REPORT OF PRELIMINARY GEOTECHNICAL INVESTIGATION

PROPOSED NICHOLAS RESIDENCE
1826-1836 WASHINGTON PLACE
SAN DIEGO, CALIFORNIA

PREPARED FOR

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March 20, 2015

Mr. Jim Nicholas CWE 2140453.01
3593 5th Avenue, Suite C
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Subject: **Report of Preliminary Geotechnical Investigation**
Proposed Nicholas Residence, 1826-1836 Washington Place, San Diego, California

Dear Mr. Nicholas:

In accordance with your request and our proposal dated August 7, 2014, we have completed a preliminary geotechnical investigation for proposed residence 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 residence 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,
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1826-1836 WASHINGTON PLACE
SAN DIEGO, CALIFORNIA

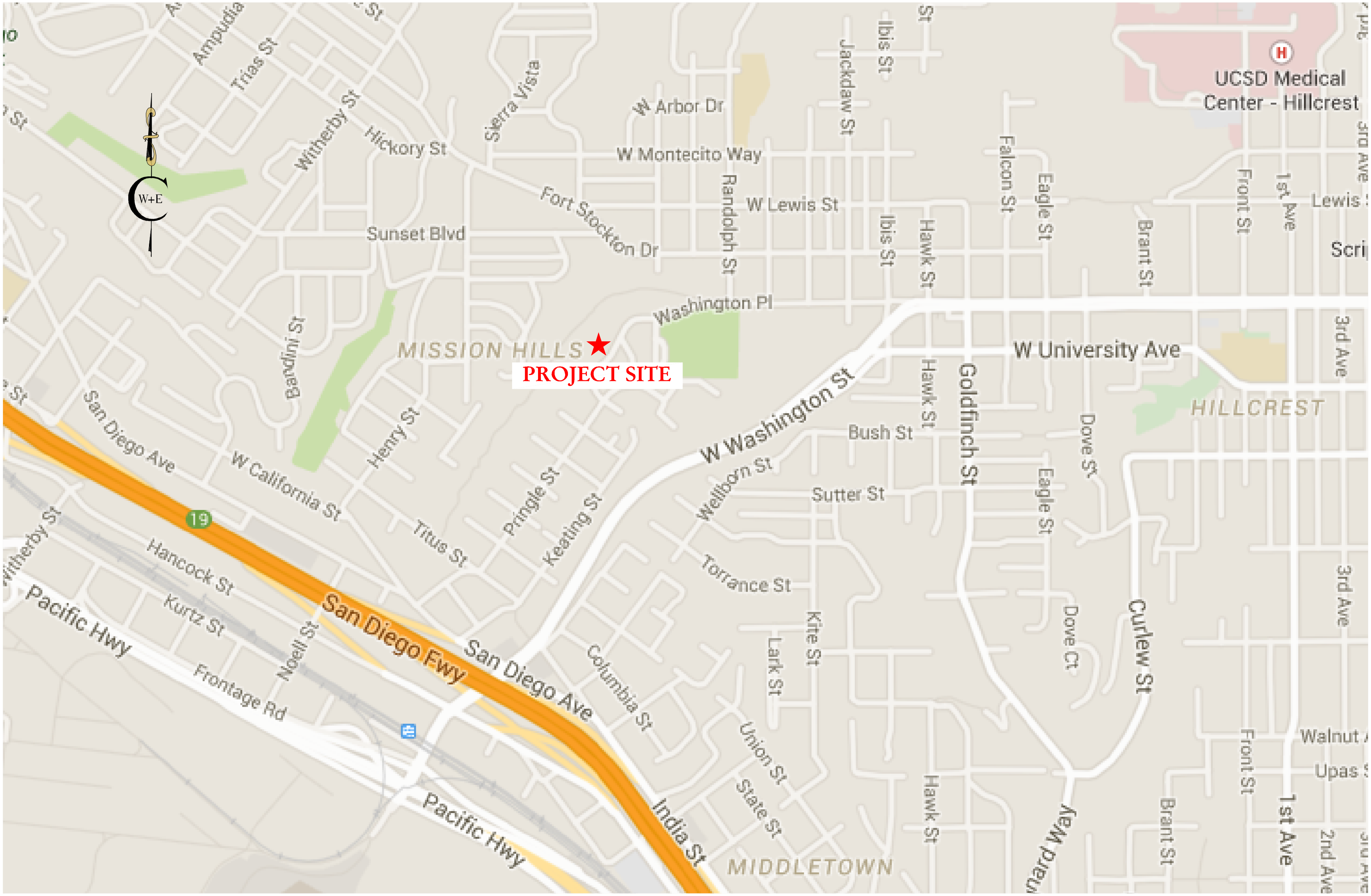
INTRODUCTION AND PROJECT DESCRIPTION

This report presents the results of a preliminary geotechnical investigation performed for a proposed residential project to be constructed at 1826-1836 Washington Place, San Diego, California. The following Figure Number 1 presents a vicinity map showing the location of the property.

We understand that it is proposed to raze the existing improvements on each lot and construct a new single-family residence and detached garage on the site. The residence is expected be one and/or two-stories high with a basement. The above grade portions of the home are expected to be of conventional wood-frame construction and the basement is expected to be of concrete or masonry construction. The detached garage will be a single-story structure. The building will have a conventional concrete slab-on-grade floor system, and will be supported by shallow foundations. In general, grading to accommodate the proposed improvements is expected to consist of cuts and fills of up to approximately 10 feet and 5 feet from existing grades, respectively.

To assist in the preparation of this report, we were provided with an undated site plan of unknown origin and a topographic plat prepared by Woods Land Surveying, Inc., dated November 10, 2014. A copy of the site plan was used as a base map for our Site Plan and Geologic Map, and is included herein as Plate Number 1.

This report has been prepared for the exclusive use of Jim Nicholas, and his 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.



SITE VICINITY MAP *(GOOGLE MAPS)*	**PROPOSED NICHOLAS RESIDENCE** 1826-1836 WASHINGTON PLACE SAN DIEGO, CALIFORNIA	CHRISTIAN WHEELER ENGINEERING
	DATE: MARCH 2015 / JOB NO.: 2140453.01	
	BY: BGR / FIGURE NO.: 1	

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:

- Excavate five hand-dug test pits to explore the existing soil conditions.
- Backfill the test pits with the removed soil. It should be noted that the soil was not compacted and will have to be removed and replaced as compacted fill during the future site grading.
- 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.
- Address potential construction difficulties that may be encountered due to soil conditions, groundwater or geologic hazards, and provide geotechnical recommendations to deal with these conditions.
- 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 restrained and unrestrained retaining walls.
- Provide a preliminary geotechnical report that presents the results of our investigation which includes a plot plan showing the location of our subsurface explorations, excavation logs, laboratory test results, and our conclusions and recommendations for the proposed project.

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 consists of two contiguous developed residential lots located at 1826 and 1836 Washington Place in the Mission Hills community of San Diego, California. The property is bound on the east by Washington Place, on the west by vacant land, and on the south and north by residential structures. The site currently supports two single-story, single-family residences with other normally associated improvements. Topographically, the site slopes down slightly to moderately from the street west toward the back of the improved pad area, and slopes down steeply from the rear of the pad to the west into a natural drainage. This portion of the site comprises the sidewall of a drainage canyon extending in a southwesterly direction. Based on the aforementioned topographic plat, site elevations range from about 267 feet along Washington Place to about 230 at the northwestern corner of the site. Heavy vegetation and several large mature trees exist in portions of the site west of the existing structures.

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 artificial fill, colluvium, topsoil, subsoil, very old paralic deposits, and San Diego Formation. These materials are described below.

ARTIFICIAL FILL: Artificial fill associated with the existing building pads was encountered underlying approximately the central portion of the site. As encountered in test pits P-3 and P-5, the fill soils extended to a depth of about 3 feet to 1½ feet below existing site grade, respectively. The artificial fill generally consisted of brown, damp, loose to medium dense, silty sand (SM). These materials were judged to have a very low expansion potential (EI<20).

COLLUVIUM: The western portion of the property was found to be underlain by colluvium. As encountered in test pit P-1 and P-2, the colluvium extended to a depth of about 2 feet and 1 foot below existing grade, respectively. The colluvium generally consisted of brown and reddish-brown, moist, very loose to medium dense, silty sand with some gravel (SM). The colluvium was judged to have a very low expansion potential (EI<20).

TOPSOIL: A topsoil layer was encountered underlying the fill and at grade at the eastern portion of the site. As encountered in the test pits, the topsoil layer had a maximum thickness of about 1¼ foot. The topsoil generally consisted of brown to dark brown, damp, very loose to loose, silty sand (SM). The topsoil was judged to have a very low expansion potential (EI<20).

SUBSOIL: A subsoil layer was encountered underlying the fill, topsoil, and colluvium throughout the site. These materials range in thickness from about ¾ foot to 2 feet. The subsoil generally consisted of dark grayish-brown, yellowish-brown, dark brown, and reddish- brown, moist, medium stiff to stiff, sandy clay (CL). The subsoil was found to have a high expansion potential (EI=92).

VERY OLD PARALIC DEPOSITS (Qop): A cap of Quaternary-age very old paralic deposits were encountered underlying the surficial soils at the eastern portion of the site (see cross section Plate No. 2). As encountered in our explorations, the very old paralic deposits generally consisted of reddish-brown, moist, dense, silty sand (SM) and slightly silty sand (SM-SW). The very old paralic deposits were judged to have a very low expansion potential (EI<20).

SAN DIEGO FORMATION (Tsd): Tertiary-age San Diego Formation deposits were encountered underlying the site at varying depths (see cross section Plate No. 2). As encountered in our explorations, the formational deposits generally consisted of yellowish-brown, moist, dense, silty sand (SM). The San Diego Formation deposits were judged to have a very low expansion potential (EI<20).

GROUNDWATER: No groundwater or major seepage was encountered in our subsurface explorations. We do not expect any significant groundwater related conditions during or after the proposed construction. However, it should be recognized that minor groundwater seepage problems might occur after construction and landscaping are completed, even at a site where none were present before construction. 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: It should be noted that 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 while others are classified as only potentially active according to the criteria of the California Division of Mines and Geology. Active fault zones are those which have shown conclusive evidence of faulting during the Holocene Epoch (the most recent 11,000 years) while potentially active fault zones have demonstrated movement during the Pleistocene Epoch (11,000 to 1.6 million years before the present) but no movement during Holocene time. Inactive faults are those faults that can be demonstrated to have no movement in the past 1.6 million years.

It should be recognized that the active portion of the Rose Canyon Fault Zone is located approximately 1½ miles southwest of the site. 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 west, and the Elsinore, San Jacinto and San Andreas Fault Zones to the northeast.

GENERAL GEOLOGIC HAZARDS

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. 21, the site is located within Geologic Hazard Category 52, which is assigned to level areas, gently sloping to steep terrain with favorable geologic structure, where the potential risks are classified as "low."

LIQUEFACTION: The earth materials underlying the site are not considered subject to liquefaction due to such factors as soil density, grain-size distribution, the absence of shallow groundwater conditions.

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. Due to the site's setback from the ocean and elevation, it will not be affected by a tsunami.

SEICHES: Seiches are periodic oscillations in large bodies of water such as lakes, harbors, bays or reservoirs. Due to the site's location, it will not be affected by seiches.

SLOPE STABILITY ANALYSES

GENERAL: In consideration of the existing sloping topography on and adjacent to the site, we have performed a series of quantitative slope stability analyses to determine the factors-of-safety against deep-seated slope failure for the slope that descends from the project area. It is our professional opinion that the cross section modeled in our stability analyses, oriented perpendicular to the slope, represents the worst case scenarios with regards to gross slope stability at the subject site. We have also performed a surficial stability analysis to determine the minimum factor-of-safety against surficial failure of the fill slope. Descriptions of our stability analyses are presented in the following "Gross Stability Analyses" and "Surficial Stability Analyses" sections of this report.

GROSS STABILITY ANALYSES

CROSS-SECTIONS: As presented on our Site Plan and Geotechnical Map, included herein as Plate No. 1, we have created geologic cross section A-A' to depict the proposed topography and subsurface conditions at the subject site. The geologic cross section is included on Plate No. 2 of this report. The location of the geologic cross section was chosen to be oriented perpendicular to the topography of the slope and included the steepest slope.

To analyze the stability of the subject site we have performed a series of quantitative slope stability analyses incorporating the topography and geologic conditions presented on our geologic cross section A-A'. The on-site earth materials incorporated in our stability analyses are described above in the "Geologic Setting and Soil Description" section of this report. Based on the configuration of the site and the composition of the underlying formational material, circular- type failure mechanisms were modeled in our analyses. The results of our quantitative slope stability analyses are presented below in the results of Stability Analyses Section of this report.

STRENGTH PARAMETERS: The strength parameters for the earth materials underlying the subject site were estimated by the direct shear test method and our experience and judgment with similar soil types. The results of our direct shear testing are presented at the rear of this report. The unit weights of the earth materials that underlie the subject site and adjacent areas utilized in our stability analyses were chosen based on the results of our laboratory testing and our experience with similar materials in the vicinity of the subject site. It is our professional opinion that the strength parameters and unit weights presented below and utilized in our stability analyses provide for conservative slope stability analyses.

Soil Type	Unit Weight, γ	Phi, ϕ	Cohesion, c
Very Old Paralic Deposits (Qop)	125 pcf	32°	300 psf
San Diego Formation (Tsd)	120 pcf	30°	500 psf

METHOD OF ANALYSES: The analyses of the gross stability of the proposed site topography were 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. The proposed topography of the subject site along geologic cross section A-A' was analyzed for circular-type failures and each failure analysis was programmed to run at least 2,000 random failure surfaces. The most critical failure surfaces were then accumulated 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 may be studied.

RESULTS OF STABILITY ANALYSES: Appendix A of this report presents the results of our static and pseudo-static (incorporating a kh value of 0.15g), gross stability analyses. As demonstrated on the printouts of these analyses (see Appendix A), the proposed site topography along our geologic cross section A-A' demonstrates minimum factors-of-safety greater than 1.5 and 1.1 against static and pseudo-static failures, respectively, which are the minimums that are generally considered to be stable.

SURFICIAL SLOPE STABILITY

GENERAL: Appendix B of this report presents the results of our surficial slope stability analysis of the steepest portions of the natural slopes on-site. As demonstrated on the printout of this analysis, the natural slope demonstrates a minimum factor-of-safety greater than 1.5 against shallow, surficial failures, which is the minimum that are generally considered to be stable.

CONCLUSIONS

In general, it is our professional opinion and judgment that the subject property is suitable for the construction of the proposed structures provided the recommendations presented herein are implemented. The main geotechnical conditions encountered affecting the proposed project includes potentially compressible surficial soils, expansive subsoil, and a cut/fill transition.

As encountered in our subsurface explorations, the site is underlain by potentially compressible artificial fill, colluvium, topsoil, and subsoil extending to a maximum combined depth of about 4 feet below existing grade. These deposits are considered unsuitable, in their present condition, for the support of settlement sensitive improvements.

The existing subsoil was found to be highly expansive (EI=92). Select grading is recommended to mitigate this condition. These deposits should be exported from the site or mixed with on-site low expansive soils to produce a low expansive mix suitable for use as structural fill.

An additional consideration is the potential for cut/fill transition under the proposed residence due to the proposed site configuration and grading anticipated for site preparation and to achieve proposed grades. It is recommended that this condition be mitigated by the removal of the potentially compressible soils and the partial removal of the underlying very old paralic deposits or San Diego Formation deposits. The materials removed may be replaced as compacted fill.

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.

OBSERVATION OF GRADING: Continuous observation by the Geotechnical Consultant is essential during the grading operation to confirm conditions anticipated by our investigation, to allow adjustments in design criteria to reflect actual field conditions exposed, and to determine that the grading proceeds in general accordance with the recommendations contained herein.

CLEARING AND GRUBBING: Site preparation should begin with the removal of existing improvements slated for demolition. The resulting debris and 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, colluvium, topsoil, subsoil, and very old paralic deposits or San Diego Formation deposits disturbed during demolition operations underlying proposed structures, associated improvements, and new fills should be removed in their entirety. It is anticipated that removals associated with these materials will be about 4 feet from existing grade. 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.

UNDERCUT RECOMMENDATIONS: It is recommended that the areas of the site to receive the proposed structures be undercut to a minimum depth of 4 feet below finished pad grade or 1 foot below the bottom of the deepest footing (retaining wall key included), whichever is more. The materials removed may be replaced as compacted fill provided that they have a low expansive potential (EI between 21 and 50). It is imperative that the removals and undercuts be performed in such a way as to provide for a continuous contact between the new fill and suitable native deposits that drains away from the proposed structures, and avoids adjacent zones with different undercut depths that may impair subsurface drainage. If necessary, subdrains may have to be installed to decrease undercut depths. The need for subdrains will be evaluated during grading operations.

TEST PIT BACKFILL: Backfill associated with our subsurface explorations underlying settlement-sensitive improvements not removed as part of site preparation operations should be removed and replaced as compacted fill.

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. In areas to support fill slope, keys should be cut into the competent supporting materials. The keys should be at least twelve feet wide and be sloped back at least two percent. The keys should extend at least one foot into the competent supporting materials. Where the existing ground has a slope of 5:1 (horizontal to vertical) or steeper, it should be benched into as the fill extends upward from the keyways. The benching should remove all loose surficial soils and should create level areas on which to place the fill material.

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 three inches in maximum dimension.

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

TEMPORARY SLOPES: We anticipate that temporary excavation slopes up to about 11 feet high may be required for the grading and construction of the proposed structure and associated improvements. The excavations required for footing construction are considered as part of the temporary slopes. In general, temporary cuts can be excavated vertically for the lowest 4 feet and then at an inclination of 1:1 or flatter above. We recommend that our firm be contacted to have an engineering geologist observe the temporary cut slopes during grading to ascertain that no unforeseen adverse conditions exist. If adverse conditions are identified, it may be necessary to flatten the slope inclination. No surcharge loads such as soil or equipment stockpiles, vehicles, etc. should be allowed within a distance from the top of temporary slopes equal to half the slope height.

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 where the friable sands are exposed. 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. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations. Christian Wheeler Engineering should be immediately notified if zones of potential instability, sloughing or raveling develop, and mitigation measures should be implemented prior to continuing work.

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 structures 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 recommend that the ground adjacent to structures be sloped away at a minimum gradient of two percent. Densely vegetated areas where runoff can be impaired should have a minimum gradient of five percent for the first five 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.

FOUNDATIONS

GENERAL: Based on our findings and engineering judgment, the proposed structures and associated improvements may be supported by conventional shallow continuous and isolated spread footings. The following recommendations are considered the minimum based on the anticipated soil conditions after site preparation as recommended in our forthcoming geotechnical report is performed, and are not intended to be lieu of structural considerations. All foundations should be designed by a qualified professional.

SHALLOW FOUNDATIONS: Spread footings supporting the proposed structures should be embedded at least 12 inches and 18 inches below lowest adjacent finished pad grade, for single-story and two-story structures, respectively. Spread footings supporting the proposed associated improvements should be embedded at least 12 inches below lowest adjacent finished pad grade. 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. Property line footings should extend at least 6 inches into very old paralic deposits or San Diego Formation deposits. Footings located adjacent or within slopes should be extended to a depth such that a minimum horizontal distance of 10 feet exists between the lower outside footing edge and the face of the slope.

BEARING CAPACITY: Spread footings supporting the proposed structures and exterior improvements with a minimum depth and 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 5,000 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. The passive resistance may be considered to be equal to an equivalent fluid weight of 300 pounds per cubic foot. 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.

FOUNDATION EXCAVATION OBSERVATION: All footing excavations should be observed by Christian Wheeler Engineering prior to placing of forms and reinforcing steel to determine whether the foundation recommendations presented herein are followed and that the foundation soils are as anticipated in the preparation of this report. All footing excavations should be excavated neat, level, and square. All loose or unsuitable material should be removed prior to the placement of concrete.

SETTLEMENT CHARACTERISTICS: The anticipated total and differential settlement is expected to be less than about one inch and one inch over forty 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 prevailing foundation soils are assumed to have a low expansive potential (EI between 21 and 50). The recommendations within this report reflect these conditions.

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.

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	32.749° -117.180°
Site Class	D
Site Coefficient F_a	1.004
Site Coefficient F_v	1.521
Spectral Response Acceleration at Short Periods S_s	1.241 g
Spectral Response Acceleration at 1 Second Period S_1	0.479 g
$S_{MS}=F_aS_s$	1.245 g
$S_{M1}=F_vS_1$	0.729 g
$S_{DS}=2/3*S_{MS}$	0.830 g
$S_{D1}=2/3*S_{M1}$	0.486 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 CONCRETE SLABS

GENERAL: It is our understanding that the floor system of the proposed structures will consist of a concrete slab-on-grade. The following recommendations are considered the minimum slab requirements based on the soil conditions and are not intended in lieu of structural considerations. These recommendations assume that the site preparation recommendations contained in this report are implemented.

INTERIOR FLOOR SLABS: The minimum slab thickness should be 4 inches (actual) and the slab should be reinforced with at least No. 3 bars spaced at 18 inches on center each way. Slab reinforcement should be supported on chairs such that the reinforcing bars are positioned at mid-height in the floor slab. The slab reinforcement should extend down into the perimeter footings at least 6 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. Two inches of sand are typically used above and below the plastic. 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). Driveway slabs should have a minimum thickness of 5 inches and be reinforced with at least No. 4 bars placed at 18 inches ocew. Driveway slabs should be provided with a thickened edge a least 12 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 upper foot of embedment should be neglected when calculating passive pressures, unless the foundation abuts a hard surface such as a concrete slab. The passive pressure may be increased by one-third for seismic loading. The coefficient of friction for concrete to soil may be assumed to be 0.30 for the resistance to lateral movement. When combining frictional and passive resistance, the friction should be reduced by one-third.

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 38 and 58 pounds per cubic foot, respectively. These pressures do not consider any other surcharge. If any are anticipated, this office should be contacted for the necessary increase in soil pressure. These values are based on 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 12H pounds per square foot (where H = wall height in feet) occurring at the top of the wall.

WATERPROOFING AND WALL DRAINAGE SYSTEMS: The need for waterproofing should be evaluated by others. If required, 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. 9 of this report for informational purposes. Additionally, outlets points for the retaining wall drain system should be coordinated with the project civil engineer.

BACKFILL: Retaining wall 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 February 25, 2015 at the locations indicated on the Site Plan and Geotechnical Map included herewith as Plate No. 1. These explorations consisted of hand-dug test pits. 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 Plate Nos. 3 through 7. 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 and bulk samples of the earth materials encountered were 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 is 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.

b) **MOISTURE-DENSITY:** In-place moisture contents and dry densities were determined for selected soil samples in accordance with ATM D 1188. The results are summarized in the test pit logs.

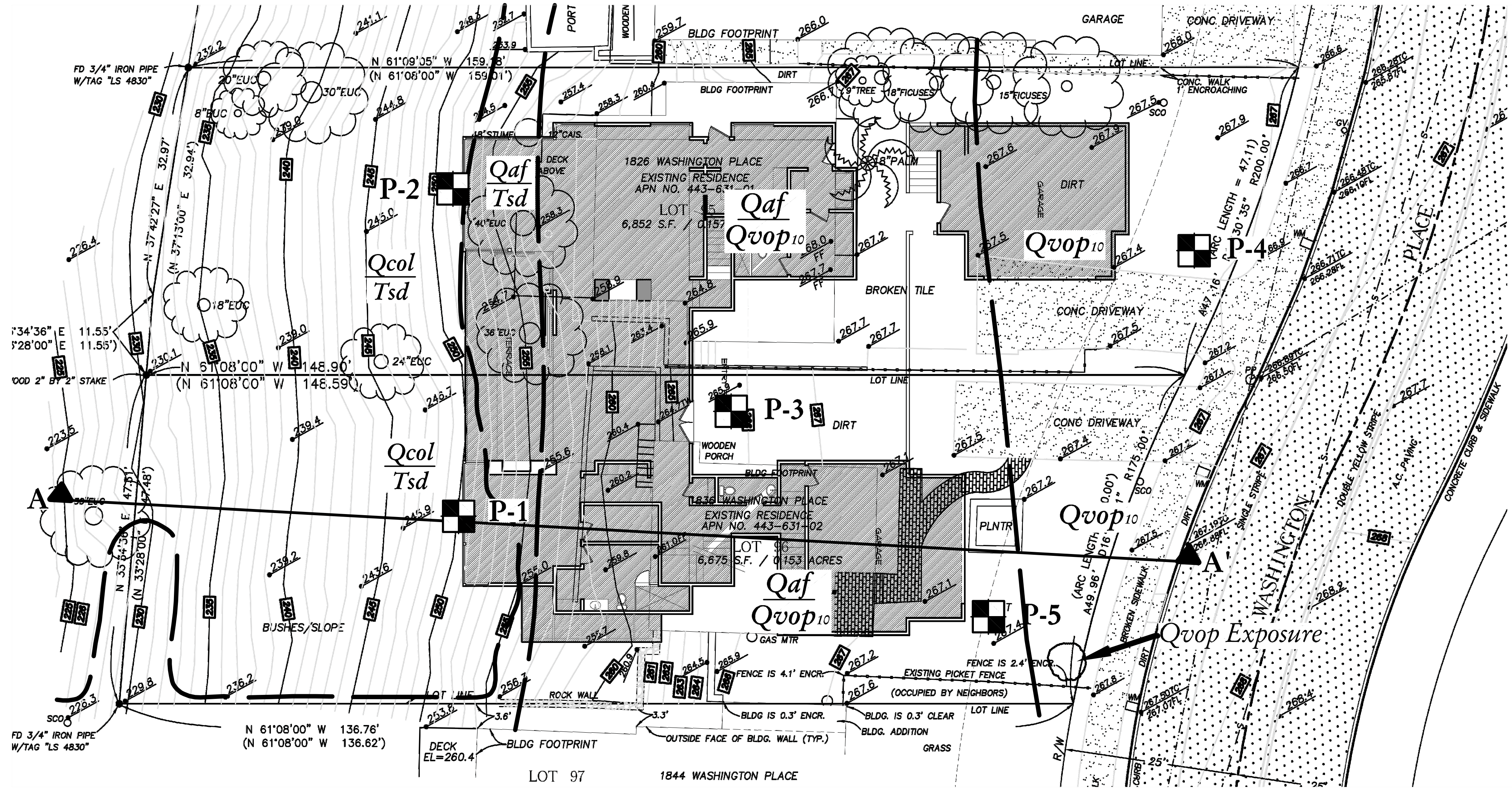
c) **MAXIMUM DRY DENSITY AND OPTIUM MOISTURE CONTENT TEST:** The maximum dry density and optimum moisture content of a selected soil sample were determined in the laboratory in accordance with ASTM D 1557, Method A. The results of this test are presented on Plate Number 8.

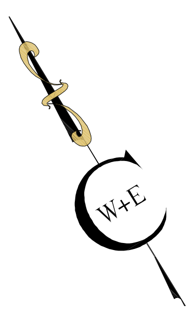
d) **DIRECT SHEAR TEST:** Direct shear tests were performed on selected samples of the on-site soils in accordance with ASTM D 3080. The results of this test are presented on Plate Number 8.

e) **EXPANSION INDEX TEST:** An expansion index test was performed on a selected remolded soil sample in accordance with ASTM D 4829. The results of the test are presented on Plate Number 8.

f) **GRAIN SIZE DISTRIBUTION:** The grain size distribution of a selected soil sample was determined in accordance with ASTM D 422. The results of this test are presented on Plate Number 8.

g) **SOLUBLE SULFATES:** The soluble sulfate content of a selected soil sample was determined in accordance with California Test Method 417. The test results are presented on Plate Number 8.





0 20' 40'

SCALE: 1" = 20'

CWE LEGEND

P-5	APPROXIMATE BORING LOCATION
A A'	GEOLOGIC CROSS SECTION
	APPROXIMATE GEOLOGIC CONTACT
Qaf / Qvop	ARTIFICIAL FILL OVER VERY OLD PARALIC DEPOSITS
Qaf / Tsd	ARTIFICIAL FILL OVER SAN DIEGO FORMATION
Qvop	VERY OLD PARALIC DEPOSITS

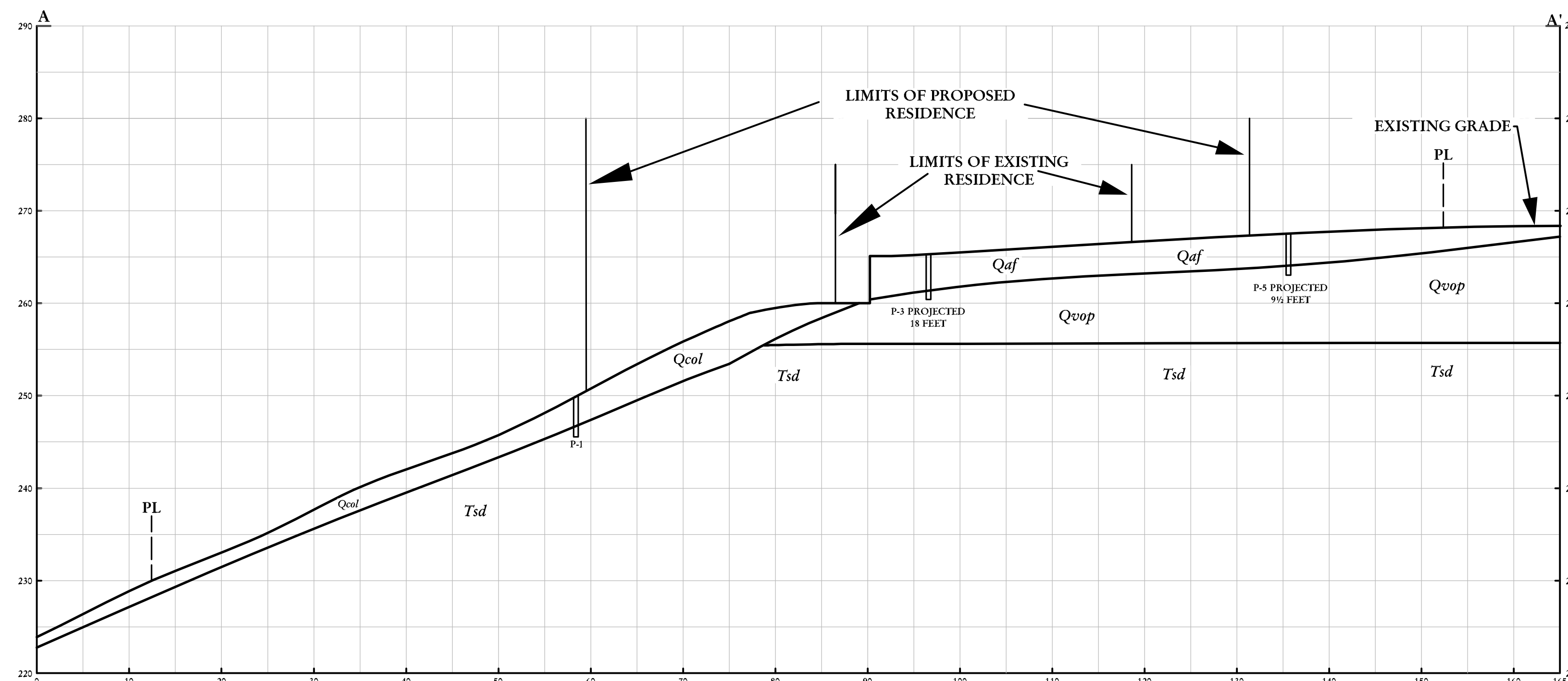
SITE PLAN AND GEOTECHNICAL MAP

PROPOSED NICHOLAS RESIDENCE
1826-1836 WASHINGTON PLACE
SAN DIEGO, CALIFORNIA

DATE:	MARCH 2015	JOB NO.:	2140453.01
BY:	MWL/BGR	PLATE NO.:	1

CHRISTIAN WHEELER
ENGINEERING

CWE LEGEND	
Qaf	ARTIFICIAL FILL
Qcol	COLLUVIUM
Qvop	VERY OLD PARALIC DEPOSITS
Tsd	SAN DIEGO FORMATION
NOTE: SURFICIAL TOPSOIL AND SUBSOIL NOT MAPPED	



0 20' 40'

SCALE: 1" = 20'

CROSS SECTION A-A'

PROPOSED NICHOLAS RESIDENCE 1826-1836 WASHINGTON PLACE SAN DIEGO, CALIFORNIA			
DATE:	MARCH 2015	JOB NO.:	2140453.01
BY:	MWL	PLATE NO.:	2

CHRISTIAN WHEELER ENGINEERING

LOG OF TEST PIT P-1

Date Drilled:	2/25/15	Equipment:	Hand Tools
Logged By:	TSW	Auger Type:	N/A
Existing Elevation:	250 feet	Drive Type:	N/A
Finish Elevation:	N/A	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	NG	Nuclear Gauge Test
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	250		SM	**Colluvium (Qcol):** Medium brown, moist, very loose, medium- to coarse-grained, SILTY SAND with rock up to 2".							
½											
1	249										
1½											
2	248		CL	**Subsoil:** Reddish-brown and dark brown and yellowish-brown, moist, medium stiff to stiff, SANDY CLAY.							
2½						CK		12.2	100.0		
3	247										
3½			SM	**San Diego Formation(Tsd):** Yellowish-brown, moist, dense, very fine- to fine-grained, SILTY SAND.							
4	246					CK		10.1	97.5		
4½				Test pit terminated at 4½ feet. No groundwater or seepage encountered.							
5	245										
5½											
6	244										
6½											
7	243										
7½											
8	242										

Notes:

Symbol Legend

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

PROPOSED NICHOLAS RESIDENCE
1826-1836 WASHINGTON PLACE
SAN DIEGO, CALIFORNIA

DATE:	MARCH 2015	JOB NO.:	2140453.01
BY:	MWL	PLATE NO.:	3

CHRISTIAN WHEELER
ENGINEERING

LOG OF TEST PIT P-2

Date Drilled:	2/25/15	Equipment:	Hand Tools
Logged By:	TSW	Auger Type:	N/A
Existing Elevation:	252 feet	Drive Type:	N/A
Finish Elevation:	N/A	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	NG	Nuclear Gauge Test
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	252		SM	**Colluvium (Qcol):** Medium brown, moist, very loose, medium- to coarse-grained, SILTY SAND with rock up to 3".							
½											
1	251		CL	**Subsoil:** Reddish-brown and dark brown and yellowish-brown, moist, medium stiff to stiff, SANDY CLAY.							
1½											
2	250					CK		10.7	95.1		
2½											
3	249		SM	**San Diego Formation(Tsd):** Yellowish-brown, moist, dense, very fine- to fine-grained, SILTY SAND.							
3½						CK		10.7	93.8		
4	248			Test pit terminated at 4 feet. No groundwater or seepage encountered.							
4½											
5	247										
5½											
6	246										
6½											
7	245										
7½											
8	244										

Notes:

Symbol Legend

▽	Groundwater Level During Drilling
▼	Groundwater Level After Drilling
❢❢	Apparent Seepage
*	No Sample Recovery
**	Erroneous Blow Count (rocks present)

PROPOSED NICHOLAS RESIDENCE
1826-1836 WASHINGTON PLACE
SAN DIEGO, CALIFORNIA

DATE:	MARCH 2015	JOB NO.:	2140453.01
BY:	MWL	PLATE NO.:	4

CHRISTIAN WHEELER
ENGINEERING

LOG OF TEST PIT P-3

Date Drilled:	2/25/15	Equipment:	Hand Tools
Logged By:	TSW	Auger Type:	N/A
Existing Elevation:	266 feet	Drive Type:	N/A
Finish Elevation:	N/A	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	NG	Nuclear Gauge Test
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	252		SM	**Artificial Fill (Qaf):** Medium brown, moist, loose to medium dense, medium- to coarse-grained, SILTY SAND with rock up to 3".							
½											
1	251										
1½						CK		5.5	112.6		
2	250		SM	**Topsoil:** Medium to dark brown, moist, very loose to loose, fine- to medium-grained, SILTY SAND; moderate roots.							
2½											
3	249					CK		4.1	101.8		
			CL	**Subsoil:** Dark brown, moist, medium stiff, SANDY CLAY.							EI
3½											
4	248					CK		16.8	101.3		
			SM	**Very Old Paralic Deposits (Qvop):** Reddish-brown, moist, dense, medium to coarse-grained, SILTY SAND; micaceous, moderately cemented.							SA MD DS SO_4
4½						CK					
5	247			Test pit terminated at 4 feet. No groundwater or seepage encountered.							
5½											
6	246										
6½											
7	245										
7½											
8	244										

Notes:

Symbol Legend

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

PROPOSED NICHOLAS RESIDENCE
1826-1836 WASHINGTON PLACE
SAN DIEGO, CALIFORNIA

DATE:	MARCH 2015	JOB NO.:	2140453.01
BY:	MWL	PLATE NO.:	5

CHRISTIAN WHEELER
ENGINEERING

LOG OF TEST PIT P-4

Date Drilled:	2/25/15	Equipment:	Hand Tools
Logged By:	TSW	Auger Type:	N/A
Existing Elevation:	267½ feet	Drive Type:	N/A
Finish Elevation:	N/A	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	NG	Nuclear Gauge Test
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	267½		SM	**Topsoil:** Medium to dark brown, moist, very loose to loose, fine- to medium-grained, SILTY SAND with CLAY.							
½			CL	**Subsoil:** Dark grayish-brown, moist to very moist, medium stiff, SANDY CLAY.							
1	266½										
1½						CK					
2	265½		SM	**Very Old Paralic Deposits (Qvop):** Reddish-brown, moist, dense, medium to coarse-grained, SILTY SAND; micaceous, moderately cemented.							
2½						CK		4.4	123.8		
3	264½			Test pit terminated at 3 feet. No groundwater or seepage encountered.							
3½											
4	263½										
4½											
5	262½										
5½											
6	261½										
6½											
7	260½										
7½											
8	259½										

Notes:

Symbol Legend

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

PROPOSED NICHOLAS RESIDENCE
1826-1836 WASHINGTON PLACE
SAN DIEGO, CALIFORNIA

DATE:	MARCH 2015	JOB NO.:	2140453.01
BY:	MWL	PLATE NO.:	6

CHRISTIAN WHEELER
ENGINEERING

LOG OF TEST PIT P-5

Date Drilled:	2/25/15	Equipment:	Hand Tools
Logged By:	TSW	Auger Type:	N/A
Existing Elevation:	267½ feet	Drive Type:	N/A
Finish Elevation:	N/A	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	NG	Nuclear Gauge Test
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	267½		SM	**Artificial Fill (Qaf):** Medium brown, damp, loose to medium dense, fine- to medium-grained, SILTY SAND.							
½											
1	266½										
1½			SM	**Topsoil:** Medium to dark brown, damp, very loose to loose, fine- to medium-grained, SILTY SAND.							
2	265½										
2½			CL	**Subsoil:** Dark brown, moist, medium stiff, SANDY CLAY.							
3	264½										
3½			SM	**Very Old Paralic Deposits (Qvop):** Reddish-brown, moist, dense, medium to coarse-grained, SILTY SAND; well cemented.							
4	263½										
4½				Test pit terminated at 4½ feet. No groundwater or seepage encountered.							
5	262½										
5½											
6	261½										
6½											
7	260½										
7½											
8	259½										

Notes:

Symbol Legend

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

PROPOSED NICHOLAS RESIDENCE
1826-1836 WASHINGTON PLACE
SAN DIEGO, CALIFORNIA

DATE:	MARCH 2015	JOB NO.:	2140453.01
BY:	MWL	PLATE NO.:	7

CHRISTIAN WHEELER
ENGINEERING

LABORATORY TEST RESULTS

PROPOSED NICHOLAS RESIDENCE

1826-1836 WASHINGTON PLACE

SAN DIEGO, CALIFORNIA

MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (ASTM D1557)

Sample Location	**Test Pit P-3 @ 4'-5'**
Sample Description	Brown Slightly Silt Sand (SM-SW)
Maximum Density	115.0 pcf
Optimum Moisture	11.2 %

DIRECT SHEAR (ASTM D3080)

Sample Location	**Test Pit P-3 @ 4'-5'**
Sample Type	Remolded to 90 %
Friction Angle	34°
Cohesion	200 psf

EXPANSION INDEX TESTS (ASTM D4829)

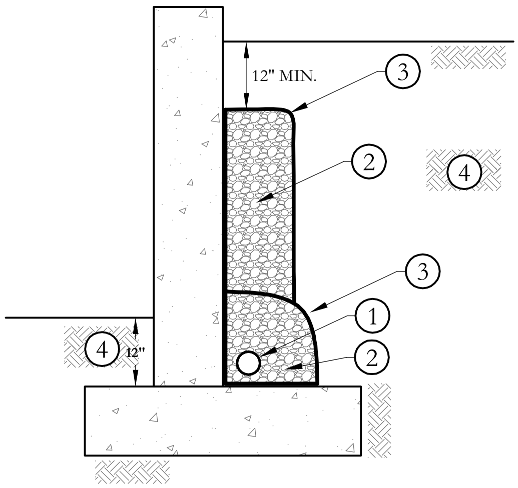
Sample Location	**Test Pit P-3 @ 3¼'-4'**
Initial Moisture:	11.8 %
Initial Dry Density	104.1 pcf
Final Moisture:	26.9 %
Expansion Index:	92 (High)

GRAIN SIZE DISTRIBUTION (ASTM D422)

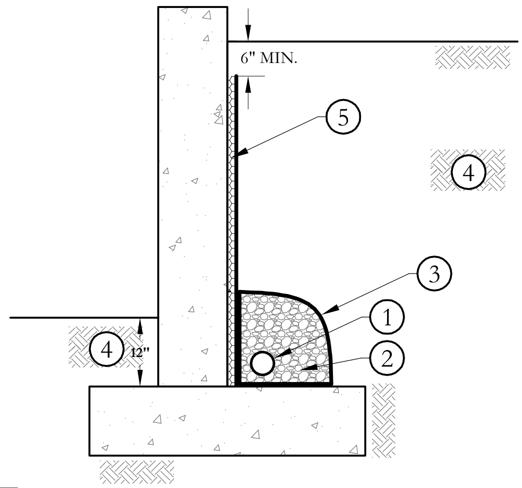
Sample Location	**Pit P-3 @ 4'-5'**
Sieve Size	*Percent Passing*
#4	100
#8	77
#16	61
#30	45
#50	25
#100	11
#200	6

SOLUBLE SULFATES (CALIFORNIA TEST 417)

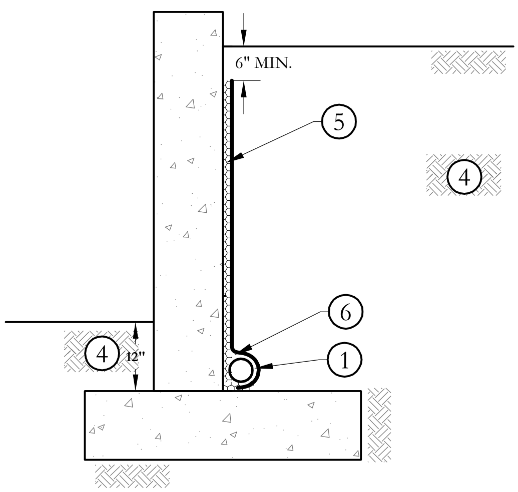
Sample Location	**Test Pit P-3 @ 4'-5'**
Soluble Sulfate	0.068 % (SO_4)



1 DETAIL



2 DETAIL



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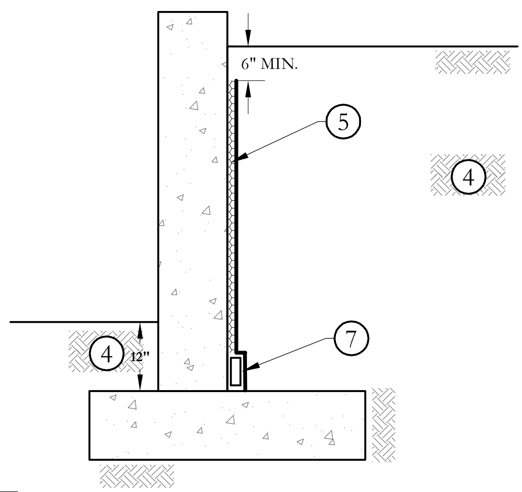

4 DETAIL

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. GEOFABRIC 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 NICHOLAS RESIDENCE
1826-1836 WASHINGTON PLACE
SAN DIEGO, CALIFORNIA

DATE:	MARCH 2015	JOB NO.:	2140453.01
BY:	BGR	PLATE NO.:	9

CHRISTIAN WHEELER
ENGINEERING

APPENDIX A

GROSS SLOPE STABILITY ANALYSES

Nicholas Residence Section A

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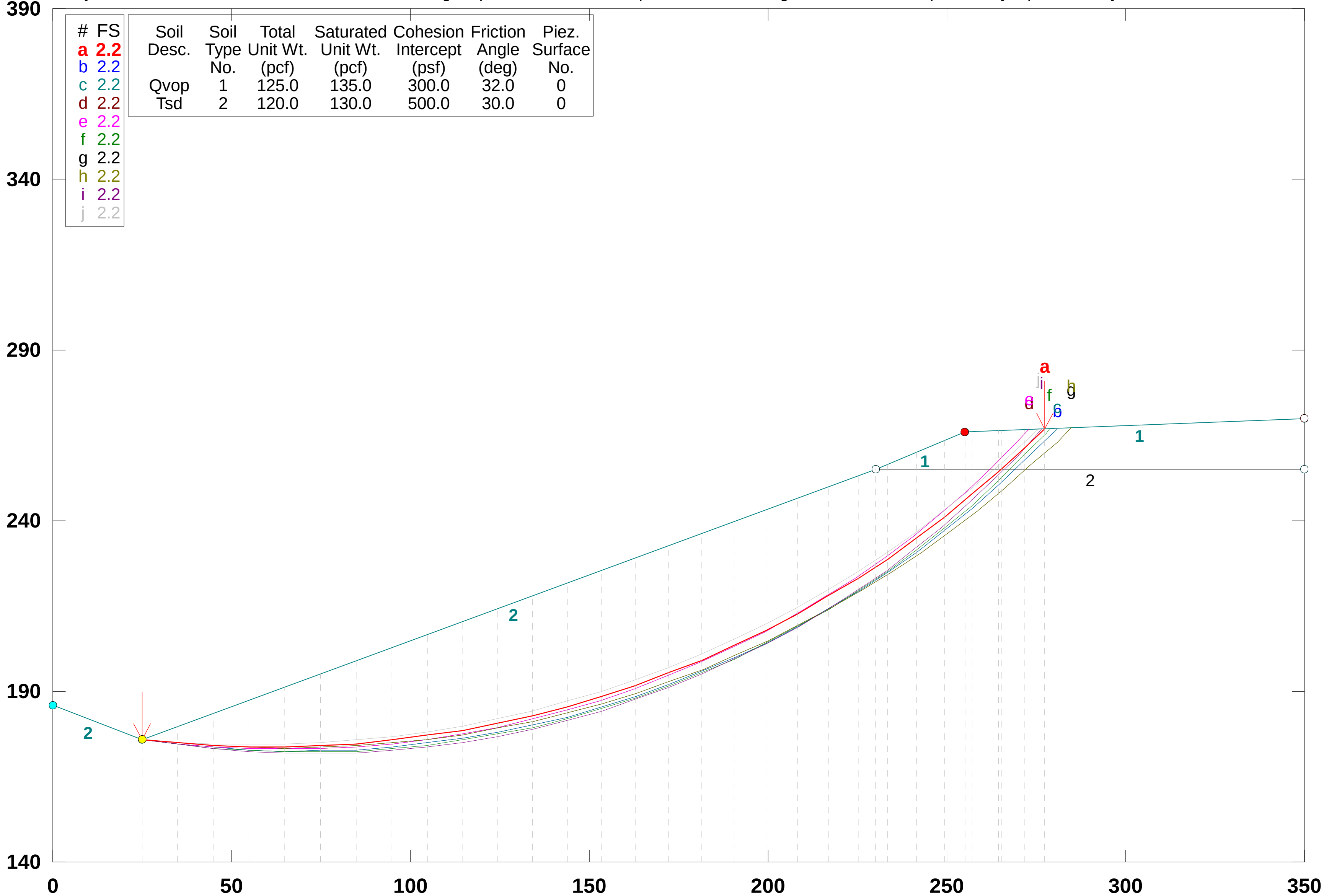

#	FS
a	2.2
b	2.2
c	2.2
d	2.2
e	2.2
f	2.2
g	2.2
h	2.2
i	2.2
j	2.2

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Qvop	1	125.0	135.0	300.0	32.0	0
Tsd	2	120.0	130.0	500.0	30.0	0

GSTABL7 v.2 FSmin=2.2

Safety Factors Are Calculated By The Modified Bishop Method

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                           ***  GSTABL7  ***
                  ** GSTABL7 by Garry H. Gregory, P.E. **
   ** Original Version 1.0, January 1996; Current Version 2.003, June 2002 **
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 *********************************************************************************
                     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:        3/17/2015
    Time of Run:              12:22PM
    Run By:                   TSW
    Input Data Filename:      W:\2014 Jobs\2140453 - Nicholas Res., 1826-1836 Washington P
lace, Mission Hills\Reports\2140453.01- Geo Inv\2140453 Slope Stability\A.in
    Output Filename:          W:\2014 Jobs\2140453 - Nicholas Res., 1826-1836 Washington P
lace, Mission Hills\Reports\2140453.01- Geo Inv\2140453 Slope Stability\A.OUT
    Unit System:              English
    Plotted Output Filename:  W:\2014 Jobs\2140453 - Nicholas , 1826-1836 Washington Place
, Mission Hills\Reports\2140453.01- Geo Inv\2140453 Slope Stability\A.PLT
    PROBLEM DESCRIPTION:  Nicholas Residence
                          Section A
    BOUNDARY COORDINATES
        4 Top   Boundaries
        5 Total Boundaries
    Boundary     X-Left     Y-Left    X-Right    Y-Right    Soil Type
       No.        (ft)       (ft)       (ft)       (ft)     Below Bnd
        1          0.00     186.00      25.00     176.00        2
        2         25.00     176.00     230.00     255.00        2
        3        230.00     255.00     255.00     266.00        1
        4        255.00     266.00     350.00     270.00        1
        5        230.00     255.00     350.00     255.00        2
    User Specified Y-Origin =       140.00(ft)
    Default X-Plus Value = 0.00(ft)
    Default Y-Plus Value = 0.00(ft)
   ISOTROPIC SOIL PARAMETERS
     2 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   125.0    135.0     300.0     32.0    0.00       0.0      0
      2   120.0    130.0     500.0     30.0    0.00       0.0      0
    A Critical Failure Surface Searching Method, Using A Random
    Technique For Generating Circular Surfaces, Has Been Specified.
    3000 Trial Surfaces Have Been Generated.
    3000 Surface(s) Initiate(s) From Each Of     1 Points Equally Spaced
    Along The Ground Surface Between  X =  25.00(ft)
                                 and  X =  25.00(ft)
    Each Surface Terminates Between   X = 255.00(ft)
                                and   X = 350.00(ft)
    Unless Further Limitations Were Imposed, The Minimum Elevation
    At Which A Surface Extends Is  Y =      0.00(ft)
    10.00(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 =  3000
          Statistical Data On All Valid FS Values:
             FS Max =   4.265   FS Min =   2.215   FS Ave =   2.800
             Standard Deviation =    0.380   Coefficient of Variation =   13.57 %
          Failure Surface Specified By 29 Coordinate Points
            Point      X-Surf      Y-Surf
             No.        (ft)        (ft)
              1         25.00      176.00
              2         34.95      174.96
              3         44.92      174.25
```

4	54.91	173.88
5	64.91	173.84
6	74.91	174.14
7	84.89	174.77
8	94.84	175.74
9	104.76	177.05
10	114.62	178.68
11	124.43	180.65
12	134.16	182.94
13	143.81	185.57
14	153.37	188.51
15	162.82	191.77
16	172.16	195.35
17	181.37	199.24
18	190.45	203.44
19	199.38	207.93
20	208.15	212.73
21	216.76	217.82
22	225.19	223.20
23	233.44	228.85
24	241.49	234.78
25	249.34	240.98
26	256.98	247.43
27	264.39	254.14
28	271.58	261.10
29	277.22	266.94

Circle Center At X = 61.00 ; Y = 471.47 ; and Radius = 297.65

Factor of Safety

*** 2.215 ***

Individual data on the 31 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	9.9	2909.2	0.0	0.0	0.	0.	0.0	0.0	0.0
2	10.0	8560.0	0.0	0.0	0.	0.	0.0	0.0	0.0
3	10.0	13837.2	0.0	0.0	0.	0.	0.0	0.0	0.0
4	10.0	18714.9	0.0	0.0	0.	0.	0.0	0.0	0.0
5	10.0	23170.3	0.0	0.0	0.	0.	0.0	0.0	0.0
6	10.0	27183.9	0.0	0.0	0.	0.	0.0	0.0	0.0
7	10.0	30739.3	0.0	0.0	0.	0.	0.0	0.0	0.0
8	9.9	33823.4	0.0	0.0	0.	0.	0.0	0.0	0.0
9	9.9	36427.0	0.0	0.0	0.	0.	0.0	0.0	0.0
10	9.8	38543.6	0.0	0.0	0.	0.	0.0	0.0	0.0
11	9.7	40170.8	0.0	0.0	0.	0.	0.0	0.0	0.0
12	9.7	41309.5	0.0	0.0	0.	0.	0.0	0.0	0.0
13	9.6	41963.8	0.0	0.0	0.	0.	0.0	0.0	0.0
14	9.5	42141.6	0.0	0.0	0.	0.	0.0	0.0	0.0
15	9.3	41853.9	0.0	0.0	0.	0.	0.0	0.0	0.0
16	9.2	41115.3	0.0	0.0	0.	0.	0.0	0.0	0.0
17	9.1	39943.2	0.0	0.0	0.	0.	0.0	0.0	0.0
18	8.9	38358.8	0.0	0.0	0.	0.	0.0	0.0	0.0
19	8.8	36385.7	0.0	0.0	0.	0.	0.0	0.0	0.0
20	8.6	34050.7	0.0	0.0	0.	0.	0.0	0.0	0.0
21	8.4	31383.5	0.0	0.0	0.	0.	0.0	0.0	0.0
22	4.8	16861.3	0.0	0.0	0.	0.	0.0	0.0	0.0
23	3.4	11606.6	0.0	0.0	0.	0.	0.0	0.0	0.0
24	8.1	25709.4	0.0	0.0	0.	0.	0.0	0.0	0.0
25	7.8	22780.8	0.0	0.0	0.	0.	0.0	0.0	0.0
26	5.7	14797.8	0.0	0.0	0.	0.	0.0	0.0	0.0
27	2.0	4723.2	0.0	0.0	0.	0.	0.0	0.0	0.0
28	7.4	14164.9	0.0	0.0	0.	0.	0.0	0.0	0.0
29	0.9	1308.3	0.0	0.0	0.	0.	0.0	0.0	0.0
30	6.3	6707.0	0.0	0.0	0.	0.	0.0	0.0	0.0
31	5.6	1973.6	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 30 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	25.00	176.00
2	34.90	174.62

3	44.85	173.60
4	54.83	172.92
5	64.82	172.59
6	74.82	172.62
7	84.82	173.00
8	94.79	173.73
9	104.73	174.81
10	114.63	176.23
11	124.47	178.01
12	134.24	180.13
13	143.93	182.59
14	153.53	185.40
15	163.03	188.54
16	172.41	192.01
17	181.66	195.81
18	190.77	199.93
19	199.73	204.37
20	208.53	209.12
21	217.15	214.18
22	225.60	219.54
23	233.84	225.19
24	241.89	231.13
25	249.72	237.35
26	257.33	243.84
27	264.70	250.59
28	271.83	257.60
29	278.71	264.86
30	280.68	267.08

Circle Center At X = 69.10 ; Y = 456.62 ; and Radius = 284.06

Factor of Safety

*** 2.216 ***

Failure Surface Specified By 30 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	25.00	176.00
2	34.90	174.62
3	44.85	173.60
4	54.83	172.92
5	64.82	172.59
6	74.82	172.62
7	84.82	173.00
8	94.79	173.73
9	104.73	174.81
10	114.63	176.23
11	124.47	178.01
12	134.24	180.13
13	143.93	182.59
14	153.53	185.40
15	163.03	188.54
16	172.41	192.01
17	181.66	195.81
18	190.77	199.93
19	199.73	204.37
20	208.53	209.12
21	217.15	214.18
22	225.60	219.54
23	233.84	225.19
24	241.89	231.13
25	249.72	237.35
26	257.33	243.84
27	264.70	250.59
28	271.83	257.60
29	278.71	264.86
30	280.68	267.08

Circle Center At X = 69.10 ; Y = 456.62 ; and Radius = 284.06

Factor of Safety

*** 2.216 ***

Failure Surface Specified By 29 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)

1	25.00	176.00
2	34.92	174.74
3	44.88	173.83
4	54.86	173.28
5	64.86	173.09
6	74.86	173.27
7	84.85	173.80
8	94.81	174.69
9	104.73	175.93
10	114.60	177.54
11	124.41	179.49
12	134.14	181.80
13	143.78	184.46
14	153.32	187.46
15	162.74	190.80
16	172.04	194.48
17	181.20	198.49
18	190.21	202.83
19	199.06	207.49
20	207.73	212.47
21	216.22	217.75
22	224.52	223.34
23	232.60	229.22
24	240.48	235.38
25	248.12	241.83
26	255.53	248.55
27	262.69	255.52
28	269.60	262.76
29	273.16	266.76

Circle Center At X = 65.10 ; Y = 451.14 ; and Radius = 278.04
Factor of Safety
*** 2.216 ***

Failure Surface Specified By 29 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	25.00	176.00
2	34.92	174.74
3	44.88	173.83
4	54.86	173.28
5	64.86	173.09
6	74.86	173.27
7	84.85	173.80
8	94.81	174.69
9	104.73	175.93
10	114.60	177.54
11	124.41	179.49
12	134.14	181.80
13	143.78	184.46
14	153.32	187.46
15	162.74	190.80
16	172.04	194.48
17	181.20	198.49
18	190.21	202.83
19	199.06	207.49
20	207.73	212.47
21	216.22	217.75
22	224.52	223.34
23	232.60	229.22
24	240.48	235.38
25	248.12	241.83
26	255.53	248.55
27	262.69	255.52
28	269.60	262.76
29	273.16	266.76

Circle Center At X = 65.10 ; Y = 451.14 ; and Radius = 278.04
Factor of Safety
*** 2.216 ***

Failure Surface Specified By 30 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)

1	25.00	176.00
2	34.89	174.52
3	44.83	173.39
4	54.80	172.63
5	64.79	172.23
6	74.79	172.19
7	84.78	172.52
8	94.76	173.20
9	104.70	174.25
10	114.60	175.67
11	124.45	177.44
12	134.22	179.56
13	143.91	182.04
14	153.50	184.87
15	162.98	188.05
16	172.34	191.57
17	181.57	195.42
18	190.65	199.61
19	199.57	204.13
20	208.32	208.96
21	216.89	214.12
22	225.27	219.58
23	233.44	225.34
24	241.40	231.39
25	249.14	237.73
26	256.64	244.34
27	263.89	251.23
28	270.89	258.37
29	277.63	265.76
30	278.67	267.00

Circle Center At X = 70.82 ; Y = 447.34 ; and Radius = 275.18

Factor of Safety

*** 2.216 ***

Failure Surface Specified By 30 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	25.00	176.00
2	34.93	174.84
3	44.90	174.01
4	54.89	173.51
5	64.88	173.34
6	74.88	173.49
7	84.87	173.98
8	94.84	174.79
9	104.77	175.93
10	114.66	177.40
11	124.50	179.20
12	134.28	181.31
13	143.97	183.75
14	153.59	186.50
15	163.10	189.57
16	172.52	192.95
17	181.81	196.64
18	190.98	200.63
19	200.01	204.93
20	208.90	209.51
21	217.63	214.39
22	226.19	219.55
23	234.58	224.99
24	242.79	230.71
25	250.80	236.69
26	258.61	242.93
27	266.22	249.43
28	273.60	256.17
29	280.76	263.15
30	284.69	267.25

Circle Center At X = 65.15 ; Y = 476.89 ; and Radius = 303.56

Factor of Safety

*** 2.218 ***

Failure Surface Specified By 30 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	25.00	176.00
2	34.93	174.84
3	44.90	174.01
4	54.89	173.51
5	64.88	173.34
6	74.88	173.49
7	84.87	173.98
8	94.84	174.79
9	104.77	175.93
10	114.66	177.40
11	124.50	179.20
12	134.28	181.31
13	143.97	183.75
14	153.59	186.50
15	163.10	189.57
16	172.52	192.95
17	181.81	196.64
18	190.98	200.63
19	200.01	204.93
20	208.90	209.51
21	217.63	214.39
22	226.19	219.55
23	234.58	224.99
24	242.79	230.71
25	250.80	236.69
26	258.61	242.93
27	266.22	249.43
28	273.60	256.17
29	280.76	263.15
30	284.69	267.25

Circle Center At X = 65.15 ; Y = 476.89 ; and Radius = 303.56

Factor of Safety

*** 2.218 ***

Failure Surface Specified By 30 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	25.00	176.00
2	34.87	174.41
3	44.80	173.19
4	54.76	172.34
5	64.75	171.87
6	74.75	171.77
7	84.75	172.04
8	94.73	172.69
9	104.67	173.71
10	114.57	175.11
11	124.42	176.87
12	134.19	179.01
13	143.87	181.50
14	153.45	184.36
15	162.92	187.58
16	172.26	191.15
17	181.47	195.06
18	190.51	199.32
19	199.40	203.91
20	208.10	208.84
21	216.61	214.08
22	224.93	219.64
23	233.02	225.51
24	240.89	231.68
25	248.53	238.14
26	255.92	244.88
27	263.05	251.89
28	269.91	259.16
29	276.49	266.69
30	276.67	266.91

Circle Center At X = 72.41 ; Y = 438.58 ; and Radius = 266.82

Factor of Safety

*** 2.218 ***

Failure Surface Specified By 29 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	25.00	176.00
2	34.96	175.13
3	44.95	174.58
4	54.94	174.37
5	64.94	174.48
6	74.93	174.91
7	84.91	175.68
8	94.85	176.77
9	104.75	178.18
10	114.59	179.92
11	124.38	181.98
12	134.09	184.36
13	143.72	187.06
14	153.26	190.07
15	162.69	193.39
16	172.01	197.01
17	181.20	200.95
18	190.26	205.18
19	199.18	209.70
20	207.95	214.52
21	216.55	219.61
22	224.98	224.99
23	233.23	230.64
24	241.29	236.56
25	249.15	242.74
26	256.81	249.17
27	264.25	255.85
28	271.47	262.77
29	275.46	266.86

Circle Center At X = 56.60 ; Y = 479.68 ; and Radius = 305.32

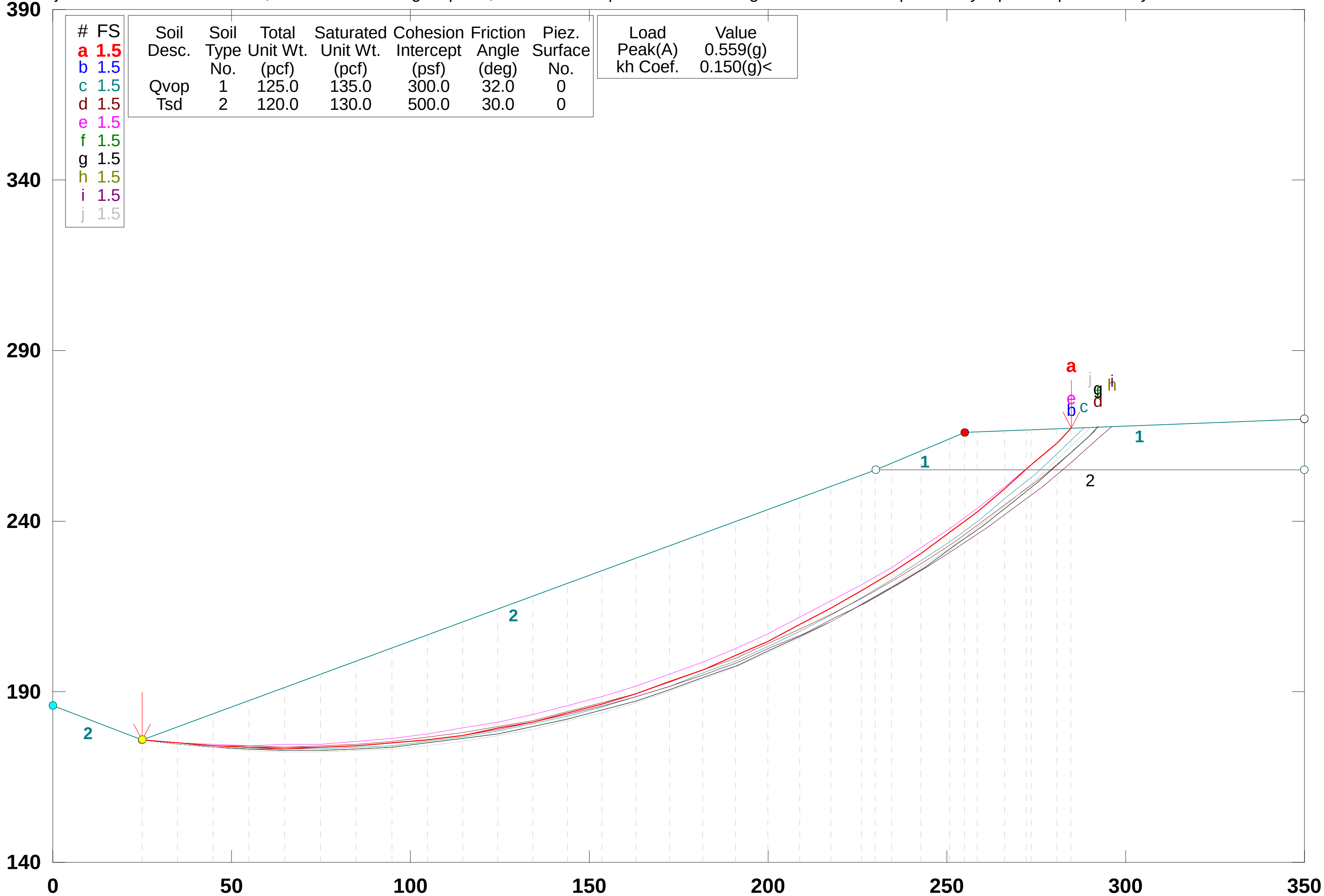
Factor of Safety

*** 2.218 ***

**** END OF GSTABL7 OUTPUT ****

Nicholas Residence Section A- Pseudostatic

w:\2014 jobs\2140453 - nicholas res., 1826-1836 washington place, mission hills\reports\2140453.01- geo inv\2140453 slope stability\a-pseudo.pl2 Run By: TSW 3/19/2015 04:15PM



#	FS
a	1.5
b	1.5
c	1.5
d	1.5
e	1.5
f	1.5
g	1.5
h	1.5
i	1.5
j	1.5

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Qvop	1	125.0	135.0	300.0	32.0	0
Tsd	2	120.0	130.0	500.0	30.0	0

Load	Value
Peak(A)	0.559(g)
kh Coef.	0.150(g)<

GSTABL7 v.2 FSmin=1.5

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 **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*********************************************************************************
                     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:         3/19/2015
    Time of Run:               04:15PM
    Run By:                    TSW
    Input Data Filename:       W:\2014 Jobs\2140453 - Nicholas Res., 1826-1836 Washington P
lace, Mission Hills\Reports\2140453.01- Geo Inv\2140453 Slope Stability\A-Pseudo.in
    Output Filename:           W:\2014 Jobs\2140453 - Nicholas Res., 1826-1836 Washington P
lace, Mission Hills\Reports\2140453.01- Geo Inv\2140453 Slope Stability\A-Pseudo.OUT
    Unit System:               English
    Plotted Output Filename:   W:\2014 Jobs\2140453 - Nicholas , 1826-1836 Washington Place
, Mission Hills\Reports\2140453.01- Geo Inv\2140453 Slope Stability\A-Pseudo.PLT
    PROBLEM DESCRIPTION:  Nicholas Residence
                          Section A- Pseudostatic
    BOUNDARY COORDINATES
        4 Top   Boundaries
        5 Total Boundaries
```

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	186.00	25.00	176.00	2
2	25.00	176.00	230.00	255.00	2
3	230.00	255.00	255.00	266.00	1
4	255.00	266.00	350.00	270.00	1
5	230.00	255.00	350.00	255.00	2

```
    User Specified Y-Origin =       140.00(ft)
    Default X-Plus Value = 0.00(ft)
    Default Y-Plus Value = 0.00(ft)
   ISOTROPIC SOIL PARAMETERS
     2 Type(s) of Soil
```

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	125.0	135.0	300.0	32.0	0.00	0.0	0
2	120.0	130.0	500.0	30.0	0.00	0.0	0

```
    Specified Peak Ground Acceleration Coefficient (A) =   0.559(g)
    Specified Horizontal Earthquake Coefficient (kh) =   0.150(g)
    Specified Vertical Earthquake Coefficient (kv) =   0.000(g)
    Specified Seismic Pore-Pressure Factor =   0.000
    A Critical Failure Surface Searching Method, Using A Random
    Technique For Generating Circular Surfaces, Has Been Specified.
    3000 Trial Surfaces Have Been Generated.
    3000 Surface(s) Initiate(s) From Each Of     1 Points Equally Spaced
    Along The Ground Surface Between  X =  25.00(ft)
                                 and  X =  25.00(ft)
    Each Surface Terminates Between   X = 255.00(ft)
                                and   X = 350.00(ft)
    Unless Further Limitations Were Imposed, The Minimum Elevation
    At Which A Surface Extends Is  Y =      0.00(ft)
    10.00(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 =  3000
          Statistical Data On All Valid FS Values:
             FS Max =   3.012   FS Min =   1.526   FS Ave =   1.905
             Standard Deviation =    0.265   Coefficient of Variation =   13.90 %
          Failure Surface Specified By 30 Coordinate Points
            Point      X-Surf      Y-Surf
```

No.	(ft)	(ft)
1	25.00	176.00
2	34.93	174.84
3	44.90	174.01
4	54.89	173.51
5	64.88	173.34
6	74.88	173.49
7	84.87	173.98
8	94.84	174.79
9	104.77	175.93
10	114.66	177.40
11	124.50	179.20
12	134.28	181.31
13	143.97	183.75
14	153.59	186.50
15	163.10	189.57
16	172.52	192.95
17	181.81	196.64
18	190.98	200.63
19	200.01	204.93
20	208.90	209.51
21	217.63	214.39
22	226.19	219.55
23	234.58	224.99
24	242.79	230.71
25	250.80	236.69
26	258.61	242.93
27	266.22	249.43
28	273.60	256.17
29	280.76	263.15
30	284.69	267.25

Circle Center At X = 65.15 ; Y = 476.89 ; and Radius = 303.56

Factor of Safety

*** 1.526 ***

Individual data on the 32 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	9.9	2971.3	0.0	0.0	0.	0.	445.7	0.0	0.0
2	10.0	8754.8	0.0	0.0	0.	0.	1313.2	0.0	0.0
3	10.0	14180.1	0.0	0.0	0.	0.	2127.0	0.0	0.0
4	10.0	19221.0	0.0	0.0	0.	0.	2883.2	0.0	0.0
5	10.0	23854.5	0.0	0.0	0.	0.	3578.2	0.0	0.0
6	10.0	28060.5	0.0	0.0	0.	0.	4209.1	0.0	0.0
7	10.0	31822.0	0.0	0.0	0.	0.	4773.3	0.0	0.0
8	9.9	35125.0	0.0	0.0	0.	0.	5268.7	0.0	0.0
9	9.9	37958.7	0.0	0.0	0.	0.	5693.8	0.0	0.0
10	9.8	40315.7	0.0	0.0	0.	0.	6047.4	0.0	0.0
11	9.8	42191.9	0.0	0.0	0.	0.	6328.8	0.0	0.0
12	9.7	43586.0	0.0	0.0	0.	0.	6537.9	0.0	0.0
13	9.6	44500.6	0.0	0.0	0.	0.	6675.1	0.0	0.0
14	9.5	44941.2	0.0	0.0	0.	0.	6741.2	0.0	0.0
15	9.4	44916.5	0.0	0.0	0.	0.	6737.5	0.0	0.0
16	9.3	44438.4	0.0	0.0	0.	0.	6665.8	0.0	0.0
17	9.2	43522.1	0.0	0.0	0.	0.	6528.3	0.0	0.0
18	9.0	42185.4	0.0	0.0	0.	0.	6327.8	0.0	0.0
19	8.9	40449.6	0.0	0.0	0.	0.	6067.4	0.0	0.0
20	8.7	38338.3	0.0	0.0	0.	0.	5750.8	0.0	0.0
21	8.6	35878.2	0.0	0.0	0.	0.	5381.7	0.0	0.0
22	3.8	15301.3	0.0	0.0	0.	0.	2295.2	0.0	0.0
23	4.6	17888.7	0.0	0.0	0.	0.	2683.3	0.0	0.0
24	8.2	30653.7	0.0	0.0	0.	0.	4598.1	0.0	0.0
25	8.0	27885.2	0.0	0.0	0.	0.	4182.8	0.0	0.0
26	4.2	13668.3	0.0	0.0	0.	0.	2050.2	0.0	0.0
27	3.6	10862.2	0.0	0.0	0.	0.	1629.3	0.0	0.0
28	7.6	18796.4	0.0	0.0	0.	0.	2819.5	0.0	0.0
29	6.1	10887.0	0.0	0.0	0.	0.	1633.1	0.0	0.0
30	1.3	1792.1	0.0	0.0	0.	0.	268.8	0.0	0.0
31	7.2	6506.5	0.0	0.0	0.	0.	976.0	0.0	0.0

32	3.9	966.0	0.0	0.0	0.	0.	144.9	0.0	0.0

Failure Surface Specified By 30 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	25.00	176.00
2	34.93	174.84
3	44.90	174.01
4	54.89	173.51
5	64.88	173.34
6	74.88	173.49
7	84.87	173.98
8	94.84	174.79
9	104.77	175.93
10	114.66	177.40
11	124.50	179.20
12	134.28	181.31
13	143.97	183.75
14	153.59	186.50
15	163.10	189.57
16	172.52	192.95
17	181.81	196.64
18	190.98	200.63
19	200.01	204.93
20	208.90	209.51
21	217.63	214.39
22	226.19	219.55
23	234.58	224.99
24	242.79	230.71
25	250.80	236.69
26	258.61	242.93
27	266.22	249.43
28	273.60	256.17
29	280.76	263.15
30	284.69	267.25

Circle Center At X =   65.15 ; Y =   476.89 ; and Radius =   303.56

Factor of Safety

***   1.526   ***

Failure Surface Specified By 30 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	25.00	176.00
2	34.93	174.78
3	44.89	173.89
4	54.87	173.33
5	64.87	173.09
6	74.87	173.17
7	84.86	173.59
8	94.83	174.32
9	104.77	175.39
10	114.68	176.77
11	124.53	178.48
12	134.32	180.51
13	144.04	182.86
14	153.68	185.52
15	163.23	188.49
16	172.68	191.78
17	182.01	195.37
18	191.22	199.26
19	200.30	203.46
20	209.24	207.94
21	218.02	212.72
22	226.65	217.77
23	235.11	223.11
24	243.38	228.72
25	251.47	234.60
26	259.37	240.74
27	267.06	247.13
28	274.54	253.77
29	281.80	260.65
30	288.48	267.41

Circle Center At X =   67.23 ; Y =   479.72 ; and Radius =   306.65
Factor of Safety
*** 1.527 ***
Failure Surface Specified By 31 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	25.00	176.00
2	34.95	175.01
3	44.93	174.32
4	54.92	173.93
5	64.92	173.85
6	74.92	174.07
7	84.90	174.60
8	94.87	175.43
9	104.80	176.56
10	114.70	178.00
11	124.55	179.73
12	134.34	181.76
13	144.06	184.10
14	153.71	186.72
15	163.28	189.64
16	172.75	192.85
17	182.12	196.34
18	191.38	200.12
19	200.52	204.17
20	209.53	208.51
21	218.41	213.11
22	227.14	217.99
23	235.72	223.12
24	244.14	228.52
25	252.39	234.17
26	260.47	240.07
27	268.36	246.21
28	276.06	252.58
29	283.57	259.19
30	290.87	266.03
31	292.42	267.58

Circle Center At X =   62.61 ; Y =   502.53 ; and Radius =   328.68
Factor of Safety
*** 1.527 ***
Failure Surface Specified By 30 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	25.00	176.00
2	34.96	175.12
3	44.95	174.56
4	54.94	174.30
5	64.94	174.35
6	74.94	174.71
7	84.91	175.38
8	94.86	176.36
9	104.78	177.65
10	114.65	179.24
11	124.47	181.14
12	134.23	183.34
13	143.91	185.84
14	153.51	188.65
15	163.02	191.74
16	172.42	195.13
17	181.72	198.81
18	190.90	202.78
19	199.96	207.02
20	208.87	211.55
21	217.65	216.35
22	226.27	221.42
23	234.72	226.75
24	243.01	232.35
25	251.13	238.19
26	259.05	244.29
27	266.79	250.63

28	274.32	257.20
29	281.65	264.01
30	284.95	267.26

Circle Center At X = 58.29 ; Y = 497.02 ; and Radius = 322.74

Factor of Safety

*** 1.527 ***

Failure Surface Specified By 31 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	25.00	176.00
2	34.92	174.73
3	44.87	173.78
4	54.85	173.15
5	64.85	172.84
6	74.85	172.86
7	84.84	173.20
8	94.82	173.86
9	104.77	174.85
10	114.69	176.15
11	124.55	177.78
12	134.36	179.72
13	144.11	181.98
14	153.77	184.55
15	163.34	187.43
16	172.82	190.62
17	182.19	194.12
18	191.44	197.92
19	200.57	202.01
20	209.55	206.39
21	218.39	211.07
22	227.08	216.03
23	235.60	221.26
24	243.95	226.77
25	252.11	232.54
26	260.08	238.58
27	267.86	244.87
28	275.43	251.40
29	282.78	258.18
30	289.91	265.19
31	292.17	267.57

Circle Center At X = 69.33 ; Y = 482.34 ; and Radius = 309.53

Factor of Safety

*** 1.528 ***

Failure Surface Specified By 31 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	25.00	176.00
2	34.92	174.73
3	44.87	173.78
4	54.85	173.15
5	64.85	172.84
6	74.85	172.86
7	84.84	173.20
8	94.82	173.86
9	104.77	174.85
10	114.69	176.15
11	124.55	177.78
12	134.36	179.72
13	144.11	181.98
14	153.77	184.55
15	163.34	187.43
16	172.82	190.62
17	182.19	194.12
18	191.44	197.92
19	200.57	202.01
20	209.55	206.39
21	218.39	211.07
22	227.08	216.03
23	235.60	221.26
24	243.95	226.77

25	252.11	232.54
26	260.08	238.58
27	267.86	244.87
28	275.43	251.40
29	282.78	258.18
30	289.91	265.19
31	292.17	267.57

Circle Center At X = 69.33 ; Y = 482.34 ; and Radius = 309.53

Factor of Safety

*** 1.528 ***

Failure Surface Specified By 31 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	25.00	176.00
2	34.94	174.95
3	44.92	174.20
4	54.91	173.75
5	64.91	173.60
6	74.90	173.76
7	84.89	174.21
8	94.86	174.97
9	104.81	176.03
10	114.72	177.38
11	124.58	179.04
12	134.39	180.99
13	144.13	183.24
14	153.80	185.78
15	163.39	188.61
16	172.89	191.73
17	182.30	195.13
18	191.59	198.82
19	200.77	202.78
20	209.83	207.02
21	218.75	211.54
22	227.54	216.31
23	236.17	221.36
24	244.65	226.66
25	252.97	232.21
26	261.12	238.01
27	269.08	244.06
28	276.86	250.34
29	284.45	256.85
30	291.84	263.59
31	296.10	267.73

Circle Center At X = 64.79 ; Y = 505.00 ; and Radius = 331.40

Factor of Safety

*** 1.528 ***

Failure Surface Specified By 31 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	25.00	176.00
2	34.94	174.95
3	44.92	174.20
4	54.91	173.75
5	64.91	173.60
6	74.90	173.76
7	84.89	174.21
8	94.86	174.97
9	104.81	176.03
10	114.72	177.38
11	124.58	179.04
12	134.39	180.99
13	144.13	183.24
14	153.80	185.78
15	163.39	188.61
16	172.89	191.73
17	182.30	195.13
18	191.59	198.82
19	200.77	202.78
20	209.83	207.02

21	218.75	211.54
22	227.54	216.31
23	236.17	221.36
24	244.65	226.66
25	252.97	232.21
26	261.12	238.01
27	269.08	244.06
28	276.86	250.34
29	284.45	256.85
30	291.84	263.59
31	296.10	267.73

Circle Center At X = 64.79 ; Y = 505.00 ; and Radius = 331.40

Factor of Safety

*** 1.528 ***

Failure Surface Specified By 31 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	25.00	176.00
2	34.90	174.62
3	44.85	173.57
4	54.82	172.85
5	64.82	172.47
6	74.82	172.42
7	84.81	172.70
8	94.79	173.32
9	104.75	174.27
10	114.66	175.55
11	124.53	177.16
12	134.34	179.10
13	144.08	181.37
14	153.74	183.96
15	163.31	186.87
16	172.77	190.10
17	182.12	193.65
18	191.35	197.50
19	200.45	201.66
20	209.40	206.12
21	218.19	210.88
22	226.82	215.93
23	235.28	221.26
24	243.56	226.87
25	251.64	232.76
26	259.53	238.91
27	267.20	245.32
28	274.66	251.99
29	281.89	258.90
30	288.88	266.04
31	290.20	267.48

Circle Center At X = 71.32 ; Y = 471.95 ; and Radius = 299.55

Factor of Safety

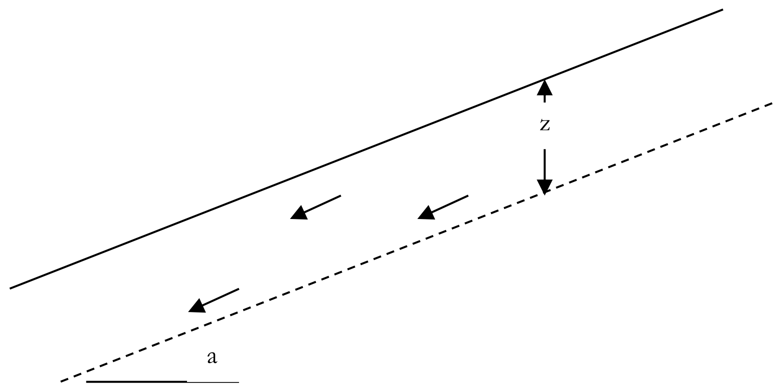
*** 1.528 ***

**** END OF GSTABL7 OUTPUT ****

APPENDIX B

SURFICIAL SLOPE STABILITY

SURFICIAL SLOPE STABILITY
NATURAL SLOPE 2:1 (H:V)



SEEPAGE PARALLEL TO SLOPE

ASSUMED PARAMETERS

z	Depth of Saturation (ft)	3
a	Slope Angle (H:1)	2
γ_W	Unit Weight of Water (pcf)	62.4
γ_T	Saturated Unit Weight of Soil (pcf)	130
ϕ	Angle of Internal Friction Along Plane of Failure (degrees)	28
c	Cohesion Along Plane of Failure (psf)	150

FACTOR OF SAFETY

$$FS = \frac{c + T(\tan\phi)}{T} \longrightarrow FS = \frac{c + (\gamma_T - \gamma_W)(z)(\cos a)^2(\tan\phi)}{(\gamma_T)(z)(\sin a)(\cos a)}$$

FS = 1.51

CHRISTIAN WHEELER
Engineering

PROPOSED NICHOLAS RESIDENCE			
1826-1836 WASHINGTON PLACE, SAN DIEGO, CA			
BY:	TSW	DATE:	March 2015
JOB NO.:	2140453.01	PLATE:	B-1

APPENDIX C

REFERENCES

REFERENCES

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APPENDIX D

RECOMMENDED GRADING SPECIFICATIONS - GENERAL PROVISIONS

RECOMMENDED GRADING SPECIFICATIONS - GENERAL PROVISIONS

PROPOSED NICHOLAS RESIDENCE
1826-1836 WASHINGTON PLACE
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 D-1557-91
Density of Soil In-Place - ASTM D-1556-90 or ASTM D-2922

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 six 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 Uniform Building Code Standard 29-2.

OVERSIZED MATERIAL: Oversized fill material is generally defined herein as rocks or lumps of soil over 6 inches in diameter. Oversized materials should not be placed in fill unless recommendations of placement of such material should be 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.