Preliminary Drainage Study

Kornberg Residence

2605 Ellentown Road
La Jolla, CA 92037

Prepared for:
Jason Kornberg
2605 Ellentown Road
La Jolla, CA 92037

Prepared by:
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November 18, 2018

PTS No.

Introduction

This project, located at 2605 Ellentown Road on Lot 42 of Map No. 3014 proposes the removal of an existing single-family residence and construction of a new single-family residence and appurtenances. The project includes construction of onsite drainage system, landscaping and a new home with some raised floors.

The attached drainage area maps are from a survey by Christensen Engineering & Surveying dated August 31, 2017. The site, in its existing pre-construction condition, drains onto Ellentown Road. Two offsite areas convey runoff to the site that then flows through it and onto Ellentown Road. Following construction this same pattern will exist with the difference being that a portion of the site will convey runoff to a curb outlet while the remainder of the site and offsite runoff tributary to the site will continue to flow to Ellentown Road by surface sheet flow. Since there is no change in the area contributing runoff and since the runoff coefficient does not change, the volume of runoff flowing onto Ellentown Road will not change. There is an increase in imperviousness due to the new construction (5,529 sf, 42.6% pre-construction versus 8,532 sf, 65.8% post-construction) but using the method found in the City of San Diego Drainage Design Manual, the calculated total runoff from onsite and offsite, does not change.

Section 404 of CWA regulates the discharge of dredged or fill material into waters of the United States. Section 404 is regulated by the Army Corps of Engineers. Section 401 of CWA requires that the State provide certification that any activity authorized under Section 404 is in compliance with effluent limits, the state's water quality standards, and any other appropriate requirements of state law. Section 401 is administered by the State Regional Water Quality Control Board. The project does not require a Federal CWA Section 404 permit nor Section 401 Certification because it does not cause dredging or filling in waters of the United States and is in compliance with the State Water Quality Standards.

The Rational Method was used to calculate the anticipated flow for the 100-year storm return frequency event using the method outlined in the City of San Diego Drainage Design Manual.

The proposed project will have no adverse effects on the neighboring properties nor the public storm drain system.

_____ 11-18-18

Antony K. Christensen
RCE 54021
Exp. 12-31-19
JN A2018-39

Date

Calculations

1. Intensity Calculation

(From the City of San Diego Drainage Design Manual)
Tc = Time of concentration

$Tc = 1.8\ (1.1\text{-}C)\ (D)^{1/2} / S^{1/3}$

Since the difference in elevation is 7' (80'-73') and the distance traveled is 204' (S=3.4%). C=0.55.

Tc = 9.4 minutes

From table in Manual:

I_{100} = 3.6 inches

2. Coefficient Determination

The offsite area that will contribute to runoff to the site is single-family residential as is the site itself:

Pre-Construction:
The project site is currently improved as a single-family residence:

C= 0.55

Post construction:
for Single Family

C = 0.55

3. Volume calculations

Q = CIA

Areas of Drainage

Pre-Construction

Southerly offsite area flowing onto it	OS-S = 0.021 Acre
Northerly offsite area flowing onto it	OS-N = 0.004 Acre
Area of site flowing to Ellentown Road	P-ONS = 0.298 Acre

Post-Construction

Southerly offsite area flowing onto it	OS-S = 0.021 Acre
Northerly offsite area flowing onto it	OS-N = 0.004 Acre
Westerly area of site flowing to Ellentown Road by sheet flow	PC-W = 0.095 Acre
Easterly area of site flowing to Ellentown Road by curb outlet	PC-E = 0.203 Acre

Pre-Construction

$Q_{100OS\text{-}S}$ = (0.55) (3.6) (0.021)
$Q_{100OS\text{-}N}$ = (0.55) (3.6) (0.004)
$Q_{100P\text{-}ONS}$ = (0.55) (3.6) (0.298)

$Q_{100OS\text{-}S}$ = 0.04 cfs
$Q_{100OS\text{-}N}$ = 0.01 cfs
$Q_{100P\text{-}ONS}$ = 0.59 cfs

Post-Construction

$Q_{100OS-S}$ = (0.55) (3.6) (0.021)
$Q_{100OS-N}$ = (0.55) (3.6) (0.004)
$Q_{100PC-W}$ = (0.55) (3.6) (0.095)
$Q_{100PC-E}$ = (0.55) (3.6) (0.203)

$Q_{100OS-S}$ = 0.04 cfs
$Q_{100OS-N}$ = 0.01 cfs
$Q_{100PC-W}$ = 0.40 cfs
$Q_{100PC-W}$ = 0.19 cfs

4. Discussion

The site, in its existing pre-construction condition, drains onto Ellentown Road. Two offsite areas convey runoff to the site that then flows through it and onto Ellentown Road. Following construction this this same pattern will exist with the difference being that a portion of the site will convey runoff to a curb outlet while the remainder of the site and offsite runoff tributary to the site will continue to flow to Ellentown Road by surface sheet flow. Since there is no change in the area contributing runoff and since the runoff coefficient does not change, the volume of runoff flowing onto Ellentown Road will not change. There is an increase in imperviousness due to the new construction (5,529 sf, 42.6% pre-construction versus 8,532 sf, 65.8% post-construction) but using the method found in the City of San Diego Drainage Design Manual, the calculated total runoff from onsite and offsite, does not change.

Type of conveyance is a: Curb Outlet
Depth of channel equals .25 Feet
Bottom Width Equals 3
Side slope equals .01
Slope of conveyance equals 2 %
Roughness equals .013
Flow quantity equals .4005673 CFS
Area equals .1710324 Square Feet
Velocity equals 2.338739 FPS
Depth of flow equals 5.699996E-02 Feet

APPENDIX

Table A-1. Runoff Coefficients for Rational Method

Land Use	Runoff Coefficient (C)
	Soil Type [1]
Residential:	
Single Family	0.55
Multi-Units	0.70
Mobile Homes	0.65
Rural (lots greater than ½ acre)	0.45
Commercial [2]	
80% Impervious	0.85
Industrial [2]	
90% Impervious	0.95

Note:
[1] Type D soil to be used for all areas.
[2] Where actual conditions deviate significantly from the tabulated imperviousness values of 80% or 90%, the values given for coefficient C, may be revised by multiplying 80% or 90% by the ratio of actual imperviousness to the tabulated imperviousness. However, in case shall the final coefficient be less than 0.50. For example: Consider commercial property on D soil.

Actual imperviousness = 50%
Tabulated imperviousness = 80%
Revised C = (50/80) x 0.85 = 0.53

The values in Table A–1 are typical for urban areas. However, if the basin contains rural or agricultural land use, parks, golf courses, or other types of nonurban land use that are expected to be permanent, the appropriate value should be selected based upon the soil and cover and approved by the City.

A.1.3. Rainfall Intensity

The rainfall intensity (I) is the rainfall in inches per hour (in/hr.) for a duration equal to the T_c for a selected storm frequency. Once a particular storm frequency has been selected for design and a T_c calculated for the drainage area, the rainfall intensity can be determined from the Intensity-Duration-Frequency Design Chart (Figure A-1).

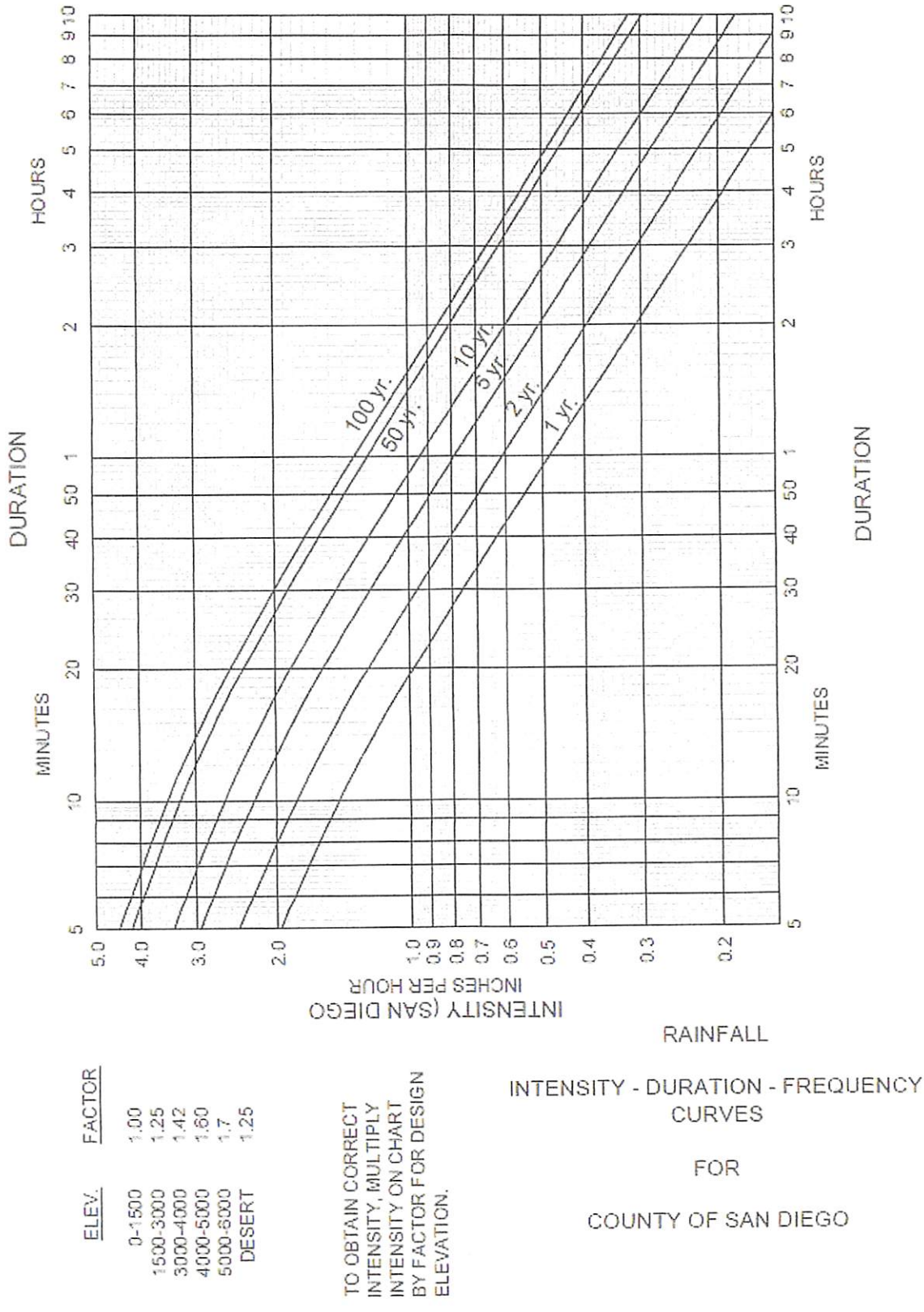


Figure A-1. Intensity-Duration-Frequency Design Chart

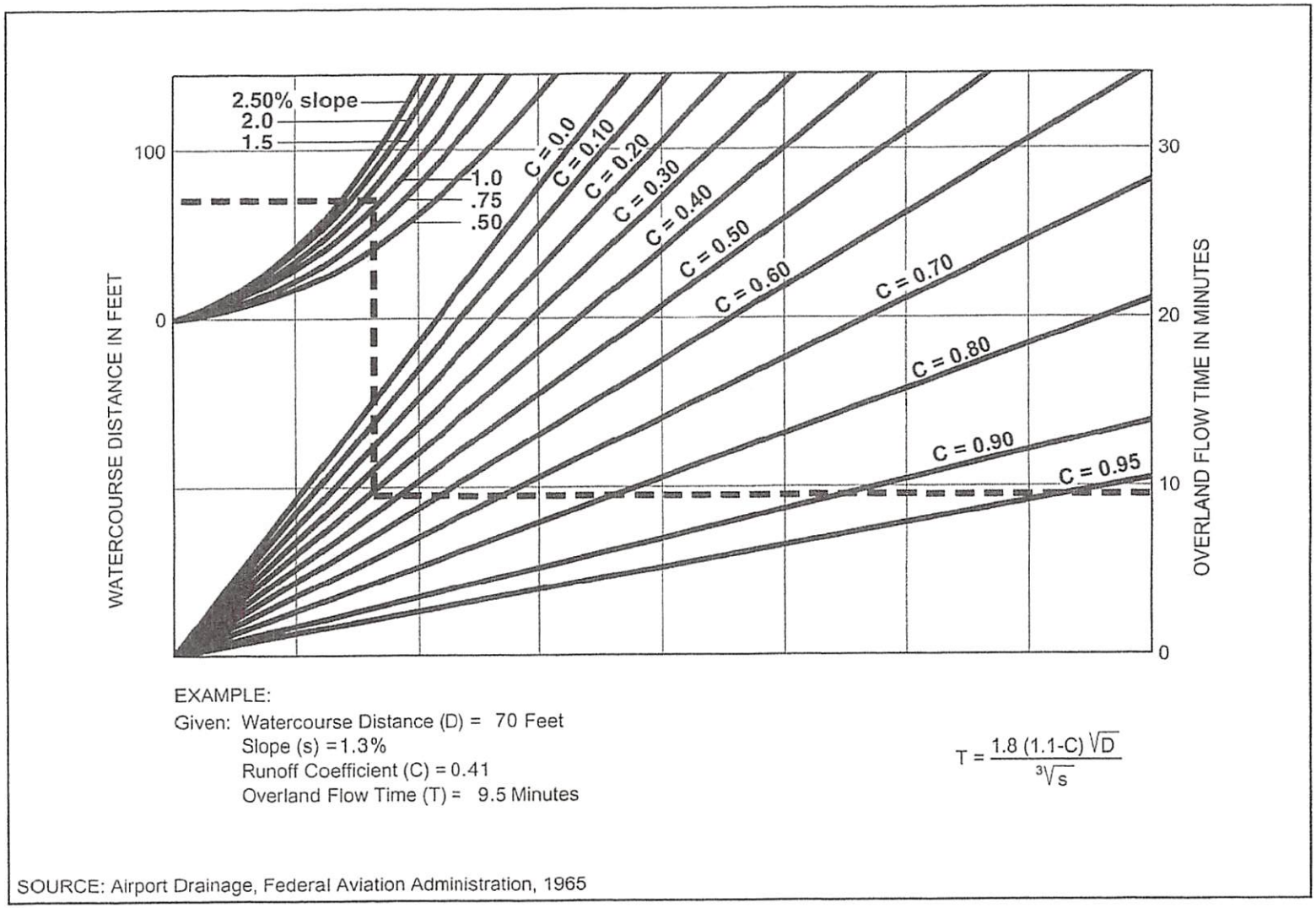


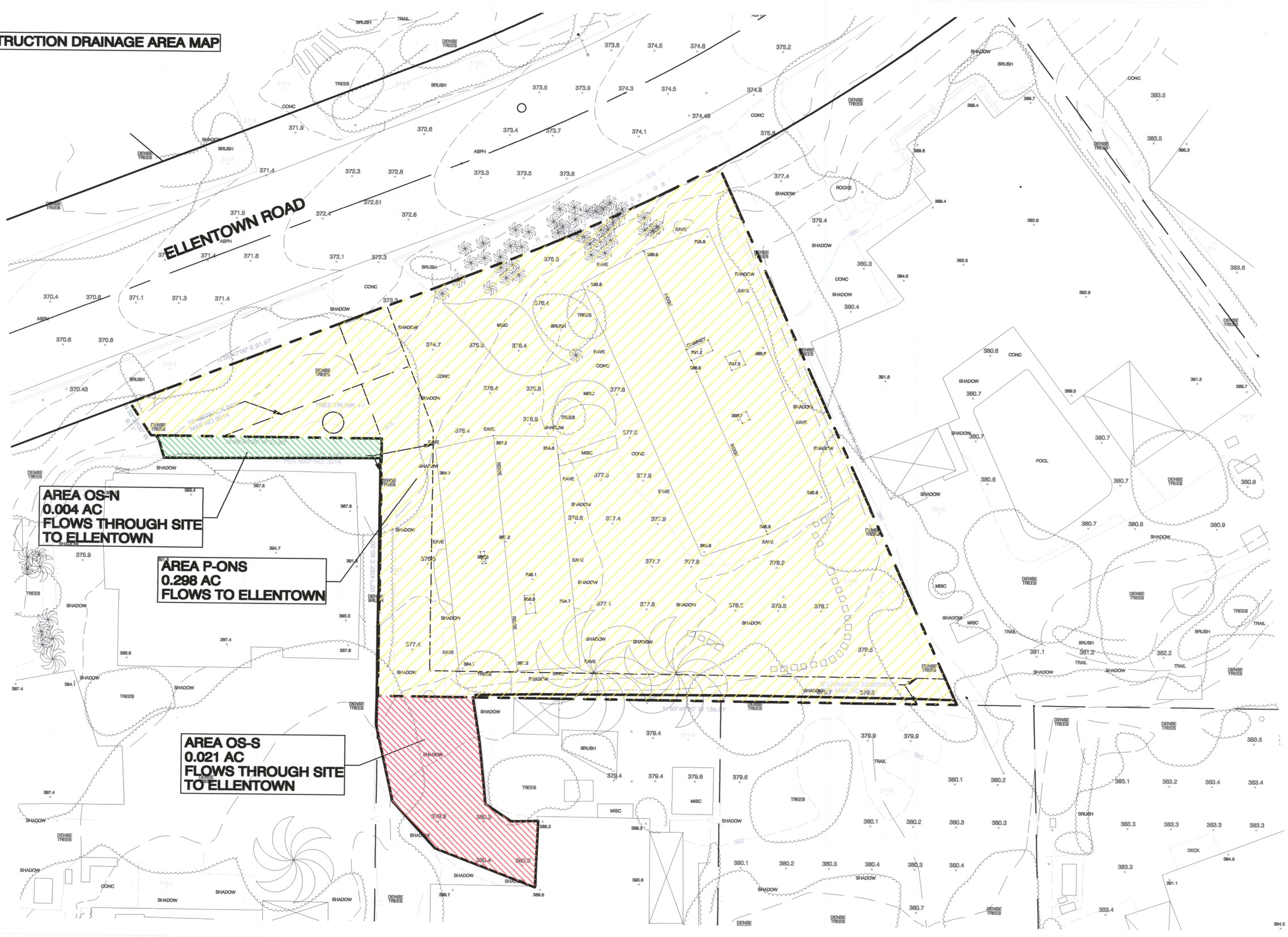
Figure A-4. Rational Formula – Overland Time of Flow Nomograph

Note: Use formula for watercourse distances in excess of 100 feet.

DRAINAGE AREA MAPS

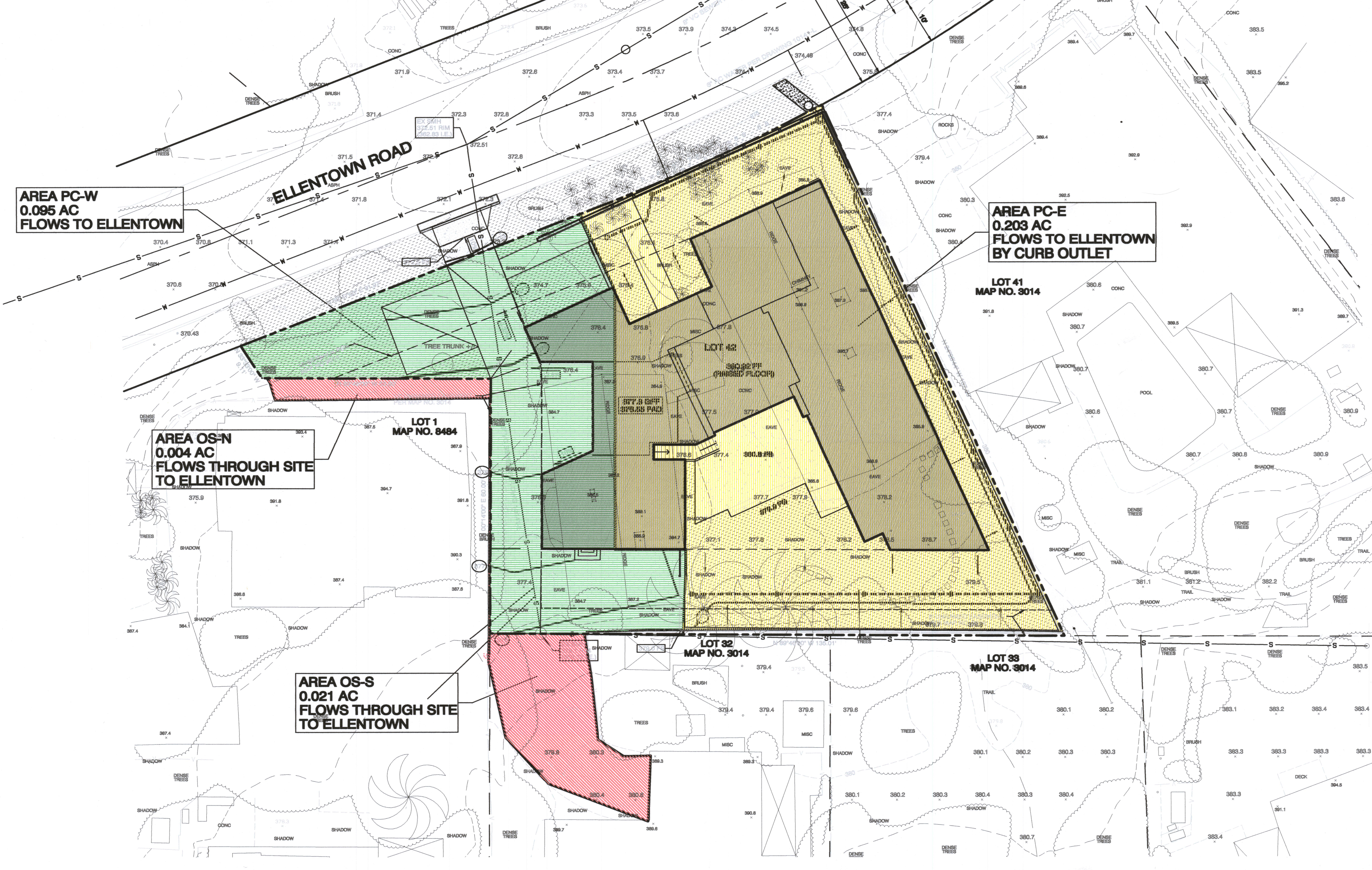
PRE-DEVELOPMENT DRAINAGE AREA MAP

PRE-CONSTRUCTION DRAINAGE AREA MAP



POST-DEVELOPMENT DRAINAGE AREA MAP

POST-CONSTRUCTION DRAINAGE AREA MAP



CHRISTIAN WHEELER
ENGINEERING

REPORT OF PRELIMINARY GEOTECHNICAL INVESTIGATION

PROPOSED KORNBERG RESIDENCE
2605 ELLENTOWN ROAD
LA JOLLA, CALIFORNIA

PREPARED FOR

JASON KORNBERG
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PREPARED BY

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CHRISTIAN WHEELER
ENGINEERING

March 9, 2018

Jason Kornberg
2605 Ellentown Road
San Diego, California 92037

CWE 2180060.01

Subject: **Report of Preliminary Geotechnical Investigation**
Proposed Kornberg Residence, 2605 Ellentown Road, La Jolla, California

Dear Mr. Kornberg:

In accordance with your request and our proposal dated January 22, 2018, we have completed a preliminary geotechnical investigation for proposed residential structure 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 proposed residential structure as presently planned provided the recommendations contained in this report are implemented.

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

Respectfully submitted,
CHRISTIAN WHEELER ENGINEERING

Daniel B. Adler, RCE #36037

REGISTERED PROFESSIONAL ENGINEER
DANIEL B. ADLER
No. 36037
Exp. 6-30-18
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CHRISTIAN WHEELER
ENGINEERING

PRELIMINARY GEOTECHNICAL INVESTIGATION

PROPOSED KORNBERG RESIDENCE
2605 ELLENTOWN ROAD
LA JOLLA, CALIFORNIA

INTRODUCTION AND PROJECT DESCRIPTION

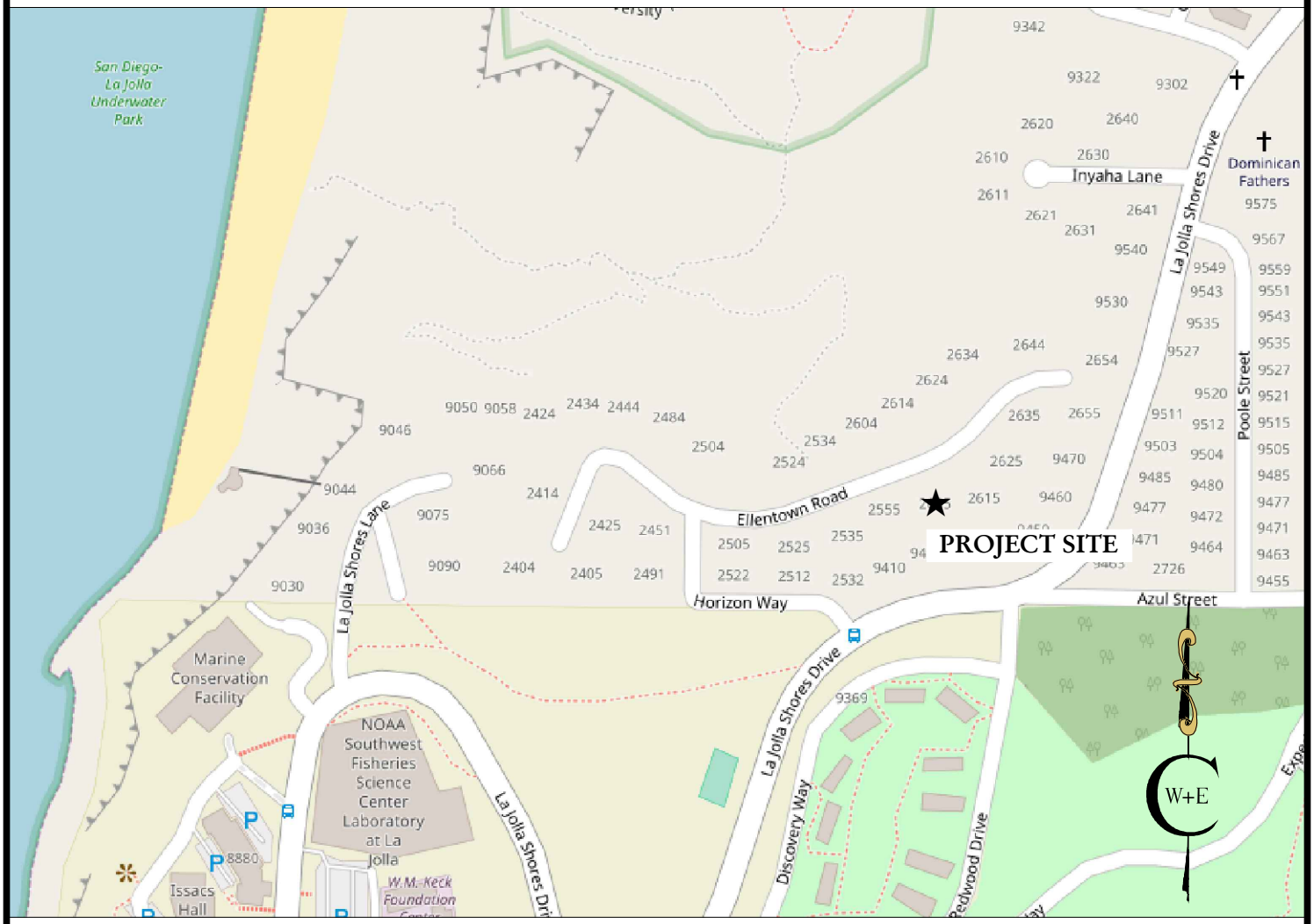
This report presents the results of a preliminary geotechnical investigation performed for a proposed residential structure to be constructed at 2605 Ellentown Road, La Jolla, California. The following Figure No. 1 presents a vicinity map showing the location of the property.

We understand that the subject project will consist of the demolition of the existing structures and their replacement with a new single-story residential structure that will include an attached garage and accessory building. It is anticipated that the proposed structure will be of wood-frame construction and will be supported on shallow foundations. It is assumed that the structure will have concrete slab-on-grade floors; however, raised wood floors are also been considered for the structure with the exception of the garage. It is assumed that grading will be very minor and consist of cuts and fills less than about 2 feet deep.

To assist in the preparation of this report, we were provided with an undated proposed site plan of unknown origin and a topographic map prepared by Christensen Engineering & Surveying, dated August 31, 2017. A copy of the topographic map was used as a base map for our Site Plan and Geologic Map, and is included herein as Plate No. 1.

This report has been prepared for the exclusive use of Jason Kornberg 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

SITE VICINITY



PROPOSED KORNBERG RESIDENCE
2605 ELLENTOWN ROAD
LA JOLLA, CALIFORNIA

DATE:	MARCH 2018	JOB NO.:	2180060.01
BY:	SRD	FIGURE NO.:	1

CHRISTIAN WHEELER
ENGINEERING

investigation, laboratory testing and/or recommendations are necessary. Our professional services have been performed, our findings obtained and our recommendations prepared in accordance with generally accepted engineering principles and practices. This warranty is in lieu of all other warranties, expressed or implied.

SCOPE OF SERVICES

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

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

- Excavate five hand-dug test pits to explore the existing soil conditions and obtain samples for laboratory testing.
- 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 planned construction.
- 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 in accordance with the 2016 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 difficulties.
- Provide site preparation and grading recommendations, as necessary, 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 a preliminary geotechnical report presenting the results of our investigation including a plot plan showing the location of our subsurface explorations, excavation logs, laboratory test results, and our conclusions and recommendations for the proposed project.

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

FINDINGS

SITE DESCRIPTION

The subject site is an irregular-shaped lot located at 2605 Ellentown Road, in the La Jolla community of San Diego, California. The property presently supports a residential structure and a detached garage. The site is bounded on the north by Ellentown Road and is otherwise bounded by residential structures. Topographically, the site slopes very gently to the north. Elevations range from about 373 feet at the northwestern corner of the property to about 380 feet at its southeastern corner.

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, topsoil, subsoil, and very old paralic deposits. These materials are described below.

ARTIFICIAL FILL (Qaf): Artificial fill was encountered underlying the north-central portion of the site. As encountered in test pits P-3 and P-4, this material extends to a maximum depth of about 1½ feet from existing grade. Deeper fill soils may exist in areas of the site not investigated.

The fill soils generally consisted of grayish-brown and light grayish-brown, dry and damp, loose and very loose, silty sand (SM). The artificial fill was judged to have a very ow expansion potential (EI < 20).

TOPSOIL: A relatively thin topsoil layer was encountered underlying the artificial fill and at grade throughout the property. As encountered in the test pits, this material has a maximum thickness of about 1½ feet. Thicker topsoil may exist in areas of the site not investigated. The topsoil generally consisted of light grayish-brown and light brown, dry and damp, loose, silty sand (SM). The topsoil was judged to have a very low expansion potential (EI < 20).

SUBSOIL: A relatively thin subsoil layer was encountered underlying the topsoil throughout the property. As encountered in the test pits, this material extends to a maximum thickness of about 1½ feet. Thicker subsoil may exist in areas of the site not investigated. The subsoil generally consisted of light gray, reddish-brown, light gray, and light brown, moist, medium dense and dense, clayey sand (SM). The subsoil was found to have a low expansion potential (EI = 42).

VERY OLD PARALIC DEPOSITS (Qvop): Quaternary-age very old paralic deposits were encountered underlying the surficial soils. The very old paralic deposits generally consisted of orangish-brown, damp and moist, very dense, silty sand (SM). The very old paralic deposits were judged to have a very low expansion potential (EI < 20).

GROUNDWATER: Groundwater or seepage was not observed within our excavations. However, it should be recognized that minor groundwater seepage problems might occur after construction and landscaping are completed. These are usually minor phenomena and are often the result of an alteration in drainage patterns and/or an increase in irrigation water. Based on the anticipated construction and the permeability of the on-site soils, it is our opinion that any seepage problems that may occur will be minor in extent. It is further our opinion that these problems can be most effectively corrected on an individual basis if and when they occur.

TECTONIC SETTING: 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 Rose Canyon Fault Zone is located approximately ¾ of a mile 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; Newport-Inglewood and Palos Verdes Fault Zones to the northwest; and the Elsinore, Earthquake Valley, San Jacinto and San Andreas Fault Zones to the northeast.

GEOLOGIC HAZARDS

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. 34, the site is located in Geologic Hazards Category 51. Hazard Category 51 is assigned to level areas underlain by paralic deposits and bedrock, where the risks are also classified as nominal.

SURFACE RUPTURE: There are no known faults below the surface of the subject site; therefore, the risk of surface rupture from a seismic event is considered low.

SLOPE STABILITY: As part of our study we reviewed the publication, "Landslide Hazards in the Southern Part of the San Diego Metropolitan Area" by Tan, 1995. This reference is a comprehensive study that classifies San Diego County into areas of relative landslide susceptibility. According to this

publication, the site is located in within Relative Landslide Susceptibility Area 2, which is considered to be the "marginally susceptible" area. Based on the topography of the site and the lack of any significant steep, unsupported slopes at or adjacent to the site, it is our opinion that the risk of either deep-seated or significant surficial slope instability can be considered to be very low.

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

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 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 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 about the offshore fault systems makes it difficult to assess the risk due to locally generated tsunamis. According to the Tsunami Inundation Map For Emergency Planning (CGS, 2009) and the County of San Diego's Multi-Jurisdictional Hazard Mitigation Plan (OES, 2010) the site is located outside of a tsunami inundation area and maximum tsunami projected runup, respectively. Given this information and the site's location, the risk associated with tsunamis at the site is considered to be negligible.

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

CONCLUSIONS

In general, it is our professional opinion and judgment that the subject property is suitable for the construction of the subject project and associated improvements provided the recommendations

presented herein are implemented. The main geotechnical condition encountered affecting the proposed project is potentially compressible artificial fill and native deposits.

Potentially compressible artificial fill, topsoil, and subsoil underlie the site. As encountered in our test pits, these materials extend to a maximum combined depth of about 4 feet below existing grade (test pit P-4). However, deeper compressible soils may exist in areas of the site not investigated. These deposits are considered unsuitable, in their present condition, for the support of settlement sensitive improvements. It is recommended that these materials be removed and replaced as compacted fill.

It is our understanding that in the past the existing residential structure experienced moisture issues. In order to minimize the potential for this occurrence, it is contemplated to use raised floors for the structure with the exception of the garage portion. It is our opinion that the past moisture issues were likely the result of poor site drainage and the presence of near surface soils with very low infiltration rates (very old paralic deposits). Although a future unanticipated occurrence such as a leak cannot be predicted, it is our opinion that the proposed grading and construction will mitigate moisture issues related to outside sources. Furthermore, consideration may be given to extending the proposed footings into the very old paralic deposits (thus creating a moisture cut-off wall), and using a less permeable concrete mix for on-grade slabs. Subdrains adjacent to foundations are not recommended.

It is anticipated that the site preparation recommendations will result of a mat of newly compacted fill underlying the proposed improvements. Unless the foundations are deepened for moisture mitigation considerations, it is assumed that the foundations for the proposed structure will be founded on these materials. In order to mitigate for differential foundation soil conditions, it is recommended that all footings be founded either on newly compacted fill or very old paralic deposits. This recommendation may require undercutting very old paralic deposits within foundation levels.

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

RECOMMENDATIONS

GRADING AND EARTHWORK

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

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

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

SITE PREPARATION: It is recommended that existing potentially compressible soils as well as any very old paralic deposits disturbed during demolition underlying the proposed settlement sensitive improvements and new fills should be removed in their entirety. Based on our findings, the maximum anticipated removal depth is about 4 feet from existing grade. Deeper removals may be necessary in areas of the site not investigated, due to unforeseen condition, or due to isolated deeper foundations. Lateral removals limits should extend at least 5 feet from the perimeter of the 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.

BOTTOM OF REMOVAL EXCAVATION: The removals and undercuts should be performed in such a way as to provide for a continuous contact between the new fill soils and very old paralic

deposits that drains away from the proposed structure, and avoids adjacent zones with different undercut depths that may impair subsurface drainage.

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 about 12 inches, moisture conditioned, and compacted to at least 90 percent relative compaction. No scarification is recommended underneath the proposed structure if the footings extend into very old paralic deposits.

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.

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 structure and associated improvements may be supported by conventional shallow continuous and isolated spread footings founded in newly compacted fill. If desired in order to mitigate for potential moisture issues, the structure may be supported on footings extending into very old paralic deposits. The following recommendations are considered the minimum based on the anticipated soil conditions, and are not intended to be lieu of structural considerations. All foundations should be designed by a qualified engineer.

DIMENSIONS: Spread footings supporting the proposed structure and associated improvements should be embedded at least 12 inches below lowest adjacent finish 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 24 inches wide.

BEARING CAPACITY: Spread footings supporting the proposed structure and associated improvements founded on newly compacted fill may be designed for an allowable soil bearing pressure of 2,000 pounds per square foot. This value may be increased by 600 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 4,000 pounds per square foot. Spread footings supporting the proposed structure and associated improvements founded on very old paralic deposits may be designed for an allowable soil bearing pressure of 4,000 pounds per square foot. This value may be increased by 800 pounds per square

foot for each additional foot of embedment and 600 pounds per square foot for each additional foot of width up to a maximum of 6,000 pounds per square foot. This value may 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 1 inch and 1 inch over 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 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.

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 0.007 percent. Soils with a soluble sulfate content of less than 0.1 percent are considered to be negligible. Therefore, no special requirements are considered necessary for the concrete mix design.

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 2016 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	32.872° -117.247°
Site Class	D
Site Coefficient F_a	1.0
Site Coefficient F_v	1.511
Spectral Response Acceleration at Short Periods S_s	1.261 g
Spectral Response Acceleration at 1 Second Period S_1	0.489 g
$S_{MS} = F_a S_s$	1.261 g
$S_{M1} = F_v S_1$	0.739 g
$S_{DS} = 2/3 * S_{MS}$	0.841 g
$S_{D1} = 2/3 * S_{M1}$	0.493 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 structure 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. Slabs located adjacent to existing footings or slabs should be doweled as recommended by the project structural designer.

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. 4 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 18 inches deep and 6 inches wide. All slabs should be provided with weakened plane joints in accordance with the American Concrete Institute (ACI) guidelines. Special attention should be paid to the method of concrete curing to reduce the potential for excessive shrinkage cracking. It should be recognized that minor cracks occur normally in concrete slabs due to shrinkage. Some shrinkage cracks should be expected and are not necessarily an indication of excessive movement or structural distress.

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 his 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 9, 2018 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 in Appendix A. The soils are described in accordance with the Unified Soils Classification. In addition, a verbal textural description, the wet color, the apparent moisture, and the density or consistency is provided. The density of granular soils is given as very loose, loose, medium dense, dense or very dense. The consistency of silts or clays is given as either very soft, soft, medium stiff, stiff, very stiff, or hard.

Relatively undisturbed chunk samples sand bulk samples 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 and the subsequent results are presented in Appendix B.

CE &S CHRISTENSEN ENGINEERING & SURVEYING
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7888 SILVERTON AVENUE, SUITE "J", SAN DIEGO, CALIFORNIA 92126
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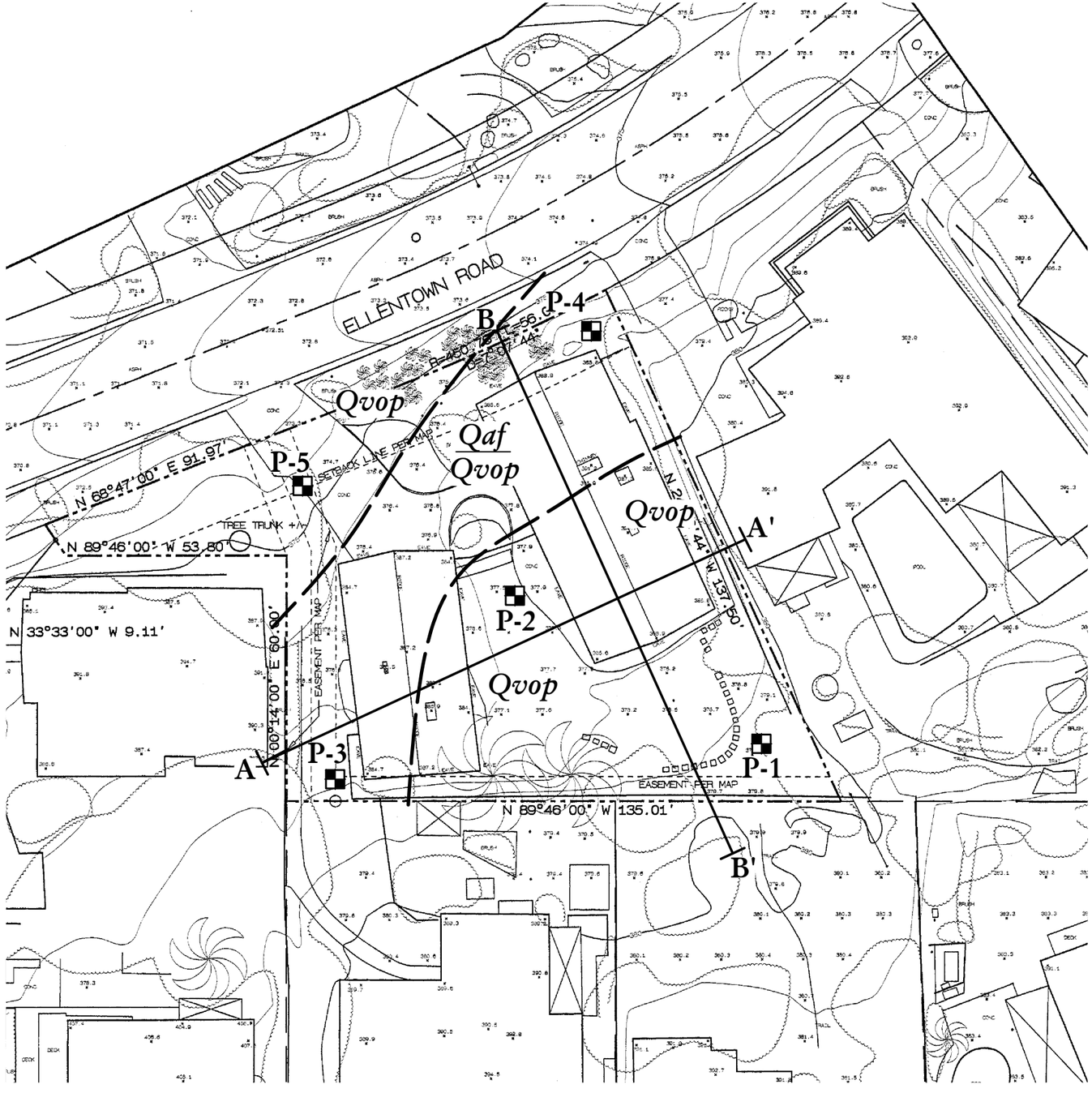


0 30' 60'

SCALE: 1" = 30'

CWE LEGEND

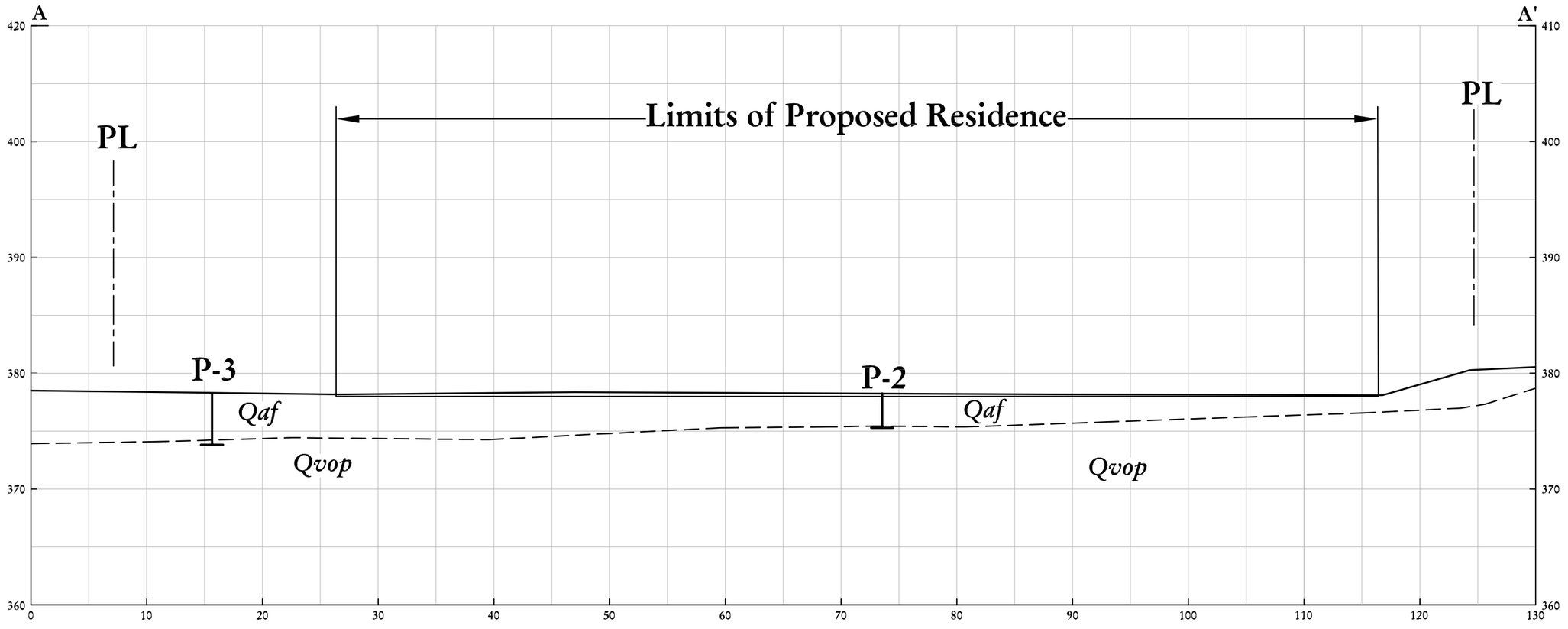
P-5	APPROXIMATE TEST PIT LOCATION
Qaf / Qvop	ARTIFICIAL FILL OVER VERY OLD PARALIC DEPOSITS
Qvop	OLD PARALIC DEPOSITS
— —	GEOLOGIC CONTACT
⊢—⊣	CROSS SECTION

SITE PLAN AND GEOTECHNICAL MAP

PROPOSED KORNBERG RESIDENCE
2605 ELLENTOWN ROAD
LA JOLLA, CALIFORNIA

DATE:	MARCH 2018	JOB NO.:	2180060.01
BY:	SD	PLATE NO.:	1

CHRISTIAN WHEELER ENGINEERING



CWE LEGEND	
Qaf	Undifferentiated Artificial Fill, Topsoil, and Subsoil
Qvop	Very Old Paralic Deposits

0 10' 20'

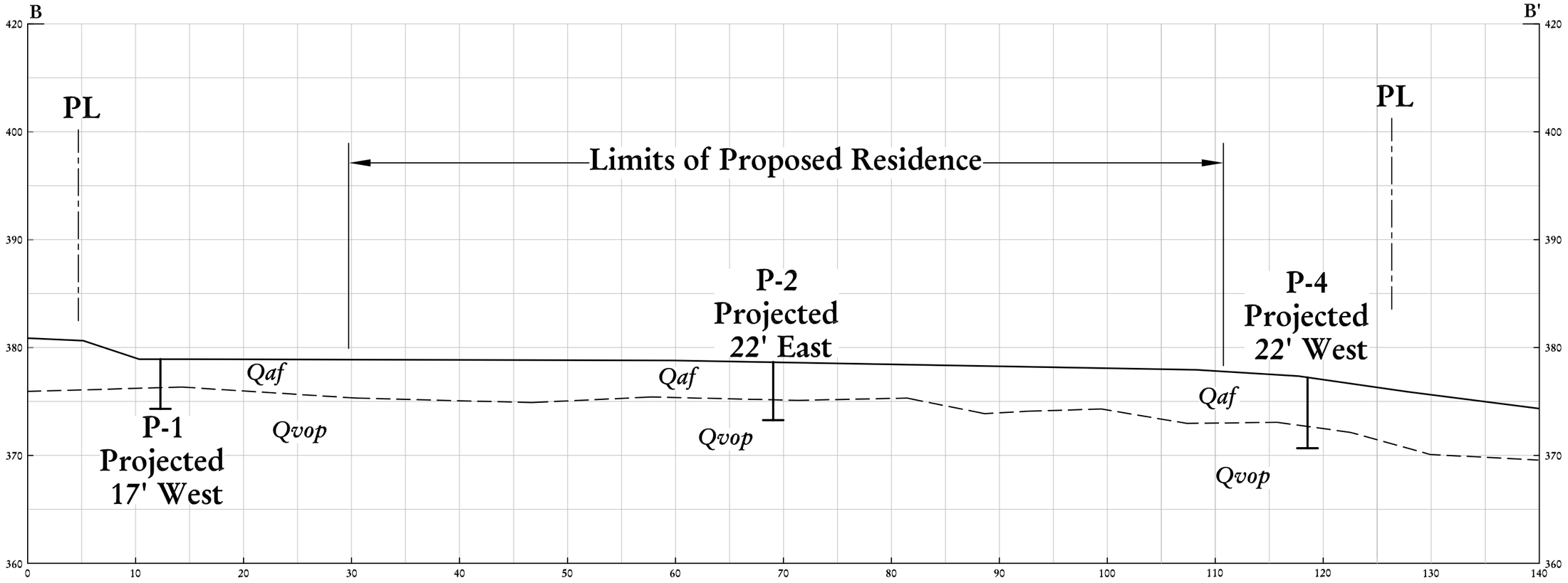
SCALE: 1" = 10'

GEOLOGIC CROSS SECTION A-A'

PROPOSED KORNBERG RESIDENCE
2605 ELLENTOWN ROAD
LA JOLLA, CALIFORNIA

DATE:	MARCH 2018	JOB NO.:	2180060.01
BY:	SD	PLATE NO.:	2

CHRISTIAN WHEELER
ENGINEERING



CWE LEGEND	
Qaf	Undifferentiated Artificial Fill, Topsoil, and Subsoil
Qvop	Very Old Paralic Deposits

0 10' 20'

SCALE: 1" = 10'

GEOLOGIC CROSS SECTION B-B'

PROPOSED KORNBERG RESIDENCE
2605 ELLENTOWN ROAD
LA JOLLA, CALIFORNIA

DATE:	MARCH 2018	JOB NO.:	2180060.01
BY:	SD	PLATE NO.:	2

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ENGINEERING

Appendix A

Subsurface Explorations

LOG OF TEST PIT P-1

Date Logged:	2/9/18	Equipment:	Hand tools
Logged By:	DJF	Auger Type:	N/A
Existing Elevation:	Unknown	Drive Type:	N/A
Finish Elevation:	Unknown	Depth to Water:	N/A

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
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	SD	Sample Density

DEPTH (ft)	USCS SYMBOL	SUMMARY OF SUBSURFACE CONDITIONS (based on Unified Soil Classification System)	SAMPLE TYPE
0	SM	**Topsoil:** Light grayish-brown, damp, loose, very fine- to medium-grained, SILTY SAND with hematite nodules, rootlets and animal burrows.	
0.5			
1			CK
1.5	SC	**Subsoil:** Light gray to reddish-brown, moist, dense, very fine- to medium-grained, CLAYEY SAND, mottled.	
2			CK
2.5	SM	**Very Old Paralic Deposits (Qvop) :** Orangish-brown, moist, very dense, very fine- to medium-grained, SILTY SAND.	
3		Test pit terminated at 3 feet. No groundwater or seepage encountered.	
3.5			
4			
4.5			
5			
5.5			
6			
6.5			
7			
7.5			

PENETRATION (blows per foot)	BULK	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	RELATIVE COMPACTION (%)	LABORATORY TESTS

Notes:

Symbol Legend

- ▽ Groundwater Level During Drilling
- ▼ Groundwater Level After Drilling
- ⁹⁹ Apparent Seepage
- * No Sample Recovery
- ** Non-Representative Blow Count (rocks present)

PROPOSED KORNBERG RESIDENCE
2605 ELLENTOWN ROAD
LA JOLLA, CALIFORNIA

DATE:	MARCH 2018	JOB NO.:	2180060.01
BY:	SRD	FIGURE NO.:	A-1

CHRISTIAN WHEELER ENGINEERING

LOG OF TEST PIT P-2

Date Logged:	2/9/18	Equipment:	Hand tools
Logged By:	DJF	Auger Type:	N/A
Existing Elevation:	Unknown	Drive Type:	N/A
Finish Elevation:	Unknown	Depth to Water:	N/A

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
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	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
0			SM	**Topsoil:** Light grayish-brown, damp, loose, very fine- to medium-grained, SILTY SAND with hematite nodules, rootlets and animal burrows.							SA
0.5				Light brown.							SO4, DS
1			SC	**Subsoil:** Light gray to reddish-brown, moist, medium dense to dense, very fine- to medium-grained, CLAYEY SAND, mottled.							EI
1.5						CK		13.9	110.8		CP
2											
2.5						CK					
3			SM	**Very Old Paralic Deposits (Qvop) :** Orangish-brown, moist, very dense, very fine- to medium-grained, SILTY SAND.							
3.5				Test pit terminated at 3 feet. No groundwater or seepage encountered.							
4											
4.5											
5											
5.5											
6											
6.5											
7											
7.5											

Notes:

Symbol Legend

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

PROPOSED KORNBERG RESIDENCE
2605 ELLENTOWN ROAD
LA JOLLA, CALIFORNIA

DATE:	MARCH 2018	JOB NO.:	2180060.01
BY:	SRD	FIGURE NO.:	A-2

CHRISTIAN WHEELER ENGINEERING

LOG OF TEST PIT P-3

Date Logged:	2/9/18	Equipment:	Hand tools
Logged By:	DJF	Auger Type:	N/A
Existing Elevation:	Unknown	Drive Type:	N/A
Finish Elevation:	Unknown	Depth to Water:	N/A

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
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	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
0 – 0.5			SM	**Artificial Fill (Qaf):** Grayish-brown, dry, very loose, very fine- to medium-grained, SILTY SAND with concrete debris.							
1 – 1.5			SM	**Topsoil:** Light brown, damp, loose, very fine- to medium-grained, SILTY SAND with hematite nodules.							
2 – 2.5			SC	**Subsoil:** Light gray to reddish-brown, moist, dense, very fine- to medium-grained, CLAYEY SAND, mottled.		CK		11.1	116.4		SD
3			SM	**Very Old Paralic Deposits (Qvop):** Orangish-brown, damp, very dense, very fine- to medium-grained, SILTY SAND.							
3.5				Test pit terminated at 3.5 feet. No groundwater or seepage encountered.							
4 – 4.5 – 5 – 5.5 – 6 – 6.5 – 7 – 7.5											

Notes:

Symbol Legend

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

PROPOSED KORNBERG RESIDENCE
2605 ELLENTOWN ROAD
LA JOLLA, CALIFORNIA

DATE:	MARCH 2018	JOB NO.:	2180060.01
BY:	SRD	FIGURE NO.:	A-3

CHRISTIAN WHEELER ENGINEERING

LOG OF TEST PIT P-4

Date Logged:	2/9/18	Equipment:	Hand tools
Logged By:	DJF	Auger Type:	N/A
Existing Elevation:	Unknown	Drive Type:	N/A
Finish Elevation:	Unknown	Depth to Water:	N/A

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
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	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
0			SM	**Artificial Fill (Qaf):** Light grayish-brown, damp, loose, very fine- to medium-grained, SILTY SAND with rootlets and Qvop fragments.							
0.5											
1											
1.5			SM	**Topsoil:** Grayish-brown, damp, loose, SILTY SAND with hematite nodules, porous.							
2											
2.5				Light brown.							
3			SC	**Subsoil:** Orangish-brown to light gray, moist, dense, very fine- to medium-grained, CLAYEY SAND, mottled.							
3.5											
4			SM	**Very Old Paralic Deposits (Qvop):** Orangish-brown, moist, very dense, very fine- to medium-grained, SILTY SAND.							
4.5				Test pit terminated at 4.5 feet. No groundwater or seepage encountered.							
5											
5.5											
6											
6.5											
7											
7.5											

Notes:

Symbol Legend

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

PROPOSED KORNBERG RESIDENCE
2605 ELLENTOWN ROAD
LA JOLLA, CALIFORNIA

DATE:	MARCH 2018	JOB NO.:	2180060.01
BY:	SRD	FIGURE NO.:	A-4

CHRISTIAN WHEELER ENGINEERING

LOG OF TEST PIT P-5

Date Logged:	2/9/18	Equipment:	Hand tools
Logged By:	DJF	Auger Type:	N/A
Existing Elevation:	Unknown	Drive Type:	N/A
Finish Elevation:	Unknown	Depth to Water:	N/A

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
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	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
0 – 0.5			SM	**Topsoil:** Light brown, dry, loose, SILTY SAND.							
1 – 1.5			SC	**Subsoil:** Light brown to grayish-brown, moist, medium dense, very fine- to medium-grained, CLAYEY SAND, mottled.							
2 – 2.5			SM	**Very Old Paralic Deposits (Qvop) :** Light orangish-brown, damp, very dense, very fine- to medium-grained, SILTY SAND.							
3				Test pit terminated at 3 feet. No groundwater or seepage encountered.							
3.5 – 7.5											

Notes:

Symbol Legend

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

PROPOSED KORNBERG RESIDENCE
2605 ELLENTOWN ROAD
LA JOLLA, CALIFORNIA

DATE:	MARCH 2018	JOB NO.:	2180060.01
BY:	SRD	FIGURE NO.:	A-5

CHRISTIAN WHEELER ENGINEERING

Appendix B

Laboratory Test Results

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

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

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

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.

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

e) **EXPANSION INDEX TEST:** An expansion index test was performed on a selected remolded soil sample was performed in accordance with ASTM D 4829.

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

g) **ATTERBERG LIMITS:** The Liquid Limit, Plastic Limit and Plastic Index of a selected soil sample was determined in accordance with ASTM D424.

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

i) **CONSOLIDATION TEST:** Consolidation tests were performed on selected undisturbed samples in accordance with ASTM D 2435.

LABORATORY TEST RESULTS

PROPOSED KORNBERG RESIDENCE

2605 ELLENTOWN ROAD

LA JOLLA, CALIFORNIA

MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (ASTM D1557)

Sample Location	**Test Pit P-2 @0'-1'**
Sample Description	Brown Silty Sand (SM)
Maximum Density	133.6 pcf
Optimum Moisture	7.1 %

DIRECT SHEAR (ASTM D3080)

Sample Location	**Test Pit P-2 @ 0-1'**
Sample Type	Remolded to 90%
Friction Angle	31°
Cohesion	200 psf

EXPANSION INDEX TESTS (ASTM D4829)

Sample Location	**Test Pit P-2 @ 1' -2½'**
Initial Moisture:	12.0 %
Initial Dry Density	103.3 pcf
Final Moisture:	23.8 %
Expansion Index:	42 (Low)

GRAIN SIZE DISTRIBUTION (ASTM D422)

Sample Location	**Test Pit P-2 @ 0-1'**
Sieve Size	*Percent Passing*
¾"	100
½"	99
⅜	97
#4	94
#8	93
#16	92
#30	84
#50	56
#100	39
#200	32

COLLAPSE POTENTIAL (ASTM D 5333)

Sample Location	**Test Pit P-2 @ 1½'**
Initial Moisture Content	13.9 %
Initial Density	110.8 pcf
Consolidation Before Water Added	1.5 %
Consolidation After Water Added	1.4%
Final Moisture	17.7 %

SOLUBLE SULFATES (CALIFORNIA TEST 417)

Sample Location	**Test Pit P-2 @0'-2'**
Soluble Sulfate	0.007 % (SO_4)

APPENDIX C

REFERENCES

REFERENCES

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APPENDIX D

GRADING SPECIFICATIONS

RECOMMENDED GRADING SPECIFICATIONS - GENERAL PROVISIONS

PROPOSED KORNBERG RESIDENCE
2605 ELLENTOWN ROAD
LA JOLLA, CALIFORNIA

GENERAL INTENT

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

OBSERVATION AND TESTING

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

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

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

Maximum Density & Optimum Moisture Content - ASTM D1557
Density of Soil In-Place - ASTM D1556 or ASTM D2922

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.