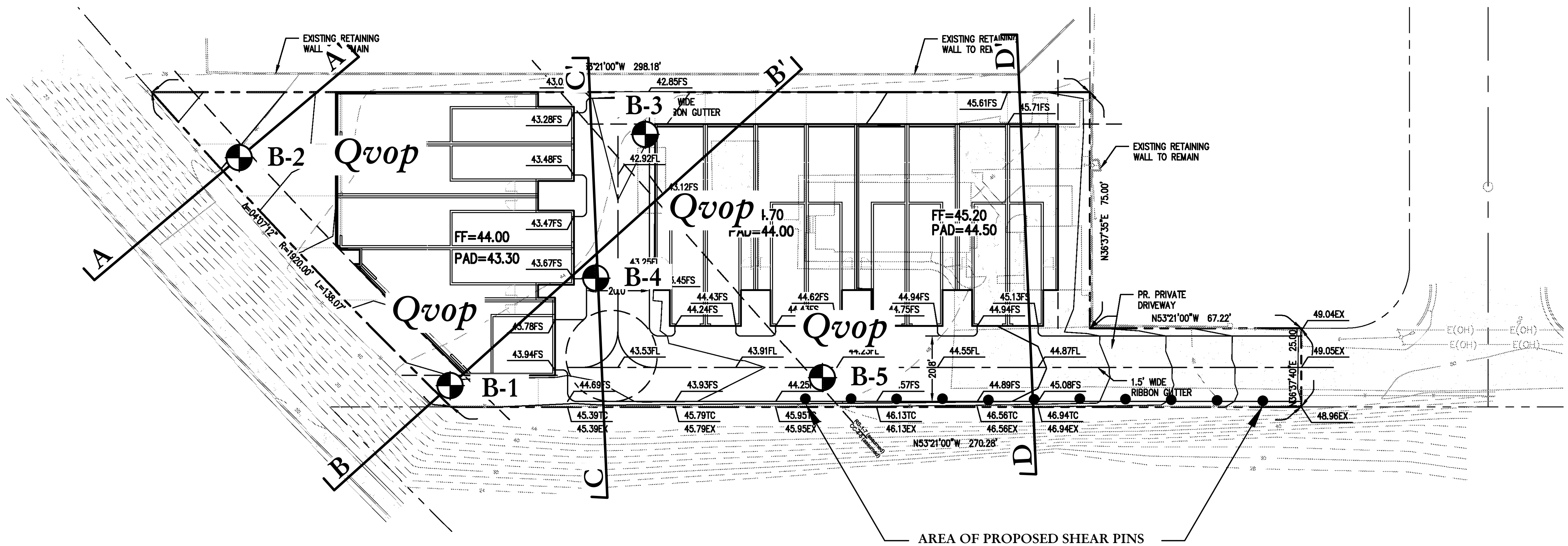
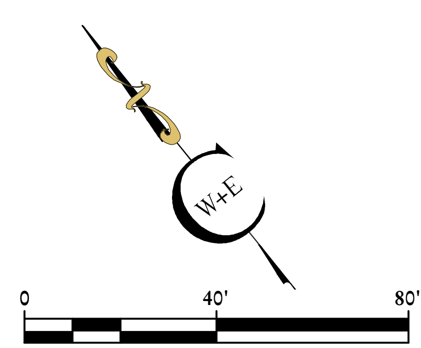
ATTACHMENTS





SCALE: 1" = 40'

CWE LEGEND

B-5	APPROXIMATE BORING LOCATION
C C'	GEOLOGIC CROSS SECTION
Qvop	VERY OLD PARALIC DEPOSITS

ENGINEER

CIVIL LANDWORKS CORP.
110 COPPERWOOD WAY, SUITE P
OCEANSIDE, CA 92058
760-908-8745

DAVID V. CARON 7-19-16

REGISTERED PROFESSIONAL ENGINEER DAVID V. CARON No.C070066 EXP.09/30/16 CIVIL STATE OF CALIFORNIA

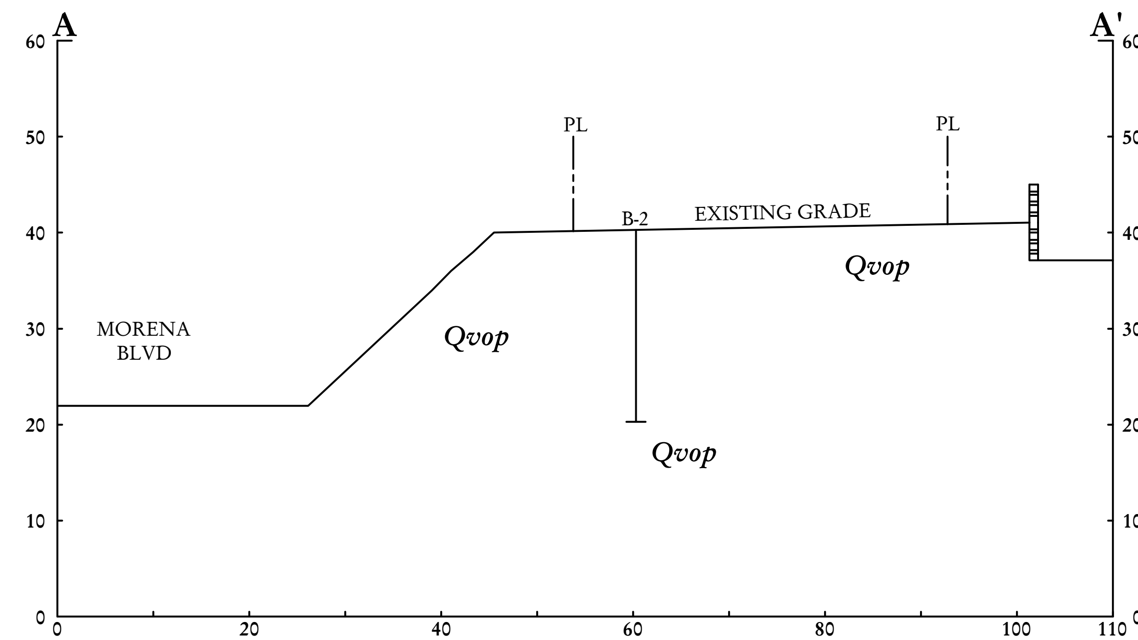
Civil Landworks
110 COPPERWOOD WAY, SUITE P, OCEANSIDE, CA 92058
PH: 760-908-8745 • info@civillandworks.com

SITE PLAN AND GEOTECHNICAL MAP

PROPOSED RESIDENTIAL DEVELOPMENT
1389 LIETA STREET
SAN DIEGO, CALIFORNIA

DATE:	JULY 2016	JOB NO.:	2150433.01
BY:	DRR/JDB	PLATE NO.:	1

CHRISTIAN WHEELER ENGINEERING



CWE LEGEND

Qvop VERY OLD PARALIC DEPOSITS

0 20' 40'

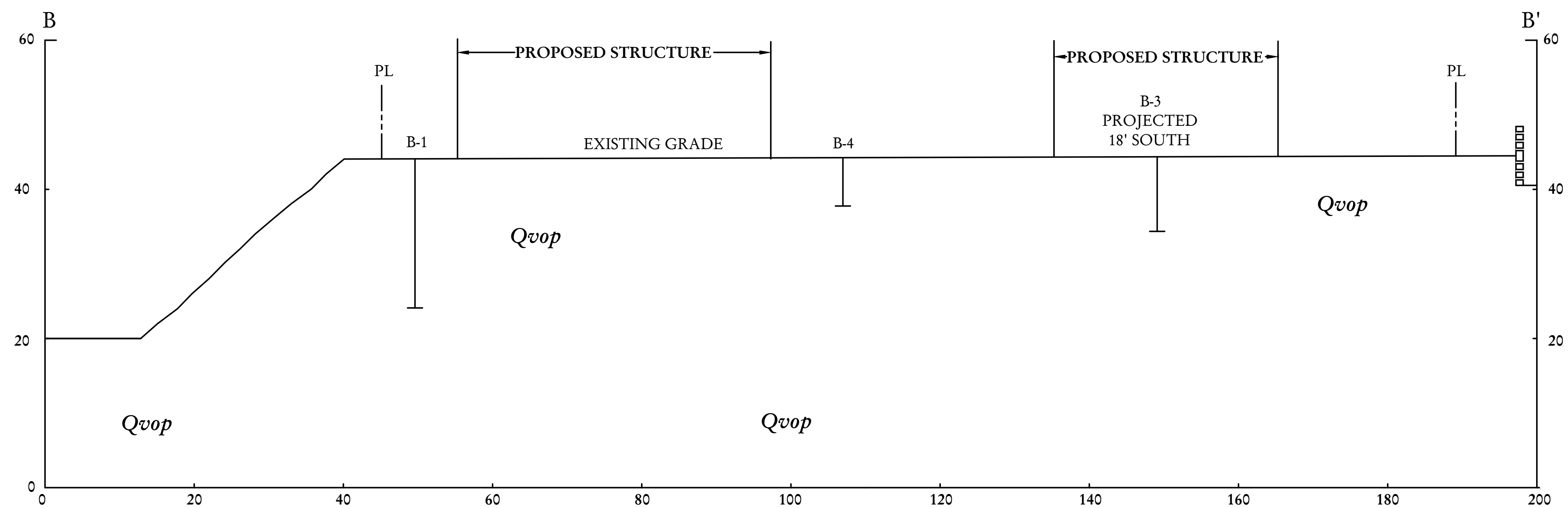
SCALE: 1" = 20'

GEOLOGIC CROSS SECTION A-A'

PROPOSED RESIDENTIAL DEVELOPMENT
1389 LIETA STREET
SAN DIEGO, CALIFORNIA

DATE:	JULY 2016	JOB NO.:	2150433.01
BY:	SD	PLATE NO.:	2

CHRISTIAN WHEELER
ENGINEERING



CWE LEGEND

Qvop	VERY OLD PARALIC DEPOSITS

0 20' 40'

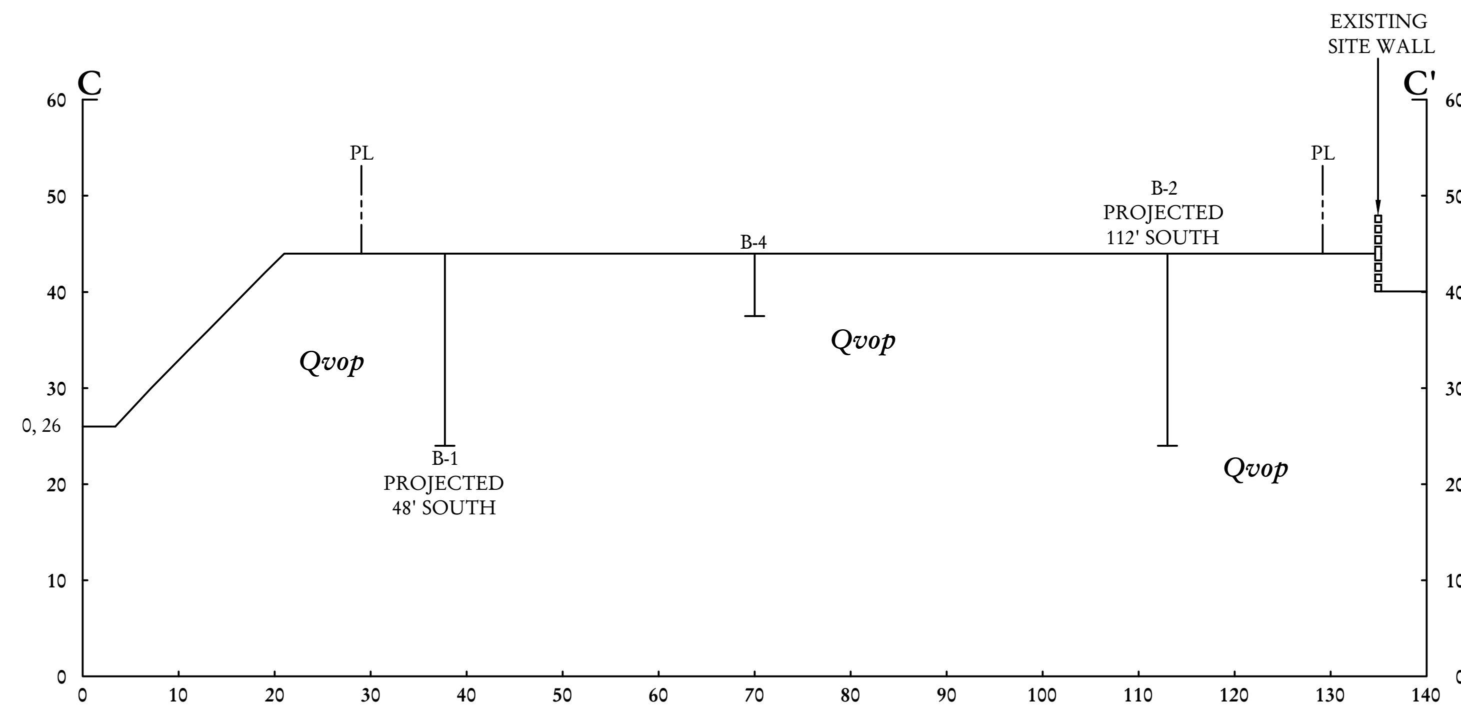
SCALE: 1" = 20'

GEOLOGIC CROSS SECTION B-B'

PROPOSED RESIDENTIAL DEVELOPMENT
1389 LIETA STREET
SAN DIEGO, CALIFORNIA

DATE:	JULY 2016	JOB NO.:	2150433.01
BY:	SD	PLATE NO.:	3

CHRISTIAN WHEELER
ENGINEERING



CWE LEGEND

Qvop	VERY OLD PARALIC DEPOSITS

0 20' 40'

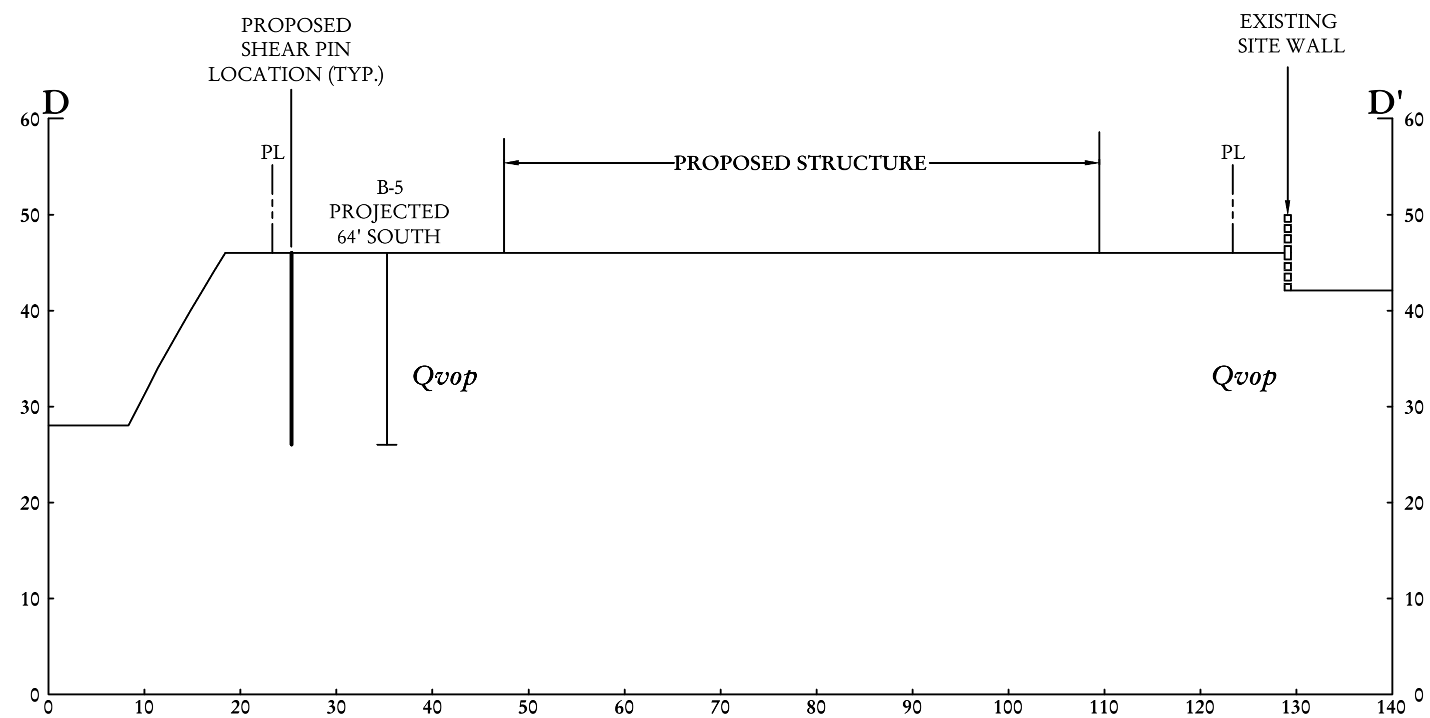
SCALE: 1" = 20'

GEOLOGIC CROSS SECTION C-C'

PROPOSED RESIDENTIAL DEVELOPMENT
1389 LIETA STREET
SAN DIEGO, CALIFORNIA

DATE:	JULY 2016	JOB NO.:	2150433.01
BY:	SD	PLATE NO.:	4

CHRISTIAN WHEELER
ENGINEERING



CWE LEGEND

Qvop VERY OLD PARALIC DEPOSITS

0 20' 40'

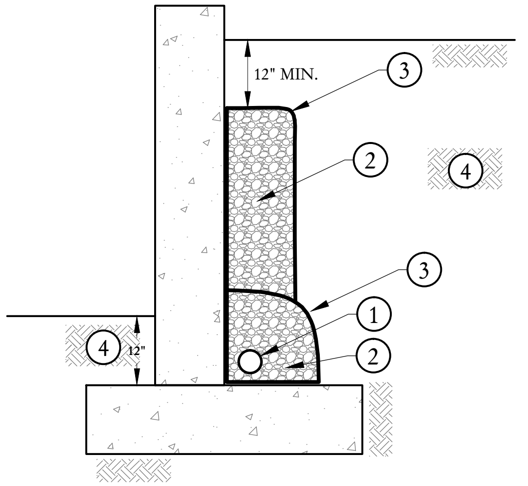
SCALE: 1" = 20'

GEOLOGIC CROSS SECTION D-D'

PROPOSED RESIDENTIAL DEVELOPMENT
1389 LIETA STREET
SAN DIEGO, CALIFORNIA

DATE:	JULY 2016	JOB NO.:	2150433.01
BY:	SD	PLATE NO.:	5

CHRISTIAN WHEELER
ENGINEERING



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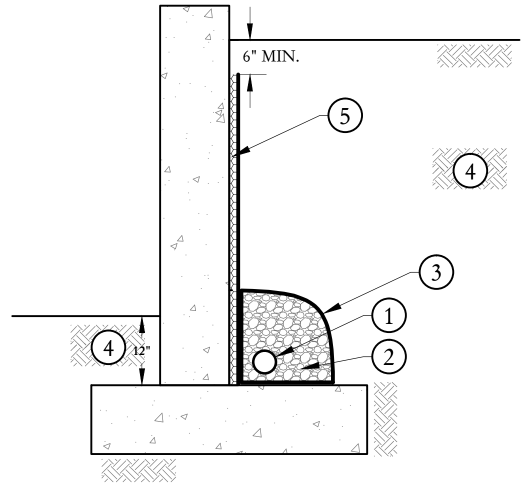

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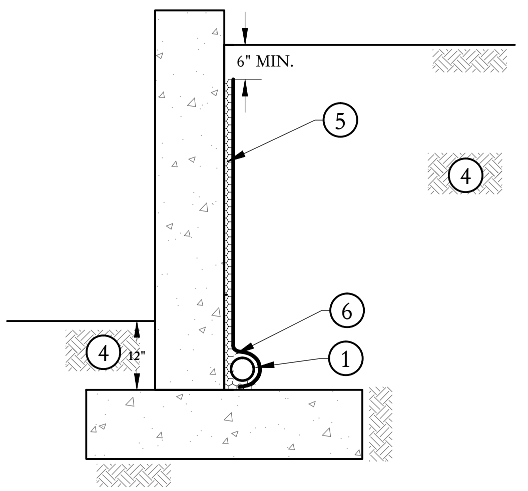

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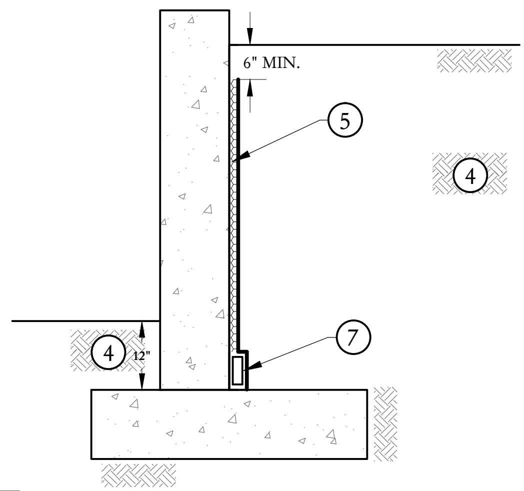

4 DETAIL

NOTES AND DETAILS

GENERAL NOTES:

1) THE NEED FOR WATERPROOFING SHOULD BE EVALUATED BY OTHERS.
2) WATERPROOFING TO BE DESIGNED BY OTHERS (CWE CAN PROVIDE A DESIGN IF REQUESTED).
3) EXTEND DRAIN TO SUITABLE DISCHARGE POINT PER CIVIL ENGINEER.
4) DO NOT CONNECT SURFACE DRAINS TO SUBDRAIN SYSTEM.

DETAILS:

1. 4-INCH PERFORATED PVC PIPE ON TOP OF FOOTING, HOLES POSITIONED DOWNWARD (SDR 35, SCHEDULE 40, OR EQUIVALENT).
2. ¾ INCH OPEN-GRADED CRUSHED AGGREGATE.
3. GEOFARBRIC WRAPPED COMPLETELY AROUND ROCK.
4. PROPERLY COMPACTED BACKFILL SOIL.
5. WALL DRAINAGE PANELS (MIRADRAIN OR EQUIVALENT) PLACED PER MANUFACTURER'S REC'S.
6. UNDERLAY SUBDRAIN WITH AND CUT FABRIC BACK FROM DRAINAGE PANELS AND WRAP FABRIC AROUND PIPE.
7. COLLECTION DRAIN (TOTAL DRAIN OR EQUIVALENT) LOCATED AT BASE OF WALL DRAINAGE PANEL PER MANUFACTURER'S RECOMMENDATIONS.

CANTILEVER RETAINING WALL DRAINAGE SYSTEMS

PROPOSED RESIDENTIAL DEVELOPMENT
1389 LIETA STREET
SAN DIEGO, CALIFORNIA

DATE:	JULY 2016	JOB NO.:	2150433.01
BY:	SRD	PLATE NO.:	6

CHRISTIAN WHEELER
ENGINEERING

Appendix A

Subsurface Explorations

LOG OF TEST BORING B-1

Date Logged:	12/18/15	Equipment:	Dietrich
Logged By:	DRR	Auger Type:	6 inch Solid Flight
Existing Elevation:	44.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	43.0 feet	Depth to Water:	N/A

Sample Type and Laboratory Test Legend

Cal	Modified California Sampler	CK	Chunk Density
SPT	Standard Penetration Test	DR	Density Ring
ST	Shelby Tube		
MD	Max Density	DS	Direct Shear
SO4	Soluble Sulfates	Con	Consolidation
SA	Sieve Analysis	EI	Expansion Index
HA	Hydrometer	R-Val	Resistance Value
SE	Sand Equivalent	Chl	Soluble Chlorides
PI	Plasticity Index	Res	pH & Resistivity
CP	Collapse Potential		

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	USCS SYMBOL	SUMMARY OF SUBSURFACE CONDITIONS (based on Unified Soil Classification System)	PENETRATION (blows per foot)	SAMPLE TYPE	BULK	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	RELATIVE COMPACTION (%)	LABORATORY TESTS
0			SM	**Topsoil**							
			SM	**Old Paralic Deposits (Qop):** Orangish-brown, damp to moist, dense, fine- to medium-grained, SILTY SAND.	77	Cal					SA SO4
5			SM	Light yellowish-brown, damp to moist, medium dense, fine-grained, SILTY SAND.	33	Cal		7.4	109.4		77
10			SP	Light yellowish-brown to orangish-brown, damp, medium dense, fine- to medium-grained, POORLY GRADED SAND.	34	Cal		2.8	99.1		77
15			SM	Orangish-brown, moist, medium dense to dense, fine- to medium-grained, SILTY SAND.	53	Cal		8.6	112.0		
			SP	Light brown, damp to moist, medium dense, fine- to coarse-grained, POORLY GRADED SAND.	36	Cal		2.6	97.8		
20				Boring terminated at 20 feet. No groundwater or seepage encountered.							
25											
30											

Notes:

Symbol Legend

- ∇ Groundwater Level During Drilling
- ▼ Groundwater Level After Drilling
- Apparent Seepage
- * No Sample Recovery
- ** Non-Representative Blow Count (rocks present)

PROPOSED RESIDENTIAL DEVELOPMENT
1389 LIETA STREET
SAN DIEGO, CALIFORNIA

DATE:	JULY 2016	JOB NO.:	2150433.01
BY:	SRD	FIGURE NO.:	A-1

CHRISTIAN WHEELER
ENGINEERING

LOG OF TEST BORING B-2

Date Logged:	12/18/15	Equipment:	Dietrich
Logged By:	DRR	Auger Type:	6 inch Solid Flight
Existing Elevation:	42.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	42.0 feet	Depth to Water:	N/A

Sample Type and Laboratory Test Legend

Cal	Modified California Sampler	CK	Chunk Density
SPT	Standard Penetration Test	DR	Density Ring
ST	Shelby Tube		
MD	Max Density	DS	Direct Shear
SO4	Soluble Sulfates	Con	Consolidation
SA	Sieve Analysis	EI	Expansion Index
HA	Hydrometer	R-Val	Resistance Value
SE	Sand Equivalent	Chl	Soluble Chlorides
PI	Plasticity Index	Res	pH & Resistivity
CP	Collapse Potential		

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	USCS SYMBOL	SUMMARY OF SUBSURFACE CONDITIONS (based on Unified Soil Classification System)	PENETRATION (blows per foot)	SAMPLE TYPE	BULK	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	RELATIVE COMPACTION (%)	LABORATORY TESTS
0			SM	**Topsoil:** Orangish-brown, dry, loose, fine- to medium-grained, SILTY SAND; abundant animal burrows.							
			SM	Orangish-brown, damp, medium dense.	36	Cal		2.8	102.3		
5											
					44	Cal		4.8	112.4		CP
			SM	Orangish-brown, damp to moist, medium dense, fine-grained, SILTY SAND.							
10											
			SM-SP	Light brown, damp, medium dense, fine- to medium-grained, SILTY SAND-POORLY GRADED SAND.	28	Cal		6.6	106.7		
15											
			SM	Orangish-brown, moist, dense, fine- to coarse-grained, SILTY SAND; trace gravels up to 1".	60	Cal		6.5	106.7		DS
					50/5"	Cal					
20				Boring terminated at 20 feet. No groundwater or seepage encountered.							
25											
30											

Notes:

Symbol Legend

- ▽ Groundwater Level During Drilling
- ▼ Groundwater Level After Drilling
- Apparent Seepage
- * No Sample Recovery
- ** Non-Representative Blow Count (rocks present)

PROPOSED RESIDENTIAL DEVELOPMENT
1389 LIETA STREET
SAN DIEGO, CALIFORNIA

DATE:	JULY 2016	JOB NO.:	2150433.01
BY:	SRD	FIGURE NO.:	A-2

CHRISTIAN WHEELER
ENGINEERING

LOG OF TEST BORING B-3

Sample Type and Laboratory Test Legend

Cal	Modified California Sampler	CK	Chunk Density
SPT	Standard Penetration Test	DR	Density Ring
ST	Shelby Tube		
MD	Max Density	DS	Direct Shear
SO4	Soluble Sulfates	Con	Consolidation
SA	Sieve Analysis	EI	Expansion Index
HA	Hydrometer	R-Val	Resistance Value
SE	Sand Equivalent	Chl	Soluble Chlorides
PI	Plasticity Index	Res	pH & Resistivity
CP	Collapse Potential		

Date Logged:	12/18/15	Equipment:	Dietrich
Logged By:	DRR	Auger Type:	6 inch Solid Flight
Existing Elevation:	43.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	43.0 feet	Depth to Water:	N/A

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	USCS SYMBOL	SUMMARY OF SUBSURFACE CONDITIONS (based on Unified Soil Classification System)	PENETRATION (blows per foot)	SAMPLE TYPE	BULK	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	RELATIVE COMPACTION (%)	LABORATORY TESTS
0			SM	**Artificial Fill (Qaf):** Dark brown, damp, loose, fine- to medium-grained, SILTY SAND.							
			SM								
			SM	**Topsoil:** Orangish-brown, damp, loose, fine- to medium-grained, SILTY SAND.	26	Cal					
				Old Paralic Deposits (Qop): Orangish-brown, damp to moist, medium dense, fine- to medium-grained, SILTY SAND.							
5					73	Cal					
10					32	Cal					
				Boring terminated at 10 feet. No groundwater or seepage encountered.							
15											
20											
25											
30											

Notes:

Symbol Legend

- Groundwater Level During Drilling
- Groundwater Level After Drilling
- Apparent Seepage
- * No Sample Recovery
- ** Non-Representative Blow Count (rocks present)

PROPOSED RESIDENTIAL DEVELOPMENT
1389 LIETA STREET
SAN DIEGO, CALIFORNIA

DATE:	JULY 2016	JOB NO.:	2150433.01
BY:	SRD	FIGURE NO.:	A-3

CHRISTIAN WHEELER ENGINEERING

LOG OF TEST BORING B-4

Date Logged:	12/18/15	Equipment:	Dietrich
Logged By:	DRR	Auger Type:	6 inch Solid Flight
Existing Elevation:	44.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	44.0 feet	Depth to Water:	N/A

Sample Type and Laboratory Test Legend

Cal	Modified California Sampler	CK	Chunk Density
SPT	Standard Penetration Test	DR	Density Ring
ST	Shelby Tube		
MD	Max Density	DS	Direct Shear
SO4	Soluble Sulfates	Con	Consolidation
SA	Sieve Analysis	EI	Expansion Index
HA	Hydrometer	R-Val	Resistance Value
SE	Sand Equivalent	Chl	Soluble Chlorides
PI	Plasticity Index	Res	pH & Resistivity
CP	Collapse Potential		

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	USCS SYMBOL	SUMMARY OF SUBSURFACE CONDITIONS (based on Unified Soil Classification System)	PENETRATION (blows per foot)	SAMPLE TYPE	BULK	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	RELATIVE COMPACTION (%)	LABORATORY TESTS
0			SM	**Topsoil:** Brown, damp, loose, fine- to medium-grained, SILTY SAND; porous.							
			SM	**Old Paralic Deposits (Qop):** Grayish-brown, damp, dense to very dense, fine- to medium-grained, SILTY SAND.	50/5"	Cal		3.7	110.1		
5					28	Cal					
			SM-SP	Light orangish-brown, damp to moist, medium dense, fine- to coarse-grained, SILTY SAND-POORLY GRADED SAND.							
				Boring terminated at 6½ feet. No groundwater or seepage encountered.							
10											
15											
20											
25											
30											

Notes:

Symbol Legend

- ∇ Groundwater Level During Drilling
- ▼ Groundwater Level After Drilling
- Apparent Seepage
- * No Sample Recovery
- ** Non-Representative Blow Count (rocks present)

PROPOSED RESIDENTIAL DEVELOPMENT
1389 LIETA STREET
SAN DIEGO, CALIFORNIA

DATE:	JULY 2016	JOB NO.:	2150433.01
BY:	SRD	FIGURE NO.:	A-4

CHRISTIAN WHEELER ENGINEERING

LOG OF TEST BORING B-5

Date Logged:	12/18/15	Equipment:	Dietrich
Logged By:	DRR	Auger Type:	6 inch Solid Flight
Existing Elevation:	45.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	42.0 feet	Depth to Water:	N/A

Sample Type and Laboratory Test Legend

Cal	Modified California Sampler	CK	Chunk Density
SPT	Standard Penetration Test	DR	Density Ring
ST	Shelby Tube		
MD	Max Density	DS	Direct Shear
SO4	Soluble Sulfates	Con	Consolidation
SA	Sieve Analysis	EI	Expansion Index
HA	Hydrometer	R-Val	Resistance Value
SE	Sand Equivalent	Chl	Soluble Chlorides
PI	Plasticity Index	Res	pH & Resistivity
CP	Collapse Potential		

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	USCS SYMBOL	SUMMARY OF SUBSURFACE CONDITIONS (based on Unified Soil Classification System)	PENETRATION (blows per foot)	SAMPLE TYPE	BULK	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	RELATIVE COMPACTION (%)	LABORATORY TESTS
0			SM	Old Paralic Deposits (Qop): Orangish-brown, damp, medium dense, fine-grained, SILTY SAND.							
					38	Cal		7.3	107.6		
5											
			SM-SP	Light orangish-brown, damp, medium dense, fine- to coarse-grained, SILTY SAND-POORLY GRADED SAND.	22	Cal		4.1	95.5		DS
10											
					38	Cal		4.0	101.5		SA
15											
			SM	Orangish-brown, damp to moist, medium dense to dense, fine- to coarse-grained, SILTY SAND; slight gravels.							
					57	Cal		6.6	105.0		
20				Boring terminated at 20 feet. No groundwater or seepage encountered.							
25											
30											

Notes:

Symbol Legend

- ∇ Groundwater Level During Drilling
- ▼ Groundwater Level After Drilling
- Apparent Seepage
- * No Sample Recovery
- ** Non-Representative Blow Count (rocks present)

PROPOSED RESIDENTIAL DEVELOPMENT
1389 LIETA STREET
SAN DIEGO, CALIFORNIA

DATE:	JULY 2016	JOB NO.:	2150433.01
BY:	SRD	FIGURE NO.:	A-5

CHRISTIAN WHEELER
ENGINEERING

Appendix B

Laboratory Test Results

Laboratory tests were performed in accordance with the generally accepted American Society for Testing and Materials (ASTM) test methods or suggested procedures. Brief descriptions of the tests performed are presented below:

a) **CLASSIFICATION:** Field classifications were verified in the laboratory by visual examination. The final soil classifications are in accordance with the Unified Soil Classification System and are presented on the exploration logs in Appendix A.

b) **MOISTURE-DENSITY: MOISTURE-DENSITY:** In-place moisture contents and dry densities were determined for selected soil samples in accordance with ATM D 2937. The results are summarized in the boring logs presented in Appendix A.

c) **DIRECT SHEAR:** Direct shear tests were performed on selected samples of the on-site soils in accordance with ASTM D 3080.

d) **GRAIN SIZE DISTRIBUTION:** The grain size distributions of selected samples were determined in accordance with ASTM C136 and/or ASTM D 422.

e) **COLLAPSE POTENTIAL TEST:** Collapse potential tests were performed on selected undisturbed soil samples in accordance with ASTM D 5333.

f) **SOLUBLE SULFATE CONTENT:** The soluble sulfate content was determined for representative samples in accordance with California Test Methods 417.

LABORATORY TEST RESULTS

PROPOSED MULTI-FAMILY DEVELOPEMENT

1389 LIETA STREET

SAN DIEGO, CALIFORNIA

DIRECT SHEAR (ASTM D3080)

Sample Location	**Boring B-1 @ 11½'**	**Boring B-2 @ 16½'**	**Boring B-5 @ 8½'**
Sample Type	Undisturbed	Undisturbed	Undisturbed
Friction Angle	33°	36°	35°
Cohesion	175 psf	200 psf	175 psf

GRAIN SIZE DISTRIBUTION (ASTM D422)

Sample Location	**Boring B-1 @ 1'-4'**	**Boring B-5 @ 14½'**
Sieve Size	*Percent Passing*	*Percent Passing*
⅜		100
#4		99
#8	100	99
#16	99	95
#30	93	73
#50	65	31
#100	41	17
#200	29	13

COLLAPSE POTENTIAL (ASTM D 5333)

Sample Location	**Boring B-1 @ 6½'**	**Boring B-2 @ 6½'**
Initial Moisture Content	7.4 %	4.8 %
Initial Density	109.4 pcf	112.4 pcf
Consolidation Before Water Added	2.9 %	4.3 %
Consolidation After Water Added	7.3%	6.7 %
Final Moisture	15.2 %	14.3 %

SOLUBLE SULFATES (CALIFORNIA TEST METHOD 417)

Sample Location	**Boring B-1 @ 1'-4'**
Soluble Sulfate	0.005 % (SO_4)

Appendix C

References

REFERENCES

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California Emergency Management Agency – California Geological Society – University of Southern California, 2009, Tsunami Inundation Map for Emergency Planning, La Jolla Quadrangle, scale 1:24,000, dated June 1, 2009.

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Kennedy, M.P. and Tan, S.S., 2008, Geologic Map of the San Diego 30' X 60' Quadrangle, California; California Department of Conservation and California Geological Survey.

Kern, P., 1989, Earthquakes and Faults in San Diego County, Pickle Press, 73 pp.

Tan, S.S., 1995, Landslide Hazards in the Southern Part of the San Diego Metropolitan Area, San Diego County, California, California Division of Mines and Geology Open-File Report 95-03.

U.S. Geological Survey, U.S. Seismic Design Maps Web Application, http://geohazards.usgs.gov/designmaps/us/application.php

U.S. Geological Survey, Quaternary Faults in Google Earth, http://earthquake.usgs.gov/hazards/qfaults/google.php

TOPOGRAPHIC MAPS

City of San Diego, 1953, Topographic Map Sheet 222-1701; Scale: 1 inch = 200 feet

City of San Diego, 1963, Topographic Map Sheet 222-1701; Scale: 1 inch = 200 feet

City of San Diego, 1979, Ortho-Topographic Map Sheet 222-1701; Scale: 1 inch = 200 feet

United States Geological Survey, 1903, La Jolla Quadrangle; Scale 1 inch = 2000 feet

United States Geological Survey, 1943, La Jolla Quadrangle; Scale 1 inch = 2000 feet

United States Geological Survey, 1953, La Jolla Quadrangle; Scale 1 inch = 2000 feet

United States Geological Survey, 1967, La Jolla Quadrangle; Scale 1 inch = 2000 feet

United States Geological Survey, 1975, La Jolla Quadrangle; Scale 1 inch = 2000 feet

Appendix D

Recommended Grading Specifications – General Provisions

RECOMMENDED GRADING SPECIFICATIONS - GENERAL PROVISIONS

PROPOSED RESIDENTIAL DEVELOPMENT
1389 LIETA STREET
SAN DIEGO, CALIFORNIA

GENERAL INTENT

The intent of these specifications is to establish procedures for clearing, compacting natural ground, preparing areas to be filled, and placing and compacting fill soils to the lines and grades shown on the accepted plans. The recommendations contained in the preliminary geotechnical investigation report and/or the attached Special Provisions are a part of the Recommended Grading Specifications and shall supersede the provisions contained hereinafter in the case of conflict. These specifications shall only be used in conjunction with the geotechnical report for which they are a part. No deviation from these specifications will be allowed, except where specified in the geotechnical report or in other written communication signed by the Geotechnical Engineer.

OBSERVATION AND TESTING

Christian Wheeler Engineering shall be retained as the Geotechnical Engineer to observe and test the earthwork in accordance with these specifications. It will be necessary that the Geotechnical Engineer or his representative provide adequate observation so that he may provide his opinion as to whether or not the work was accomplished as specified. It shall be the responsibility of the contractor to assist the Geotechnical Engineer and to keep him apprised of work schedules, changes and new information and data so that he may provide these opinions. In the event that any unusual conditions not covered by the special provisions or preliminary geotechnical report are encountered during the grading operations, the Geotechnical Engineer shall be contacted for further recommendations.

If, in the opinion of the Geotechnical Engineer, substandard conditions are encountered, such as questionable or unsuitable soil, unacceptable moisture content, inadequate compaction, adverse weather, etc., construction should be stopped until the conditions are remedied or corrected or he shall recommend rejection of this work.

Tests used to determine the degree of compaction should be performed in accordance with the following American Society for Testing and Materials test methods:

Maximum Density & Optimum Moisture Content - ASTM D1557
Density of Soil In-Place - ASTM D1556 or ASTM D6938

All densities shall be expressed in terms of Relative Compaction as determined by the foregoing ASTM testing procedures.

PREPARATION OF AREAS TO RECEIVE FILL

All vegetation, brush and debris derived from clearing operations shall be removed, and legally disposed of. All areas disturbed by site grading should be left in a neat and finished appearance, free from unsightly debris.

After clearing or benching the natural ground, the areas to be filled shall be scarified to a depth of 6 inches, brought to the proper moisture content, compacted and tested for the specified minimum degree of compaction. All loose soils in excess of 6 inches thick should be removed to firm natural ground which is defined as natural soil which possesses an in-situ density of at least 90 percent of its maximum dry density.

When the slope of the natural ground receiving fill exceeds 20 percent (5 horizontal units to 1 vertical unit), the original ground shall be stepped or benched. Benches shall be cut to a firm competent formational soil. The lower bench shall be at least 10 feet wide or 1-1/2 times the equipment width, whichever is greater, and shall be sloped back into the hillside at a gradient of not less than two (2) percent. All other benches should be at least 6 feet wide. The horizontal portion of each bench shall be compacted prior to receiving fill as specified herein for compacted natural ground. Ground slopes flatter than 20 percent shall be benched when considered necessary by the Geotechnical Engineer.

Any abandoned buried structures encountered during grading operations must be totally removed. All underground utilities to be abandoned beneath any proposed structure should be removed from within 10 feet of the structure and properly capped off. The resulting depressions from the above described procedure should be backfilled with acceptable soil that is compacted to the requirements of the Geotechnical Engineer. This includes, but is not limited to, septic tanks, fuel tanks, sewer lines or leach lines, storm drains and water lines. Any buried structures or utilities not to be abandoned should be brought to the attention of the Geotechnical Engineer so that he may determine if any special recommendation will be necessary.

All water wells which will be abandoned should be backfilled and capped in accordance to the requirements set forth by the Geotechnical Engineer. The top of the cap should be at least 4 feet below finish grade or 3 feet below the bottom of footing whichever is greater. The type of cap will depend on the diameter of the well and should be determined by the Geotechnical Engineer and/or a qualified Structural Engineer.

FILL MATERIAL

Materials to be placed in the fill shall be approved by the Geotechnical Engineer and shall be free of vegetable matter and other deleterious substances. Granular soil shall contain sufficient fine material to fill the voids. The definition and disposition of oversized rocks and expansive or detrimental soils are covered in the geotechnical report or Special Provisions. Expansive soils, soils of poor gradation, or soils with low strength characteristics may be thoroughly mixed with other soils to provide satisfactory fill material, but only with the explicit consent of the Geotechnical Engineer. Any import material shall be approved by the Geotechnical Engineer before being brought to the site.

PLACING AND COMPACTION OF FILL

Approved fill material shall be placed in areas prepared to receive fill in layers not to exceed 6 inches in compacted thickness. Each layer shall have a uniform moisture content in the range that will allow the compaction effort to be efficiently applied to achieve the specified degree of compaction. Each layer shall be uniformly compacted to the specified minimum degree of compaction with equipment of adequate size to economically compact the layer. Compaction equipment should either be specifically designed for soil compaction or of proven reliability. The minimum degree of compaction to be achieved is specified in either the Special Provisions or the recommendations contained in the preliminary geotechnical investigation report.

When the structural fill material includes rocks, no rocks will be allowed to nest and all voids must be carefully filled with soil such that the minimum degree of compaction recommended in the Special Provisions is achieved. The maximum size and spacing of rock permitted in structural fills and in non-structural fills is discussed in the geotechnical report, when applicable.

Field observation and compaction tests to estimate the degree of compaction of the fill will be taken by the Geotechnical Engineer or his representative. The location and frequency of the tests shall be at the Geotechnical Engineer's discretion. When the compaction test indicates that a particular layer is at less than the required degree of compaction, the layer shall be reworked to the satisfaction of the Geotechnical Engineer and until the desired relative compaction has been obtained.

Fill slopes shall be compacted by means of sheepsfoot rollers or other suitable equipment. Compaction by sheepsfoot roller shall be at vertical intervals of not greater than four feet. In addition, fill slopes at a ratio of two horizontal to one vertical or flatter, should be trackrolled. Steeper fill slopes shall be over-built and cut-back to finish contours after the slope has been constructed. Slope compaction operations shall result in all fill material six or more inches inward from the finished face of the slope having a relative compaction of at least 90 percent of maximum dry density or the degree of compaction specified in the Special Provisions section of this specification. The compaction operation on the slopes shall be continued until the Geotechnical Engineer is of the opinion that the slopes will be surficially stable.

Density tests in the slopes 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 that day of such conditions by written communication from the Geotechnical Engineer or his representative in the form of a daily field report.

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 cost to the Owner or Geotechnical Engineer.

CUT SLOPES

The Engineering Geologist shall inspect cut slopes excavated in rock or lithified formational material during the grading operations at intervals determined at his discretion. 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 to determine if mitigating measures are necessary.

Unless otherwise specified in the geotechnical report, no cut slopes shall be excavated higher or steeper than that allowed by the ordinances of the controlling governmental agency.

ENGINEERING OBSERVATION

Field observation by the Geotechnical Engineer or his representative shall be made during the filling and compaction operations so that he can express his opinion regarding the conformance of the grading with acceptable standards of practice. Neither the presence of the Geotechnical Engineer or his representative or the observation and testing shall release the Grading Contractor from his duty to compact all fill material to the specified degree of compaction.

SEASON LIMITS

Fill shall not be placed during unfavorable weather conditions. When work is interrupted by heavy rain, filling operations shall not be resumed until the proper moisture content and density of the fill materials can be achieved. Damaged site conditions resulting from weather or acts of God shall be repaired before acceptance of work.

RECOMMENDED GRADING SPECIFICATIONS - SPECIAL PROVISIONS

RELATIVE COMPACTION: The minimum degree of compaction to be obtained in compacted natural ground, compacted fill, and compacted backfill shall be at least 90 percent. For street and parking lot subgrade, the upper twelve inches should be compacted to at least 95 percent relative compaction.

EXPANSIVE SOILS: Detrimentally expansive soil is defined as clayey soil which has an expansion index of 50 or greater when tested in accordance with the American Society of Testing Materials (ASTM) Laboratory Test D4829-95.

OVERSIZED MATERIAL: Oversized fill material is generally defined herein as rocks or lumps of soil over six inches in diameter. Oversized materials should not be placed in fill unless recommendations of placement of such material is provided by the Geotechnical Engineer. At least 40 percent of the fill soils shall pass through a No. 4 U.S. Standard Sieve.

TRANSITION LOTS: Where transitions between cut and fill occur within the proposed building pad, the cut portion should be undercut a minimum of one foot below the base of the proposed footings and recompacted as structural backfill. In certain cases that would be addressed in the geotechnical report, special footing reinforcement or a combination of special footing reinforcement and undercutting may be required.

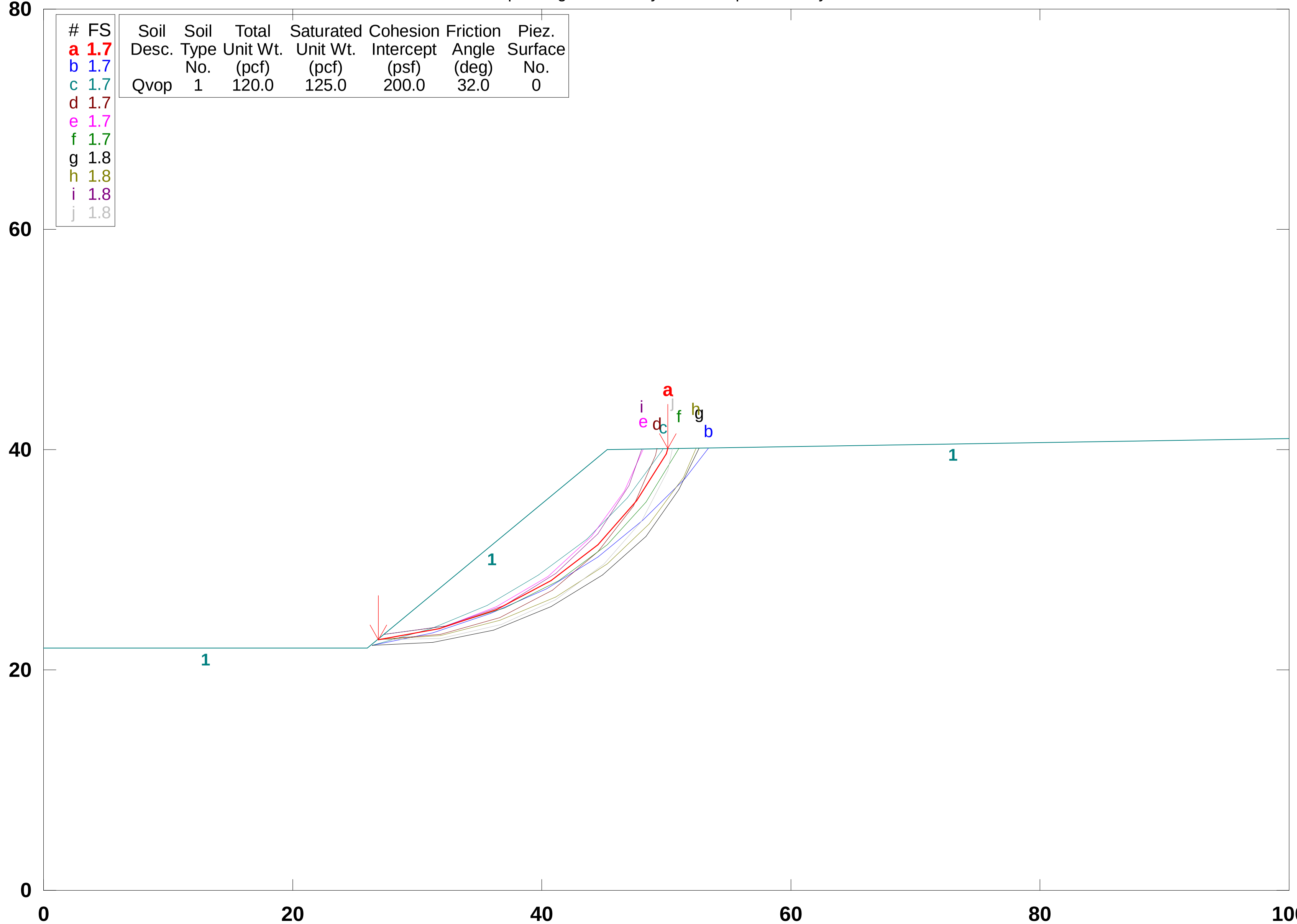
Appendix E

Global Stability Analyses

Cross Section
A-A’

CWE 2150433 - Leita Street Mixed Use A-A' Static

c:\users\dave russell\desktop\leita gross stability\a-a'static.pl2   Run By: DRR   2/3/2016   02:04PM



GSTABL7 v.2 FSmin=1.7

Safety Factors Are Calculated By The Modified Bishop Method

```
                         ***  GSTABL7  ***
              ** GSTABL7 by Garry H. Gregory, P.E. **
   ** Original Version 1.0, January 1996; Current Version 2.003, June 2002 **
           (All Rights Reserved-Unauthorized Use Prohibited)
 *********************************************************************************
                    SLOPE STABILITY ANALYSIS SYSTEM
       Modified Bishop, Simplified Janbu, or GLE Method of Slices.
       (Includes Spencer & Morgenstern-Price Type Analysis)
       Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
       Nonlinear Undrained Shear Strength, Curved Phi Envelope,
       Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
       Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.
 *********************************************************************************
 Analysis Run Date:        2/3/2016
 Time of Run:              02:04PM
 Run By:                   DRR
 Input Data Filename:      C:\Users\Dave Russell\Desktop\Leita Gross Stability\a-a’Stat
ic.in
 Output Filename:          C:\Users\Dave Russell\Desktop\Leita Gross Stability\a-a’Stat
ic.OUT
 Unit System:              English
 Plotted Output Filename:  C:\Users\Dave Russell\Desktop\LeGross Stability\a-a’Static.P
LT
 PROBLEM DESCRIPTION:  CWE 2150433 - Leita Street Mixed Use
                       A-A’ Static
 BOUNDARY COORDINATES
     3 Top   Boundaries
     3 Total Boundaries
 Boundary     X-Left     Y-Left    X-Right    Y-Right    Soil Type
    No.        (ft)       (ft)       (ft)       (ft)     Below Bnd
     1          0.00      22.00      26.00      22.00        1
     2         26.00      22.00      45.30      40.00        1
     3         45.30      40.00     100.00      41.00        1
 Default Y-Origin = 0.00(ft)
 Default X-Plus Value = 0.00(ft)
 Default Y-Plus Value = 0.00(ft)
ISOTROPIC SOIL PARAMETERS
  1 Type(s) of Soil
 Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
 Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
  No.  (pcf)    (pcf)     (psf)     (deg)    Param.   (psf)     No.
   1   120.0    125.0     200.0     32.0    0.00       0.0      0
 A Critical Failure Surface Searching Method, Using A Random
 Technique For Generating Circular Surfaces, Has Been Specified.
 2000 Trial Surfaces Have Been Generated.
  100 Surface(s) Initiate(s) From Each Of    20 Points Equally Spaced
 Along The Ground Surface Between  X =  20.00(ft)
                              and  X =  30.00(ft)
 Each Surface Terminates Between   X =  47.00(ft)
                             and   X =  90.00(ft)
 Unless Further Limitations Were Imposed, The Minimum Elevation
 At Which A Surface Extends Is  Y =      0.00(ft)
  5.00(ft) Line Segments Define Each Trial Failure Surface.
 Following Are Displayed The Ten Most Critical Of The Trial
       Failure Surfaces Evaluated. They Are
       Ordered - Most Critical First.
       * * Safety Factors Are Calculated By The Modified Bishop Method * *
       Total Number of Trial Surfaces Evaluated =  2000
       Statistical Data On All Valid FS Values:
          FS Max =   7.224   FS Min =   1.720   FS Ave =   3.798
          Standard Deviation =    1.214   Coefficient of Variation =   31.95 %
       Failure Surface Specified By  8 Coordinate Points
         Point      X-Surf      Y-Surf
          No.        (ft)        (ft)
           1         26.84       22.79
           2         31.75       23.75
           3         36.41       25.56
           4         40.69       28.14
           5         44.46       31.43
           6         47.61       35.31
```

7	50.03	39.69
8	50.17	40.09

Circle Center At X = 23.78 ; Y = 51.29 ; and Radius = 28.67

Factor of Safety

*** 1.720 ***

Individual data on the 8 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	4.9	1061.1	0.0	0.0	0.	0.	0.0	0.0	0.0
2	4.7	2730.0	0.0	0.0	0.	0.	0.0	0.0	0.0
3	4.3	3522.2	0.0	0.0	0.	0.	0.0	0.0	0.0
4	3.8	3472.4	0.0	0.0	0.	0.	0.0	0.0	0.0
5	0.8	771.3	0.0	0.0	0.	0.	0.0	0.0	0.0
6	2.3	1697.0	0.0	0.0	0.	0.	0.0	0.0	0.0
7	2.4	746.1	0.0	0.0	0.	0.	0.0	0.0	0.0
8	0.1	3.3	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	26.32	22.29
2	31.19	23.42
3	35.88	25.14
4	40.32	27.44
5	44.44	30.27
6	48.17	33.60
7	51.46	37.37
8	53.32	40.15

Circle Center At X = 19.96 ; Y = 61.27 ; and Radius = 39.49

Factor of Safety

*** 1.730 ***

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	26.32	22.29
2	31.09	23.78
3	35.62	25.90
4	39.81	28.63
5	43.59	31.90
6	46.88	35.66
7	49.62	39.84
8	49.73	40.08

Circle Center At X = 18.01 ; Y = 57.54 ; and Radius = 36.20

Factor of Safety

*** 1.738 ***

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	26.84	22.79
2	31.82	23.22
3	36.59	24.75
4	40.90	27.28
5	44.54	30.70
6	47.35	34.84
7	49.18	39.49
8	49.27	40.07

Circle Center At X = 27.41 ; Y = 45.24 ; and Radius = 22.46

Factor of Safety

*** 1.742 ***

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	26.84	22.79
2	31.75	23.76
3	36.36	25.69
4	40.49	28.51
5	43.97	32.10
6	46.66	36.31
7	48.10	40.05

```
Circle Center At X =    24.49 ; Y =    47.52 ; and Radius =    24.85
       Factor of Safety
      ***    1.745   ***
Failure Surface Specified By  8 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1         27.37       23.28
    2         32.31       24.01
    3         37.04       25.64
    4         41.39       28.11
    5         45.21       31.34
    6         48.38       35.20
    7         50.78       39.59
    8         50.95       40.10
Circle Center At X =    25.90 ; Y =    50.28 ; and Radius =    27.04
       Factor of Safety
      ***    1.747   ***
Failure Surface Specified By  8 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1         26.32       22.29
    2         31.31       22.51
    3         36.18       23.66
    4         40.74       25.70
    5         44.84       28.57
    6         48.32       32.16
    7         51.06       36.34
    8         52.63       40.13
Circle Center At X =    27.73 ; Y =    48.54 ; and Radius =    26.28
       Factor of Safety
      ***    1.758   ***
Failure Surface Specified By  8 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1         26.84       22.79
    2         31.83       23.18
    3         36.65       24.48
    4         41.16       26.65
    5         45.20       29.60
    6         48.63       33.23
    7         51.34       37.44
    8         52.44       40.13
Circle Center At X =    27.26 ; Y =    49.72 ; and Radius =    26.94
       Factor of Safety
      ***    1.759   ***
Failure Surface Specified By  7 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1         27.37       23.28
    2         32.31       24.06
    3         36.95       25.91
    4         41.07       28.74
    5         44.47       32.41
    6         46.97       36.74
    7         47.99       40.05
Circle Center At X =    26.35 ; Y =    45.75 ; and Radius =    22.50
       Factor of Safety
      ***    1.766   ***
Failure Surface Specified By  8 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1         26.84       22.79
    2         31.84       22.89
    3         36.69       24.11
    4         41.15       26.37
    5         44.99       29.57
    6         48.03       33.55
    7         50.10       38.10
    8         50.51       40.10
Circle Center At X =    28.93 ; Y =    44.77 ; and Radius =    22.08
```

```
 Factor of Safety
***    1.773   ***
    **** END OF GSTABL7 OUTPUT ****
```

Cross Section

B-B’

CWE 2150433 - Leita Street Mixed Use B-B' Static

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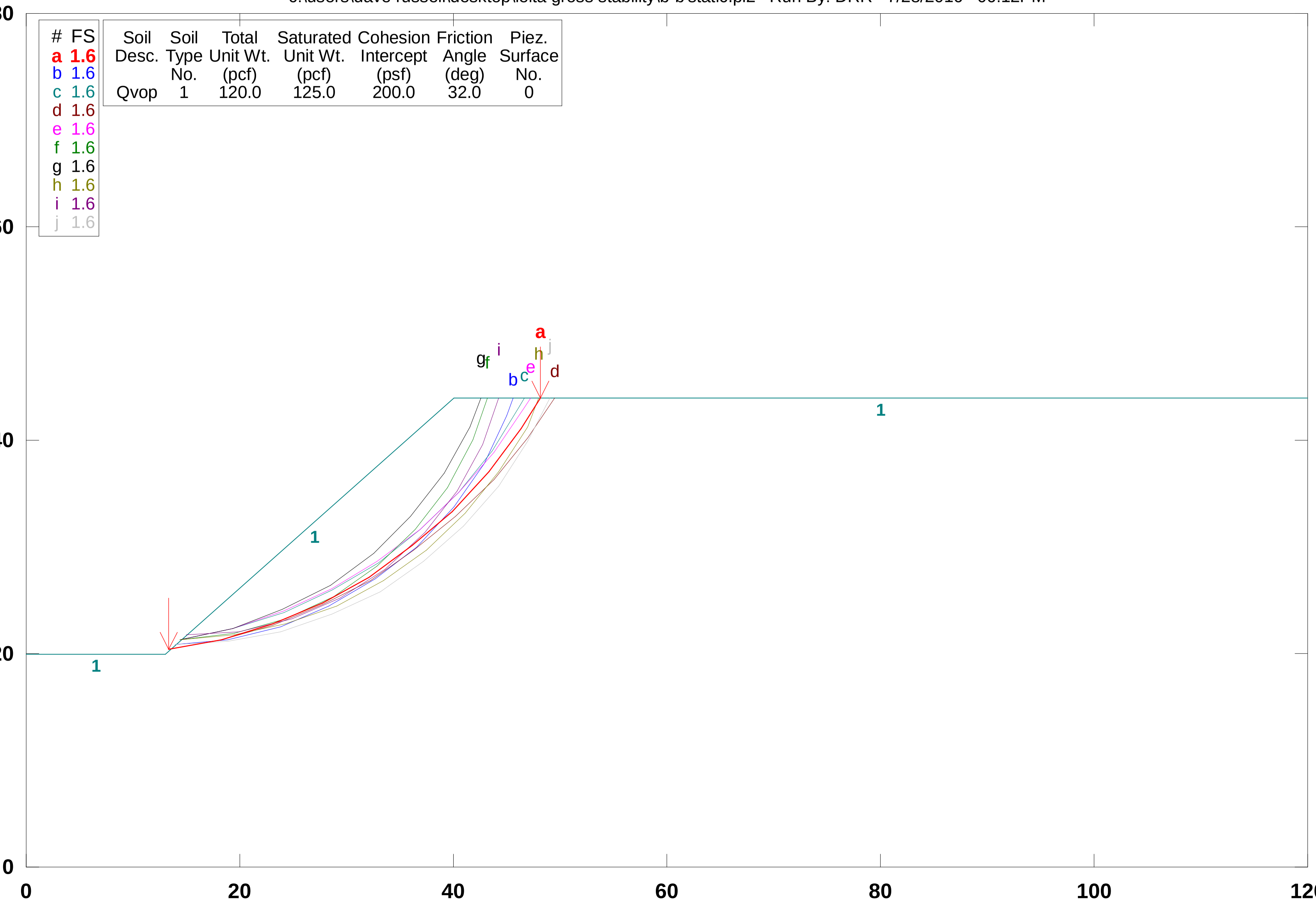


GSTABL7 v.2 FSmin=1.6

Safety Factors Are Calculated By The Modified Bishop Method

```
                                *** GSTABL7 ***
                      ** GSTABL7 by Garry H. Gregory, P.E. **
         ** Original Version 1.0, January 1996; Current Version 2.003, June 2002 **
                   (All Rights Reserved-Unauthorized Use Prohibited)
    *********************************************************************************
                           SLOPE STABILITY ANALYSIS SYSTEM
           Modified Bishop, Simplified Janbu, or GLE Method of Slices.
           (Includes Spencer & Morgenstern-Price Type Analysis)
           Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
           Nonlinear Undrained Shear Strength, Curved Phi Envelope,
           Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
           Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.
    *********************************************************************************
    Analysis Run Date:         7/28/2016
    Time of Run:               06:12PM
    Run By:                    DRR
    Input Data Filename:       c:\Users\Dave Russell\Desktop\Leita Gross Stability\b-b’stat
ic.in
    Output Filename:           c:\Users\Dave Russell\Desktop\Leita Gross Stability\b-b’stat
ic.OUT
    Unit System:               English
    Plotted Output Filename:  c:\Users\Dave Russell\Desktop\LeGross Stability\b-b’static.P
LT
    PROBLEM DESCRIPTION:  CWE 2150433 - Leita Street Mixed Use
                          B-B’ Static
    BOUNDARY COORDINATES
        3 Top   Boundaries
        3 Total Boundaries
    Boundary     X-Left     Y-Left    X-Right    Y-Right    Soil Type
       No.        (ft)       (ft)       (ft)       (ft)     Below Bnd
        1          0.00      20.00      13.00      20.00        1
        2         13.00      20.00      40.00      44.00        1
        3         40.00      44.00     120.00      44.00        1
    Default Y-Origin = 0.00(ft)
    Default X-Plus Value = 0.00(ft)
    Default Y-Plus Value = 0.00(ft)
   ISOTROPIC SOIL PARAMETERS
     1 Type(s) of Soil
    Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
    Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
     No.  (pcf)    (pcf)     (psf)     (deg)    Param.   (psf)     No.
      1   120.0    125.0     200.0     32.0    0.00       0.0      0
    A Critical Failure Surface Searching Method, Using A Random
    Technique For Generating Circular Surfaces, Has Been Specified.
    2000 Trial Surfaces Have Been Generated.
     100 Surface(s) Initiate(s) From Each Of    20 Points Equally Spaced
    Along The Ground Surface Between  X =   5.00(ft)
                                 and  X =  15.00(ft)
    Each Surface Terminates Between   X =  40.00(ft)
                                and   X = 100.00(ft)
    Unless Further Limitations Were Imposed, The Minimum Elevation
    At Which A Surface Extends Is  Y =      0.00(ft)
     5.00(ft) Line Segments Define Each Trial Failure Surface.
    Following Are Displayed The Ten Most Critical Of The Trial
          Failure Surfaces Evaluated. They Are
          Ordered - Most Critical First.
          * * Safety Factors Are Calculated By The Modified Bishop Method * *
          Total Number of Trial Surfaces Evaluated =  2000
          Statistical Data On All Valid FS Values:
             FS Max =   6.207   FS Min =   1.558   FS Ave =   3.548
             Standard Deviation =    1.087   Coefficient of Variation =   30.63 %
          Failure Surface Specified By 10 Coordinate Points
            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)
              1         13.42       20.37
              2         18.33       21.34
              3         23.11       22.81
              4         27.71       24.77
              5         32.07       27.20
              6         36.16       30.08
```

7	39.93	33.37
8	43.34	37.03
9	46.34	41.03
10	48.12	44.00

Circle Center At X = 6.77 ; Y = 67.43 ; and Radius = 47.52

Factor of Safety

*** 1.558 ***

Individual data on the 10 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	4.9	1000.3	0.0	0.0	0.	0.	0.0	0.0	0.0
2	4.8	2744.8	0.0	0.0	0.	0.	0.0	0.0	0.0
3	4.6	3994.3	0.0	0.0	0.	0.	0.0	0.0	0.0
4	4.4	4731.9	0.0	0.0	0.	0.	0.0	0.0	0.0
5	4.1	4973.5	0.0	0.0	0.	0.	0.0	0.0	0.0
6	3.8	4766.8	0.0	0.0	0.	0.	0.0	0.0	0.0
7	0.1	86.5	0.0	0.0	0.	0.	0.0	0.0	0.0
8	3.3	3508.7	0.0	0.0	0.	0.	0.0	0.0	0.0
9	3.0	1791.3	0.0	0.0	0.	0.	0.0	0.0	0.0
10	1.8	317.5	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	13.95	20.84
2	18.92	21.32
3	23.78	22.51
4	28.41	24.39
5	32.72	26.93
6	36.62	30.07
7	40.01	33.73
8	42.84	37.86
9	45.04	42.35
10	45.57	44.00

Circle Center At X = 13.26 ; Y = 54.96 ; and Radius = 34.12

Factor of Safety

*** 1.570 ***

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	14.47	21.31
2	19.37	22.31
3	24.12	23.87
4	28.66	25.96
5	32.94	28.56
6	36.88	31.63
7	40.45	35.14
8	43.59	39.03
9	46.26	43.25
10	46.62	44.00

Circle Center At X = 8.27 ; Y = 64.22 ; and Radius = 43.35

Factor of Safety

*** 1.573 ***

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	13.42	20.37
2	18.33	21.30
3	23.13	22.70
4	27.77	24.58
5	32.19	26.91
6	36.37	29.66
7	40.24	32.82
8	43.79	36.34
9	46.97	40.20
10	49.51	44.00

Circle Center At X = 6.63 ; Y = 70.12 ; and Radius = 50.21

Factor of Safety

*** 1.574 ***

```
Failure Surface Specified By 10 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1         14.47       21.31
    2         19.36       22.39
    3         24.09       23.99
    4         28.63       26.08
    5         32.92       28.65
    6         36.91       31.66
    7         40.56       35.09
    8         43.81       38.88
    9         46.65       43.00
   10         47.18       44.00
Circle Center At X =     6.95 ; Y =    67.07 ; and Radius =    46.38
       Factor of Safety
      ***    1.579   ***
Failure Surface Specified By  9 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1         14.47       21.31
    2         19.44       21.86
    3         24.26       23.21
    4         28.79       25.33
    5         32.91       28.15
    6         36.52       31.61
    7         39.52       35.61
    8         41.83       40.05
    9         43.13       44.00
Circle Center At X =    13.60 ; Y =    51.93 ; and Radius =    30.64
       Factor of Safety
      ***    1.592   ***
Failure Surface Specified By  9 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1         14.47       21.31
    2         19.36       22.36
    3         24.06       24.08
    4         28.46       26.45
    5         32.49       29.41
    6         36.05       32.92
    7         39.09       36.89
    8         41.54       41.24
    9         42.61       44.00
Circle Center At X =     9.54 ; Y =    56.36 ; and Radius =    35.40
       Factor of Safety
      ***    1.599   ***
Failure Surface Specified By 10 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1         14.47       21.31
    2         19.46       21.71
    3         24.34       22.77
    4         29.04       24.49
    5         33.46       26.82
    6         37.53       29.73
    7         41.17       33.16
    8         44.32       37.04
    9         46.91       41.32
   10         48.07       44.00
Circle Center At X =    14.09 ; Y =    58.10 ; and Radius =    36.79
       Factor of Safety
      ***    1.603   ***
Failure Surface Specified By  9 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1         15.00       21.78
    2         19.99       22.11
    3         24.85       23.27
    4         29.45       25.23
    5         33.66       27.94
```

```
    6         37.35       31.31
    7         40.42       35.26
    8         42.78       39.66
    9         44.24       44.00
Circle Center At X =    15.55 ; Y =    51.44 ; and Radius =    29.67
       Factor of Safety
      ***    1.609   ***
Failure Surface Specified By 10 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1         13.95       20.84
    2         18.94       21.13
    3         23.85       22.08
    4         28.59       23.67
    5         33.08       25.87
    6         37.23       28.65
    7         40.98       31.96
    8         44.26       35.73
    9         47.01       39.91
   10         48.98       44.00
Circle Center At X =    14.30 ; Y =    58.39 ; and Radius =    37.55
       Factor of Safety
      ***    1.610   ***
          **** END OF GSTABL7 OUTPUT ****
```

Cross Section
C-C’

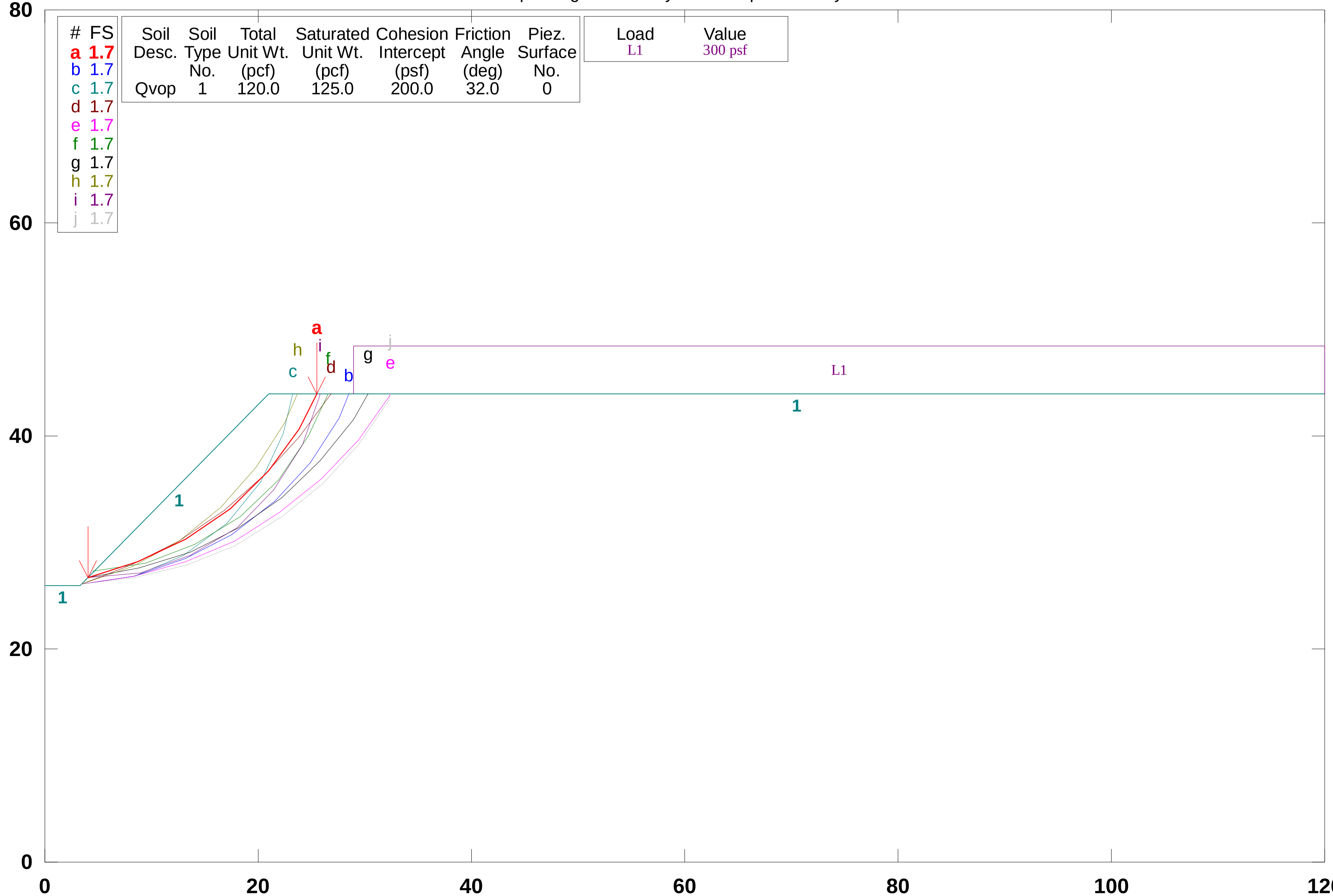
CWE 2150433 - Leita Street Mixed Use C-C' Static

c:\users\dave russell\desktop\leita gross stability\c-c'static.pl2 Run By: DRR 7/28/2016 06:02PM

#	FS
a	1.7
b	1.7
c	1.7
d	1.7
e	1.7
f	1.7
g	1.7
h	1.7
i	1.7
j	1.7

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Qvop	1	120.0	125.0	200.0	32.0	0

Load	Value
L1	300 psf



GSTABL7 v.2 FSmin=1.7

Safety Factors Are Calculated By The Modified Bishop Method

***** GSTABL7 *****

** GSTABL7 by Garry H. Gregory, P.E. **

** Original Version 1.0, January 1996; Current Version 2.003, June 2002 **


```
*********************************************************************************
                   SLOPE STABILITY ANALYSIS SYSTEM
       Modified Bishop, Simplified Janbu, or GLE Method of Slices.
       (Includes Spencer & Morgenstern-Price Type Analysis)
       Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
       Nonlinear Undrained Shear Strength, Curved Phi Envelope,
       Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
       Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.
*********************************************************************************
    Analysis Run Date:        7/28/2016
    Time of Run:              06:02PM
    Run By:                   DRR
    Input Data Filename:      c:\Users\Dave Russell\Desktop\Leita Gross Stability\c-c'stat
ic.in
    Output Filename:          c:\Users\Dave Russell\Desktop\Leita Gross Stability\c-c'stat
ic.OUT
    Unit System:              English
    Plotted Output Filename:  c:\Users\Dave Russell\Desktop\LeGross Stability\c-c'static.P
LT
    PROBLEM DESCRIPTION:  CWE 2150433 - Leita Street Mixed Use
                          C-C' Static
    BOUNDARY COORDINATES
        3 Top   Boundaries
        3 Total Boundaries
    Boundary     X-Left     Y-Left    X-Right    Y-Right    Soil Type
       No.        (ft)       (ft)       (ft)       (ft)     Below Bnd
        1          0.00      26.00       3.30      26.00        1
        2          3.30      26.00      21.00      44.00        1
        3         21.00      44.00     120.00      44.00        1
    Default Y-Origin = 0.00(ft)
    Default X-Plus Value = 0.00(ft)
    Default Y-Plus Value = 0.00(ft)
   ISOTROPIC SOIL PARAMETERS
     1 Type(s) of Soil
    Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
    Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
     No.  (pcf)    (pcf)     (psf)     (deg)    Param.   (psf)     No.
      1   120.0    125.0     200.0     32.0    0.00       0.0      0
   BOUNDARY LOAD(S)
        1 Load(s) Specified
    Load        X-Left      X-Right     Intensity     Deflection
     No.         (ft)         (ft)        (psf)          (deg)
      1         29.00       120.00        300.0           0.0
    NOTE - Intensity Is Specified As A Uniformly Distributed
           Force Acting On A Horizontally Projected Surface.
    A Critical Failure Surface Searching Method, Using A Random
    Technique For Generating Circular Surfaces, Has Been Specified.
    2000 Trial Surfaces Have Been Generated.
     100 Surface(s) Initiate(s) From Each Of    20 Points Equally Spaced
    Along The Ground Surface Between  X =   0.30(ft)
                                and  X =  10.30(ft)
    Each Surface Terminates Between   X =  23.00(ft)
                               and   X =  70.00(ft)
    Unless Further Limitations Were Imposed, The Minimum Elevation
    At Which A Surface Extends Is  Y =      0.00(ft)
     5.00(ft) Line Segments Define Each Trial Failure Surface.
    Following Are Displayed The Ten Most Critical Of The Trial
          Failure Surfaces Evaluated. They Are
          Ordered - Most Critical First.
          * * Safety Factors Are Calculated By The Modified Bishop Method * *
          Total Number of Trial Surfaces Evaluated =  2000
          Statistical Data On All Valid FS Values:
             FS Max =   8.057   FS Min =   1.653   FS Ave =   3.820
             Standard Deviation =    1.372   Coefficient of Variation =   35.93 %
          Failure Surface Specified By  7 Coordinate Points
            Point      X-Surf      Y-Surf
```

No.	(ft)	(ft)
1	3.98	26.70
2	8.77	28.13
3	13.27	30.31
4	17.36	33.19
5	20.93	36.69
6	23.89	40.72
7	25.57	44.00

Circle Center At X = -2.48 ; Y = 57.00 ; and Radius = 30.99
Factor of Safety
*** 1.653 ***
Individual data on the 7 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	4.8	988.1	0.0	0.0	0.	0.	0.0	0.0	0.0
2	4.5	2499.8	0.0	0.0	0.	0.	0.0	0.0	0.0
3	4.1	3170.8	0.0	0.0	0.	0.	0.0	0.0	0.0
4	3.6	3072.0	0.0	0.0	0.	0.	0.0	0.0	0.0
5	0.1	60.8	0.0	0.0	0.	0.	0.0	0.0	0.0
6	2.9	1819.6	0.0	0.0	0.	0.	0.0	0.0	0.0
7	1.7	329.4	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	3.46	26.16
2	8.41	26.88
3	13.16	28.43
4	17.58	30.77
5	21.53	33.83
6	24.91	37.52
7	27.60	41.73
8	28.55	44.00

Circle Center At X = 1.87 ; Y = 54.97 ; and Radius = 28.85
Factor of Safety
*** 1.657 ***
Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	3.46	26.16
2	8.40	26.92
3	13.01	28.85
4	17.03	31.82
5	20.22	35.67
6	22.40	40.17
7	23.21	44.00

Circle Center At X = 2.79 ; Y = 46.87 ; and Radius = 20.72
Factor of Safety
*** 1.663 ***
Failure Surface Specified By 8 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	3.46	26.16
2	8.14	27.92
3	12.59	30.20
4	16.73	32.99
5	20.53	36.25
6	23.92	39.92
7	26.86	43.97
8	26.88	44.00

Circle Center At X = -9.21 ; Y = 67.10 ; and Radius = 42.85
Factor of Safety
*** 1.665 ***
Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	3.46	26.16
2	8.41	26.84
3	13.23	28.18

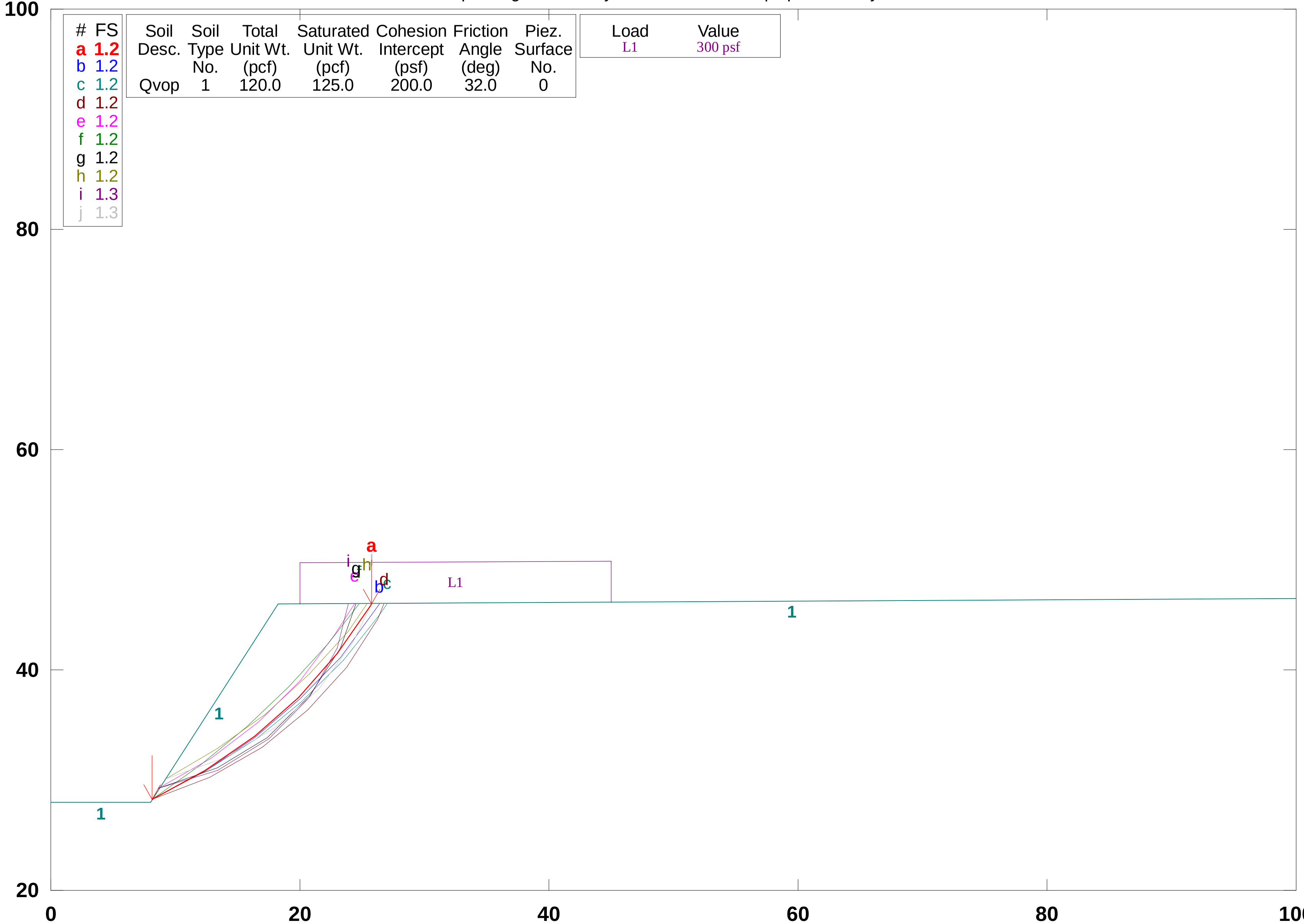
```
    4         17.81       30.18
    5         22.08       32.78
    6         25.95       35.95
    7         29.35       39.61
    8         32.22       43.71
    9         32.36       44.00
Circle Center At X =     1.04 ; Y =    62.46 ; and Radius =    36.38
       Factor of Safety
      ***    1.677   ***
Failure Surface Specified By  7 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1          4.51       27.23
    2          9.45       28.03
    3         14.12       29.80
    4         18.35       32.46
    5         21.96       35.92
    6         24.81       40.03
    7         26.51       44.00
Circle Center At X =     3.03 ; Y =    52.07 ; and Radius =    24.88
       Factor of Safety
      ***    1.679   ***
Failure Surface Specified By  8 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1          3.98       26.70
    2          8.91       27.53
    3         13.67       29.08
    4         18.14       31.31
    5         22.24       34.17
    6         25.87       37.61
    7         28.96       41.54
    8         30.36       44.00
Circle Center At X =     0.94 ; Y =    60.08 ; and Radius =    33.52
       Factor of Safety
      ***    1.679   ***
Failure Surface Specified By  7 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1          3.46       26.16
    2          8.18       27.80
    3         12.57       30.20
    4         16.50       33.29
    5         19.86       36.99
    6         22.56       41.20
    7         23.76       44.00
Circle Center At X =    -4.00 ; Y =    55.29 ; and Radius =    30.07
       Factor of Safety
      ***    1.679   ***
Failure Surface Specified By  8 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1          3.98       26.70
    2          8.96       27.15
    3         13.71       28.73
    4         17.96       31.35
    5         21.51       34.88
    6         24.15       39.12
    7         25.75       43.86
    8         25.76       44.00
Circle Center At X =     4.53 ; Y =    48.36 ; and Radius =    21.68
       Factor of Safety
      ***    1.683   ***
Failure Surface Specified By  9 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1          3.46       26.16
    2          8.43       26.64
    3         13.29       27.85
    4         17.91       29.77
```

```
    5         22.19       32.34
    6         26.06       35.51
    7         29.41       39.22
    8         32.18       43.38
    9         32.47       44.00
Circle Center At X =     2.68 ; Y =    60.02 ; and Radius =    33.87
       Factor of Safety
      ***    1.695   ***
          **** END OF GSTABL7 OUTPUT ****
```

Cross Section D-D’

CWE 2150433 - Leita Street Mixed Use D-D' Static - No Shear Pins

c:\users\dave russell\desktop\leita gross stability\d-d'static withouth sps.pl2   Run By: DRR   7/25/2016   03:58PM



GSTABL7 v.2 FSmin=1.2

Safety Factors Are Calculated By The Modified Bishop Method

***** GSTABL7 *****

** GSTABL7 by Garry H. Gregory, P.E. **
** Original Version 1.0, January 1996; Current Version 2.003, June 2002 **


```
*********************************************************************************
                    SLOPE STABILITY ANALYSIS SYSTEM
        Modified Bishop, Simplified Janbu, or GLE Method of Slices.
        (Includes Spencer & Morgenstern-Price Type Analysis)
        Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
        Nonlinear Undrained Shear Strength, Curved Phi Envelope,
        Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
        Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.
*********************************************************************************
Analysis Run Date:        7/25/2016
Time of Run:              03:58PM
Run By:                   DRR
Input Data Filename:      C:\Users\Dave Russell\Desktop\Leita Gross Stability\D-D’stat
ic withouth SPs.in
Output Filename:          C:\Users\Dave Russell\Desktop\Leita Gross Stability\D-D’stat
ic withouth SPs.OUT
Unit System:              English
Plotted Output Filename:  C:\Users\Dave Russell\Desktop\LeGross Stability\D-D’static w
ithouth SPs.PLT
PROBLEM DESCRIPTION:  CWE 2150433 - Leita Street Mixed Use
                      D-D’ Static - No Shear Pins
BOUNDARY COORDINATES
    3 Top   Boundaries
    3 Total Boundaries
Boundary     X-Left     Y-Left    X-Right    Y-Right    Soil Type
   No.        (ft)       (ft)       (ft)       (ft)     Below Bnd
    1          0.00      28.00       8.00      28.00        1
    2          8.00      28.00      18.30      46.00        1
    3         18.30      46.00     100.00      46.50        1
User Specified Y-Origin =       20.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)
ISOTROPIC SOIL PARAMETERS
  1 Type(s) of Soil
Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
 No.  (pcf)    (pcf)     (psf)     (deg)    Param.   (psf)     No.
  1   120.0    125.0     200.0     32.0    0.00       0.0      0
BOUNDARY LOAD(S)
    1 Load(s) Specified
Load        X-Left      X-Right     Intensity     Deflection
 No.         (ft)         (ft)        (psf)          (deg)
  1          20.00        45.00        300.0          0.0
NOTE - Intensity Is Specified As A Uniformly Distributed
       Force Acting On A Horizontally Projected Surface.
PIER/PILE LOAD(S)
    1 Pier/Pile Load(s) Specified
Pier/Pile  X-Pos    Y-Pos     Load    Spacing  Inclination  Length
   No.     (ft)     (ft)      (lbs)     (ft)      (deg)      (ft)
    1      19.00    46.00     5000.0     1.0      90.00      20.0
NOTE - An Equivalent Line Load Is Calculated For Each Row Of Piers/Piles
       Assuming A Uniform Distribution Of Load Horizontally Between
       Individual Piers/Piles.
PIER/PILE LOAD DATA HAS BEEN SUPPRESSED
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
2000 Trial Surfaces Have Been Generated.
 100 Surface(s) Initiate(s) From Each Of    20 Points Equally Spaced
Along The Ground Surface Between  X =   5.00(ft)
                             and  X =  15.00(ft)
Each Surface Terminates Between   X =  21.00(ft)
                            and   X =  50.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is  Y =      0.00(ft)
 5.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
```

Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Evaluated = 2000
Statistical Data On All Valid FS Values:
FS Max = 16.567   FS Min =   1.181   FS Ave =   3.654
Standard Deviation =   2.217   Coefficient of Variation =   60.69 %

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	8.16	28.28
2	12.42	30.90
3	16.34	34.00
4	19.87	37.53
5	22.97	41.46
6	25.58	45.72
7	25.73	46.05

Circle Center At X =   -12.02 ; Y =   65.86 ; and Radius =   42.66
Factor of Safety
***   1.181   ***

Individual data on the   8 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	4.3	1232.3	0.0	0.0	0.	0.	0.0	0.0	0.0
2	3.9	3154.4	0.0	0.0	0.	0.	0.0	0.0	0.0
3	2.0	2190.1	0.0	0.0	0.	0.	0.0	0.0	0.0
4	1.6	1747.6	0.0	0.0	0.	0.	0.0	0.0	0.0
5	0.1	128.0	0.0	0.0	0.	0.	0.0	0.0	0.0
6	3.0	2294.4	0.0	0.0	0.	0.	0.0	0.0	890.4
7	2.6	767.1	0.0	0.0	0.	0.	0.0	0.0	784.3
8	0.1	2.9	0.0	0.0	0.	0.	0.0	0.0	44.8

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	8.16	28.28
2	12.44	30.86
3	16.41	33.90
4	20.02	37.35
5	23.23	41.19
6	26.00	45.35
7	26.36	46.05

Circle Center At X =   -13.05 ; Y =   68.30 ; and Radius =   45.29
Factor of Safety
***   1.186   ***

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	8.16	28.28
2	12.46	30.82
3	16.49	33.79
4	20.18	37.16
5	23.50	40.90
6	26.42	44.96
7	27.04	46.05

Circle Center At X =   -14.14 ; Y =   71.00 ; and Radius =   48.19
Factor of Safety
***   1.195   ***

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	8.16	28.28
2	12.75	30.26
3	16.95	32.96
4	20.66	36.31
5	23.78	40.23
6	26.21	44.59
7	26.73	46.05

Circle Center At X =   -1.63 ; Y =   57.25 ; and Radius =   30.58

```
         Factor of Safety
        ***    1.204   ***
  Failure Surface Specified By  6 Coordinate Points
    Point      X-Surf      Y-Surf
     No.        (ft)        (ft)
      1          8.68       29.20
      2         12.84       31.98
      3         16.61       35.26
      4         19.96       38.98
      5         22.81       43.08
      6         24.37       46.04
  Circle Center At X =   -11.19 ; Y =    63.43 ; and Radius =    39.58
         Factor of Safety
        ***    1.213   ***
  Failure Surface Specified By  6 Coordinate Points
    Point      X-Surf      Y-Surf
     No.        (ft)        (ft)
      1          8.16       28.28
      2         12.06       31.41
      3         15.71       34.82
      4         19.11       38.49
      5         22.22       42.40
      6         24.69       46.04
  Circle Center At X =   -31.77 ; Y =    82.02 ; and Radius =    66.96
         Factor of Safety
        ***    1.227   ***
  Failure Surface Specified By  6 Coordinate Points
    Point      X-Surf      Y-Surf
     No.        (ft)        (ft)
      1          8.68       29.20
      2         13.32       31.07
      3         17.43       33.92
      4         20.80       37.61
      5         23.27       41.96
      6         24.49       46.04
  Circle Center At X =     2.77 ; Y =    50.59 ; and Radius =    22.20
         Factor of Safety
        ***    1.234   ***
  Failure Surface Specified By  6 Coordinate Points
    Point      X-Surf      Y-Surf
     No.        (ft)        (ft)
      1          9.21       30.12
      2         13.38       32.88
      3         17.24       36.06
      4         20.74       39.63
      5         23.84       43.55
      6         25.43       46.04
  Circle Center At X =   -14.39 ; Y =    70.37 ; and Radius =    46.66
         Factor of Safety
        ***    1.248   ***
  Failure Surface Specified By  6 Coordinate Points
    Point      X-Surf      Y-Surf
     No.        (ft)        (ft)
      1          8.68       29.20
      2         13.38       30.92
      3         17.50       33.75
      4         20.78       37.53
      5         23.01       42.00
      6         23.88       46.03
  Circle Center At X =     4.33 ; Y =    48.40 ; and Radius =    19.69
         Factor of Safety
        ***    1.254   ***
  Failure Surface Specified By  6 Coordinate Points
    Point      X-Surf      Y-Surf
     No.        (ft)        (ft)
      1          9.21       30.12
      2         13.85       31.98
      3         18.02       34.74
      4         21.54       38.29
      5         24.28       42.47
```

```
     6         25.70       46.05
Circle Center At X =     2.52 ; Y =    53.54 ; and Radius =    24.37
       Factor of Safety
      ***    1.266   ***
          **** END OF GSTABL7 OUTPUT ****
```

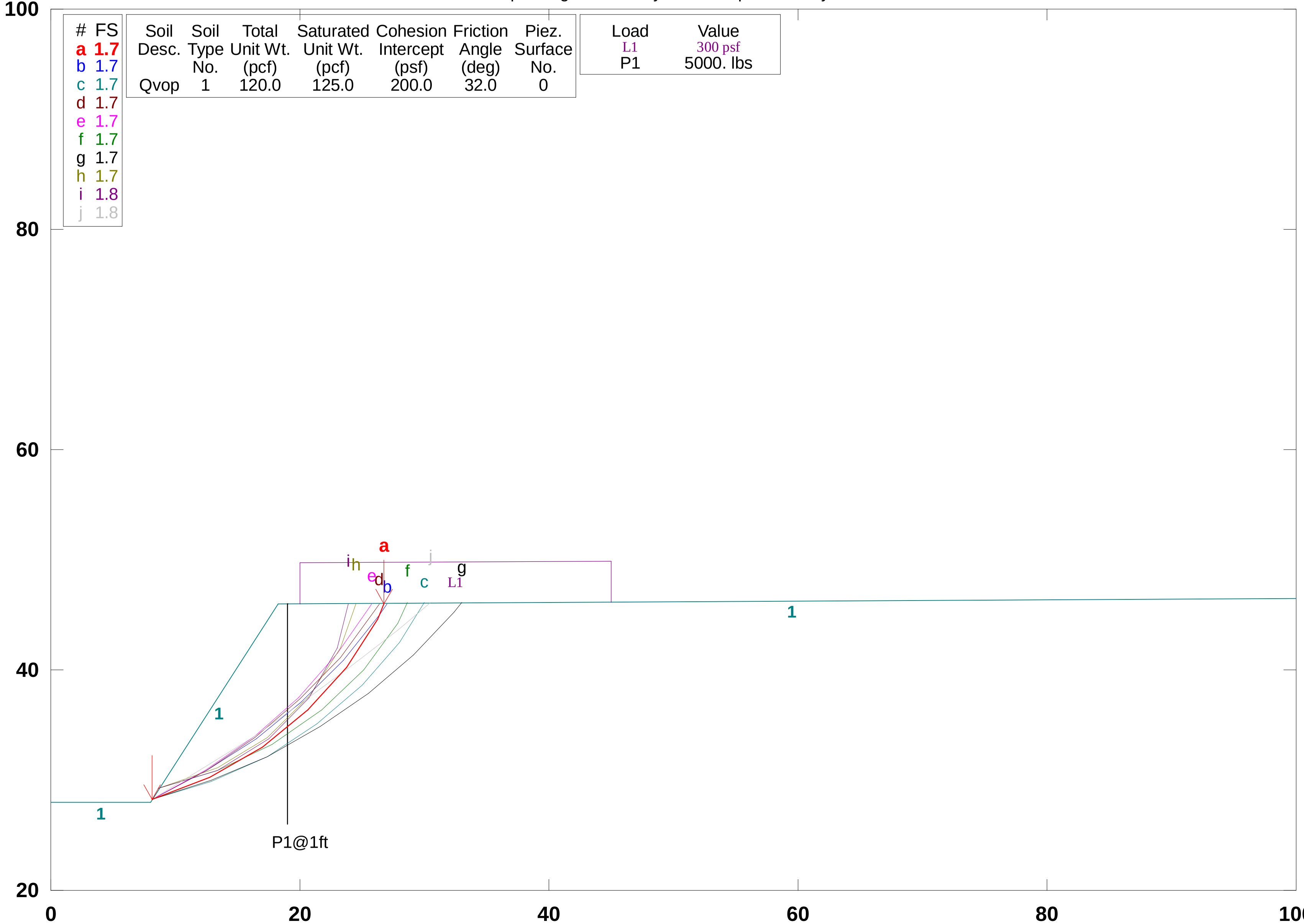
CWE 2150433 - Leita Street Mixed Use D-D' Static

c:\users\dave russell\desktop\leita gross stability\d-d'static.pl2   Run By: DRR   7/25/2016   03:56PM

#	FS
a	1.7
b	1.7
c	1.7
d	1.7
e	1.7
f	1.7
g	1.7
h	1.7
i	1.8
j	1.8

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Qvop	1	120.0	125.0	200.0	32.0	0

Load	Value
L1	300 psf
P1	5000. lbs



GSTABL7 v.2 FSmin=1.7

Safety Factors Are Calculated By The Modified Bishop Method

***** GSTABL7 *****

** GSTABL7 by Garry H. Gregory, P.E. **
** Original Version 1.0, January 1996; Current Version 2.003, June 2002 **

****
SLOPE STABILITY ANALYSIS SYSTEM
Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.
****

```
    Analysis Run Date:         7/25/2016
    Time of Run:               03:56PM
    Run By:                    DRR
    Input Data Filename:       C:\Users\Dave Russell\Desktop\Leita Gross Stability\D-D'stat
ic.in
    Output Filename:           C:\Users\Dave Russell\Desktop\Leita Gross Stability\D-D'stat
ic.OUT
    Unit System:               English
    Plotted Output Filename:   C:\Users\Dave Russell\Desktop\LeGross Stability\D-D'static.P
LT
    PROBLEM DESCRIPTION:  CWE 2150433 - Leita Street Mixed Use
                          D-D' Static
    BOUNDARY COORDINATES
        3 Top   Boundaries
        3 Total Boundaries
    Boundary     X-Left     Y-Left    X-Right    Y-Right    Soil Type
       No.        (ft)       (ft)       (ft)       (ft)     Below Bnd
        1          0.00      28.00       8.00      28.00        1
        2          8.00      28.00      18.30      46.00        1
        3         18.30      46.00     100.00      46.50        1
    User Specified Y-Origin =        20.00(ft)
    Default X-Plus Value = 0.00(ft)
    Default Y-Plus Value = 0.00(ft)
   ISOTROPIC SOIL PARAMETERS
     1 Type(s) of Soil
    Soil  Total  Saturated  Cohesion Friction   Pore   Pressure   Piez.
    Type Unit Wt. Unit Wt. Intercept   Angle  Pressure Constant Surface
     No.  (pcf)    (pcf)     (psf)     (deg)    Param.   (psf)     No.
      1   120.0    125.0     200.0     32.0    0.00       0.0      0
   BOUNDARY LOAD(S)
        1 Load(s) Specified
    Load        X-Left      X-Right     Intensity     Deflection
     No.         (ft)         (ft)        (psf)          (deg)
      1         20.00        45.00        300.0           0.0
    NOTE - Intensity Is Specified As A Uniformly Distributed
           Force Acting On A Horizontally Projected Surface.
   PIER/PILE LOAD(S)
        1 Pier/Pile Load(s) Specified
   Pier/Pile  X-Pos    Y-Pos     Load    Spacing  Inclination  Length
      No.     (ft)     (ft)      (lbs)     (ft)      (deg)      (ft)
       1     19.00    46.00     5000.0     1.0      90.00       20.0
    NOTE - An Equivalent Line Load Is Calculated For Each Row Of Piers/Piles
           Assuming A Uniform Distribution Of Load Horizontally Between
           Individual Piers/Piles.
    A Critical Failure Surface Searching Method, Using A Random
    Technique For Generating Circular Surfaces, Has Been Specified.
    2000 Trial Surfaces Have Been Generated.
     100 Surface(s) Initiate(s) From Each Of    20 Points Equally Spaced
    Along The Ground Surface Between  X =   5.00(ft)
                                 and  X =  15.00(ft)
    Each Surface Terminates Between   X =  21.00(ft)
                                and   X =  50.00(ft)
    Unless Further Limitations Were Imposed, The Minimum Elevation
    At Which A Surface Extends Is  Y =      0.00(ft)
     5.00(ft) Line Segments Define Each Trial Failure Surface.
    Following Are Displayed The Ten Most Critical Of The Trial
          Failure Surfaces Evaluated. They Are
```

Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Evaluated = 2000
Statistical Data On All Valid FS Values:
FS Max = 18.253 FS Min = 1.658 FS Ave = 4.222
Standard Deviation = 2.379 Coefficient of Variation = 56.35 %
Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	8.16	28.28
2	12.75	30.26
3	16.95	32.96
4	20.66	36.31
5	23.78	40.23
6	26.21	44.59
7	26.73	46.05

Circle Center At X = -1.63 ; Y = 57.25 ; and Radius = 30.58
Factor of Safety
*** 1.658 ***
Individual data on the 8 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	4.6	1663.6	0.0	0.0	0.	0.	0.0	0.0	0.0
2	4.2	4221.4	0.0	0.0	0.	0.	0.0	0.0	0.0
3	1.3	1817.3	0.0	0.0	0.	0.	0.0	0.0	0.0
4	1.7	2256.1	0.0	0.0	0.	0.	0.0	0.0	0.0
5	0.7	796.3	0.0	0.0	0.	0.	0.0	0.0	199.1
6	3.1	2896.7	0.0	0.0	0.	0.	0.0	0.0	934.0
7	2.4	1060.5	0.0	0.0	0.	0.	0.0	0.0	730.2
8	0.5	45.7	0.0	0.0	0.	0.	0.0	0.0	157.0

Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	8.16	28.28
2	12.46	30.82
3	16.49	33.79
4	20.18	37.16
5	23.50	40.90
6	26.42	44.96
7	27.04	46.05

Circle Center At X = -14.14 ; Y = 71.00 ; and Radius = 48.19
Factor of Safety
*** 1.682 ***
Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	8.16	28.28
2	12.89	29.89
3	17.34	32.17
4	21.40	35.08
5	24.99	38.56
6	28.04	42.53
7	30.01	46.07

Circle Center At X = -0.39 ; Y = 61.20 ; and Radius = 34.01
Factor of Safety
*** 1.684 ***
Failure Surface Specified By 7 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	8.16	28.28
2	12.44	30.86
3	16.41	33.90
4	20.02	37.35
5	23.23	41.19
6	26.00	45.35
7	26.36	46.05

Circle Center At X = -13.05 ; Y = 68.30 ; and Radius = 45.29
Factor of Safety

```
      ***    1.690   ***
Failure Surface Specified By  7 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1          8.16       28.28
    2         12.42       30.90
    3         16.34       34.00
    4         19.87       37.53
    5         22.97       41.46
    6         25.58       45.72
    7         25.73       46.05
Circle Center At X =   -12.02 ; Y =    65.86 ; and Radius =    42.66
       Factor of Safety
      ***    1.701   ***
Failure Surface Specified By  7 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1          8.68       29.20
    2         13.40       30.85
    3         17.79       33.25
    4         21.72       36.34
    5         25.10       40.02
    6         27.84       44.21
    7         28.65       46.06
Circle Center At X =     0.95 ; Y =    58.79 ; and Radius =    30.59
       Factor of Safety
      ***    1.729   ***
Failure Surface Specified By  8 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1          8.16       28.28
    2         12.85       29.99
    3         17.35       32.18
    4         21.59       34.83
    5         25.53       37.91
    6         29.13       41.38
    7         32.35       45.20
    8         32.95       46.09
Circle Center At X =    -5.75 ; Y =    73.79 ; and Radius =    47.59
       Factor of Safety
      ***    1.729   ***
Failure Surface Specified By  6 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1          8.68       29.20
    2         13.32       31.07
    3         17.43       33.92
    4         20.80       37.61
    5         23.27       41.96
    6         24.49       46.04
Circle Center At X =     2.77 ; Y =    50.59 ; and Radius =    22.20
       Factor of Safety
      ***    1.745   ***
Failure Surface Specified By  6 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1          8.68       29.20
    2         13.38       30.92
    3         17.50       33.75
    4         20.78       37.53
    5         23.01       42.00
    6         23.88       46.03
Circle Center At X =     4.33 ; Y =    48.40 ; and Radius =    19.69
       Factor of Safety
      ***    1.767   ***
Failure Surface Specified By  7 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1          8.16       28.28
    2         12.28       31.11
```

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    3         16.32       34.06
    4         20.26       37.13
    5         24.12       40.31
    6         27.87       43.62
    7         30.51       46.07
Circle Center At X =   -84.35 ; Y =   167.50 ; and Radius =   167.16
       Factor of Safety
      ***    1.769   ***
          **** END OF GSTABL7 OUTPUT ****
```