CHRISTIAN WHEELER
ENGINEERING

REPORT OF PRELIMINARY GEOTECHNICAL INVESTIGATION

CHABAD CORONADO
970 C AVENUE
CORONADO, CALIFORNIA

PREPARED FOR

CHABAD CORONADO
970 C AVENUE
CORONADO, CALIFORNIA 92118

PREPARED BY

CHRISTIAN WHEELER ENGINEERING
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CHRISTIAN WHEELER
ENGINEERING

May 9, 2024

Chabad Coronado
970 C Avenue
Coronado, California 92118
Attention: Gary Kippur

CWE 2230388.01

Subject: Report of Preliminary Geotechnical Investigation
Chabad Coronado, 970 C Avenue, Coronado, California

Ladies and Gentlemen:

In accordance with our proposal dated July 7, 2023, we have completed a preliminary geotechnical investigation for the proposed structure to be constructed at the subject property. Presented within is 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 proposed project, provided the recommendations included in this report are fully implemented.

Please do not hesitate to contact our office with any questions or concerns. We appreciate the opportunity to provide professional services for the proposed project.

Respectfully submitted,
CHRISTIAN WHEELER ENGINEERING

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PRELIMINARY GEOTECHNICAL INVESTIGATION

CHABAD CORONADO
970 C AVENUE
CORONADO, CALIFORNIA

INTRODUCTION AND PROJECT DESCRIPTION

This report presents the results of a preliminary geotechnical investigation performed for a proposed structure to be constructed at 970 C Avenue, Coronado, California. The following Figure No. 1 presents a vicinity map showing the location of the property.

We understand that the subject project will consist of the demolition of the existing structures and associated improvements and the construction of a two-story structure with a full basement. It is anticipated that the proposed structure will be of masonry and wood-frame construction, supported by shallow foundations, with a conventional concrete on-grade floor slab. Grading to accommodate the proposed construction is anticipated to consist of cuts up to about 14 feet deep.

To assist in the preparation of this report, we were provided with miscellaneous architectural plans prepared by Christian Rice Architects, Inc., dated May 23, 2023. A copy of the proposed site plan was used to create our Site Plan and Geologic Map, which is included as Plate No. 1 of this report. A geologic cross section was also created to depict the proposed construction and subsurface soils conditions. Our geologic cross section is presented herein as Plate No. 2. The elevations portrayed on our cross section and assumed on our boring logs were derived from Google Earth® and should be considered rough estimates.

This report has been prepared for the exclusive use of Chabad Coronado, and its design consultants, for specific application to the project described herein. Should the project be modified, the conclusions and recommendations presented in this report should be reviewed by Christian Wheeler Engineering (CWE) 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

CHABAD CORONADO **970 C AVENUE** **CORONADO, CALIFORNIA**	
DATE: MAY 2024	REPORT NO.: 2230388.01
BY: SD	FIGURE NO.: 1

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SCOPE OF SERVICES

The preliminary geotechnical investigation consisted of surface reconnaissance, subsurface exploration, obtaining soil samples, laboratory testing, analysis of the field and laboratory data, and review of relevant geologic literature. The 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 the preliminary geotechnical investigation was to:

- Obtain a boring permit from the County of San Diego Department of Environmental Health to perform the geotechnical borings.
- Drill 2 exploratory borings with a truck-mounted drill rig to explore existing soil conditions and obtain soil samples for laboratory testing.
- Backfill the boring holes using bentonite as required by the County of San Diego Department of Environmental Health.
- Evaluate, by laboratory tests and our 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 in accordance with the 2022 edition of the California Building Code.
- Discuss potential construction difficulties that may be encountered due to soil conditions, groundwater, or geologic hazards, and provide geotechnical recommendations to mitigate identified construction difficulties.
- Provide site preparation and grading recommendations for the anticipated work, as necessary.
- Provide shored and unshored temporary cut slope recommendations.
- Provide foundation recommendations for the type of construction anticipated and develop soil engineering design criteria for the recommended foundation designs.
- Provide earth retaining wall design parameters.
- Provide a preliminary geotechnical report presenting the results of the investigation, including a plot plan showing the location of the subsurface explorations, excavation logs, laboratory test results, and conclusions and recommendations for the proposed project.

FINDINGS

SITE DESCRIPTION

The subject site consists of a rectangular-shaped lot located at 970 C Avenue, Coronado, California. The property is presently occupied by two structures and an associated paved parking area. The site is bounded on the east by C Avenue, on the south by 10th Street, on the west by a paved alley, and on the north by a residential structure. Topographically, the lot is relatively flat-lying. According to Google® Earth, average site elevation is about 25 feet.

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 on the subsurface conditions observed within the exploratory borings and review of readily available, pertinent geologic and geotechnical literature, it was determined that the area of the site investigated is generally underlain by old paralic deposits. These materials are described below:

> **OLD PARALIC DEPOSITS (Qop):** Quaternary-age old paralic deposits were encountered underlying the site. The old paralic deposits exceeded the maximum exploration depth of approximately 20 feet below existing grade. These materials generally consisted of brown to reddish-brown, orangish-brown, and yellowish-brown, silty sand (SM). The old paralic deposits were loose to a depth of about 5 feet below grade, and increase in density from medium dense to very dense with depth. The old paralic deposits were damp to moist above the water table, and saturated below it. The old paralic deposits were judged to have a very low Expansion Index (EI<20).

GROUNDWATER: Groundwater was encountered at approximately 17 feet and 18 feet below grade in borings B-1 and B-2, respectively. In addition, a monitoring well was observed in the easterly portion of the site and the groundwater elevation was measured. The groundwater elevation within the monitoring well was measured to be at 18 feet below existing grade corresponding to the elevation in which we encountered groundwater in our borings. Cuts up to 14 feet are expected to accommodate the proposed basement level. It is our opinion that, unless deeper cuts are performed and except for shoring design and installation, groundwater will not significantly affect the proposed construction. However, it is our opinion that, for structural design purposes, the structure should be designed for a season high groundwater level at 16 feet below existing grade. It should be noted that variations in subsurface water (including perched water zones and seepage) may result from

fluctuations in the ground surface topography, subsurface stratification, precipitation, irrigation, and other factors that may not have been evident at the time of the investigation. It should also be recognized that minor groundwater seepage problems might occur after development of a site even where none were present before development. These are usually minor phenomena and are often the result of an alteration in drainage patterns and/or an increase in irrigation water. It is further our opinion that these problems can be most effectively corrected on an individual basis if and when they occur.

TECTONIC SETTING: No major faults are known to traverse the subject site. However, 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, which typically consist of several individual, en echelon faults that generally strike in a northerly to north-westerly direction. Some of the fault zones (and the individual faults within the zones) are classified as active, while others are classified as only potentially active, according to the criteria of the California Geologic Survey. Active fault zones are characterized as having shown conclusive evidence of faulting during the Holocene Epoch (the most recent 11,700 years), while potentially active fault zones have demonstrated movement during the Pleistocene Epoch (11,700 to 2.6 million years before the present), but no movement during Holocene time.

The Alquist-Priolo Earthquake Fault Zoning Act, as codified in the State of California Public Resources Code, requires the State Geologist to delineate special studies zones around Quaternary-age faults that are "sufficiently active and well-defined" as to be subject to surface rupture. Effective May 1, 2003, the State of California adopted five additional Alquist-Priolo (AP) Fault Zones within the city of Coronado and surrounding areas. The zones are located in the vicinity of the active faults identified within the Rose Canyon Fault Zone (RCFZ). Although the site is located within the zone of influence of the active Rose Canyon Fault Zone, it is not located within one of the AP zones.

The Coronado, Silver Strand, Spanish Bight faults, three en echelon wrench faults associated with the Rose Canyon Fault Zone, are located approximately ¼ mile east, ¾ mile east, and ¾ mile west of the site, respectively. Other active fault zones in the region that could possibly affect the site include the Coronado Bank, San Diego Trough and San Clemente Fault Zone to the west, the Newport-Inglewood and Palos Verdes Fault Zones to the northwest, and the Elsinore, Earthquake Valley, San Jacinto and San Andreas Fault Zones to the northeast.

GENERAL GEOLOGIC HAZARDS

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

SURFACE RUPTURE: No active or potentially active faults are known to underlie the subject site. As such, the site is not considered subject to surface rupture.

SLOPE STABILITY: As part of the investigation we reviewed the publication, "Landslide Hazards in the Southern Part of the San Diego Metropolitan Area" by Tan, 1995. This reference is a comprehensive study that classifies San Diego County into areas of relative landslide susceptibility. The subject site is located in Area 2, which is considered to be "marginally susceptible" to slope failures. Based on our findings, the site topography, and the proposed construction, it is our opinion that the likelihood of slope stability related problems at the site is very low.

FLOODING: As delineated on the Flood Insurance Rate Map (FIRM), map No. 06073C1891H prepared by the Federal Emergency Management Agency, the site is in Zone X which is considered to be an "area of minimal flood hazard." Areas of minimal flood hazards are located outside of the boundaries of both the 100-year and 500-year flood zones.

TSUNAMIS: Tsunamis are great sea waves produced by a submarine earthquake or volcanic eruption. Historically, the San Diego area has been free of tsunami-related hazards and tsunamis reaching San Diego have generally been well within the normal tidal range. It is thought that the wide continental margin located off the coast acts to diffuse and reflect the wave energy of remotely generated tsunamis. The largest historical tsunami to reach San Diego's coast was 4.6 feet high, generated by the 1960 earthquake in Chile. A lack of knowledge of the offshore fault systems makes it difficult to assess the risk presented by locally generated tsunamis. According to the Tsunami Inundation Map For Emergency Planning (CGS, 2022) and the County of San Diego's Multi-Jurisdictional Hazard Mitigation Plan (OES, 2023) the site is located outside the maximum tsunami projected run-up. Previous reports by tsunami researchers have indicated that that the runup height could be as high as approximately 13 to 15 feet. Considering that the site has an elevation of approximately 24 feet, there is a very low possibility that runup could occur at the subject site. Given this information and the site's location, the risk associated with tsunamis at the site is considered to be low. However, the County of San Diego and the City of Coronado have developed a tsunami alert and evacuation

plan. The city has posted signs throughout the community showing routes of evacuation in the event of a tsunami warning, evacuation center locations, and the limits of tsunami hazard areas. The property owner should have an evacuation plan in place in the event of a tsunami warning.

SEICHES: Seiches are periodic oscillations in large bodies of water such as lakes, harbors, bays or reservoirs. Due to the geology and configuration of the San Diego Bay, the site is considered to have a low risk potential for being affected by seiches.

LIQUEFACTION INDUCED SETTLEMENTS: Proposed construction indicates cuts of up to 14 feet below existing grade to accommodate proposed basement. As encountered in our subsurface explorations, at these elevations, blow counts during sampling utilizing a modified California split tube sampler indicate the old paralic deposits to be in a dense to very dense state and are therefore not considered potentially liquefiable. Based on our experience and the subsurface data from the relevant borings, it is our opinion that the materials of the old paralic deposits located immediately above and below the ground water table elevation are in a generally medium dense to very dense state. Based on this condition, it is our opinion that the potential for liquefaction at the subject site is relatively low.

LATERAL GROUND SPREADING: Another concern is the possible lateral ground spreading that could occur at the site. Lateral ground spreading can occur when the viscous liquefied soils flow downslope, usually towards a river channel or shoreline. The project area is located within about ½ mile of the Pacific Ocean and is relatively gently sloping. Based on this condition, the relatively level hydraulic gradient that is expected across the project area, and the shallow depth of the Ocean shelf, it is our opinion that if liquefaction were to occur during an earthquake, the site will likely experience only minor lateral movement towards the Pacific Ocean.

CLAYS AND CYCLIC SOFTENING: Cyclic softening is a term used to describe the development of significant strains or strength loss during a seismic event within fine-grained soils that exhibit clay-like behavior. These strains or strength loss can lead to differential settlement. It is our professional opinion that due to the predominantly sandy nature of the foundation-bearing soils, the risk of cyclic softening of fine-grained soils during a seismic event is considered negligible.

OTHER POTENTIAL GEOLOGIC HAZARDS: Other potential geologic hazards due to volcanoes or seismic-induced settlement should be considered negligible or nonexistent.

CONCLUSIONS

In general, it is our professional opinion and judgment that the subject property is suitable for the construction of the proposed project, provided the recommendations presented herein are fully implemented. The main geotechnical condition affecting the proposed project consists of potentially compressible old paralic deposits underlying the site, proposed basement excavation, and groundwater.

As encountered in our borings, potentially compressible old paralic deposits underlie the site to a depth of about 5 feet below existing grade. Deeper compressible soils may exist in areas of the site not investigated. These soils are considered unsuitable, in their present condition, for the support of settlement sensitive improvements. It is recommended that the potentially compressible soils underlying settlement sensitive improvements not removed to achieve finish pad grade be removed and replaced as compacted fill as described hereinafter.

It is anticipated that most of the temporary excavations associated with basement construction will require shoring.

Groundwater was encountered at approximately 17 feet and 18 feet below grade in borings B-1 and B-2, respectively. Cuts up to 14 feet are expected to accommodate the proposed basement level. It is our opinion that, unless deeper cuts are performed and except for shoring design and installation, groundwater will not significantly affect the proposed construction. However, it is our opinion that, for structural design purposes, the structure should be designed for a season high groundwater level at 16 feet below existing grade.

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 Coronado, 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 demolition of the existing garage and associated improvements. 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 loose, potentially compressible old paralic deposits underlying the proposed settlement sensitive improvements be removed. Based on our findings, these materials extended to a depth of about 5 feet below existing grade. However, 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 beyond the perimeter of the proposed improvements. No removals are recommended within 2 feet from 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.

SPECIAL CONDITION: Removals along property lines and near existing improvements to remain will be limited. Special grading procedures such as slot excavations or shoring may be needed in these areas. This condition will be evaluated and recommendations provided as need during the grading operations.

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 about 12 inches, watered thoroughly, and compacted to at least 90 percent relative compaction.

IMPORTED FILL: Imported fill soils may be necessary for retaining wall backfill. Imported fill should consist of low expansive (EI between 21 to 50) silty sands or clayey sands free of rocks or lumps over 3 inches in maximum dimension. Imported fill should be approved by this office prior to delivery to the site in order to establish compatibility with the on-site soils and project requirements. Laboratory tests will be needed prior to import fill approval. A minimum 5 business days lead time should be assumed.

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 3 inches in maximum dimension.

Utility trench backfill within 5 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.

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

The ground around the proposed improvements should be graded so that surface water flows rapidly away from the improvements without ponding. In general, we recommend that the ground adjacent to structure slope away at a gradient of at least 5 percent for a minimum distance of 10 feet. If the minimum distance of 10 feet cannot be achieved, an alternative method of drainage runoff away from the building at the termination of the 5 percent slope will need to be used. Swales and impervious surfaces that are located within 10 feet of the building should have a minimum slope of 2 percent. It is essential that new and existing drainage patterns be coordinated to produce proper drainage. Pervious hardscape surfaces adjacent to structures should be similarly graded.

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

TEMPORARY SLOPES: Temporary cut slopes up to about 14 feet (including the foundation excavation) are anticipated for the construction of the subject project. It is anticipated that most of the slopes will be shored. It is recommended that the location of proposed unshored temporary cut slopes be reviewed by our office. Unshored temporary cut slopes should be excavated at an inclination of 1.5:1 (horizontal to vertical) or flatter. It should be recognized that flatter inclinations could be required for wet or saturated soils or cohesionless sands. Deep, temporary confined excavations, such as for underground utility trenches, should use sloping sides, shoring, or "trench boxes" during construction, or any other approved construction

technique to assure stability of the excavations. Our firm should be contacted to observe all unshored cut slopes during grading to ascertain that no unforeseen adverse conditions exist. 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. Where there is not room to construct temporary slopes, temporary or permanent shoring of the excavation sides will be necessary. Specific design criteria for shoring are presented in the "Shoring" section of this report.

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

TEMPORARY SHORING

GENERAL: Shoring may be necessary for the proposed construction. It is anticipated that the shoring system will utilize soldier beams with wooden lagging. The following design parameters may be assumed to calculate earth pressures on shoring.

TABLE I: TEMPORARY SHORING DESIGN PARAMETERS

Soil Type	Loose Old Paralic Deposits (0-5')	Old Paralic Deposits (Below 5')
Angle of friction	28°	32°
Apparent cohesion	N/A	100 pounds per square foot
Soil unit weight	110 pounds per cubic foot (pcf)	121 pounds per cubic foot (pcf)*

*Buoyant Weight Below Groundwater Table

Active pressures can be applied to shoring that is capable of rotating 0.002 radians. At-rest pressures should be applied to a shoring system that is unyielding and not able to rotate. These values do not include surcharge loads. Construction surcharge loads should be evaluated on a case-by-case basis. Vertical and lateral movements of the temporary shoring are expected to be small assuming an adequate lateral support system.

DRILLING CONDITIONS: Loose soils should be anticipated to a depth of about 5 feet below existing grade. Groundwater should be anticipated at a depth of about 17 feet below existing site grades.

MONITORING: Some means of monitoring the performance of the shoring system is recommended. The monitoring should consist of periodic surveying of the lateral and vertical locations of the tops of the soldier piles approximately every 50 lineal feet. We will need to discuss this further with the design consultants and the contractor when the design of the shoring system has been finalized.

FOUNDATIONS

GENERAL: Based on our findings and engineering judgment, the proposed structure and associated improvements may be supported by conventional shallow continuous and isolated spread footings. The following minimum recommendations are based on the anticipated soil conditions, and are not intended to be in lieu of structural considerations. All foundations should be designed by a qualified engineer.

DIMENSIONS: Conventional footings supporting the proposed structure should have a minimum embedment depth of 18 inches below lowest adjacent finish grade. Conventional footings supporting light on-grade light exterior miscellaneous improvements should have a minimum embedment depth of 12 inches below lowest adjacent finish grade. Continuous and isolated footings should have a minimum width of 18 inches and 24 inches, respectively. Retaining wall footings should be at least 24 inches wide.

LIMITED GRADING FOUNDATIONS: It is recommended that the bottom of footings in areas where the recommended site preparations are limited due to existing improvements or along property lines be moisture conditioned as necessary and compacted to a relative compaction of at least 95 percent of its maximum laboratory dry density as determined by ASTM Laboratory Test D1557. Compaction should be confirmed by performing in-place density tests. In addition, these footings should be designed for an allowable soil bearing pressure of 1,500 pounds per square foot (psf).

BEARING CAPACITY: Continuous footings supporting the proposed structure with a minimum embedment of 18 inches and a minimum width of 18 inches may be designed for an allowable soil bearing pressure of 3,000 pounds per square foot (psf). This value may be increased by 500 pounds per square foot for each additional foot of embedment and 400 pounds per square foot for each additional foot of width up to a maximum of 5,000 pounds per square foot. Continuous footings supporting the proposed light exterior improvements with a minimum embedment of 12 inches and a minimum width of 18 inches may be designed

for an allowable soil bearing pressure of 2,000 pounds per square foot (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 REINFORCEMENT: The project structural engineer should provide reinforcement requirements for foundations. However, based on soil conditions, we recommend that the minimum reinforcing for continuous footings should 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 fill material may be considered to be 0.30. The passive resistance for the fill 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.

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

EXPANSIVE CHARACTERISTICS: The anticipated foundation soils are anticipated to have a very low expansion potential (EI<20). The recommendations presented in this report reflect this condition.

FOUNDATION EXCAVATION OBSERVATION: All footing excavations should be observed by CWE personnel prior to placing of forms and reinforcing steel in order to determine whether the foundation recommendations presented herein are followed, and that the foundation-bearing soils are present in a condition anticipated during the preparation of this report. All footing excavations should be excavated in a neat, level, and square manner. All loose or unsuitable material should be removed prior to the placement of concrete.

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 the foundations and other structural elements, based on the requirements of the structure, and considering the information presented in this report.

SOLUBLE SULFATES: The water-soluble sulfate content of a selected soil sample from the site was determined in accordance with California Test Method 417. The results of this test indicate that the soil sample had a soluble sulfate content of <0.003 percent. Soils with a soluble sulfate content of less than 0.1 percent are considered to have a negligible potential for causing adverse effects on concrete and structural steel materials of the proposed footings. Therefore, no special requirements are considered necessary for the concrete mix design.

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 corrosion testing should only be used as a guideline to determine if additional testing and analysis is necessary.

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 2022 California Building Code. The site coefficients and adjusted maximum considered earthquake spectral response acceleration parameters are presented in the following Table II.

TABLE II: SEISMIC DESIGN FACTORS

Site Coordinates: Latitude Longitude	32.686° 117.179°
Site Class	D
Site Coefficient F_a	1.0
Site Coefficient F_v	1.794
Spectral Response Acceleration at Short Periods S_S	1.512 g
Spectral Response Acceleration at 1 Second Period S_1	0.506 g
$S_{MS}=F_aS_s$	1.512 g
$S_{M1}=F_vS_1$	0.908 g
$S_{DS}=2/3*S_{MS}$	1.008 g
$S_{D1}=2/3*S_{M1}$	0.605 g

Probable ground shaking levels at the site could range from slight to moderate, depending on 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.

SLAB-ON-GRADE

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

INTERIOR FLOOR SLABS: The garage slab-on-grade should be designed to be at least 4 inches thick (actual), and reinforced with at a minimum No. 3 bars spaced at 18 inches on center in each direction. Slab-on-grade reinforcement should be supported on chairs, such that the reinforcing bars are positioned at mid-height within the floor slab. The slab-on-grade reinforcement should extend into the perimeter footings to a depth of at least 6 inches.

UNDER-SLAB VAPOR RETARDERS: The following recommendations apply to conventional slabs-on-grade. 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 placement of a vapor retarder, such as polyethylene sheeting, in a layer of coarse sand placed directly beneath the concrete slab. Two inches of sand are typically placed above the sheeting. Stegowrap® polyethylene sheeting with the thickness of 15-millimeters should be considered as the minimum recommended material to be used as a vapor retarder. The 15-millimeter thickness Stegowrap® or a similar material with sealed seams should extend at least 12 inches down the sides of the interior and perimeter footings. The sand should have a sand equivalent number of at least 30, and contain less than 10% material passing the No. 100 sieve, and less than 5% material passing the No. 200 sieve. The vapor retarder should be placed in accordance with the recommendation and consideration contained within American Concrete Institute (ACI) publication No. 302, "Guide for Concrete Floor and Slab Construction" and ASTM standard 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 12 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 40 and 59 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 13H 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. The retaining wall designer should provide a detail for a wall drainage system. Typical retaining wall drain system details will be presented in Plate No. 3 for informational purposes.

Additionally, outlet 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. Plans and specifications should be made available to the geotechnical engineer and engineering geologist for review and verification of compliance with this report and the California Building Code.

It is recommended that CWE be retained to provide continuous soil engineering services during the earthwork operations in order to verify compliance with the design concepts, specifications or recommendations, and to allow for 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 conditions encountered at the subsurface exploration locations. The recommendations are also based on the assumption that the soil conditions do not deviate appreciably from those encountered during subsurface investigation. 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 encountered during site development should be brought to the attention of the geotechnical engineer for evaluation of compliance with the recommendations contained herein.

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 occur with the passage of time, whether due to natural processes or the work of man at 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 in order to verify 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 ensure that the contractor and his subcontractors carry out such recommendations during construction.

FIELD EXPLORATIONS

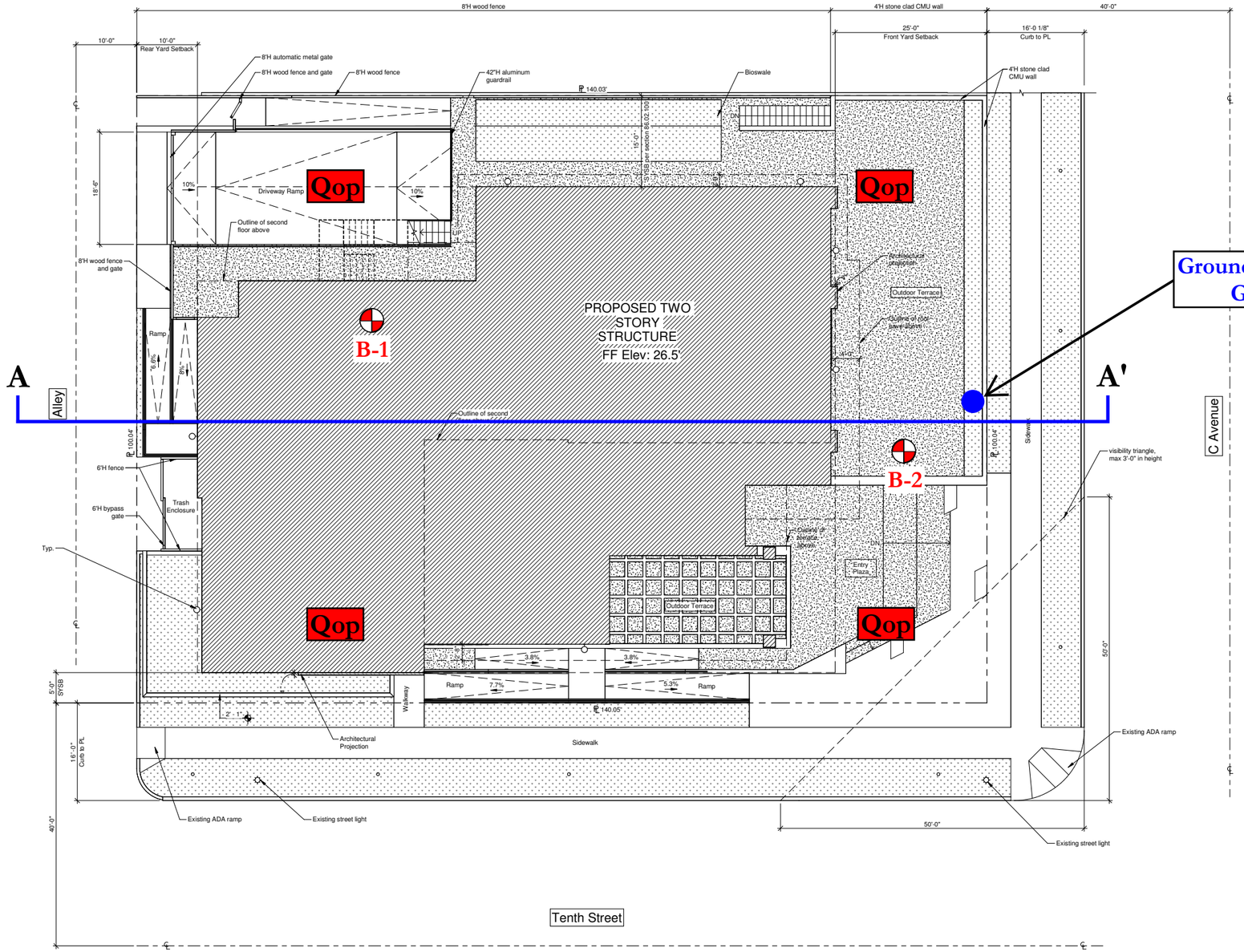
Two subsurface explorations were excavated on March 27, 2024 at the locations indicated on the Site Plan and Geotechnical Map attached as Plate No. 1. These explorations consisted of borings drilled utilizing a portable drill rig. The fieldwork was conducted under the observation and direction of our engineering geology personnel.

The subsurface explorations were logged during excavation activities. The logs are presented in Appendix A. The soils were classified in accordance with the Unified Soils Classification System (USCS). In addition, a verbal textural description, the wet color, the apparent moisture, and the density or consistency is provided. The density of granular soils is given as very loose, loose, medium dense, dense or very dense. The consistency of silts or clays is given as either very soft, soft, medium stiff, stiff, very stiff, or hard.

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

LABORATORY TESTING

Laboratory tests were performed in accordance with the generally accepted ASTM testing methods or suggested procedures. A brief description of the tests performed and the subsequent results are presented in Appendix B.

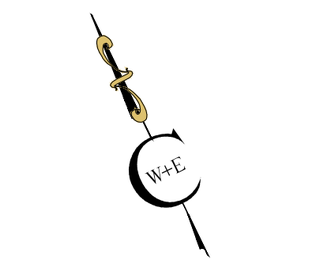


Groundwater monitoring well.
Groundwater at 18'.

CWE LEGEND

- B-2 — APPROXIMATE BORING LOCATION
- GEOLOGIC CROSS SECTION
- Qop — OLD PARALIC DEPOSITS

Note: Minor fills and landscape topsoil not mapped



0 20 40

APPROXIMATE SCALE: 1" = 20'

project:
Chabad of Coronado
970 C Avenue, Coronado, California 92118

architect:
christian rice architects, inc.
1127 loma ave, coronado, ca 92118 p.619.522.9040

LICENSED ARCHITECT
CHRISTIAN S. RICE
No. C-31291
07-31-25
RENEWAL DATE
STATE OF CALIFORNIA

drawn by:
HA

drawing date:
May 23, 2023

revisions:

revision	date	notes

sheet title:
Existing Site Plan

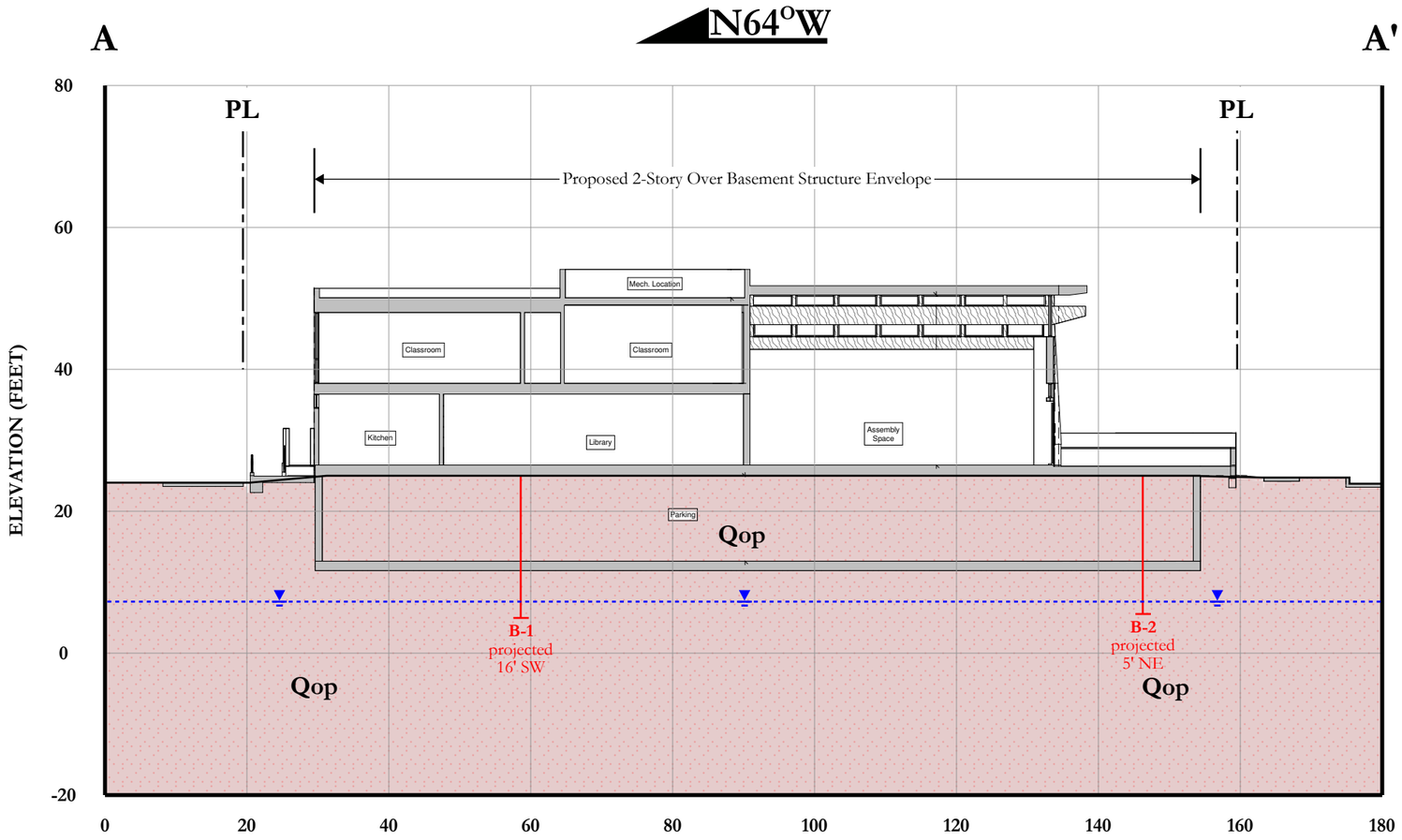
drawing number:
A1

SITE PLAN AND GEOTECHNICAL MAP

CHABAD CORONADO
970 C AVENUE
CORONADO, CALIFORNIA

DATE: MAY 2024	REPORT NO.: 2230388.01
BY: JMM	PLATE NO.: 1

CHRISTIAN WHEELER ENGINEERING



CWE LEGEND

Qop	OLD PARALIC DEPOSITS
▼	GROUNDWATER ELEVATION

Note: Minor fills and landscape topsoil not shown on cross section

0 20 40

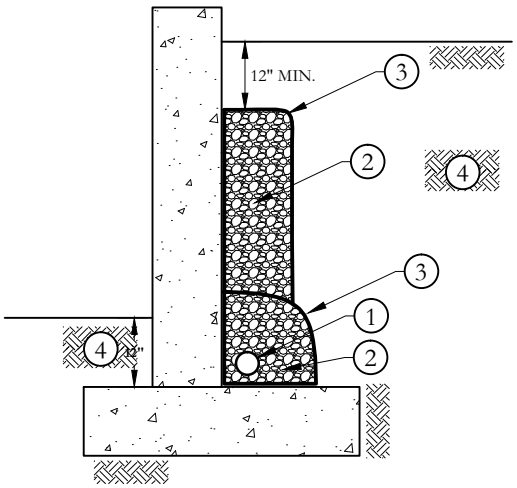
SCALE: 1" = 20'

GEOLOGIC CROSS-SECTION A-A'

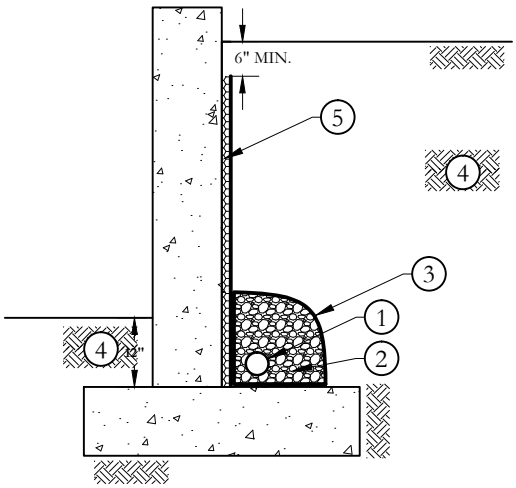
CHABAD CORONADO
970 C AVENUE
CORONADO, CALIFORNIA

DATE: MAY 2024	REPORT NO.: 2230388.01
BY: JMM	PLATE NO.: 2

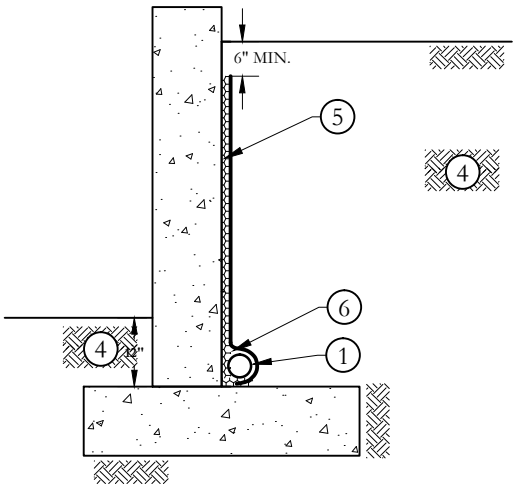
CHRISTIAN WHEELER ENGINEERING



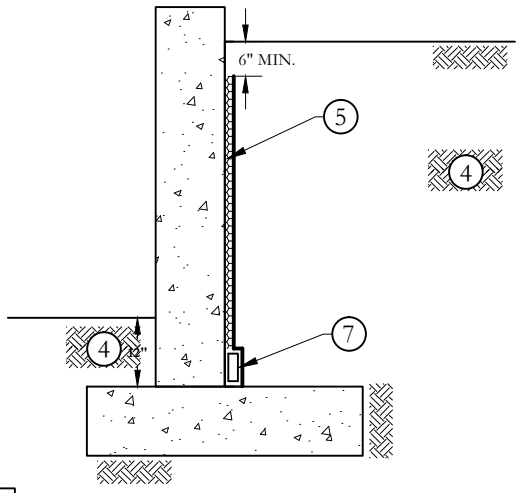
1 DETAIL



2 DETAIL



3 DETAIL



4 DETAIL

NOTES AND DETAILS

GENERAL NOTES:

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

DETAILS:

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

CANTILEVER RETAINING WALL DRAINAGE SYSTEMS

CHABAD CORONADO
970 C AVENUE
CORONADO, CALIFORNIA

DATE:	MAY 2024	REPORT NO.:	2230388.01
BY:	JMM	PLATE NO.:	3

CHRISTIAN WHEELER ENGINEERING

Appendix A

Subsurface Explorations

LOG OF BORING B-1

Date Logged:	3/27/24	Equipment:	IR A 300
Logged By:	JMM	Auger Type:	8" hollow stem
Existing Elevation:	±25'	Drive Type:	140lbs/30" drop
Finish Elevation:	±11'	Depth to Water:	17'

Sample Type and Laboratory Test Legend

Cal	Modified California Sampler	CK	Chunk
SPT	Standard Penetration Test	DR	Drive Ring
ST	Shelby Tube		
MD	Max Density	DS	Direct Shear
SO_4	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	SD	Sample Density

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
				4" AC, no base							
1–2			SM	**Old Paralic Deposits (Qop):** Brown to reddish-brown, damp to moist, loose, SILTY SAND, no cementation.							
3					12	Cal		7.2	100.2		
4–5				Reddish-brown to orangish-brown to yellowish-brown, mottled, medium dense.							
6–9											
10					33	Cal		9.8	109.6		
11											SO4
12–13											
14				Reddish-brown to light gray to orangish-brown, very dense.							
15					71	Cal		7.3	97.6		CP
16–17	▼			Gray, saturated. Groundwater at 17'.							SA
18–19											
20					57	Cal		29.7	92.0		
21				Bottom at 20 feet. Groundwater encountered at 17 feet. Caved at 17 feet.							
22–24											

Notes:

Symbol Legend

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

CHABAD CORONADO
970 C AVENUE
CORONADO, CALIFORNIA

DATE:	MAY 2024	JOB NO.:	2230388.01
BY:	SD	APPENDIX:	A-1

CHRISTIAN WHEELER ENGINEERING

LOG OF BORING B-2

Date Logged:	3/27/24	Equipment:	IR A 300
Logged By:	JMM	Auger Type:	8" hollow stem
Existing Elevation:	±25'	Drive Type:	140lbs/30" drop
Finish Elevation:	±11'	Depth to Water:	18'

Sample Type and Laboratory Test Legend

Cal	Modified California Sampler	CK	Chunk
SPT	Standard Penetration Test	DR	Drive Ring
ST	Shelby Tube		
MD	Max Density	DS	Direct Shear
SO_4	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	SD	Sample Density

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
				5" landscape topsoil							
1			SM	**Old Paralic Deposits (Qop):** Reddish-brown to brown, damp to moist, loose, SILTY SAND, no cementation.							SA
2											
3											
4					11	Cal		10.1	99.8		DS
5				Reddish-brown to orangish-brown to yellowish-brown, mottled, medium dense.							
6											
7											
8											
9											
10				Dense.	39	Cal		6.1	97.6		CP
11											
12											
13				Yellowish-brown to light gray to orangish-brown, very dense.							
14											
15					78	Cal		11.5	93.0		DS
16											
17											
18	▼			Groundwater at 18'.							
19					57	Cal		28.9	91.4		
20				Bottom at 19.5 feet.							
21				Groundwater encountered at 18 feet.							
22				Caved at 15 feet.							
23											
24											

Notes:

Symbol Legend

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

CHABAD CORONADO
970 C AVENUE
CORONADO, CALIFORNIA

DATE:	MAY 2024	JOB NO.:	2230388.01
BY:	SD	APPENDIX:	A-2

CHRISTIAN WHEELER ENGINEERING

Appendix B

Laboratory Test Results

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

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

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

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

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

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

f) **SOLUBLE SULFATES:** The soluble sulfate content of a selected soil sample was determined in accordance with California Test Method 417.

LABORATORY TEST RESULTS

CHABAD CORONADO

970 C AVENUE

CORONADO, CALIFORNIA

DIRECT SHEAR (ASTM D3080)

Sample Location	**Boring B-2 @ 4'**	**Boring B-2 @ 15'**
Sample Type	Undisturbed	Undisturbed
Friction Angle	28°	32°
Cohesion	200 psf	100 psf

GRAIN SIZE DISTRIBUTION (ASTM D422)

Sample Location	**Boring B-1 @ 15'-18'**	**Boring B-2 @ ½'-2½'**
Sieve Size	*Percent Passing*	*Percent Passing*
#4	100	100
#8	100	100
#16	100	100
#30	98	98
#50	95	91
#100	68	57
#200	22	29

COLLAPSE POTENTIAL (ASTM D 5333)

Sample Location	**Boring B-1 @ 15'**	**Boring B-2 @ 10'**
Initial Moisture Content	7.3 %	6.1 %
Initial Density	97.6 pcf	97.9 pcf
Consolidation Before Water Added	1.3 %	1.3 %
Consolidation After Water Added	1.7 %	1.6 %
Final Moisture	24.1 %	22.8 %

SOLUBLE SULFATES (CALIFORNIA TEST 417)

Sample Location	**Boring B-1 @ 10'-13'**
Soluble Sulfate	<0.003 % (SO_4)

Appendix C

References

REFERENCES

American Society of Civil Engineers; ASCE 7 Hazard Tool; https://asce7hazardtool.online

California Geological Survey; 2010; Fault Activity Map of California; https://maps.conservation.ca.gov/cgs/Dataviewer/

California Geological Survey; 2018; Earthquake Fault Zones, A Guide for Government Agencies, Property Owners/Developers, and Geoscience Practitioners for Assessing Fault Rupture Hazards in California; Special Publication 42.

California Geologic Survey, California Tsunami Maps and Data, https://www.conservation.ca.gov/cgs/tsunami/maps

California Geological Survey; 2022; Earthquake Zones of Required Investigation; https://maps.conservation.ca.gov/cgs/informationwarehouse/

Christian Rice Architects, Inc., Miscellaneous Architectural Plans, Chabad of Coronado, 970 C Avenue, Coronado, California, 92118, dated May 23, 2023.

Federal Emergency Management Agency, San Diego County, California and Incorporated Areas Flood Insurance Rate Map, Map Number 06073C1891H, effective December 20, 2019.

Graehl, N.G.; and Wilson, R.I.; 2022; Tsunami Hazard Area Map, San Diego County; produced by the California Geological Survey and the California Governor's Office of Emergency Services; dated 2022; displayed at multiple scales.

Jennings, C.W. and Bryant, W. A., 2010, Fault Activity Map, California Geological Survey, Geologic Data Map No. 6, http://www.quake.ca.gov/gmaps/FAM/faultactivitymap.html

Kennedy, Michael P. and Tan, Siang S., 2008, Geologic Map of the San Diego 30'x60' Quadrangle, California, California Geologic Survey, Map No. 3.

Office of Emergency Services-Unified Disaster Council, San Diego County, 2010, Multi-Jurisdictional Hazard Mitigation Plan, dated August 2010.

Southern California Earthquake Data Center; 2023; Earthquake Information, Fault Name Index; https://scedc.caltech.edu/earthquake/faults.html

REFERENCES (continued)

Tan, S.S.; 1995; Landslide Hazards in the Southern Part of the San Diego Metropolitan Area, San Diego County, California; Relative Landslide Susceptibility and Landslide Distribution Map; Open File Report 95-03; Map No. 33; Plate D.

United States Geological Survey; 2017; Quaternary fault and fold database for the United States; https://www.usgs.gov/natural-hazards/earthquake-hazards/faults.

Appendix D

Recommended Grading Specifications – General Provisions

RECOMMENDED GRADING SPECIFICATIONS - GENERAL PROVISIONS

CHABAD CORONADO
970 C AVENUE
CORONADO, CALIFORNIA

GENERAL INTENT

The intent of these specifications is to establish procedures for clearing and grubbing of the site area, compacting of the natural ground, preparing of areas for fill placement, 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 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 appraised of work schedules, changes and new information and data so that he may provide these opinions. In the event that any unusual conditions not covered by the special provisions or preliminary geotechnical report are encountered during the grading operations, the Geotechnical Engineer shall be contacted for further recommendations.

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

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

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

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

PREPARATION OF AREAS TO RECEIVE FILL

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

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

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

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

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

FILL MATERIAL

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

PLACING AND COMPACTION OF FILL

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

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

Field observation and compaction tests to estimate the degree of compaction of the fill will be taken by the Geotechnical Engineer or his representative. The location and frequency of the tests shall be at the Geotechnical Engineer's discretion. When the compaction test indicates that a particular layer is at less than

the required degree of compaction, the layer shall be reworked to the satisfaction of the Geotechnical Engineer and until the desired relative compaction has been obtained.

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

Density tests in the slopes will be made by the Geotechnical Engineer during construction of the slopes to determine if the required compaction is being achieved. Where failing tests occur or other field problems arise, the Contractor will be notified that day of such conditions by written communication from the Geotechnical Engineer or his representative in the form of a daily field report.

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

CUT SLOPES

The Engineering Geologist shall inspect cut slopes excavated in rock or lithified formational material during the grading operations at intervals determined at his discretion. If any conditions not anticipated in the preliminary report such as perched water, seepage, lenticular or confined strata of a potentially adverse nature, unfavorably inclined bedding, joints or fault planes are encountered during grading, these conditions shall be analyzed by the Engineering Geologist and Geotechnical Engineer to determine if mitigating measures are necessary.

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

ENGINEERING OBSERVATION

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

SEASON LIMITS

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

RECOMMENDED GRADING SPECIFICATIONS - SPECIAL PROVISIONS

RELATIVE COMPACTION: The minimum degree of compaction to be obtained in compacted natural ground, compacted fill, and compacted backfill shall be at least 90 percent. For street and parking lot subgrade, the upper 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 ASTM D4829.

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 are 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.