CHRISTIAN WHEELER
ENGINEERING

June 6, 2016

James and Tricia Riha
c/o Beacham Construction
405 Via del Norte
La Jolla, California 92037
Attention: Louis Beacham

CWE 2160564.02

Subject: Report of Preliminary Findings and Recommendations
Proposed 8-Lot Residential Subdivision, 8303 La Jolla Shores Drive, La Jolla, California

Ladies and Gentlemen:

In accordance with the request of Louis Beacham, we have prepared this report to present preliminary geotechnical findings and recommendations for the subject project.

PRELIMINARY SITE INFORMATION AND PROJECT DESCRIPTION

The subject site is comprised of three adjacent residential lots identified as Assessor's Parcel Numbers 346-250-08 through -10. The lot is located adjacent to and east of Calle Frescota and south of Calle del Cielo in the La Jolla Shores area of San Diego, California. The site currently supports a single-story, single-family residence with a garage, storage structures and other normally associated improvements. Topographically, the site ascends gently from west to east with an approximately 50-foot-high slope along the eastern margin of the site.

We understand that the three existing parcels that comprise the subject site are to be subdivided to create a total of ±8 residential parcels. We anticipate that each of the parcels will be developed to receive one-to two-story single-family split level residences that are of conventional, wood-frame and masonry construction. The structures will be supported by shallow foundations and incorporate on-grade concrete floor slabs. All the lots will also have swimming pools. Access to the new lots will be afforded by a new cul-de-sac that connects to Calle Del Cielo. Grading to accommodate the proposed improvements is expected to consist of cuts and fills of less than about 10 feet and 15 feet from existing site grades, respectively. Retaining walls up to about

12 feet high are proposed. It is further anticipated that imported fill soils will be necessary to achieve proposed site grades.

To assist in the preparation of this report, we were provided with a preliminary grading plan prepared by Christensen Engineering & Surveying, dated April 21, 2017. A copy of the plan was used as a base map for our Site Plan and Geologic Map, and is included herein as Plate No. 1. In addition, we reviewed our report prepared for the subject site titled "Report of Geologic Reconnaissance, Proposed Residential Subdivision", dated January 9, 2017 (CWE 2160564.01).

PRELIMINARY FINDINGS

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 generally underlain by artificial fill, topsoil, Quaternary-age old paralic deposits, and Tertiary age sedimentary deposits of the Ardath Shale. A site plan and geotechnical map, which depicts the location of our borings, is included herein as Plates No.1. The boring logs are provided in Appendix A of this report. The materials encountered in the subsurface explorations are described below:

ARTIFICIAL FILL (Qaf): A surficial veneer of man-placed caps much of the central and western portions of the site and also within the area of a relatively level, graded pad area within the northeast portion of the site. As encountered in our exploratory borings, the artificial fill extended a maximum depth of about 9 feet from existing grade (Borings B-7 and B-8). Deeper fill soils may exist in areas of the site not investigated. The fill materials generally consisted of brown, loose to medium dense, dry to moist, clayey sand (SC). The artificial fill was judged to have a medium expansion potential (EI between 51 and 90).

TOPSOIL: An approximately 1-foot-thick layer of topsoil was encountered in Boring B-9. Where not removed by previous site grading, a similar veneer of topsoil is expected across other areas of

the site not investigated. The encountered topsoil consisted of brown, dry, loose, silty sand (SM). The topsoil was judged to have a low expansion potential (EI between 21 and 50).

OLD PARALIC DEPOSITS (Qop): Quaternary-age old paralic deposits were encountered underlying the surficial soils (topsoil and artificial fill) or at grade throughout the site. These soils generally consisted of brown, orangish-brown, reddish-brown, light gray, and light brown, damp to moist, interbedded, stiff, sandy clay (CL), medium dense silty and sand (SM) and clayey sand (SC), and dense poorly graded sand with silt (SP-SM) and clayey sand/sandy clay (SC/CL). In addition, some of the near surface, old paralic deposits were found to be loose to medium dense. The sandy portions of the old paralic deposits (SM and SP-SM) were judged to have a very low to low expansion potential (EI between 0 and 50), whereas the clayey old paralic deposits (CL and SC/CL) were judged to have a low to medium expansion potential (EI between 51 and 90).

ARDATH SHALE (Ta): Tertiary-age sedimentary deposits of the Ardath Shale underlie the old paralic deposits across the site and crop out along the engineered slope along and adjacent to the site's eastern perimeter. These soils generally consisted of light yellowish-brown, greenish-gray and light gray, moist, very stiff to hard, silty clay (CL), clayey silt (ML), and clayey silt/silty clay (ML/CL). These formational deposits were judged to have a medium to high expansion potential (EI between 51 and 130).

GROUNDWATER: In general, no groundwater or major seepage was encountered in our subsurface explorations.

PRELIMINARY CONCLUSIONS

In general, it is our professional opinion and judgment that the subject property is suitable for the construction of the proposed residential subdivision and associated improvements provided the recommendations presented herein are implemented. The main geotechnical conditions affecting the proposed project consist of potentially compressible artificial fill, topsoil and portions of the upper, old paralic deposits, cut/fill transitions across proposed building pads, and expansive soils. These conditions are discussed hereinafter.

The site is underlain by potentially compressible artificial fill, topsoil, and old paralic deposits. As encountered in our borings the artificial fill underlies the west-central portion of the site, and extends to a maximum depth of about 9 feet from existing grade (Borings B-7 and B-8). Deeper fill soils and topsoil may exist in areas of the site not investigated. Relatively shallow layers of potentially compressible topsoil and old paralic deposits were also encountered. It is estimated that these materials do not exceed about 2 feet in thickness. The fill soils, topsoil, and potentially compressible, upper old paralic 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 in areas to receive settlement sensitive improvements and new fills.

The removal and recompaction of existing loose surficial soils as well as the proposed grading will result in cut/fill transition areas under some of the proposed structures and associated improvements. This configuration may result in differential settlements due to the potential of fill soils and native materials to settle differently. In order to mitigate this condition, it is recommended that the cut portions of the lots be undercut as described hereinafter.

Some of the anticipated foundation soils are moderately to highly expansive (EI between 51 and 130). Select grading is recommended to mitigate this condition.

The following foundation recommendations should be considered preliminary, and may require revisions after the results of laboratory tests currently being performed are analyzed.

PRELIMINARY 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 or our Report of Preliminary Geotechnical Investigation, which will be provided under separate cover.

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

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

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

SITE PREPARATION: It is recommended that existing potentially compressible soils underlying the proposed structures, associated improvements and new fills be removed in their entirety. Based on our findings, the maximum removal depth is about 9 feet below existing grade (Borings B-7 and B-8). Deeper removals may be necessary in areas of the site not investigated or due to unforeseen conditions. Lateral removals limits should extend at least 5 feet from the perimeter of the structures, associated 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.

UNDERCUT: Native soils within 3 feet from finish pad grade should be undercut. The undercut material may be replaced as compacted fill. In areas where footings deeper than the minimum recommended undercut are proposed, undercuts extending to a minimum depth of 1 foot below the bottom of the footing or retaining wall key are recommended. The removals and undercuts should be performed in such a way as to provide for a continuous contact between the fill and native soils that drains away from the proposed structures, and avoids adjacent zones with different undercut depths that may impair subsurface drainage.

SELECT GRADING: It is recommended that moderately to highly expansive soils (EI between 51 and 130) within 5 feet from finish pad grade be mixed with low expansive on-site soil or imported (EI between 21 and 50) to create a low expansive mix for use as structural fill.

IMPORTED FILL SOILS: Imported fill soils should consist of clayey and/or silty sands that have a low expansion potential (EI between 21 and 50), relatively high strength, and relatively low permeability characteristics. At least 72 hours will be necessary to perform necessary laboratory test to approve an import source.

PROCESSING OF FILL AREAS: Prior to placing any new fill soils or constructing any new improvements in areas that have been cleaned out to receive fill, the exposed soils should be scarified to a depth of 12 inches, watered thoroughly, and compacted to at least 90 percent relative compaction. In areas to support fill slopes, keys should be cut into the competent supporting materials. The keys should be at least 10 feet wide, and be sloped back into the hillside at least 2 percent. The keys should extend at least 1 foot into the competent supporting materials. Where the existing ground has a slope of 5:1 (horizontal to vertical) or steeper, it should be benched into as the fill extends upward from the keyway.

FILL SLOPES: Fill slopes should be compacted by back-rolling with a sheepsfoot compactor at vertical intervals not exceeding four feet in vertical dimension as the fill is being placed. The face of fill slopes constructed at a 2:1 (horizontal to vertical) or flatter inclination should also be track-walked when the slope is completed. As an alternative, fill slopes can be overfilled by at least three feet and cut back to the compacted core at the design finish contour.

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 6 to 8 inches thick, with each lift compacted by mechanical means. Fills should consist of approved earth material, free of trash or debris, roots, vegetation, or other materials determined to be unsuitable by the Geotechnical Consultant. Fill material should be free of rocks or lumps of soil in excess of three inches in maximum dimension.

Utility trench backfill within 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 and the top of slopes into controlled drainage devices are recommended.

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

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

TEMPORARY CONSTRUCTION SLOPES: A temporary cut slopes up to about 12 feet in height will be necessary for the construction of proposed structures. Temporary cut slopes may be constructed vertically for the lower 4 feet (including footing excavation) and at a continous1:1 (horizontal to vertical) inclination thereafter. All temporary slopes should be observed by the engineering geologist during grading to ascertain that no unforeseen adverse conditions exist. No surcharge loads such as adjacent building foundations, soil or equipment stockpiles, vehicles, etc. should be allowed within a distance from the top of temporary slopes equal to half the slope height.

It should be noted that the contractor is solely responsible for designing and constructing stable, temporary excavations and may need to shore, slope, or bench the sides of trench excavations as required to maintain the stability of the excavation sides. The contractor's "competent person", as defined in the OSHA Construction Standards for Excavations, 29 CFR, Part 1926, should evaluate the

soil exposed in the excavations as part of the contractor's safety process. Temporary cut slopes should be constructed in accordance with the recommendations presented in this section. In no other case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations.

FOUNDATIONS

GENERAL: Based on our findings and engineering judgment, the proposed structures and associated improvements may be supported by conventional shallow continuous and isolated spread footings. The following recommendations are considered the minimum based on the anticipated soil conditions, 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 structures should be embedded at least 18 inches below lowest adjacent finish pad grade. Spread footings supporting the proposed light exterior 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 18 inches deep and 24 inches wide.

BEARING CAPACITY: Spread footings supporting the proposed structures may be designed for an allowable soil bearing pressure of 2,500 pounds per square foot (psf). 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 light exterior improvements may be designed for an allowable soil bearing pressure of 2,000 pounds per square foot (psf). These values 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 the 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.

PROPOSED SWIMMING POOLS: Foundation recommendations for the proposed swimming pools will be provided on an individual basis after grading is performed. However, it is recommended that the proposed swimming pools be founded on old paralic deposits or Ardath Shale.

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: Provided select grading as recommended herein is performed, the prevailing foundation soils are assumed to have a low expansive potential (EI between 21 and 50). The recommendations within this report reflect these conditions.

FOUNDATION PLAN REVIEW: The final foundation plan and accompanying details and notes should be submitted to this office for review. The intent of our review will be to verify that the plans used for construction reflect the minimum dimensioning and reinforcing criteria presented in this section and that no additional criteria are required due to changes in the foundation type or layout. It is not our intent to

review structural plans, notes, details, or calculations to verify that the design engineer has correctly applied the geotechnical design values. It is the responsibility of the design engineer to properly design/specify the foundations and other structural elements based on the requirements of the structure and considering the information presented in this report.

SEISMIC DESIGN FACTORS

The seismic design factors applicable to the subject site are provided below. The seismic design factors were determined in accordance with the 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	32.857° -117.251°
Site Class	D
Site Coefficient F_a	1.0
Site Coefficient F_v	1.5
Spectral Response Acceleration at Short Periods S_s	1.305 g
Spectral Response Acceleration at 1 Second Period S_1	0.507 g
$S_{MS}=F_aS_s$	1.305 g
$S_{M1}=F_vS_1$	0.760 g
$S_{DS}=2/3*S_{MS}$	0.870 g
$S_{D1}=2/3*S_{M1}$	0.507 g

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

ON-GRADE SLABS

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

INTERIOR FLOOR SLABS: The minimum slab thickness should be 4 inches (actual) and the slab should be reinforced with at least No. 3 bars spaced at 18 inches on center each way. Slab reinforcement should be supported on chairs such that the reinforcing bars are positioned at mid-height in the floor slab. The slab reinforcement should extend down into the perimeter footings at least 6 inches.

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

EXTERIOR CONCRETE FLATWORK: Exterior concrete slabs on grade should have a minimum thickness of 4 inches and be reinforced with at least No. 3 bars placed at 18 inches on center each way (ocew). Driveway slabs should have a minimum thickness of 5 inches and be reinforced with at least No. 4 bars placed at 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 43 and 62 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 10.5H pounds per square foot (where H = wall height in feet) occurring at the top of the wall.

WATERPROOFING AND WALL DRAINAGE SYSTEMS: The need for waterproofing should be evaluated by others. If required, the project architect should provide (or coordinate) waterproofing details for the retaining walls. The design values presented above are based on a drained backfill condition and do not consider hydrostatic pressures. Unless hydrostatic pressures are incorporated into the design, the retaining wall designer should provide a detail for a wall drainage system. Typical retaining wall drain system details are presented in Plate No. 2 of this report for informational purposes. Additionally, outlets points for the retaining wall drain system should be coordinated with the project civil engineer.

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

CLOSURE

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

Respectfully submitted,
CHRISTIAN WHEELER ENGINEERING

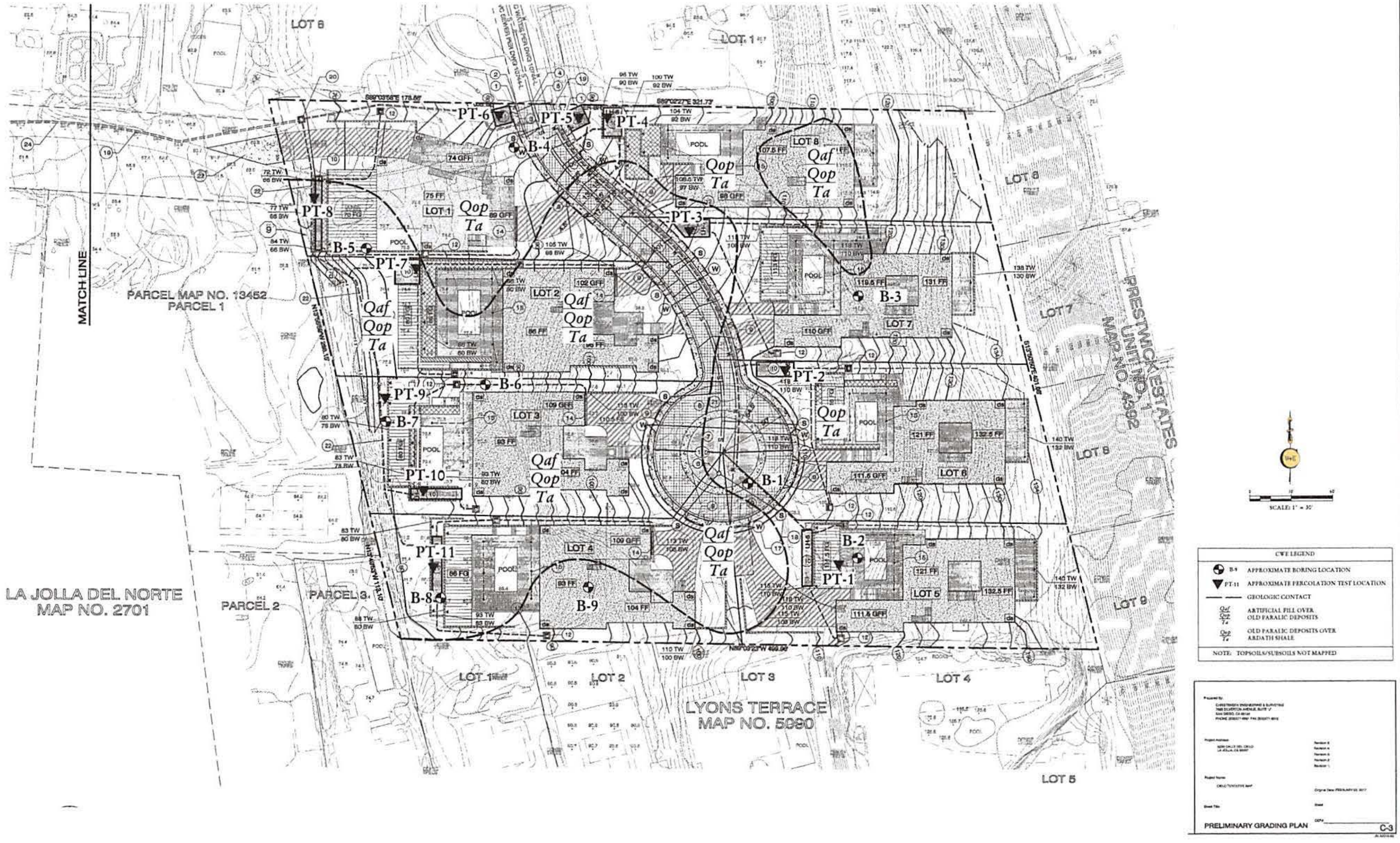
REGISTERED PROFESSIONAL ENGINEER
DANIEL B. ADLER
No. 36037
Exp. 6-30-18
CIVIL
STATE OF CALIFORNIA

CERTIFIED ENGINEERING GEOLOGIST
DAVID R. RUSSELL
No. 2215
STATE OF CALIFORNIA

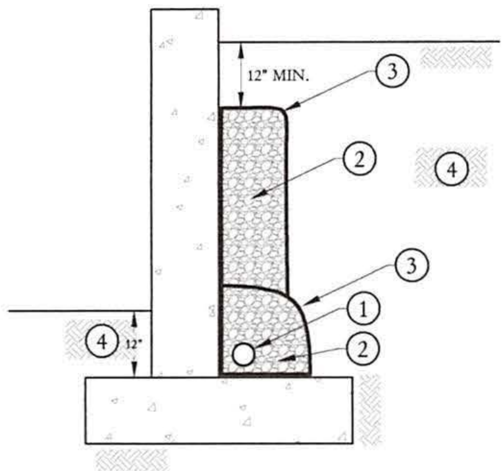
Daniel B. Adler, RCE #36037

David R. Russell, RCE #2215

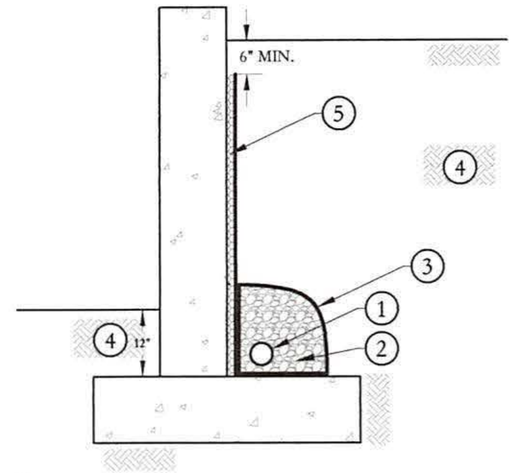
ec: : lb@beachamconstruction.com
paul@alcornbenton.com



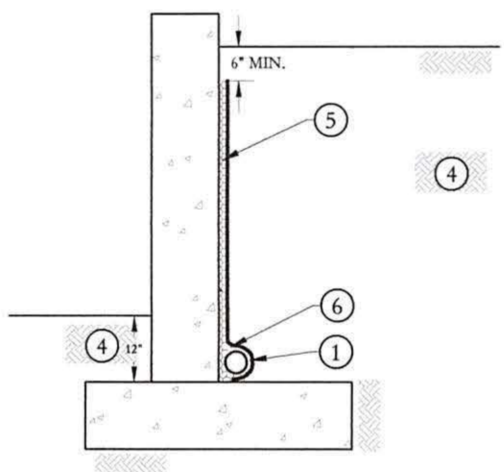
SITE PLAN AND GEOTECHNICAL MAP	LA JOLLA 8-LOT SUBDIVISION CALLE DEL CIELO LA JOLLA, CALIFORNIA		CHRISTIAN WHEELER ENGINEERING
	DATE: JUNE 2017	JOB NO.: [illegible]	
	BY: SLD	PLATE NO.: 1	



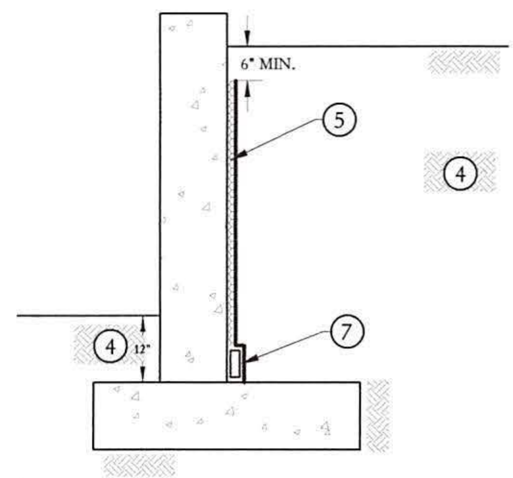
1 DETAIL



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	**LA JOLLA 8-LOT SUBDIVISION** 8280 CALLE DEL CIELO LA JOLLA, CALIFORNIA				CHRISTIAN WHEELER ENGINEERING
	DATE:	JUNE 2017	JOB NO.:	2160564.02	
	BY:	SRD	PLATE NO.:	2	

Appendix A

Exploration Logs

LOG OF TEST BORING B-1

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

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	8 inch Solid Flight
Existing Elevation:	100.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	110.0 feet	Depth to Water:	Unknown

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				4" of AC.							
			CL	<u>Old Paralic Deposits (Qop)</u>: Light brown to yellowish-brown, damp, stiff, SANDY CLAY, mottled, upper 3' moderately weathered, porous.	18	Cal					
			CL	Brown to reddish-brown, moist.	14	SPT					
5					27	Cal					
10			SC	Light brown, moist, medium dense, very fine- to medium-grained, CLAYEY SAND with gravels.	16	Cal					
			SM	Light brown, moist, medium dense, very fine- to medium-grained, SILTY SAND with trace gravels, mottled.	28	Cal					
15											
			SM-SP	Light brown to black, moist, dense, very fine- to coarse-grained, POORLY GRADED SAND with silt.	57	Cal					
20				Boring terminated at 19.5 feet. No groundwater or seepage encountered.							
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	JUNE 2017	JOB NO.:	2160564.02
BY:	SRD	FIGURE NO.:	A-1

CHRISTIAN WHEELER
ENGINEERING

LOG OF TEST BORING B-2

Sample Type and Laboratory Test Legend

Cal Modified California Sampler · SPT Standard Penetration Test · ST Shelby Tube · CK Chunk · DR Drive Ring

MD Max Density · SO4 Soluble Sulfates · SA Sieve Analysis · HA Hydrometer · SE Sand Equivalent · PI Plasticity Index · CP Collapse Potential · DS Direct Shear · Con Consolidation · EI Expansion Index · R-Val Resistance Value · Chl Soluble Chlorides · Res pH & Resistivity · SD Sample Density

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	8 inch Solid Flight
Existing Elevation:	108.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	111.0 feet	Depth to Water:	Unknown

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				3" of AC.							
			CL	Old Paralic Deposits (Qop): Dark brown, moist, stiff, SANDY CLAY, mottled, upper 2' weathered with rootlets.	18	Cal					
			CL	Light orangish-brown to light gray.	42	Cal					
5					27	Cal					
			SC	Light brown, moist, medium dense, very fine- to medium-grained, CLAYEY SAND with trace gravels.							
10			SM	Light yellowish-brown, damp, medium dense, very fine- to medium-grained, VERY SILTY SAND with trace gravels.	28	Cal					
				Boring terminated at 11.5 feet. No groundwater or seepage encountered.							
15											
20											
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	JUNE 2017	JOB NO.:	2160564.02
BY:	SRD	FIGURE NO.:	A-2

CHRISTIAN WHEELER ENGINEERING

LOG OF TEST BORING B-3

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	8 inch Solid Flight
Existing Elevation:	111.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	119.0 feet	Depth to Water:	Unknown

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			CL	Old Paralic Deposits (Qop): Dark brown, damp, loose, SANDY CLAY, mottled, upper 2' moderately weathered.							
					28	Cal					
5			SC	Light yellowish-brown, moist, medium dense, very fine- to medium-grained, CLAYEY SAND.	39	Cal					
			SM	Light yellowish-brown, moist, medium dense, very fine- to medium-grained, VERY SILTY SAND.							
10					25	Cal					
15			SP-SM	Light gray, damp, medium dense, very fine- to medium-grained, POORLY GRADED SAND with silt and gravels. Gravel/cobble bed at 16 to 17 feet.	50/5"	Cal**					
					50/1"	SPT*					
				Boring terminated at 17 feet. No groundwater or seepage encountered.							
20											
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	JUNE 2017	JOB NO.:	2160564.02
BY:	SRD	FIGURE NO.:	A-3

CHRISTIAN WHEELER ENGINEERING

LOG OF TEST BORING B-4

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

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	8 inch Solid Flight
Existing Elevation:	82.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	74.0 feet	Depth to Water:	Unknown

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				4" of AC.							
			SC	Old Paralic Deposits (Qop): Brown to reddish-brown, dry, loose to medium dense, very fine- to medium-grained, CLAYEY SAND, mottled, upper 2' highly weathered.							
				Moist, medium dense.	18	Cal					
			SM	Light brown, moist, medium dense, very fine- to medium-grained, SILTY SAND.	13	Cal					
5											
			SM	Light brown to light grayish-brown, dense, fine- to coarse-grained, SILTY SAND with clay, mottled.	41	Cal					
10											
					50/4"	Cal					
15			ML	Ardath Shale (Ta): Light yellowish-brown, moist, hard, CLAYEY SILT with sand.							
					50/5"	Cal					
				Boring terminated at 19 feet. No groundwater or seepage encountered.							
20											
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	JUNE 2017	JOB NO.:	2160564.02
BY:	SRD	FIGURE NO.:	A-4

CHRISTIAN WHEELER
ENGINEERING

LOG OF TEST BORING B-5

Sample Type and Laboratory Test Legend

Cal Modified California Sampler; SPT Standard Penetration Test; ST Shelby Tube; CK Chunk; DR Drive Ring

MD Max Density; SO4 Soluble Sulfates; SA Sieve Analysis; HA Hydrometer; SE Sand Equivalent; PI Plasticity Index; CP Collapse Potential; DS Direct Shear; Con Consolidation; EI Expansion Index; R-Val Resistance Value; Chl Soluble Chlorides; Res pH & Resistivity; SD Sample Density

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	8 inch Solid Flight
Existing Elevation:	73.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	70.0 feet	Depth to Water:	Unknown

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			SC	**Artificial Fill (Qaf):** Brown, damp, loose to medium dense, very fine- to medium-grained, SANDY CLAY.							
				Moist, medium dense.	19	Cal					
			SC	**Old Paralic Deposits (Qop):** Orangish-brown to brown, moist, medium dense, very fine- to medium-grained, CLAYEY SAND, mottled.	21	Cal					
10					34	Cal					
			ML	**Ardath Shale (Ta):** Yellowish-brown, moist, very stiff, CLAYEY SILT with sand, moderately weathered to 16 feet.							
15					25	SPT					
				Hard.	50/5"	SPT					
				Boring terminated at 19 feet. No groundwater or seepage encountered.							
20											
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	JUNE 2017	JOB NO.:	2160564.02
BY:	SRD	FIGURE NO.:	A-5

CHRISTIAN WHEELER ENGINEERING

LOG OF TEST BORING B-6

Sample Type and Laboratory Test Legend

Cal Modified California Sampler
SPT Standard Penetration Test
ST Shelby Tube
CK Chunk
DR Drive Ring

MD Max Density
SO4 Soluble Sulfates
SA Sieve Analysis
HA Hydrometer
SE Sand Equivalent
PI Plasticity Index
CP Collapse Potential
DS Direct Shear
Con Consolidation
EI Expansion Index
R-Val Resistance Value
Chl Soluble Chlorides
Res pH & Resistivity
SD Sample Density

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	8 inch Solid Flight
Existing Elevation:	79.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	93.0 feet	Depth to Water:	Unknown

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			SC	**Artificial Fill (Qaf):** Brown, damp, loose to medium dense, very fine- to medium-grained, CLAYEY SAND with brick and concrete debris.							
			SC	**Old Paralic Deposits (Qop):** Brown to reddish-brown, damp, medium dense, very fine- to medium-grained, CLAYEY SAND.	32	Cal					
5					24	Cal					
				Fine- to coarse-grained at contact.							
10			CL	**Ardath Shale (Ta):** Greenish-gray, moist, very stiff, SILTY CLAY, highly weathered.	19	SPT					
			ML-CL	Light yellowish-brown to light gray, moist, very stiff, CLAYEY SILT/SILTY CLAY, slightly weathered.							
15					28	SPT					
				Boring terminated at 15 feet. No groundwater or seepage encountered.							
20											
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	JUNE 2017	JOB NO.:	2160564.02
BY:	SRD	FIGURE NO.:	A-6

CHRISTIAN WHEELER ENGINEERING

LOG OF TEST BORING B-7

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	8 inch Solid Flight
Existing Elevation:	78.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	80.0 feet	Depth to Water:	Unknown

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			SC	Artificial Fill (Qaf): Brown, dry, loose to medium dense, very fine- to medium-grained, CLAYEY SAND with concrete debris in the upper 2 feet.							
				Medium dense.	14	Cal					
5					14	Cal					
10			SC/ CL	Old Paralic Deposits (Qop): Reddish-brown to brown, moist, dense, very fine- to medium-grained, CLAYEY SAND/SANDY CLAY, mottled.							
					38	Cal					
15											
				Fine- to coarse-grained with gravels at contact.							
			ML/ CL	Ardath Shale (Ta): Yellowish-brown to light gray, moist, very stiff, CLAYEY SILT/SILTY CLAY.	26	SPT					
20				Boring terminated at 20 feet. No groundwater or seepage encountered.							
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	JUNE 2017	JOB NO.:	2160564.02
BY:	SRD	FIGURE NO.:	A-7

CHRISTIAN WHEELER ENGINEERING

LOG OF TEST BORING B-8

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

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	8 inch Solid Flight
Existing Elevation:	83.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	86.0 feet	Depth to Water:	Unknown

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			SC	<u>Artificial Fill (Qaf)</u>: Brown, dry, loose to medium dense, very fine- to medium-grained, CLAYEY SAND with gravels and concrete debris.							
				Moist, medium dense.	18	Cal					
5				Brick debris at 5 feet.	20	Cal					
10			SC	<u>Old Paralic Deposits (Qop)</u>: Reddish-brown to brown, moist, dense, very fine- to medium-grained, CLAYEY SAND/SANDY CLAY.	44	Cal					
			SM	Light brown, moist, dense, very fine- to medium-grained, SILTY SAND.							
			SC	Reddish-brown to light gray, moist, dense, very fine- to medium-grained, CLAYEY SAND.	57	Cal					
15				Boring terminated at 14.5 feet. No groundwater or seepage encountered.							
20											
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	JUNE 2017	JOB NO.:	2160564.02
BY:	SRD	FIGURE NO.:	A-8

CHRISTIAN WHEELER
ENGINEERING

LOG OF TEST BORING B-9

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

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	8 inch Solid Flight
Existing Elevation:	89.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	93.0 feet	Depth to Water:	Unknown

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	USCS SYMBOL	SUMMARY OF SUBSURFACE CONDITIONS (based on Unified Soil Classification System)	PENETRATION (blows per foot)	SAMPLE TYPE	BULK	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	RELATIVE COMPACTION (%)	LABORATORY TESTS
0			SM	**Topsoil:** Brown, dry, loose, very fine- to medium-grained, CLAYEY SAND, porous.							
			CL	**Old Paralic Deposits (Qop):** Brown, moist, very stiff, SANDY CLAY, upper 12" highly weathered, porous.	33	Cal					
				Very stiff..							
5			SC	Orangish-brown, moist, medium dense, very fine- to medium-grained, CLAYEY SAND.	20	Cal					
			SM	Light brown to light orangish-brown, moist, dense, very fine- to medium-grained, SILTY SAND.	38	Cal					
10			SP-SM	Light brown, moist, dense, fine- to coarse-grained, POORLY GRADED SAND with silt.							
15					64	Cal					
				Boring terminated at 16.5 feet. No groundwater or seepage encountered.							
20											
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	JUNE 2017	JOB NO.:	2160564.02
BY:	SRD	FIGURE NO.:	A-9

CHRISTIAN WHEELER
ENGINEERING

CHRISTIAN WHEELER
ENGINEERING

REPORT OF GEOLOGIC RECONNAISSANCE
PROPSOED RESIDENTIAL SUBDIVISION
8303 LA JOLLA SHORES DRIVE
LA JOLLA CALIFORNIA

SUBMITTED TO

JAMES AND TRICIA RIHA
C/O BEACHAM CONSTRUCTION
405 VIA DEL NORTE
LA JOLLA, CALIFORNIA 92037

SUBMITTED BY

CHRISTIAN WHEELER ENGINEERING
3980 HOME AVENUE
SAN DIEGO, CALIFORNIA 92105

January 9, 2017

James and Tricia Riha CWE 2160564.01
c/o Beacham Construction
405 Via del Norte
La Jolla, California 92037
Attention: Louis Beacham

Subject: Report of Geologic Reconnaissance
Proposed Residential Subdivision, 8303 La Jolla Shores Drive, La Jolla, California

Ladies and Gentlemen:

In accordance with the request of the project architect, we have performed a geologic reconnaissance of the subject site. In general, the purpose of our limited study was to evaluate the geologic and geotechnical conditions at the subject site, and to provide our professional opinion regarding the possible effect of these conditions on the existing and proposed site improvements.

SCOPE OF SERVICE

Our limited evaluation consisted of surface reconnaissance, research of readily available records and historic reports within our in-house files and on-file with the City's engineering and records department, analysis of regional, historic and current aerial photographs and topographic maps as well as geologic and geotechnical literature, and the preparation of this report. Our scope of service for this limited study did not include subsurface exploration, laboratory testing, or assessment of hazardous substance contamination.

DOCUMENTS REVIEWED

A review of available maps, photographs and literature was performed as part of this limited study. The documents reviewed included, but were not necessarily limited to the following:

- Aerial Photographs, San Diego County Department of Maps and Records for years 1928, 1953, 1972, 1973, 1978, 1983, 1986,, 1987, 1990, 1993, 1994, 1995, 2002, 2004, 2006, 2008, and 2013.

- Kennedy, M.P. and Tan, S.S., 2008, Geologic Map of the San Diego 30' X 60' Quadrangle, California; California Department of Conservation and California Geological Survey.
- Tan, S.S., and Giffen, D.G., 1995, Landslide Hazards in the Southern Part of the San Diego Metropolitan Area, San Diego County, California, California Division of Mines and Geology, Open-File Report 95-03, scale 1:24,000.
- San Diego Seismic Safety Study, Sheet No. 29, 2008 edition.
- 200-Scale Ortho & Topographic Map, City of San Diego, Sheet 250-1689: 1953, 1963, and 1977 editions.

FINDINGS

SITE DESCRIPTION

The subject site is comprised of three adjacent residential lots identified as Assessor's Parcel Numbers 346-250-08 through -10. The lot is located adjacent to and east of Calle Frescota and south of Calle del Cielo in the La Jolla Shores area of San Diego, California. The site currently supports a single-story, single-family residence with a garage, storage structures and other normally associated improvements. Topographically, the site ascends gently from west to east with an approximately 50-foot-high slope along the eastern margin of the site.

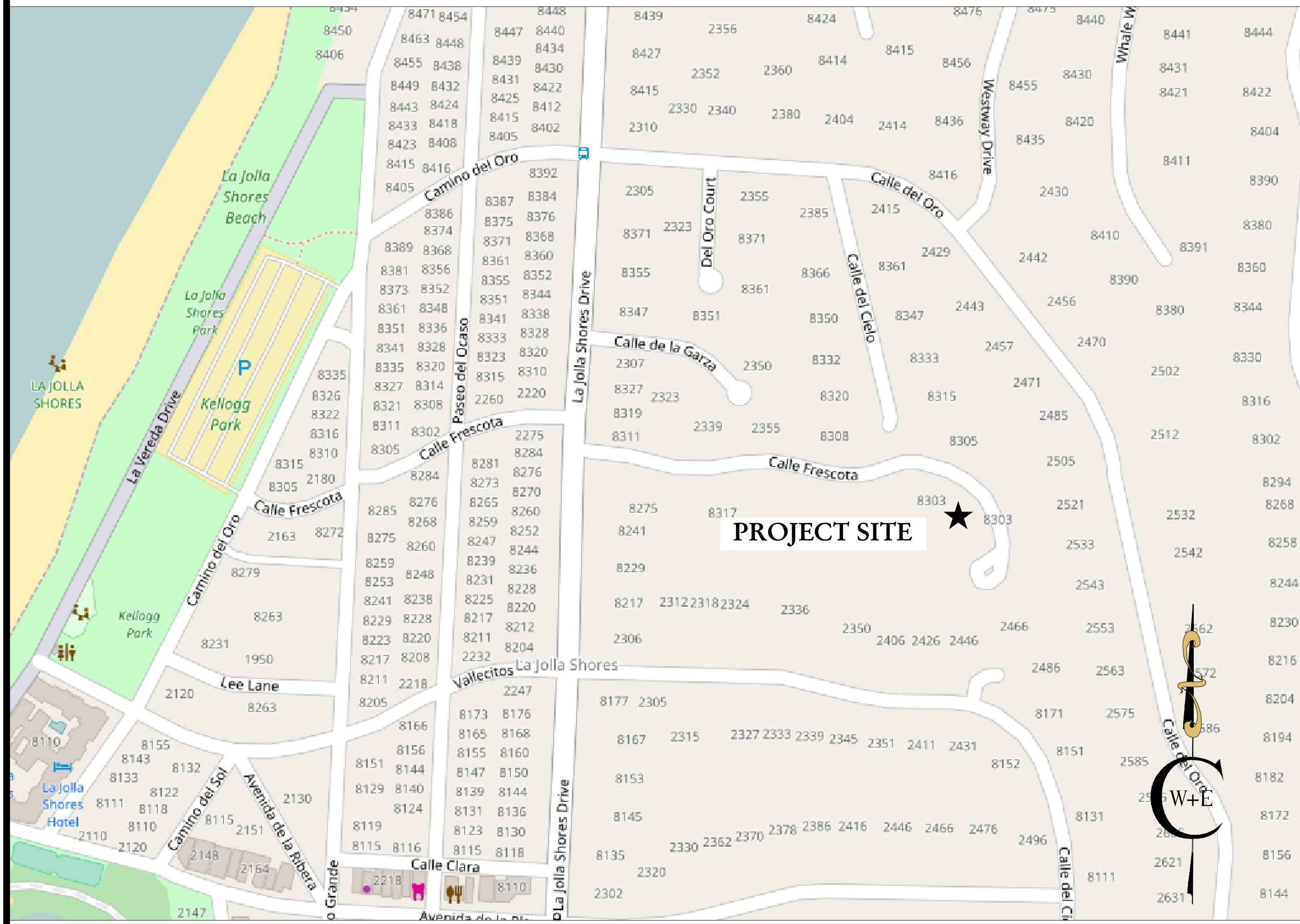
We understand that the three existing parcels that comprise the subject site are to be subdivided to create a total of ±8 residential parcels. We anticipate that each of the parcels will be developed with new, one- to two-story single-family residences that are of conventional, wood frame construction with on-grade concrete floor slabs. Access to the new lots will be afforded by a new cul-de-sac that connects to Calle Del Cielo. Although no grading plans have been made available to us for review at this time, grading to accommodate the proposed improvements is expected to consist of cuts and fills of less than about 10 feet from existing site grades.
The following Figure Number 1 presents a site vicinity map showing the location of the property.

SITE HISTORY

A review of the photographs for available years (1928, 1953, 1972, 1973, 1978, 1983, 1986, 1987, 1990, 1993, 1994, 1995, 2002, 2004, 2006, 2008, and 2013) revealed that the existing residence on-site was constructed over 63 years ago. Previous grading and earthwork at the subject lot appears to have consisted of cuts and fills across the site in order to create the existing level pad area around the existing residence and the creation of the engineered slope areas along the eastern margin of the site.

SITE VICINITY

© OpenStreetMap contributors



RESIDENTIAL SUBDIVISION
8303 LA JOLLA SHORES DRIVE
LA JOLLA, CALIFORNIA

DATE:	JANUARY 2017	JOB NO.:	2160564
BY:	SRD	FIGURE NO.:	1

CHRISTIAN WHEELER
ENGINEERING

GENERAL GEOLOGY AND SUBSURFACE CONDITIONS

GEOLOGIC SETTING: The subject site is located in the Coastal Plains Physiographic Province of San Diego County. Based on our review of the referenced geotechnical literature and our experience within the vicinity of the site, we anticipate that the majority of the subject site is underlain by Tertiary-age sedimentary deposits of the Ardath Shale, Quaternary-age paralic (terrace) and slopewash deposits, and man-placed fill soils.
A portion of the local geologic map (Kennedy and Tan, 2008) is presented on the following Figure No. 2.

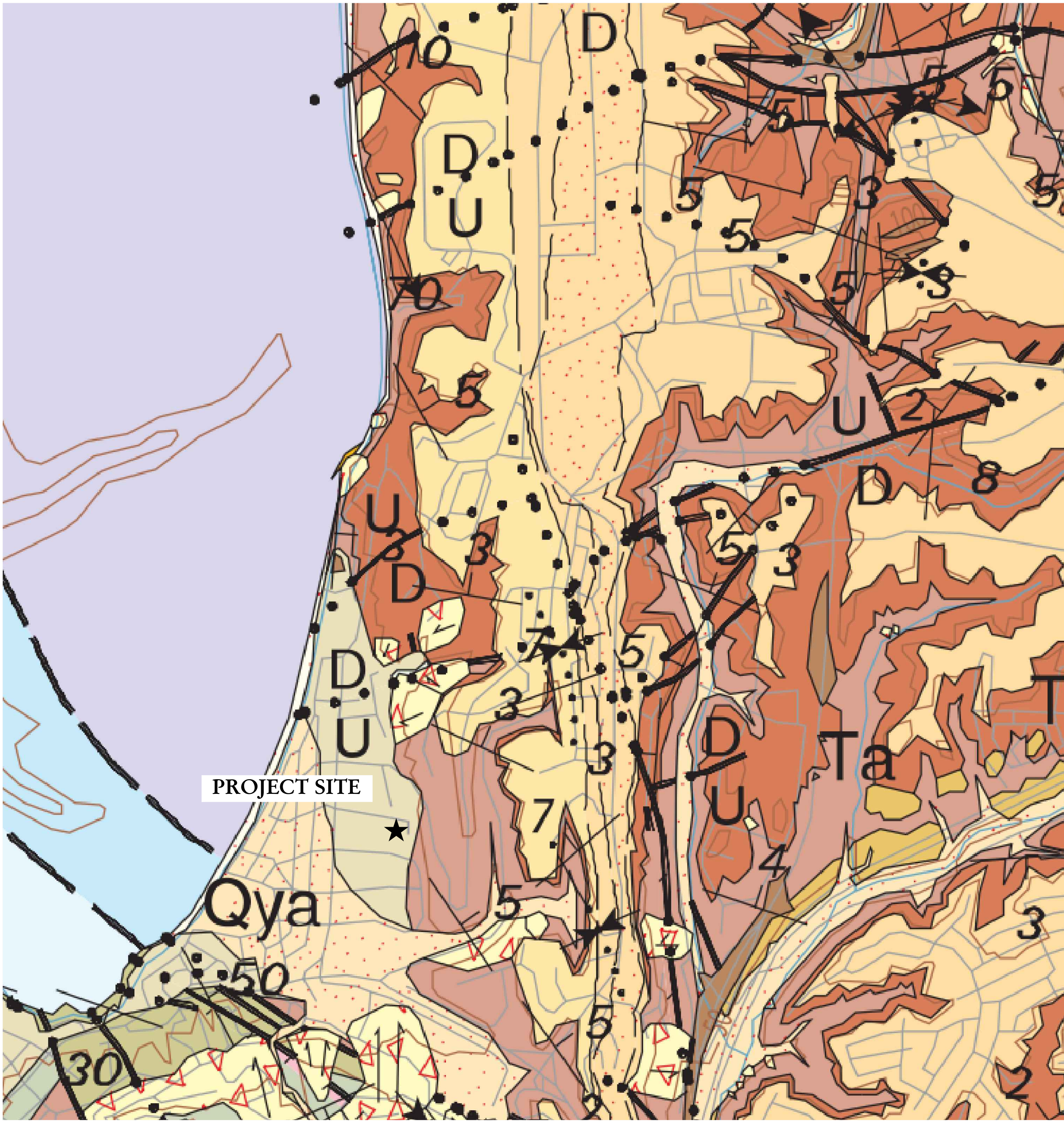
ARTIFICIAL FILL (Qaf): Our surficial reconnaissance of the site and review of the referenced topographic maps suggests that portions of the site may be underlain by up to 10 feet of man-placed fill soils associated with the development of the site. Generally, similar fills in the vicinity of the site are noted to consist of a heterogeneous mixture of sands and clays of varying degrees of compaction.

SLOPEWASH (Qsw): Quaternary-age slopewash deposits are anticipated to underlie the existing fill across the central and western portions of the site. Typically, such slopewash deposits in the area of the site consist of interbedded layers of sands and clays of generally low relative densities, which are considered to be somewhat compressible and to possess generally low strength characteristics with regards to bearing value.

OLD PARALIC DEPOSITS (Qop): Quaternary-age old paralic (terrace) deposits underlie the existing fills and slopewash across the majority of the site. The old paralic deposits in the vicinity of the site typically consist of a mixture of sandy clay and clayey sands that are generally stiff to very stiff/medium dense to dense in consistency and which are considered to possess generally moderate strength characteristics with regards to the support of settlement sensitive structures.

ARDATH SHALE (Ta): Tertiary-age sedimentary deposits of the Ardath Shale underlie the existing fills, slopewash, and old paralic deposits across the central and western potions of the site and crop out along the slope areas area along the eastern margin of the site. The materials of the Ardath Shale in the vicinity of the site typically consist of a mixture of moderately well cemented silty, sandy clay and clayey sands that are generally very stiff to hard/dense to very dense in consistency and which are considered to possess generally high strength characteristics with regards to the support of settlement sensitive structures.

GEOLOGIC STRUCTURE: Based on our review of the referenced geologic maps and our experience in the vicinity of the subject site, the old paralic deposits that underlie the site are expected to be generally massive, with faint bedding that dips gently ($<5°$) to the west-southwest. The Tertiary-age sediments of the Ardath Shale are



PORTION OF THE GEOLOGIC MAP OF SAN DIEGO 30'X60' QUADRANGLE, 2008	RESIDENTIAL SUBDIVISION 8303 LA JOLLA SHORES DRIVE LA JOLLA, CALIFORNIA	CHRISTIAN WHEELER ENGINEERING
	DATE: JANUARY 2017 / JOB NO.: 2160564	
	BY: SRD / FIGURE NO.: 2	

The Scripps Fault, which is a relatively small, southwest to northeast trending fault, has been mapped by others approximately 1,900 feet northwest of the site (Kennedy and Tan, 2008). Where exposed in the canyon approximately 2,500 feet to the north of the subject site, the Scripps Fault juxtaposes Tertiary-age sedimentary deposits of the Scripps Formation and Ardath Shale. The Scripps Fault has not been mapped as bisecting the middle to early Pleistocene-aged very old paralic deposits that crop out approximately 2,800 feet to the northeast of the subject site. As such, it is our professional opinion and judgment that the Scripps Fault may be considered inactive.

The following Table I presents the active faults that are considered most likely to significantly affect the proposed residence over the anticipated economic lifetime of the structure.

TABLE I: PROXIMAL FAULT ZONES

Fault Zone	Distance	Max. Magnitude Earthquake
Rose Canyon	< 1 km	7.2 Magnitude
Coronado Bank	21 km	7.6 Magnitude
Newport-Inglewood	37 km	7.1 Magnitude
Elsinore	62 km	7.1 Magnitude
Earthquake Valley	72 km	6.5 Magnitude

GEOLOGIC HAZARDS

GENERAL: No geologic hazards of sufficient magnitude to preclude the continued residential use or redevelopment of the site are known to exist. In our professional opinion and to the best of our knowledge, the site should be suitable for continued residential use or future redevelopment, provided sound engineering, construction, and site maintenance procedures are followed should the site be redeveloped.

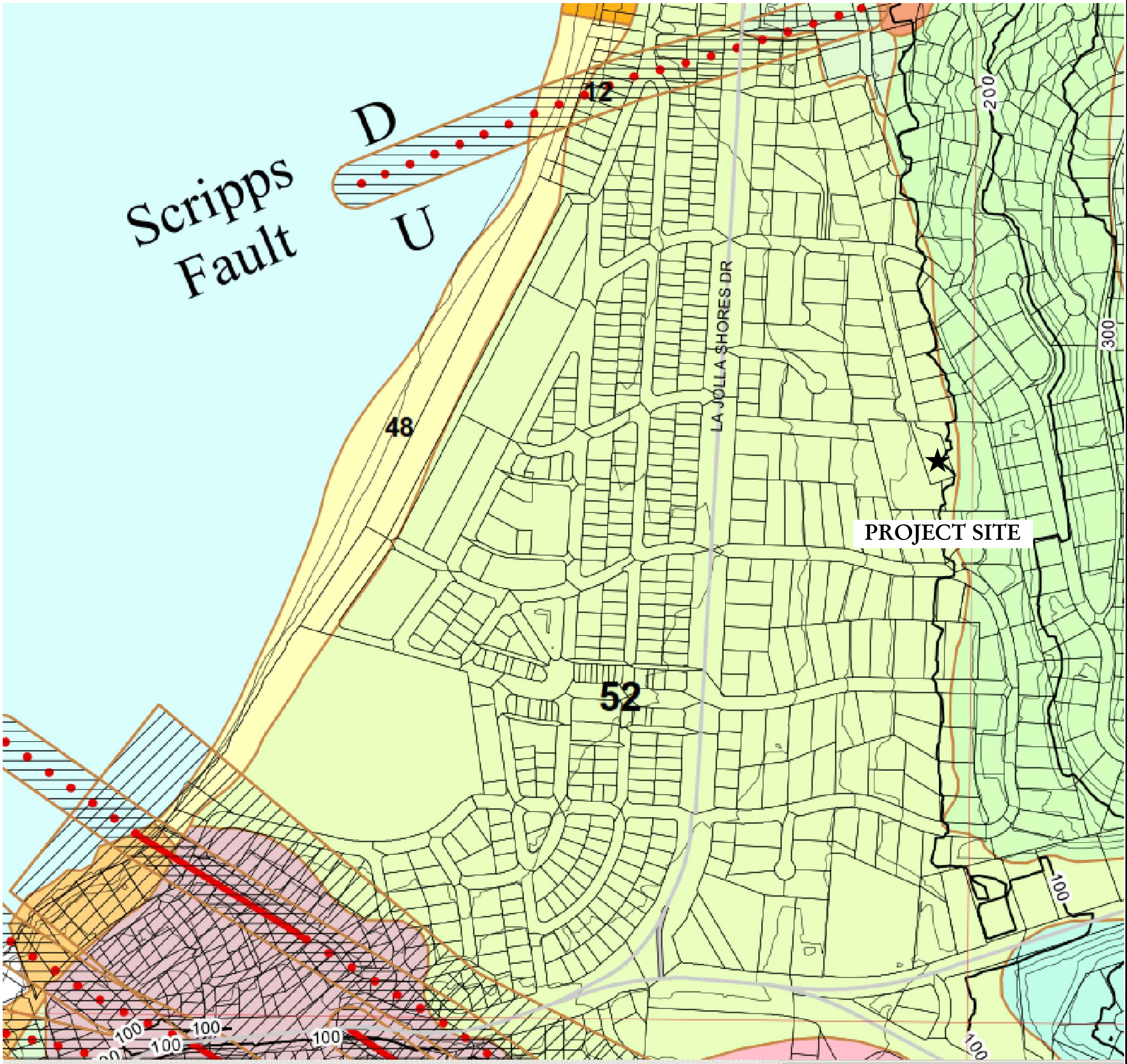
CITY OF SAN DIEGO SEISMIC SAFETY STUDY: As part of our services, we have reviewed the City of San Diego Seismic Safety Study. This study is the result of a comprehensive investigation of the City that rates areas according to geological risk potential (nominal, low, moderate, and high) and identifies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

According to the San Diego Seismic Safety Map No. 29, the central and western portions of the site are located within Geologic Hazard Category 52, which is assigned to level to sloping areas where the geologic structure is considered to be “favorable” and the level of geologic risk is generally considered to be “low.” The eastern slope area within the eastern portion of the site is located within Hazard Category 26, which is assigned to areas underlain by “slide-prone” formations such as the Ardath Shale where the geologic structure is generally expected to dip gently (< 5°) to the east-northeast. Such bedding o the Ardath Shale is considered to be favorable with regards to the stability of the west acing slope along the eastern margin of the site.

GROUNDWATER: No regional, free groundwater is expected within thirty feet from existing grades at the site. It should, however, be recognized that minor groundwater seepage problems might occur after construction and landscaping at a site even where none were present before construction. These are usually minor phenomena and are often the result of an alteration in drainage patterns and/or an increase in irrigation water. Based on the anticipated construction and landscaping, it is our opinion that any near surface seepage problems that may occur will be minor in extent. It is further our opinion that these problems can be most effectively corrected on an individual basis if and when they occur.

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

A review of available geologic maps indicates that the nearest active fault is the Rose Canyon Fault Zone, located approximately ½ mile (¾ km) to the southwest. Other active fault zones in the region that could possibly affect the site include the Newport-Inglewood, Coronado Bank and the Palos Verde Fault Zones to the northwest; the Elsinore, San Jacinto, and San Andreas Fault Zones to the northeast; and the Earthquake Valley Fault to the east.



SEISMIC SAFETY STUDY **Geology Hazard & Faults**	**RESIDENTIAL SUBDIVISION** **8303 LA JOLLA SHORES DRIVE** **LA JOLLA, CALIFORNIA**		CHRISTIAN WHEELER ENGINEERING
	DATE: JANUARY 2017	JOB NO.: 2160564	
	BY: SRD	FIGURE NO.: 3	

considered to be unfavorable. However, as described above in the Geologic Structure section of this report, the orientation of the bedding of the Ardath Shale along the east side of the slope is considered to be favorable with regards to the suitability of the site.

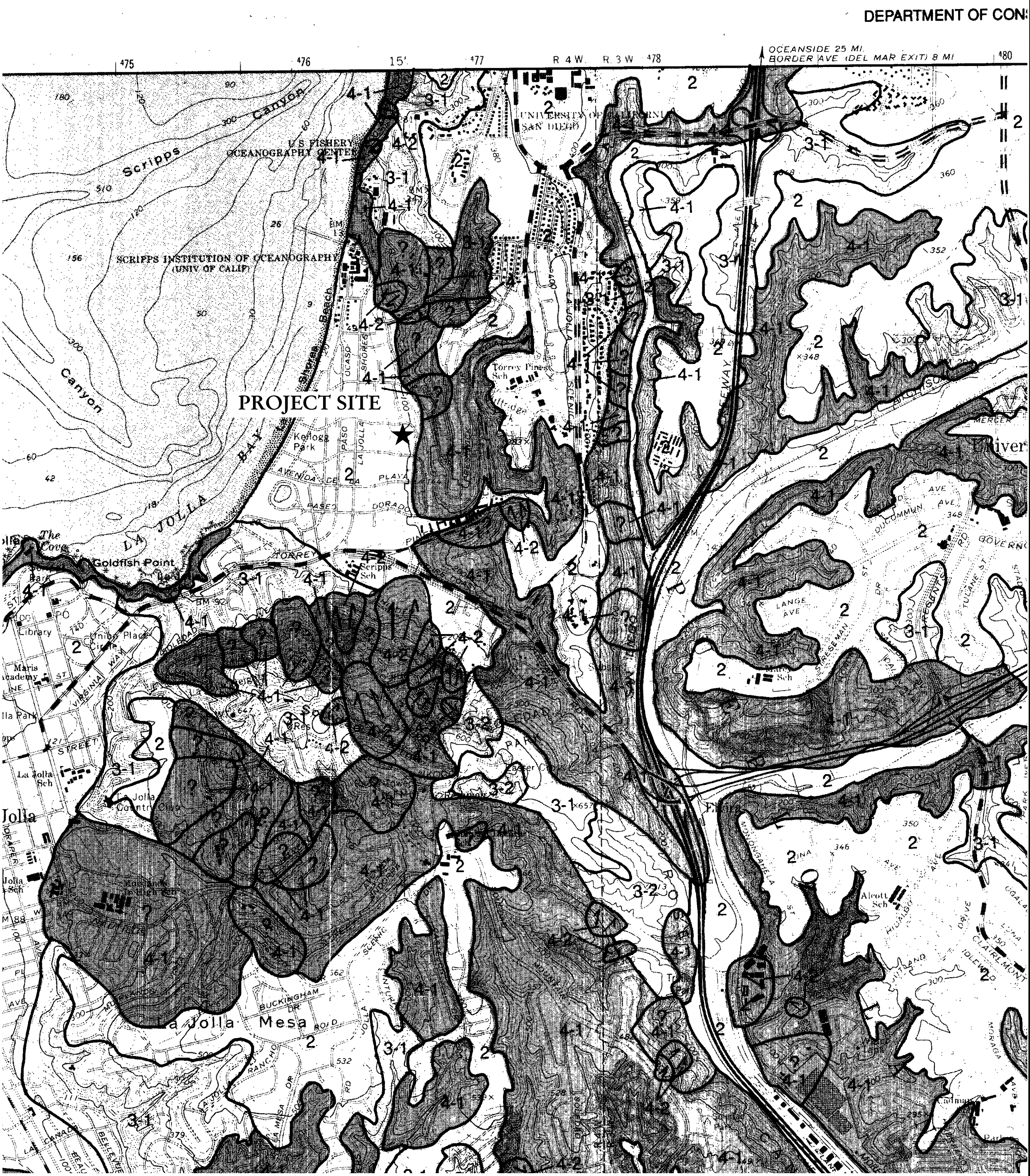
LANDSLIDE POTENTIAL AND SLOPE STABILITY: The majority of the site is identified as being in an area that is considered “marginally susceptible” to slope failures while the eastern margin of the site is identified as being in an area that is considered “most susceptible” to slope stability hazards due to such factors as the character of the geologic units, the presence of joints, fractures or other planes of weakness within the formational materials, and the presence of steep slopes.

The Relative Landslide Susceptibility and Landslide Distribution Map of the La Jolla Quadrangle prepared by the California Division of Mines and Geology indicated that the majority of the site is situated within Relative Landslide Susceptibility Area 2. Area 2 is considered to be “marginally susceptible” to slope failures. Based on the generally level area of the majority of the subject site, the risk of slope failures affecting the existing and proposed improvements within the western and central portions of the site is considered to be low. The west to east ascending slope along the eastern margin of the site is situated within Relative Landslide Susceptibility Area 4-1. Sites within Area 4-1 are considered to be “most susceptible” to slope failures. Although no evidence of landsliding has been observed within the eastern margin of the site, future development of the site will require quantitative analysis of the stability of the proposed site configuration and off-site (to the east) geomorphology.

LIQUEFACTION: The earth materials underlying the site are not anticipated to be susceptible to soil liquefaction in the event of a major, proximal seismic event due to the absence of a sallow groundwater table and the anticipated consistency and density of the near surface soils.

EXPANSIVE SOILS: The majority of the near surface soils at the site are anticipated to possess a low to medium expansive potential. However, the presence of detrimentally expansive soils (having an Expansion Index in excess of 50), if present, may be mitigated, should future development occur, by proper foundation reinforcing and design.

FLOODING: As delineated on the referenced Flood Insurance Rate Map (FIRM), panel 06073C1582G 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.



RELATIVE LANDSLIDE SUSCEPTIBILITY AND LANDSLIDE DISTRIBUTION MAP *(LA JOLLA QUADRANGLE)*	RESIDENTIAL SUBDIVISION 8303 LA JOLLA SHORES DRIVE LA JOLLA, CALIFORNIA		CHRISTIAN WHEELER ENGINEERING
	DATE: JANUARY 2017	JOB NO.: 2160564	
	BY: SRD	FIGURE NO.: 4	

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. The site is not mapped within a potential tsunami inundation area on the La Quadrangle of the Tsunami Inundation Map for Emergency Planning (CalEMA, 2009).

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.

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

CONCLUSIONS

1) Based on our review of the referenced topographic maps and aerial photographs, the site appears to have first developed prior to 1953.

2) No geologic hazards of sufficient magnitude to preclude the future residential usage of the site or future redevelopment of the site are known to exist. The site can be considered to be average with respect to potential geologic hazards compared to other, similar sites in the immediate area.

3) The Relative Landslide Susceptibility and Landslide Distribution Map of the La Jolla Quadrangle prepared by the California Division of Mines and Geology indicated that the majority of the site is situated within Relative Landslide Susceptibility Area 2. Area 2 is considered to be "marginally susceptible" to slope failures. Based on the generally level area of the majority of the subject site, the risk of slope failures affecting the existing and proposed improvements within the western and central portions of the site is considered to be low. The west to east ascending slope along the eastern margin of the site is situated within Relative Landslide Susceptibility Area 4-1. Sites within Area 4-1 are considered to be "most susceptible" to slope failures. Although no evidence of landsliding has been observed within the eastern margin of the site, future development of the site will require quantitative analysis of the stability of the proposed site configuration and off-site (to the east) geomorphology.

4) No known active faults are mapped as bisecting the site. The nearest active fault is the Rose Canyon Fault Zone, located approximately ½ mile (¾ km) to the southwest.

5) Any and all future site development should be constructed in accordance with the minimum requirements of the most recent edition of the California Building Code and/or the recommendations of a qualified geotechnical engineer. Any future structures should be constructed in accordance with the requirements of the City of San Diego.

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

Respectfully submitted,

CHRISTIAN WHEELER ENGINEERING

REGISTERED GEOLOGIST
DAVID R. RUSSELL
No. 2215
CERTIFIED
ENGINEERING
GEOLOGIST
Exp. 09-17
STATE OF CALIFORNIA

David R. Russell, CEG #2215

ec: lb@beachamconstruction.com; paul@alcornbenton.com

REFERENCES

Anderson, J.G., Rockwell, R.K. and Agnew, D.C., 1989, Past and Possible Future Earthquakes of Significance to the San Diego Region, Earthquake Spectra, Volume 5, No. 2, 1989

Boore, David M., Joyner, William B., and Fumal, Thomas E., 1997, "Empirical Near-Source Attenuation Relationships for Horizontal and Vertical Components of Peak Ground Acceleration, Peak Ground Velocity, and Pseudo-Absolute Acceleration Response Spectra", in Seismological Research Letters, Volume 68, Number 1, January/February 1997.

California Division of Mines and Geology, 1991, State of California Earthquake Fault Studies Zones, La Jolla Quadrangle, scale 1:24,000.

California Emergency Management Agency, 2009, Tsunami Inundation Map for Emergency Planning, State of California , County of San Diego, La Jolla Quadrangle, June 1, 2009.

Christian Wheeler Engineering, 2015, Report of Preliminary Geotechnical Investigation,
Proposed Leibowitz Residence, 8283 La Jolla Shores Drive, La Jolla, California, CWE Report 2140684.01, dated January 26, 2015.

City of San Diego, 2008, Seismic Safety Study, Sheet 29.

Federal Emergency Management Agency, Flood Map 06073C1582G, FIS date May 16, 2012.

Hart, E. W. and Bryant, W. A., 1997, Fault-Rupture Hazard Zones in California; California Division of Mines and Geology Special Publication 42.

Jennings, C.W., 1975, Fault Map of California, California Division of Mines and Geology, Map No. 1; Scale 1:750,000.

Kennedy, M.P. and Peterson, G.L., 1975 (Reprint 2001), Geology of the San Diego Metropolitan Area, California, California Division of Mines and Geology Bulletin 200.

REFERENCES (continued)

Kennedy, M.P. and others, 1975, Character and Recency of Faulting, San Diego Metropolitan Area, California, California Division of Mines and Geology Special Report 123.

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

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

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

Wesnousky, S.G., 1986, "Earthquakes, Quaternary Faults, and Seismic Hazards in California"; in Journal of Geophysical Research, Vol. 91, No. B12, pp 12,587 to 12, 631, November 1986.

TOPOGRAPHIC MAPS

City of San Diego, 1953, 200-Scale Topographic Map, Sheet 250-1689.

City of San Diego, 1963, 200-Scale Topographic Map, Sheet 250-1689.

City of San Diego, 1977, 200-Scale Ortho-Topographic Map, Sheet 250-1689.

U.S. Geological Survey, 1967, 7 ½-Minute Topographic Maps, La Jolla Quadrangle

U.S. Geological Survey, 1975, 7 ½-Minute Topographic Maps, La Jolla Quadrangle

PHOTOGRAPHS

Aerial Fotobank, 1995-96, Aerial Foto-Map Book, San Diego County, Sheet 1227; Scale 1" = 1000 feet (approximate).

Aerial Graphics, 1982, Aerial Foto-Map Book; Scale 1" = 2000 feet (approximate).

California Coastal Project, Oblique Aerial Photographs, 1972, 1979, 1986, 1987, 1993, 2002, 2004, 2006, 2008, and 2013.

San Diego County, 1928, Flight 52A; Scale: 1 inch = 1000 feet (approximate).

San Diego County, 1973, Flight 31, Photographs 18 through 20; Scale: 1" = 1000 feet (approximate).

San Diego County, 1978, Flight 17B, Photographs 52 and 53; Scale: 1" = 1000 feet (approximate).

San Diego County, 1983, Photographs 553 and 554; Scale: 1" = 2000 feet (approximate).

San Diego County, 1990, Flight WAC (West), Photograph 1-201; Scale: 1" = 1000 feet (approximate).

CHRISTIAN WHEELER
ENGINEERING

June 6, 2016

James and Tricia Riha CWE 2160564.02
c/o Beacham Construction
405 Via del Norte
La Jolla, California 92037
Attention: Louis Beacham

Subject: Report of Preliminary Findings and Recommendations
Proposed 8-Lot Residential Subdivision, 8303 La Jolla Shores Drive, La Jolla, California

Ladies and Gentlemen:

In accordance with the request of Louis Beacham, we have prepared this report to present preliminary geotechnical findings and recommendations for the subject project.

PRELIMINARY SITE INFORMATION AND PROJECT DESCRIPTION

The subject site is comprised of three adjacent residential lots identified as Assessor's Parcel Numbers 346-250-08 through -10. The lot is located adjacent to and east of Calle Frescota and south of Calle del Cielo in the La Jolla Shores area of San Diego, California. The site currently supports a single-story, single-family residence with a garage, storage structures and other normally associated improvements. Topographically, the site ascends gently from west to east with an approximately 50-foot-high slope along the eastern margin of the site.

We understand that the three existing parcels that comprise the subject site are to be subdivided to create a total of ±8 residential parcels. We anticipate that each of the parcels will be developed to receive one-to two-story single-family split level residences that are of conventional, wood-frame and masonry construction. The structures will be supported by shallow foundations and incorporate on-grade concrete floor slabs. All the lots will also have swimming pools. Access to the new lots will be afforded by a new cul-de-sac that connects to Calle Del Cielo. Grading to accommodate the proposed improvements is expected to consist of cuts and fills of less than about 10 feet and 15 feet from existing site grades, respectively. Retaining walls up to about

12 feet high are proposed. It is further anticipated that imported fill soils will be necessary to achieve proposed site grades.

To assist in the preparation of this report, we were provided with a preliminary grading plan prepared by Christensen Engineering & Surveying, dated April 21, 2017. A copy of the plan was used as a base map for our Site Plan and Geologic Map, and is included herein as Plate No. 1. In addition, we reviewed our report prepared for the subject site titled “Report of Geologic Reconnaissance, Proposed Residential Subdivision”, dated January 9, 2017 (CWE 2160564.01).

PRELIMINARY FINDINGS

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 generally underlain by artificial fill, topsoil, Quaternary-age old paralic deposits, and Tertiary age sedimentary deposits of the Ardath Shale. A site plan and geotechnical map, which depicts the location of our borings, is included herein as Plates No.1. The boring logs are provided in Appendix A of this report. The materials encountered in the subsurface explorations are described below:

ARTIFICIAL FILL (Qaf): A surficial veneer of man-placed caps much of the central and western portions of the site and also within the area of a relatively level, graded pad area within the northeast portion of the site. As encountered in our exploratory borings, the artificial fill extended a maximum depth of about 9 feet from existing grade (Borings B-7 and B-8). Deeper fill soils may exist in areas of the site not investigated. The fill materials generally consisted of brown, loose to medium dense, dry to moist, clayey sand (SC). The artificial fill was judged to have a medium expansion potential (EI between 51 and 90).

TOPSOIL: An approximately 1-foot-thick layer of topsoil was encountered in Boring B-9. Where not removed by previous site grading, a similar veneer of topsoil is expected across other areas of

the site not investigated. The encountered topsoil consisted of brown, dry, loose, silty sand (SM). The topsoil was judged to have a low expansion potential (EI between 21 and 50).

OLD PARALIC DEPOSITS (Qop): Quaternary-age old paralic deposits were encountered underlying the surficial soils (topsoil and artificial fill) or at grade throughout the site. These soils generally consisted of brown, orangish-brown, reddish-brown, light gray, and light brown, damp to moist, interbedded, stiff, sandy clay (CL), medium dense silty and sand (SM) and clayey sand (SC), and dense poorly graded sand with silt (SP-SM) and clayey sand/sandy clay (SC/CL). In addition, some of the near surface, old paralic deposits were found to be loose to medium dense. The sandy portions of the old paralic deposits (SM and SP-SM) were judged to have a very low to low expansion potential (EI between 0 and 50), whereas the clayey old paralic deposits (CL and SC/CL) were judged to have a low to medium expansion potential (EI between 51 and 90).

ARDATH SHALE (Ta): Tertiary-age sedimentary deposits of the Ardath Shale underlie the old paralic deposits across the site and crop out along the engineered slope along and adjacent to the site's eastern perimeter. These soils generally consisted of light yellowish-brown, greenish-gray and light gray, moist, very stiff to hard, silty clay (CL), clayey silt (ML), and clayey silt/silty clay (ML/CL). These formational deposits were judged to have a medium to high expansion potential (EI between 51 and 130).

GROUNDWATER: In general, no groundwater or major seepage was encountered in our subsurface explorations.

PRELIMINARY CONCLUSIONS

In general, it is our professional opinion and judgment that the subject property is suitable for the construction of the proposed residential subdivision and associated improvements provided the recommendations presented herein are implemented. The main geotechnical conditions affecting the proposed project consist of potentially compressible artificial fill, topsoil and portions of the upper, old paralic deposits, cut/fill transitions across proposed building pads, and expansive soils. These conditions are discussed hereinafter.

The site is underlain by potentially compressible artificial fill, topsoil, and old paralic deposits. As encountered in our borings the artificial fill underlies the west-central portion of the site, and extends to a maximum depth of about 9 feet from existing grade (Borings B-7 and B-8). Deeper fill soils and topsoil may exist in areas of the site not investigated. Relatively shallow layers of potentially compressible topsoil and old paralic deposits were also encountered. It is estimated that these materials do not exceed about 2 feet in thickness. The fill soils, topsoil, and potentially compressible, upper old paralic 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 in areas to receive settlement sensitive improvements and new fills.

The removal and recompaction of existing loose surficial soils as well as the proposed grading will result in cut/fill transition areas under some of the proposed structures and associated improvements. This configuration may result in differential settlements due to the potential of fill soils and native materials to settle differently. In order to mitigate this condition, it is recommended that the cut portions of the lots be undercut as described hereinafter.

Some of the anticipated foundation soils are moderately to highly expansive (EI between 51 and 130). Select grading is recommended to mitigate this condition.

The following foundation recommendations should be considered preliminary, and may require revisions after the results of laboratory tests currently being performed are analyzed.

PRELIMINARY 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 or our Report of Preliminary Geotechnical Investigation, which will be provided under separate cover.

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

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

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

SITE PREPARATION: It is recommended that existing potentially compressible soils underlying the proposed structures, associated improvements and new fills be removed in their entirety. Based on our findings, the maximum removal depth is about 9 feet below existing grade (Borings B-7 and B-8). Deeper removals may be necessary in areas of the site not investigated or due to unforeseen conditions. Lateral removals limits should extend at least 5 feet from the perimeter of the structures, associated 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.

UNDERCUT: Native soils within 3 feet from finish pad grade should be undercut. The undercut material may be replaced as compacted fill. In areas where footings deeper than the minimum recommended undercut are proposed, undercuts extending to a minimum depth of 1 foot below the bottom of the footing or retaining wall key are recommended. The removals and undercuts should be performed in such a way as to provide for a continuous contact between the fill and native soils that drains away from the proposed structures, and avoids adjacent zones with different undercut depths that may impair subsurface drainage.

SELECT GRADING: It is recommended that moderately to highly expansive soils (EI between 51 and 130) within 5 feet from finish pad grade be mixed with low expansive on-site soil or imported (EI between 21 and 50) to create a low expansive mix for use as structural fill.

IMPORTED FILL SOILS: Imported fill soils should consist of clayey and/or silty sands that have a low expansion potential (EI between 21 and 50), relatively high strength, and relatively low permeability characteristics. At least 72 hours will be necessary to perform necessary laboratory test to approve an import source.

PROCESSING OF FILL AREAS: Prior to placing any new fill soils or constructing any new improvements in areas that have been cleaned out to receive fill, the exposed soils should be scarified to a depth of 12 inches, watered thoroughly, and compacted to at least 90 percent relative compaction. In areas to support fill slopes, keys should be cut into the competent supporting materials. The keys should be at least 10 feet wide, and be sloped back into the hillside at least 2 percent. The keys should extend at least 1 foot into the competent supporting materials. Where the existing ground has a slope of 5:1 (horizontal to vertical) or steeper, it should be benched into as the fill extends upward from the keyway.

FILL SLOPES: Fill slopes should be compacted by back-rolling with a sheepsfoot compactor at vertical intervals not exceeding four feet in vertical dimension as the fill is being placed. The face of fill slopes constructed at a 2:1 (horizontal to vertical) or flatter inclination should also be track-walked when the slope is completed. As an alternative, fill slopes can be overfilled by at least three feet and cut back to the compacted core at the design finish contour.

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 6 to 8 inches thick, with each lift compacted by mechanical means. Fills should consist of approved earth material, free of trash or debris, roots, vegetation, or other materials determined to be unsuitable by the Geotechnical Consultant. Fill material should be free of rocks or lumps of soil in excess of three inches in maximum dimension.

Utility trench backfill within 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 and the top of slopes into controlled drainage devices are recommended.

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

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

TEMPORARY CONSTRUCTION SLOPES: A temporary cut slopes up to about 12 feet in height will be necessary for the construction of proposed structures. Temporary cut slopes may be constructed vertically for the lower 4 feet (including footing excavation) and at a continous1:1 (horizontal to vertical) inclination thereafter. All temporary slopes should be observed by the engineering geologist during grading to ascertain that no unforeseen adverse conditions exist. No surcharge loads such as adjacent building foundations, soil or equipment stockpiles, vehicles, etc. should be allowed within a distance from the top of temporary slopes equal to half the slope height.

It should be noted that the contractor is solely responsible for designing and constructing stable, temporary excavations and may need to shore, slope, or bench the sides of trench excavations as required to maintain the stability of the excavation sides. The contractor's "competent person", as defined in the OSHA Construction Standards for Excavations, 29 CFR, Part 1926, should evaluate the

soil exposed in the excavations as part of the contractor's safety process. Temporary cut slopes should be constructed in accordance with the recommendations presented in this section. In no other case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations.

FOUNDATIONS

GENERAL: Based on our findings and engineering judgment, the proposed structures and associated improvements may be supported by conventional shallow continuous and isolated spread footings. The following recommendations are considered the minimum based on the anticipated soil conditions, 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 structures should be embedded at least 18 inches below lowest adjacent finish pad grade. Spread footings supporting the proposed light exterior 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 18 inches deep and 24 inches wide.

BEARING CAPACITY: Spread footings supporting the proposed structures may be designed for an allowable soil bearing pressure of 2,500 pounds per square foot (psf). 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 light exterior improvements may be designed for an allowable soil bearing pressure of 2,000 pounds per square foot (psf). These values 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 the 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.

PROPOSED SWIMMING POOLS: Foundation recommendations for the proposed swimming pools will be provided on an individual basis after grading is performed. However, it is recommended that the proposed swimming pools be founded on old paralic deposits or Ardath Shale.

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: Provided select grading as recommended herein is performed, the prevailing foundation soils are assumed to have a low expansive potential (EI between 21 and 50). The recommendations within this report reflect these conditions.

FOUNDATION PLAN REVIEW: The final foundation plan and accompanying details and notes should be submitted to this office for review. The intent of our review will be to verify that the plans used for construction reflect the minimum dimensioning and reinforcing criteria presented in this section and that no additional criteria are required due to changes in the foundation type or layout. It is not our intent to

review structural plans, notes, details, or calculations to verify that the design engineer has correctly applied the geotechnical design values. It is the responsibility of the design engineer to properly design/specify the foundations and other structural elements based on the requirements of the structure and considering the information presented in this report.

SEISMIC DESIGN FACTORS

The seismic design factors applicable to the subject site are provided below. The seismic design factors were determined in accordance with the 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	32.857° -117.251°
Site Class	D
Site Coefficient F_a	1.0
Site Coefficient F_v	1.5
Spectral Response Acceleration at Short Periods S_s	1.305 g
Spectral Response Acceleration at 1 Second Period S_1	0.507 g
$S_{MS}=F_aS_s$	1.305 g
$S_{M1}=F_vS_1$	0.760 g
$S_{DS}=2/3*S_{MS}$	0.870 g
$S_{D1}=2/3*S_{M1}$	0.507 g

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

ON-GRADE SLABS

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

INTERIOR FLOOR SLABS: The minimum slab thickness should be 4 inches (actual) and the slab should be reinforced with at least No. 3 bars spaced at 18 inches on center each way. Slab reinforcement should be supported on chairs such that the reinforcing bars are positioned at mid-height in the floor slab. The slab reinforcement should extend down into the perimeter footings at least 6 inches.

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

EXTERIOR CONCRETE FLATWORK: Exterior concrete slabs on grade should have a minimum thickness of 4 inches and be reinforced with at least No. 3 bars placed at 18 inches on center each way (ocew). Driveway slabs should have a minimum thickness of 5 inches and be reinforced with at least No. 4 bars placed at 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 43 and 62 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 10.5H pounds per square foot (where H = wall height in feet) occurring at the top of the wall.

WATERPROOFING AND WALL DRAINAGE SYSTEMS: The need for waterproofing should be evaluated by others. If required, the project architect should provide (or coordinate) waterproofing details for the retaining walls. The design values presented above are based on a drained backfill condition and do not consider hydrostatic pressures. Unless hydrostatic pressures are incorporated into the design, the retaining wall designer should provide a detail for a wall drainage system. Typical retaining wall drain system details are presented in Plate No. 2 of this report for informational purposes. Additionally, outlets points for the retaining wall drain system should be coordinated with the project civil engineer.

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

CLOSURE

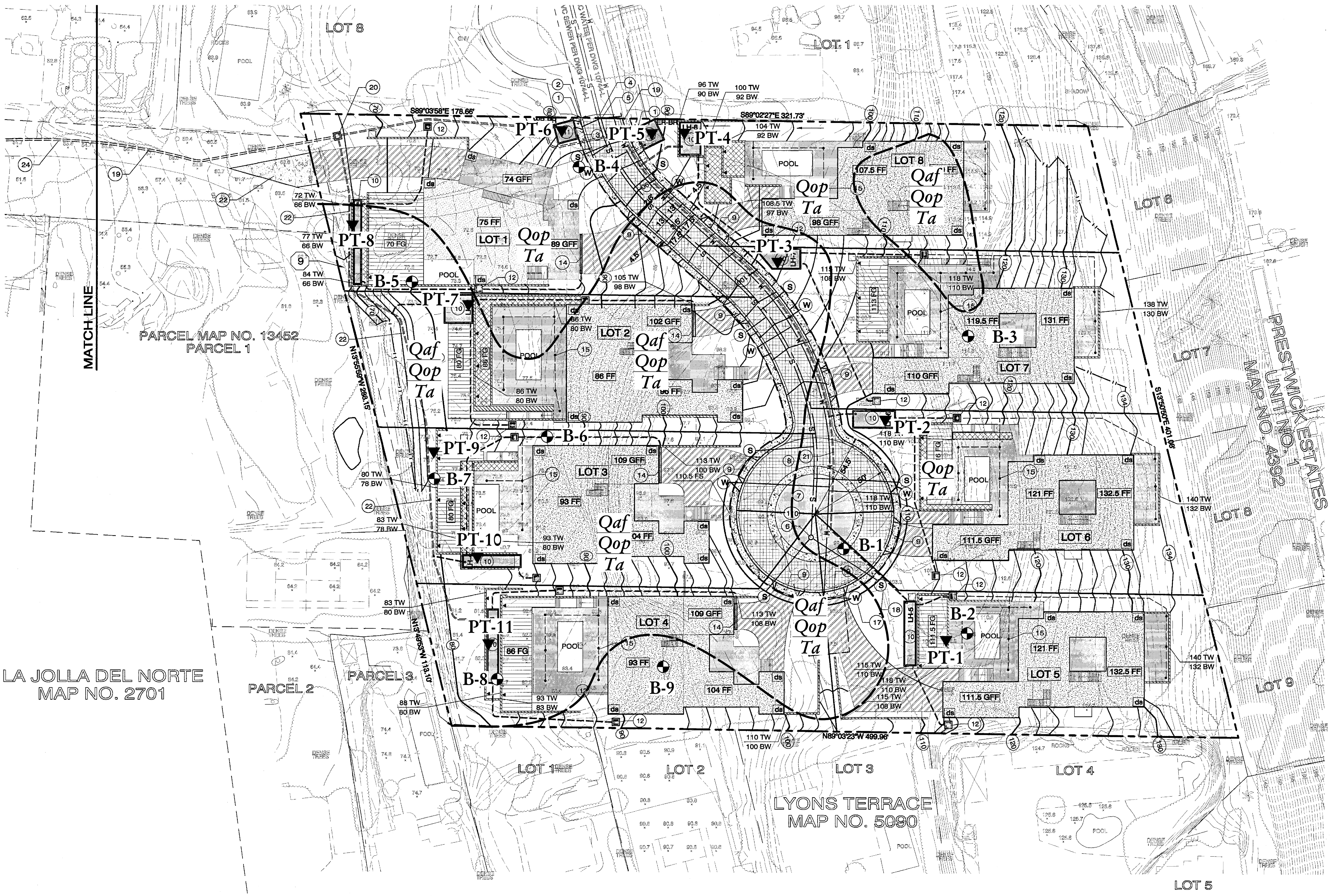
If you have any questions after reviewing this letter, please do not hesitate to contact this office. This opportunity to be of professional service is sincerely appreciated.

Respectfully submitted,
CHRISTIAN WHEELER ENGINEERING

Daniel B. Adler, RCE #36037

David R. Russell, CEG #2215

ec: : lb@beachamconstruction.com
paul@alcornbenton.com



CWE LEGEND	
B-9	APPROXIMATE BORING LOCATION
PT-11	APPROXIMATE PERCOLATION TEST LOCATION
	GEOLOGIC CONTACT
Qaf / Qop / Ta	ARTIFICIAL FILL OVER OLD PARALIC DEPOSITS
Qop / Ta	OLD PARALIC DEPOSITS OVER ARDATH SHALE
NOTE: TOPSOILS/SUBSOILS NOT MAPPED	

Prepared By:
CHRISTENSEN ENGINEERING & SURVEYING
7888 SILVERTON AVENUE, SUITE "J"
SAN DIEGO, CA 92126
PHONE (858)271-9901 FAX (858)271-8912

Project Address:
8280 CALLE DEL CIELO
LA JOLLA, CA 92037.

Revision 5:
Revision 4:
Revision 3:
Revision 2:
Revision 1:

Project Name:
CIELO TENTATIVE MAP

Original Date: FEBRUARY 03, 2017

Sheet Title:
PRELIMINARY GRADING PLAN

Sheet
DEP#
C-3

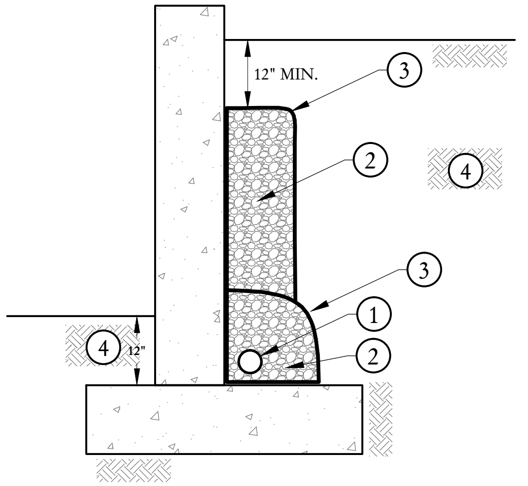
JN A2015-50

SITE PLAN AND GEOTECHNICAL MAP

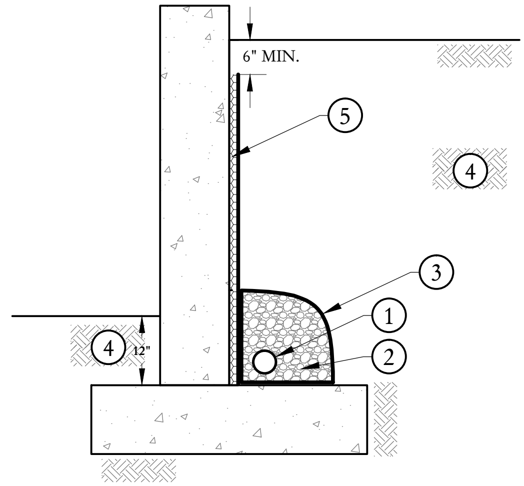
LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE: JUNE 2017	JOB NO.: 2160564.02
BY: SRD	PLATE NO.: 1

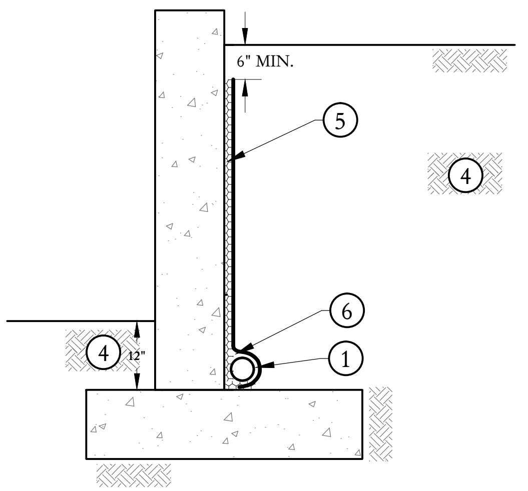
CHRISTIAN WHEELER ENGINEERING



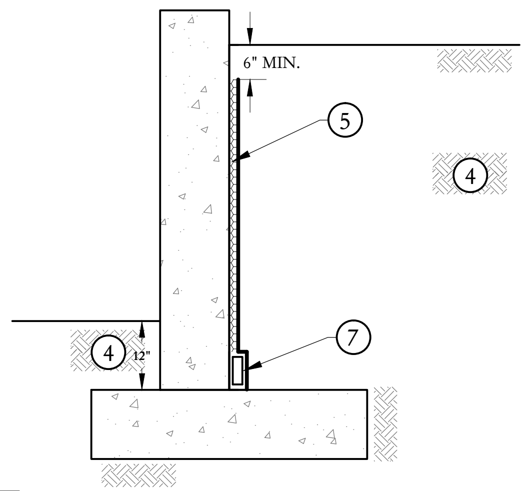
1 DETAIL



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	**LA JOLLA 8-LOT SUBDIVISION** 8280 CALLE DEL CIELO LA JOLLA, CALIFORNIA			CHRISTIAN WHEELER ENGINEERING
	DATE: JUNE 2017		JOB NO.: 2160564.02	
	BY: SRD		PLATE NO.: 2	

Appendix A

Exploration Logs

LOG OF TEST BORING B-1

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	8 inch Solid Flight
Existing Elevation:	100.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	110.0 feet	Depth to Water:	Unknown

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				4" of AC.							
			CL	**Old Paralic Deposits (Qop)**: Light brown to yellowish-brown, damp, stiff, SANDY CLAY, mottled, upper 3' moderately weathered, porous.	18	Cal					
			CL	Brown to reddish-brown, moist.	14	SPT					
5					27	Cal					
10			SC	Light brown, moist, medium dense, very fine- to medium-grained, CLAYEY SAND with gravels.	16	Cal					
			SM	Light brown, moist, medium dense, very fine- to medium-grained, SILTY SAND with trace gravels, mottled.							
15					28	Cal					
			SM-SP	Light brown to black, moist, dense, very fine- to coarse-grained, POORLY GRADED SAND with silt.	57	Cal					
20				Boring terminated at 19.5 feet. No groundwater or seepage encountered.							
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	JUNE 2017	JOB NO.:	2160564.02
BY:	SRD	FIGURE NO.:	A-1

CHRISTIAN WHEELER ENGINEERING

LOG OF TEST BORING B-2

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

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	8 inch Solid Flight
Existing Elevation:	108.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	111.0 feet	Depth to Water:	Unknown

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				3" of AC.							
			CL	**Old Paralic Deposits (Qop):** Dark brown, moist, stiff, SANDY CLAY, mottled, upper 2' weathered with rootlets.							
					18	Cal					
			CL	Light orangish-brown to light gray.							
5					42	Cal					
					27	Cal					
			SC	Light brown, moist, medium dense, very fine- to medium-grained, CLAYEY SAND with trace gravels.							
10			SM	Light yellowish-brown, damp, medium dense, very fine- to medium-grained, VERY SILTY SAND with trace gravels.	28	Cal					
				Boring terminated at 11.5 feet. No groundwater or seepage encountered.							
15											
20											
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	JUNE 2017	JOB NO.:	2160564.02
BY:	SRD	FIGURE NO.:	A-2

CHRISTIAN WHEELER ENGINEERING

LOG OF TEST BORING B-3

Sample Type and Laboratory Test Legend

Cal	Modified California Sampler	CK	Chunk
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

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	8 inch Solid Flight
Existing Elevation:	111.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	119.0 feet	Depth to Water:	Unknown

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			CL	**Old Paralic Deposits (Qop):** Dark brown, damp, loose, SANDY CLAY, mottled, upper 2' moderately weathered.							
					28	Cal					
5			SC	Light yellowish-brown, moist, medium dense, very fine- to medium-grained, CLAYEY SAND.	39	Cal					
			SM	Light yellowish-brown, moist, medium dense, very fine- to medium-grained, VERY SILTY SAND.							
10					25	Cal					
15			SP-SM	Light gray, damp, medium dense, very fine- to medium-grained, POORLY GRADED SAND with silt and gravels.	50/5"	Cal**					
				Gravel/cobble bed at 16 to 17 feet.	50/1"	SPT*					
				Boring terminated at 17 feet. No groundwater or seepage encountered.							
20											
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	JUNE 2017	JOB NO.:	2160564.02
BY:	SRD	FIGURE NO.:	A-3

CHRISTIAN WHEELER
ENGINEERING

LOG OF TEST BORING B-4

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	8 inch Solid Flight
Existing Elevation:	82.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	74.0 feet	Depth to Water:	Unknown

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				4" of AC.							
			SC	**Old Paralic Deposits (Qop):** Brown to reddish-brown, dry, loose to medium dense, very fine- to medium-grained, CLAYEY SAND, mottled, upper 2' highly weathered.	18	Cal					
				Moist, medium dense.							
5			SM	Light brown, moist, medium dense, very fine- to medium-grained, SILTY SAND.	13	Cal					
10			SM	Light brown to light grayish-brown, dense, fine- to coarse-grained, SILTY SAND with clay, mottled.	41	Cal					
					50/4"	Cal					
15			ML	**Ardath Shale (Ta):** Light yellowish-brown, moist, hard, CLAYEY SILT with sand.							
					50/5"	Cal					
20				Boring terminated at 19 feet. No groundwater or seepage encountered.							
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	JUNE 2017	JOB NO.:	2160564.02
BY:	SRD	FIGURE NO.:	A-4

CHRISTIAN WHEELER ENGINEERING

LOG OF TEST BORING B-5

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

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	8 inch Solid Flight
Existing Elevation:	73.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	70.0 feet	Depth to Water:	Unknown

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			SC	**Artificial Fill (Qaf):** Brown, damp, loose to medium dense, very fine- to medium-grained, SANDY CLAY.							
				Moist, medium dense.	19	Cal					
			SC	**Old Paralic Deposits (Qop):** Orangish-brown to brown, moist, medium dense, very fine- to medium-grained, CLAYEY SAND, mottled.	21	Cal					
5											
					34	Cal					
10											
			ML	**Ardath Shale (Ta):** Yellowish-brown, moist, very stiff, CLAYEY SILT with sand, moderately weathered to 16 feet.							
					25	SPT					
15											
				Hard.							
					50/5"	SPT					
				Boring terminated at 19 feet. No groundwater or seepage encountered.							
20											
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	JUNE 2017	JOB NO.:	2160564.02
BY:	SRD	FIGURE NO.:	A-5

CHRISTIAN WHEELER ENGINEERING

LOG OF TEST BORING B-6

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

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	8 inch Solid Flight
Existing Elevation:	79.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	93.0 feet	Depth to Water:	Unknown

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			SC	**Artificial Fill (Qaf):** Brown, damp, loose to medium dense, very fine- to medium-grained, CLAYEY SAND with brick and concrete debris.							
			SC	**Old Paralic Deposits (Qop):** Brown to reddish-brown, damp, medium dense, very fine- to medium-grained, CLAYEY SAND.	32	Cal					
					24	Cal					
5											
				Fine- to coarse-grained at contact.							
10			CL	**Ardath Shale (Ta):** Greenish-gray, moist, very stiff, SILTY CLAY, highly weathered.	19	SPT					
			ML-CL	Light yellowish-brown to light gray, moist, very stiff, CLAYEY SILT/SILTY CLAY, slightly weathered.							
					28	SPT					
15				Boring terminated at 15 feet. No groundwater or seepage encountered.							
20											
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	JUNE 2017	JOB NO.:	2160564.02
BY:	SRD	FIGURE NO.:	A-6

CHRISTIAN WHEELER
ENGINEERING

LOG OF TEST BORING B-7

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

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	8 inch Solid Flight
Existing Elevation:	78.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	80.0 feet	Depth to Water:	Unknown

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			SC	**Artificial Fill (Qaf):** Brown, dry, loose to medium dense, very fine- to medium-grained, CLAYEY SAND with concrete debris in the upper 2 feet.							
				Medium dense.	14	Cal					
5					14	Cal					
10			SC/CL	**Old Paralic Deposits (Qop):** Reddish-brown to brown, moist, dense, very fine- to medium-grained, CLAYEY SAND/SANDY CLAY, mottled.	38	Cal					
15											
				Fine- to coarse-grained with gravels at contact.							
20			ML/CL	**Ardath Shale (Ta):** Yellowish-brown to light gray, moist, very stiff, CLAYEY SILT/SILTY CLAY.	26	SPT					
				Boring terminated at 20 feet. No groundwater or seepage encountered.							
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	JUNE 2017	JOB NO.:	2160564.02
BY:	SRD	FIGURE NO.:	A-7

CHRISTIAN WHEELER ENGINEERING

LOG OF TEST BORING B-8

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	8 inch Solid Flight
Existing Elevation:	83.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	86.0 feet	Depth to Water:	Unknown

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			SC	**Artificial Fill (Qaf):** Brown, dry, loose to medium dense, very fine- to medium-grained, CLAYEY SAND with gravels and concrete debris.							
				Moist, medium dense.	18	Cal					
5				Brick debris at 5 feet.	20	Cal					
10			SC	**Old Paralic Deposits (Qop):** Reddish-brown to brown, moist, dense, very fine- to medium-grained, CLAYEY SAND/SANDY CLAY.	44	Cal					
			SM	Light brown, moist, dense, very fine- to medium-grained, SILTY SAND.							
			SC	Reddish-brown to light gray, moist, dense, very fine- to medium-grained, CLAYEY SAND.	57	Cal					
15				Boring terminated at 14.5 feet. No groundwater or seepage encountered.							
20											
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	JUNE 2017	JOB NO.:	2160564.02
BY:	SRD	FIGURE NO.:	A-8

CHRISTIAN WHEELER ENGINEERING

LOG OF TEST BORING B-9

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

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	8 inch Solid Flight
Existing Elevation:	89.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	93.0 feet	Depth to Water:	Unknown

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	USCS SYMBOL	SUMMARY OF SUBSURFACE CONDITIONS (based on Unified Soil Classification System)	PENETRATION (blows per foot)	SAMPLE TYPE	BULK	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	RELATIVE COMPACTION (%)	LABORATORY TESTS
0			SM	**Topsoil:** Brown, dry, loose, very fine- to medium-grained, CLAYEY SAND, porous.							
			CL	**Old Paralic Deposits (Qop):** Brown, moist, very stiff, SANDY CLAY, upper 12" highly weathered, porous.	33	Cal					
				Very stiff..							
5			SC	Orangish-brown, moist, medium dense, very fine- to medium-grained, CLAYEY SAND.	20	Cal					
			SM	Light brown to light orangish-brown, moist, dense, very fine- to medium-grained, SILTY SAND.	38	Cal					
10			SP-SM	Light brown, moist, dense, fine- to coarse-grained, POORLY GRADED SAND with silt.							
15					64	Cal					
				Boring terminated at 16.5 feet. No groundwater or seepage encountered.							
20											
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	JUNE 2017	JOB NO.:	2160564.02
BY:	SRD	FIGURE NO.:	A-9

CHRISTIAN WHEELER
ENGINEERING

CHRISTIAN WHEELER
ENGINEERING

August 24, 2017

James and Tricia Riha
c/o Beacham Construction
405 Via Del Norte
La Jolla, California 92037

Report 2160564.03

Subject: **Report of Geotechnical Infiltration Feasibility Study**
Proposed Residential Subdivision, 8303 La Jolla Shores Drive, La Jolla, California

References: 1) Christian Wheeler Engineering, Report 2160564.01, Geologic Reconnaissance, 8303 La Jolla Shores Drive, dated January 9, 2017
2) Christensen Engineering & Surveying, Preliminary Grading Plan, 8303 La Jolla Shores Drive, dated February 3, 2017

Dear Mr. and Mrs. Riha:

In accordance with your request and our proposal dated April 28, 2017, we have prepared this report to present the results of our geotechnical infiltration feasibility study during the discretionary phase of the project. In general, the purpose of our investigation was to provide design infiltration rates based on percolation rates measured in the field. We understand that the subject site will be developed into an eight unit residential subdivision. We also understand that each lot will be designed to include a dedicated storm water basin, and two additional basins will be constructed to accommodate storm water runoff originating from the paved areas of the subdivision.

FINDINGS

SITE DESCRIPTION: The subject site is comprised of three adjacent residential lots identified as Assessor's Parcel Numbers 346-250-08 through -10. The lot is located adjacent to and east of Calle Frescota and south of Calle del Cielo in the La Jolla Shores area of San Diego, California. The site currently supports a single-story, single-family residence with a garage, storage structures and other normally associated improvements. Topographically, the site ascends gently from west to east with an approximately 50-foot-high slope along the eastern margin of the site.

FIELD INVESTIGATION: Our subsurface exploration of the site consisted of nine small-diameter, geotechnical borings that were advanced using a truck-mounted drill rig between May 11 and May 12, 2017. The borings were advanced to the depths ranging from 11½ feet to 19½ feet below existing grades. Eleven percolation test borings were also advanced with a truck-mounted drill rig on May 12, 2017, and were located in areas identified by the project civil engineer as potential storm water infiltration zones. The percolation test borings were advanced to depths ranging from 5 to 11 feet below existing grades. The approximate locations of the borings and percolation test borings are shown on Plate No. 1 of this report. Logs of the explorations are presented in Appendix A of this report. The borings were logged in detail with emphasis on describing the soil profile. No evidence of soil contamination was detected within the samples obtained.

GEOLOGIC SETTING AND SOIL DESCRIPTION: Based upon the findings of our subsurface explorations, it was determined that the proposed storm water basin locations are underlain by old paralic deposits, primarily consisting of sandy clays (CL) with lesser amounts of interbedded clayey sand lenses (SC).

INFILTRATION RATE DETERMINATION

FIELD MEASUREMENTS: Percolation testing was performed on May 15, 2017 in the eleven percolation test borings that were drilled at the locations of the proposed storm water basins, as directed by the project Civil Engineer. The seven-inch-diameter borings, designated as PT-1 through PT-11, were drilled to depths of 5 to 11 feet below existing grade, and cleaned of loose soils. The borings were drilled to the approximate bottom of the proposed storm water basins. Three-inch diameter perforated pipes were set in the holes and the pipes were surrounded by ¾-inch gravel to prevent caving. After pipe installation, the test holes were presoaked.

The field percolation rates were determined the following Monday (two days after pre-soaking) by using the falling head test method. It should be noted that the water placed within the percolation test borings on the day the subsurface exploration was conducted did not fully infiltrate by the time of the start of percolation testing. The initial water level was established by refilling the test holes to near the tops of the proposed storm water basins. Percolation rates were monitored and recorded every 30 minutes over a period of 6 hours until the infiltration rates stabilized. Measurements were taken using a water level meter (Solinst, Model 101) with an accuracy measured to 0.005 foot increments (0.06 inch increments). To account for the use of gravel placed around the perforated pipe, an adjustment factor of 0.47 was used in the calculation of the percolation and

infiltration rates. The measured gravel adjusted percolation and calculated infiltration rates are presented in Table I.

TABLE I: PERCOLATION AND INFILTRATION RATES

Test No.	Location	Soil Underlying BMP	Depth of Testing	Gravel Adjusted Percolation Rate	Infiltration Rate
PT-1	West Side of Lot 5	Old Paralic Deposits	5 feet	0.24 inches per hour	0.00 inches per hour
PT-2	NW Corner of Lot 6	Old Paralic Deposits	5 feet	0.96 inches per hour	0.04 inches per hour
PT-3	NW Corner of Lot 7	Old Paralic Deposits	5 feet	0.24 inches per hour	0.01 inches per hour
PT-4	NW Corner of Lot 8	Old Paralic Deposits	5 feet	0.24 inches per hour	0.01 inches per hour
PT-5	NW Corner of Lot 8	Old Paralic Deposits	5 feet	0.24 inches per hour	0.01 inches per hour
PT-6	NE Corner of Lot 1	Old Paralic Deposits	5 feet	0.24 inches per hour	0.01 inches per hour
PT-7	NW Corner of Lot 2	Old Paralic Deposits	5 feet	0.24 inches per hour	0.01 inches per hour
PT-8	West Side of Lot 1	Old Paralic Deposits	5 feet	0.24 inches per hour	0.01 inches per hour
PT-9	NW Corner of Lot 3	Old Paralic Deposits	10 feet	0.48 inches per hour	0.01 inches per hour
PT-10	SW Corner of Lot 3	Old Paralic Deposits	10 feet	0.48 inches per hour	0.02 inches per hour
PT-11	West Side of Lot 4	Old Paralic Deposits	10.9 feet	1.44 inches per hour	0.03 inches per hour

Infiltration and percolation are two related but different processes describing the movement of moisture through soil. Infiltration is the downward entry of water into the soil or rock surface and percolation is the flow (lateral and vertical) of water through soil and porous or fractured rock. The direct measurement yielded by a percolation test tends to overestimate the infiltration rate, except in cases where a storm water basin or a

dry well is similarly dimensioned to the borehole. As such, the measured percolation rates were converted into infiltration rates using the Porchet Method. The spreadsheet used for the conversion is included in Appendix C of this report.

The average infiltration rate for the natural soils at a depth of 5 feet below existing grades at locations PT-1 through PT-9 and at depths of 10 and 11 feet below existing grade at locations PT-10 and PT-11 was approximately 0.01 inches per hour.

FACTOR OF SAFETY: The City of San Diego Storm Water Standards Design Manual states that "a maximum factor of safety of 2.0 is recommended for infiltration feasibility screening such that an artificially high factor of safety cannot be used to inappropriately rule out infiltration, unless justified. If the site passes the feasibility analysis at a factor of safety of 2.0, then infiltration must be investigated, but a higher factor of safety may be selected at the discretion of the design engineer. Using a FOS of 2.0, an infiltration rate of 0.005 inches per hour can be used for the feasibility analysis for the proposed storm water basins.

The infiltration rate calculated based on the results of the percolation testing is not considered an appreciable rate of infiltration, which indicates a No Infiltration Condition as an appropriate characterization for the project site. Also, based on our professional opinion and the findings of the site investigation, the soil infiltration properties across the areas of the site available for the storm water infiltration are likely to be uniform.

GEOTECHNICAL CRITERIA FOR STORM WATER BASINS

GENERAL: Based on the current Storm Water Standards, BMP Design Manual, certain geotechnical criteria need to be addressed when assessing the feasibility and desirability of the use of storm water basins for a project site. Those criteria, Per Section C.2 of the manual, are addressed below.

C2.1 SOIL AND GEOLOGIC CONDITIONS: Site soil and geologic conditions influence the rate at which water can physically enter the soils. Based on the conditions observed in our exploratory borings, the site is underlain by artificial fill and old paralic deposits. As observed within our borings, the artificial fill consisted of clayey sand/sandy clay (SC/CL) and the old paralic deposits consisted of sandy clay and clayey sand (CL/SC). Groundwater was not encountered within our subsurface investigation.

C2.2 SETTLEMENT AND VOLUME CHANGE: Settlement and volume change can occur when water is introduced below grade. Based upon the soil conditions observed in our borings the artificial fill is subject to a higher potential for hydro collapse upon wetting, while the potential for hydro-collapse within the underlying old paralic deposits is considered to be relatively low. This can be mitigated by a combination of remedial grading and incorporating impermeable liners or cut-off walls. The artificial fill is comprised of clayey sand/sandy clay (SC/CL) which we believe to have a low to moderate expansive potential. There is a potential for heaving within the fill when water is introduced.

C2.3 SLOPE STABILITY: Infiltration of water has the potential to increase the risk of failure to nearby slopes. However, the underlying old paralic deposits are not expected to be prone to slope stability issues provided sound engineering recommendations and construction practices are followed.

C2.4 UTILITY CONSIDERATIONS: Utilities are either public or private infrastructure components that include underground pipelines, vaults, and wires/conduit, and above ground wiring and associated structures. Infiltration of water can pose a risk to subsurface utilities, or geotechnical hazards can occur within the utility trenches when water is introduced. However, based on the infeasibility of infiltration within the approximate boundaries of the site, no further utility considerations in relation to storm water infiltration can be advised at this time.

C2.5 GROUNDWATER MOUNDING: Groundwater mounding occurs when infiltrated water creates a rise in the groundwater table beneath the facility. Groundwater mounding can affect nearby subterranean structures and utilities. Based on the anticipated depth to groundwater, the potential for groundwater mounding is low.

C2.6 RETAINING WALL AND FOUNDATIONS: Infiltration of water can result in potential increases in lateral pressures and potential reduction in soil strength. Retaining walls and foundations can be negatively impacted by these changes in soil conditions. This should be taken into account when designing the storm water basins, retaining walls and foundations for the site. Based on the currently existing project site conditions and the No Infiltration Condition characterization, no negative impacts associated with storm water infiltration are anticipated to effect proposed retaining walls and foundations.

CONCLUSIONS AND RECOMMENDATIONS

Field infiltration rates within the soils below the proposed storm water basins were very low. Using a factor of safety of 2.0, infiltration rates of 0.005 inches per hour can be used. The infiltration rate of 0.005 inches per hour is not considered an appreciable rate of infiltration, which indicates a No Infiltration Condition existing at the project site. Based on our professional opinion and the findings of the site investigation, the soil infiltration properties across the areas of the site available for the storm water infiltration are likely to be uniform, and as such on-site storm water infiltration should not be considered under the currently existing site conditions.

It is our professional opinion and judgment that our recommendation that infiltration facilities not be used to manage storm water discharge is consistent and in accordance with Appendices C and D of the Model BMP Design Manual San Diego Region (2015). Worksheet C.4-1: Categorization of Infiltration Feasibility Criteria has been completed and signed for the subject project, and is included in Appendix B of this report.

It should be noted that it is not our intent to review the civil engineering plans, notes, details, or calculations, when prepared, to verify that the engineer has complied with any particular storm water design standards. It is the responsibility of the designer to properly prepare the storm water plan based on the municipal requirements considering the planned site development and infiltration rates.

LIMITATIONS

The recommendations and opinions expressed in this report reflect our best estimate of the project requirements based on our limited percolation testing, an evaluation of the subsurface soil conditions encountered at our subsurface exploration locations and the assumption that the infiltration rates and soil conditions do not deviate appreciably from those encountered. It should be recognized that the performance of the infiltration basins 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 soils engineer so that they may make modifications if necessary. In addition, this office should be advised of any changes in the project scope, proposed site grading or storm water basins design so that it may be determined if the recommendations contained herein are appropriate. This should be verified in writing or modified by a written addendum.

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

Respectfully submitted,
CHRISTIAN WHEELER ENGINEERING

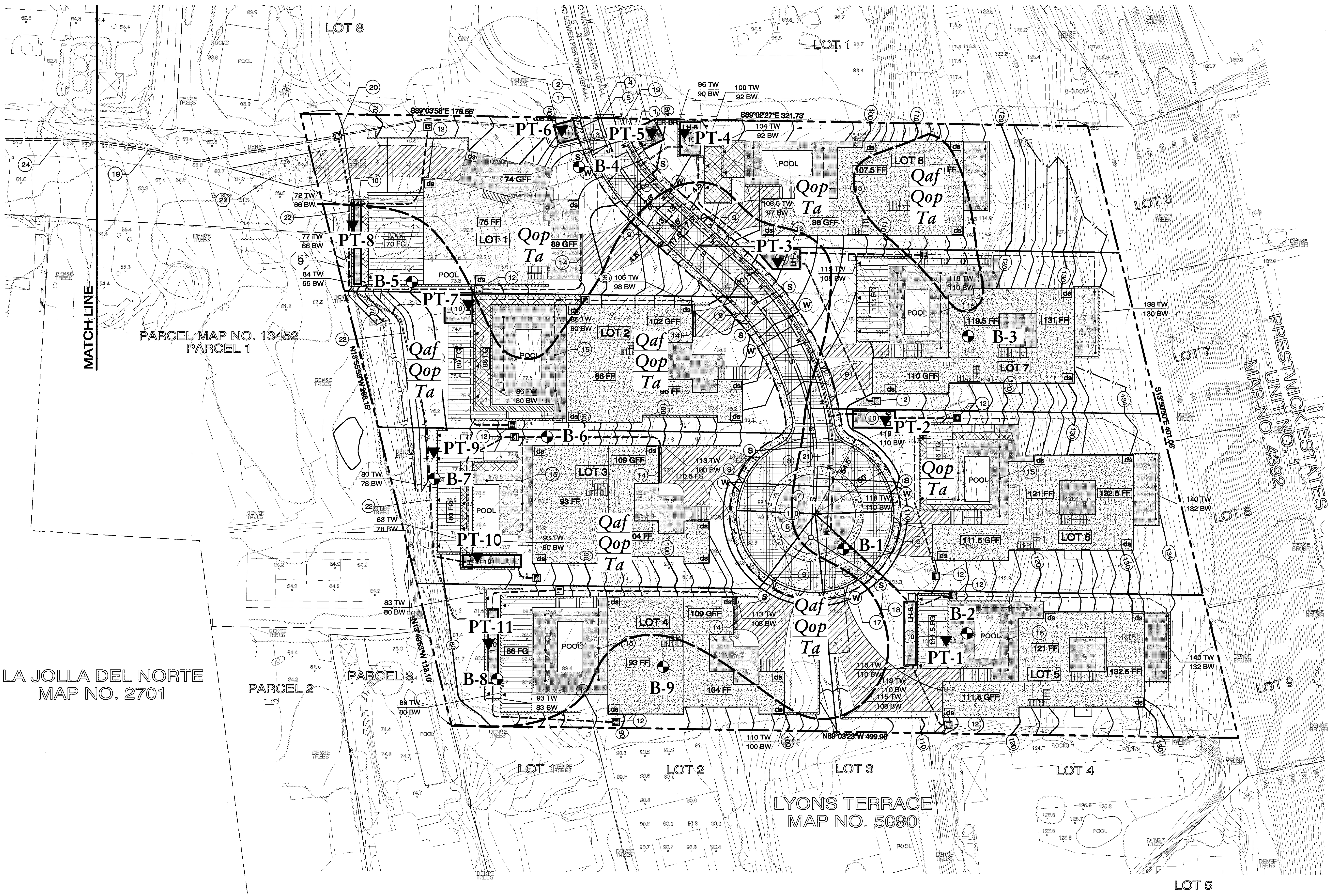
Daniel B. Adler, RCE #36037

David R. Russell, CEG #2215

ec: : lb@beachamconstruction.com; paul@alcornbenton.com; ceands@aol.com

REGISTERED PROFESSIONAL ENGINEER
DANIEL B. ADLER
No. 36037
Exp. 6-30-18
CIVIL
STATE OF CALIFORNIA

CERTIFIED ENGINEERING GEOLOGIST
DAVID R. RUSSELL
No. 2215
STATE OF CALIFORNIA



CWE LEGEND	
B-9	APPROXIMATE BORING LOCATION
PT-11	APPROXIMATE PERCOLATION TEST LOCATION
	GEOLOGIC CONTACT
Qaf / Qop / Ta	ARTIFICIAL FILL OVER OLD PARALIC DEPOSITS
Qop / Ta	OLD PARALIC DEPOSITS OVER ARDATH SHALE
NOTE: TOPSOILS/SUBSOILS NOT MAPPED	

Prepared By:

CHRISTENSEN ENGINEERING & SURVEYING
7888 SILVERTON AVENUE, SUITE "J"
SAN DIEGO, CA 92126
PHONE (858)271-9901 FAX (858)271-8912

Project Address:

8280 CALLE DEL CIELO
LA JOLLA, CA 92037.

Revision 5:
Revision 4:
Revision 3:
Revision 2:
Revision 1:

Project Name:

CIELO TENTATIVE MAP

Original Date: FEBRUARY 03, 2017

Sheet Title:

Sheet

DEP#

PRELIMINARY GRADING PLAN

C-3

JN A2015-50

SITE PLAN AND GEOTECHNICAL MAP	LA JOLLA 8-LOT SUBDIVISION 8280 CALLE DEL CIELO LA JOLLA, CALIFORNIA		CHRISTIAN WHEELER ENGINEERING
	DATE: JUNE 2017	JOB NO.: 2160564.02	
	BY: SRD	PLATE NO.: 1	

Appendix A

Boring Logs

LOG OF TEST BORING B-1

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

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	7 inch Hollow Stem
Existing Elevation:	100.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	110.0 feet	Depth to Water:	Unknown

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				4" of AC.							
			CL	**Old Paralic Deposits (Qop)**: Light brown to yellowish-brown, damp, stiff, SANDY CLAY, mottled, upper 3' moderately weathered, porous. Expansion Index of 82 (Medium).	18	Cal					SA EI SO4 DS
			CL	Brown to reddish-brown, moist.	14	SPT					
5											
					27	Cal		11.9	114.3		
10			SC	Light brown, moist, medium dense, very fine- to medium-grained, CLAYEY SAND with gravels.	16	Cal		11.9	105.9		
			SM	Light brown, moist, medium dense, very fine- to medium-grained, SILTY SAND with trace gravels, mottled.							
15					28	Cal					
			SM-SP	Light brown to black, moist, dense, very fine- to coarse-grained, POORLY GRADED SAND with silt.	57	Cal		6.7	128.0		
20				Boring terminated at 19.5 feet. No groundwater or seepage encountered.							
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	AUGUST 2017	JOB NO.:	2160564.03
BY:	SRD	FIGURE NO.:	A-1

CHRISTIAN WHEELER ENGINEERING

LOG OF TEST BORING B-2

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	7 inch Hollow Stem
Existing Elevation:	108.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	111.0 feet	Depth to Water:	Unknown

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				3" of AC.							
			CL	**Old Paralic Deposits (Qop)**: Dark brown, moist, stiff, SANDY CLAY, mottled, upper 2' weathered with rootlets.							
					18	Cal					
			CL	Light orangish-brown to light gray.							
5					42	Cal					
					27	Cal					
			SC	Light brown, moist, medium dense, very fine- to medium-grained, CLAYEY SAND with trace gravels.							
10			SM	Light yellowish-brown, damp, medium dense, very fine- to medium-grained, VERY SILTY SAND with trace gravels.	28	Cal					
				Boring terminated at 11.5 feet. No groundwater or seepage encountered.							
15											
20											
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	AUGUST 2017	JOB NO.:	2160564.03
BY:	SRD	FIGURE NO.:	A-2

CHRISTIAN WHEELER ENGINEERING

LOG OF TEST BORING B-3

Sample Type and Laboratory Test Legend			
Cal	Modified California Sampler	CK	Chunk
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

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	7 inch Hollow Stem
Existing Elevation:	111.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	119.0 feet	Depth to Water:	Unknown

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			CL	**Old Paralic Deposits (Qop):** Dark brown, damp, loose, SANDY CLAY, mottled, upper 2' moderately weathered.							
					28	Cal					
			SC	Light yellowish-brown, moist, medium dense, very fine- to medium-grained, CLAYEY SAND.	39	Cal		15.2	111.1		DS
5											
			SM	Light yellowish-brown, moist, medium dense, very fine- to medium-grained, VERY SILTY SAND.							
					25	Cal		13.9	106.1		
10											
			SP-SM	Light gray, damp, medium dense, very fine- to medium-grained, POORLY GRADED SAND with silt and gravels.							
15					50/5"	Cal**					
				Gravel/cobble bed at 16 to 17 feet.	50/1"	SPT*					
				Boring terminated at 17 feet. No groundwater or seepage encountered.							
20											
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	AUGUST 2017	JOB NO.:	2160564.03
BY:	SRD	FIGURE NO.:	A-3

CHRISTIAN WHEELER ENGINEERING

LOG OF TEST BORING B-4

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	7 inch Hollow Stem
Existing Elevation:	82.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	74.0 feet	Depth to Water:	Unknown

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				4" of AC.							
			SC	**Old Paralic Deposits (Qop):** Brown to reddish-brown, dry, loose to medium dense, very fine- to medium-grained, CLAYEY SAND, mottled, upper 2' highly weathered.							
				Moist, medium dense.	18	Cal					
5			SM	Light brown, moist, medium dense, very fine- to medium-grained, SILTY SAND.	13	Cal		8.8	116.1		
			SM	Light brown to light grayish-brown, dense, fine- to coarse-grained, SILTY SAND with clay, mottled.							
10					41	Cal					
					50/4"	Cal					
15			ML	**Ardath Shale (Ta):** Light yellowish-brown, moist, hard, CLAYEY SILT with sand.							
					50/5"	Cal		13.2	112.6		DS
20				Boring terminated at 19 feet. No groundwater or seepage encountered.							
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	AUGUST 2017	JOB NO.:	2160564.03
BY:	SRD	FIGURE NO.:	A-4

CHRISTIAN WHEELER
ENGINEERING

LOG OF TEST BORING B-5

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	7 inch Hollow Stem
Existing Elevation:	73.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	70.0 feet	Depth to Water:	Unknown

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			SC	**Artificial Fill (Qaf):** Brown, damp, loose to medium dense, very fine- to medium-grained, SANDY CLAY.							
				Moist, medium dense.	19	Cal					
			SC	**Old Paralic Deposits (Qop):** Orangish-brown to brown, moist, medium dense, very fine- to medium-grained, CLAYEY SAND, mottled.	21	Cal					
5											
					34	Cal					
10											
			CL	**Ardath Shale (Ta):** Yellowish-brown, moist, very stiff, SILTY CLAY with sand, moderately weathered to 16 feet.							
					25	SPT					
15											
				Hard.							SA
					50/5"	SPT					PI
				Boring terminated at 19 feet. No groundwater or seepage encountered.							
20											
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	AUGUST 2017	JOB NO.:	2160564.03
BY:	SRD	FIGURE NO.:	A-5

CHRISTIAN WHEELER ENGINEERING

LOG OF TEST BORING B-6

Sample Type and Laboratory Test Legend

Cal Modified California Sampler; SPT Standard Penetration Test; ST Shelby Tube; CK Chunk; DR Drive Ring

MD Max Density; SO4 Soluble Sulfates; SA Sieve Analysis; HA Hydrometer; SE Sand Equivalent; PI Plasticity Index; CP Collapse Potential

DS Direct Shear; Con Consolidation; EI Expansion Index; R-Val Resistance Value; Chl Soluble Chlorides; Res pH & Resistivity; SD Sample Density

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	7 inch Hollow Stem
Existing Elevation:	79.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	93.0 feet	Depth to Water:	Unknown

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			SC	**Artificial Fill (Qaf):** Brown, damp, loose to medium dense, very fine- to medium-grained, CLAYEY SAND with brick and concrete debris.							
			CL	**Old Paralic Deposits (Qop):** Brown to reddish-brown, moist, stiff to very stiff, SANDY CLAY. Expansion Index of 36 (Low).	32	Cal		10.9	115.2		SA EI
5					24	Cal		15.4	112.6		CP
				Fine- to coarse-grained at contact.							
10			CH	**Ardath Shale (Ta):** Greenish-gray, moist, very stiff, SILTY CLAY, highly weathered.	19	SPT					SA PI
			ML-CL	Light yellowish-brown to light gray, moist, very stiff, CLAYEY SILT/SILTY CLAY, slightly weathered.							
					28	SPT					
15				Boring terminated at 15 feet. No groundwater or seepage encountered.							
20											
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	AUGUST 2017	JOB NO.:	2160564.03
BY:	SRD	FIGURE NO.:	A-6

CHRISTIAN WHEELER ENGINEERING

LOG OF TEST BORING B-7

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

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	7 inch Hollow Stem
Existing Elevation:	78.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	80.0 feet	Depth to Water:	Unknown

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			CL	**Artificial Fill (Qaf):** Brown, dry, medium stiff, SANDY CLAY with concrete debris in the upper 2 feet. Expansion Index of 58 (Medium).							SA EI SO4 DS
				Stiff.	14	Cal					
5											
					14	Cal					
			CL	**Old Paralic Deposits (Qop):** Reddish-brown to brown, moist, very stiff to stiff, SANDY CLAY, mottled.							
10											
					38	Cal		15.0	117.4		SA PI
15											
				Fine- to coarse-grained with gravels at contact.							
			ML/CL	**Ardath Shale (Ta):** Yellowish-brown to light gray, moist, very stiff, CLAYEY SILT/SILTY CLAY.	26	SPT					
20											
				Boring terminated at 20 feet. No groundwater or seepage encountered.							
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	AUGUST 2017	JOB NO.:	2160564.03
BY:	SRD	FIGURE NO.:	A-7

CHRISTIAN WHEELER ENGINEERING

LOG OF TEST BORING B-8

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	7 inch Hollow Stem
Existing Elevation:	83.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	86.0 feet	Depth to Water:	Unknown

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			SC	**Artificial Fill (Qaf):** Brown, dry, loose to medium dense, very fine- to medium-grained, CLAYEY SAND with gravels and concrete debris.							
				Moist, medium dense.	18	Cal					
5				Brick debris at 5 feet.	20	Cal					
10			SC	**Old Paralic Deposits (Qop):** Reddish-brown to brown, moist, dense, very fine- to medium-grained, CLAYEY SAND/SANDY CLAY.	44	Cal					
			SM	Light brown, moist, dense, very fine- to medium-grained, SILTY SAND.							
			SC	Reddish-brown to light gray, moist, dense, very fine- to medium-grained, CLAYEY SAND.	57	Cal					
15				Boring terminated at 14.5 feet. No groundwater or seepage encountered.							
20											
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	AUGUST 2017	JOB NO.:	2160564.03
BY:	SRD	FIGURE NO.:	A-8

CHRISTIAN WHEELER ENGINEERING

LOG OF TEST BORING B-9

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	7 inch Hollow Stem
Existing Elevation:	89.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	93.0 feet	Depth to Water:	Unknown

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:** Brown, dry, loose, very fine- to medium-grained, CLAYEY SAND, porous.							
			CL	**Old Paralic Deposits (Qop):** Brown, moist, very stiff, SANDY CLAY, upper 12" highly weathered, porous.	33	Cal					SA
				Very stiff..							
5			SC	Orangish-brown, moist, medium dense, very fine- to medium-grained, CLAYEY SAND.	20	Cal		8.1	117.3		
			SM	Light brown to light orangish-brown, moist, dense, very fine- to medium-grained, SILTY SAND.	38	Cal		9.2	111.9		
10			SP-SM	Light brown, moist, dense, fine- to coarse-grained, POORLY GRADED SAND with silt.							
15					64	Cal					
				Boring terminated at 16.5 feet. No groundwater or seepage encountered.							
20											
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	AUGUST 2017	JOB NO.:	2160564.03
BY:	SRD	FIGURE NO.:	A-9

CHRISTIAN WHEELER
ENGINEERING

Appendix B

Worksheet C.4-1: Categorization of Infiltration Feasibility Condition

Worksheet C.4-1: Categorization of Infiltration Feasibility Condition

<table>
<tr><th colspan="2">Categorization of Infiltration Feasibility Condition</th><th colspan="2">Worksheet C.4-1</th></tr>
<tr><td colspan="4">Part 1 - Full Infiltration Feasibility Screening Criteria
Would infiltration of the full design volume be feasible from a physical perspective without any undesirable consequences that cannot be reasonably mitigated?</td></tr>
<tr><td>Criteria</td><td>Screening Question</td><td>Yes</td><td>No</td></tr>
<tr><td>1</td><td>Is the estimated reliable infiltration rate below proposed facility locations greater than 0.5 inches per hour? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.</td><td></td><td>X</td></tr>
<tr><td colspan="4">Provide basis:

An infiltration rate assessment has been performed for the soils beneath the area of the proposed on-site storm water infiltration basins as presented in the Report of Geotechnical Infiltration Feasibility Study (CWE 2160564.03). The measured percolation rates were converted to infiltration rates using the Porchet Method. The City of San Diego Storm Water Standards BMP Design Manual states that “a maximum factor of safety (FOS) of 2.0 is recommended for infiltration feasibility screening such that an artificially high factor of safety cannot be used to inappropriately rule out infiltration, unless justified.” Using a FOS of 2.0, the average infiltration rate for the soils below the proposed storm water basins was 0.006 inches per hour.</td></tr>
<tr><td>2</td><td>Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.</td><td>X</td><td></td></tr>
<tr><td colspan="4">Provide basis:

An infiltration rate assessment has been performed for the subject site. Based on the underlying soil conditions and our recommendations presented in our report, we anticipate that infiltration greater than 0.5 inches per hour can be allowed without increasing risk of geologic hazards that cannot be mitigated to an acceptable level.</td></tr>
</table>

Worksheet C.4-1 Page 2 of			
Criteria	Screening Question	Yes	No
3	Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of groundwater contamination (shallow water table, storm water pollutants or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: An infiltration rate assessment has been performed for the subject site. Based on the underlying soil conditions and our recommendations presented in our report, we anticipate that infiltration greater than 0.5 inches per hour can be allowed without increasing risk of groundwater contamination that cannot be mitigated to an acceptable level. The seasonal high groundwater table is estimated to be at greater than 30 feet below existing grades.			
4	Can infiltration greater than 0.5 inches per hour be allowed without causing potential water balance issues such as change of seasonality of ephemeral streams or increased discharge of contaminated groundwater to surface waters? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: There does not appear to be a high risk of causing potential water balance issues such as change of seasonality of ephemeral streams or increased discharge of contaminated groundwater to surface waters by allowing infiltration greater than 0.5 inches per hour.			
Part 1 Result*	If all answers to rows 1 - 4 are "Yes" a full infiltration design is potentially feasible. The feasibility screening category is Full Infiltration If any answer from row 1-4 is "No", infiltration may be possible to some extent but would not generally be feasible or desirable to achieve a "full infiltration" design. Proceed to Part 2		

*To be completed using gathered site information and best professional judgment considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by City Engineer to substantiate findings.

Worksheet C.4-1 Page 3 of			
Part 2 – Partial Infiltration vs. No Infiltration Feasibility Screening Criteria Would infiltration of water in any appreciable amount be physically feasible without any negative consequences that cannot be reasonably mitigated?			
Criteria	Screening Question	Yes	No
5	Do soil and geologic conditions allow for infiltration in any appreciable rate or volume? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.		X
Provide basis: An infiltration rate assessment has been performed for the soils beneath the area of the proposed biofiltration basins as presented in the Report of Geotechnical Infiltration Feasibility Study (CWE 2160564.03). The measured percolation rates were converted to infiltration rates using the Porchet Method. The City of San Diego Storm Water Standards BMP Design Manual states that “a maximum factor of safety (FOS) of 2.0 is recommended for infiltration feasibility screening such that an artificially high factor of safety cannot be used to inappropriately rule out infiltration, unless justified.” Using a FOS of 2.0, an infiltration rate of 0.006 inches per hour can be used for the feasibility analysis for the proposed biofiltration basins. The estimated design infiltration rate is less than 0.01 inches per hour, which is not considered an appreciable rate or volume.			
6	Can Infiltration in any appreciable quantity be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.	X	
Provide basis: An infiltration rate assessment has been performed for the subject site. Based on the underlying soil conditions and our recommendations presented in our report, we anticipate that infiltration in any appreciable quantity can be allowed without increasing risk of geologic hazards that cannot be mitigated to an acceptable level. C.2.2 The underlying old paralic deposits are not expected to be prone to hydro collapse, consolidation or heave to a degree that cannot be mitigated. C.2.3 The underlying old paralic deposits are not expected to be prone to slope stability issues provided sound engineering recommendations and construction practices are followed. C.2.4 Vertical liners could be used to prevent lateral migration into nearby utility trenches. C.2.5 Groundwater mounding is not expected to be a concern. C.2.6 Where biofiltration basins are located within 10 feet of a structure or retaining walls cut-off wall could be constructed around the perimeter of the basins.			

Worksheet C.4-1 Page 4 of			
Criteria	Screening Question	Yes	No
7	Can Infiltration in any appreciable quantity be allowed without posing significant risk for groundwater related concerns (shallow water table, storm water pollutants or other factors)? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: An infiltration rate assessment has been performed for the subject site. Based on the underlying soil conditions and our recommendations presented in our report, we anticipate that an infiltration rate of 0.006 inches per hour can be allowed without increasing risk of groundwater contamination that cannot be mitigated to an acceptable level. The seasonal high groundwater table is estimated to be at greater than 30 feet below existing grades. C.3.1 We have no knowledge of groundwater or soil contamination onsite or down-gradient from the site. C.3.2 The seasonal high groundwater table is estimated to be at greater than 30 feet below existing grade. C.3.3 No existing wellheads are known within the vicinity of the subject site. C.3.4 We have no knowledge of a previous industrial use.			
8	Can infiltration be allowed without violating downstream water rights? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: We did not perform a study regarding water rights. However, these rights are not typical in the San Diego area.			
Part 2 Result*	If all answers from row 1-4 are yes then partial infiltration design is potentially feasible. The feasibility screening category is Partial Infiltration. If any answer from row 5-8 is no, then infiltration of any volume is considered to be infeasible within the drainage area. The feasibility screening category is No Infiltration.		No Infiltration

*To be completed using gathered site information and best professional judgment considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by City Engineer to substantiate findings

Appendix C

Porchet Method- Percolation to Infiltration Conversion Spreadsheet

Percolation to Infiltration Rate Conversion (Porchet Method)

La Jolla Shores Drive

CWE 2160564.03

Perc Test #	Gravel Adjustment Factor	Effective Radius (inches) r	Depth of Hole Below Existing Grade (inches)	Time Interval (min.) Δt	Height of pipe above surface (feet)	Initial Water Depth without correction (feet)	Final Water Depth without correction (feet)	Initial Water Height with correction (inches) H_o	Final Water Height with correction (inches) H_f	Change in head (inches) ΔH	Average Head Height (inches) H_{avg}	Tested Infiltration Rate (inch/hour) I_t
1	0.47	3.5	60	30	0.25	1.88	1.89	40.44	40.32	0.12	40.38	0.00
2	0.47	3.5	60	30	0.00	3.32	3.36	20.16	19.68	0.48	19.92	0.04
3	0.47	3.5	60	30	0.33	3.71	3.72	19.44	19.32	0.12	19.38	0.01
4	0.47	3.5	60	30	0.00	2.63	2.64	28.44	28.32	0.12	28.38	0.01
5	0.47	3.5	60	30	0.00	2.78	2.79	26.64	26.52	0.12	26.58	0.01
6	0.47	3.5	60	30	0.00	3.11	3.12	22.68	22.56	0.12	22.62	0.01
7	0.47	3.5	60	30	0.00	3.64	3.65	16.32	16.20	0.12	16.26	0.01
8	0.47	3.5	60	30	0.00	2.67	2.68	27.96	27.84	0.12	27.90	0.01
9	0.47	3.5	120	30	0.00	6.21	6.23	45.48	45.24	0.24	45.36	0.01
10	0.47	3.5	120	30	0.00	8.10	8.12	22.80	22.56	0.24	22.68	0.02
11	0.47	3.5	131	30	3.00	10.60	10.66	39.80	39.08	0.72	39.44	0.03

"Initial and final water depth without correction" are measurements taken from top of pipe if pipe is sticking out of ground (most cases)
"Initial and final water height with correction" factors in the height of pipe above surface, and provides measurement of water above bottom of pipe
If measurements are taken from grade "Height of pipe above surface" = 0

Gravel Adjustment Factor:

4-inch Diameter Pipe: 1.00 - No Gravel Used (No Caving)
0.51 - 3/4 inch gravel with 8 inch diameter hole
0.56 - 3/4 inch gravel with 7 inch diameter hole
0.64 - 3/4 inch gravel with 6 inch diameter hole

3-inch Diameter Pipe: 1.00 - No Gravel Used (No Caving)
0.44 - 3/4 inch gravel with 8 inch diameter hole
0.47 - 3/4 inch gravel with 7 inch diameter hole
0.51 - 3/4 inch gravel with 6 inch diameter hole

Porchet Method - Tested Percolation Rate Conversion to Tested Infiltration Rate

$$I_t = \frac{\Delta H\ 60\ r}{\Delta t\ (r+2H_{avg})}$$

I_t = tested infiltration rate, inches per hour
ΔH = change in head over the time interval, inches
Δt = time interval, minutes
r = effective radius of test hole
H_{avg} = average head over the time interval, inches

CHRISTIAN WHEELER
ENGINEERING

August 24, 2017

James and Tricia Riha
c/o Beacham Construction
405 Via Del Norte
La Jolla, California 92037

Report 2160564.03

Subject: **Report of Geotechnical Infiltration Feasibility Study**
Proposed Residential Subdivision, 8303 La Jolla Shores Drive, La Jolla, California

References: 1) Christian Wheeler Engineering, Report 2160564.01, Geologic Reconnaissance, 8303 La Jolla Shores Drive, dated January 9, 2017
2) Christensen Engineering & Surveying, Preliminary Grading Plan, 8303 La Jolla Shores Drive, dated February 3, 2017

Dear Mr. and Mrs. Riha:

In accordance with your request and our proposal dated April 28, 2017, we have prepared this report to present the results of our geotechnical infiltration feasibility study during the discretionary phase of the project. In general, the purpose of our investigation was to provide design infiltration rates based on percolation rates measured in the field. We understand that the subject site will be developed into an eight unit residential subdivision. We also understand that each lot will be designed to include a dedicated storm water basin, and two additional basins will be constructed to accommodate storm water runoff originating from the paved areas of the subdivision.

FINDINGS

SITE DESCRIPTION: The subject site is comprised of three adjacent residential lots identified as Assessor's Parcel Numbers 346-250-08 through -10. The lot is located adjacent to and east of Calle Frescota and south of Calle del Cielo in the La Jolla Shores area of San Diego, California. The site currently supports a single-story, single-family residence with a garage, storage structures and other normally associated improvements. Topographically, the site ascends gently from west to east with an approximately 50-foot-high slope along the eastern margin of the site.

FIELD INVESTIGATION: Our subsurface exploration of the site consisted of nine small-diameter, geotechnical borings that were advanced using a truck-mounted drill rig between May 11 and May 12, 2017. The borings were advanced to the depths ranging from 11½ feet to 19½ feet below existing grades. Eleven percolation test borings were also advanced with a truck-mounted drill rig on May 12, 2017, and were located in areas identified by the project civil engineer as potential storm water infiltration zones. The percolation test borings were advanced to depths ranging from 5 to 11 feet below existing grades. The approximate locations of the borings and percolation test borings are shown on Plate No. 1 of this report. Logs of the explorations are presented in Appendix A of this report. The borings were logged in detail with emphasis on describing the soil profile. No evidence of soil contamination was detected within the samples obtained.

GEOLOGIC SETTING AND SOIL DESCRIPTION: Based upon the findings of our subsurface explorations, it was determined that the proposed storm water basin locations are underlain by old paralic deposits, primarily consisting of sandy clays (CL) with lesser amounts of interbedded clayey sand lenses (SC).

INFILTRATION RATE DETERMINATION

FIELD MEASUREMENTS: Percolation testing was performed on May 15, 2017 in the eleven percolation test borings that were drilled at the locations of the proposed storm water basins, as directed by the project Civil Engineer. The seven-inch-diameter borings, designated as PT-1 through PT-11, were drilled to depths of 5 to 11 feet below existing grade, and cleaned of loose soils. The borings were drilled to the approximate bottom of the proposed storm water basins. Three-inch diameter perforated pipes were set in the holes and the pipes were surrounded by ¾-inch gravel to prevent caving. After pipe installation, the test holes were presoaked.

The field percolation rates were determined the following Monday (two days after pre-soaking) by using the falling head test method. It should be noted that the water placed within the percolation test borings on the day the subsurface exploration was conducted did not fully infiltrate by the time of the start of percolation testing. The initial water level was established by refilling the test holes to near the tops of the proposed storm water basins. Percolation rates were monitored and recorded every 30 minutes over a period of 6 hours until the infiltration rates stabilized. Measurements were taken using a water level meter (Solinst, Model 101) with an accuracy measured to 0.005 foot increments (0.06 inch increments). To account for the use of gravel placed around the perforated pipe, an adjustment factor of 0.47 was used in the calculation of the percolation and

infiltration rates. The measured gravel adjusted percolation and calculated infiltration rates are presented in Table I.

TABLE I: PERCOLATION AND INFILTRATION RATES

Test No.	Location	Soil Underlying BMP	Depth of Testing	Gravel Adjusted Percolation Rate	Infiltration Rate
PT-1	West Side of Lot 5	Old Paralic Deposits	5 feet	0.24 inches per hour	0.00 inches per hour
PT-2	NW Corner of Lot 6	Old Paralic Deposits	5 feet	0.96 inches per hour	0.04 inches per hour
PT-3	NW Corner of Lot 7	Old Paralic Deposits	5 feet	0.24 inches per hour	0.01 inches per hour
PT-4	NW Corner of Lot 8	Old Paralic Deposits	5 feet	0.24 inches per hour	0.01 inches per hour
PT-5	NW Corner of Lot 8	Old Paralic Deposits	5 feet	0.24 inches per hour	0.01 inches per hour
PT-6	NE Corner of Lot 1	Old Paralic Deposits	5 feet	0.24 inches per hour	0.01 inches per hour
PT-7	NW Corner of Lot 2	Old Paralic Deposits	5 feet	0.24 inches per hour	0.01 inches per hour
PT-8	West Side of Lot 1	Old Paralic Deposits	5 feet	0.24 inches per hour	0.01 inches per hour
PT-9	NW Corner of Lot 3	Old Paralic Deposits	10 feet	0.48 inches per hour	0.01 inches per hour
PT-10	SW Corner of Lot 3	Old Paralic Deposits	10 feet	0.48 inches per hour	0.02 inches per hour
PT-11	West Side of Lot 4	Old Paralic Deposits	10.9 feet	1.44 inches per hour	0.03 inches per hour

Infiltration and percolation are two related but different processes describing the movement of moisture through soil. Infiltration is the downward entry of water into the soil or rock surface and percolation is the flow (lateral and vertical) of water through soil and porous or fractured rock. The direct measurement yielded by a percolation test tends to overestimate the infiltration rate, except in cases where a storm water basin or a

dry well is similarly dimensioned to the borehole. As such, the measured percolation rates were converted into infiltration rates using the Porchet Method. The spreadsheet used for the conversion is included in Appendix C of this report.

The average infiltration rate for the natural soils at a depth of 5 feet below existing grades at locations PT-1 through PT-9 and at depths of 10 and 11 feet below existing grade at locations PT-10 and PT-11 was approximately 0.01 inches per hour.

FACTOR OF SAFETY: The City of San Diego Storm Water Standards Design Manual states that "a maximum factor of safety of 2.0 is recommended for infiltration feasibility screening such that an artificially high factor of safety cannot be used to inappropriately rule out infiltration, unless justified. If the site passes the feasibility analysis at a factor of safety of 2.0, then infiltration must be investigated, but a higher factor of safety may be selected at the discretion of the design engineer. Using a FOS of 2.0, an infiltration rate of 0.005 inches per hour can be used for the feasibility analysis for the proposed storm water basins.

The infiltration rate calculated based on the results of the percolation testing is not considered an appreciable rate of infiltration, which indicates a No Infiltration Condition as an appropriate characterization for the project site. Also, based on our professional opinion and the findings of the site investigation, the soil infiltration properties across the areas of the site available for the storm water infiltration are likely to be uniform.

GEOTECHNICAL CRITERIA FOR STORM WATER BASINS

GENERAL: Based on the current Storm Water Standards, BMP Design Manual, certain geotechnical criteria need to be addressed when assessing the feasibility and desirability of the use of storm water basins for a project site. Those criteria, Per Section C.2 of the manual, are addressed below.

C2.1 SOIL AND GEOLOGIC CONDITIONS: Site soil and geologic conditions influence the rate at which water can physically enter the soils. Based on the conditions observed in our exploratory borings, the site is underlain by artificial fill and old paralic deposits. As observed within our borings, the artificial fill consisted of clayey sand/sandy clay (SC/CL) and the old paralic deposits consisted of sandy clay and clayey sand (CL/SC). Groundwater was not encountered within our subsurface investigation.

C2.2 SETTLEMENT AND VOLUME CHANGE: Settlement and volume change can occur when water is introduced below grade. Based upon the soil conditions observed in our borings the artificial fill is subject to a higher potential for hydro collapse upon wetting, while the potential for hydro-collapse within the underlying old paralic deposits is considered to be relatively low. This can be mitigated by a combination of remedial grading and incorporating impermeable liners or cut-off walls. The artificial fill is comprised of clayey sand/sandy clay (SC/CL) which we believe to have a low to moderate expansive potential. There is a potential for heaving within the fill when water is introduced.

C2.3 SLOPE STABILITY: Infiltration of water has the potential to increase the risk of failure to nearby slopes. However, the underlying old paralic deposits are not expected to be prone to slope stability issues provided sound engineering recommendations and construction practices are followed.

C2.4 UTILITY CONSIDERATIONS: Utilities are either public or private infrastructure components that include underground pipelines, vaults, and wires/conduit, and above ground wiring and associated structures. Infiltration of water can pose a risk to subsurface utilities, or geotechnical hazards can occur within the utility trenches when water is introduced. However, based on the infeasibility of infiltration within the approximate boundaries of the site, no further utility considerations in relation to storm water infiltration can be advised at this time.

C2.5 GROUNDWATER MOUNDING: Groundwater mounding occurs when infiltrated water creates a rise in the groundwater table beneath the facility. Groundwater mounding can affect nearby subterranean structures and utilities. Based on the anticipated depth to groundwater, the potential for groundwater mounding is low.

C2.6 RETAINING WALL AND FOUNDATIONS: Infiltration of water can result in potential increases in lateral pressures and potential reduction in soil strength. Retaining walls and foundations can be negatively impacted by these changes in soil conditions. This should be taken into account when designing the storm water basins, retaining walls and foundations for the site. Based on the currently existing project site conditions and the No Infiltration Condition characterization, no negative impacts associated with storm water infiltration are anticipated to effect proposed retaining walls and foundations.

CONCLUSIONS AND RECOMMENDATIONS

Field infiltration rates within the soils below the proposed storm water basins were very low. Using a factor of safety of 2.0, infiltration rates of 0.005 inches per hour can be used. The infiltration rate of 0.005 inches per hour is not considered an appreciable rate of infiltration, which indicates a No Infiltration Condition existing at the project site. Based on our professional opinion and the findings of the site investigation, the soil infiltration properties across the areas of the site available for the storm water infiltration are likely to be uniform, and as such on-site storm water infiltration should not be considered under the currently existing site conditions.

It is our professional opinion and judgment that our recommendation that infiltration facilities not be used to manage storm water discharge is consistent and in accordance with Appendices C and D of the Model BMP Design Manual San Diego Region (2015). Worksheet C.4-1: Categorization of Infiltration Feasibility Criteria has been completed and signed for the subject project, and is included in Appendix B of this report.

It should be noted that it is not our intent to review the civil engineering plans, notes, details, or calculations, when prepared, to verify that the engineer has complied with any particular storm water design standards. It is the responsibility of the designer to properly prepare the storm water plan based on the municipal requirements considering the planned site development and infiltration rates.

LIMITATIONS

The recommendations and opinions expressed in this report reflect our best estimate of the project requirements based on our limited percolation testing, an evaluation of the subsurface soil conditions encountered at our subsurface exploration locations and the assumption that the infiltration rates and soil conditions do not deviate appreciably from those encountered. It should be recognized that the performance of the infiltration basins 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 soils engineer so that they may make modifications if necessary. In addition, this office should be advised of any changes in the project scope, proposed site grading or storm water basins design so that it may be determined if the recommendations contained herein are appropriate. This should be verified in writing or modified by a written addendum.

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

Respectfully submitted,

CHRISTIAN WHEELER ENGINEERING

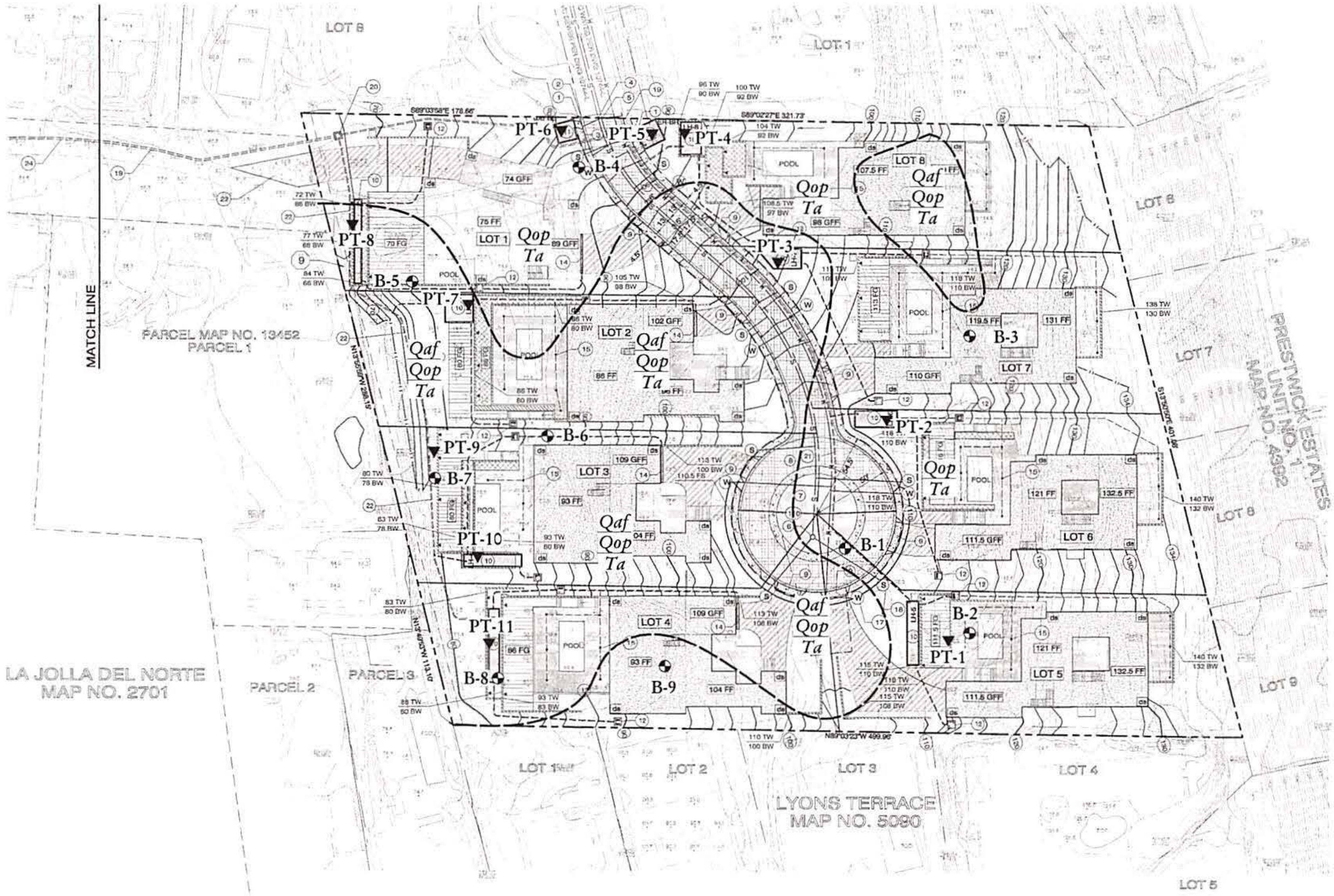
Daniel B. Adler, RCE #36037

David R. Russell, CEG #2215

ec: : lb@beachamconstruction.com; paul@alcornbenton.com; ~~ceands~~@aol.com

REGISTERED PROFESSIONAL ENGINEER
DANIEL B. ADLER
No. 36037
Exp. 6-30-18
CIVIL
STATE OF CALIFORNIA

CERTIFIED ENGINEERING GEOLOGIST
DAVID R. RUSSELL
No. 2215
STATE OF CALIFORNIA



CWE LEGEND	
B-9	APPROXIMATE BORING LOCATION
PT-11	APPROXIMATE PERCOLATION TEST LOCATION
	GEOLOGIC CONTACT
Qaf / Qop / Ta	ARTIFICIAL FILL OVER OLD PARALIC DEPOSITS
Qop / Ta	OLD PARALIC DEPOSITS OVER ARDATH SHALE
NOTE: TOPSOILS/SUBSOILS NOT MAPPED	

PRELIMINARY GRADING PLAN C-3

SITE PLAN AND GEOTECHNICAL MAP

LA JOLLA 6-LOT SUBDIVISION
CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	JUNE 2017	JOB NO.:	[illegible]
BY:	SRD	PLATE NO.:	1

CHRISTIAN WHEELER ENGINEERING

Appendix A

Boring Logs

LOG OF TEST BORING B-1

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	7 inch Hollow Stem
Existing Elevation:	100.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	110.0 feet	Depth to Water:	Unknown

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				4" of AC.							
			CL	Old Paralic Deposits (Qop): Light brown to yellowish-brown, damp, stiff, SANDY CLAY, mottled, upper 3' moderately weathered, porous. Expansion Index of 82 (Medium).	18	Cal					SA EI SO4 DS
			CL	Brown to reddish-brown, moist.	14	SPT					
5					27	Cal		11.9	114.3		
10			SC	Light brown, moist, medium dense, very fine- to medium-grained, CLAYEY SAND with gravels.	16	Cal		11.9	105.9		
			SM	Light brown, moist, medium dense, very fine- to medium-grained, SILTY SAND with trace gravels, mottled.							
15					28	Cal					
			SM-SP	Light brown to black, moist, dense, very fine- to coarse-grained, POORLY GRADED SAND with silt.	57	Cal		6.7	128.0		
20				Boring terminated at 19.5 feet. No groundwater or seepage encountered.							
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	AUGUST 2017	JOB NO.:	2160564.03
BY:	SRD	FIGURE NO.:	A-1

CHRISTIAN WHEELER ENGINEERING

LOG OF TEST BORING B-2

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

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	7 inch Hollow Stem
Existing Elevation:	108.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	111.0 feet	Depth to Water:	Unknown

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				3" of AC.							
			CL	**Old Paralic Deposits (Qop):** Dark brown, moist, stiff, SANDY CLAY, mottled, upper 2' weathered with rootlets.							
					18	Cal					
			CL	Light orangish-brown to light gray.							
					42	Cal					
5											
					27	Cal					
			SC	Light brown, moist, medium dense, very fine- to medium-grained, CLAYEY SAND with trace gravels.							
10			SM	Light yellowish-brown, damp, medium dense, very fine- to medium-grained, VERY SILTY SAND with trace gravels.	28	Cal					
				Boring terminated at 11.5 feet. No groundwater or seepage encountered.							
15											
20											
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	AUGUST 2017	JOB NO.:	2160564.03
BY:	SRD	FIGURE NO.:	A-2

CHRISTIAN WHEELER ENGINEERING

LOG OF TEST BORING B-3

Sample Type and Laboratory Test Legend

Cal	Modified California Sampler	CK	Chunk
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

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	7 inch Hollow Stem
Existing Elevation:	111.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	119.0 feet	Depth to Water:	Unknown

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			CL	Old Paralic Deposits (Qop): Dark brown, damp, loose, SANDY CLAY, mottled, upper 2' moderately weathered.							
					28	Cal					
5			SC	Light yellowish-brown, moist, medium dense, very fine- to medium-grained, CLAYEY SAND.	39	Cal	■	15.2	111.1		DS
			SM	Light yellowish-brown, moist, medium dense, very fine- to medium-grained, VERY SILTY SAND.							
10					25	Cal		13.9	106.1		
15			SP-SM	Light gray, damp, medium dense, very fine- to medium-grained, POORLY GRADED SAND with silt and gravels.	50/5"	Cal**					
				Gravel/cobble bed at 16 to 17 feet.	50/1"	SPT*					
				Boring terminated at 17 feet. No groundwater or seepage encountered.							
20											
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	AUGUST 2017	JOB NO.:	2160564.03
BY:	SRD	FIGURE NO.:	A-3

CHRISTIAN WHEELER ENGINEERING

LOG OF TEST BORING B-4

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

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	7 inch Hollow Stem
Existing Elevation:	82.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	74.0 feet	Depth to Water:	Unknown

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				4" of AC.							
			SC	**Old Paralic Deposits (Qop):** Brown to reddish-brown, dry, loose to medium dense, very fine- to medium-grained, CLAYEY SAND, mottled, upper 2' highly weathered.	18	Cal					
				Moist, medium dense.							
			SM	Light brown, moist, medium dense, very fine- to medium-grained, SILTY SAND.	13	Cal		8.8	116.1		
5											
			SM	Light brown to light grayish-brown, dense, fine- to coarse-grained, SILTY SAND with clay, mottled.	41	Cal					
10											
					50/4"	Cal					
15			ML	**Ardath Shale (Ta):** Light yellowish-brown, moist, hard, CLAYEY SILT with sand.							
					50/5"	Cal		13.2	112.6		DS
				Boring terminated at 19 feet. No groundwater or seepage encountered.							
20											
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	AUGUST 2017	JOB NO.:	2160564.03
BY:	SRD	FIGURE NO.:	A-4

CHRISTIAN WHEELER ENGINEERING

LOG OF TEST BORING B-5

Sample Type and Laboratory Test Legend

Cal Modified California Sampler; SPT Standard Penetration Test; ST Shelby Tube; CK Chunk; DR Drive Ring

MD Max Density; SO4 Soluble Sulfates; SA Sieve Analysis; HA Hydrometer; SE Sand Equivalent; PI Plasticity Index; CP Collapse Potential; DS Direct Shear; Con Consolidation; EI Expansion Index; R-Val Resistance Value; Chl Soluble Chlorides; Res pH & Resistivity; SD Sample Density

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	7 inch Hollow Stem
Existing Elevation:	73.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	70.0 feet	Depth to Water:	Unknown

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			SC	**Artificial Fill (Qaf):** Brown, damp, loose to medium dense, very fine- to medium-grained, SANDY CLAY.							
				Moist, medium dense.	19	Cal					
5			SC	**Old Paralic Deposits (Qop):** Orangish-brown to brown, moist, medium dense, very fine- to medium-grained, CLAYEY SAND, mottled.	21	Cal					
10					34	Cal					
			CL	**Ardath Shale (Ta):** Yellowish-brown, moist, very stiff, SILTY CLAY with sand, moderately weathered to 16 feet.							
15					25	SPT					
				Hard.							SA
					50/5"	SPT					PI
20				Boring terminated at 19 feet. No groundwater or seepage encountered.							
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	AUGUST 2017	JOB NO.:	2160564.03
BY:	SRD	FIGURE NO.:	A-5

CHRISTIAN WHEELER ENGINEERING

LOG OF TEST BORING B-6

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

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	7 inch Hollow Stem
Existing Elevation:	79.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	93.0 feet	Depth to Water:	Unknown

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			SC	Artificial Fill (Qaf): Brown, damp, loose to medium dense, very fine- to medium-grained, CLAYEY SAND with brick and concrete debris.							
			CL	Old Paralic Deposits (Qop): Brown to reddish-brown, moist, stiff to very stiff, SANDY CLAY. Expansion Index of 36 (Low).	32	Cal		10.9	115.2		SA EI
					24	Cal		15.4	112.6		CP
5				Fine- to coarse-grained at contact.							
			CH	Ardath Shale (Ta): Greenish-gray, moist, very stiff, SILTY CLAY, highly weathered.	19	SPT					SA PI
10			ML-CL	Light yellowish-brown to light gray, moist, very stiff, CLAYEY SILT/SILTY CLAY, slightly weathered.							
					28	SPT					
15				Boring terminated at 15 feet. No groundwater or seepage encountered.							
20											
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	AUGUST 2017	JOB NO.:	2160564.03
BY:	SRD	FIGURE NO.:	A-6

CHRISTIAN WHEELER ENGINEERING

LOG OF TEST BORING B-7

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	7 inch Hollow Stem
Existing Elevation:	78.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	80.0 feet	Depth to Water:	Unknown

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			CL	Artificial Fill (Qaf): Brown, dry, medium stiff, SANDY CLAY with concrete debris in the upper 2 feet. Expansion Index of 58 (Medium).							SA EI SO4 DS
				Stiff.	14	Cal					
5					14	Cal					
10			CL	Old Paralic Deposits (Qop): Reddish-brown to brown, moist, very stiff to stiff, SANDY CLAY, mottled.							
					38	Cal		15.0	117.4		SA PI
15											
				Fine- to coarse-grained with gravels at contact.							
20			ML/CL	Ardath Shale (Ta): Yellowish-brown to light gray, moist, very stiff, CLAYEY SILT/SILTY CLAY.	26	SPT					
				Boring terminated at 20 feet. No groundwater or seepage encountered.							
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	AUGUST 2017	JOB NO.:	2160564.03
BY:	SRD	FIGURE NO.:	A-7

CHRISTIAN WHEELER ENGINEERING

LOG OF TEST BORING B-8

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

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	7 inch Hollow Stem
Existing Elevation:	83.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	86.0 feet	Depth to Water:	Unknown

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			SC	Artificial Fill (Qaf): Brown, dry, loose to medium dense, very fine- to medium-grained, CLAYEY SAND with gravels and concrete debris.							
				Moist, medium dense.	18	Cal					
5				Brick debris at 5 feet.	20	Cal					
			SC	Old Paralic Deposits (Qop): Reddish-brown to brown, moist, dense, very fine- to medium-grained, CLAYEY SAND/SANDY CLAY.	44	Cal					
10											
			SM	Light brown, moist, dense, very fine- to medium-grained, SILTY SAND.							
			SC	Reddish-brown to light gray, moist, dense, very fine- to medium-grained, CLAYEY SAND.	57	Cal					
15				Boring terminated at 14.5 feet. No groundwater or seepage encountered.							
20											
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	AUGUST 2017	JOB NO.:	2160564.03
BY:	SRD	FIGURE NO.:	A-8

CHRISTIAN WHEELER ENGINEERING

LOG OF TEST BORING B-9

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

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	7 inch Hollow Stem
Existing Elevation:	89.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	93.0 feet	Depth to Water:	Unknown

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	USCS SYMBOL	SUMMARY OF SUBSURFACE CONDITIONS (based on Unified Soil Classification System)	PENETRATION (blows per foot)	SAMPLE TYPE	BULK	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	RELATIVE COMPACTION (%)	LABORATORY TESTS
0			SM	**Topsoil:** Brown, dry, loose, very fine- to medium-grained, CLAYEY SAND, porous.							
			CL	**Old Paralic Deposits (Qop):** Brown, moist, very stiff, SANDY CLAY, upper 12" highly weathered, porous.	33	Cal					SA
				Very stiff..							
5			SC	Orangish-brown, moist, medium dense, very fine- to medium-grained, CLAYEY SAND.	20	Cal		8.1	117.3		
			SM	Light brown to light orangish-brown, moist, dense, very fine- to medium-grained, SILTY SAND.	38	Cal		9.2	111.9		
10			SP-SM	Light brown, moist, dense, fine- to coarse-grained, POORLY GRADED SAND with silt.							
15					64	Cal					
				Boring terminated at 16.5 feet. No groundwater or seepage encountered.							
20											
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	AUGUST 2017	JOB NO.:	2160564.03
BY:	SRD	FIGURE NO.:	A-9

CHRISTIAN WHEELER ENGINEERING

Appendix B

Worksheet C.4-1: Categorization of Infiltration Feasibility Condition

Worksheet C.4-1: Categorization of Infiltration Feasibility Condition

Categorization of Infiltration Feasibility Condition		Worksheet C.4-1	
Part 1 - Full Infiltration Feasibility Screening Criteria Would infiltration of the full design volume be feasible from a physical perspective without any undesirable consequences that cannot be reasonably mitigated?			
Criteria	Screening Question	Yes	No
1	Is the estimated reliable infiltration rate below proposed facility locations greater than 0.5 inches per hour? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.		X
Provide basis: An infiltration rate assessment has been performed for the soils beneath the area of the proposed on-site storm water infiltration basins as presented in the Report of Geotechnical Infiltration Feasibility Study (CWE 2160564.03). The measured percolation rates were converted to infiltration rates using the Porchet Method. The City of San Diego Storm Water Standards BMP Design Manual states that "a maximum factor of safety (FOS) of 2.0 is recommended for infiltration feasibility screening such that an artificially high factor of safety cannot be used to inappropriately rule out infiltration, unless justified." Using a FOS of 2.0, the average infiltration rate for the soils below the proposed storm water basins was 0.006 inches per hour.			
2	Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.	X	
Provide basis: An infiltration rate assessment has been performed for the subject site. Based on the underlying soil conditions and our recommendations presented in our report, we anticipate that infiltration greater than 0.5 inches per hour can be allowed without increasing risk of geologic hazards that cannot be mitigated to an acceptable level.			

Worksheet C.4-1 Page 2 of			
Criteria	Screening Question	Yes	No
3	Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of groundwater contamination (shallow water table, storm water pollutants or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: An infiltration rate assessment has been performed for the subject site. Based on the underlying soil conditions and our recommendations presented in our report, we anticipate that infiltration greater than 0.5 inches per hour can be allowed without increasing risk of groundwater contamination that cannot be mitigated to an acceptable level. The seasonal high groundwater table is estimated to be at greater than 30 feet below existing grades.			
4	Can infiltration greater than 0.5 inches per hour be allowed without causing potential water balance issues such as change of seasonality of ephemeral streams or increased discharge of contaminated groundwater to surface waters? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: There does not appear to be a high risk of causing potential water balance issues such as change of seasonality of ephemeral streams or increased discharge of contaminated groundwater to surface waters by allowing infiltration greater than 0.5 inches per hour.			
Part 1 Result*	If all answers to rows 1 - 4 are "Yes" a full infiltration design is potentially feasible. The feasibility screening category is Full Infiltration If any answer from row 1-4 is "No", infiltration may be possible to some extent but would not generally be feasible or desirable to achieve a "full infiltration" design. Proceed to Part 2		

*To be completed using gathered site information and best professional judgment considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by City Engineer to substantiate findings.

Worksheet C.4-1 Page 3 of			
Part 2 – Partial Infiltration vs. No Infiltration Feasibility Screening Criteria Would infiltration of water in any appreciable amount be physically feasible without any negative consequences that cannot be reasonably mitigated?			
Criteria	Screening Question	Yes	No
5	Do soil and geologic conditions allow for infiltration in any appreciable rate or volume? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.		X
Provide basis: An infiltration rate assessment has been performed for the soils beneath the area of the proposed biofiltration basins as presented in the Report of Geotechnical Infiltration Feasibility Study (CWE 2160564.03). The measured percolation rates were converted to infiltration rates using the Porchet Method. The City of San Diego Storm Water Standards BMP Design Manual states that "a maximum factor of safety (FOS) of 2.0 is recommended for infiltration feasibility screening such that an artificially high factor of safety cannot be used to inappropriately rule out infiltration, unless justified." Using a FOS of 2.0, an infiltration rate of 0.006 inches per hour can be used for the feasibility analysis for the proposed biofiltration basins. The estimated design infiltration rate is less than 0.01 inches per hour, which is not considered an appreciable rate or volume.			
6	Can Infiltration in any appreciable quantity be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.	X	
Provide basis: An infiltration rate assessment has been performed for the subject site. Based on the underlying soil conditions and our recommendations presented in our report, we anticipate that infiltration in any appreciable quantity can be allowed without increasing risk of geologic hazards that cannot be mitigated to an acceptable level. C.2.2 The underlying old paralic deposits are not expected to be prone to hydro collapse, consolidation or heave to a degree that cannot be mitigated. C.2.3 The underlying old paralic deposits are not expected to be prone to slope stability issues provided sound engineering recommendations and construction practices are followed. C.2.4 Vertical liners could be used to prevent lateral migration into nearby utility trenches. C.2.5 Groundwater mounding is not expected to be a concern. C.2.6 Where biofiltration basins are located within 10 feet of a structure or retaining walls cut-off wall could be constructed around the perimeter of the basins.			

Worksheet C.4-1 Page 4 of			
Criteria	Screening Question	Yes	No
7	Can Infiltration in any appreciable quantity be allowed without posing significant risk for groundwater related concerns (shallow water table, storm water pollutants or other factors)? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: An infiltration rate assessment has been performed for the subject site. Based on the underlying soil conditions and our recommendations presented in our report, we anticipate that an infiltration rate of 0.006 inches per hour can be allowed without increasing risk of groundwater contamination that cannot be mitigated to an acceptable level. The seasonal high groundwater table is estimated to be at greater than 30 feet below existing grades. C.3.1 We have no knowledge of groundwater or soil contamination onsite or down-gradient from the site. C.3.2 The seasonal high groundwater table is estimated to be at greater than 30 feet below existing grade. C.3.3 No existing wellheads are known within the vicinity of the subject site. C.3.4 We have no knowledge of a previous industrial use.			
8	Can infiltration be allowed without violating downstream water rights? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: We did not perform a study regarding water rights. However, these rights are not typical in the San Diego area.			
Part 2 Result*	If all answers from row 1-4 are yes then partial infiltration design is potentially feasible. The feasibility screening category is Partial Infiltration. If any answer from row 5-8 is no, then infiltration of any volume is considered to be infeasible within the drainage area. The feasibility screening category is No Infiltration.		No Infiltration

*To be completed using gathered site information and best professional judgment considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by City Engineer to substantiate findings

Appendix C

Porchet Method- Percolation to Infiltration Conversion Spreadsheet

Percolation to Infiltration Rate Conversion (Porchet Method)

La Jolla Shores Drive

CWE 2160564.03

Perc Test #	Gravel Adjustment Factor	Effective Radius (inches) r	Depth of Hole Below Existing Grade (inches)	Time Interval (min.) Δt	Height of pipe above surface (feet)	Initial Water Depth without correction (feet)	Final Water Depth without correction (feet)	Initial Water Height with correction (inches) H_o	Final Water Height with correction (inches) H_f	Change in head (inches) ΔH	Average Head Height (inches) H_{avg}	Tested Infiltration Rate (inch/hour) I_t
1	0.47	3.5	60	30	0.25	1.88	1.89	40.44	40.32	0.12	40.38	0.00
2	0.47	3.5	60	30	0.00	3.32	3.36	20.16	19.68	0.48	19.92	0.04
3	0.47	3.5	60	30	0.33	3.71	3.72	19.44	19.32	0.12	19.38	0.01
4	0.47	3.5	60	30	0.00	2.63	2.64	28.44	28.32	0.12	28.38	0.01
5	0.47	3.5	60	30	0.00	2.78	2.79	26.64	26.52	0.12	26.58	0.01
6	0.47	3.5	60	30	0.00	3.11	3.12	22.68	22.56	0.12	22.62	0.01
7	0.47	3.5	60	30	0.00	3.64	3.65	16.32	16.20	0.12	16.26	0.01
8	0.47	3.5	60	30	0.00	2.67	2.68	27.96	27.84	0.12	27.90	0.01
9	0.47	3.5	120	30	0.00	6.21	6.23	45.48	45.24	0.24	45.36	0.01
10	0.47	3.5	120	30	0.00	8.10	8.12	22.80	22.56	0.24	22.68	0.02
11	0.47	3.5	131	30	3.00	10.60	10.66	39.80	39.08	0.72	39.44	0.03

"Initial and final water depth without correction" are measurements taken from top of pipe if pipe is sticking out of ground (most cases)
"Initial and final water height with correction" factors in the height of pipe above surface, and provides measurement of water above bottom of pipe
If measurements are taken from grade "Height of pipe above surface" = 0

Gravel Adjustment Factor:

4-inch Diameter Pipe: 1.00 - No Gravel Used (No Caving)
0.51 - 3/4 inch gravel with 8 inch diameter hole
0.56 - 3/4 inch gravel with 7 inch diameter hole
0.64 - 3/4 inch gravel with 6 inch diameter hole

3-inch Diameter Pipe: 1.00 - No Gravel Used (No Caving)
0.44 - 3/4 inch gravel with 8 inch diameter hole
0.47 - 3/4 inch gravel with 7 inch diameter hole
0.51 - 3/4 inch gravel with 6 inch diameter hole

Porchet Method - Tested Percolation Rate Conversion to Tested Infiltration Rate

$$I_t = \frac{\Delta H \, 60 \, r}{\Delta t \, (r + 2H_{avg})}$$

I_t = tested infiltration rate, inches per hour
ΔH = change in head over the time interval, inches
Δt = time interval, minutes
r = effective radius of test hole
H_{avg} = average head over the time interval, inches

Preliminary Drainage Study

Cielo Tentative Map

Parcels 1-3, PM No. 14620
8280 Calle del Cielo
La Jolla, California 92037

Prepared for:
Patricia Riha Gift Trust
8303 La Jolla Shores Drive
La Jolla, California 92037

Prepared by:
Christensen Engineering & Surveying
7888 Silverton Avenue, Suite "J"
San Diego, CA 92126
(858) 271-9901

February 05, 2017
Revised June 04, 2017
Revised July 15, 2017
Revised August 21, 2017

PTS No. 529620

Introduction

This project proposes the subdivision of existing parcels 1-3 of Parcel Map No. 14620 into 8 lots. This project involves the removal of the existing single-family residence followed by the proposed construction of 8 new single-family residences and appurtenances, including a private driveway, drainage, sewer and water facilities, landscaping and site walls.

The attached drainage area maps are from a topographic survey by Christensen Engineering & Surveying dated February 3, 2016. Prior to construction there exists offsite runoff to the site from the area northerly of the property. As shown on the pre-construction drainage area map, the offsite and onsite runoff flows to the area westerly, with the majority of the runoff flowing to the 60' road easement westerly of the site and then to La Jolla Shores Drive. A portion of the site runoff flows to the neighboring properties westerly of the site. The total pre-construction runoff flowing westerly is 7.49 cfs. Following construction there is a total increase in site runoff of 0.56 cfs (from 7.34 to 7.90 cfs). Following construction, the majority of the site runoff (7.56 cfs) will be conveyed to a cleanout in the private driveway and then convey by a 18" RCP drain to an existing curb inlet at the southeast corner of the intersection of Calle del Oro and Calle del Cielo. A portion of the site runoff (3.60 cfs) will be collected in a cleanout on Lot 1 and pumped to the cleanout in the private driveway. Total runoff to the west will decrease from 7.49 cfs to 0.48 cfs a decrease of 93.6%. The addition of 7.56 cfs of runoff to the public storm drain system in Calle del Oro will cause no adverse effect. The decrease in runoff to the west will improve the drainage condition experienced by the westerly neighbors as well as in La Jolla Shores Drive. The site has 0.650 ac of imperviousness and a proposed 1.782 ac area of imperiousness following development, a change from 14.6% to 40.0% area of imperviousness.

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 or the public storm drain system.

______________________________ 08-21-17

Antony K. Christensen Date

RCE 54021

Exp. 12-31-17

JN A2015-50

Calculations

1. *Intensity Calculation*

(From the City of San Diego Drainage Design Manual, Page 86)
Tc = Time of concentration

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

Since the difference in elevation is 77' (142'-65') and the distance traveled is 678' (S=11.4%). C=0.55.

Tc = 11.4 minutes

From table on Page 83

I_{100} = 3.3 inches

2. *Coefficient Determination*

The site and the area offsite that will contribute to runoff is included in this study.
From Page 82

Pre-Construction:
Since the property is developed a weighted average for the area of imperviousness is used for the area of the site that is not improved (C=0.45) and the improved area (C=0.55) is used:

14.6 % of the site is impervious, 85.4% is permeable.

So 0.146 * 0.55 + 0.854 * 0.45 = 0.47

C= 0.50 (required minimum by City)

Post construction:
From Page 82 for Single Family

C = 0.55

3. *Volume calculations*

Q = CIA

Areas of Drainage

While the procedure used by the City of San Diego Drainage Design Manual indicates that areas of similar use should employ the same runoff coefficient using that method for this project would result in the same, pre- and post-construction total runoff. Therefore, the weighted average is used below.

Pre-Construction

Area offsite draining onsite and then westerly to the 60' road easement by surface flow	OS = 0.093 Acre
Northerly area of site draining westerly to 60' road easement by surface flow	A = 0.135 Acre
Main area of site draining westerly to 60' road easement by surface flow	B = 3.717 Acre
Southerly and westerly area of Draining westerly onto neighboring Properties by surface flow	C = 0.600 Acre

Post-Construction

Area draining from lots 5-8 biofiltration basins to 8" PVC drain in street and to the Type A cleanout in the private driveway and then in a 18" RCP drain to the existing curb inlet in Calle del Cielo.	PC-A = 1.491 Acre

Area draining from portion of Lots 5-8 and easterly street to the Type A cleanout in the private driveway and then in a 18" RCP drain to the existing curb inlet in Calle del Cielo.	PC-B = 0.687 Acre
Area of westerly street draining To westerly street biofiltration basin and then to the Type A cleanout in the private driveway and then in a 18" RCP drain to the existing curb inlet in Calle del Cielo. .	PC-C = 0.209 Acre
Area draining from lots 1-4 biofiltration basins to 8" PVC drain and then to the cleanout in lot 1	PC-D = 1.256 Acre
Area of lots 2-4 flowing westerly to drainage ditch and then to clean out in lot 1	PC-E1 = 0.519 Acre
Area of lots 2-4 flowing westerly by surface flow	PC-E2 = 0.040 Acre
Area of Lot 1 flowing westerly by surface flow to 60' easement	PC-F = 0.142 Acre

Pre-Construction

Q_{100OS} = (0.50) (3.3) (0.093)
Q_{100A} = (0.50) (3.3) (0.135)
Q_{100B} = (0.50) (3.3) (3.717)
Q_{100C} = (0.50) (3.3) (0.600)

Q_{1000S} = 0.15 cfs
Q_{100A} = 0.22 cfs
Q_{100B} = 6.13 cfs
Q_{100C} = 0.99 cfs

Post-Construction

Q_{100OS} = (0.50) (3.3) (0.093)
$Q_{100PC\text{-}A}$ = (0.55) (3.3) (1.491)
$Q_{100PC\text{-}B}$ = (0.55) (3.3) (0.687)
$Q_{100PC\text{-}C}$ = (0.55) (3.3) (0.209)
$Q_{100PC\text{-}D}$ = (0.55) (3.3) (1.256)
$Q_{100PC\text{-}E1}$ = (0.55) (3.3) (0.519)
$Q_{100PC\text{-}E2}$ = (0.55) (3.3) (0.040)
$Q_{100PC\text{-}F}$ = (0.55) (3.3) (0.142)

Q_{100OS} = 0.15 cfs
$Q_{100PC\text{-}A}$ = 2.71 cfs
$Q_{100PC\text{-}B}$ = 1.25 cfs
$Q_{100PC\text{-}C}$ = 0.38 cfs
$Q_{100PC\text{-}D}$ = 2.28 cfs
$Q_{100PC\text{-}E1}$ = 0.94 cfs
$Q_{100PC\text{-}E2}$ = 0.07 cfs
$Q_{100PC\text{-}F}$ = 0.26 cfs

4. Discussion

A portion of the site and offsite area (Areas OS, A & B), in its existing pre-construction condition, drains westerly to the 60' easement area (6.50 cfs) and another portion of the site (Area C) drains to the westerly neighbor properties (0.99 cfs). So, total runoff flowing westerly is 7.49 cfs) Following construction areas PC-A, B, C, D and E-1 (7.56 cfs) will be collected in a Type A cleanout and then conveyed in a new 18" RCP drain to the existing 15' curb inlet at the southeast corner of Calle del Cielo and Calle del Oro. From that curb inlet runoff flows to a second curb inlet at the northerly intersection of Calle del Cielo and Calle del Oro and then to a 30" concrete pipe at La Jolla Shores Drive and then by a 1.5' x 4' box culvert (under pressure) to its outlet. Area PC-C,D & E1 will be collected in a cleanout in lot 1 (3.60 cfs) and will be pumped to the Type A cleanout described above. The offsite run-on and runoff from area OS (0.15 cfs) and areas PC-E2 & F (0.41 cfs) continues to flow by surface runoff onto the 60' easement. The area flowing to the neighboring properties decreases (from 0.99 cfs to 0.33 cfs). Following construction, the total runoff from the site increases from 7.34 cfs to 7.90 cfs (offsite run-on does not change (0.15 cfs)). Runoff continues to flow westerly, as it does now but is decreased from 7.49 cfs to 0.48 cfs (Areas

PC-E2, F and OS), a decrease of 93.6%. The public drain system in Calle del Cielo and Calle del Oro and Camino del Oro was evaluated (see following sections) and the increase in runoff of 7.56 cfs will not have a deleterious effect on the public storm drain. The system is capable of conveying this small increase in runoff.

Public Storm Drain Impact Analysis

1. *Intensity Calculation*

(From the City of San Diego Drainage Design Manual, Page 86)
Tc = Time of concentration

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

Since the difference in elevation is 315' (352'-37') and the distance traveled is 4,070' (S=7.7%). C=0.55.

Tc = 32 minutes

From table on Page 83

I_{100} = 1.9 inches

2. *Coefficient Determination*

The area to be evaluated is single-family residential:

From Page 82 for Single Family

C = 0.55

3. *Volume calculations*

Q = CIA

Areas of Drainage

Area easterly of the existing curb inlet in at the northerly intersection of Calle del Cielo and Calle del Oro	OS-E = 30.8 Acres

Area westerly of the existing curb inlet in at the northerly intersection of Calle del Cielo and Calle del Oro that flows to the curb inlets at the intersection of Calle del Oro, Camino del Oro and La Jolla Shores Drive — OS-W = 20.0 Acres

Area easterly of the existing curb inlet in at the northerly intersection of Calle del Cielo and Calle del Oro that flows by a concrete ditch to a catch basin at this area's northerly extension to the existing curb inlet at the northerly intersection of Calle del Cielo and Calle del Oro. — OS-SE = 4.9 Acres

The area easterly of Calle del Cielo that flows onto Calle del Cielo and to the existing curb inlet at the southeast intersection of Calle del Cielo and Calle del Oro. — OS-C = 3.1 Acres

$Q_{100OS\text{-}E}$ = (0.55) (1.9) (30.8)
$Q_{100OS\text{-}W}$ = (0.55) (1.9) (20.0)
$Q_{100OS\text{-}SE}$ = (0.55) (1.9) (4.9)
$Q_{100OS\text{-}C}$ = (0.55) (1.9) (3.1)

$Q_{100OS\text{-}E}$ = 32.2 cfs
$Q_{100OS\text{-}W}$ = 20.9 cfs
$Q_{100OS\text{-}SE}$ = 5.1 cfs
$Q_{100OS\text{-}C}$ = 3.2 cfs

4. Discussion (Public Storm Drain)

Before construction areas OS-E, OS-SE and OS-C flow to or are conveyed to the existing curb inlet at the northerly intersection of Calle del Cielo and Calle del Oro. The total runoff to this curb inlet is 40.4 cfs. Runoff is conveyed from this curb inlet by a 24" RCP to join with a 30" CP at the intersection of Calle del Oro, Camino del Oro and La Jolla Shores Drive. That 24" drain is capable of conveying (n=0.013, S= 6.4%) 57.4 cfs see attached printout. The 30" drain receives runoff from the 24" drain and from area OS-W (20.9 cfs) for a total runoff conveyed of 61.3 cfs. The 30" drain is capable of conveying (n-0.013, S=3.76%) 79.7 cfs.

Since the 24" RCP is capable of conveying 57.4 cfs and currently conveys 40.4 cfs the addition of 7.56 cfs will have no adverse effect on the system.

Since the 30" RC is capable of conveying 79.7 cfs and currently conveys 61.3 cfs the addition of 7.56 cfs will have no adverse effect on the system.

The 1.5' x 4.0' box culvert flows under pressure from the sealed cleanout shown on drawing 10394-L and the addition of 7.56 cfs increases the hydraulic grade line in the cleanout in the 30" RCP portion of the drain by 1.10' and the hydraulic grade is 7.60' below the rim elevation. This additional runoff will have no adverse effect on the system.

Calculation Results Summary

Scenario: Base

>>>> Info: Subsurface Network Rooted by: O-1
>>>> Info: Subsurface Analysis iterations: 1
>>>> Info: Convergence was achieved.

CALCULATION SUMMARY FOR SURFACE NETWORKS

Label	Inlet Type	Inlet	Total Intercepted Flow (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	Gutter Spread (ft)	Gutter Depth (ft)
I-1	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00

CALCULATION SUMMARY FOR SUBSURFACE NETWORK WITH ROOT: O-1

Label	Number of Sections	Section Size	Section Shape	Length (ft)	Total System Flow (cfs)	Average Velocity (ft/s)	Hydraulic Grade Upstream (ft)	Hydraulic Grade Downstream (ft)
P-3	1	Box 1.5 x 4	Box	227.50	61.30	10.22	4.30	0.22
P-2	1	Box 1.5 x 4	Box	172.00	61.30	10.22	7.08	4.00
P-1	1	30 inch	Circular	369.25	61.30	17.88	17.20	7.08

Label	Total System Flow (cfs)	Ground Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
O-1	61.30	2.00	-1.28	-1.28
J-2	61.30	4.00	4.00	4.00
J-1	61.30	5.85	7.08	7.08
I-1	61.30	25.90	17.20	17.20

Completed: 07/16/2017 08:49:31 AM

Calculation Results Summary

==

Scenario: Base

\>>>> Info: Subsurface Network Rooted by: O-1
\>>>> Info: Subsurface Analysis iterations: 1
\>>>> Info: Convergence was achieved.

CALCULATION SUMMARY FOR SURFACE NETWORKS

Label	Inlet Type	Inlet	Total Intercepted Flow (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	Gutter Spread (ft)	Gutter Depth (ft)
I-1	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00

CALCULATION SUMMARY FOR SUBSURFACE NETWORK WITH ROOT: O-1

Label	Number of Sections	Section Size	Section Shape	Length (ft)	Total System Flow (cfs)	Average Velocity (ft/s)	Hydraulic Grade Upstream (ft)	Hydraulic Grade Downstream (ft)
P-3	1	Box 1.5 x 4	Box	227.50	68.86	11.48	5.37	0.22
P-2	1	Box 1.5 x 4	Box	172.00	68.86	11.48	7.89	4.00
P-1	1	30 inch	Circular	369.25	68.86	14.03	18.30	7.89

Label	Total System Flow (cfs)	Ground Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
O-1	68.86	2.00	-1.28	-1.28
J-2	68.86	4.00	4.00	4.00
J-1	68.86	5.85	7.89	7.89
I-1	68.86	25.90	18.30	18.30

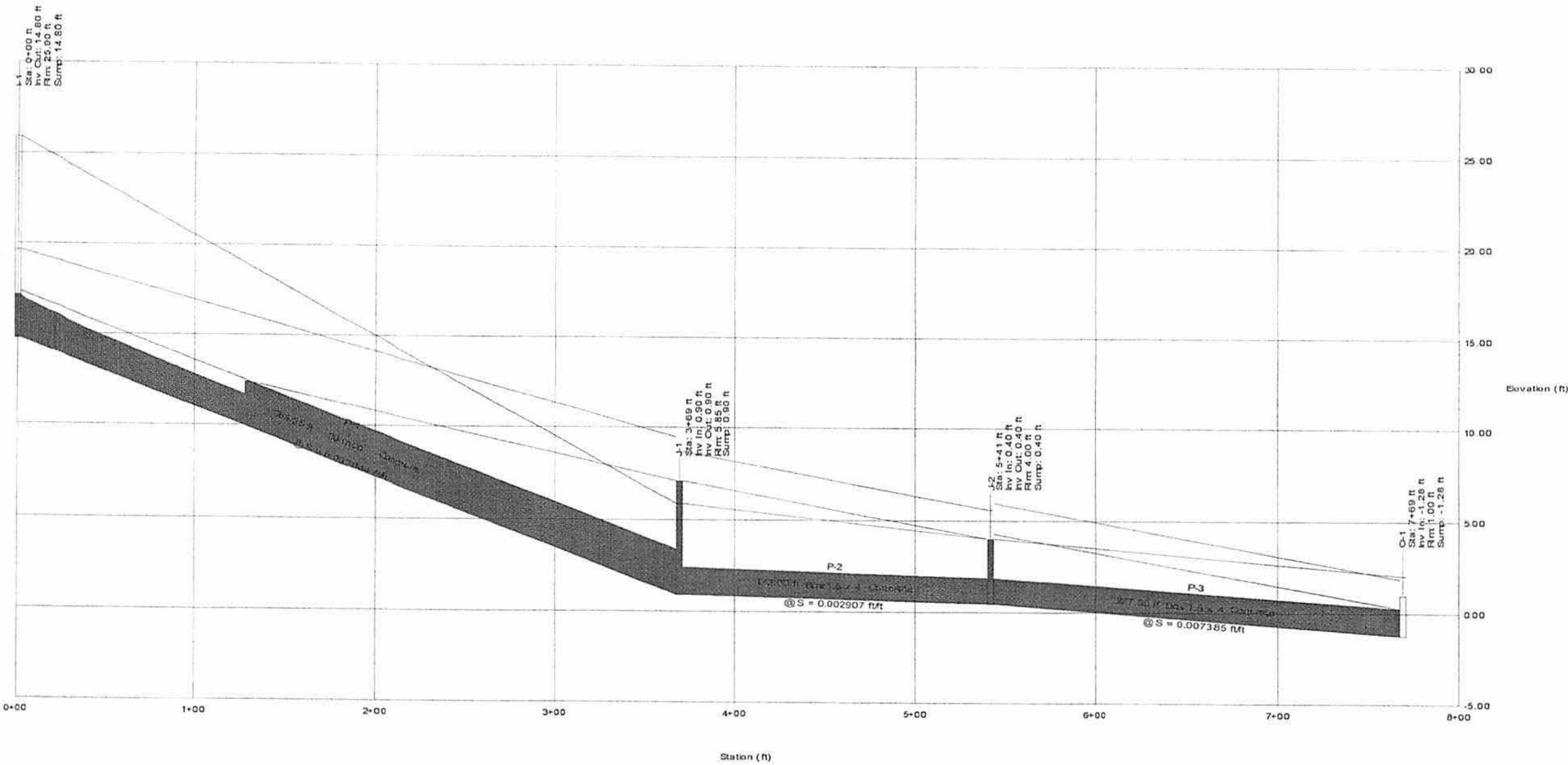
==

Completed: 07/16/2017 08:40:12 AM

Profile
Scenario: Base

Profile: Profile - Before 7.56 cfs additional runoff

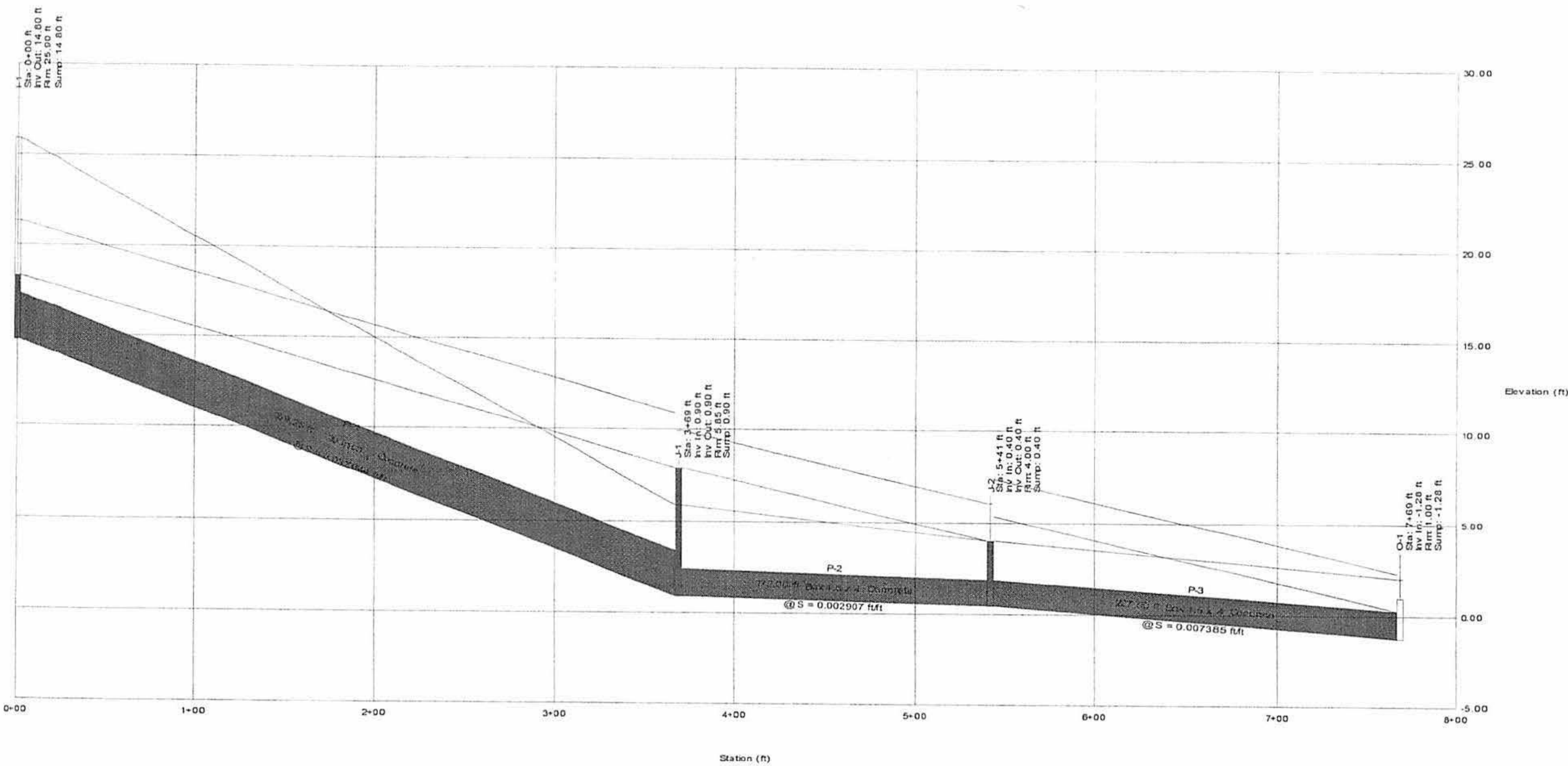
Scenario: Base



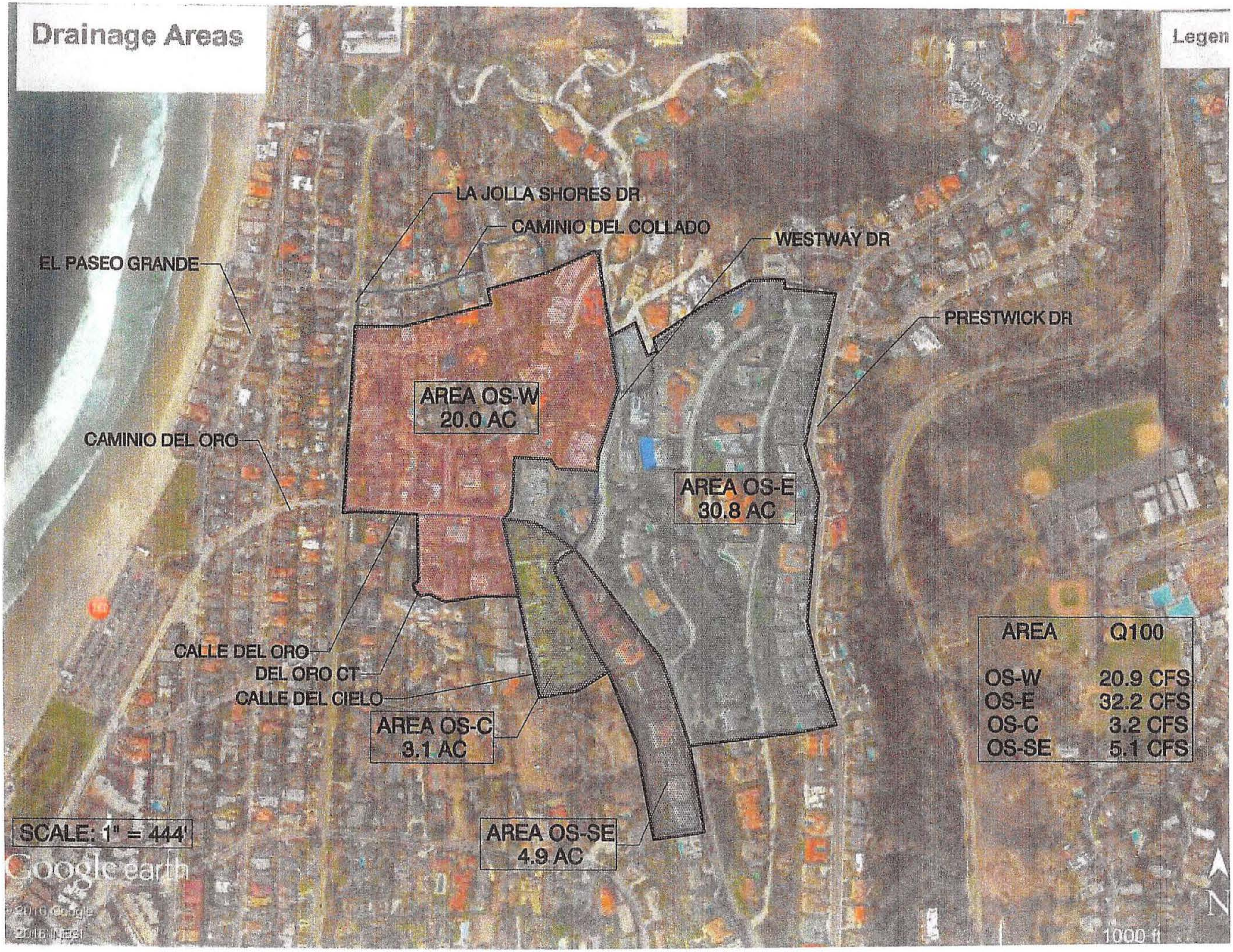
Profile
Scenario: Base

Profile: Profile - After 7.56 cfs additional runoff

Scenario: Base



© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666



Drainage Areas
Legen
LA JOLLA SHORES DR
CAMINIO DEL COLLADO
EL PASEO GRANDE
WESTWAY DR
PRESTWICK DR
AREA OS-W
20.0 AC
CAMINIO DEL ORO
AREA OS-E
30.8 AC
CALLE DEL ORO
DEL ORO CT
CALLE DEL CIELO
AREA OS-C
3.1 AC
AREA OS-SE
4.9 AC
AREA Q100
OS-W 20.9 CFS
OS-E 32.2 CFS
OS-C 3.2 CFS
OS-SE 5.1 CFS
SCALE: 1" = 444'
Google earth
1000 ft
N

APPENDIX

TABLE 2

RUNOFF COEFFICIENTS (RATIONAL METHOD)

DEVELOPED AREAS (URBAN)

Land Use	Coefficient, C Soil Type (1)
Residential:	D
Single Family	.55
Multi-Units	.70
Mobile Homes	.65
Rural (lots greater than 1/2 acre)	.45
Commercial (2) 80% Impervious	.85
Industrial (2) 90% Impervious	.95

NOTES:

(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 no case shall the final coefficient be less than 0.50. For example: Consider commercial property on D soil.

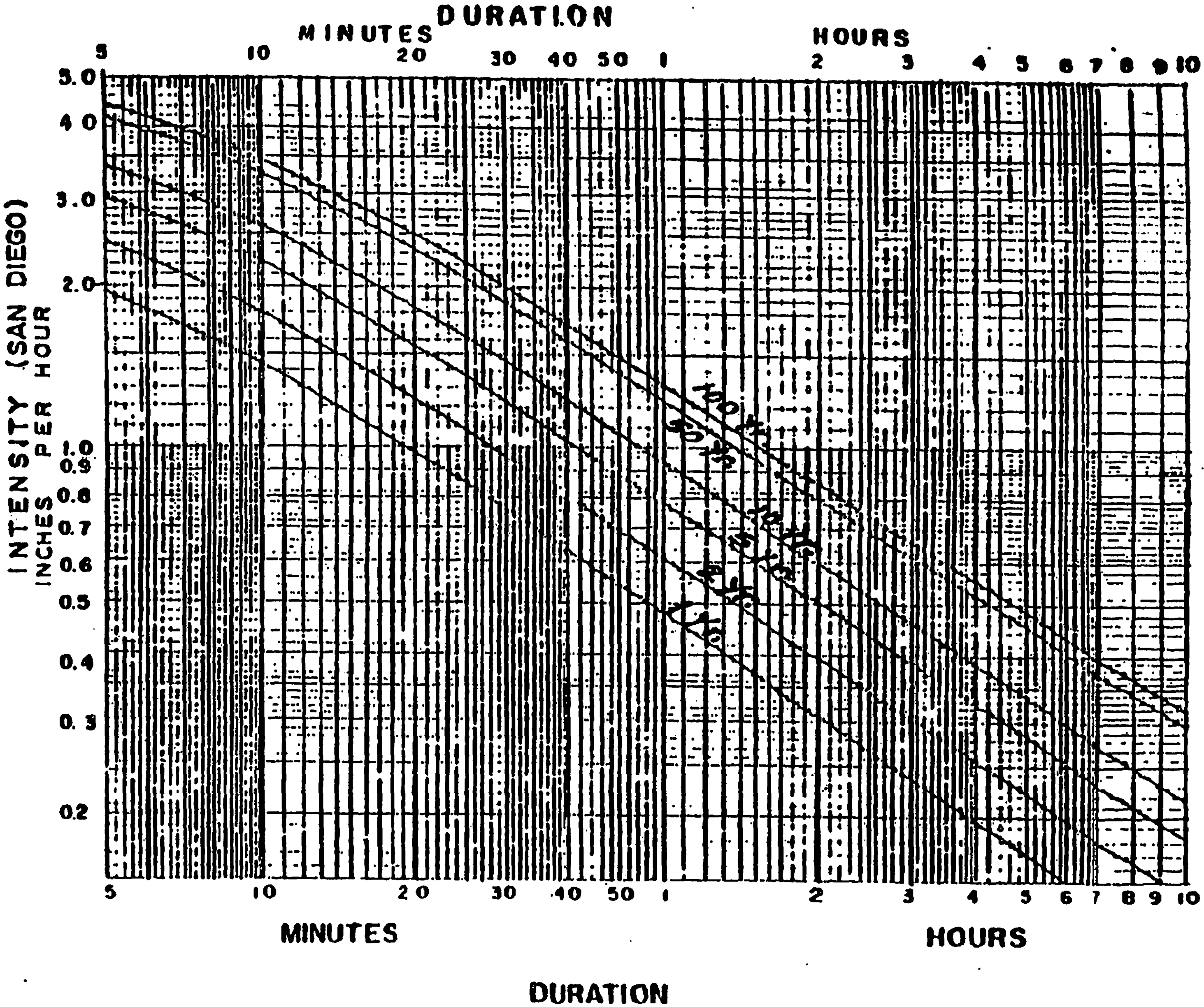
Actual imperviousness = 50%

Tabulated imperviousness = 80%

$$\text{Revised C} = \frac{50}{80} \times 0.85 = 0.53$$

ELEV.	FACTOR
0–1500	1.00
1500–3000	1.25
3000–4000	1.42
4000–5000	1.60
5000–6000	1.70
DESERT	1.25

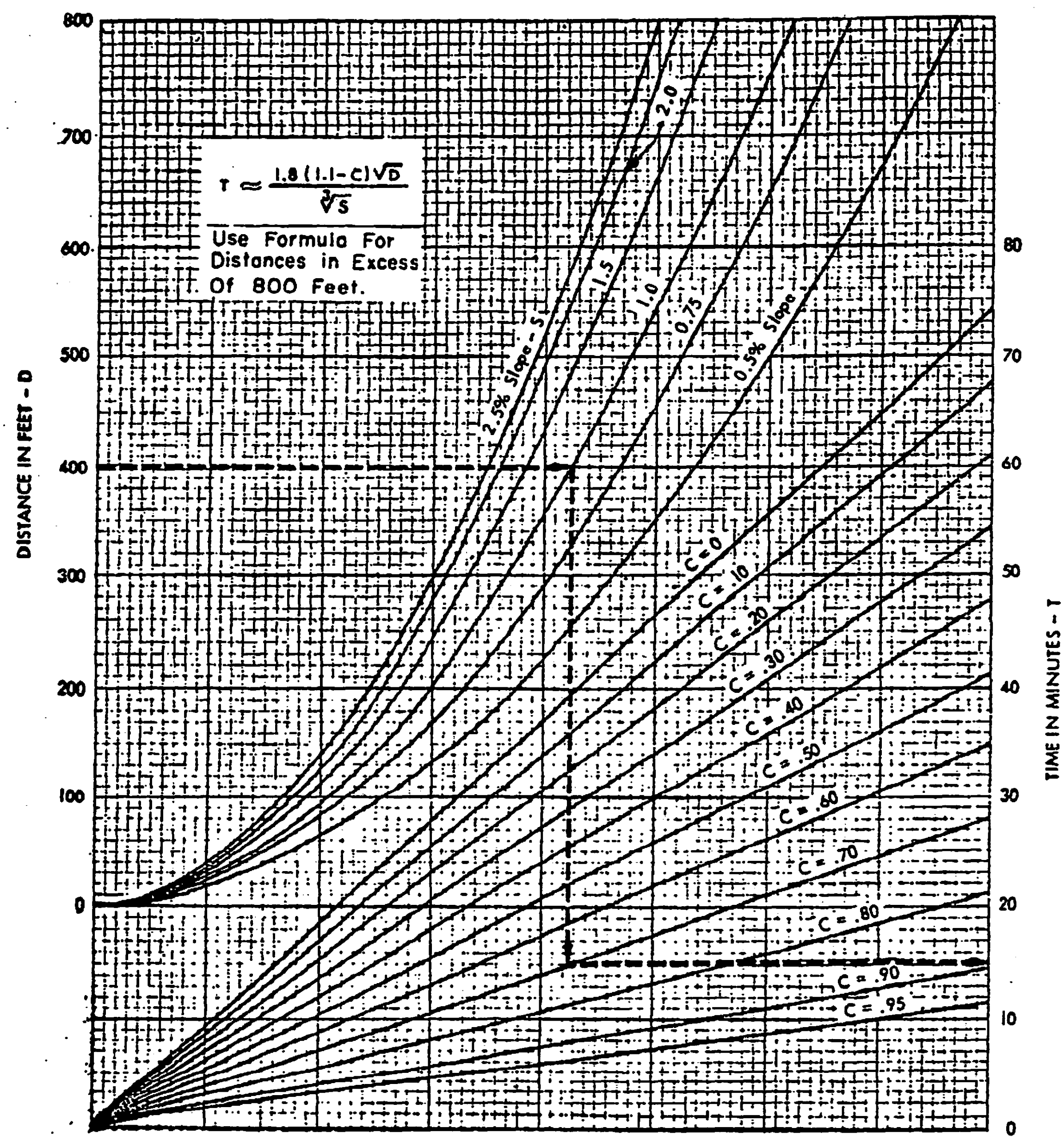
To obtain correct intensity, multiply intensity on chart by factor for design elevation.



RAINFALL
INTENSITY-DURATION-FREQUENC'
CURVES
for
COUNTY OF SAN DIEGO

APPENDIX I-

URBAN AREAS OVERLAND TIME OF FLOW CURVES



Surface Flow Time Curves

EXAMPLE:

GIVEN: LENGTH OF FLOW = 400 FT.
SLOPE = 1.0 %
COEFFICIENT OF RUNOFF C = .70

READ: OVERLAND FLOWTIME = 15 MINUTES

DRAINAGE AREA MAPS

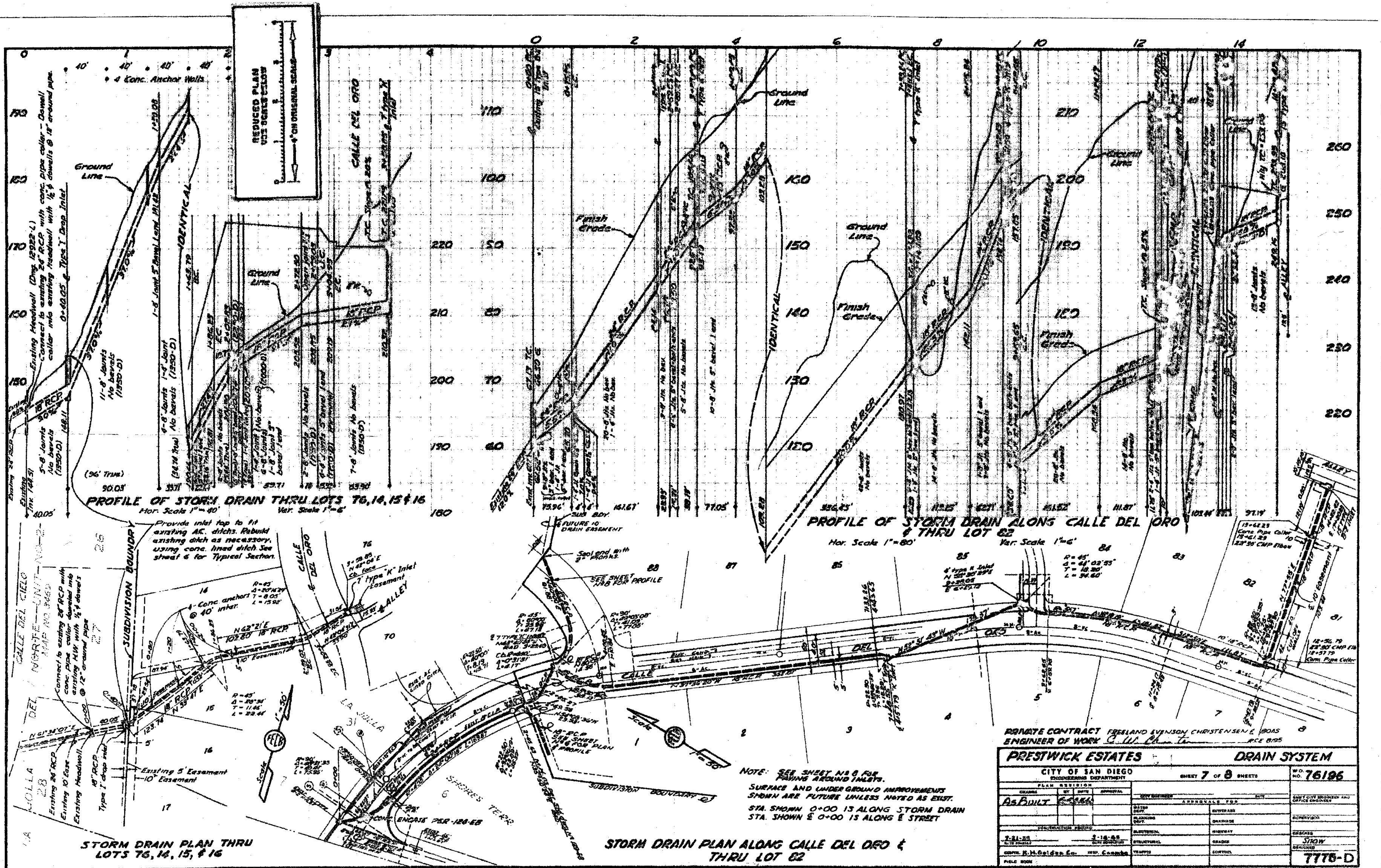
PRE-DEVELOPMENT DRAINAGE AREA MAP

PRE-CONSTRUCTION DRAINAGE AREA MAP

POST-DEVELOPMENT DRAINAGE AREA MAP

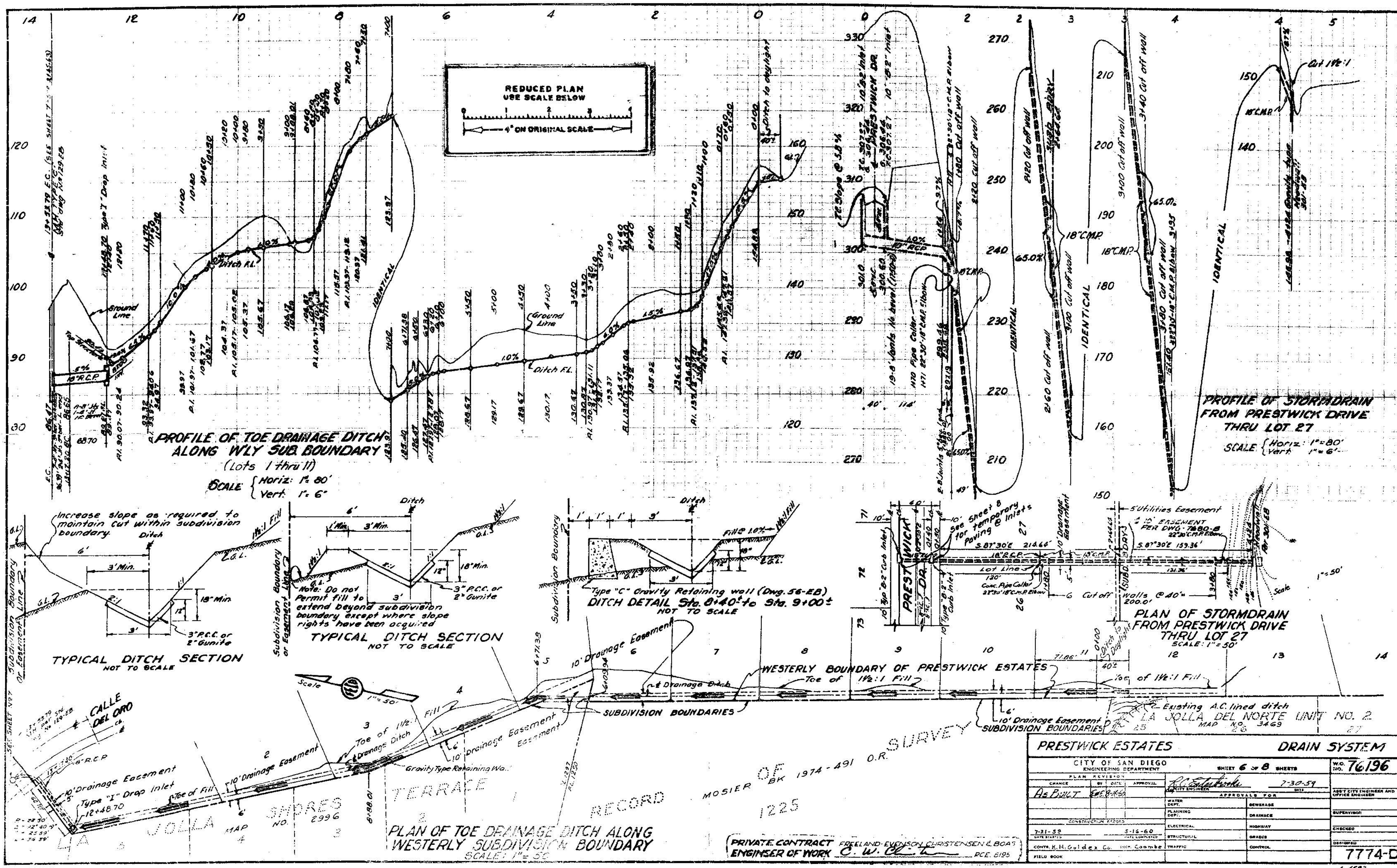
POST-CONSTRUCTION DRAINAGE AREA MAP

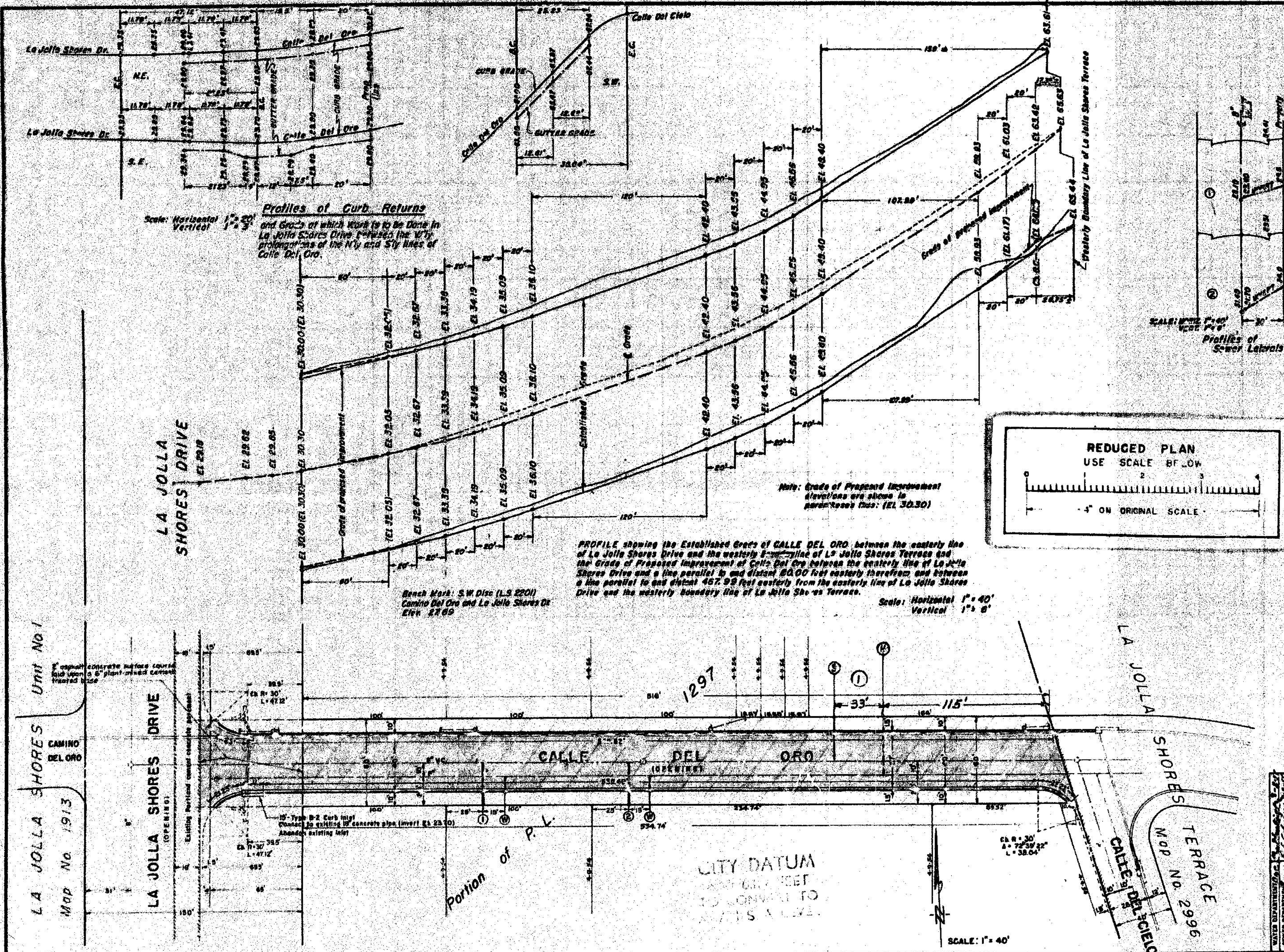
REFERENCE PLANS



MICROFILMED

A-4583


REDUCED PLAN
USE SCALE BELOW
4" ON ORIGINAL SCALE
PROFILE OF TOE DRAINAGE DITCH ALONG W'LY SUB. BOUNDARY
(Lots 1 thru 11)
SCALE { Horiz: 1"= 80' Vert. 1"= 6'
Ground Line
Ditch F.L.
18" R.C.P.
IDENTICAL
PROFILE OF STORMDRAIN FROM PRESTWICK DRIVE THRU LOT 27
SCALE { Horiz: 1"=80' Vert. 1"= 6'
18" C.M.P.
Cut off wall
Increase slope as required to maintain cut within subdivision boundary.
TYPICAL DITCH SECTION
NOT TO SCALE
Note: Do not permit fill to extend beyond subdivision boundary except where slope rights have been acquired
TYPICAL DITCH SECTION
NOT TO SCALE
Type "C" Gravity Retaining wall (Dwg. 56-EB)
DITCH DETAIL Sta. 6+40± to Sta. 9+00±
NOT TO SCALE
5' Utilities Easement
PLAN OF STORMDRAIN FROM PRESTWICK DRIVE THRU LOT 27
SCALE: 1"= 50'
PRESTWICK DR.
WESTERLY BOUNDARY OF PRESTWICK ESTATES
Toe of 1½:1 Fill
10' Drainage Easement
SUBDIVISION BOUNDARIES
Existing A.C. lined ditch
LA JOLLA DEL NORTE UNIT NO. 2
MAP NO. 3469
CALLE DEL ORO
Type "I" Drop Inlet
Gravity Type Retaining Wall
LA JOLLA SHORES MAP NO. 2996
TERRACE
RECORD OF SURVEY
MOSIER BK 1974-491 O.R.
1225
PLAN OF TOE DRAINAGE DITCH ALONG WESTERLY SUBDIVISION BOUNDARY
SCALE: 1"= 50'
PRIVATE CONTRACT ENGINEER OF WORK
FREELAND-EVENSON, CHRISTENSEN & BOAS
R.C.E. 6195
PRESTWICK ESTATES
DRAIN SYSTEM
CITY OF SAN DIEGO
ENGINEERING DEPARTMENT
SHEET 6 OF 8 SHEETS
W.O. NO. 76196
As Built
7-30-59
7-31-59
5-16-60
CONTR. K.H. Goldes Co.
7774-D
MICROFILMED



WORK TO BE DONE

The improvement consists of the following work to be done according to these plans and the specifications hereto attached:

The grading of the portions of the streets shown hatched thus:

The preparation of subgrade and paving of the portions of the streets shown shaded thus:

The construction of Type G curb as shown thus:

The construction of curb inlet as shown thus:

The construction of 4" vitrified clay pipe sewer laterals as shown thus: ①

The construction of ¾" copper water services as shown thus: Ⓦ

Legend-Existing Work

Sewer main — 8" V.C. —
Water main — 8" —
Storm drain
Cleanout
Manhole
Edge of pavement
Curb inlet
Roll type curb
Pole
Deadman

Standard Drawings

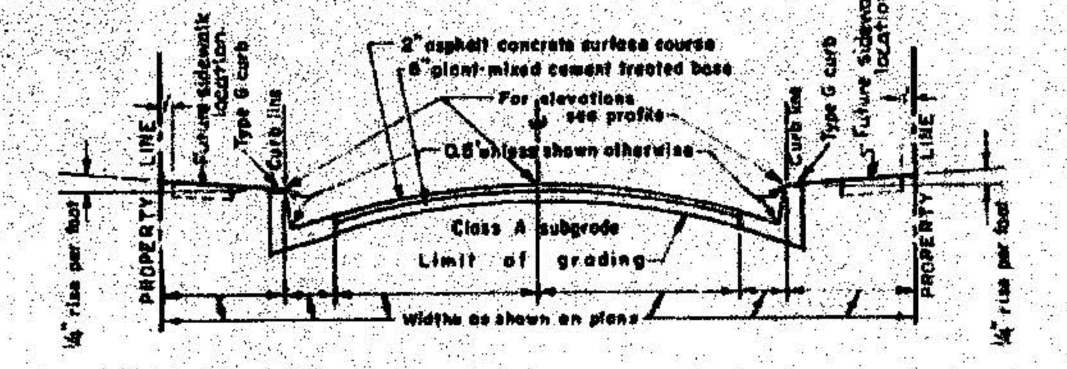
9-S-B (11-1-54) 304-S-B (7-7-54)
122-S-B (11-23-54) 200-S-B (9-16-54)

Specifications

Standard Specifications filed July 7, 1954

Legend

Property divisions by deed
Curb and sidewalk lines



TYPICAL CROSS SECTION

Plat No. 2697

WATER DEPARTMENT | SEWER DEPARTMENT | DRAINAGE | FIELD CHECK | OFFICE CHECK | PLANNING COMMISSION | GRADES | SUPERVISOR

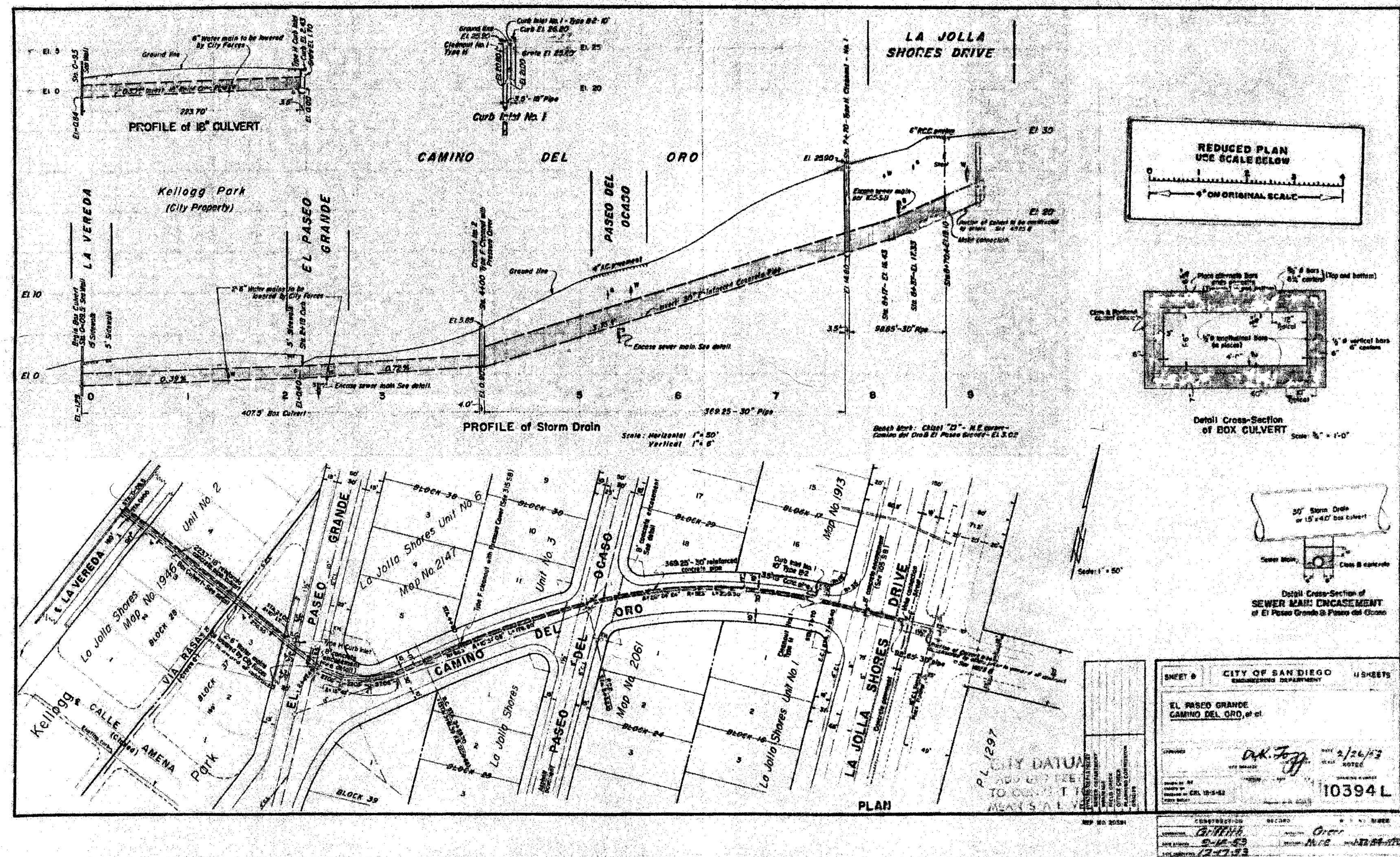
CITY OF SAN DIEGO
ENGINEERING DEPARTMENT

Plans for the improvement of
CALLE DEL ORO between the easterly line of La Jolla Shores Drive and the westerly boundary line of La Jolla Shores Terrace, and
LA JOLLA SHORES DRIVE between the westerly prolongations of the northerly and southerly lines of Calle Del Oro.

APPROVED: AK [signature] CITY MANAGER / CITY ENGINEER	DATE 2/4/55
	SCALE NOTED
DRAWN BY H. Remington 1-7-55; TRACED BY; CHECKED BY V.J.W. 1-27-55; FIELD BOOKS 2346-B	DRAWING NUMBER 11944L

MICROFILMED JUN 27 1958

CONSTRUCTION RECORD	W. O. No. 32424
CONTRACTOR Griffith	INSPECTOR Boyd
DATE STARTED 8-17-55	REVISIONS ① DATE 12-5-55
DATE COMPLETED 11-4-55	



PROFILE of 18" CULVERT
Ground line
Curb Inlet No. 1
LA JOLLA SHORES DRIVE
CAMINO DEL ORO
Kellogg Park
(City Property)
LA VEREDA
EL PASEO GRANDE
PASEO DEL OCASO
REDUCED PLAN
USE SCALE BELOW
4" ON ORIGINAL SCALE
Excess sewer main. See detail.
407.5' Box Culvert
369.25 - 30" Pipe
98.85'-30" Pipe
PROFILE of Storm Drain
Scale: Horizontal 1" = 50'
Vertical 1" = 5'
Detail Cross-Section of BOX CULVERT
Detail Cross-Section of SEWER MAIN ENCASEMENT
of El Paseo Grande & Paseo del Ocaso
La Jolla Shores Unit No. 6
Map No. 2147
Unit No. 2
Unit No. 3
La Jolla Shores Map No. 1946
Map No. 1913
Map No. 2061
La Jolla Shores Unit No. 1
BLOCK 38
BLOCK 30
BLOCK 29
BLOCK 28
BLOCK 24
BLOCK 39
VIA RASA
CALLE AMENA
Kellogg Park
Scale: 1" = 50'
PLAN
CITY OF SAN DIEGO
ENGINEERING DEPARTMENT
EL PASEO GRANDE
CAMINO DEL ORO, et al.
2/26/53
10394 L

The City of San Diego

PRIORITY DEVELOPMENT PROJECT (PDP) STORM WATER QUALITY MANAGEMENT PLAN (SWQMP) FOR

Cielo Tentative Map

PTS NO. 529620

REGISTERED PROFESSIONAL ENGINEER
ANTONY K. CHRISTENSEN
NO. C54021
EXP. 12-31-17
CIVIL
STATE OF CALIFORNIA

ENGINEER OF WORK:

Antony K. Christensen, RCE 54021
Provide Wet Signature and Stamp Above Line

PREPARED FOR:

Patricia Riha Gift Trust
8303 La Jolla Shores Drive
La Jolla, CA 92037

PREPARED BY:

Christensen Engineering & Surveying
7888 Silverton Avenue, Suite "J"
San Diego, CA 92126
858-271-9901

February 05, 2017 Revised
June 06, 2017 Revised
August 30, 2017

Approved by: City of San Diego Date

TABLE OF CONTENTS

ACRONYMS

APN	Assessor's Parcel Number
ASBS	Area of Special Biological Significance
BMP	Best Management Practice
CEQA	California Environmental Quality Act
CGP	Construction General Permit
DCV	Design Capture Volume
DMA	Drainage Management Areas
ESA	Environmentally Sensitive Area
GLU	Geomorphic Landscape Unit
GW	Ground Water
HMP	Hydromodification Management Plan
HSG	Hydrologic Soil Group
HU	Harvest and Use
INF	Infiltration
LID	Low Impact Development
LUP	Linear Underground/Overhead Projects
MS4	Municipal Separate Storm Sewer System
N/A	Not Applicable
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
PDP	Priority Development Project
PE	Professional Engineer
POC	Pollutant of Concern
SC	Source Control
SD	Site Design
SDRWQCB	San Diego Regional Water Quality Control Board
SIC	Standard Industrial Classification
SWPPP	Stormwater Pollutant Protection Plan
SWQMP	Storm Water Quality Management Plan
TMDL	Total Maximum Daily Load
WMAA	Watershed Management Area Analysis
WPCP	Water Pollution Control Program
WQIP	Water Quality Improvement Plan

CERTIFICATION PAGE

Project Name: Cielo Tentative Map
Permit Application Number: 529620

I hereby declare that I am the Engineer in Responsible Charge of design of storm water BMPs for this project, and that I have exercised responsible charge over the design of the project as defined in Section 6703 of the Business and Professions Code, and that the design is consistent with the requirements of the Storm Water Standards, which is based on the requirements of SDRWQCB Order No. R9-2013-0001 as amended by R9-2015-0001 and R9-2015-0100 (MS4 Permit).

I have read and understand that the City Engineer has adopted minimum requirements for managing urban runoff, including storm water, from land development activities, as described in the Storm Water Standards. I certify that this PDP SWQMP has been completed to the best of my ability and accurately reflects the project being proposed and the applicable source control and site design BMPs proposed to minimize the potentially negative impacts of this project's land development activities on water quality. I understand and acknowledge that the plan check review of this PDP SWQMP by the City Engineer is confined to a review and does not relieve me, as the Engineer in Responsible Charge of design of storm water BMPs for this project, of my responsibilities for project design.

Engineer of Work's Signature, PE Number & Expiration Date

Antony K. Christensen, RCE 54021

Christensen Engineering & Surveying

08-30-17

Date

REGISTERED PROFESSIONAL ENGINEER
ANTONY K. CHRISTENSEN
NO. C54021
EXP. 12-31-17
CIVIL
STATE OF CALIFORNIA

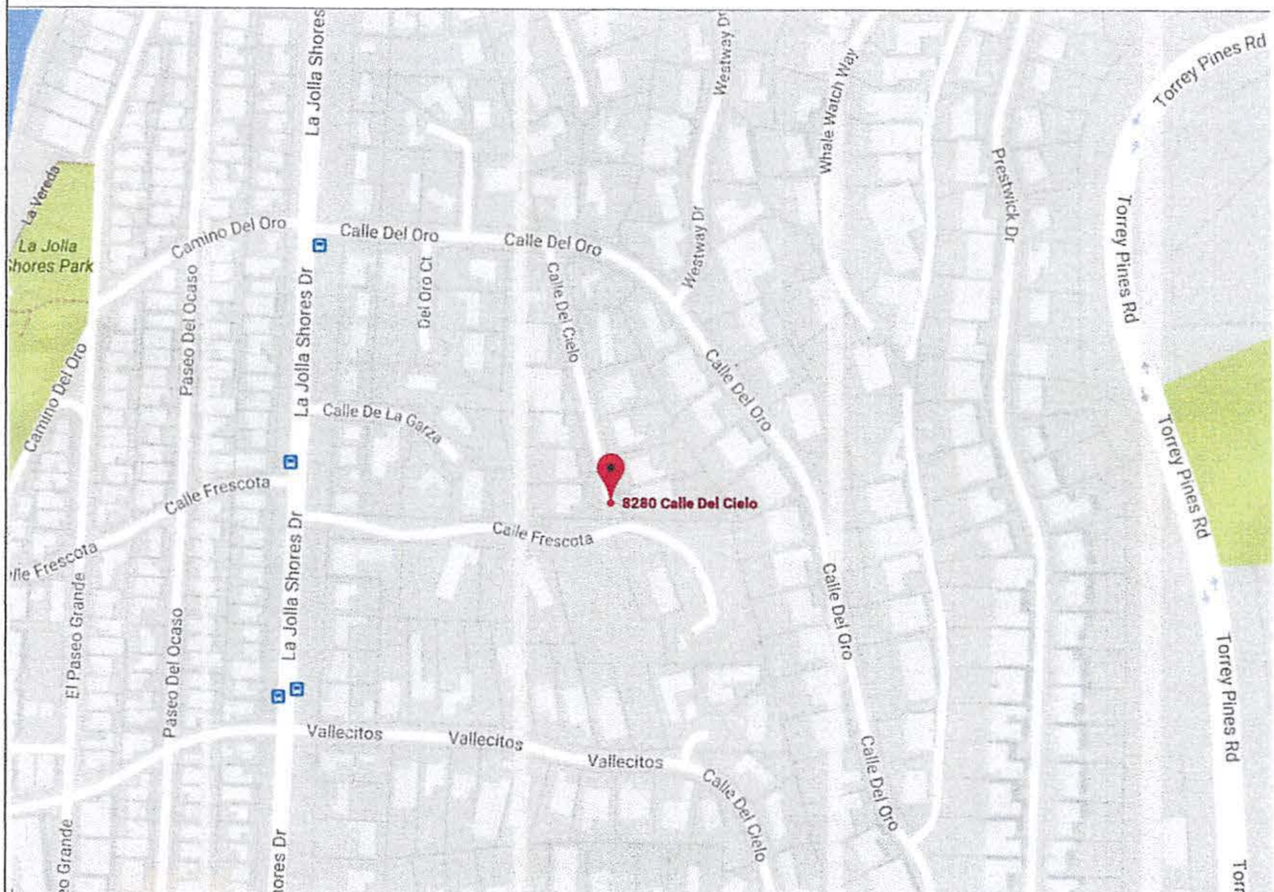
SUBMITTAL RECORD

Use this Table to keep a record of submittals of this PDP SWQMP. Each time the PDP SWQMP is re-submitted, provide the date and status of the project. In last column indicate changes that have been made or indicate if response to plan check comments is included. When applicable, insert response to plan check comments.

Submittal Number	Date	Project Status	Changes
1		☒ Preliminary Design/Planning/CEQA ☐ Final Design	Initial Submittal
2	06-06-17	☐ Preliminary Design/Planning/CEQA ☐ Final Design	Address City Comments
3	08-30-17	☐ Preliminary Design/Planning/CEQA ☐ Final Design	Address City Comments
4		☐ Preliminary Design/Planning/CEQA ☐ Final Design	

PROJECT VICINITY MAP

Project Name: Cielo Tentative Map
Permit Application Number: 529620



STORM WATER REQUIREMENTS APPLICABILITY CHECKLIST

Complete and attach DS-560 Form included in Appendix A.1

City of San Diego
Development Services
1222 First Ave., MS-302
San Diego, CA 92101
(619) 446-5000

Storm Water Requirements Applicability Checklist

FORM DS-560

OCTOBER 2016

Project Address: 8280 Calle del Dielo	Project Number *(for City Use Only):*

SECTION 1. Construction Storm Water BMP Requirements:

All construction sites are required to implement construction BMPs in accordance with the performance standards in the Storm Water Standards Manual. Some sites are additionally required to obtain coverage under the State Construction General Permit (CGP)[1] , which is administered by the State Water Resources Control Board.

For all projects complete PART A: If project is required to submit a SWPPP or WPCP, continue to PART B.

PART A: Determine Construction Phase Storm Water Requirements.

1. Is the project subject to California's statewide General NPDES permit for Storm Water Discharges Associated with Construction Activities, also known as the State Construction General Permit (CGP)? (Typically projects with land disturbance greater than or equal to 1 acre.)

☒ Yes; SWPPP required, skip questions 2-4 ☐ No; next question

2. Does the project propose construction or demolition activity, including but not limited to, clearing, grading, grubbing, excavation, or any other activity resulting in ground disturbance and contact with storm water runoff?

☐ Yes; WPCP required, skip 3-4 ☐ No; next question

3. Does the project propose routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of the facility? (Projects such as pipeline/utility replacement)

☐ Yes; WPCP required, skip 4 ☐ No; next question

4. Does the project only include the following Permit types listed below?

- Electrical Permit, Fire Alarm Permit, Fire Sprinkler Permit, Plumbing Permit, Sign Permit, Mechanical Permit, Spa Permit.
- Individual Right of Way Permits that exclusively include only ONE of the following activities: water service, sewer lateral, or utility service.
- Right of Way Permits with a project footprint less than 150 linear feet that exclusively include only ONE of the following activities: curb ramp, sidewalk and driveway apron replacement, pot holing, curb and gutter replacement, and retaining wall encroachments.

☐ Yes; no document required

Check one of the boxes below, and continue to PART B:

☒ If you checked "Yes" for question 1, **a SWPPP is REQUIRED. Continue to PART B**

☐ If you checked "No" for question 1, and checked "Yes" for question 2 or 3, **a WPCP is REQUIRED.** If the project proposes less than 5,000 square feet of ground disturbance AND has less than a 5-foot elevation change over the entire project area, a Minor WPCP may be required instead. **Continue to PART B.**

☐ If you checked "No" for all questions 1-3, and checked "Yes" for question 4 PART B **does not apply and no document is required. Continue to Section 2.**

1. More information on the City's construction BMP requirements as well as CGP requirements can be found at: www.sandiego.gov/stormwater/regulations/index.shtml

PART B: Determine Construction Site Priority

This prioritization must be completed within this form, noted on the plans, and included in the SWPPP or WPCP. The city reserves the right to adjust the priority of projects both before and after construction. Construction projects are assigned an inspection frequency based on if the project has a "high threat to water quality." The City has aligned the local definition of "high threat to water quality" to the risk determination approach of the State Construction General Permit (CGP). The CGP determines risk level based on project specific sediment risk and receiving water risk. Additional inspection is required for projects within the Areas of Special Biological Significance (ASBS) watershed. **NOTE:** The construction priority does **NOT** change construction BMP requirements that apply to projects; rather, it determines the frequency of inspections that will be conducted by city staff.

Complete PART B and continued to Section 2

1. ☒ **ASBS**

   a. Projects located in the ASBS watershed.

2. ☐ **High Priority**

   a. Projects 1 acre or more determined to be Risk Level 2 or Risk Level 3 per the Construction General Permit and not located in the ASBS watershed.

   b. Projects 1 acre or more determined to be LUP Type 2 or LUP Type 3 per the Construction General Permit and not located in the ASBS watershed.

3. ☐ **Medium Priority**

   a. Projects 1 acre or more but not subject to an ASBS or high priority designation.

   b. Projects determined to be Risk Level 1 or LUP Type 1 per the Construction General Permit and not located in the ASBS watershed.

4. ☐ **Low Priority**

   a. Projects requiring a Water Pollution Control Plan but not subject to ASBS, high, or medium priority designation.

SECTION 2. Permanent Storm Water BMP Requirements.

Additional information for determining the requirements is found in the Storm Water Standards Manual.

PART C: Determine if Not Subject to Permanent Storm Water Requirements.

Projects that are considered maintenance, or otherwise not categorized as "new development projects" or "redevelopment projects" according to the Storm Water Standards Manual are not subject to Permanent Storm Water BMPs.

If "yes" is checked for any number in Part C, proceed to Part F and check "Not Subject to Permanent Storm Water BMP Requirements".

If "no" is checked for all of the numbers in Part C continue to Part D.

1.	Does the project only include interior remodels and/or is the project entirely within an existing enclosed structure and does not have the potential to contact storm water?	☐ Yes ☒ No
2.	Does the project only include the construction of overhead or underground utilities without creating new impervious surfaces?	☐ Yes ☒ No
3.	Does the project fall under routine maintenance? Examples include, but are not limited to: roof or exterior structure surface replacement, resurfacing or reconfiguring surface parking lots or existing roadways without expanding the impervious footprint, and routine replacement of damaged pavement (grinding, overlay, and pothole repair).	☐ Yes ☒ No

PART D: PDP Exempt Requirements.

PDP Exempt projects are required to implement site design and source control BMPs.

If "yes" was checked for any questions in Part D, continue to Part F and check the box labeled "PDP Exempt."

If "no" was checked for all questions in Part D, continue to Part E.

1. **Does the project ONLY include new or retrofit sidewalks, bicycle lanes, or trails that:**
   - **Are designed and constructed to direct storm water runoff to adjacent vegetated areas, or other non-erodible permeable areas? Or;**
   - **Are designed and constructed to be hydraulically disconnected from paved streets and roads? Or;**
   - **Are designed and constructed with permeable pavements or surfaces in accordance with the Green Streets guidance in the City's Storm Water Standards manual?**

   ☐ Yes; PDP exempt requirements apply ☒ No; next question

2. Does the project ONLY include retrofitting or redeveloping existing paved alleys, streets or roads designed and constructed in accordance with the Green Streets guidance in the City's Storm Water Standards Manual?

   ☐ Yes; PDP exempt requirements apply ☒ No; project not exempt.

PART E: Determine if Project is a Priority Development Project (PDP).
Projects that match one of the definitions below are subject to additional requirements including preparation of a Storm Water Quality Management Plan (SWQMP).

If "yes" is checked for any number in PART E, continue to PART F and check the box labeled "Priority Development Project".

If "no" is checked for every number in PART E, continue to PART F and check the box labeled "Standard Development Project".

1.	**New Development that creates 10,000 square feet or more of impervious surfaces collectively over the project site.** This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land.	☒ Yes ☐ No
2.	**Redevelopment project that creates and/or replaces 5,000 square feet or more of impervious surfaces on an existing site of 10,000 square feet or more of impervious surfaces.** This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land.	☐ Yes ☒ No
3.	**New development or redevelopment of a restaurant.** Facilities that sell prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC 5812), and where the land development creates and/or replace 5,000 square feet or more of impervious surface.	☐ Yes ☒ No
4.	**New development or redevelopment on a hillside.** The project creates and/or replaces 5,000 square feet or more of impervious surface (collectively over the project site) and where the development will grade on any natural slope that is twenty-five percent or greater.	☐ Yes ☒ No
5.	**New development or redevelopment of a parking lot that creates and/or replaces 5,000 square feet or more of impervious surface (collectively over the project site).**	☐ Yes ☒ No
6.	**New development or redevelopment of streets, roads, highways, freeways, and driveways.** The project creates and/or replaces 5,000 square feet or more of impervious surface (collectively over the project site).	☒ Yes ☐ No

7.	**New development or redevelopment discharging directly to an Environmentally Sensitive Area.** The project creates and/or replaces 2,500 square feet of impervious surface (collectively over project site), and discharges directly to an Environmentally Sensitive Area (ESA). "Discharging directly to" includes flow that is conveyed overland a distance of 200 feet or less from the project to the ESA, or conveyed in a pipe or open channel any distance as an isolated flow from the project to the ESA (i.e. not commingled with flows from adjacent lands).	☐ Yes ☒ No
8.	**New development or redevelopment projects of a retail gasoline outlet (RGO) that create and/or replaces 5,000 square feet of impervious surface.** The development project meets the following criteria: (a) 5,000 square feet or more or (b) has a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.	☐ Yes ☒ No
9.	**New development or redevelopment projects of an automotive repair shops that creates and/or replaces 5,000 square feet or more of impervious surfaces.** Development projects categorized in any one of Standard Industrial Classification (SIC) codes 5013, 5014, 5541, 7532-7534, or 7536-7539.	☐ Yes ☒ No
10.	**Other Pollutant Generating Project.** The project is not covered in the categories above, results in the disturbance of one or more acres of land and is expected to generate pollutants post construction, such as fertilizers and pesticides. This does not include projects creating less than 5,000 sf of impervious surface and where added landscaping does not require regular use of pesticides and fertilizers, such as slope stabilization using native plants. Calculation of the square footage of impervious surface need not include linear pathways that are for infrequent vehicle use, such as emergency maintenance access or bicycle pedestrian use, if they are built with pervious surfaces of if they sheet flow to surrounding pervious surfaces.	☐ Yes ☒ No

PART F: Select the appropriate category based on the outcomes of PART C through PART E.

1.	The project is **NOT SUBJECT TO PERMANENT STORM WATER REQUIREMENTS**.	☐
2.	The project is a **STANDARD DEVELOPMENT PROJECT**. Site design and source control BMP requirements apply. See the Storm Water Standards Manual for guidance.	☐
3.	The project is **PDP EXEMPT**. Site design and source control BMP requirements apply. See the Storm Water Standards Manual for guidance.	☐
4.	The project is a **PRIORITY DEVELOPMENT PROJECT**. Site design, source control, and structural pollutant control BMP requirements apply. See the Storm Water Standards Manual for guidance on determining if project requires a hydromodification plan management	☒

Joy D. Christensen	Assistant Engineer
Name of Owner or Agent *(Please Print)*	Title
Joy D. Christensen	02/06/2017
Signature	Date

Applicability of Permanent, Post-Construction Storm Water BMP Requirements		Form I-1
Project Identification		
Project Name: Cielo Tentative Map		
Permit Application Number: 529620		Date: February 05, 2017
Determination of Requirements		
The purpose of this form is to identify permanent, post-construction requirements that apply to the project. This form serves as a short summary of applicable requirements, in some cases referencing separate forms that will serve as the backup for the determination of requirements. Answer each step below, starting with Step 1 and progressing through each step until reaching "Stop". Refer to Part 1 of Storm Water Standards sections and/or separate forms referenced in each step below.		

Step	Answer	Progression
Step 1: Is the project a "development project"? See Section 1.3 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.	☒ Yes	Go to Step 2.
	☐ No	Stop. Permanent BMP requirements do not apply. No SWQMP will be required. Provide discussion below.
Discussion / justification if the project is not a "development project" (e.g., the project includes only interior remodels within an existing building):		
Step 2: Is the project a Standard Project, Priority Development Project (PDP), or exception to PDP definitions? To answer this item, see Section 1.4 of the BMP Design Manual (Part 1 of Storm Water Standards) in its entirety for guidance, AND complete Storm Water Requirements Applicability Checklist.	☐ Standard Project	Stop. Standard Project requirements apply.
	☒ PDP	PDP requirements apply, including PDP SWQMP. Go to Step 3.
	☐ PDP Exempt	Stop. Standard Project requirements apply. Provide discussion and list any additional requirements below.
Discussion / justification, and additional requirements for exceptions to PDP definitions, if applicable:		

Form I-1 Page 2		
Step	Answer	Progression
Step 3. Is the project subject to earlier PDP requirements due to a prior lawful approval? See Section 1.10 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.	☐Yes	Consult the City Engineer to determine requirements. Provide discussion and identify requirements below. Go to Step 4.
	☒ No	BMP Design Manual PDP requirements apply. Go to Step 4.
Discussion / justification of prior lawful approval, and identify requirements (<u>not required if prior lawful approval does not apply</u>):		
Step 4. Do hydromodification control requirements apply? See Section 1.6 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.	☐ Yes	PDP structural BMPs required for pollutant control (Chapter 5) and hydromodification control (Chapter 6). Go to Step 5.
	☒ No	Stop. PDP structural BMPs required for pollutant control (Chapter 5) only. Provide brief discussion of exemption to hydromodification control below.
Discussion / justification if hydromodification control requirements do <u>not</u> apply: Runoff flows to La Jolla Drive, then southerly along it to a curb inlet at Calle Vallecitos (4599-D) and then in the public storm drain to the Pacific Ocean. The other outlet is to a curb inlet in Calle del Cielo (7775-D) and then down Calle del Oro in a 24" drain (7775-D) then to a 30" drain in Camino del Oro (11394-L) and then to a 1.5' x 4' box culvert (11394-L) to the Pacific Ocean		
Step 5. Does protection of critical coarse sediment yield areas apply? See Section 6.2 of the BMP Design Manual (Part 1 of Storm Water Standards) for guidance.	☐ Yes	Management measures required for protection of critical coarse sediment yield areas (Chapter 6.2). Stop.
	☒ No	Management measures not required for protection of critical coarse sediment yield areas. Provide brief discussion below. Stop.
Discussion / justification if protection of critical coarse sediment yield areas does <u>not</u> apply: Verified using Google Earth KMZ file from Project Clean Water.		

Site Information Checklist For PDPs	Form I-3B
Project Summary Information	
Project Name	Cielo Tentative Map
Project Address	8280 Calle del Cielo La Jolla, CA 92037
Assessor's Parcel Number(s) (APN(s))	346-250-08-00, 346-250-09-00, 246-250-10-00 AND 346-240-01-00
Permit Application Number	529620
Project Watershed	Select One: ☐ San Dieguito River ☒ Penasquitos ☐ Mission Bay ☐ San Diego River ☐ San Diego Bay ☐ Tijuana River
Hydrologic subarea name with Numeric Identifier up to two decimal places (9XX.XX)	906.30
Project Area (total area of Assessor's Parcel(s) associated with the project or total area of the right-of-way)	4.453 Acres (______ Square Feet)
Area to be disturbed by the project (Project Footprint)	4.188 Acres (______ Square Feet)
Project Proposed Impervious Area (subset of Project Footprint)	1.782 Acres (______ Square Feet)
Project Proposed Pervious Area (subset of Project Footprint)	2.406 Acres (______ Square Feet)
Note: Proposed Impervious Area + Proposed Pervious Area = Area to be Disturbed by the Project. This may be less than the Project Area.	
The proposed increase or decrease in impervious area in the proposed condition as compared to the pre-project condition.	(0.650 - 1.782) +274 %

Description of Existing Site Condition and Drainage Patterns

Current Status of the Site (select all that apply):

☒ Existing development
☐ Previously graded but not built out
☐ Agricultural or other non-impervious use
☐ Vacant, undeveloped/natural

Description / Additional Information: Portions of the property is improved with paving for the private road and a single family residence and appurtenances.

Existing Land Cover Includes (select all that apply):

☒ Vegetative Cover
☐ Non-Vegetated Pervious Areas
☒ Impervious Areas

Description / Additional Information: The project site non-vegetated pervious area includes gravel driveway at the front of the existing single family residence.

Underlying Soil belongs to Hydrologic Soil Group (select all that apply):

☐ NRCS Type A
☐ NRCS Type B
☐ NRCS Type C
☒ NRCS Type D

Approximate Depth to Groundwater (GW):

☐ GW Depth < 5 feet
☐ 5 feet < GW Depth < 10 feet
☐ 10 feet < GW Depth < 20 feet
☒ GW Depth > 20 feet

Existing Natural Hydrologic Features (select all that apply):

☐ Watercourses
☐ Seeps
☐ Springs
☐ Wetlands
☒None

Description / Additional Information: A canyon exists onsite.

Description of Existing Site Topography and Drainage:

How is storm water runoff conveyed from the site? At a minimum, this description should answer:

1. Whether existing drainage conveyance is natural or urban;
2. If runoff from offsite is conveyed through the site? If yes, quantification of all offsite drainage areas, design flows, and locations where offsite flows enter the project site and summarize how such flows are conveyed through the site;
3. Provide details regarding existing project site drainage conveyance network, including storm drains, concrete channels, swales, detention facilities, storm water treatment facilities, and natural and constructed channels;
4. Identify all discharge locations from the existing project along with a summary of the conveyance system size and capacity for each of the discharge locations. Provide summary of the pre-project drainage areas and design flows to each of the existing runoff discharge locations.

Description / Additional Information:

The site conveys urban runoff to the west, Some runoff if to a 60' road easement and some drains directly to the neighbors westerly. A small area northerly of the site flows through the site (0.093 ac) and then to the same road easement westerly. All runoff to the road easement eventually flow westerly to La Jolla Shores Drive and to the public storm drain located therein. From there the runoff flows to the Pacific Ocean.

Prior to construction there exists offsite runoff to the site from the area northerly of the property. As shown on the pre-construction drainage area map, the offsite and onsite runoff flows to the area westerly, with the majority of the runoff flowing to the 60' road easement westerly of the site and then to La Jolla Shores Drive. A portion of the site runoff flows to the neighboring properties westerly of the site. The total pre-construction runoff flowing westerly is 7.49 cfs. Following construction there is a total increase in site runoff of 0.56 cfs (from 7.34 to 7.90 cfs). Following construction, the majority of the site runoff (7.56 cfs) will be conveyed to a cleanout in the private driveway and then convey by a 18" RCP drain to an existing curb inlet at the southeast corner of the intersection of Calle del Oro and Calle del Cielo. A portion of the site runoff (3.60 cfs) will be collected in a cleanout on Lot 1 and pumped to the cleanout in the private driveway. Total runoff to the west will decrease from 7.49 cfs to 0.48 cfs a decrease of 93.6%. The addition of 7.56 cfs of runoff to the public storm drain system in Calle del Oro will cause no adverse effect. The decrease in runoff to the west will improve the drainage condition experienced by the westerly neighbors as well as in La Jolla Shores Drive. The site has 0.650 ac of imperviousness and a proposed 1.782 ac area of imperiousness following development, a change from 14.6% to 40.0% area of imperviousness.

Description of Proposed Site Development and Drainage Patterns

Project Description / Proposed Land Use and/or Activities:

This project involves the removal of the existing single-family residence and subdivision of the property into 8 lots for single-family residences.

List/describe proposed impervious features of the project (e.g., buildings, roadways, parking lots, courtyards, athletic courts, other impervious features):

Impervious surfaces will include the new buildings and hardscape patio and walkways and driveway.

List/describe proposed pervious features of the project (e.g., landscape areas):

Landscaped areas and pervious paving as well as pools. The pools shall have adequate freeboard and/or overflow capability to prohibit overflow discharge to the MS4.

Does the project include grading and changes to site topography?

☒ Yes

☐ No

Description / Additional Information:

Mass grading will be performed as shown on the project map.

Does the project include changes to site drainage (e.g., installation of new storm water conveyance systems)?

☒ Yes

☐ No

If yes, provide details regarding the proposed project site drainage conveyance network, including storm drains, concrete channels, swales, detention facilities, storm water treatment facilities, natural and constructed channels, and the method for conveying offsite flows through or around the proposed project site. Identify all discharge locations from the proposed project site along with a summary of the conveyance system size and capacity for each of the discharge locations. Provide a summary of pre and post-project drainage areas and design flows to each of the runoff discharge locations. Reference the drainage study for detailed calculations.

Description / Additional Information:

There is a decrease in runoff to La Jolla Shores Drive with an increase in runoff to the public storm drain northerly of the site. All runoff will continue to flow to the Pacific Ocean and the new runoff flowing northerly will have not adverse effect on the public storm drains system The decrease in runoff to La Jolla Shores Drive, will have a beneficial effect on that portion of the public storm drain system. There will be a significant decrease in volume to neighboring properties. See the Drainage Study.

Form I-3B Page 6 of 11

Identify whether any of the following features, activities, and/or pollutant source areas will be present (select all that apply):

- ☒ On-site storm drain inlets
- ☐ Interior floor drains and elevator shaft sump pumps
- ☐ Interior parking garages
- ☐ Need for future indoor & structural pest control
- ☒ Landscape/Outdoor Pesticide Use
- ☒ Pools, spas, ponds, decorative fountains, and other water features
- ☐ Food service
- ☒ Refuse areas
- ☐ Industrial processes
- ☐ Outdoor storage of equipment or materials
- ☐ Vehicle and Equipment Cleaning
- ☐ Vehicle/Equipment Repair and Maintenance
- ☐ Fuel Dispensing Areas
- ☐ Loading Docks
- ☐ Fire Sprinkler Test Water
- ☐ Miscellaneous Drain or Wash Water
- ☐ Plazas, sidewalks, and parking lots
- ☐ Large Trash Generating Facilities
- ☐ Animal Facilities
- ☐ Plant Nurseries and Garden Centers
- ☐ Automotive-related Uses

Description / Additional Information:

No pesticides are expected to be required as part of the landscape management. Refuse containers stored in the garage. Onsite storm drains will include area drains and catch basins. Pools are part of the project design.

Identification and Narrative of Receiving Water

Narrative describing flow path from discharge location(s), through urban storm conveyance system, to receiving creeks, rivers, and lagoons and ultimate discharge location to Pacific Ocean (or bay, lagoon, lake or reservoir, as applicable) Runoff flows from the project site via a 18" RCP drain to the public storm drain system in Calle del Cielo then to the existing system in Calle del Oro and Camino del Oro, to the Pacific Ocean. Some site runoff continues to flow by surface flow to La Jolla Shores Drive.
Provide a summary of all beneficial uses of receiving waters downstream of the project discharge locations. For Coastal Water uses include Industrial service supply, Navigation, Contact Water Recreation, Non-Contact Water Recreation, Commercial and Sport fishing, Biologic Habitats, Estuarine, Wildlife, Rare and Marine habitats, Migration, Aquaculture, Shellfish Harvesting, Spawning. Ground Water uses include Municipal, Domestic and Industrial supply.
Identify all ASBS (areas of special biological significance) receiving waters downstream of the project discharge locations. La Jolla Shores ASBS area.
Provide distance from project outfall location to impaired or sensitive receiving waters. Approximately 0.2 mile westerly to the Pacific Ocean.
Summarize information regarding the proximity of the permanent, post-construction storm water BMPs to the City's Multi-Habitat Planning Area and environmentally sensitive lands There are no MHPA or ESL areas near the project site.

Identification of Receiving Water Pollutants of Concern

List any 303(d) impaired water bodies within the path of storm water from the project site to the Pacific Ocean (or bay, lagoon, lake or reservoir, as applicable), identify the pollutant(s)/stressor(s) causing impairment, and identify any TMDLs and/or Highest Priority Pollutants from the WQIP for the impaired water bodies:

303(d) Impaired Water Body	Pollutant(s)/Stressor(s)	TMDLs/ WQIP Highest Priority Pollutant
Pacific Ocean	Bacteria	Indicator Bacteria

Identification of Project Site Pollutants*

*Identification of project site pollutants is only required if flow-thru treatment BMPs are implemented onsite in lieu of retention or biofiltration BMPs (note the project must also participate in an alternative compliance program unless prior lawful approval to meet earlier PDP requirements is demonstrated)

Identify pollutants anticipated from the project site based on all proposed use(s) of the site (see BMP Design Manual (Part 1 of Storm Water Standards) Appendix B.6):

Pollutant	Not Applicable to the Project Site	Anticipated from the Project Site	Also a Receiving Water Pollutant of Concern
Sediment			
Nutrients			
Heavy Metals			
Organic Compounds			
Trash & Debris			
Oxygen Demanding Substances			
Oil & Grease			
Bacteria & Viruses			
Pesticides			

Hydromodification Management Requirements

Do hydromodification management requirements apply (see Section 1.6 of the BMP Design Manual)?

- ☐ Yes, hydromodification management flow control structural BMPs required.
- ☒ No, the project will discharge runoff directly to existing underground storm drains discharging directly to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean.
- ☐ No, the project will discharge runoff directly to conveyance channels whose bed and bank are concrete-lined all the way from the point of discharge to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean.
- ☐ No, the project will discharge runoff directly to an area identified as appropriate for an exemption by the WMAA for the watershed in which the project resides.

Description / Additional Information (to be provided if a 'No' answer has been selected above):

Critical Coarse Sediment Yield Areas*

*This Section only required if hydromodification management requirements apply

Based on Section 6.2 and Appendix H does CCSYA exist on the project footprint or in the upstream area draining through the project footprint?

- ☐ Yes
- ☒ No

Discussion / Additional Information:

Potential CCSYAs do not occur onsite or areas upstream and tributary to the site.

Flow Control for Post-Project Runoff*

*This Section only required if hydromodification management requirements apply

List and describe point(s) of compliance (POCs) for flow control for hydromodification management (see Section 6.3.1). For each POC, provide a POC identification name or number correlating to the project's HMP Exhibit and a receiving channel identification name or number correlating to the project's HMP Exhibit.

Has a geomorphic assessment been performed for the receiving channel(s)?

☐ No, the low flow threshold is 0.1Q2 (default low flow threshold)

☐ Yes, the result is the low flow threshold is 0.1Q2

☐ Yes, the result is the low flow threshold is 0.3Q2

☐ Yes, the result is the low flow threshold is 0.5Q2

If a geomorphic assessment has been performed, provide title, date, and preparer:

Discussion / Additional Information: (optional)

Form I-3B Page 11 of 11

Other Site Requirements and Constraints

When applicable, list other site requirements or constraints that will influence storm water management design, such as zoning requirements including setbacks and open space, or local codes governing minimum street width, sidewalk construction, allowable pavement types, and drainage requirements.

None.

Optional Additional Information or Continuation of Previous Sections As Needed

This space provided for additional information or continuation of information from previous sections as needed.

Source Control BMP Checklist for All Development Projects	Form I-4		
Source Control BMPs			
All development projects must implement source control BMPs SC-1 through SC-6 where applicable and feasible. See Chapter 4 and Appendix E of the BMP Design Manual (Part 1 of the Storm Water Standards) for information to implement source control BMPs shown in this checklist. Answer each category below pursuant to the following. • "Yes" means the project will implement the source control BMP as described in Chapter 4 and/or Appendix E of the BMP Design Manual. Discussion / justification is not required. • "No" means the BMP is applicable to the project but it is not feasible to implement. Discussion / justification must be provided. • "N/A" means the BMP is not applicable at the project site because the project does not include the feature that is addressed by the BMP (e.g., the project has no outdoor materials storage areas). Discussion / justification may be provided.			
Source Control Requirement	Applied?		
SC-1 Prevention of Illicit Discharges into the MS4	☐ Yes	☐ No	☒ N/A
Discussion / justification if SC-1 not implemented: None anticipated.			
SC-2 Storm Drain Stenciling or Signage	☒ Yes	☐ No	☐ N/A
Discussion / justification if SC-2 not implemented: For curb inlets.			
SC-3 Protect Outdoor Materials Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐ Yes	☐ No	☒ N/A
Discussion / justification if SC-3 not implemented: Will not occur onsite.			
SC-4 Protect Materials Stored in Outdoor Work Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐ Yes	☐ No	☒ N/A
Discussion / justification if SC-4 not implemented: Will not occur onsite.			
SC-5 Protect Trash Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☒ Yes	☐ No	☐ N/A
Discussion / justification if SC-5 not implemented: Refuse containers will be stored within the proposed garage.			

Form I-4 Page 2 of 2			
Source Control Requirement	**Applied?**		
SC-6 Additional BMPs Based on Potential Sources of Runoff Pollutants (must answer for each source listed below)			
On-site storm drain inlets	☒ Yes	☐ No	☐ N/A
Interior floor drains and elevator shaft sump pumps	☐ Yes	☐ No	☒ N/A
Interior parking garages	☐ Yes	☐ No	☒ N/A
Need for future indoor & structural pest control	☐ Yes	☐ No	☒ N/A
Landscape/Outdoor Pesticide Use	☒ Yes	☐ No	☐ N/A
Pools, spas, ponds, decorative fountains, and other water features	☒ Yes	☐ No	☐ N/A
Food service	☐ Yes	☐ No	☒ N/A
Refuse areas	☒ Yes	☐ No	☐ N/A
Industrial processes	☐ Yes	☐ No	☒ N/A
Outdoor storage of equipment or materials	☐ Yes	☐ No	☒ N/A
Vehicle/Equipment Repair and Maintenance	☐ Yes	☐ No	☒ N/A
Fuel Dispensing Areas	☐ Yes	☐ No	☒ N/A
Loading Docks	☐ Yes	☐ No	☒ N/A
Fire Sprinkler Test Water	☐ Yes	☐ No	☒ N/A
Miscellaneous Drain or Wash Water	☐ Yes	☐ No	☒ N/A
Plazas, sidewalks, and parking lots	☐ Yes	☐ No	☒ N/A
SC-6A: Large Trash Generating Facilities	☐ Yes	☐ No	☒ N/A
SC-6B: Animal Facilities	☐ Yes	☐ No	☒ N/A
SC-6C: Plant Nurseries and Garden Centers	☐ Yes	☐ No	☒ N/A
SC-6D: Automotive-related Uses	☐ Yes	☐ No	☒ N/A

Discussion / justification if SC-6 not implemented. Clearly identify which sources of runoff pollutants are discussed. Justification must be provided for all "No" answers shown above.

Landscaping will be employed but pesticide use is not anticipated. Refuse will be collected in container stored in the proposed garage. Onsite drains include area drains and catch basins.

Site Design BMP Checklist for All Development Projects	Form I-5		

Site Design BMPs

All development projects must implement site design BMPs SD-1 through SD-8 where applicable and feasible. See Chapter 4 and Appendix E of the BMP Design Manual (Part 1 of Storm Water Standards) for information to implement site design BMPs shown in this checklist.

Answer each category below pursuant to the following.

- "Yes" means the project will implement the site design BMP as described in Chapter 4 and/or Appendix E of the BMP Design Manual. Discussion / justification is not required.
- "No" means the BMP is applicable to the project but it is not feasible to implement. Discussion / justification must be provided.
- "N/A" means the BMP is not applicable at the project site because the project does not include the feature that is addressed by the BMP (e.g., the project site has no existing natural areas to conserve). Discussion / justification may be provided.

A site map with implemented site design BMPs must be included at the end of this checklist.

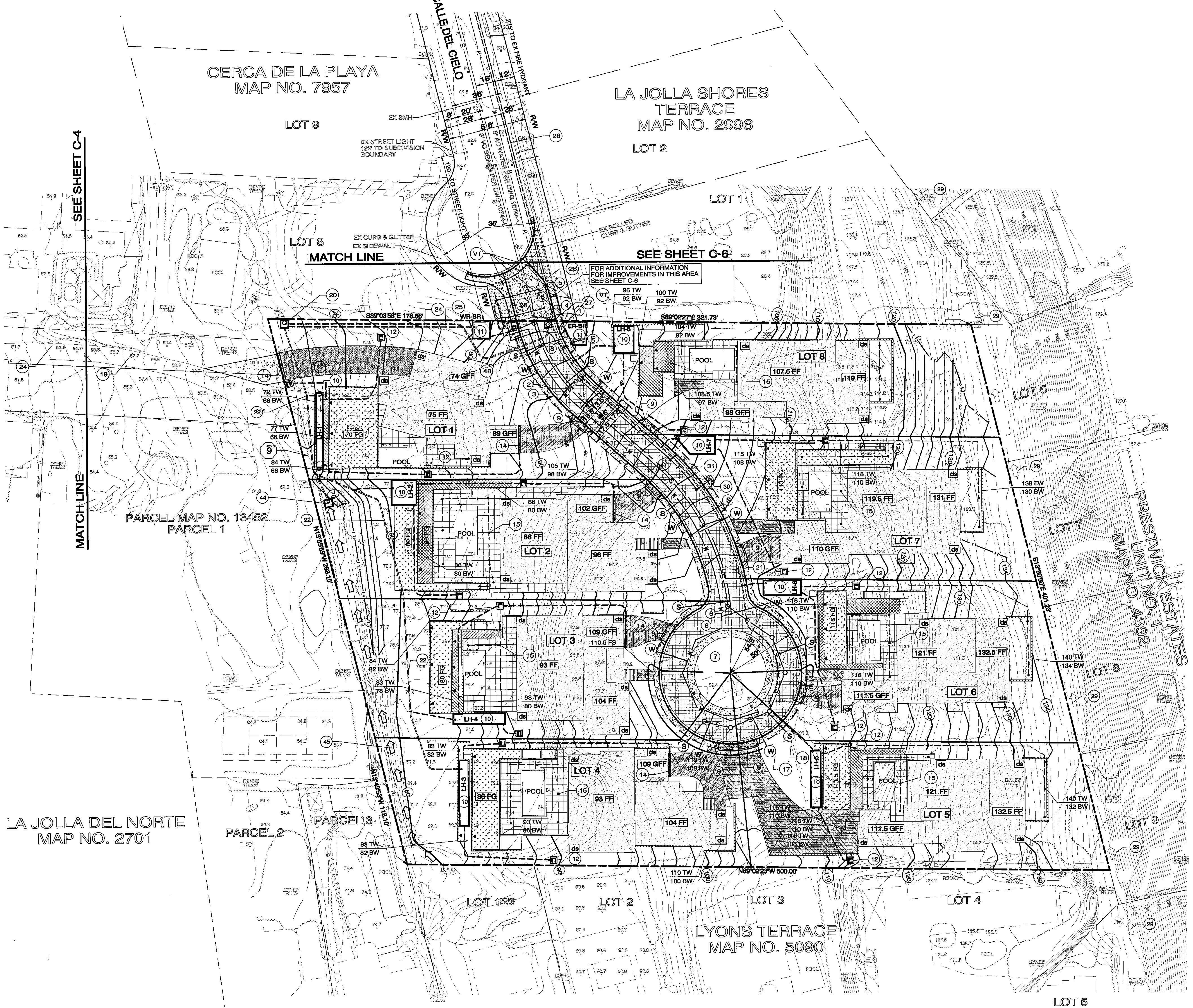
Site Design Requirement	Applied?		
SD-1 Maintain Natural Drainage Pathways and Hydrologic Features	☐ Yes	☐ No	☒ N/A
Discussion / justification if SD-1 not implemented: Does not exist onsite.			
1-1 Are existing natural drainage pathways and hydrologic features mapped on the site map?	☐ Yes	☒ No	
1-2 Are trees implemented? If yes, are they shown on the site map?	☐ Yes	☒ No	
1-3 Implemented trees meet the design criteria in SD-1 Fact Sheet (e.g. soil volume, maximum credit, etc.)?	☐ Yes	☒ No	
1-4 Is tree credit volume calculated using Appendix B.2.2.1 and SD-1 Fact Sheet in Appendix E?	☐ Yes	☒ No	
SD-2 Have natural areas, soils and vegetation been conserved?	☐ Yes	☐ No	☒ N/A
Discussion / justification if SD-2 not implemented: No natural area exist onsite.			

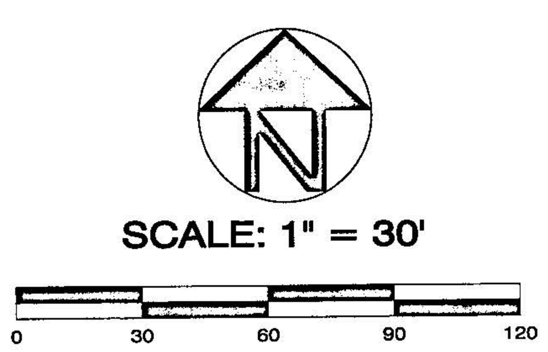
Form I-5 Page 2 of 4			
Site Design Requirement	Applied?		
SD-3 Minimize Impervious Area	☒ Yes	☐ No	☐ N/A
Discussion / justification if SD-3 not implemented:			
SD-4 Minimize Soil Compaction	☒ Yes	☐ No	☐ N/A
Discussion / justification if SD-4 not implemented:			
SD-5 Impervious Area Dispersion	☒ Yes	☐ No	☐ N/A
Discussion / justification if SD-5 not implemented: Self-mitigating areas flow by surface flow and are generally collected and conveyed offsite in the drain system. Runoff from areas not collected and flowing offsite do so by surface flow and the runoff is not concentrated. Runoff decreases by 93.3% from its pre-construction volume.			
5-1 Is the pervious area receiving runon from impervious area identified on the site map?	☒ Yes	☐ No	
5-2 Does the pervious area satisfy the design criteria in SD-5 Fact Sheet in Appendix E (e.g. maximum slope, minimum length, etc.)	☒ Yes	☐ No	
5-3 Is impervious area dispersion credit volume calculated using Appendix B.2.1.1 and SD-5 Fact Sheet in Appendix E?	☐ Yes	☒ No	

Site Design Requirement	Applied?		
SD-6 Runoff Collection	☐ Yes	☐ No	☒ N/A
Discussion / justification if SD-6 not implemented: Runoff is collected from the impervious areas and directed to bioretention basins.			
6a-1 Are green roofs implemented in accordance with design criteria in SD-6A Fact Sheet? If yes, are they shown on the site map?	☐ Yes	☒ No	
6a-2 Is green roof credit volume calculated using Appendix B.2.1.2 and SD-6A Fact Sheet in Appendix E?	☐ Yes	☒ No	
6b-1 Are permeable pavements implemented in accordance with design criteria in SD-6B Fact Sheet? If yes, are they shown on the site map?	☐ Yes	☒ No	
6b-2 Is permeable pavement credit volume calculated using Appendix B.2.1.3 and SD-6B Fact Sheet in Appendix E?	☐ Yes	☒ No	
SD-7 Landscaping with Native or Drought Tolerant Species	☒ Yes	☐ No	☐ N/A
Discussion / justification if SD-7 not implemented: Permeable pavement is being utilized but no credit volume is being claimed.			
SD-8 Harvesting and Using Precipitation	☐ Yes	☒ No	☐ N/A
Discussion / justification if SD-8 not implemented: The water demand in the 36 hour limit is exceeded by the DCV.			
8-1 Are rain barrels implemented in accordance with design criteria in SD-8 Fact Sheet? If yes, are they shown on the site map?	☐ Yes	☒ No	
8-2 Is rain barrel credit volume calculated using Appendix B.2.2.2 and SD-8 Fact Sheet in Appendix E?	☐ Yes	☒ No	

Form I-5 Page 4 of 4
Insert Site Map with all site design BMPs identified:

TENTATIVE MAP NO. 1871908
COAST
AL DEVELOPMENT PERMIT 1871905
SITE DEVELOPMENT PERMIT 187907
PLANNED DEVELOPMENT PERMIT





CONSTRUCTION NOTES

1. PROPOSED CURB INLET WITHOUT STANDARD BOX TO ALLOW STREET RUNOFF TO BE COLLECTED AND CONVEYED TO BIOFILTRATION BASIN
2. PROPOSED PRIVATE 6" TYPE "G" CURB AND GUTTER PER SDG-151 ONSITE (SEE SHEET C-6 FOR OFFSITE)
3. PROPOSED PRIVATE 4" SIDEWALK PER SDG-155 (TYPICAL)
4. PROPOSED PRIVATE 8" PVC SEWER TO JOIN EXISTING 8" VC SEWER AT NEW SEWER MANHOLE
5. PROPOSED PRIVATE 6" PVC WATER TO JOIN EXISTING 8" AC WATER, REMOVE MAIN AND AIR VALVE BEYOND POC
6. PROPOSED PRIVATE SEWER MHs PER SDS-107 (84.0 RIM / (77.42 IE)) AT ENTRANCE & (109.5 RIM / 103.0 IE) AT CUL-DE-SAC
7. PROPOSED GRASS-CRETE OR EQUIVALENT PAVEMENT
8. PROPOSED STAMPED CONCRETE PAVEMENT
9. C/L PRIVATE MODIFIED DRIVEWAYS PER SDG-159

LOT	WIDTH
1	12'
2	12'
3	13'
4	13'
5	14'
6	14'
7	13'
8	12'

10. PROPOSED BIOFILTRATION BASIN FOR INDIVIDUAL LOTS
11. PROPOSED BIOFILTRATION BASIN FOR STREET RUNOFF (ALSO PORTIONS OF LOTS 5-8)

11A PROPOSED BIOFILTRATION BASIN FOR WESTERLY STREET RUNOFF

12. PROPOSED 3636 CATCH BASIN ON LOTS TO COLLECT RUNOFF TO BE CONVEYED TO INDIVIDUAL LOT BIOFILTRATION BASINS
13. REMOVE AND REPLACE EXISTING 22' DRIVEWAY PER SDG-159 AT LA JOLLA SHORE DRIVE
14. PROPOSED 6' TRENCH DRAIN
15. PROPOSED DECK DRAINS
16. PROPOSED PLANTER DRAIN DISCHARGING THROUGH WALL
17. PROPOSED PRIVATE 1" WATER SERVICE (TYPICAL)
18. PROPOSED PRIVATE 4" SEWER LATERAL (TYPICAL)
19. PRIVATE 8" PVC DRAIN FROM CATCH BASIN LOT 1 TYPE A-4 CLEANOUT (ITEM 25)
20. TYPE A-4 CLEANOUT PER D-09 WITH TWO 7.5 HP PUMPS TO CONVEY RUNOFF TO TYPE A-4 CLEANOUT IN PRIVATE DRIVEWAY (ITEM 27)
21. PROPOSED PRIVATE 12" PVC DRAIN TO COLLECT TREATED RUNOFF FROM LOTS 5-8 AND CONVEY IT TO TYPE A CLEANOUT (ITEM 27)
22. PROPOSED PRIVATE 12" PVC DRAIN TO COLLECT TREATED RUNOFF FROM LOTS 1-4 AND CONVEY IT TO CLEANOUT IN LOT 1
23. POROUS CONCRETE PAVEMENT TO JOIN AC DRIVEWAY IN 60' EASEMENT TO PERMEABLE PAVING DRIVEWAY ON LOT 1
24. PROPOSED 8" PVC DRAIN TO CONVEY TREATED RUNOFF FROM BASIN WR-BR TO CLEANOUT (ITEM #20)
25. TWO 4" PVC DRAINS FROM PUMPS IN CLEANOUT (ITEM #20) TO CLEANOUT (ITEM 27)
26. 6" PRIVATE FIRE SERVICE BACKFLOW PREVENTER PER SDW-120
27. PRIVATE TYPE "A" CLEANOUT TO COLLECT RUNOFF AND CONVEY IT IN 18" RCP DRAIN TO EX CURB INLET AT INTERSECTION OF CALLE DEL CIELO TO CALLE DE ORO
28. PUBLIC 18" RCP DRAIN TO CONVEY RUNOFF FROM TYPE "A" CLEANOUT TO EX CURB INLET AT INTERSECTION OF CALLE DEL CIELO TO CALLE DE ORO (Q_{100} = 7.56 CFS)
29. EXISTING DRAINAGE DITCH ON NEIGHBORING PROPERTIES PER DWG 7774-D
30. PRIVATE FIRE HYDRANT PER SDW-104
31. PRIVATE 6" PVC FIRE SERVICE
44. PROPOSED TYPE "F" CATCH BASIN PER SDD-119
45. PROPOSED CONCRETE DITCH PER SDD-106
48. PROPOSED TYPE "B" CURB INLET PER SDD-116

VT VISIBILITY TRIANGLE AREA
NO OBSTRUCTION, INCLUDING LANDSCAPING OR SOLID WALLS IN THE VISIBILITY AREA SHALL EXCEED 3' IN HEIGHT

NOTES:

PRIVATE DRAINAGE EASEMENTS AND AGREEMENTS WILL BE REQUIRED IN LOTS 1-3 & 8

AN ENCROACHMENT MAINTENANCE AND REMOVAL AGREEMENT WILL BE REQUIRED FOR PRIVATE 6" PVC WATER MAIN IN CALLE DEL CIELO.

ALL UNUSED EXISTING WATER SERVICES ARE TO BE KILLED, INCLUDING EXISTING 2" WATER SERVICE IN 60' ROAD EASEMENT SUPPLYING CURRENT IMPROVEMENTS.

ALL PROPOSED ONSITE UTILITIES SHALL BE UNDERGROUND.

ALL GARAGE DOORS SHALL BE A MINIMUM OF 20' FROM BACK OF SIDEWALK (SEE SITE PLAN)

BACKUP GENERATOR SHALL BE PROVIDED TO SUPPLY PUMPS IN ITEM 20, IN THE EVENT OF LOSS OF POWER

PUBLIC STORM DRAIN AND PUBLIC WATER TO BE SEPARATED A MINIMUM OF 5', EDGE TO EDGE, IN CALLE DEL CIELO RIGHT OF WAY.

GRADING DATA

AREA OF SITE - 4.453 AC
AREA OF SITE TO BE GRADED 4.188 SF
PERCENT OF SITE TO BE GRADED 94%
AREA OF SITE WITH SLOPES GREATER THEN 25% - 0.783 AC
PERCENT OF SITE WITH SLOPES GREATER THEN 25% - 17.6%

NO ENVIRONMENTALLY SENSITIVE LANDS EXIST ONSITE
NO PART OF SITE IS PREVIOUSLY UNDISTURBED PER BIOLOGICAL LETTER REPORT PREPARED BY KLUTZ BIOLOGICAL CONSULTING DATED JANUARY 17, 2017.

AMOUNT OF CUT - 4,600 C.Y.
AMOUNT OF FILL - 34,000 C.Y.
AMOUNT OF IMPORT - 29,400 C.Y.
MAXIMUM HEIGHT OF FILL SLOPE - 17 FEET
MAXIMUM DEPTH OF CUT - 10 FEET
RETAINING WALL: 10 FEET MAX, HT. 2100 FEET TOTAL LENGTH (OTHERS, PART OF RESIDENCES)

AUGUST 21, 2017

ANTONY K. CHRISTENSEN, RCE 54021 — Date
LS 7508

REGISTERED PROFESSIONAL ENGINEER — Antony K. Christensen — No. 54021 — Exp. 12-31-17 — CIVIL — STATE OF CALIFORNIA

LICENSED LAND SURVEYOR — Antony K. Christensen — Exp. 12-31-17 — No. LS 7508 — STATE OF CALIFORNIA

Prepared By:

CHRISTENSEN ENGINEERING & SURVEYING
7888 SILVERTON AVENUE, SUITE "J"
SAN DIEGO, CA 92126
PHONE (858)271-9901 FAX (858)271-8912

Project Address:

8280 CALLE DEL CIELO
LA JOLLA, CA 92037.

Project Name:

CIELO TENTATIVE MAP

Sheet Title:

PRELIMINARY GRADING PLAN

Revision 5:
Revision 4: 08-18-17 ADDRESS CITY COMMENTS
Revision 3: 08-02-17 REVISE FIRE SERVICE CONNECTION TO MAIN
Revision 2: 07-15-17 REVISE DESIGN ADDRESS CITY COMMENTS
Revision 1: 05-27-17 REVISE DESIGN ADDRESS CITY COMMENTS

Original Date: FEBRUARY 03, 2017

Sheet

DEP# ____

C-3

JN A2015-50

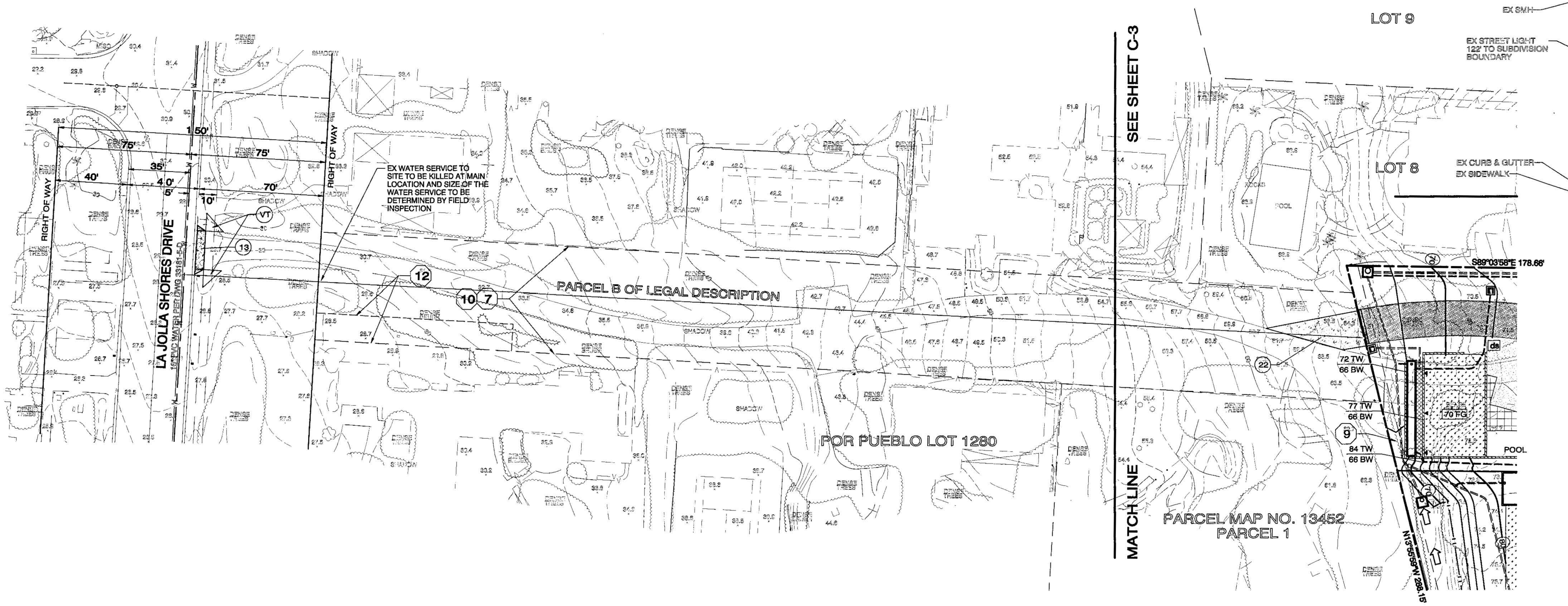
TENTATIVE MAP NO. 1871908
COASTAL DEVELOPMENT PERMIT 1871905
SITE DEVELOPMENT PERMIT 187907
PLANNED DEVELOPMENT PERMIT

CONSTRUCTION NOTES

(13) REMOVE AND REPLACE EXISTING 22' DRIVEWAY PER SDG-159 AT LA JOLLA SHORE DRIVE

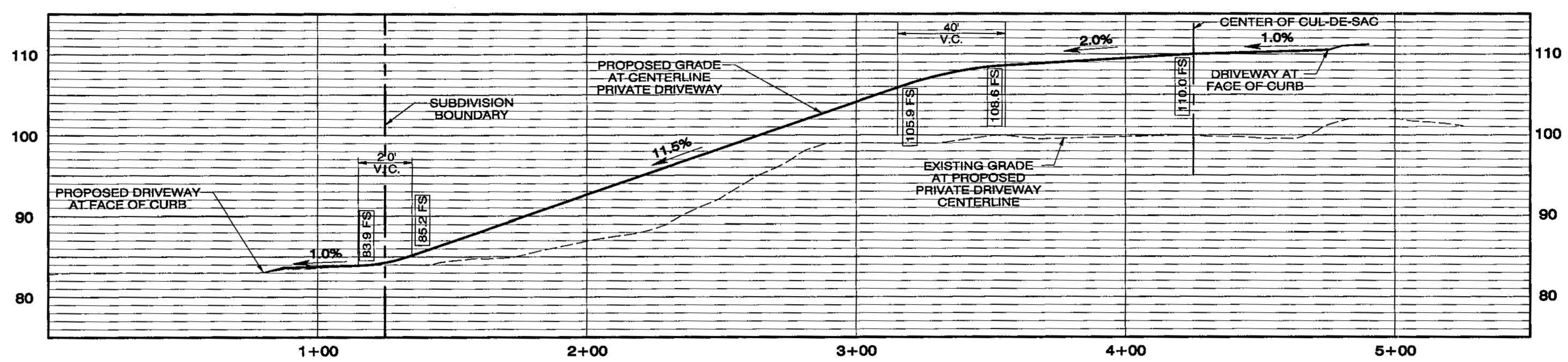
(22) PROPOSED PRIVATE 12" PVC DRAIN TO COLLECT TREATED RUNOFF FROM LOTS 1-4 AND CONVEY IT TO CLEANOUT IN LOT 1

(VT) VISIBILITY TRIANGLE AREA
NO OBSTRUCTION, INCLUDING LANDSCAPING OR SOLID WALLS IN THE VISIBILITY AREA SHALL EXCEED 3' IN HEIGHT

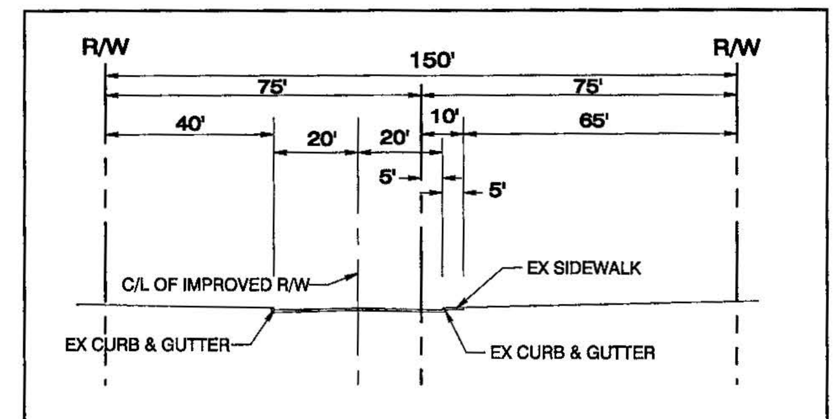


LEGEND

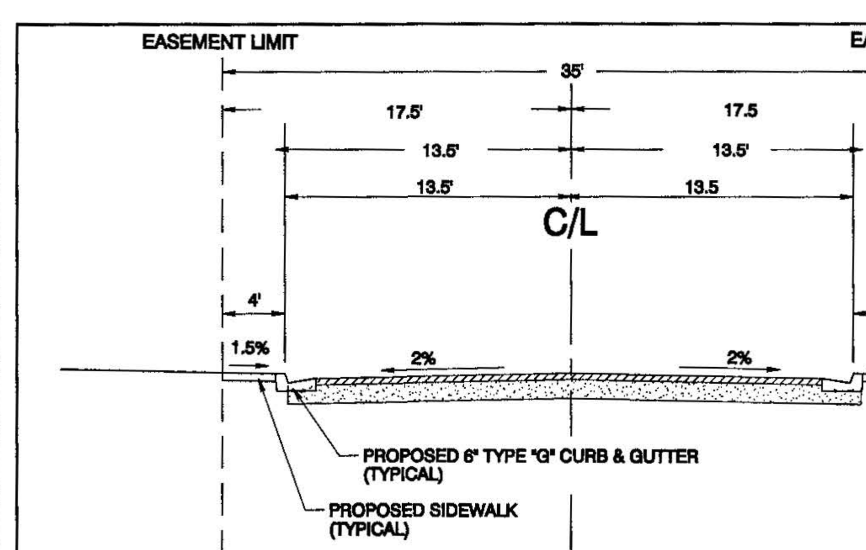
- PROPERTY LINE/TM BNDRY
- EXISTING CONTOUR
- EXISTING ELECTRICAL LINE
- EXISTING GAS LINE
- EXISTING SEWER LINE
- EXISTING TELEPHONE LINE
- EXISTING WATER LINE
- PROPOSED STREET EASEMENT
- EX FIRE HYDRANT
- PROPOSED SEWER MANHOLE SDS-107
- PROPOSED PVT 4" PVC SEWER LATERAL
- PROPOSED 1" WATER SERVICE
- PROPOSED CATCH BASIN FOR FLOW TO IMPs
- PROPOSED CATCH BASIN AS DRAIN JUNCITON
- PROPOSED AREA DRAIN
- PROPOSED PVC DRAIN
- PROPOSED PVC DRAIN FOR DECK AREA SURFACES
- PROPOSED CONCRETE SURFACE
- PROPOSED PAVER SURFACE
- PROPOSED HEADWALL PER D-30
- PROPOSED RIP RAP ENERGY DISSIPATER PER SDD-104
- PROPOSED CURB/GUTTER (ROLLED) & SIDEWALK PER G-4 & SDG-155
- PROPOSED CURB INLET TYPE B MODIFIED (THROAT ONLY)
- BIOFILTRATION BASIN
- 18" RCP DRAIN
- TYPE "A" DRAIN CLEANOUT PER D-09
- PRIVATE RETAINING WALL
- VISIBILITY TRIANGLE (VT)



PRIVATE DRIVEWAY AT CALLE DEL CIELO PROFILE
HORIZONTAL SCALE 1" = 30'
VERTICAL SCALE 1" = 10'



LA JOLLA SHORES DRIVE TYPICAL SECTION:
NOT TO SCALE



PRIVATE DRIVEWAY TYPICAL SECTION:
NOT TO SCALE

CIELO PARKING TABLE

	LOT AREA	FLOOR AREA	# OF BEDROOMS	MINIMUM PARKING SPACES REQUIRED PER (TABLE 142-05C)	PARKING SPACES PROVIDED
PROPOSED LOT 1:	24,431 SF	7,275 SF	3	2	6
PROPOSED LOT 2:	23,673 SF	7,450 SF	5	2	4
PROPOSED LOT 3:	25,500 SF	7,450 SF	5	2	4
PROPOSED LOT 4:	23,633 SF	7,450 SF	5	2	4
PROPOSED LOT 5:	23,659 SF	7,450 SF	4	2	5
PROPOSED LOT 6:	25,425 SF	7,450 SF	4	2	4
PROPOSED LOT 7:	23,991 SF	7,450 SF	4	2	4
PROPOSED LOT 8:	23,685 SF	7,450 SF	4	2	4

ALL LAND USES ARE SF (SINGLE FAMILY) PER LA JOLLA SHORES PDO

DMA/IMP AREA SUMMARY

LOT (DMA)	IMPERVIOUS AREA	PERMEABLE AREA	TOTAL AREA CONVEYED TO IMP	IMP NAME	IMP SURFACE AREA	SELF-MITIGATING AREA	POOL AREA	"C" VALUE
1	0.182 AC	0.143 AC	0.325 AC	LH-1	235 SF	0.135 AC	0.012 AC	0.55
2	0.232 AC	0.094 AC	0.326 AC	LH-2	290 SF	0.166 AC	0.012 AC	0.67
3	0.182 AC	0.101 AC	0.283 AC	LH-3	250 SF	0.044 AC	0.014 AC	0.61
4	0.199 AC	0.116 AC	0.315 AC	LH-4	275 SF	0.190 AC	0.011 AC	0.61
5	0.179 AC	0.155 AC	0.344 AC	LH-5	260 SF		0.010 AC	0.51
6	0.179 AC	0.188 AC	0.367 AC	LH-6	255 SF		0.010 AC	0.49
7	0.187 AC	0.172 AC	0.359 AC	LH-7	270 SF		0.010 AC	0.52
8	0.185 AC	0.210 AC	0.395 AC	LH-8	250 SF		0.010 AC	0.47
EAST ST	0.101 AC	0.102 AC 0.521 AC *	0.724 AC	ER-BR	200 SF	NONE	NONE	0.21
WEST ST	0.098 AC	0.111 AC	0.209 AC	WR-BR	132 SF	NONE	NONE	0.48
DE MINIMIS	76 SF	0	N/A					

* PERVIOUS AREAS OF LOTS 5-8 FLOWING TO IMP ER-BR

NOTE:

ALL SELF MITIGATING AREA SHALL COMPLY WITH SECTION 5.2.1 OF THE CITY OF SAN DIEGO STORM WATER MANUAL. LANDSCAPED AREA SHALL BE VEGETATED WITH NATVE OR NON-NATIVE/NON-INVASIVE DROUGHT TOLERATE SPECIES THAT DO NOT REQURE REGULAR APPLICATION OF FERTILIZERS AND PESTICIDES.

SOILS SHALL BE AMENDED AND AERATED TO PROMOTE WATER RETENTION CHARACTERISTICS EQUIVALENT TO UNDISTURBED NATIVE SOIL.

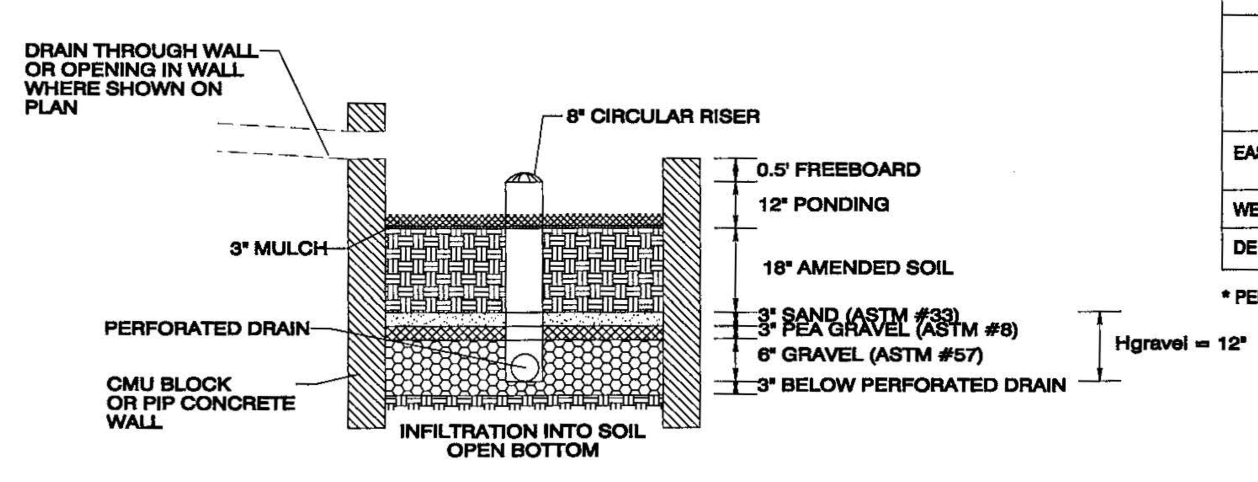
NO MORE THAT 5% OF SELF MIGITATING AREA SHALL BE INCIDENTALLY IMPERVIOUS

IMPERVIOUS AREA SHALL NOT BE HYDRAULICALLY CONNECTED TO OTHER IMPREVIOUS AREAS

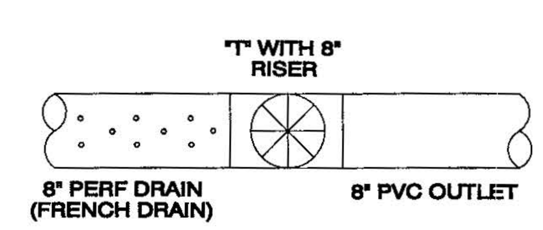
SELF-MITIGATING AREAS SHALL BE SEPARATE FROM DMAs PERMANENT STORM WATER POLLUTANT CONTROL BMPs.

SELF-MITIGATING AREAS IN LOTS 1-4 HAVE NO IMPERVIOUS AREA DRAINING TO THEM. RUNOFF FROM THESE AREAS ARE COLLECTED BY AREA DRAINS SEPARATE FROM THE TREATED RUNOFF AND CONVEYED OFFSITE OR FLOW BY SHEET FLOW, WITH NO CONCENTRATION OF RUNOFF.

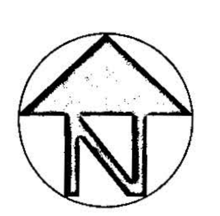
POOL AREAS SHALL HAVE ADEQUATE FREEBOARD AND OVERFLOW DEVICE TO PREVENT OVERFLOW TO THE MS4.



BIOFILTRATION BASIN DETAIL (PVT)
NOT TO SCALE



BASIN OUTLET DETAIL (PVT)
NOT TO SCALE



SCALE: 1" = 30'

0 30 60 90 120

AUGUST 21, 2017
Date

ANTONY K. CHRISTENSEN, RCE 54021
LS 7509

Prepared By:

CHRISTENSEN ENGINEERING & SURVEYING
7888 SILVERTON AVENUE, SUITE "J"
SAN DIEGO, CA 92126
PHONE (858)271-9901 FAX (858)271-8912

Project Address:

8280 CALLE DEL CIELO
LA JOLLA, CA 92037.

Project Name:

CIELO TENTATIVE MAP

Sheet Title:

PRELIMINARY GRADING PLAN

Revision 5: 08-18-17 ADDRESS CITY COMMENTS
Revision 4: 08-02-17 WATER SERVICE TO BE KILLED ADDED TO PLAN
Revision 3: 07-15-17 REVISE DESIGN ADDRESS CITY COMMENTS
Revision 2: 05-27-17 REVISE DESIGN ADDRESS CITY COMMENTS
Revision 1: 04-20-17 ADD DRAIN DETAILS

Original Date: FEBRUARY 03, 2017

Sheet

DEP#

C-4

JN A2015-50

Summary of PDP Structural BMPs	Form I-6

PDP Structural BMPs

All PDPs must implement structural BMPs for storm water pollutant control (see Chapter 5 of the BMP Design Manual, Part 1 of Storm Water Standards). Selection of PDP structural BMPs for storm water pollutant control must be based on the selection process described in Chapter 5. PDPs subject to hydromodification management requirements must also implement structural BMPs for flow control for hydromodification management (see Chapter 6 of the BMP Design Manual). Both storm water pollutant control and flow control for hydromodification management can be achieved within the same structural BMP(s).

PDP structural BMPs must be verified by the City at the completion of construction. This includes requiring the project owner or project owner's representative to certify construction of the structural BMPs (complete Form DS-563). PDP structural BMPs must be maintained into perpetuity (see Chapter 7 of the BMP Design Manual).

Use this form to provide narrative description of the general strategy for structural BMP implementation at the project site in the box below. Then complete the PDP structural BMP summary information sheet (page 3 of this form) for each structural BMP within the project (copy the BMP summary information page as many times as needed to provide summary information for each individual structural BMP).

Describe the general strategy for structural BMP implementation at the site. This information must describe how the steps for selecting and designing storm water pollutant control BMPs presented in Section 5.1 of the BMP Design Manual were followed, and the results (type of BMPs selected). For projects requiring hydromodification flow control BMPs, indicate whether pollutant control and flow control BMPs are integrated or separate.

Recent testing by the geotechnical consultant has determined that the average infiltration over the project site averages approximately 0.01 in/hr and has been used in the sizing worksheets. The project is a non-infiltration site. The lots each have their own biofiltration basins. The street is divided in half with some lot runoff from lots 5-8 being conveyed onto the easterly half of the street and separately treated by biofiltration basins for the east and west half of the street. A portion of lots 1-4 is self-mitigating and flows westerly. Each lot has a proposed pool, which is self-retaining. A small area at the entrance to the subdivision (less than 200 sf) is considered a de minimis area and flows to Calle del Cielo. The project is exempt from hydromodification requirements.

Form I-6 Page 2 of X
(Page reserved for continuation of description of general strategy for structural BMP implementation at the site)
(Continued from page 1)

Form I-6 Page 3 of X (Copy as many as needed)
Structural BMP Summary Information
Structural BMP ID No. IMPs For LH-1 to LH-8 and ER-BR and WR-BR
Construction Plan Sheet No. C-3
Type of structural BMP: ○ Retention by harvest and use (HU-1) ○ Retention by infiltration basin (INF-1) ○ Retention by bioretention (INF-2) ○ Retention by permeable pavement (INF-3) ○ Partial retention by biofiltration with partial retention (PR-1) ◉ Biofiltration (BF-1) ○ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide (BMP type/description in discussion section below) ○ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below) ○ Flow-thru treatment control with alternative compliance (provide BMP type/description in ○ Detention pond or vault for hydromodification management ○ Other (describe in discussion section below)
Purpose: ◉ Pollutant control only ○ Hydromodification control only ○ Combined pollutant control and hydromodification control ○ Pre-treatment/forebay for another structural BMP ○ Other (describe in discussion section below)

Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification form DS-563	Antony K. Christensen, RCE 54021
Who will be the final owner of this BMP?	The eventual individual lot owners
Who will maintain this BMP into perpetuity?	Each lot owner
What is the funding mechanism for maintenance?	A storm water agreement with the City of San Diego with each lot owner

Form I-6 Page 4 of X (Copy as many as needed)
Structural BMP ID No.
Construction Plan Sheet No.
Discussion (as needed):

City of San Diego
Development Services
1222 First Ave., MD-302
San Diego, CA 92101
(619) 446-5000

THE CITY OF SAN DIEGO

Permanent BMP Construction

Self Certification Form

FORM
DS-563
February 2016

Date Prepared:	Project No.:
Project Applicant:	Phone:
Project Address:	
Project Engineer:	Phone:

The purpose of this form is to verify that the site improvements for the project, identified above, have been constructed in conformance with the approved Storm Water Quality Management Plan (SWQMP) documents and drawings.

This form must be completed by the engineer and submitted prior to final inspection of the construction permit. Completion and submittal of this form is required for all new development and redevelopment projects in order to comply with the City's Storm Water ordinances and NDPES Permit Order No. R9-2013-0001 as amended by R9-2015-0001 and R9-2015-0100. Final inspection for occupancy and/or release of grading or public improvement bonds may be delayed if this form is not submitted and approved by the City of San Diego.

CERTIFICATION:

As the professional in responsible charge for the design of the above project, I certify that I have inspected all constructed Low Impact Development (LID) site design, source control and structural BMP's required per the approved SWQMP and Construction Permit No. ______________________; and that said BMP's have been constructed in compliance with the approved plans and all applicable specifications, permits, ordinances and Order No. R9-2013-0001 as amended by R9-2015-0001 and R9-2015-0100 of the San Diego Regional Water Quality Control Board.

I understand that this BMP certification statement does not constitute an operation and maintenance verification.

Signature: ______________________________

Date of Signature: ________________________

Printed Name: ________________________

Title: ________________________

Phone No. ________________________

Engineer's Stamp

ATTACHMENT 1
BACKUP FOR PDP POLLUTANT CONTROL BMPS

This is the cover sheet for Attachment 1.

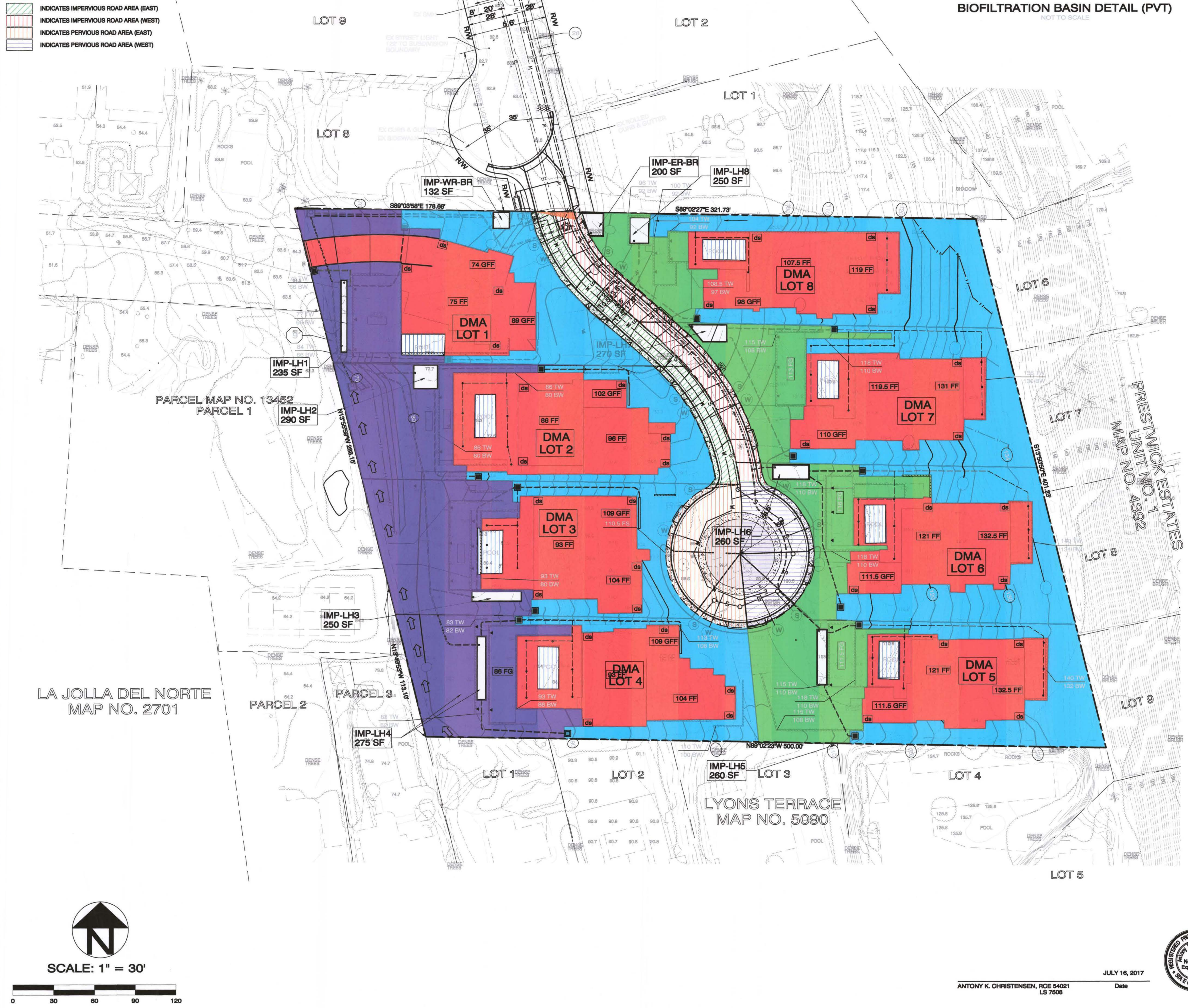
Indicate which Items are Included:

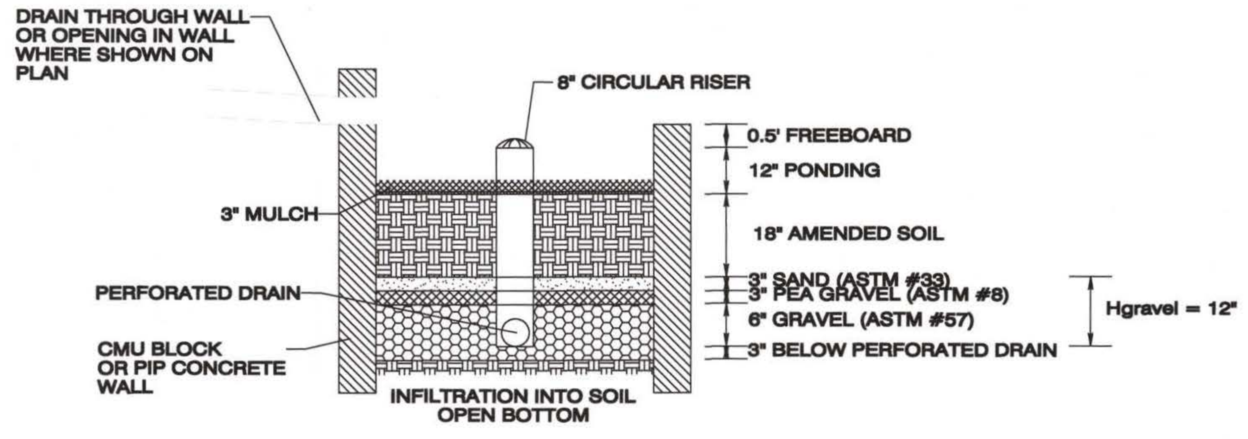
Attachment Sequence	Contents	Checklist
Attachment 1a	DMA Exhibit (Required) See DMA Exhibit Checklist.	☒ Included
Attachment 1b	Tabular Summary of DMAs Showing DMA ID matching DMA Exhibit, DMA Area, and DMA Type (Required)* *Provide table in this Attachment OR on DMA Exhibit in Attachment 1a	○ Included on DMA Exhibit in Attachment 1a ◉ Included as Attachment 1b, separate from DMA Exhibit
Attachment 1c	Form I-7, Harvest and Use Feasibility Screening Checklist (Required unless the entire project will use infiltration BMPs) Refer to Appendix B.3-1 of the BMP Design Manual to complete Form I-7.	○ Included ◉ Not included because the entire project will use infiltration BMPs
Attachment 1d	Form I-8, Categorization of Infiltration Feasibility Condition (Required unless the project will use harvest and use BMPs) **See Attachment 6** Refer to Appendices C and D of the BMP Design Manual to complete Form I-8.	◉ Included ○ Not included because the entire project will use harvest and use BMPs
Attachment 1e	Pollutant Control BMP Design Worksheets / Calculations (Required) See Drainage Study for WQ Flow Refer to Appendices B and E of the BMP Design Manual for structural pollutant control BMP design guidelines and site design credit calculations	☒Included

Use this checklist to ensure the required information has been included on the DMA Exhibit:

The DMA Exhibit must identify:

- ☐ Underlying hydrologic soil group
- ☐ Approximate depth to groundwater
- ☐ Existing natural hydrologic features (watercourses, seeps, springs, wetlands)
- ☐ Critical coarse sediment yield areas to be protected
- ☐ Existing topography and impervious areas
- ☐ Existing and proposed site drainage network and connections to drainage offsite
- ☐ Proposed grading
- ☐ Proposed impervious features
- ☐ Proposed design features and surface treatments used to minimize imperviousness
- ☐ Drainage management area (DMA) boundaries, DMA ID numbers, and DMA areas (square footage or acreage), and DMA type (i.e., drains to BMP, self-retaining, or self-mitigating)
- ☐ Potential pollutant source areas and corresponding required source controls (see Chapter 4, Appendix E.1, and Form I-3B)
- ☐ Structural BMPs (identify location, type of BMP, and size/detail)





BIOFILTRATION BASIN DETAIL (PVT)

NOT TO SCALE

TENTATIVE MAP NO.
COASTAL DEVELOPMENT PERMIT
SITE DEVELOPMENT PERMIT
PLANNED DEVELOPMENT PERMIT

EXHIBIT CHECKLIST:

HYDROLOGIC SOIL GROUP: "D" (UNITED STATES DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICES WEB SOIL SURVEY)

APPROXIMATE DEPTH TO GROUNDWATER: GREATER THAN 20'

EXISTING NATURAL HYDROLOGIC RESOURCES: NO WATERCOURSES, SEEP. SPRINGS OR WETLANDS EXIST IN THE PROJECT AREA

CRITICAL COARSE SEDIMENT YIELD AREAS: POTENTIAL CCSYAs (PCCSYAs) DO NOT OCCUR ONSITE OR UPSTREAM

EXISTING TOPOGRAPHY AND IMPERVIOUS AREAS: TOPOGRAPHY IS SHOWN ONE SINGLE FAMILY RESIDENCE EXISTS ONSITE

EXISTING AND PROPOSED SITE DRAINAGE NETWORK AND CONNECTIONS TO DRAINAGE OFFSITE: DRAINAGE FLOWS CURRENTLY FLOWS WESTERLY FOLLOWING DEVELOPMENT IT WILL CONTINUE TO DO SO, FLOWING ONTO LA JOLLA SHORES DRIVE

PROPOSED GRADING: IS SHOWN ON DMA MAP

PROPOSED IMPERVOUS FEATURES: IMPERVIOUS ROOF AND WALKWAYS AND DRIVEWAYS

PROPOSED DESIGN FEATURES AND SURFACE TREATMENTS USED TO MINIMIZE IMPERVIOUSNESS: ARE SHOWN AND LANDSCAPING IS USED TO MINIMIZE IMPERVOUSNESS.

DMA MANAGEMENT AREA BOUNDARIES, NUMBERS, AREAS AND TYPES: SHOWN

POTENTIAL POLLUTANT SOURCE AREAS AND SOURCE CONTROLS:

EXISTING ONSITE STORM DRAIN INLET: DO NOT EXIST
INDOOR DRAINS, GARAGES AND PESTICIDE USE: GARAGES ARE SHOWN
LANDSCAPE/OUTSIDE PESTICIDE USE: NOT ANTICIPATED TO BE USED
POOLS, SPAS, PONDS: SHOWN
FOOD SERVICE: NOT EMPLOYED
REFUSE AREAS: COVERED REFUSE AREA WILL BE EMPLOYED AS SHOWN
INDUSTRIAL PROCESSE: DO NOT OCCUR
OUTDOOR STORAGE OF EQUIPMENT OR MATERIALS: DOES NOT EXIST
VEHICLE CLEANING: DOES NOT EXIST
VEHICLE AND EQUIPMENT REPAIR: DOES NOT EXIST
FUEL DISPENSING AREAS: DO NOT EXIST
LOADING DOCKS: DO NOT EXIST
FIRE SPRINKLER TEST WATER: WILL BE CONVEYED TO SEWER
MISCELLANEOUS DRAIN OR WASH WATER: DOES NOT EXIST
PLAZAS, SIDEWALKS AND PARKING LOTS: ARE AS SHOWN

STRUCTURAL BMP SHOWN AS TO LOCATION, TYPE, SIZE AND DETAIL ARE SHOWN (BIOFILTRATION BASINS)

HYDROMODIFICATION REQUIREMENTS: IS EXEMPT. RUNOFF FLOWS VIA HARDENED CONVEYANCE TO AN EXEMPT WATER BODY (PACIFIC OCEAN) IMP-B AND IMP-C.

DMA/IMP AREA SUMMARY

LOT (DMA)	IMPERVIOUS AREA	PERMEABLE AREA	TOTAL AREA CONVEYED TO IMP	IMP NAME	IMP SURFACE AREA	SELF-MITIGATING AREA	POOL AREA	"C" VALUE
1	0.182 AC	0.143 AC	0.325 AC	LH-1	235 SF	0.135 AC	0.012 AC	0.55
2	0.232 AC	0.094 AC	0.326 AC	LH-2	290 SF	0.166 AC	0.012 AC	0.67
3	0.182 AC	0.101 AC	0.283 AC	LH-3	250 SF	0.044 AC	0.014 AC	0.61
4	0.199 AC	0.116 AC	0.315 AC	LH-4	275 SF	0.190 AC	0.011 AC	0.61
5	0.179 AC	0.155 AC	0.344 AC	LH-5	260 SF		0.010 AC	0.51
6	0.179 AC	0.188 AC	0.367 AC	LH-6	255 SF		0.010 AC	0.49
7	0.187 AC	0.172 AC	0.359 AC	LH-7	270 SF		0.010 AC	0.52
8	0.185 AC	0.210 AC	0.395 AC	LH-8	250 SF		0.010 AC	0.47
EAST ST	0.101 AC	0.102 AC 0.521 AC *	0.724 AC	ER-BR	200 SF	NONE	NONE	0.21
WEST ST	0.098 AC	0.111 AC	0.209 AC	WR-BR	132 SF	NONE	NONE	0.48
DE MINIMIS	76 SF	0	N/A					

* PERVIOUS AREAS OF LOTS 5-8 FLOWING TO IMP ER-BR

NOTE:

ALL SELF MITIGATING AREA SHALL COMPLY WITH SECTION 5.2.1 OF THE CITY OF SAN DIEGO STORM WATER MANUAL. LANDSCAPED AREA SHALL BE VEGETATED WITH NATVE OR NON-NATIVE/NON-INVASIVE DROUGHT TOLERATE SPECIES THAT DO NOT REQURE REGULAR APPLICATION OF FERTILIZERS AND PESTICIDES.

SOILS SHALL BE AMENDED AND AERATED TO PROMOTE WATER RETENTION CHARACTERISTICS EQUIVALENT TO UNDISTURBED NATIVE SOIL.

NO MORE THAT 5% OF SELF MIGITATING AREA SHALL BE INCIDENTALLY IMPERVIOUS

IMPERVIOUS AREA SHALL NOT BE HYDRAULICALLY CONNECTED TO OTHER IMPREVIOUS AREAS

SELF-MITIGATING AREAS SHALL BE SEPARATE FROM DMAs PERMANENT STORM WATER POLLUTANT CONTROL BMPs.

SELF-MITIGATING AREAS IN LOTS 1-4 HAVE NO IMPERVIOUS AREA DRAINING TO THEM. RUNOFF FROM THESE AREAS ARE COLLECTED BY AREA DRAINS SEPARATE FROM THE TREATED RUNOFF AND CONVEYED OFFSITE OR FLOW BY SHEET FLOW, WITH NO CONCENTRATION OF RUNOFF.

POOL AREAS SHALL HAVE ADEQUATE FREEBOARD AND OVERFLOW DEVICE TO PREVENT OVERFLOW TO THE MS4.

ANTONY K. CHRISTENSEN, RCE 54021
LS 7506

JULY 16, 2017
Date

Prepared By:

CHRISTENSEN ENGINEERING & SURVEYING
7888 SILVERTON AVENUE, SUITE "J"
SAN DIEGO, CA 92126
PHONE (858)271-9901 FAX (858)271-8912

Project Address:

8280 CALLE DEL CIELO
LA JOLLA, CA 92037.

Revision 5:
Revision 4:
Revision 3:
Revision 2: 07-16-15 ADDRESS CITY COMMENTS
Revision 1: 06-06-27 REVISED DESIGN

Project Name:

CIELO TENTATIVE MAP

Original Date: FEBRUARY 03, 2017

Sheet Title:

DRAINAGE MANAGEMENT AREA EXHIBIT

Sheet

DEP#

C-3

JN A2015-50

Hydromodification Exemption - Path of Travel

Worksheet B.2-1 DCV

Design Capture Volume		Worksheet B.2-1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.55	inches
2	Area tributary to BMP (s)	A=	.325	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.55	unitless
4	Trees Credit Volume	TCV=	0	cubic-feet
5	Rain barrels Credit Volume	RCV=	0	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=	357	cubic-feet

Weighted Runoff Factor Calculations:

C = Impervious Area * (0.9) + Pervious Area * (0.1) / (Impervious Area + Pervious Area)

C = (0.182)*(0.9) + (0.143)*(0.1) / (0.325) = 0.55

Cielo Tentative Map Lot 2 (LH-2)

Worksheet B.2-1 DCV

Design Capture Volume		Worksheet B.2-1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.55	inches
2	Area tributary to BMP (s)	A=	.326	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.67	unitless
4	Trees Credit Volume	TCV=	0	cubic-feet
5	Rain barrels Credit Volume	RCV=	0	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=	435	cubic-feet

Weighted Runoff Factor Calculations:

C = Impervious Area * (0.9) + Pervious Area * (0.1) / (Impervious Area + Pervious Area)

C = (0.232)*(0.9) + (0.094)*(0.1) / (0.326) = 0.67

Cielo Tentative Map Lot 3 (LH-3)

Worksheet B.2-1 DCV

Design Capture Volume		Worksheet B.2-1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.55	inches
2	Area tributary to BMP (s)	A=	.283	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.61	unitless
4	Trees Credit Volume	TCV=	0	cubic-feet
5	Rain barrels Credit Volume	RCV=	0	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=	344	cubic-feet

Weighted Runoff Factor Calculations:

C = Impervious Area * (0.9) + Pervious Area * (0.1) / (Impervious Area + Pervious Area)

C = (0.182)*(0.9) + (0.101)*(0.1) / (0.283) = 0.61

Worksheet B.2-1 DCV

Design Capture Volume		Worksheet B.2-1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.55	inches
2	Area tributary to BMP (s)	A=	.315	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.31	unitless
4	Trees Credit Volume	TCV=	0	cubic-feet
5	Rain barrels Credit Volume	RCV=	0	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=	367	cubic-feet

Weighted Runoff Factor Calculations:

C = Impervious Area * (0.9) + Pervious Area * (0.1) / (Impervious Area + Pervious Area)

C = (0.199)*(0.9) + (0.116)*(0.1) / (0.315) = 0.61

Cielo Tentative Map Lot 5 (LH-5)

Worksheet B.2-1 DCV

Design Capture Volume		Worksheet B.2-1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.55	inches
2	Area tributary to BMP (s)	A=	.344	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.51	unitless
4	Trees Credit Volume	TCV=	0	cubic-feet
5	Rain barrels Credit Volume	RCV=	0	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=	350	cubic-feet

Weighted Runoff Factor Calculations:

C = Impervious Area * (0.9) + Pervious Area * (0.1) / (Impervious Area + Pervious Area)

C = (0.179)*(0.9) + (0.155)*(0.1) / (0.344) = 0.51

Cielo Tentative Map Lot 6 (LH-6)

Worksheet B.2-1 DCV

Design Capture Volume		Worksheet B.2-1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.55	inches
2	Area tributary to BMP (s)	A=	.367	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.49	unitless
4	Trees Credit Volume	TCV=	0	cubic-feet
5	Rain barrels Credit Volume	RCV=	0	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=	359	cubic-feet

Weighted Runoff Factor Calculations:

C = Impervious Area * (0.9) + Pervious Area * (0.1) / (Impervious Area + Pervious Area)

C = (0.179)*(0.9) + (0.188)*(0.1) / (0.367) = 0.49

Cielo Tentative Map Lot 7 (LH-7)

Worksheet B.2-1 DCV

Design Capture Volume		Worksheet B.2-1		
1	85^{th} percentile 24-hr storm depth from Figure B.1-1	d=	0.55	inches
2	Area tributary to BMP (s)	A=	.359	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.52	unitless
4	Trees Credit Volume	TCV=	0	cubic-feet
5	Rain barrels Credit Volume	RCV=	0	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=	373	cubic-feet

Weighted Runoff Factor Calculations:

C = Impervious Area * (0.9) + Pervious Area * (0.1) / (Impervious Area + Pervious Area)

C = (0.187)*(0.9) + (0.172)*(0.1) / (0.359) = 0.52

Worksheet B.2-1 DCV

Design Capture Volume		Worksheet B.2-1		
1	85^{th} percentile 24-hr storm depth from Figure B.1-1	d=	0.55	inches
2	Area tributary to BMP (s)	A=	.395	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.47	unitless
4	Trees Credit Volume	TCV=	0	cubic-feet
5	Rain barrels Credit Volume	RCV=	0	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=	371	cubic-feet

Weighted Runoff Factor Calculations:

C = Impervious Area * (0.9) + Pervious Area * (0.1) / (Impervious Area + Pervious Area)

C = (0.185)*(0.9) + (0.210)*(0.1) / (0.395) = 0.47

Cielo Tentative Map West Road (WR-BR)

Worksheet B.2-1 DCV

Design Capture Volume		Worksheet B.2-1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.55	inches
2	Area tributary to BMP (s)	A=	.209	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.48	unitless
4	Trees Credit Volume	TCV=	0	cubic-feet
5	Rain barrels Credit Volume	RCV=	0	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=	200	cubic-feet

Weighted Runoff Factor Calculations:

C = Impervious Area * (0.9) + Pervious Area * (0.1) / (Impervious Area + Pervious Area)

C = (0.098)*(0.9) + (0.111)*(0.1) / (0.209) = 048

Cielo Tentative Map East Road (ER-BR)

Worksheet B.2-1 DCV

Design Capture Volume		Worksheet B.2-1		
1	85^{th} percentile 24-hr storm depth from Figure B.1-1	d=	0.55	inches
2	Area tributary to BMP (s)	A=	0.724	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C=	0.21	unitless
4	Trees Credit Volume	TCV=	0	cubic-feet
5	Rain barrels Credit Volume	RCV=	0	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=	304	cubic-feet

Weighted Runoff Factor Calculations:

C = Impervious Area * (0.9) + Pervious Area * (0.1) / (Impervious Area + Pervious Area)

C = (0.101)*(0.9) + (0.623)*(0.1) / (0.724) = 0.21

The City of SAN DIEGO	Project Name	Cielo Tentative Map	
	BMP ID	LH-1	
Sizing Method for Pollutant Removal Criteria		**Worksheet B.5-1**	
1	Area draining to the BMP	14157	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.55	
3	85th percentile 24-hour rainfall depth	0.55	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	357	cu. ft.
BMP Parameters			
5	Surface ponding [6 inch minimum, 12 inch maximum]	12	inches
6	Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations	18	inches
7	Aggregate storage (also add ASTM No 8 stone) above underdrain invert (12 inches typical) – use 0 inches if the aggregate is not over the entire bottom surface area	12	inches
8	Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area	3	inches
9	Freely drained pore storage of the media	0.2	in/in
10	Porosity of aggregate storage	0.4	in/in
11	Media filtration rate to be used for sizing (maximum filtration rate of 5 in/hr. with no outlet control; if the filtration rate is controlled by the outlet use the outlet controlled rate (includes infiltration into the soil and flow rate through the outlet structure) which will be less than 5 in/hr.)	5	in/hr.
Baseline Calculations			
12	Allowable routing time for sizing	6	hours
13	Depth filtered during storm [Line 11 x Line 12]	30	inches
14	Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)]	21.6	inches
15	Total Depth Treated [Line 13 + Line 14]	51.6	inches
Option 1 – Biofilter 1.5 times the DCV			
16	Required biofiltered volume [1.5 x Line 4]	535	cu. ft.
17	Required Footprint [Line 16/ Line 15] x 12	124	sq. ft.
Option 2 - Store 0.75 of remaining DCV in pores and ponding			
18	Required Storage (surface + pores) Volume [0.75 x Line 4]	268	cu. ft.
19	Required Footprint [Line 18/ Line 14] x 12	149	sq. ft.
Footprint of the BMP			
20	BMP Footprint Sizing Factor (Default 0.03 or an alternative minimum footprint sizing factor from Line 11 in Worksheet B.5-3)	0.03	
21	Minimum BMP Footprint [Line 1 x Line 2 x Line 20]	234	sq. ft.
22	Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21)	234	sq. ft.
23	Provided BMP Footprint	235	sq. ft.
24	Is Line 23 > Line 22?	**Yes, Performance Standard is Met**	

The City of SAN DIEGO	Project Name	Cielo Tentative Map	
	BMP ID	LH-1	
Sizing Method for Volume Retention Criteria		Worksheet B.5-2	
1	Area draining to the BMP	13180	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.49	
3	85th percentile 24-hour rainfall depth	0.55	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	296	cu. ft.
BMP Parameters			
5	Footprint of the BMP	200	sq. ft.
6	Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations	18	inches
7	Media retained pore space [50% of (FC-WP)]	0.05	in/in
8	Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area	5	inches
9	Porosity of aggregate storage	0.4	in/in
Volume Retention Requirement			
10	Measured infiltration rate in the DMA	0.01	in/hr.
11	Factor of safety	2	
12	Reliable infiltration rate, for biofiltration BMP sizing [Line 10/ Line 11] Note: This worksheet is not applicable if Line 12 < 0.01 in/hr.	0.005	in/hr.
13	Average annual volume reduction target (Figure B.5-2) When Line 12 ≥ 0.01 in/hr. = Minimum (40, 166.9 x Line 12 +6.62)	7.5	%
14	Fraction of DCV to be retained (Figure B.5-3) 0.0000013 x Line 13^3 - 0.000057 x Line 13^2 + 0.0086 x Line 13 - 0.014	0.047	
15	Target volume retention [Line 14 x Line 4]	14	cu. ft.
Evapotranspiration: Average Annual Volume Retention			
16	Effective evapotranspiration depth [Line 6 x Line 7]	0.9	inches
17	Retained Pore Volume [(Line 16 x Line 5)/12]	15	cu. ft.
18	Fraction of DCV retained in pore spaces [Line 17/Line 4]	0.05	
19	Evapotranspiration average annual capture [ET nomographs in Figure B.5-5]	3.8	%
Infiltration: Average Annual Volume Retention			
20	Drawdown for infiltration storage [(Line 8 x Line 9)/Line 12]	400	hours
21	Equivalent DCV fraction from evapotranspiration (use Line 19 and Line 20 in Figure B.4-1; Refer to Appendix B.4.2.2)	0.04	
22	Infiltration volume storage [(Line 5 x Line 8 x Line 9)/12]	33	cu. ft.
23	Infiltration Storage Fraction of DCV [Line 22/Line 4]	0.11	
24	Total Equivalent Fraction of DCV [Line 21 + Line 23]	0.15	
25	Biofiltration BMP average annual capture [use Line 24 and 20 in Figure B.4-1]	13.61	%
Volume retention required from site design and other BMPs			
26	Fraction of DCV retained (Figure B.5-3) 0.0000013 x Line 25^3 - 0.000057 x Line 25^2 + 0.0086 x Line 25 - 0.014	0.096	
27	Remaining target DCV retention [(Line 14 – Line 26) x Line 4] Note: If Line 27 is equal to or smaller than 0 then the BMP meets the volume retention performance standard. If Line 27 is greater than 0, the applicant must implement site design and/or other BMPs within the DMA that will retain DCV equivalent to or greater than Line 27 to meet the volume retention performance standard	-15	cu. ft.
Volume Retention Performance Standard is Met			

The City of SAN DIEGO	Project Name	Cielo Tentative Map			
	BMP ID	LH-1			

Volume Retention for No Infiltration Condition		Worksheet B.5-5	
1	Area draining to the biofiltration BMP	14157	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.55	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]	7786	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]	234	sq. ft.
5	Biofiltration BMP Footprint	235	sq. ft.

Landscape Area (must be identified on DS-3247)

	Identification	1	2	3	4	5
6	Landscape area that meet the requirements in SD-4 and SD-5 Fact Sheet (sq. ft.)	none				
7	Impervious area draining to the landscape area (sq. ft.)	none				
8	Impervious to Pervious Area ratio [Line 7/Line 6]	0.00	0.00	0.00	0.00	0.00
9	Effective Credit Area If (Line 8 >1.5, Line 6, Line 7/1.5]	0	0	0	0	0

10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]	0	sq. ft.
11	Provided footprint for evapotranspiration [Line 5 + Line 10]	235	sq. ft.

Volume Retention Performance Standard

14	Is Line 11 ≥ Line 4? If yes, then volume retention performance standard for no infiltration condition is met. If no, increase the landscape area or propose other site design BMPs (e.g. trees, rain barrels, etc.) that will result in equivalent or greater average annual volume retention when compared to the average annual volume retention achieved by a standard biofiltration BMP. If the option of implementing other site design BMPs is selected, applicant must include supporting documentation with explanation of the approach in the PDP SWQMP.	**Performance Standard is Met**

The City of SAN DIEGO	**Project Name**	Cielo Tentative Map	
	BMP ID	LH-2	
Sizing Method for Pollutant Removal Criteria		**Worksheet B.5-1**	
1	Area draining to the BMP	14170	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.67	
3	85th percentile 24-hour rainfall depth	0.55	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	435	cu. ft.
BMP Parameters			
5	Surface ponding [6 inch minimum, 12 inch maximum]	12	inches
6	Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations	18	inches
7	Aggregate storage (also add ASTM No 8 stone) above underdrain invert (12 inches typical) – use 0 inches if the aggregate is not over the entire bottom surface area	12	inches
8	Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area	3	inches
9	Freely drained pore storage of the media	0.2	in/in
10	Porosity of aggregate storage	0.4	in/in
11	Media filtration rate to be used for sizing (maximum filtration rate of 5 in/hr. with no outlet control; if the filtration rate is controlled by the outlet use the outlet controlled rate (includes infiltration into the soil and flow rate through the outlet structure) which will be less than 5 in/hr.)	5	in/hr.
Baseline Calculations			
12	Allowable routing time for sizing	6	hours
13	Depth filtered during storm [Line 11 x Line 12]	30	inches
14	Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)]	21.6	inches
15	Total Depth Treated [Line 13 + Line 14]	51.6	inches
Option 1 – Biofilter 1.5 times the DCV			
16	Required biofiltered volume [1.5 x Line 4]	653	cu. ft.
17	Required Footprint [Line 16/ Line 15] x 12	152	sq. ft.
Option 2 - Store 0.75 of remaining DCV in pores and ponding			
18	Required Storage (surface + pores) Volume [0.75 x Line 4]	326	cu. ft.
19	Required Footprint [Line 18/ Line 14] x 12	181	sq. ft.
Footprint of the BMP			
20	BMP Footprint Sizing Factor (Default 0.03 or an alternative minimum footprint sizing factor from Line 11 in Worksheet B.5-3)	0.03	
21	Minimum BMP Footprint [Line 1 x Line 2 x Line 20]	285	sq. ft.
22	Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21)	285	sq. ft.
23	Provided BMP Footprint	290	sq. ft.
24	Is Line 23 > Line 22?	**Yes, Performance Standard is Met**	

The City of SAN DIEGO	Project Name	Cielo Tentative Map		
	BMP ID	LH-2		
Sizing Method for Volume Retention Criteria		Worksheet B.5-2		
1	Area draining to the BMP		14170	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)		0.69	
3	85th percentile 24-hour rainfall depth		0.55	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]		448	cu. ft.
BMP Parameters				
5	Footprint of the BMP		290	sq. ft.
6	Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations		18	inches
7	Media retained pore space [50% of (FC-WP)]		0.05	in/in
8	Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area		5	inches
9	Porosity of aggregate storage		0.4	in/in
Volume Retention Requirement				
10	Measured infiltration rate in the DMA		0.01	in/hr.
11	Factor of safety		2	
12	Reliable infiltration rate, for biofiltration BMP sizing [Line 10/ Line 11] Note: This worksheet is not applicable if Line 12 < 0.01 in/hr.		0.005	in/hr.
13	Average annual volume reduction target (Figure B.5-2) When Line 12 ≥ 0.01 in/hr. = Minimum (40, 166.9 x Line 12 +6.62)		7.5	%
14	Fraction of DCV to be retained (Figure B.5-3) 0.0000013 x Line 13^3 - 0.000057 x Line 13^2 + 0.0086 x Line 13 - 0.014		0.047	
15	Target volume retention [Line 14 x Line 4]		21	cu. ft.
Evapotranspiration: Average Annual Volume Retention				
16	Effective evapotranspiration depth [Line 6 x Line 7]		0.9	inches
17	Retained Pore Volume [(Line 16 x Line 5)/12]		22	cu. ft.
18	Fraction of DCV retained in pore spaces [Line 17/Line 4]		0.05	
19	Evapotranspiration average annual capture [ET nomographs in Figure B.5-5]		3.8	%
Infiltration: Average Annual Volume Retention				
20	Drawdown for infiltration storage [(Line 8 x Line 9)/Line 12]		400	hours
21	Equivalent DCV fraction from evapotranspiration (use Line 19 and Line 20 in Figure B.4-1; Refer to Appendix B.4.2.2)		0.04	
22	Infiltration volume storage [(Line 5 x Line 8 x Line 9)/12]		48	cu. ft.
23	Infiltration Storage Fraction of DCV [Line 22/Line 4]		0.11	
24	Total Equivalent Fraction of DCV [Line 21 + Line 23]		0.15	
25	Biofiltration BMP average annual capture [use Line 24 and 20 in Figure B.4-1]		13.61	%
Volume retention required from site design and other BMPs				
26	Fraction of DCV retained (Figure B.5-3) 0.0000013 x Line 25^3 - 0.000057 x Line 25^2 + 0.0086 x Line 25 - 0.014		0.096	
27	Remaining target DCV retention [(Line 14 – Line 26) x Line 4] Note: If Line 27 is equal to or smaller than 0 then the BMP meets the volume retention performance standard. If Line 27 is greater than 0, the applicant must implement site design and/or other BMPs within the DMA that will retain DCV equivalent to or greater than Line 27 to meet the volume retention performance standard		-22	cu. ft.
Volume Retention Performance Standard is Met				

The City of SAN DIEGO	Project Name	Cielo Tentative Map				
	BMP ID	LH-2				

Volume Retention for No Infiltration Condition — **Worksheet B.5-5**

1	Area draining to the biofiltration BMP				14170	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)				0.67	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]				9494	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]				285	sq. ft.
5	Biofiltration BMP Footprint				290	sq. ft.
Landscape Area (must be identified on DS-3247)						
	Identification	**1**	**2**	**3**	**4**	**5**
6	Landscape area that meet the requirements in SD-4 and SD-5 Fact Sheet (sq. ft.)	none				
7	Impervious area draining to the landscape area (sq. ft.)	none				
8	Impervious to Pervious Area ratio [Line 7/Line 6]	0.00	0.00	0.00	0.00	0.00
9	Effective Credit Area If (Line 8 >1.5, Line 6, Line 7/1.5]	0	0	0	0	0
10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]				0	sq. ft.
11	Provided footprint for evapotranspiration [Line 5 + Line 10]				290	sq. ft.
Volume Retention Performance Standard						
14	Is Line 11 ≥ Line 4? If yes, then volume retention performance standard for no infiltration condition is met. If no, increase the landscape area or propose other site design BMPs (e.g. trees, rain barrels, etc.) that will result in equivalent or greater average annual volume retention when compared to the average annual volume retention achieved by a standard biofiltration BMP. If the option of implementing other site design BMPs is selected, applicant must include supporting documentation with explanation of the approach in the PDP SWQMP.				**Performance Standard is Met**	

The City of SAN DIEGO	Project Name	Cielo Tentative Map	
	BMP ID	LH-3	
Sizing Method for Pollutant Removal Criteria		**Worksheet B.5-1**	

1	Area draining to the BMP	12320	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.61	
3	85th percentile 24-hour rainfall depth	0.55	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	344	cu. ft.
BMP Parameters			
5	Surface ponding [6 inch minimum, 12 inch maximum]	12	inches
6	Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations	18	inches
7	Aggregate storage (also add ASTM No 8 stone) above underdrain invert (12 inches typical) – use 0 inches if the aggregate is not over the entire bottom surface area	12	inches
8	Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area	3	inches
9	Freely drained pore storage of the media	0.2	in/in
10	Porosity of aggregate storage	0.4	in/in
11	Media filtration rate to be used for sizing (maximum filtration rate of 5 in/hr. with no outlet control; if the filtration rate is controlled by the outlet use the outlet controlled rate (includes infiltration into the soil and flow rate through the outlet structure) which will be less than 5 in/hr.)	5	in/hr.
Baseline Calculations			
12	Allowable routing time for sizing	6	hours
13	Depth filtered during storm [Line 11 x Line 12]	30	inches
14	Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)]	21.6	inches
15	Total Depth Treated [Line 13 + Line 14]	51.6	inches
Option 1 – Biofilter 1.5 times the DCV			
16	Required biofiltered volume [1.5 x Line 4]	517	cu. ft.
17	Required Footprint [Line 16/ Line 15] x 12	120	sq. ft.
Option 2 - Store 0.75 of remaining DCV in pores and ponding			
18	Required Storage (surface + pores) Volume [0.75 x Line 4]	258	cu. ft.
19	Required Footprint [Line 18/ Line 14] x 12	144	sq. ft.
Footprint of the BMP			
20	BMP Footprint Sizing Factor (Default 0.03 or an alternative minimum footprint sizing factor from Line 11 in Worksheet B.5-3)	0.03	
21	Minimum BMP Footprint [Line 1 x Line 2 x Line 20]	225	sq. ft.
22	Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21)	225	sq. ft.
23	Provided BMP Footprint	250	sq. ft.
24	Is Line 23 > Line 22?	**Yes, Performance Standard is Met**	

The City of SAN DIEGO	Project Name	Cielo Tentative Map	
	BMP ID	LH-3	
Sizing Method for Volume Retention Criteria		Worksheet B.5-2	
1	Area draining to the BMP	12320	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.61	
3	85th percentile 24-hour rainfall depth	0.55	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	344	cu. ft.
BMP Parameters			
5	Footprint of the BMP	250	sq. ft.
6	Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations	18	inches
7	Media retained pore space [50% of (FC-WP)]	0.05	in/in
8	Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area	5	inches
9	Porosity of aggregate storage	0.4	in/in
Volume Retention Requirement			
10	Measured infiltration rate in the DMA	0.01	in/hr.
11	Factor of safety	2	
12	Reliable infiltration rate, for biofiltration BMP sizing [Line 10/ Line 11] Note: This worksheet is not applicable if Line 12 < 0.01 in/hr.	0.005	in/hr.
13	Average annual volume reduction target (Figure B.5-2) When Line 12 ≥ 0.01 in/hr. = Minimum (40, 166.9 x Line 12 +6.62)	7.5	%
14	Fraction of DCV to be retained (Figure B.5-3) 0.0000013 x Line 13^3 - 0.000057 x Line 13^2 + 0.0086 x Line 13 - 0.014	0.047	
15	Target volume retention [Line 14 x Line 4]	16	cu. ft.
Evapotranspiration: Average Annual Volume Retention			
16	Effective evapotranspiration depth [Line 6 x Line 7]	0.9	inches
17	Retained Pore Volume [(Line 16 x Line 5)/12]	19	cu. ft.
18	Fraction of DCV retained in pore spaces [Line 17/Line 4]	0.05	
19	Evapotranspiration average annual capture [ET nomographs in Figure B.5-5]	3.8	%
Infiltration: Average Annual Volume Retention			
20	Drawdown for infiltration storage [(Line 8 x Line 9)/Line 12]	400	hours
21	Equivalent DCV fraction from evapotranspiration (use Line 19 and Line 20 in Figure B.4-1; Refer to Appendix B.4.2.2)	0.04	
22	Infiltration volume storage [(Line 5 x Line 8 x Line 9)/12]	42	cu. ft.
23	Infiltration Storage Fraction of DCV [Line 22/Line 4]	0.12	
24	Total Equivalent Fraction of DCV [Line 21 + Line 23]	0.16	
25	Biofiltration BMP average annual capture [use Line 24 and 20 in Figure B.4-1]	14.41	%
Volume retention required from site design and other BMPs			
26	Fraction of DCV retained (Figure B.5-3) 0.0000013 x Line 25^3 - 0.000057 x Line 25^2 + 0.0086 x Line 25 - 0.014	0.102	
27	Remaining target DCV retention [(Line 14 – Line 26) x Line 4] Note: If Line 27 is equal to or smaller than 0 then the BMP meets the volume retention performance standard. If Line 27 is greater than 0, the applicant must implement site design and/or other BMPs within the DMA that will retain DCV equivalent to or greater than Line 27 to meet the volume retention performance standard	-19	cu. ft.

Volume Retention Performance Standard is Met

The City of SAN DIEGO

Project Name	Cielo Tentative Map
BMP ID	LH-3

Volume Retention for No Infiltration Condition			**Worksheet B.5-5**	
1	Area draining to the biofiltration BMP		12320	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)		0.61	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]		7515	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]		225	sq. ft.
5	Biofiltration BMP Footprint		250	sq. ft.

Landscape Area (must be identified on DS-3247)

	Identification	1	2	3	4	5
6	Landscape area that meet the requirements in SD-4 and SD-5 Fact Sheet (sq. ft.)	none				
7	Impervious area draining to the landscape area (sq. ft.)	none				
8	Impervious to Pervious Area ratio [Line 7/Line 6]	0.00	0.00	0.00	0.00	0.00
9	Effective Credit Area If (Line 8 >1.5, Line 6, Line 7/1.5]	0	0	0	0	0
10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]			0		sq. ft.
11	Provided footprint for evapotranspiration [Line 5 + Line 10]			250		sq. ft.

Volume Retention Performance Standard

14	Is Line 11 ≥ Line 4? If yes, then volume retention performance standard for no infiltration condition is met. If no, increase the landscape area or propose other site design BMPs (e.g. trees, rain barrels, etc.) that will result in equivalent or greater average annual volume retention when compared to the average annual volume retention achieved by a standard biofiltration BMP. If the option of implementing other site design BMPs is selected, applicant must include supporting documentation with explanation of the approach in the PDP SWQMP.	**Performance Standard is Met**

The City of SAN DIEGO	Project Name	Cielo Tentative Map	
	BMP ID	LH-4	
Sizing Method for Pollutant Removal Criteria		**Worksheet B.5-1**	
1	Area draining to the BMP	13110	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.61	
3	85th percentile 24-hour rainfall depth	0.55	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	367	cu. ft.
BMP Parameters			
5	Surface ponding [6 inch minimum, 12 inch maximum]	12	inches
6	Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations	18	inches
7	Aggregate storage (also add ASTM No 8 stone) above underdrain invert (12 inches typical) – use 0 inches if the aggregate is not over the entire bottom surface area	12	inches
8	Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area	3	inches
9	Freely drained pore storage of the media	0.2	in/in
10	Porosity of aggregate storage	0.4	in/in
11	Media filtration rate to be used for sizing (maximum filtration rate of 5 in/hr. with no outlet control; if the filtration rate is controlled by the outlet use the outlet controlled rate (includes infiltration into the soil and flow rate through the outlet structure) which will be less than 5 in/hr.)	5	in/hr.
Baseline Calculations			
12	Allowable routing time for sizing	6	hours
13	Depth filtered during storm [Line 11 x Line 12]	30	inches
14	Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)]	21.6	inches
15	Total Depth Treated [Line 13 + Line 14]	51.6	inches
Option 1 – Biofilter 1.5 times the DCV			
16	Required biofiltered volume [1.5 x Line 4]	550	cu. ft.
17	Required Footprint [Line 16/ Line 15] x 12	128	sq. ft.
Option 2 - Store 0.75 of remaining DCV in pores and ponding			
18	Required Storage (surface + pores) Volume [0.75 x Line 4]	275	cu. ft.
19	Required Footprint [Line 18/ Line 14] x 12	153	sq. ft.
Footprint of the BMP			
20	BMP Footprint Sizing Factor (Default 0.03 or an alternative minimum footprint sizing factor from Line 11 in Worksheet B.5-3)	0.03	
21	Minimum BMP Footprint [Line 1 x Line 2 x Line 20]	240	sq. ft.
22	Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21)	240	sq. ft.
23	Provided BMP Footprint	280	sq. ft.
24	Is Line 23 > Line 22?	**Yes, Performance Standard is Met**	

The City of SAN DIEGO	Project Name	Cielo Tentative Map	
	BMP ID	LH-4	
Sizing Method for Volume Retention Criteria		Worksheet B.5-2	

1	Area draining to the BMP	13110	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.61	
3	85^{th} percentile 24-hour rainfall depth	0.55	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	367	cu. ft.
BMP Parameters			
5	Footprint of the BMP	275	sq. ft.
6	Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations	18	inches
7	Media retained pore space [50% of (FC-WP)]	0.05	in/in
8	Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area	5	inches
9	Porosity of aggregate storage	0.4	in/in
Volume Retention Requirement			
10	Measured infiltration rate in the DMA	0.01	in/hr.
11	Factor of safety	2	
12	Reliable infiltration rate, for biofiltration BMP sizing [Line 10/ Line 11] Note: This worksheet is not applicable if Line 12 < 0.01 in/hr.	0.005	in/hr.
13	Average annual volume reduction target (Figure B.5-2) When Line 12 ≥ 0.01 in/hr. = Minimum (40, 166.9 x Line 12 +6.62)	7.5	%
14	Fraction of DCV to be retained (Figure B.5-3) 0.0000013 x Line 13^3 - 0.000057 x Line 13^2 + 0.0086 x Line 13 - 0.014	0.047	
15	Target volume retention [Line 14 x Line 4]	17	cu. ft.
Evapotranspiration: Average Annual Volume Retention			
16	Effective evapotranspiration depth [Line 6 x Line 7]	0.9	inches
17	Retained Pore Volume [(Line 16 x Line 5)/12]	21	cu. ft.
18	Fraction of DCV retained in pore spaces [Line 17/Line 4]	0.06	
19	Evapotranspiration average annual capture [ET nomographs in Figure B.5-5]	4.5	%
Infiltration: Average Annual Volume Retention			
20	Drawdown for infiltration storage [(Line 8 x Line 9)/Line 12]	400	hours
21	Equivalent DCV fraction from evapotranspiration (use Line 19 and Line 20 in Figure B.4-1; Refer to Appendix B.4.2.2)	0.05	
22	Infiltration volume storage [(Line 5 x Line 8 x Line 9)/12]	46	cu. ft.
23	Infiltration Storage Fraction of DCV [Line 22/Line 4]	0.13	
24	Total Equivalent Fraction of DCV [Line 21 + Line 23]	0.18	
25	Biofiltration BMP average annual capture [use Line 24 and 20 in Figure B.4-1]	15.80	%
Volume retention required from site design and other BMPs			
26	Fraction of DCV retained (Figure B.5-3) 0.0000013 x Line 25^3 - 0.000057 x Line 25^2 + 0.0086 x Line 25 - 0.014	0.113	
27	Remaining target DCV retention [(Line 14 – Line 26) x Line 4] Note: If Line 27 is equal to or smaller than 0 then the BMP meets the volume retention performance standard. If Line 27 is greater than 0, the applicant must implement site design and/or other BMPs within the DMA that will retain DCV equivalent to or greater than Line 27 to meet the volume retention performance standard	-24	cu. ft.

Volume Retention Performance Standard is Met

The City of SAN DIEGO		Project Name	Cielo Tentative Map				
		BMP ID	LH-4				
Volume Retention for No Infiltration Condition				**Worksheet B.5-5**			
1	Area draining to the biofiltration BMP					13110	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)					0.61	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]					7997	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]					240	sq. ft.
5	Biofiltration BMP Footprint					275	sq. ft.
Landscape Area (must be identified on DS-3247)							
		Identification	**1**	**2**	**3**	**4**	**5**
6	Landscape area that meet the requirements in SD-4 and SD-5 Fact Sheet (sq. ft.)		none				
7	Impervious area draining to the landscape area (sq. ft.)		none				
8	Impervious to Pervious Area ratio [Line 7/Line 6]		0.00	0.00	0.00	0.00	0.00
9	Effective Credit Area If (Line 8 >1.5, Line 6, Line 7/1.5]		0	0	0	0	0
10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]					0	sq. ft.
11	Provided footprint for evapotranspiration [Line 5 + Line 10]					275	sq. ft.
Volume Retention Performance Standard							
14	Is Line 11 ≥ Line 4? If yes, then volume retention performance standard for no infiltration condition is met. If no, increase the landscape area or propose other site design BMPs (e.g. trees, rain barrels, etc.) that will result in equivalent or greater average annual volume retention when compared to the average annual volume retention achieved by a standard biofiltration BMP. If the option of implementing other site design BMPs is selected, applicant must include supporting documentation with explanation of the approach in the PDP SWQMP.					**Performance Standard is Met**	

The City of SAN DIEGO	Project Name	Cielo Tentative Map	
	BMP ID	LH-5	
Sizing Method for Pollutant Removal Criteria		**Worksheet B.5-1**	
1	Area draining to the BMP	14965	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.51	
3	85^{th} percentile 24-hour rainfall depth	0.55	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	350	cu. ft.
BMP Parameters			
5	Surface ponding [6 inch minimum, 12 inch maximum]	12	inches
6	Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations	18	inches
7	Aggregate storage (also add ASTM No 8 stone) above underdrain invert (12 inches typical) – use 0 inches if the aggregate is not over the entire bottom surface area	12	inches
8	Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area	3	inches
9	Freely drained pore storage of the media	0.2	in/in
10	Porosity of aggregate storage	0.4	in/in
11	Media filtration rate to be used for sizing (maximum filtration rate of 5 in/hr. with no outlet control; if the filtration rate is controlled by the outlet use the outlet controlled rate (includes infiltration into the soil and flow rate through the outlet structure) which will be less than 5 in/hr.)	5	in/hr.
Baseline Calculations			
12	Allowable routing time for sizing	6	hours
13	Depth filtered during storm [Line 11 x Line 12]	30	inches
14	Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)]	21.6	inches
15	Total Depth Treated [Line 13 + Line 14]	51.6	inches
Option 1 – Biofilter 1.5 times the DCV			
16	Required biofiltered volume [1.5 x Line 4]	525	cu. ft.
17	Required Footprint [Line 16/ Line 15] x 12	122	sq. ft.
Option 2 - Store 0.75 of remaining DCV in pores and ponding			
18	Required Storage (surface + pores) Volume [0.75 x Line 4]	262	cu. ft.
19	Required Footprint [Line 18/ Line 14] x 12	146	sq. ft.
Footprint of the BMP			
20	BMP Footprint Sizing Factor (Default 0.03 or an alternative minimum footprint sizing factor from Line 11 in Worksheet B.5-3)	0.03	
21	Minimum BMP Footprint [Line 1 x Line 2 x Line 20]	229	sq. ft.
22	Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21)	229	sq. ft.
23	Provided BMP Footprint	260	sq. ft.
24	Is Line 23 > Line 22?	**Yes, Performance Standard is Met**	

The City of SAN DIEGO	Project Name	Cielo Tentative Map	
	BMP ID	LH-5	
Sizing Method for Volume Retention Criteria		Worksheet B.5-2	
1	Area draining to the BMP	14965	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.51	
3	85^{th} percentile 24-hour rainfall depth	0.55	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	350	cu. ft.
BMP Parameters			
5	Footprint of the BMP	260	sq. ft.
6	Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations	18	inches
7	Media retained pore space [50% of (FC-WP)]	0.05	in/in
8	Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area	5	inches
9	Porosity of aggregate storage	0.4	in/in
Volume Retention Requirement			
10	Measured infiltration rate in the DMA	0.01	in/hr.
11	Factor of safety	2	
12	Reliable infiltration rate, for biofiltration BMP sizing [Line 10/ Line 11] Note: This worksheet is not applicable if Line 12 < 0.01 in/hr.	0.005	in/hr.
13	Average annual volume reduction target (Figure B.5-2) When Line 12 ≥ 0.01 in/hr. = Minimum (40, 166.9 x Line 12 +6.62)	7.5	%
14	Fraction of DCV to be retained (Figure B.5-3) $0.0000013 \times \text{Line } 13^3 - 0.000057 \times \text{Line } 13^2 + 0.0086 \times \text{Line } 13 - 0.014$	0.047	
15	Target volume retention [Line 14 x Line 4]	16	cu. ft.
Evapotranspiration: Average Annual Volume Retention			
16	Effective evapotranspiration depth [Line 6 x Line 7]	0.9	inches
17	Retained Pore Volume [(Line 16 x Line 5)/12]	20	cu. ft.
18	Fraction of DCV retained in pore spaces [Line 17/Line 4]	0.06	
19	Evapotranspiration average annual capture [ET nomographs in Figure B.5-5]	4.5	%
Infiltration: Average Annual Volume Retention			
20	Drawdown for infiltration storage [(Line 8 x Line 9)/Line 12]	400	hours
21	Equivalent DCV fraction from evapotranspiration (use Line 19 and Line 20 in Figure B.4-1; Refer to Appendix B.4.2.2)	0.05	
22	Infiltration volume storage [(Line 5 x Line 8 x Line 9)/12]	43	cu. ft.
23	Infiltration Storage Fraction of DCV [Line 22/Line 4]	0.12	
24	Total Equivalent Fraction of DCV [Line 21 + Line 23]	0.17	
25	Biofiltration BMP average annual capture [use Line 24 and 20 in Figure B.4-1]	15.00	%
Volume retention required from site design and other BMPs			
26	Fraction of DCV retained (Figure B.5-3) $0.0000013 \times \text{Line } 25^3 - 0.000057 \times \text{Line } 25^2 + 0.0086 \times \text{Line } 25 - 0.014$	0.107	
27	Remaining target DCV retention [(Line 14 – Line 26) x Line 4] Note: If Line 27 is equal to or smaller than 0 then the BMP meets the volume retention performance standard. If Line 27 is greater than 0, the applicant must implement site design and/or other BMPs within the DMA that will retain DCV equivalent to or greater than Line 27 to meet the volume retention performance standard	-21	cu. ft.

Volume Retention Performance Standard is Met

The City of SAN DIEGO	Project Name	Cielo Tentative Map
	BMP ID	LH-5

Volume Retention for No Infiltration Condition		Worksheet B.5-5	
1	Area draining to the biofiltration BMP	14965	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.51	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]	7632	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]	229	sq. ft.
5	Biofiltration BMP Footprint	260	sq. ft.

Landscape Area (must be identified on DS-3247)

	Identification	1	2	3	4	5
6	Landscape area that meet the requirements in SD-4 and SD-5 Fact Sheet (sq. ft.)	none				
7	Impervious area draining to the landscape area (sq. ft.)	none				
8	Impervious to Pervious Area ratio [Line 7/Line 6]	0.00	0.00	0.00	0.00	0.00
9	Effective Credit Area If (Line 8 >1.5, Line 6, Line 7/1.5]	0	0	0	0	0

10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]	0	sq. ft.
11	Provided footprint for evapotranspiration [Line 5 + Line 10]	260	sq. ft.

Volume Retention Performance Standard

14	Is Line 11 ≥ Line 4? If yes, then volume retention performance standard for no infiltration condition is met. If no, increase the landscape area or propose other site design BMPs (e.g. trees, rain barrels, etc.) that will result in equivalent or greater average annual volume retention when compared to the average annual volume retention achieved by a standard biofiltration BMP. If the option of implementing other site design BMPs is selected, applicant must include supporting documentation with explanation of the approach in the PDP SWQMP.	**Performance Standard is Met**

The City of SAN DIEGO	Project Name	Cielo Tentative Map	
	BMP ID	LH-6	
Sizing Method for Pollutant Removal Criteria		**Worksheet B.5-1**	

1	Area draining to the BMP	15980	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.49	
3	85th percentile 24-hour rainfall depth	0.55	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	359	cu. ft.
BMP Parameters			
5	Surface ponding [6 inch minimum, 12 inch maximum]	12	inches
6	Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations	18	inches
7	Aggregate storage (also add ASTM No 8 stone) above underdrain invert (12 inches typical) – use 0 inches if the aggregate is not over the entire bottom surface area	12	inches
8	Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area	3	inches
9	Freely drained pore storage of the media	0.2	in/in
10	Porosity of aggregate storage	0.4	in/in
11	Media filtration rate to be used for sizing (maximum filtration rate of 5 in/hr. with no outlet control; if the filtration rate is controlled by the outlet use the outlet controlled rate (includes infiltration into the soil and flow rate through the outlet structure) which will be less than 5 in/hr.)	5	in/hr.
Baseline Calculations			
12	Allowable routing time for sizing	6	hours
13	Depth filtered during storm [Line 11 x Line 12]	30	inches
14	Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)]	21.6	inches
15	Total Depth Treated [Line 13 + Line 14]	51.6	inches
Option 1 – Biofilter 1.5 times the DCV			
16	Required biofiltered volume [1.5 x Line 4]	538	cu. ft.
17	Required Footprint [Line 16/ Line 15] x 12	125	sq. ft.
Option 2 - Store 0.75 of remaining DCV in pores and ponding			
18	Required Storage (surface + pores) Volume [0.75 x Line 4]	269	cu. ft.
19	Required Footprint [Line 18/ Line 14] x 12	150	sq. ft.
Footprint of the BMP			
20	BMP Footprint Sizing Factor (Default 0.03 or an alternative minimum footprint sizing factor from Line 11 in Worksheet B.5-3)	0.03	
21	Minimum BMP Footprint [Line 1 x Line 2 x Line 20]	235	sq. ft.
22	Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21)	235	sq. ft.
23	Provided BMP Footprint	260	sq. ft.
24	Is Line 23 > Line 22?	**Yes, Performance Standard is Met**	

The City of SAN DIEGO	Project Name	Cielo Tentative Map	
	BMP ID	LH-6	
Sizing Method for Volume Retention Criteria		**Worksheet B.5-2**	

1	Area draining to the BMP	15980	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.49	
3	85th percentile 24-hour rainfall depth	0.55	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	359	cu. ft.
BMP Parameters			
5	Footprint of the BMP	260	sq. ft.
6	Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations	18	inches
7	Media retained pore space [50% of (FC-WP)]	0.05	in/in
8	Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area	5	inches
9	Porosity of aggregate storage	0.4	in/in
Volume Retention Requirement			
10	Measured infiltration rate in the DMA	0.01	in/hr.
11	Factor of safety	2	
12	Reliable infiltration rate, for biofiltration BMP sizing [Line 10/ Line 11] Note: This worksheet is not applicable if Line 12 < 0.01 in/hr.	0.005	in/hr.
13	Average annual volume reduction target (Figure B.5-2) When Line 12 ≥ 0.01 in/hr. = Minimum (40, 166.9 x Line 12 +6.62)	7.5	%
14	Fraction of DCV to be retained (Figure B.5-3) 0.0000013 x Line 13^3 - 0.000057 x Line 13^2 + 0.0086 x Line 13 - 0.014	0.047	
15	Target volume retention [Line 14 x Line 4]	17	cu. ft.
Evapotranspiration: Average Annual Volume Retention			
16	Effective evapotranspiration depth [Line 6 x Line 7]	0.9	inches
17	Retained Pore Volume [(Line 16 x Line 5)/12]	20	cu. ft.
18	Fraction of DCV retained in pore spaces [Line 17/Line 4]	0.05	
19	Evapotranspiration average annual capture [ET nomographs in Figure B.5-5]	3.8	%
Infiltration: Average Annual Volume Retention			
20	Drawdown for infiltration storage [(Line 8 x Line 9)/Line 12]	400	hours
21	Equivalent DCV fraction from evapotranspiration (use Line 19 and Line 20 in Figure B.4-1; Refer to Appendix B.4.2.2)	0.04	
22	Infiltration volume storage [(Line 5 x Line 8 x Line 9)/12]	43	cu. ft.
23	Infiltration Storage Fraction of DCV [Line 22/Line 4]	0.12	
24	Total Equivalent Fraction of DCV [Line 21 + Line 23]	0.16	
25	Biofiltration BMP average annual capture [use Line 24 and 20 in Figure B.4-1]	14.41	%
Volume retention required from site design and other BMPs			
26	Fraction of DCV retained (Figure B.5-3) 0.0000013 x Line 25^3 - 0.000057 x Line 25^2 + 0.0086 x Line 25 - 0.014	0.102	
27	Remaining target DCV retention [(Line 14 – Line 26) x Line 4] Note: If Line 27 is equal to or smaller than 0 then the BMP meets the volume retention performance standard. If Line 27 is greater than 0, the applicant must implement site design and/or other BMPs within the DMA that will retain DCV equivalent to or greater than Line 27 to meet the volume retention performance standard	-20	cu. ft.

Volume Retention Performance Standard is Met

The City of SAN DIEGO	Project Name	Cielo Tentative Map			
	BMP ID	LH-6			

Volume Retention for No Infiltration Condition — **Worksheet B.5-5**

1	Area draining to the biofiltration BMP	15980	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.49	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]	7830	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]	235	sq. ft.
5	Biofiltration BMP Footprint	255	sq. ft.

Landscape Area (must be identified on DS-3247)

	Identification	1	2	3	4	5
6	Landscape area that meet the requirements in SD-4 and SD-5 Fact Sheet (sq. ft.)	none				
7	Impervious area draining to the landscape area (sq. ft.)	none				
8	Impervious to Pervious Area ratio [Line 7/Line 6]	0.00	0.00	0.00	0.00	0.00
9	Effective Credit Area If (Line 8 >1.5, Line 6, Line 7/1.5]	0	0	0	0	0

10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]	0	sq. ft.
11	Provided footprint for evapotranspiration [Line 5 + Line 10]	255	sq. ft.

Volume Retention Performance Standard

14	Is Line 11 ≥ Line 4? If yes, then volume retention performance standard for no infiltration condition is met. If no, increase the landscape area or propose other site design BMPs (e.g. trees, rain barrels, etc.) that will result in equivalent or greater average annual volume retention when compared to the average annual volume retention achieved by a standard biofiltration BMP. If the option of implementing other site design BMPs is selected, applicant must include supporting documentation with explanation of the approach in the PDP SWQMP.	**Performance Standard is Met**

The City of SAN DIEGO	Project Name	Cielo Tentative Map	
	BMP ID	LH-7	
Sizing Method for Pollutant Removal Criteria		**Worksheet B.5-1**	
1	Area draining to the BMP	15645	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.52	
3	85th percentile 24-hour rainfall depth	0.55	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	373	cu. ft.
BMP Parameters			
5	Surface ponding [6 inch minimum, 12 inch maximum]	12	inches
6	Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations	18	inches
7	Aggregate storage (also add ASTM No 8 stone) above underdrain invert (12 inches typical) – use 0 inches if the aggregate is not over the entire bottom surface area	12	inches
8	Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area	3	inches
9	Freely drained pore storage of the media	0.2	in/in
10	Porosity of aggregate storage	0.4	in/in
11	Media filtration rate to be used for sizing (maximum filtration rate of 5 in/hr. with no outlet control; if the filtration rate is controlled by the outlet use the outlet controlled rate (includes infiltration into the soil and flow rate through the outlet structure) which will be less than 5 in/hr.)	5	in/hr.
Baseline Calculations			
12	Allowable routing time for sizing	6	hours
13	Depth filtered during storm [Line 11 x Line 12]	30	inches
14	Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)]	21.6	inches
15	Total Depth Treated [Line 13 + Line 14]	51.6	inches
Option 1 – Biofilter 1.5 times the DCV			
16	Required biofiltered volume [1.5 x Line 4]	559	cu. ft.
17	Required Footprint [Line 16/ Line 15] x 12	130	sq. ft.
Option 2 - Store 0.75 of remaining DCV in pores and ponding			
18	Required Storage (surface + pores) Volume [0.75 x Line 4]	280	cu. ft.
19	Required Footprint [Line 18/ Line 14] x 12	155	sq. ft.
Footprint of the BMP			
20	BMP Footprint Sizing Factor (Default 0.03 or an alternative minimum footprint sizing factor from Line 11 in Worksheet B.5-3)	0.03	
21	Minimum BMP Footprint [Line 1 x Line 2 x Line 20]	244	sq. ft.
22	Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21)	244	sq. ft.
23	Provided BMP Footprint	270	sq. ft.
24	Is Line 23 > Line 22?	**Yes, Performance Standard is Met**	

The City of SAN DIEGO	Project Name	Cielo Tentative Map	
	BMP ID	LH-7	
Sizing Method for Volume Retention Criteria		Worksheet B.5-2	

1	Area draining to the BMP	15645	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.52	
3	85^{th} percentile 24-hour rainfall depth	0.55	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	373	cu. ft.
BMP Parameters			
5	Footprint of the BMP	270	sq. ft.
6	Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations	18	inches
7	Media retained pore space [50% of (FC-WP)]	0.05	in/in
8	Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area	5	inches
9	Porosity of aggregate storage	0.4	in/in
Volume Retention Requirement			
10	Measured infiltration rate in the DMA	0.01	in/hr.
11	Factor of safety	2	
12	Reliable infiltration rate, for biofiltration BMP sizing [Line 10/ Line 11] Note: This worksheet is not applicable if Line 12 < 0.01 in/hr.	0.005	in/hr.
13	Average annual volume reduction target (Figure B.5-2) When Line 12 ≥ 0.01 in/hr. = Minimum (40, 166.9 x Line 12 +6.62)	7.5	%
14	Fraction of DCV to be retained (Figure B.5-3) $0.0000013 \times \text{Line } 13^3 - 0.000057 \times \text{Line } 13^2 + 0.0086 \times \text{Line } 13 - 0.014$	0.047	
15	Target volume retention [Line 14 x Line 4]	18	cu. ft.
Evapotranspiration: Average Annual Volume Retention			
16	Effective evapotranspiration depth [Line 6 x Line 7]	0.9	inches
17	Retained Pore Volume [(Line 16 x Line 5)/12]	20	cu. ft.
18	Fraction of DCV retained in pore spaces [Line 17/Line 4]	0.05	
19	Evapotranspiration average annual capture [ET nomographs in Figure B.5-5]	3.8	%
Infiltration: Average Annual Volume Retention			
20	Drawdown for infiltration storage [(Line 8 x Line 9)/Line 12]	400	hours
21	Equivalent DCV fraction from evapotranspiration (use Line 19 and Line 20 in Figure B.4-1; Refer to Appendix B.4.2.2)	0.04	
22	Infiltration volume storage [(Line 5 x Line 8 x Line 9)/12]	45	cu. ft.
23	Infiltration Storage Fraction of DCV [Line 22/Line 4]	0.12	
24	Total Equivalent Fraction of DCV [Line 21 + Line 23]	0.16	
25	Biofiltration BMP average annual capture [use Line 24 and 20 in Figure B.4-1]	14.41	%
Volume retention required from site design and other BMPs			
26	Fraction of DCV retained (Figure B.5-3) $0.0000013 \times \text{Line } 25^3 - 0.000057 \times \text{Line } 25^2 + 0.0086 \times \text{Line } 25 - 0.014$	0.102	
27	Remaining target DCV retention [(Line 14 – Line 26) x Line 4] Note: If Line 27 is equal to or smaller than 0 then the BMP meets the volume retention performance standard. If Line 27 is greater than 0, the applicant must implement site design and/or other BMPs within the DMA that will retain DCV equivalent to or greater than Line 27 to meet the volume retention performance standard	-21	cu. ft.

Volume Retention Performance Standard is Met

The City of SAN DIEGO	Project Name	Cielo Tentative Map					
	BMP ID	LH-7					

Volume Retention for No Infiltration Condition			Worksheet B.5-5				
1	Area draining to the biofiltration BMP					15645	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)					0.52	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]					8135	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]					244	sq. ft.
5	Biofiltration BMP Footprint					270	sq. ft.
Landscape Area (must be identified on DS-3247)							
	Identification		1	2	3	4	5
6	Landscape area that meet the requirements in SD-4 and SD-5 Fact Sheet (sq. ft.)		none				
7	Impervious area draining to the landscape area (sq. ft.)		none				
8	Impervious to Pervious Area ratio [Line 7/Line 6]		0.00	0.00	0.00	0.00	0.00
9	Effective Credit Area If (Line 8 >1.5, Line 6, Line 7/1.5]		0	0	0	0	0
10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]					0	sq. ft.
11	Provided footprint for evapotranspiration [Line 5 + Line 10]					270	sq. ft.
Volume Retention Performance Standard							
14	Is Line 11 ≥ Line 4? If yes, then volume retention performance standard for no infiltration condition is met. If no, increase the landscape area or propose other site design BMPs (e.g. trees, rain barrels, etc.) that will result in equivalent or greater average annual volume retention when compared to the average annual volume retention achieved by a standard biofiltration BMP. If the option of implementing other site design BMPs is selected, applicant must include supporting documentation with explanation of the approach in the PDP SWQMP.					**Performance Standard is Met**	

The City of SAN DIEGO	Project Name	Cielo Tentative Map	
	BMP ID	LH-8	
Sizing Method for Pollutant Removal Criteria		**Worksheet B.5-1**	

1	Area draining to the BMP	17210	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.47	
3	85^{th} percentile 24-hour rainfall depth	0.55	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	371	cu. ft.
BMP Parameters			
5	Surface ponding [6 inch minimum, 12 inch maximum]	12	inches
6	Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations	18	inches
7	Aggregate storage (also add ASTM No 8 stone) above underdrain invert (12 inches typical) – use 0 inches if the aggregate is not over the entire bottom surface area	12	inches
8	Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area	3	inches
9	Freely drained pore storage of the media	0.2	in/in
10	Porosity of aggregate storage	0.4	in/in
11	Media filtration rate to be used for sizing (maximum filtration rate of 5 in/hr. with no outlet control; if the filtration rate is controlled by the outlet use the outlet controlled rate (includes infiltration into the soil and flow rate through the outlet structure) which will be less than 5 in/hr.)	5	in/hr.
Baseline Calculations			
12	Allowable routing time for sizing	6	hours
13	Depth filtered during storm [Line 11 x Line 12]	30	inches
14	Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)]	21.6	inches
15	Total Depth Treated [Line 13 + Line 14]	51.6	inches
Option 1 – Biofilter 1.5 times the DCV			
16	Required biofiltered volume [1.5 x Line 4]	556	cu. ft.
17	Required Footprint [Line 16/ Line 15] x 12	129	sq. ft.
Option 2 - Store 0.75 of remaining DCV in pores and ponding			
18	Required Storage (surface + pores) Volume [0.75 x Line 4]	278	cu. ft.
19	Required Footprint [Line 18/ Line 14] x 12	154	sq. ft.
Footprint of the BMP			
20	BMP Footprint Sizing Factor (Default 0.03 or an alternative minimum footprint sizing factor from Line 11 in Worksheet B.5-3)	0.03	
21	Minimum BMP Footprint [Line 1 x Line 2 x Line 20]	243	sq. ft.
22	Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21)	243	sq. ft.
23	Provided BMP Footprint	250	sq. ft.
24	Is Line 23 > Line 22?	**Yes, Performance Standard is Met**	

The City of SAN DIEGO	Project Name	Cielo Tentative Map	
	BMP ID	LH-8	
Sizing Method for Volume Retention Criteria		Worksheet B.5-2	

1	Area draining to the BMP	17210	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.47	
3	85th percentile 24-hour rainfall depth	0.55	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	371	cu. ft.
BMP Parameters			
5	Footprint of the BMP	250	sq. ft.
6	Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations	18	inches
7	Media retained pore space [50% of (FC-WP)]	0.05	in/in
8	Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area	5	inches
9	Porosity of aggregate storage	0.4	in/in
Volume Retention Requirement			
10	Measured infiltration rate in the DMA	0.01	in/hr.
11	Factor of safety	2	
12	Reliable infiltration rate, for biofiltration BMP sizing [Line 10/ Line 11] Note: This worksheet is not applicable if Line 12 < 0.01 in/hr.	0.005	in/hr.
13	Average annual volume reduction target (Figure B.5-2) When Line 12 ≥ 0.01 in/hr. = Minimum (40, 166.9 x Line 12 +6.62)	7.5	%
14	Fraction of DCV to be retained (Figure B.5-3) 0.0000013 x Line 13^3 - 0.000057 x Line 13^2 + 0.0086 x Line 13 - 0.014	0.047	
15	Target volume retention [Line 14 x Line 4]	17	cu. ft.
Evapotranspiration: Average Annual Volume Retention			
16	Effective evapotranspiration depth [Line 6 x Line 7]	0.9	inches
17	Retained Pore Volume [(Line 16 x Line 5)/12]	19	cu. ft.
18	Fraction of DCV retained in pore spaces [Line 17/Line 4]	0.05	
19	Evapotranspiration average annual capture [ET nomographs in Figure B.5-5]	3.8	%
Infiltration: Average Annual Volume Retention			
20	Drawdown for infiltration storage [(Line 8 x Line 9)/Line 12]	400	hours
21	Equivalent DCV fraction from evapotranspiration (use Line 19 and Line 20 in Figure B.4-1; Refer to Appendix B.4.2.2)	0.04	
22	Infiltration volume storage [(Line 5 x Line 8 x Line 9)/12]	42	cu. ft.
23	Infiltration Storage Fraction of DCV [Line 22/Line 4]	0.11	
24	Total Equivalent Fraction of DCV [Line 21 + Line 23]	0.15	
25	Biofiltration BMP average annual capture [use Line 24 and 20 in Figure B.4-1]	13.61	%
Volume retention required from site design and other BMPs			
26	Fraction of DCV retained (Figure B.5-3) 0.0000013 x Line 25^3 - 0.000057 x Line 25^2 + 0.0086 x Line 25 - 0.014	0.096	
27	Remaining target DCV retention [(Line 14 – Line 26) x Line 4] Note: If Line 27 is equal to or smaller than 0 then the BMP meets the volume retention performance standard. If Line 27 is greater than 0, the applicant must implement site design and/or other BMPs within the DMA that will retain DCV equivalent to or greater than Line 27 to meet the volume retention performance standard	-18	cu. ft.

Volume Retention Performance Standard is Met

The City of SAN DIEGO	Project Name	Cielo Tentative Map
	BMP ID	LH-8

Volume Retention for No Infiltration Condition			Worksheet B.5-5
1	Area draining to the biofiltration BMP	17210	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.47	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]	8089	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]	243	sq. ft.
5	Biofiltration BMP Footprint	250	sq. ft.

Landscape Area (must be identified on DS-3247)						
	Identification	1	2	3	4	5
6	Landscape area that meet the requirements in SD-4 and SD-5 Fact Sheet (sq. ft.)	none				
7	Impervious area draining to the landscape area (sq. ft.)	none				
8	Impervious to Pervious Area ratio [Line 7/Line 6]	0.00	0.00	0.00	0.00	0.00
9	Effective Credit Area If (Line 8 >1.5, Line 6, Line 7/1.5]	0	0	0	0	0
10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]				0	sq. ft.
11	Provided footprint for evapotranspiration [Line 5 + Line 10]				250	sq. ft.

Volume Retention Performance Standard		
14	Is Line 11 ≥ Line 4? If yes, then volume retention performance standard for no infiltration condition is met. If no, increase the landscape area or propose other site design BMPs (e.g. trees, rain barrels, etc.) that will result in equivalent or greater average annual volume retention when compared to the average annual volume retention achieved by a standard biofiltration BMP. If the option of implementing other site design BMPs is selected, applicant must include supporting documentation with explanation of the approach in the PDP SWQMP.	**Performance Standard is Met**

The City of SAN DIEGO	Project Name	Cielo Tentative Map	
	BMP ID	WR-BR	
Sizing Method for Pollutant Removal Criteria		**Worksheet B.5-1**	

1	Area draining to the BMP	9105	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.48	
3	85^{th} percentile 24-hour rainfall depth	0.55	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	200	cu. ft.
BMP Parameters			
5	Surface ponding [6 inch minimum, 12 inch maximum]	12	inches
6	Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations	18	inches
7	Aggregate storage (also add ASTM No 8 stone) above underdrain invert (12 inches typical) – use 0 inches if the aggregate is not over the entire bottom surface area	12	inches
8	Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area	3	inches
9	Freely drained pore storage of the media	0.2	in/in
10	Porosity of aggregate storage	0.4	in/in
11	Media filtration rate to be used for sizing (maximum filtration rate of 5 in/hr. with no outlet control; if the filtration rate is controlled by the outlet use the outlet controlled rate (includes infiltration into the soil and flow rate through the outlet structure) which will be less than 5 in/hr.)	5	in/hr.
Baseline Calculations			
12	Allowable routing time for sizing	6	hours
13	Depth filtered during storm [Line 11 x Line 12]	30	inches
14	Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)]	21.6	inches
15	Total Depth Treated [Line 13 + Line 14]	51.6	inches
Option 1 – Biofilter 1.5 times the DCV			
16	Required biofiltered volume [1.5 x Line 4]	300	cu. ft.
17	Required Footprint [Line 16/ Line 15] x 12	70	sq. ft.
Option 2 - Store 0.75 of remaining DCV in pores and ponding			
18	Required Storage (surface + pores) Volume [0.75 x Line 4]	150	cu. ft.
19	Required Footprint [Line 18/ Line 14] x 12	83	sq. ft.
Footprint of the BMP			
20	BMP Footprint Sizing Factor (Default 0.03 or an alternative minimum footprint sizing factor from Line 11 in Worksheet B.5-3)	0.03	
21	Minimum BMP Footprint [Line 1 x Line 2 x Line 20]	131	sq. ft.
22	Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21)	131	sq. ft.
23	Provided BMP Footprint	132	sq. ft.
24	Is Line 23 > Line 22?	**Yes, Performance Standard is Met**	

The City of SAN DIEGO	Project Name	Cielo Tentative Map	
	BMP ID	WR-BR	
Sizing Method for Volume Retention Criteria		**Worksheet B.5-2**	

1	Area draining to the BMP	9105	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.48	
3	85th percentile 24-hour rainfall depth	0.55	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	200	cu. ft.
BMP Parameters			
5	Footprint of the BMP	132	sq. ft.
6	Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations	18	inches
7	Media retained pore space [50% of (FC-WP)]	0.05	in/in
8	Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area	5	inches
9	Porosity of aggregate storage	0.4	in/in
Volume Retention Requirement			
10	Measured infiltration rate in the DMA	0.01	in/hr.
11	Factor of safety	2	
12	Reliable infiltration rate, for biofiltration BMP sizing [Line 10/ Line 11] Note: This worksheet is not applicable if Line 12 < 0.01 in/hr.	0.005	in/hr.
13	Average annual volume reduction target (Figure B.5-2) When Line 12 ≥ 0.01 in/hr. = Minimum (40, 166.9 x Line 12 +6.62)	7.5	%
14	Fraction of DCV to be retained (Figure B.5-3) $0.0000013 \times \text{Line } 13^3 - 0.000057 \times \text{Line } 13^2 + 0.0086 \times \text{Line } 13 - 0.014$	0.047	
15	Target volume retention [Line 14 x Line 4]	9	cu. ft.
Evapotranspiration: Average Annual Volume Retention			
16	Effective evapotranspiration depth [Line 6 x Line 7]	0.9	inches
17	Retained Pore Volume [(Line 16 x Line 5)/12]	10	cu. ft.
18	Fraction of DCV retained in pore spaces [Line 17/Line 4]	0.05	
19	Evapotranspiration average annual capture [ET nomographs in Figure B.5-5]	3.8	%
Infiltration: Average Annual Volume Retention			
20	Drawdown for infiltration storage [(Line 8 x Line 9)/Line 12]	400	hours
21	Equivalent DCV fraction from evapotranspiration (use Line 19 and Line 20 in Figure B.4-1; Refer to Appendix B.4.2.2)	0.04	
22	Infiltration volume storage [(Line 5 x Line 8 x Line 9)/12]	22	cu. ft.
23	Infiltration Storage Fraction of DCV [Line 22/Line 4]	0.11	
24	Total Equivalent Fraction of DCV [Line 21 + Line 23]	0.15	
25	Biofiltration BMP average annual capture [use Line 24 and 20 in Figure B.4-1]	13.61	%
Volume retention required from site design and other BMPs			
26	Fraction of DCV retained (Figure B.5-3) $0.0000013 \times \text{Line } 25^3 - 0.000057 \times \text{Line } 25^2 + 0.0086 \times \text{Line } 25 - 0.014$	0.096	
27	Remaining target DCV retention [(Line 14 – Line 26) x Line 4] Note: If Line 27 is equal to or smaller than 0 then the BMP meets the volume retention performance standard. If Line 27 is greater than 0, the applicant must implement site design and/or other BMPs within the DMA that will retain DCV equivalent to or greater than Line 27 to meet the volume retention performance standard	-10	cu. ft.

Volume Retention Performance Standard is Met

The City of SAN DIEGO	Project Name	Cielo Tentative Map				
	BMP ID	WR-BR				
Volume Retention for No Infiltration Condition				**Worksheet B.5-5**		
1	Area draining to the biofiltration BMP				9105	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)				0.48	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]				4370	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]				131	sq. ft.
5	Biofiltration BMP Footprint				132	sq. ft.
Landscape Area (must be identified on DS-3247)						
	Identification	**1**	**2**	**3**	**4**	**5**
6	Landscape area that meet the requirements in SD-4 and SD-5 Fact Sheet (sq. ft.)	none				
7	Impervious area draining to the landscape area (sq. ft.)	none				
8	Impervious to Pervious Area ratio [Line 7/Line 6]	0.00	0.00	0.00	0.00	0.00
9	Effective Credit Area If (Line 8 >1.5, Line 6, Line 7/1.5]	0	0	0	0	0
10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]				0	sq. ft.
11	Provided footprint for evapotranspiration [Line 5 + Line 10]				132	sq. ft.
Volume Retention Performance Standard						
14	Is Line 11 ≥ Line 4? If yes, then volume retention performance standard for no infiltration condition is met. If no, increase the landscape area or propose other site design BMPs (e.g. trees, rain barrels, etc.) that will result in equivalent or greater average annual volume retention when compared to the average annual volume retention achieved by a standard biofiltration BMP. If the option of implementing other site design BMPs is selected, applicant must include supporting documentation with explanation of the approach in the PDP SWQMP.				**Performance Standard is Met**	

The City of SAN DIEGO	Project Name	Cielo Tentative Map	
	BMP ID	ER-BR	
Sizing Method for Pollutant Removal Criteria		**Worksheet B.5-1**	

1	Area draining to the BMP	31540	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.21	
3	85th percentile 24-hour rainfall depth	0.55	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	304	cu. ft.
BMP Parameters			
5	Surface ponding [6 inch minimum, 12 inch maximum]	12	inches
6	Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations	18	inches
7	Aggregate storage (also add ASTM No 8 stone) above underdrain invert (12 inches typical) – use 0 inches if the aggregate is not over the entire bottom surface area	12	inches
8	Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area	3	inches
9	Freely drained pore storage of the media	0.2	in/in
10	Porosity of aggregate storage	0.4	in/in
11	Media filtration rate to be used for sizing (maximum filtration rate of 5 in/hr. with no outlet control; if the filtration rate is controlled by the outlet use the outlet controlled rate (includes infiltration into the soil and flow rate through the outlet structure) which will be less than 5 in/hr.)	5	in/hr.
Baseline Calculations			
12	Allowable routing time for sizing	6	hours
13	Depth filtered during storm [Line 11 x Line 12]	30	inches
14	Depth of Detention Storage [Line 5 + (Line 6 x Line 9) + (Line 7 x Line 10) + (Line 8 x Line 10)]	21.6	inches
15	Total Depth Treated [Line 13 + Line 14]	51.6	inches
Option 1 – Biofilter 1.5 times the DCV			
16	Required biofiltered volume [1.5 x Line 4]	455	cu. ft.
17	Required Footprint [Line 16/ Line 15] x 12	106	sq. ft.
Option 2 - Store 0.75 of remaining DCV in pores and ponding			
18	Required Storage (surface + pores) Volume [0.75 x Line 4]	228	cu. ft.
19	Required Footprint [Line 18/ Line 14] x 12	126	sq. ft.
Footprint of the BMP			
20	BMP Footprint Sizing Factor (Default 0.03 or an alternative minimum footprint sizing factor from Line 11 in Worksheet B.5-3)	0.03	
21	Minimum BMP Footprint [Line 1 x Line 2 x Line 20]	199	sq. ft.
22	Footprint of the BMP = Maximum(Minimum(Line 17, Line 19), Line 21)	199	sq. ft.
23	Provided BMP Footprint	200	sq. ft.
24	Is Line 23 > Line 22?	**Yes, Performance Standard is Met**	

The City of SAN DIEGO	Project Name	Cielo Tentative Map	
	BMP ID	ER-BR	
Sizing Method for Volume Retention Criteria		Worksheet B.5-2	

1	Area draining to the BMP	31540	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)	0.21	
3	85th percentile 24-hour rainfall depth	0.55	inches
4	Design capture volume [Line 1 x Line 2 x (Line 3/12)]	304	cu. ft.
BMP Parameters			
5	Footprint of the BMP	200	sq. ft.
6	Media thickness [18 inches minimum], also add mulch layer and washed ASTM 33 fine aggregate sand thickness to this line for sizing calculations	18	inches
7	Media retained pore space [50% of (FC-WP)]	0.05	in/in
8	Aggregate storage below underdrain invert (3 inches minimum) – use 0 inches if the aggregate is not over the entire bottom surface area	5	inches
9	Porosity of aggregate storage	0.4	in/in
Volume Retention Requirement			
10	Measured infiltration rate in the DMA	0.01	in/hr.
11	Factor of safety	2	
12	Reliable infiltration rate, for biofiltration BMP sizing [Line 10/ Line 11] Note: This worksheet is not applicable if Line 12 < 0.01 in/hr.	0.005	in/hr.
13	Average annual volume reduction target (Figure B.5-2) When Line 12 ≥ 0.01 in/hr. = Minimum (40, 166.9 x Line 12 +6.62)	7.5	%
14	Fraction of DCV to be retained (Figure B.5-3) 0.0000013 x Line 13^3 - 0.000057 x Line 13^2 + 0.0086 x Line 13 - 0.014	0.047	
15	Target volume retention [Line 14 x Line 4]	14	cu. ft.
Evapotranspiration: Average Annual Volume Retention			
16	Effective evapotranspiration depth [Line 6 x Line 7]	0.9	inches
17	Retained Pore Volume [(Line 16 x Line 5)/12]	15	cu. ft.
18	Fraction of DCV retained in pore spaces [Line 17/Line 4]	0.05	
19	Evapotranspiration average annual capture [ET nomographs in Figure B.5-5]	3.8	%
Infiltration: Average Annual Volume Retention			
20	Drawdown for infiltration storage [(Line 8 x Line 9)/Line 12]	400	hours
21	Equivalent DCV fraction from evapotranspiration (use Line 19 and Line 20 in Figure B.4-1; Refer to Appendix B.4.2.2)	0.04	
22	Infiltration volume storage [(Line 5 x Line 8 x Line 9)/12]	33	cu. ft.
23	Infiltration Storage Fraction of DCV [Line 22/Line 4]	0.11	
24	Total Equivalent Fraction of DCV [Line 21 + Line 23]	0.15	
25	Biofiltration BMP average annual capture [use Line 24 and 20 in Figure B.4-1]	13.61	%
Volume retention required from site design and other BMPs			
26	Fraction of DCV retained (Figure B.5-3) 0.0000013 x Line 25^3 - 0.000057 x Line 25^2 + 0.0086 x Line 25 - 0.014	0.096	
27	Remaining target DCV retention [(Line 14 – Line 26) x Line 4] Note: If Line 27 is equal to or smaller than 0 then the BMP meets the volume retention performance standard. If Line 27 is greater than 0, the applicant must implement site design and/or other BMPs within the DMA that will retain DCV equivalent to or greater than Line 27 to meet the volume retention performance standard	-15	cu. ft.

Volume Retention Performance Standard is Met

The City of SAN DIEGO	Project Name	Cielo Tentative Map
	BMP ID	ER-BR

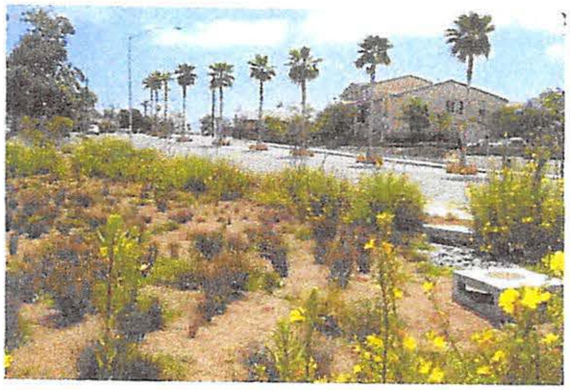
Volume Retention for No Infiltration Condition						Worksheet B.5-5	
1	Area draining to the biofiltration BMP					31540	sq. ft.
2	Adjusted runoff factor for drainage area (Refer to Appendix B.1 and B.2)					0.21	
3	Effective impervious area draining to the BMP [Line 1 x Line 2]					6623	sq. ft.
4	Required area for Evapotranspiration [Line 3 x 0.03]					199	sq. ft.
5	Biofiltration BMP Footprint					200	sq. ft.
Landscape Area (must be identified on DS-3247)							
	Identification	**1**	**2**	**3**	**4**	**5**	
6	Landscape area that meet the requirements in SD-4 and SD-5 Fact Sheet (sq. ft.)	none					
7	Impervious area draining to the landscape area (sq. ft.)	none					
8	Impervious to Pervious Area ratio [Line 7/Line 6]	0.00	0.00	0.00	0.00	0.00	
9	Effective Credit Area If (Line 8 >1.5, Line 6, Line 7/1.5]	0	0	0	0	0	
10	Sum of Landscape area [sum of Line 9 Id's 1 to 5]					0	sq. ft.
11	Provided footprint for evapotranspiration [Line 5 + Line 10]					200	sq. ft.
Volume Retention Performance Standard							
14	Is Line 11 ≥ Line 4? If yes, then volume retention performance standard for no infiltration condition is met. If no, increase the landscape area or propose other site design BMPs (e.g. trees, rain barrels, etc.) that will result in equivalent or greater average annual volume retention when compared to the average annual volume retention achieved by a standard biofiltration BMP. If the option of implementing other site design BMPs is selected, applicant must include supporting documentation with explanation of the approach in the PDP SWQMP.					**Performance Standard is Met**	

<table>
<tr><th colspan="2">Harvest and Use Feasibility Checklist</th><th>Form I-7</th></tr>
<tr><td colspan="3">1. Is there a demand for harvested water (check all that apply) at the project site that is reliably present during the wet season?
☒ Toilet and urinal flushing
☒ Landscape irrigation
☐ Other:______________</td></tr>
<tr><td colspan="3">2. If there is a demand; estimate the anticipated average wet season demand over a period of 36 hours. Guidance for planning level demand calculations for toilet/urinal flushing and landscape irrigation is provided in Section B.3.2.
[Provide a summary of calculations here]

From Table B.3-3 for Low Plant Water use 390 gal/36hr/Ac
Area of landscaping = 2.278 Ac
Landscape water demand = 390 x 2.278= 888 gallons = 119 cf

Toilet usage:
Assume 4 residents/home; 8 homes; 9.3 flushings/resident; 3.45 gallons/flush (considered high)
Toilet and Urinal usage = 4 x 8 x 9.3 x 3.45 = 1027 gallons = 137 cf</td></tr>
<tr><td colspan="3">3. Calculate the DCV using worksheet B-2.1.
DCV = ___2895___(cubic feet)</td></tr>
<tr><td>3a. Is the 36 hour demand greater than or equal to the DCV?
☐ Yes / ☒ No ⇨
⇩</td><td>3b. Is the 36 hour demand greater than 0.25DCV but less than the full DCV?
☐ Yes / ☒ No ⇨
⇩</td><td>3c. Is the 36 hour demand less than 0.25DCV?
☒ Yes
⇩</td></tr>
<tr><td>Harvest and use appears to be feasible. Conduct more detailed evaluation and sizing calculations to confirm that DCV can be used at an adequate rate to meet drawdown criteria.</td><td>Harvest and use may be feasible. Conduct more detailed evaluation and sizing calculations to determine feasibility. Harvest and use may only be able to be used for a portion of the site, or (optionally) the storage may need to be upsized to meet long term capture targets while draining in longer than 36 hours.</td><td>Harvest and use is considered to be infeasible.</td></tr>
<tr><td colspan="3">Is harvest and use feasible based on further evaluation?
☐ Yes, refer to Appendix E to select and size harvest and use BMPs.
☒ No, select alternate BMPs.</td></tr>
</table>

E.13. BF-1 Biofiltration



Location: 43rd Street and Logan Avenue, San Diego, California

MS4 Permit Category
Biofiltration

Manual Category
Biofiltration

Applicable Performance Standard
Pollutant Control
Flow Control

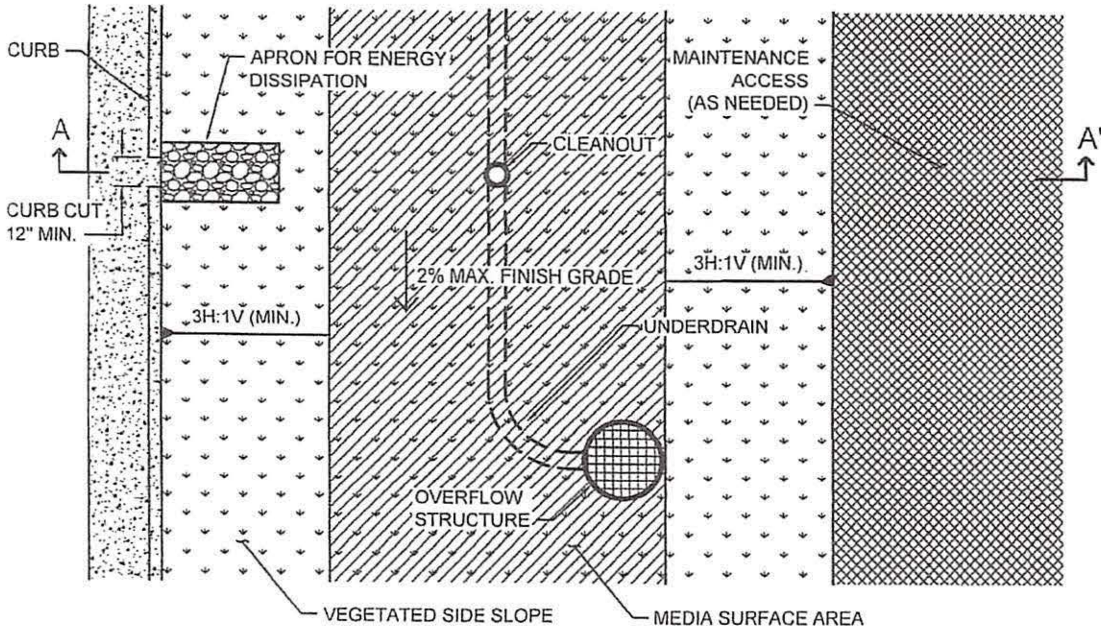
Primary Benefits
Treatment
Volume Reduction (Incidental)
Peak Flow Attenuation (Optional)

Description

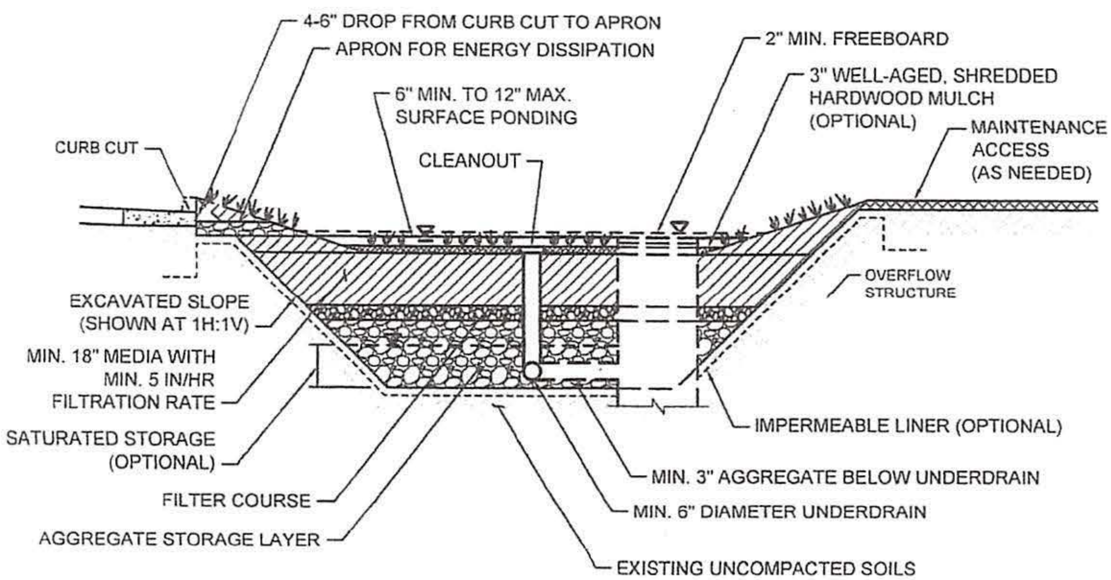
Biofiltration (Bioretention with underdrain) facilities are vegetated surface water systems that filter water through vegetation, and soil or engineered media prior to discharge via underdrain or overflow to the downstream conveyance system. Bioretention with underdrain facilities are commonly incorporated into the site within parking lot landscaping, along roadsides, and in open spaces. Because these types of facilities have limited or no infiltration, they are typically designed to provide enough hydraulic head to move flows through the underdrain connection to the storm drain system. Treatment is achieved through filtration, sedimentation, sorption, biochemical processes and plant uptake.

Typical bioretention with underdrain components include:

- Inflow distribution mechanisms (e.g, perimeter flow spreader or filter strips)
- Energy dissipation mechanism for concentrated inflows (e.g., splash blocks or riprap)
- Shallow surface ponding for captured flows
- Side slope and basin bottom vegetation selected based on expected climate and ponding depth
- Non-floating mulch layer
- Media layer (planting mix or engineered media) capable of supporting vegetation growth
- Filter course layer (aka choking layer) consisting of aggregate to prevent the migration of fines into uncompacted native soils or the aggregate storage layer
- Aggregate storage layer with underdrain(s)
- Impermeable liner or uncompacted native soils at the bottom of the facility
- Overflow structure



PLAN
NOT TO SCALE



SECTION A-A'
NOT TO SCALE

Figure E.13-E.13-1: Typical plan and Section view of a Biofiltration BMP

Design Adaptations for Project Goals

Biofiltration Treatment BMP for storm water pollutant control. The system is lined or un-lined to provide incidental infiltration, and an underdrain is provided at the bottom to carry away filtered runoff. This configuration is considered to provide biofiltration treatment via flow through the media layer. Storage provided above the underdrain within surface ponding, media, and aggregate storage is considered included in the biofiltration treatment volume. Saturated storage within the aggregate storage layer can be added to this design by raising the underdrain above the bottom of the aggregate storage layer or via an internal weir structure designed to maintain a specific water level elevation.

Integrated storm water flow control and pollutant control configuration. The system can be designed to provide flow rate and duration control by primarily providing increased surface ponding and/or having a deeper aggregate storage layer above the underdrain. This will allow for significant detention storage, which can be controlled via inclusion of an outlet structure at the downstream end of the underdrain.

Design Criteria and Considerations

Bioretention with underdrain must meet the following design criteria. Deviations from the below criteria may be approved at the discretion of the City Engineer if it is determined to be appropriate:

	Siting and Design	Intent/Rationale
□	Placement observes geotechnical recommendations regarding potential hazards (e.g., slope stability, landslides, liquefaction zones) and setbacks (e.g., slopes, foundations, utilities).	Must not negatively impact existing site geotechnical concerns.
□	An impermeable liner or other hydraulic restriction layer is included if site constraints indicate that infiltration or lateral flows should not be allowed.	Lining prevents storm water from impacting groundwater and/or sensitive environmental or geotechnical features. Incidental infiltration, when allowable, can aid in pollutant removal and groundwater recharge.
□	Contributing tributary area shall be ≤ 5 acres (≤ 1 acre preferred).	Bigger BMPs require additional design features for proper performance. Contributing tributary area greater than 5 acres may be allowed at the discretion of the City Engineer if the following conditions are met: 1) incorporate design features (e.g. flow spreaders) to minimizing short circuiting of flows in the BMP and 2) incorporate additional design features requested by the City Engineer for proper performance of the regional BMP.
□	Finish grade of the facility is ≤ 2%.	Flatter surfaces reduce erosion and channelization within the facility.
Surface Ponding		

	Siting and Design	Intent/Rationale
☐	Surface ponding is limited to a 24-hour drawdown time.	Surface ponding limited to 24 hour for plant health. Surface ponding drawdown time greater than 24-hours but less than 96 hours may be allowed at the discretion of the City Engineer if certified by a landscape architect or agronomist.
☐	Surface ponding depth is ≥ 6 and ≤ 12 inches.	Surface ponding capacity lowers subsurface storage requirements. Deep surface ponding raises safety concerns. Surface ponding depth greater than 12 inches (for additional pollutant control or surface outlet structures or flow-control orifices) may be allowed at the discretion of the City Engineer if the following conditions are met: 1) surface ponding depth drawdown time is less than 24 hours; and 2) safety issues and fencing requirements are considered (typically ponding greater than 18" will require a fence and/or flatter side slopes) and 3) potential for elevated clogging risk is considered.
☐	A minimum of 2 inches of freeboard is provided.	Freeboard provides room for head over overflow structures and minimizes risk of uncontrolled surface discharge.
☐	Side slopes are stabilized with vegetation and are = 3H:1V or shallower.	Gentler side slopes are safer, less prone to erosion, able to establish vegetation more quickly and easier to maintain.
Vegetation		
☐	Plantings are suitable for the climate and expected ponding depth. A plant list to aid in selection can be found in Appendix E.20.	Plants suited to the climate and ponding depth are more likely to survive.
☐	An irrigation system with a connection to water supply should be provided as needed.	Seasonal irrigation might be needed to keep plants healthy.
Mulch (Mandatory)		
☐	A minimum of 3 inches of well-aged, shredded hardwood mulch that has been stockpiled or stored for at least 12 months is provided.	Mulch will suppress weeds and maintain moisture for plant growth. Aging mulch kills pathogens and weed seeds and allows the beneficial microbes to multiply.
Media Layer		

	Siting and Design	Intent/Rationale
☐	Media maintains a minimum filtration rate of 5 in/hr over lifetime of facility. Additional Criteria for media hydraulic conductivity described in the bioretention soil media model specification (Appendix F.4)	A filtration rate of at least 5 inches per hour allows soil to drain between events. The initial rate should be higher than long term target rate to account for clogging over time. However an excessively high initial rate can have a negative impact on treatment performance, therefore an upper limit is needed.
☐	Media is a minimum 18 inches deep, meeting the following media specifications: Model biorention soil media specification provided in Appendix F.4 <u>or</u> County of San Diego Low Impact Development Handbook: Appendix G - Bioretention Soil Specification (June 2014, unless superseded by more recent edition). Alternatively, for proprietary designs and custom media mixes not meeting the media specifications, the media meets the pollutant treatment performance criteria in Section F.1.	A deep media layer provides additional filtration and supports plants with deeper roots. Standard specifications shall be followed. For non-standard or proprietary designs, compliance with Appendix F.1 ensures that adequate treatment performance will be provided.
☐	Media surface area is 3% of contributing area times adjusted runoff factor or greater. Unless demonstrated that the BMP surface area can be smaller than 3%.	Greater surface area to tributary area ratios: a) maximizes volume retention as required by the MS4 Permit and b) decrease loading rates per square foot and therefore increase longevity. Adjusted runoff factor is to account for site design BMPs implemented upstream of the BMP (such as rain barrels, impervious area dispersion, etc.). Refer to Appendix B.2 guidance. Use Worksheet B.5-1 Line 26 to estimate the minimum surface area required per this criteria.
☐	Where receiving waters are impaired or have a TMDL for nutrients, the system is designed with nutrient sensitive media design (see fact sheet BF-2).	Potential for pollutant export is partly a function of media composition; media design must minimize potential for export of nutrients, particularly where receiving waters are impaired for nutrients.
Filter Course Layer		
☐	A filter course is used to prevent migration of fines through layers of the facility. Filter fabric is not used.	Migration of media can cause clogging of the aggregate storage layer void spaces or subgrade and can result in poor water quality performance for turbidity and suspended solids. Filter fabric is more likely to clog.

	Siting and Design	Intent/Rationale
☐	Filter course is washed and free of fines.	Washing aggregate will help eliminate fines that could clog the facility and impede infiltration.
☐	To reduce clogging potential, a two-layer filter course (aka choking stone system) is used consisting of one 3" layer of clean and washed ASTM 33 Fine Aggregate Sand overlying a 3" layer of ASTM No 8 Stone (Appendix F.5).	This specification has been developed to maintain permeability while limiting the migration of media material into the stone reservoir and underdrain system.
Aggregate Storage Layer		
☐	ASTM #57 open graded stone is used for the storage layer and a two layer filter course (detailed above) is used above this layer	This layer provides additional storage capacity. ASTM #8 stone provides an acceptable choking/bridging interface with the particles in ASTM #57 stone.
☐	The depth of aggregate provided (12-inch typical) and storage layer configuration is adequate for providing conveyance for underdrain flows to the outlet structure.	Proper storage layer configuration and underdrain placement will minimize facility drawdown time.
Inflow, Underdrain, and Outflow Structures		
☐	Inflow, underdrains and outflow structures are accessible for inspection and maintenance.	Maintenance will prevent clogging and ensure proper operation of the flow control structures.
☐	Inflow velocities are limited to 3 ft/s or less or use energy dissipation methods. (e.g., riprap, level spreader) for concentrated inflows.	High inflow velocities can cause erosion, scour and/or channeling.
☐	Curb cut inlets are at least 12 inches wide, have a 4-6 inch reveal (drop) and an apron and energy dissipation as needed.	Inlets must not restrict flow and apron prevents blockage from vegetation as it grows in. Energy dissipation prevents erosion.
☐	Underdrain outlet elevation should be a minimum of 3 inches above the bottom elevation of the aggregate storage layer.	A minimal separation from subgrade or the liner lessens the risk of fines entering the underdrain and can improve hydraulic performance by allowing perforations to remain unblocked.
☐	Minimum underdrain diameter is 8 inches.	Smaller diameter underdrains are prone to clogging.
☐	Underdrains should be affixed with an upturned elbow to an elevation at least 9 to 12 inches above the invert of the underdrain.	An upturned elbow reduces velocity in the underdrain pipe and can help reduce mobilization of sediments from the underdrain and media bed.

	Siting and Design	Intent/Rationale
☐	Underdrains are made of slotted, PVC pipe conforming to ASTM D 3034 or equivalent or corrugated, HDPE pipe conforming to AASHTO 252M or equivalent.	Slotted underdrains provide greater intake capacity, clog resistant drainage, and reduced entrance velocity into the pipe, thereby reducing the chances of solids migration.
☐	An underdrain cleanout with a minimum 8-inch diameter and lockable cap is placed every 50 feet as required based on underdrain length.	Properly spaced cleanouts will facilitate underdrain maintenance.
☐	Overflow is safely conveyed to a downstream storm drain system or discharge point Size overflow structure to pass 100-year peak flow for on-line infiltration basins and water quality peak flow for off-line basins.	Planning for overflow lessens the risk of property damage due to flooding.

Conceptual Design and Sizing Approach for Storm Water Pollutant Control Only

To design bioretention with underdrain for storm water pollutant control only (no flow control required), the following steps should be taken:

1. Verify that siting and design criteria have been met, including placement requirements, contributing tributary area, maximum side and finish grade slopes, and the recommended media surface area tributary ratio.
2. Calculate the DCV per Appendix B based on expected site design runoff for tributary areas.
3. Use the sizing worksheet presented in Appendix B.5 to size biofiltration BMPs.

Conceptual Design and Sizing Approach when Storm Water Flow Control is Applicable

Control of flow rates and/or durations will typically require significant surface ponding and/or aggregate storage volumes, and therefore the following steps should be taken prior to determination of storm water pollutant control design. Pre-development and allowable post-project flow rates and durations should be determined as discussed in Chapter 6 of the manual.

1. Verify that siting and design criteria have been met, including placement requirements, contributing tributary area, maximum side and finish grade slopes, and the recommended media surface area tributary ratio.
2. Iteratively determine the facility footprint area, surface ponding and/or aggregate storage layer depth required to provide detention storage to reduce flow rates and durations to allowable limits. Flow rates and durations can be controlled from detention storage by altering outlet structure orifice size(s) and/or water control levels. Multi-level orifices can be used within an outlet structure to control the full range of flows.
3. If bioretention with underdrain cannot fully provide the flow rate and duration control required by this manual, an upstream or downstream structure with significant storage volume such as an underground vault can be used to provide remaining controls.
4. After bioretention with underdrain has been designed to meet flow control requirements, calculations must be completed to verify if storm water pollutant control requirements to treat the DCV have been met.

ATTACHMENT 2
BACKUP FOR PDP HYDROMODIFICATION CONTROL MEASURES

This is the cover sheet for Attachment 2.

☒ Mark this box if this attachment is empty because the project is exempt from PDP hydromodification management requirements.

Indicate which Items are Included:

Attachment Sequence	Contents	Checklist
Attachment 2a	Hydromodification Management Exhibit (Required)	☐ Included See Hydromodification Management Exhibit Checklist.
Attachment 2b	Management of Critical Coarse Sediment Yield Areas (WMAA Exhibit is required, additional analyses are optional) See Section 6.2 of the BMP Design Manual.	☐ Exhibit showing project drainage boundaries marked on WMAA Critical Coarse Sediment Yield Area Map (Required) Optional analyses for Critical Coarse Sediment Yield Area Determination ☐ 6.2.1 Verification of Geomorphic Landscape Units Onsite ☐ 6.2.2 Downstream Systems Sensitivity to Coarse Sediment ☐ 6.2.3 Optional Additional Analysis of Potential Critical Coarse Sediment Yield Areas Onsite ○ Not Performed
Attachment 2c	Geomorphic Assessment of Receiving Channels (Optional) See Section 6.3.4 of the BMP Design Manual.	○ Included ○ Submitted as separate stand-alone document
Attachment 2d	Flow Control Facility Design and Structural BMP Drawdown Calculations (Required) Overflow Design Summary for each structural BMP See Chapter 6 and Appendix G of the BMP Design Manual	○ Included ○ Submitted as separate stand-alone document
Attachment 2e	Vector Control Plan (Required when structural BMPs will not drain in 96 hours)	○ Included ○ Not required because BMPs will drain in less than 96 hours

Use this checklist to ensure the required information has been included on the Hydromodification Management Exhibit:

The Hydromodification Management Exhibit must identify:

- ☐ Underlying hydrologic soil group
- ☐ Approximate depth to groundwater
- ☐ Existing natural hydrologic features (watercourses, seeps, springs, wetlands)
- ☐ Critical coarse sediment yield areas to be protected
- ☐ Existing topography
- ☐ Existing and proposed site drainage network and connections to drainage offsite
- ☐ Proposed grading
- ☐ Proposed impervious features
- ☐ Proposed design features and surface treatments used to minimize imperviousness
- ☐ Point(s) of Compliance (POC) for Hydromodification Management
- ☐ Existing and proposed drainage boundary and drainage area to each POC (when necessary, create separate exhibits for pre-development and post-project conditions)
- ☐ Structural BMPs for hydromodification management (identify location, type of BMP, and size/detail)

ATTACHMENT 3
STRUCTURAL BMP MAINTENANCE INFORMATION

This is the cover sheet for Attachment 3.

Indicate which Items are Included:

Attachment Sequence	Contents	Checklist
Attachment 3a	Structural BMP Maintenance Thresholds and Actions (Required)	☐ Included See Structural BMP Maintenance Information Checklist.
Attachment 3b	Maintenance Agreement (Form DS-3247) (when applicable)	○ Included ◉ Not Applicable

Use this checklist to ensure the required information has been included in the Structural BMP Maintenance Information Attachment:

Preliminary Design / Planning / CEQA level submittal:

- Attachment 3a must identify:
  - ☐ Typical maintenance indicators and actions for proposed structural BMP(s) based on Section 7.7 of the BMP Design Manual
- Attachment 3b is not required for preliminary design / planning / CEQA level submittal.

Final Design level submittal:

Attachment 3a must identify:

- ☐ Specific maintenance indicators and actions for proposed structural BMP(s). This shall be based on Section 7.7 of the BMP Design Manual and enhanced to reflect actual proposed components of the structural BMP(s)
- ☐ How to access the structural BMP(s) to inspect and perform maintenance
- ☐ Features that are provided to facilitate inspection (e.g., observation ports, cleanouts, silt posts, or other features that allow the inspector to view necessary components of the structural BMP and compare to maintenance thresholds)
- ☐ Manufacturer and part number for proprietary parts of structural BMP(s) when applicable
- ☐ Maintenance thresholds specific to the structural BMP(s), with a location-specific frame of reference (e.g., level of accumulated materials that triggers removal of the materials, to be identified based on viewing marks on silt posts or measured with a survey rod with respect to a fixed benchmark within the BMP)
- ☐ When applicable, frequency of bioretention soil media replacement.
- ☐ Recommended equipment to perform maintenance
- ☐ When applicable, necessary special training or certification requirements for inspection and maintenance personnel such as confined space entry or hazardous waste management

Attachment 3b: For private entity operation and maintenance, Attachment 3b must include a Storm Water Management and Discharge Control Maintenance Agreement (Form DS-3247). The following information must be included in the exhibits attached to the maintenance agreement:

- ☐ Vicinity map
- ☐ Site design BMPs for which DCV reduction is claimed for meeting the pollutant control obligations.
- ☐ BMP and HMP location and dimensions
- ☐ BMP and HMP specifications/cross section/model
- ☐ Maintenance recommendations and frequency
- ☐ LID features such as (permeable paver and LS location, dim, SF).

THE CITY OF SAN DIEGO
RECORDING REQUESTED BY:
THE CITY OF SAN DIEGO
AND WHEN RECORDED MAIL TO:

(THIS SPACE IS FOR THE RECORDER'S USE ONLY)

STORM WATER MANAGEMENT AND DISCHARGE CONTROL MAINTENANCE AGREEMENT

APPROVAL NUMBER:	ASSESSOR'S PARCEL NUMBER:	PROJECT NUMBER:

This agreement is made by and between the City of San Diego, a municipal corporation [City] and

the owner or duly authorized representative of the owner [Property Owner] of property located at:

(PROPERTY ADDRESS)

and more particularly described as:

(LEGAL DESCRIPTION OF PROPERTY)

in the City of San Diego, County of San Diego, State of California.

Property Owner is required pursuant to the City of San Diego Municipal Code, Chapter 4, Article 3, Division 3, Chapter 14, Article 2, Division 2, and the Land Development Manual, Storm Water Standards to enter into a Storm Water Management and Discharge Control Maintenance Agreement [Maintenance Agreement] for the installation and maintenance of Permanent Storm Water Best Management Practices [Permanent Storm Water BMP's] prior to the issuance of construction permits. The Maintenance Agreement is intended to ensure the establishment and maintenance of Permanent Storm Water BMP's onsite, as described in the attached exhibit(s), the project's Storm Water Quality Management Plan [SWQMP] and Grading and/or Improvement Plan Drawing No(s), or Building Plan Project No(s):

____

Property Owner wishes to obtain a building or engineering permit according to the Grading and/or Improvement Plan Drawing No(s) or Building Plan Project No(s):

Continued on Page 2

NOW, THEREFORE, the parties agree as follows:

1. Property Owner shall have prepared, or if qualified, shall prepare an Operation and Maintenance Procedure [OMP] for Permanent Storm Water BMP's, satisfactory to the City, according to the attached exhibit(s), consistent with the Grading and/or Improvement Plan Drawing No(s), or Building Plan Project No(s):____________________

2. Property Owner shall install, maintain and repair or replace all Permanent Storm Water BMP's within their property, according to the OMP guidelines as described in the attached exhibit(s), the project's WQTR and Grading and/or Improvement Plan Drawing No(s), or Building Plan Project No(s)____________________.

3. Property Owner shall maintain operation and maintenance records for at least five (5) years. These records shall be made available to the City for inspection upon request at any time.

This Maintenance Agreement shall commence upon execution of this document by all parties named hereon, and shall run with the land.

Executed by the City of San Diego and by Property Owner in San Diego, California.

See Attached Exhibits(s):

____
(Owner Signature)

____
(Print Name and Title)

____
(Company/Organization Name)

____
(Date)

THE CITY OF SAN DIEGO

APPROVED:

____
(City Control engineer Signature

____
(Print Name)

____
(Date)

NOTE: ALL SIGNATURES MUST INCLUDE NOTARY ACKNOWLEDGMENTS PER CIVIL CODE SEC. 1180 ET.SEQ

ATTACHMENT 4
COPY OF PLAN SHEETS SHOWING PERMANENT STORM WATER BMPS

This is the cover sheet for Attachment 4.

Use this checklist to ensure the required information has been included on the plans:

The plans must identify:

- ☐ Structural BMP(s) with ID numbers matching Form I-6 Summary of PDP Structural BMPs
- ☐ The grading and drainage design shown on the plans must be consistent with the delineation of DMAs shown on the DMA exhibit
- ☐ Details and specifications for construction of structural BMP(s)
- ☐ Signage indicating the location and boundary of structural BMP(s) as required by the City Engineer
- ☐ How to access the structural BMP(s) to inspect and perform maintenance
- ☐ Features that are provided to facilitate inspection (e.g., observation ports, cleanouts, silt posts, or other features that allow the inspector to view necessary components of the structural BMP and compare to maintenance thresholds)
- ☐ Manufacturer and part number for proprietary parts of structural BMP(s) when applicable
- ☐ Maintenance thresholds specific to the structural BMP(s), with a location-specific frame of reference (e.g., level of accumulated materials that triggers removal of the materials, to be identified based on viewing marks on silt posts or measured with a survey rod with respect to a fixed benchmark within the BMP)
- ☐ Recommended equipment to perform maintenance
- ☐ When applicable, necessary special training or certification requirements for inspection and maintenance personnel such as confined space entry or hazardous waste management
- ☐ Include landscaping plan sheets showing vegetation requirements for vegetated structural BMP(s)
- ☐ All BMPs must be fully dimensioned on the plans
- ☐ When proprietary BMPs are used, site specific cross section with outflow, inflow and model number shall be provided. Broucher photocopies are not allowed.

Biofiltration Basin Maintenance Plan
for
Cielo Tentative Map
February 5, 2017

Project Address and Cross Streets Calle del Cielo

Assessor's Parcel No.: TBD

BMP Owner: Lot Owners Phone No.:

Designated Contact: Phone No.:

Mailing Address:

The property contains one Biofiltration Basin, located as described below and as shown in the attached site plan[1].
Biofiltration Basin No. 1 is located in the central portion of the project site.

I. Routine Maintenance Activities

The principal maintenance objectives are to ensure that water flows unimpeded into the Biofiltration Basin and landscaping remains attractive in appearance. Table 1 shows the routine maintenance activities, and the frequency at which they will be conducted.

Table 1
Routine Maintenance Activities for Biofiltration Basins

No.	Maintenance Task	Frequency of Task
1	Evaluate health of vegetation. Remove and replace all dead and diseased vegetation. Treat vegetation using preventative and low-toxic methods.	Twice a year
2	Maintain the vegetation and irrigation system. Prune and weed to keep flow-through basin neat and orderly in appearance.	As needed
4	Check that there is sufficient biotreatment soil media (depth as shown on plan). Check that soil is at the appropriate level to allow water to temporarily pond above soil surface (depth as shown on plan).	Before wet season and as necessary
5	Remove accumulated sediment, litter and debris from Biofiltration Basin and dispose of properly. Replenish mulch as needed.	Before wet season and as necessary
6	Inspect Biofiltration Basin to ensure that there are no clogs.	Monthly during the wet season, and as needed after storm events
7	Inspect downspouts from rooftops and sheet flow from paved areas to ensure flow to basin is unimpeded. Remove debris and repair damaged pipes. Check splash blocks or rocks and repair, replace and replenish as necessary.	Monthly during the wet season, and as needed after storm events
8	Inspect overflow pipe to ensure that it will safely convey excess flows to storm drain. Repair or replace any damaged or disconnected piping.	Before the wet season, and as necessary
9	Inspect Biofiltration Basin to ensure that it is structurally sound (no cracks or leaks). Repair as necessary.	Monthly during the wet season, and as needed after storm events
10	Inspect Biofiltration Basin using the attached inspection checklist.	Monthly, or after large storm events, and after removal of accumulated debris or material

[1] See Project Exhibit

II. Use of Pesticides

The use of pesticides and quick release fertilizers shall be minimized, and the principles of integrated pest management (IPM) followed:

1. Employ non-chemical controls (biological, physical and cultural controls) before using chemicals to treat a pest problem.
2. Prune plants properly and at the appropriate time of year.
3. Provide adequate irrigation for landscape plants. Do not over water.
4. Limit fertilizer use unless soil testing indicates a deficiency. Slow-release or organic fertilizer is preferable. Check with municipality for specific requirements.
5. Pest control should avoid harming non-target organisms, or negatively affecting air and water quality and public health. Apply chemical controls only when monitoring indicates that preventative and non-chemical methods are not keeping pests below acceptable levels. When pesticides are required, apply the least toxic and the least persistent pesticide that will provide adequate pest control. Do not apply pesticides on a prescheduled basis.
6. Sweep up spilled fertilizer and pesticides. Do not wash away or bury such spills.
7. Do not over apply pesticide. Spray only where the infestation exists. Follow the manufacturer's instructions for mixing and applying materials.
8. Only licensed, trained pesticide applicators shall apply pesticides.
9. Apply pesticides at the appropriate time to maximize their effectiveness and minimize the likelihood of discharging pesticides into runoff. With the exception of pre-emergent pesticides, avoid application if rain is expected.
10. Unwanted/unused pesticides shall be disposed as hazardous waste.

III. Vector Control

Standing water shall not remain in the treatment measures for more than four days, to prevent mosquito generation. Should any mosquito issues arise, contact San Diego County Vector Control. Mosquito larvicides shall be applied only when absolutely necessary, as indicated by the District, and then only by a licensed professional or contractor.

IV. Inspections

The attached Biofiltration Basin Inspection and Maintenance Checklist shall be used to conduct inspections monthly (or as needed), identify needed maintenance, and record maintenance that is conducted.

V. Access, Observation and Soil Media Replacement

The Basin can be accessed by the driveway to the telecommunication facility. There is a separate capped pipe to be used to drain ponding area should the drain or orifice clog. Otherwise the basin is typical in design. Soil media is to be assessed every five years for possible replacement. Soil not replaced at five years should be reassessed every year thereafter. Should soil need to be replaced it should be removed and replaced using hand tools or small excavators. A firm specializing in BMP construction/ maintenance shall be employed to maintain the basin.

Biofiltration Basin
Inspection and Maintenance Checklist

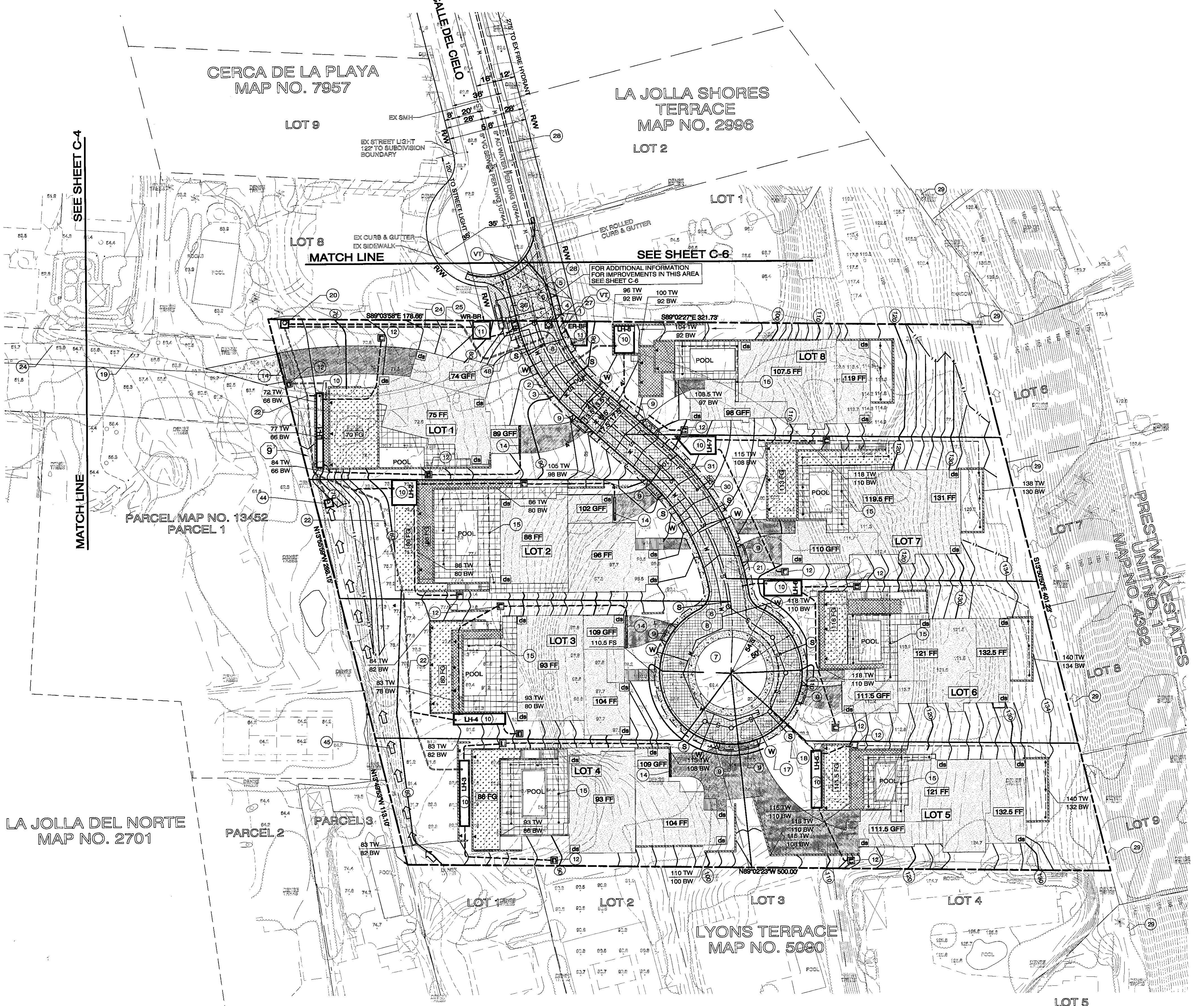
Property Address: Calle del Cielo ____________ BMP Owner: Lot Owners ____________

Treatment Measure No.: ____________ Date of Inspection: ____________ Type of Inspection: Monthly Pre-Wet Season After heavy runoff End of Wet Season

Inspector(s): ____________ Other: ____________

Defect	Conditions When Maintenance Is Needed	Maintenance Needed? (Y/N)	Comments (Describe maintenance completed and if needed maintenance was not conducted, note when it will be done)	Results Expected When Maintenance Is Performed
1. Vegetation	Vegetation is dead, diseased and/or overgrown.			Vegetation is healthy and attractive in appearance.
2. Soil	Soil too deep or too shallow.			Soil is at proper depth (per soil specifications) for optimum filtration and flow.
3. Mulch	Mulch is missing or patchy in appearance.			Mulch is even in appearance.
4. Sediment, Trash and Debris Accumulation	Sediment, trash and debris accumulated in the Biofiltration basin. Basin does not drain within 3-4 hours.			Sediment, trash and debris removed from Biofiltration Basin and disposed of properly. Basin drains within 24 hours.
5. Clogs/Drainage	Basin does not drain within 24 hours after rainfall.			Basin drains per design specifications.
6. Downspouts and Sheet Flow	Flow to basin is impeded. Downspouts are clogged or pipes are damaged. Splash blocks and rocks in need of repair, replacement or replenishment.			Downspouts and sheet flow is conveyed efficiently to the basin.
7. Overflow Pipe	Does not safely convey excess flows to storm drain. Piping damaged or disconnected.			Overflow pipe conveys excess flow to storm drain efficiently.
8. Structural Soundness	Basin is cracked, leaking or falling apart.			Cracks and leaks are repaired and basin is structurally sound.
9. Miscellaneous	Any condition not covered above that needs attention in order for the flow-through basin to function as designed.			Meet the design specifications.

TENTATIVE MAP NO. 1871908
COASTAL DEVELOPMENT PERMIT 1871905
SITE DEVELOPMENT PERMIT 187907
PLANNED DEVELOPMENT PERMIT



CONSTRUCTION NOTES

(1) PROPOSED CURB INLET WITHOUT STANDARD BOX TO ALLOW STREET RUNOFF TO BE COLLECTED AND CONVEYED TO BIOFILTRATION BASIN

(2) PROPOSED PRIVATE 6" TYPE "G" CURB AND GUTTER PER SDG-151 ONSITE (SEE SHEET C-6 FOR OFFSITE)

(3) PROPOSED PRIVATE 4" SIDEWALK PER SDG-155 (TYPICAL)

(4) PROPOSED PRIVATE 8" PVC SEWER TO JOIN EXISTING 8" VC SEWER AT NEW SEWER MANHOLE

(5) PROPOSED PRIVATE 6" PVC WATER TO JOIN EXISTING 8" AC WATER, REMOVE MAIN AND AIR VALVE BEYOND POC

(6) PROPOSED PRIVATE SEWER MHs PER SDS-107 (84.0 RIM / (77.42 IE)) AT ENTRANCE & (109.5 RIM / 103.0 IE) AT CUL-DE-SAC

(7) PROPOSED GRASS-CRETE OR EQUIVALENT PAVEMENT

(8) PROPOSED STAMPED CONCRETE PAVEMENT

(9) C/L PRIVATE MODIFIED DRIVEWAYS PER SDG-159

LOT	WIDTH
1	12'
2	12'
3	13'
4	13'
5	14'
6	14'
7	13'
8	12'

(10) PROPOSED BIOFILTRATION BASIN FOR INDIVIDUAL LOTS

(11) PROPOSED BIOFILTRATION BASIN FOR STREET RUNOFF (ALSO PORTIONS OF LOTS 5-8)

(11A) PROPOSED BIOFILTRATION BASIN FOR WESTERLY STREET RUNOFF

(12) PROPOSED 3636 CATCH BASIN ON LOTS TO COLLECT RUNOFF TO BE CONVEYED TO INDIVIDUAL LOT BIOFILTRATION BASINS

(13) REMOVE AND REPLACE EXISTING 22' DRIVEWAY PER SDG-159 AT LA JOLLA SHORE DRIVE

(14) PROPOSED 6' TRENCH DRAIN

(15) PROPOSED DECK DRAINS

(16) PROPOSED PLANTER DRAIN DISCHARGING THROUGH WALL

(17) PROPOSED PRIVATE 1" WATER SERVICE (TYPICAL)

(18) PROPOSED PRIVATE 4" SEWER LATERAL (TYPICAL)

(19) PRIVATE 8" PVC DRAIN FROM CATCH BASIN LOT 1 TYPE A-4 CLEANOUT (ITEM 25)

(20) TYPE A-4 CLEANOUT PER D-09 WITH TWO 7.5 HP PUMPS TO CONVEY RUNOFF TO TYPE A-4 CLEANOUT IN PRIVATE DRIVEWAY (ITEM 27)

(21) PROPOSED PRIVATE 12" PVC DRAIN TO COLLECT TREATED RUNOFF FROM LOTS 5-8 AND CONVEY IT TO TYPE A CLEANOUT (ITEM 27)

(22) PROPOSED PRIVATE 12" PVC DRAIN TO COLLECT TREATED RUNOFF FROM LOTS 1-4 AND CONVEY IT TO CLEANOUT IN LOT 1

(23) POROUS CONCRETE PAVEMENT TO JOIN AC DRIVEWAY IN 60' EASEMENT TO PERMEABLE PAVING DRIVEWAY ON LOT 1

(24) PROPOSED 8" PVC DRAIN TO CONVEY TREATED RUNOFF FROM BASIN WR-BR TO CLEANOUT (ITEM #20)

(25) TWO 4" PVC DRAINS FROM PUMPS IN CLEANOUT (ITEM #20) TO CLEANOUT (ITEM 27)

(26) 6" PRIVATE FIRE SERVICE BACKFLOW PREVENTER PER SDW-120

(27) PRIVATE TYPE "A" CLEANOUT TO COLLECT RUNOFF AND CONVEY IT IN 18" RCP DRAIN TO EX CURB INLET AT INTERSECTION OF CALLE DEL CIELO TO CALLE DE ORO

(28) PUBLIC 18" RCP DRAIN TO CONVEY RUNOFF FROM TYPE "A" CLEANOUT TO EX CURB INLET AT INTERSECTION OF CALLE DEL CIELO TO CALLE DE ORO (Q100 = 7.56 CFS)

(29) EXISTING DRAINAGE DITCH ON NEIGHBORING PROPERTIES PER DWG 7774-D

(30) PRIVATE FIRE HYDRANT PER SDW-104

(31) PRIVATE 6" PVC FIRE SERVICE

(44) PROPOSED TYPE "F" CATCH BASIN PER SDD-119

(45) PROPOSED CONCRETE DITCH PER SDD-106

(48) PROPOSED TYPE "B" CURB INLET PER SDD-116

(VT) VISIBILITY TRIANGLE AREA
NO OBSTRUCTION, INCLUDING LANDSCAPING OR SOLID WALLS IN THE VISIBILITY AREA SHALL EXCEED 3' IN HEIGHT

NOTES:

PRIVATE DRAINAGE EASEMENTS AND AGREEMENTS WILL BE REQUIRED IN LOTS 1-3 & 8

AN ENCROACHMENT MAINTENANCE AND REMOVAL AGREEMENT WILL BE REQUIRED FOR PRIVATE 6" PVC WATER MAIN IN CALLE DEL CIELO.

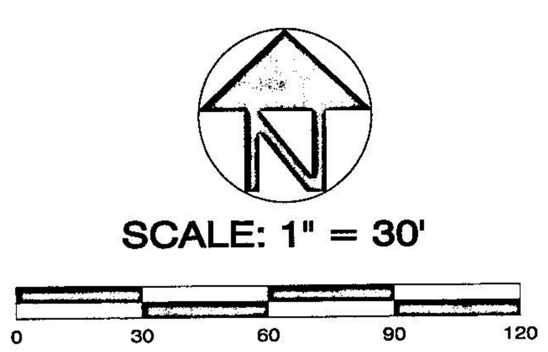
ALL UNUSED EXISTING WATER SERVICES ARE TO BE KILLED, INCLUDING EXISTING 2" WATER SERVICE IN 60' ROAD EASEMENT SUPPLYING CURRENT IMPROVEMENTS.

ALL PROPOSED ONSITE UTILITIES SHALL BE UNDERGROUND.

ALL GARAGE DOORS SHALL BE A MINIMUM OF 20' FROM BACK OF SIDEWALK (SEE SITE PLAN)

BACKUP GENERATOR SHALL BE PROVIDED TO SUPPLY PUMPS IN ITEM 20, IN THE EVENT OF LOSS OF POWER

PUBLIC STORM DRAIN AND PUBLIC WATER TO BE SEPARATED A MINIMUM OF 5', EDGE TO EDGE, IN CALLE DEL CIELO RIGHT OF WAY.



SCALE: 1" = 30'

GRADING DATA

AREA OF SITE - 4.453 AC
AREA OF SITE TO BE GRADED 4.188 SF
PERCENT OF SITE TO BE GRADED 94%
AREA OF SITE WITH SLOPES GREATER THEN 25% - 0.783 AC
PERCENT OF SITE WITH SLOPES GREATER THEN 25% - 17.6%

NO ENVIRONMENTALLY SENSITIVE LANDS EXIST ONSITE
NO PART OF SITE IS PREVIOUSLY UNDISTURBED PER BIOLOGICAL LETTER REPORT PREPARED BY KLUTZ BIOLOGICAL CONSULTING DATED JANUARY 17, 2017.

AMOUNT OF CUT - 4,600 C.Y.
AMOUNT OF FILL - 34,000 C.Y.
AMOUNT OF IMPORT - 29,400 C.Y.
MAXIMUM HEIGHT OF FILL SLOPE - 17 FEET
MAXIMUM DEPTH OF CUT - 10 FEET
RETAINING WALL: 10 FEET MAX, HT. 2100 FEET TOTAL LENGTH (OTHERS, PART OF RESIDENCES)

AUGUST 21, 2017
ANTONY K. CHRISTENSEN, RCE 54021
LS 7508
Date

REGISTERED PROFESSIONAL ENGINEER Antony K. Christensen No. 54021 Exp. 12-31-17 CIVIL STATE OF CALIFORNIA

LICENSED LAND SURVEYOR Antony K. Christensen Exp. 12-31-17 No. LS 7508 STATE OF CALIFORNIA

Prepared By:
CHRISTENSEN ENGINEERING & SURVEYING
7888 SILVERTON AVENUE, SUITE "J"
SAN DIEGO, CA 92126
PHONE (858)271-9901 FAX (858)271-8912

Project Address:
8280 CALLE DEL CIELO
LA JOLLA, CA 92037.

Project Name:
CIELO TENTATIVE MAP

Sheet Title:
PRELIMINARY GRADING PLAN

Revision 5:
Revision 4: 08-18-17 ADDRESS CITY COMMENTS
Revision 3: 08-02-17 REVISE FIRE SERVICE CONNECTION TO MAIN
Revision 2: 07-15-17 REVISE DESIGN ADDRESS CITY COMMENTS
Revision 1: 05-27-17 REVISE DESIGN ADDRESS CITY COMMENTS

Original Date: FEBRUARY 03, 2017

Sheet
DEP#
C-3

JN A2015-50

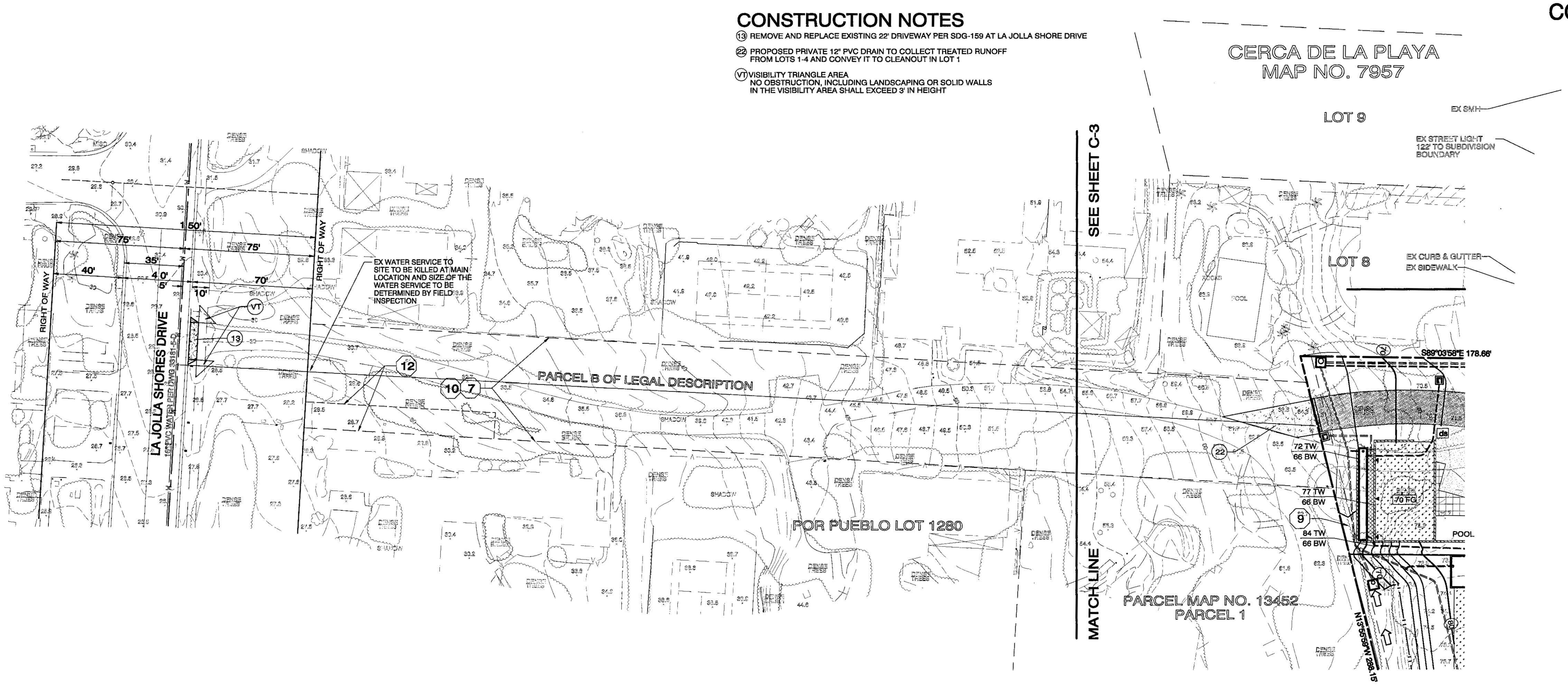
TENTATIVE MAP NO. 1871908
COAST AL DEVELOPMENT PERMIT 1871905
SITE DEVELOPMENT PERMIT 187907
PLANNED DEVELOPMENT PERMIT

CONSTRUCTION NOTES

(13) REMOVE AND REPLACE EXISTING 22' DRIVEWAY PER SDG-159 AT LA JOLLA SHORE DRIVE

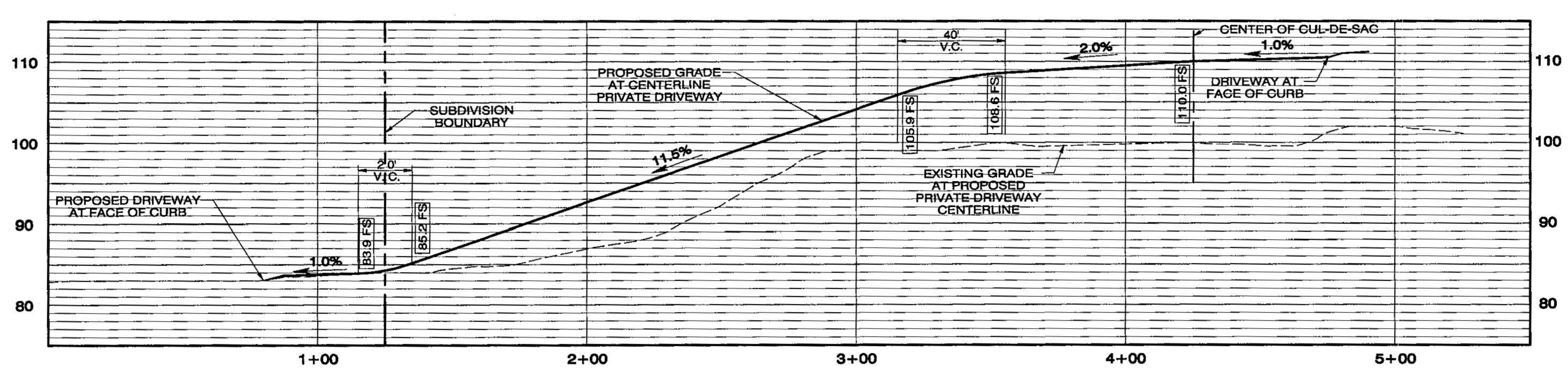
(22) PROPOSED PRIVATE 12" PVC DRAIN TO COLLECT TREATED RUNOFF FROM LOTS 1-4 AND CONVEY IT TO CLEANOUT IN LOT 1

(VT) VISIBILITY TRIANGLE AREA
NO OBSTRUCTION, INCLUDING LANDSCAPING OR SOLID WALLS IN THE VISIBILITY AREA SHALL EXCEED 3' IN HEIGHT

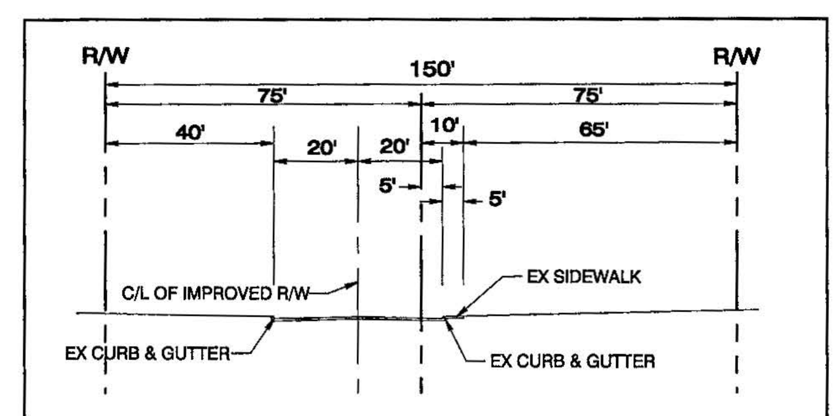


LEGEND

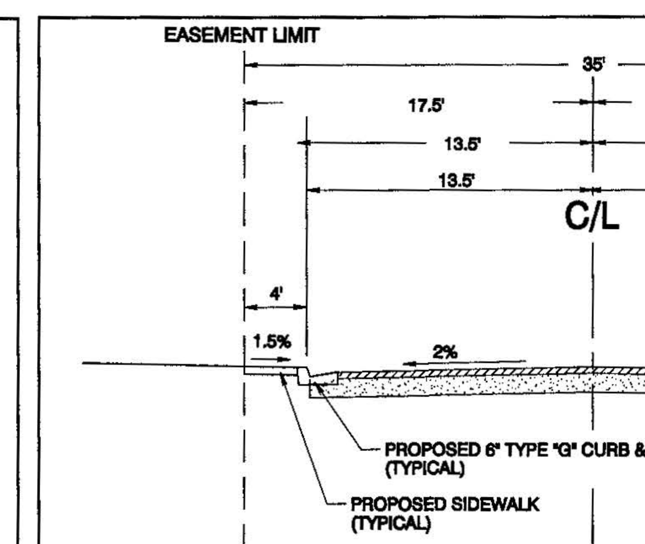
PROPERTY LINE/TM BNDRY	
EXISTING CONTOUR	
EXISTING ELECTRICAL LINE	E
EXISTING GAS LINE	G
EXISTING SEWER LINE	S
EXISTING TELEPHONE LINE	T
EXISTING WATER LINE	W
PROPOSED STREET EASEMENT	
EX FIRE HYDRANT	
PROPOSED SEWER MANHOLE SDS-107	
PROPOSED PVT 4" PVC SEWER LATERAL	S
PROPOSED 1" WATER SERVICE	W
PROPOSED CATCH BASIN FOR FLOW TO IMPs	
PROPOSED CATCH BASIN AS DRAIN JUNCITON	
PROPOSED AREA DRAIN	
PROPOSED PVC DRAIN	
PROPOSED PVC DRAIN FOR DECK AREA SURFACES	
PROPOSED CONCRETE SURFACE	
PROPOSED PAVER SURFACE	
PROPOSED HEADWALL PER D-30	
PROPOSED RIP RAP ENERGY DISSIPATER PER SDD-104	
PROPOSED CURB/GUTTER (ROLLED) & SIDEWALK PER G-4 & SDG-155	
PROPOSED CURB INLET TYPE B MODIFIED (THROAT ONLY)	
BIOFILTRATION BASIN	
18" RCP DRAIN	
TYPE "A" DRAIN CLEANOUT PER D-09	
PRIVATE RETAINING WALL	
VISIBILITY TRIANGLE (VT)	



PRIVATE DRIVEWAY AT CALLE DEL CIELO PROFILE
HORIZONTAL SCALE 1" = 30'
VERTICAL SCALE 1" = 10'



LA JOLLA SHORES DRIVE TYPICAL SECTION:
NOT TO SCALE



PRIVATE DRIVEWAY TYPICAL SECTION:
NOT TO SCALE

CIELO PARKING TABLE

	LOT AREA	FLOOR AREA	# OF BEDROOMS	MINIMUM PARKING SPACES REQUIRED PER (TABLE 142-05C)	PARKING SPACES PROVIDED
PROPOSED LOT 1:	24,431 SF	7,275 SF	3	2	6
PROPOSED LOT 2:	23,673 SF	7,450 SF	5	2	4
PROPOSED LOT 3:	25,500 SF	7,450 SF	5	2	4
PROPOSED LOT 4:	23,633 SF	7,450 SF	5	2	4
PROPOSED LOT 5:	23,659 SF	7,450 SF	4	2	5
PROPOSED LOT 6:	25,425 SF	7,450 SF	4	2	4
PROPOSED LOT 7:	23,991 SF	7,450 SF	4	2	4
PROPOSED LOT 8:	23,685 SF	7,450 SF	4	2	4

ALL LAND USES ARE SF (SINGLE FAMILY) PER LA JOLLA SHORES PDO

DMA/IMP AREA SUMMARY

LOT (DMA)	IMPERVIOUS AREA	PERMEABLE AREA	TOTAL AREA CONVEYED TO IMP	IMP NAME	IMP SURFACE AREA	SELF-MITIGATING AREA	POOL AREA	"C" VALUE
1	0.182 AC	0.143 AC	0.325 AC	LH-1	235 SF	0.135 AC	0.012 AC	0.55
2	0.232 AC	0.094 AC	0.326 AC	LH-2	290 SF	0.166 AC	0.012 AC	0.67
3	0.182 AC	0.101 AC	0.283 AC	LH-3	250 SF	0.044 AC	0.014 AC	0.61
4	0.199 AC	0.116 AC	0.315 AC	LH-4	275 SF	0.190 AC	0.011 AC	0.61
5	0.179 AC	0.155 AC	0.344 AC	LH-5	260 SF		0.010 AC	0.51
6	0.179 AC	0.188 AC	0.367 AC	LH-6	255 SF		0.010 AC	0.49
7	0.187 AC	0.172 AC	0.359 AC	LH-7	270 SF		0.010 AC	0.52
8	0.185 AC	0.210 AC	0.395 AC	LH-8	250 SF		0.010 AC	0.47
EAST ST	0.101 AC	0.102 AC 0.521 AC *	0.724 AC	ER-BR	200 SF	NONE	NONE	0.21
WEST ST	0.098 AC	0.111 AC	0.209 AC	WR-BR	132 SF	NONE	NONE	0.48
DE MINIMIS	76 SF	0	N/A					

* PERVIOUS AREAS OF LOTS 5-8 FLOWING TO IMP ER-BR

NOTE:

ALL SELF MITIGATING AREA SHALL COMPLY WITH SECTION 5.2.1 OF THE CITY OF SAN DIEGO STORM WATER MANUAL. LANDSCAPED AREA SHALL BE VEGETATED WITH NATVE OR NON-NATIVE/NON-INVASIVE DROUGHT TOLERATE SPECIES THAT DO NOT REQURE REGULAR APPLICATION OF FERTILIZERS AND PESTICIDES.

SOILS SHALL BE AMENDED AND AERATED TO PROMOTE WATER RETENTION CHARACTERISTICS EQUIVALENT TO UNDISTURBED NATIVE SOIL.

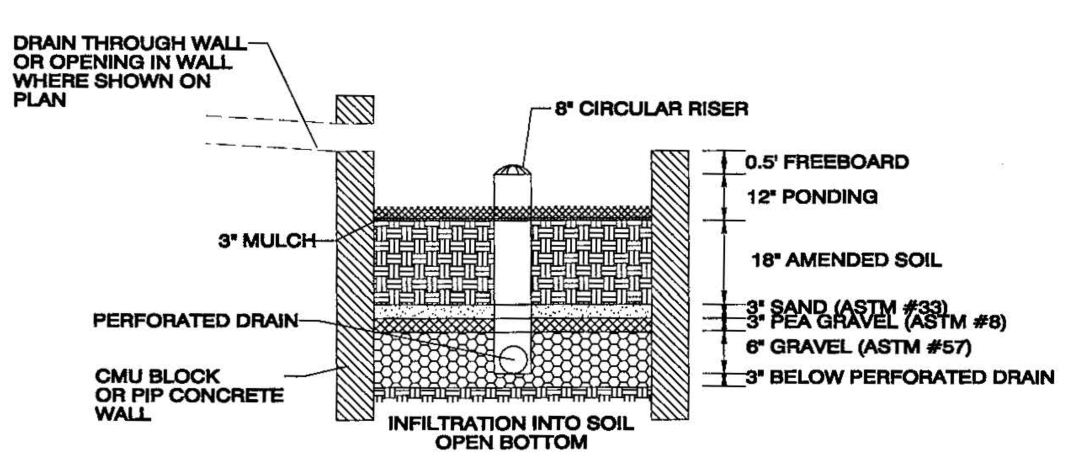
NO MORE THAT 5% OF SELF MIGITATING AREA SHALL BE INCIDENTALLY IMPERVIOUS

IMPERVIOUS AREA SHALL NOT BE HYDRAULICALLY CONNECTED TO OTHER IMPREVIOUS AREAS

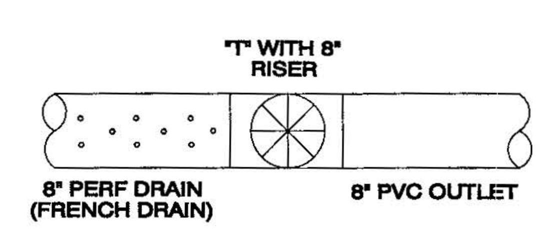
SELF-MITIGATING AREAS SHALL BE SEPARATE FROM DMAs PERMANENT STORM WATER POLLUTANT CONTROL BMPs.

SELF-MITIGATING AREAS IN LOTS 1-4 HAVE NO IMPERVIOUS AREA DRAINING TO THEM. RUNOFF FROM THESE AREAS ARE COLLECTED BY AREA DRAINS SEPARATE FROM THE TREATED RUNOFF AND CONVEYED OFFSITE OR FLOW BY SHEET FLOW, WITH NO CONCENTRATION OF RUNOFF.

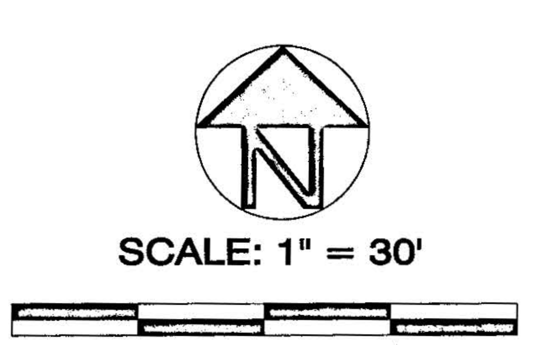
POOL AREAS SHALL HAVE ADEQUATE FREEBOARD AND OVERFLOW DEVICE TO PREVENT OVERFLOW TO THE MS4.



BIOFILTRATION BASIN DETAIL (PVT)
NOT TO SCALE



BASIN OUTLET DETAIL (PVT)
NOT TO SCALE



SCALE: 1" = 30'

AUGUST 21, 2017
ANTONY K. CHRISTENSEN, RCE 54021 Date
LS 7509

Prepared By:
CHRISTENSEN ENGINEERING & SURVEYING
7888 SILVERTON AVENUE, SUITE "J"
SAN DIEGO, CA 92126
PHONE (858)271-9901 FAX (858)271-8912

Project Address:
8280 CALLE DEL CIELO
LA JOLLA, CA 92037.

Project Name:
CIELO TENTATIVE MAP

Revision 5: 08-18-17 ADDRESS CITY COMMENTS
Revision 4: 08-02-17 WATER SERVICE TO BE KILLED ADDED TO PLAN
Revision 3: 07-15-17 REVISE DESIGN ADDRESS CITY COMMENTS
Revision 2: 05-27-17 REVISE DESIGN ADDRESS CITY COMMENTS
Revision 1: 04-20-17 ADD DRAIN DETAILS

Original Date: FEBRUARY 03, 2017

Sheet Title:
PRELIMINARY GRADING PLAN

Sheet
DEP#
C-4

JN A2015-50

ATTACHMENT 5
DRAINAGE REPORT

Attach project's drainage report. Refer to Drainage Design Manual to determine the reporting requirements.

Preliminary Drainage Study

Cielo Tentative Map

Parcels 1-3, PM No. 14620
8280 Calle del Cielo
La Jolla, California 92037

Prepared for:
Patricia Riha Gift Trust
8303 La Jolla Shores Drive
La Jolla, California 92037

Prepared by:
Christensen Engineering & Surveying
7888 Silverton Avenue, Suite "J"
San Diego, CA 92126
(858) 271-9901

February 05, 2017
Revised June 04, 2017
Revised July 15, 2017
Revised August 21, 2017

PTS No. 529620

Introduction

This project proposes the subdivision of existing parcels 1-3 of Parcel Map No. 14620 into 8 lots. This project involves the removal of the existing single-family residence followed by the proposed construction of 8 new single-family residences and appurtenances, including a private driveway, drainage, sewer and water facilities, landscaping and site walls.

The attached drainage area maps are from a topographic survey by Christensen Engineering & Surveying dated February 3, 2016. Prior to construction there exists offsite runoff to the site from the area northerly of the property. As shown on the pre-construction drainage area map, the offsite and onsite runoff flows to the area westerly, with the majority of the runoff flowing to the 60' road easement westerly of the site and then to La Jolla Shores Drive. A portion of the site runoff flows to the neighboring properties westerly of the site. The total pre-construction runoff flowing westerly is 7.49 cfs. Following construction there is a total increase in site runoff of 0.56 cfs (from 7.34 to 7.90 cfs). Following construction, the majority of the site runoff (7.56 cfs) will be conveyed to a cleanout in the private driveway and then convey by a 18" RCP drain to an existing curb inlet at the southeast corner of the intersection of Calle del Oro and Calle del Cielo. A portion of the site runoff (3.60 cfs) will be collected in a cleanout on Lot 1 and pumped to the cleanout in the private driveway. Total runoff to the west will decrease from 7.49 cfs to 0.48 cfs a decrease of 93.6%. The addition of 7.56 cfs of runoff to the public storm drain system in Calle del Oro will cause no adverse effect. The decrease in runoff to the west will improve the drainage condition experienced by the westerly neighbors as well as in La Jolla Shores Drive. The site has 0.650 ac of imperviousness and a proposed 1.782 ac area of imperiousness following development, a change from 14.6% to 40.0% area of imperviousness.

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 or the public storm drain system.

______________________________	08-21-17
Antony K. Christensen	Date
RCE 54021	
Exp. 12-31-17	
JN A2015-50	

Calculations

1. Intensity Calculation

(From the City of San Diego Drainage Design Manual, Page 86)
Tc = Time of concentration

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

Since the difference in elevation is 77' (142'-65') and the distance traveled is 678' (S=11.4%). C=0.55.

Tc = 11.4 minutes

From table on Page 83

I_{100} = 3.3 inches

2. Coefficient Determination

The site and the area offsite that will contribute to runoff is included in this study.
From Page 82

Pre-Construction:
Since the property is developed a weighted average for the area of imperviousness is used for the area of the site that is not improved (C=0.45) and the improved area (C=0.55) is used:

14.6 % of the site is impervious, 85.4% is permeable.

So 0.146 * 0.55 + 0.854 * 0.45 = 0.47

C= 0.50 (required minimum by City)

Post construction:
From Page 82 for Single Family

C = 0.55

3. *Volume calculations*

Q = CIA

Areas of Drainage

While the procedure used by the City of San Diego Drainage Design Manual indicates that areas of similar use should employ the same runoff coefficient using that method for this project would result in the same, pre- and post-construction total runoff. Therefore, the weighted average is used below.

Pre-Construction

Area offsite draining onsite and then westerly to the 60' road easement by surface flow	OS = 0.093 Acre
Northerly area of site draining westerly to 60' road easement by surface flow	A = 0.135 Acre
Main area of site draining westerly to 60' road easement by surface flow	B = 3.717 Acre
Southerly and westerly area of Draining westerly onto neighboring Properties by surface flow	C = 0.600 Acre

Post-Construction

Area draining from lots 5-8 biofiltration basins to 8" PVC drain in street and to the Type A cleanout in the private driveway and then in a 18" RCP drain to the existing curb inlet in Calle del Cielo.	PC-A = 1.491 Acre

Area draining from portion of Lots 5-8 and easterly street to the Type A cleanout in the private driveway and then in a 18" RCP drain to the existing curb inlet in Calle del Cielo.	PC-B = 0.687 Acre
Area of westerly street draining To westerly street biofiltration basin and then to the Type A cleanout in the private driveway and then in a 18" RCP drain to the existing curb inlet in Calle del Cielo. .	PC-C = 0.209 Acre
Area draining from lots 1-4 biofiltration basins to 8" PVC drain and then to the cleanout in lot 1	PC-D = 1.256 Acre
Area of lots 2-4 flowing westerly to drainage ditch and then to clean out in lot 1	PC-E1 = 0.519 Acre
Area of lots 2-4 flowing westerly by surface flow	PC-E2 = 0.040 Acre
Area of Lot 1 flowing westerly by surface flow to 60' easement	PC-F = 0.142 Acre

Pre-Construction

Q_{100OS} = (0.50) (3.3) (0.093)
Q_{100A} = (0.50) (3.3) (0.135)
Q_{100B} = (0.50) (3.3) (3.717)
Q_{100C} = (0.50) (3.3) (0.600)

Q_{1000S} = 0.15 cfs
Q_{100A} = 0.22 cfs
Q_{100B} = 6.13 cfs
Q_{100C} = 0.99 cfs

Post-Construction

Q_{100OS} = (0.50) (3.3) (0.093)
$Q_{100PC\text{-}A}$ = (0.55) (3.3) (1.491)
$Q_{100PC\text{-}B}$ = (0.55) (3.3) (0.687)
$Q_{100PC\text{-}C}$ = (0.55) (3.3) (0.209)
$Q_{100PC\text{-}D}$ = (0.55) (3.3) (1.256)
$Q_{100PC\text{-}E1}$ = (0.55) (3.3) (0.519)
$Q_{100PC\text{-}E2}$ = (0.55) (3.3) (0.040)
$Q_{100PC\text{-}F}$ = (0.55) (3.3) (0.142)

Q_{100OS} = 0.15 cfs
$Q_{100PC\text{-}A}$ = 2.71 cfs
$Q_{100PC\text{-}B}$ = 1.25 cfs
$Q_{100PC\text{-}C}$ = 0.38 cfs
$Q_{100PC\text{-}D}$ = 2.28 cfs
$Q_{100PC\text{-}E1}$ = 0.94 cfs
$Q_{100PC\text{-}E2}$ = 0.07 cfs
$Q_{100PC\text{-}F}$ = 0.26 cfs

4. Discussion

A portion of the site and offsite area (Areas OS, A & B), in its existing pre-construction condition, drains westerly to the 60' easement area (6.50 cfs) and another portion of the site (Area C) drains to the westerly neighbor properties (0.99 cfs). So, total runoff flowing westerly is 7.49 cfs) Following construction areas PC-A, B, C, D and E-1 (7.56 cfs) will be collected in a Type A cleanout and then conveyed in a new 18" RCP drain to the existing 15' curb inlet at the southeast corner of Calle del Cielo and Calle del Oro. From that curb inlet runoff flows to a second curb inlet at the northerly intersection of Calle del Cielo and Calle del Oro and then to a 30" concrete pipe at La Jolla Shores Drive and then by a 1.5' x 4' box culvert (under pressure) to its outlet. Area PC-C,D & E1 will be collected in a cleanout in lot 1 (3.60 cfs) and will be pumped to the Type A cleanout described above. The offsite run-on and runoff from area OS (0.15 cfs) and areas PC-E2 & F (0.41 cfs) continues to flow by surface runoff onto the 60' easement. The area flowing to the neighboring properties decreases (from 0.99 cfs to 0.33 cfs). Following construction, the total runoff from the site increases from 7.34 cfs to 7.90 cfs (offsite run-on does not change (0.15 cfs)). Runoff continues to flow westerly, as it does now but is decreased from 7.49 cfs to 0.48 cfs (Areas

PC-E2, F and OS), a decrease of 93.6%. The public drain system in Calle del Cielo and Calle del Oro and Camino del Oro was evaluated (see following sections) and the increase in runoff of 7.56 cfs will not have a deleterious effect on the public storm drain. The system is capable of conveying this small increase in runoff.

Public Storm Drain Impact Analysis

1. Intensity Calculation

(From the City of San Diego Drainage Design Manual, Page 86)
Tc = Time of concentration

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

Since the difference in elevation is 315' (352'-37') and the distance traveled is 4,070' (S=7.7%). C=0.55.

Tc = 32 minutes

From table on Page 83

I_{100} = 1.9 inches

2. Coefficient Determination

The area to be evaluated is single-family residential:

From Page 82 for Single Family

C = 0.55

3. Volume calculations

Q = CIA

Areas of Drainage

Area easterly of the existing curb inlet in at the northerly intersection of Calle del Cielo and Calle del Oro	OS-E = 30.8 Acres

Area westerly of the existing curb inlet in at the northerly intersection of Calle del Cielo and Calle del Oro that flows to the curb inlets at the intersection of Calle del Oro, Camino del Oro and La Jolla Shores Drive	OS-W = 20.0 Acres
Area easterly of the existing curb inlet in at the northerly intersection of Calle del Cielo and Calle del Oro that flows by a concrete ditch to a catch basin at this area's northerly extension to the existing curb inlet at the northerly intersection of Calle del Cielo and Calle del Oro.	OS-SE = 4.9 Acres
The area easterly of Calle del Cielo that flows onto Calle del Cielo and to the existing curb inlet at the southeast intersection of Calle del Cielo and Calle del Oro.	OS-C = 3.1 Acres

$Q_{100OS\text{-}E}$ = (0.55) (1.9) (30.8)
$Q_{100OS\text{-}W}$ = (0.55) (1.9) (20.0)
$Q_{100OS\text{-}SE}$ = (0.55) (1.9) (4.9)
$Q_{100OS\text{-}C}$ = (0.55) (1.9) (3.1)

$Q_{100OS\text{-}E}$ = 32.2 cfs
$Q_{100OS\text{-}W}$ = 20.9 cfs
$Q_{100OS\text{-}SE}$ = 5.1 cfs
$Q_{100OS\text{-}C}$ = 3.2 cfs

4. Discussion (Public Storm Drain)

Before construction areas OS-E, OS-SE and OS-C flow to or are conveyed to the existing curb inlet at the northerly intersection of Calle del Cielo and Calle del Oro. The total runoff to this curb inlet is 40.4 cfs. Runoff is conveyed from this curb inlet by a 24" RCP to join with a 30" CP at the intersection of Calle del Oro, Camino del Oro and La Jolla Shores Drive. That 24" drain is capable of conveying (n=0.013, S= 6.4%) 57.4 cfs see attached printout. The 30" drain receives runoff from the 24" drain and from area OS-W (20.9 cfs) for a total runoff conveyed of 61.3 cfs. The 30" drain is capable of conveying (n-0.013, S=3.76%) 79.7 cfs.

Since the 24" RCP is capable of conveying 57.4 cfs and currently conveys 40.4 cfs the addition of 7.56 cfs will have no adverse effect on the system.

Since the 30" RC is capable of conveying 79.7 cfs and currently conveys 61.3 cfs the addition of 7.56 cfs will have no adverse effect on the system.

The 1.5' x 4.0' box culvert flows under pressure from the sealed cleanout shown on drawing 10394-L and the addition of 7.56 cfs increases the hydraulic grade line in the cleanout in the 30" RCP portion of the drain by 1.10' and the hydraulic grade is 7.60' below the rim elevation. This additional runoff will have no adverse effect on the system.

Calculation Results Summary

==
Scenario: Base

\>>>> Info: Subsurface Network Rooted by: O-1
\>>>> Info: Subsurface Analysis iterations: 1
\>>>> Info: Convergence was achieved.

CALCULATION SUMMARY FOR SURFACE NETWORKS

Label	Inlet Type	Inlet	Total Intercepted Flow (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	Gutter Spread (ft)	Gutter Depth (ft)
I-1	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00

CALCULATION SUMMARY FOR SUBSURFACE NETWORK WITH ROOT: O-1

Label	Number of Sections	Section Size	Section Shape	Length (ft)	Total System Flow (cfs)	Average Velocity (ft/s)	Hydraulic Grade Upstream (ft)	Hydraulic Grade Downstream (ft)
P-3	1	Box 1.5 x 4	Box	227.50	61.30	10.22	4.30	0.22
P-2	1	Box 1.5 x 4	Box	172.00	61.30	10.22	7.08	4.00
P-1	1	30 inch	Circular	369.25	61.30	17.88	17.20	7.08

Label	Total System Flow (cfs)	Ground Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
O-1	61.30	2.00	-1.28	-1.28
J-2	61.30	4.00	4.00	4.00
J-1	61.30	5.85	7.08	7.08
I-1	61.30	25.90	17.20	17.20

==
Completed: 07/16/2017 08:49:31 AM

Calculation Results Summary

==
Scenario: Base

>>>> Info: Subsurface Network Rooted by: O-1
>>>> Info: Subsurface Analysis iterations: 1
>>>> Info: Convergence was achieved.

CALCULATION SUMMARY FOR SURFACE NETWORKS

Label	Inlet Type	Inlet	Total Intercepted Flow (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	Gutter Spread (ft)	Gutter Depth (ft)
I-1	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00

CALCULATION SUMMARY FOR SUBSURFACE NETWORK WITH ROOT: O-1

Label	Number of Sections	Section Size	Section Shape	Length (ft)	Total System Flow (cfs)	Average Velocity (ft/s)	Hydraulic Grade Upstream (ft)	Hydraulic Grade Downstream (ft)
P-3	1	Box 1.5 x 4	Box	227.50	68.86	11.48	5.37	0.22
P-2	1	Box 1.5 x 4	Box	172.00	68.86	11.48	7.89	4.00
P-1	1	30 inch	Circular	369.25	68.86	14.03	18.30	7.89

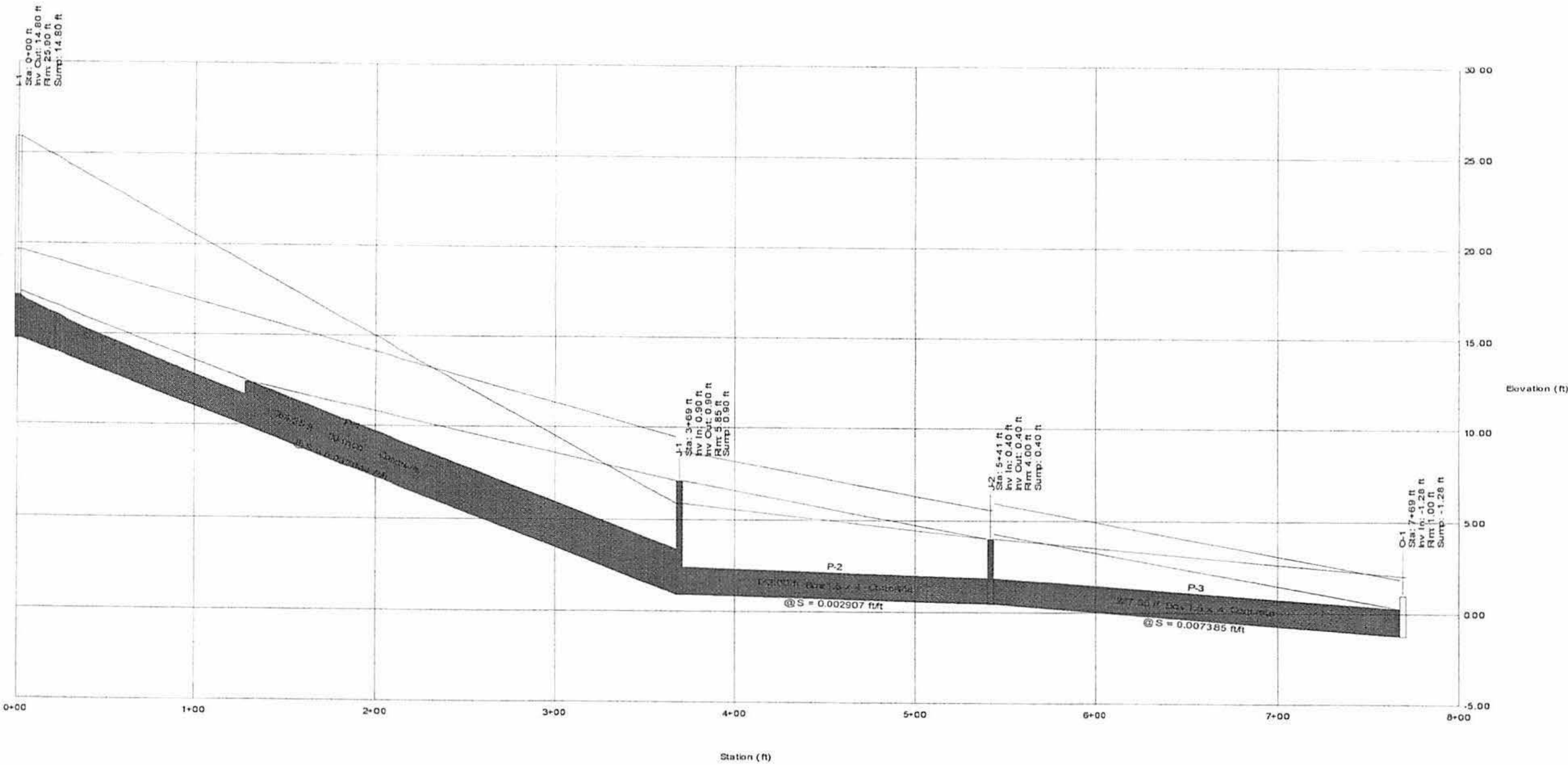
Label	Total System Flow (cfs)	Ground Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
O-1	68.86	2.00	-1.28	-1.28
J-2	68.86	4.00	4.00	4.00
J-1	68.86	5.85	7.89	7.89
I-1	68.86	25.90	18.30	18.30

==
Completed: 07/16/2017 08:40:12 AM

Profile
Scenario: Base

Profile: Profile - Before 7.56 cfs additional runoff

Scenario: Base



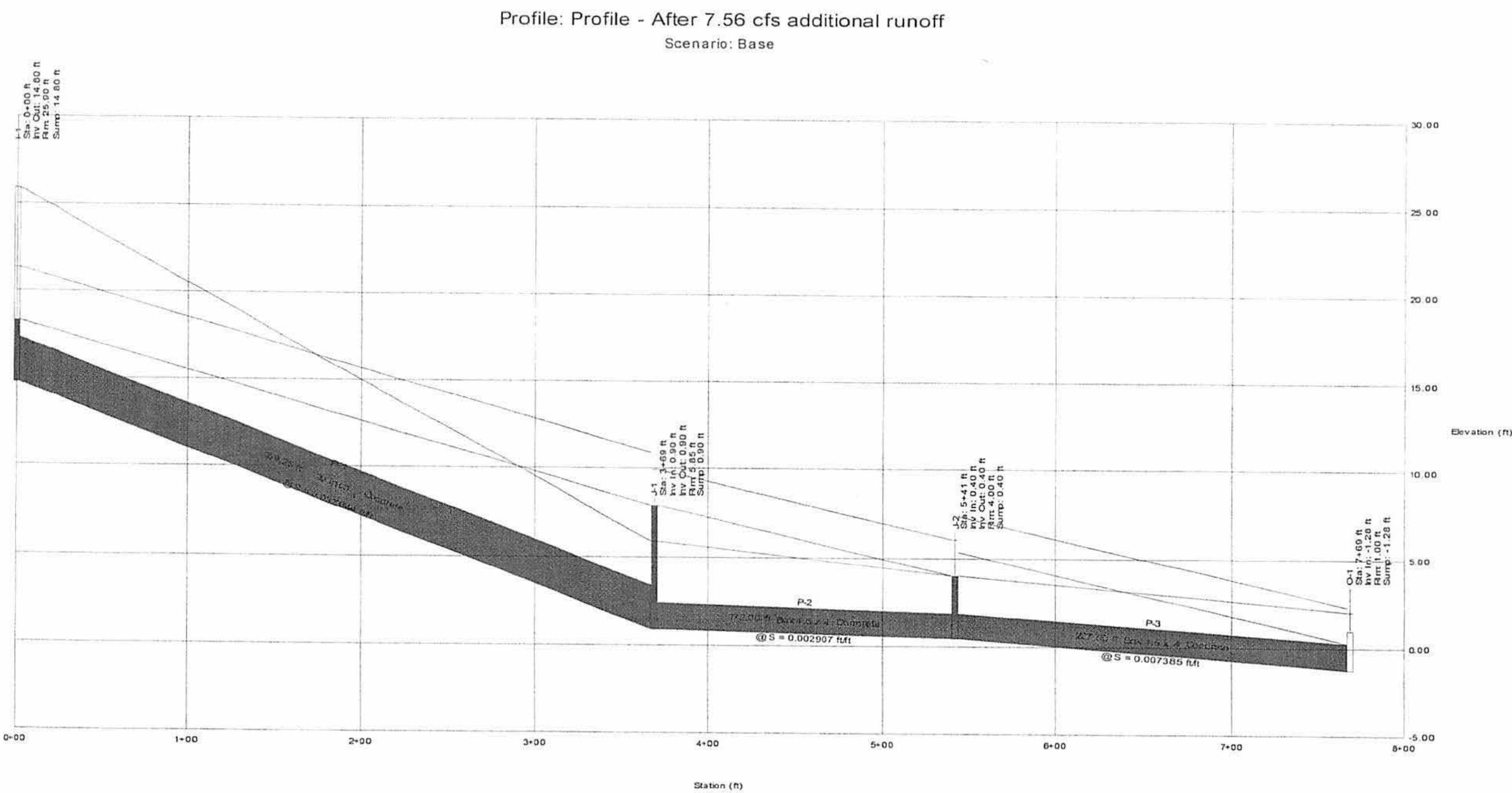
Title: Cielo
c:\program files\haestad\stmc\cielo07-15-17.stm
07/16/17 08:47:01 AM

Christensen Engineering & Surveying

© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Christensen
StormCAD v5.5 [5.5003]

Profile
Scenario: Base

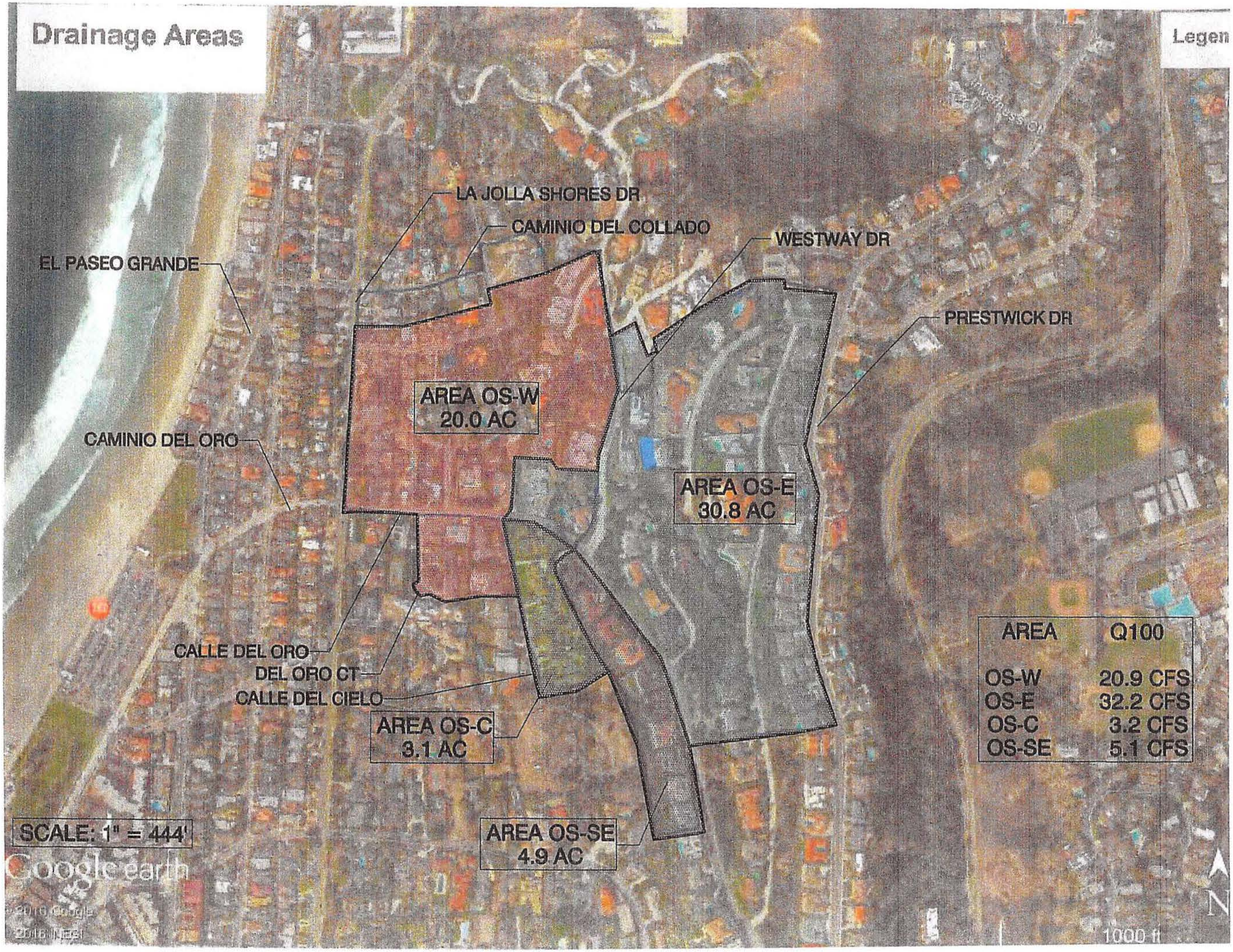


Title: Cielo
c:\program files\haestad\stmc\cielo07-15-17.stm
07/16/17 08:45:15 AM

Christensen Engineering & Surveying

© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: Christensen
StormCAD v5.5 [5.5003]


Drainage Areas
Legen
LA JOLLA SHORES DR
CAMINIO DEL COLLADO
WESTWAY DR
EL PASEO GRANDE
PRESTWICK DR
AREA OS-W
20.0 AC
CAMINIO DEL ORO
AREA OS-E
30.8 AC
CALLE DEL ORO
DEL ORO CT
CALLE DEL CIELO
AREA OS-C
3.1 AC
AREA OS-SE
4.9 AC
AREA Q100
OS-W 20.9 CFS
OS-E 32.2 CFS
OS-C 3.2 CFS
OS-SE 5.1 CFS
SCALE: 1" = 444'
Google earth
1000 ft
N

APPENDIX

TABLE 2

RUNOFF COEFFICIENTS (RATIONAL METHOD)

DEVELOPED AREAS (URBAN)

Land Use	Coefficient, C Soil Type (1)
Residential:	D
Single Family	.55
Multi-Units	.70
Mobile Homes	.65
Rural (lots greater than 1/2 acre)	.45
Commercial (2) 80% Impervious	.85
Industrial (2) 90% Impervious	.95

NOTES:

(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 no case shall the final coefficient be less than 0.50. For example: Consider commercial property on D soil.

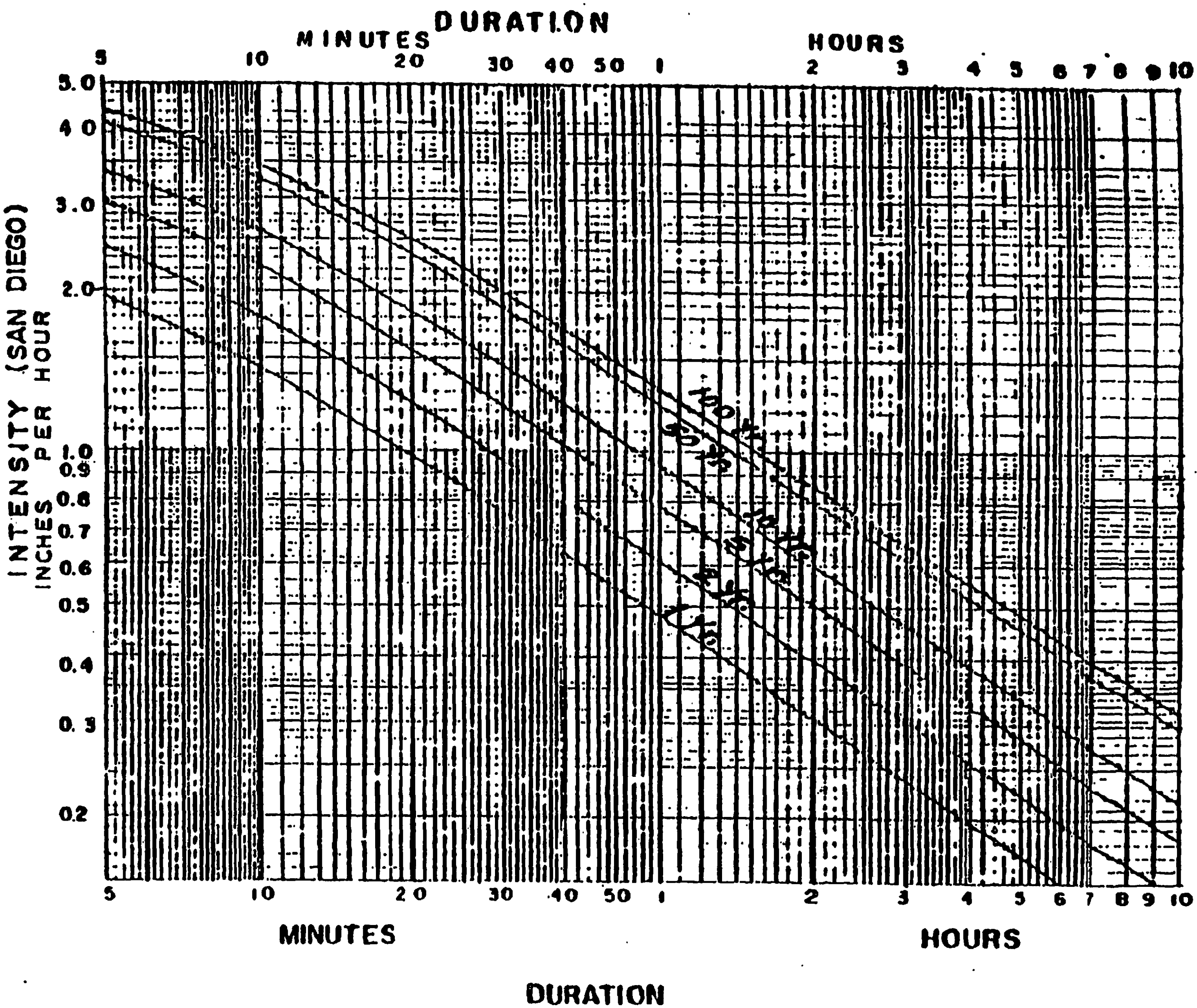
Actual imperviousness = 50%

Tabulated imperviousness = 80%

$$\text{Revised C} = \frac{50}{80} \times 0.85 = 0.53$$

ELEV.	FACTOR
0–1500	1.00
1500–3000	1.25
3000–4000	1.42
4000–5000	1.60
5000–6000	1.70
DESERT	1.25

To obtain correct intensity, multiply intensity on chart by factor for design elevation.

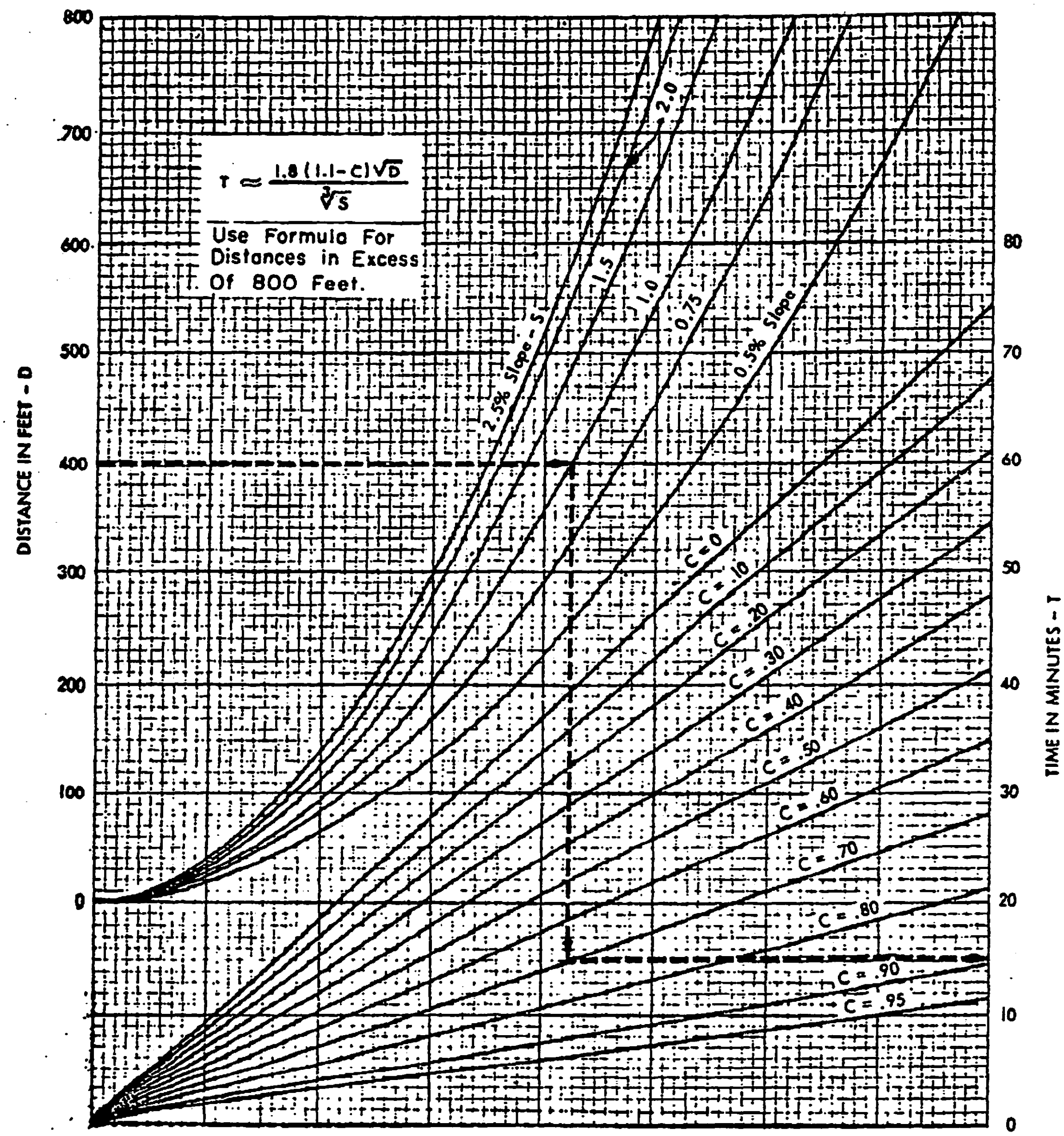


RAINFALL INTENSITY-DURATION-FREQUENC[Y]

CURVES for COUNTY OF SAN DIEGO

APPENDIX

URBAN AREAS OVERLAND TIME OF FLOW CURVES



Surface Flow Time Curves

EXAMPLE:

GIVEN: LENGTH OF FLOW = 400 FT.

SLOPE = 1.0 %

COEFFICIENT OF RUNOFF C = .70

READ: OVERLAND FLOWTIME = 15 MINUTES

DRAINAGE AREA MAPS

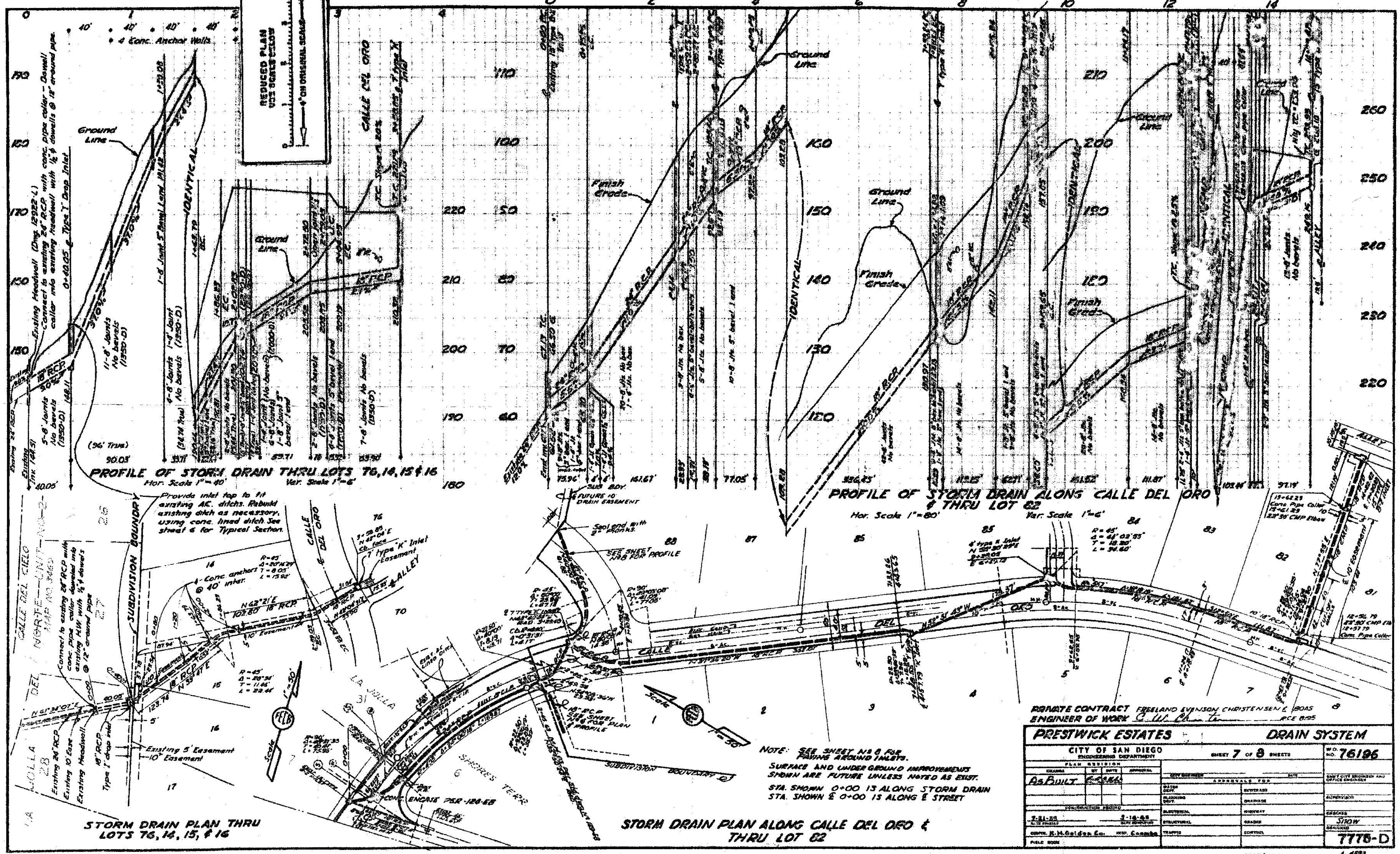
PRE-DEVELOPMENT DRAINAGE AREA MAP

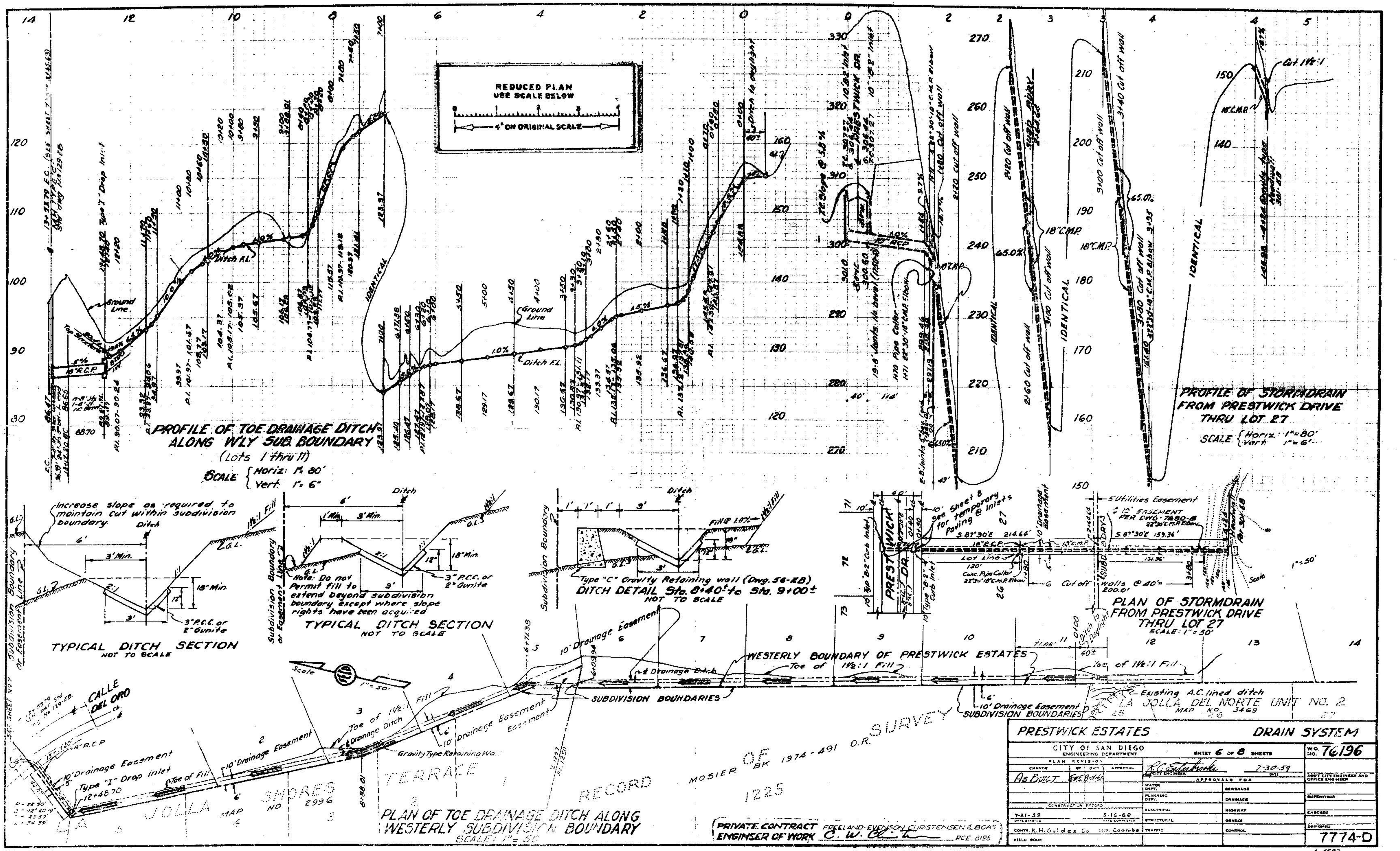
PRE-CONSTRUCTION DRAINAGE AREA MAP

POST-DEVELOPMENT DRAINAGE AREA MAP

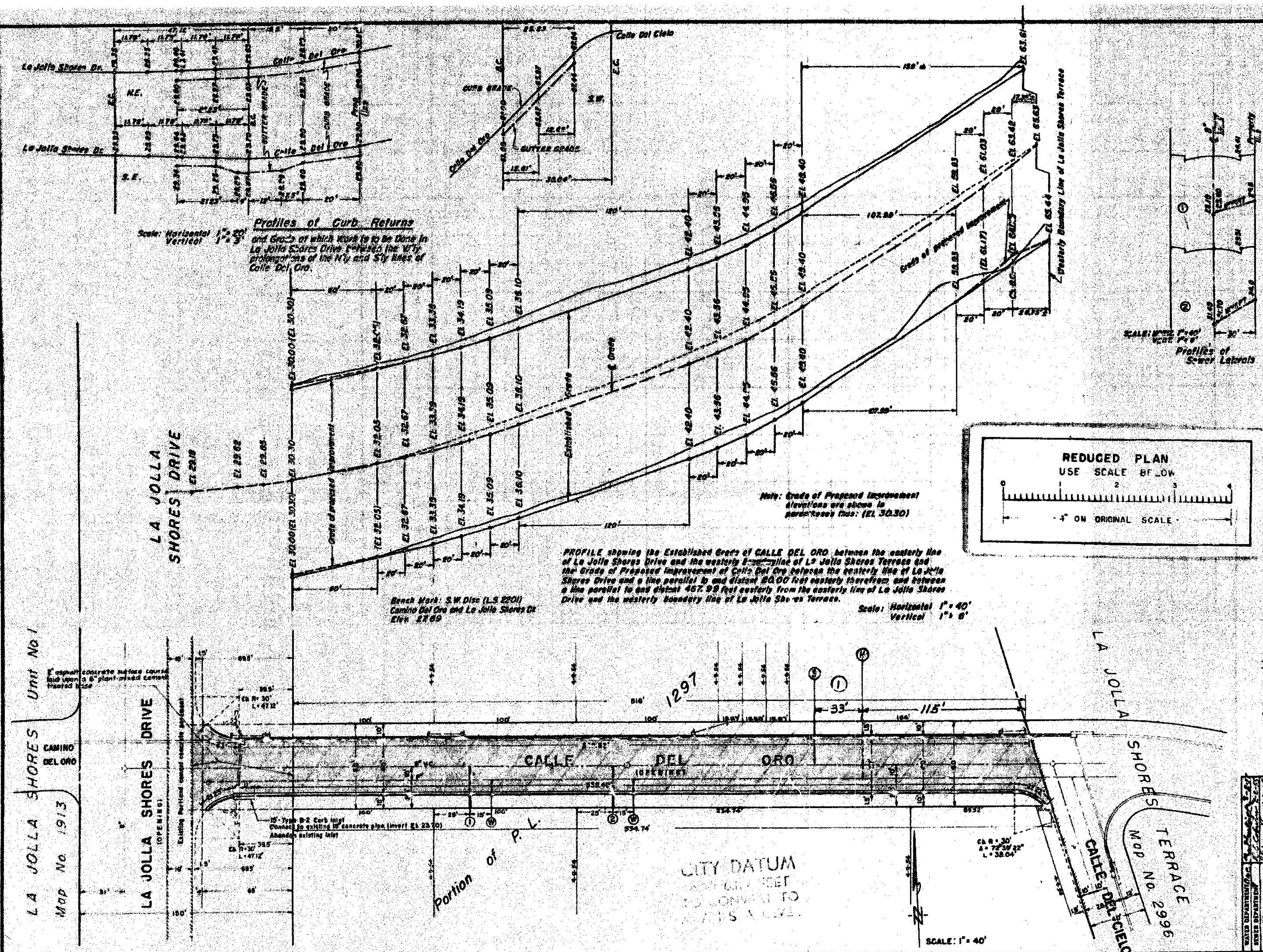
POST-CONSTRUCTION DRAINAGE AREA MAP

REFERENCE PLANS


PROFILE OF STORM DRAIN THRU LOTS 76, 14, 15 & 16
Hor. Scale 1" = 40'
Ver. Scale 1" = 6'
PROFILE OF STORM DRAIN ALONG CALLE DEL ORO & THRU LOT 82
Hor. Scale 1" = 80'
Ver. Scale 1" = 6'
REDUCED PLAN
USE SCALES BELOW
Ground Line
Finish Grade
IDENTICAL
4 Conc. Anchor Walls
Provide inlet top to fit existing AC. ditchs. Rebuild existing ditch as necessary, using conc. lined ditch. See sheet 6 for Typical Section.
SUBDIVISION BOUNDRY
CALLE DEL ORO
STORM DRAIN PLAN THRU LOTS 76, 14, 15, & 16
STORM DRAIN PLAN ALONG CALLE DEL ORO & THRU LOT 82
NOTE: SEE SHEET N 6 FOR PAVING AROUND INLETS.
SURFACE AND UNDERGROUND IMPROVEMENTS SHOWN ARE FUTURE UNLESS NOTED AS EXIST.
STA. SHOWN 0+00 IS ALONG STORM DRAIN
STA. SHOWN ℄ 0+00 IS ALONG E STREET
SEE SHEET N8 FOR PROFILE
PRIVATE CONTRACT FREELAND EVENSON CHRISTENSEN E BOAS
ENGINEER OF WORK
RCE 8195
PRESTWICK ESTATES
DRAIN SYSTEM
CITY OF SAN DIEGO
ENGINEERING DEPARTMENT
SHEET 7 OF 8 SHEETS
W.O. NO. 76196
AS BUILT
CONSTRUCTION RECORD
CONTR. K.H. Golden Co.
SNOW
7778-D
A-4583
MICROFILMED



MICROFILMED



WORK TO BE DONE

The improvement consists of the following work to be done according to these plans and the specifications hereto attached:

The grading of the portions of the streets shown hatched thus:

The preparation of subgrade and paving of the portions of the streets shown shaded thus:

The construction of Type G curb as shown thus:

The construction of curb inlet as shown thus:

The construction of 4" vitrified clay pipe sewer laterals as shown thus: ①

The construction of ¾" copper water services as shown thus: Ⓦ

Legend-Existing Work

Sewer main 8" V.C.	Edge of pavement
Water main 8"	Curb inlet
Storm drain	Roll type curb
Cleanout □	Pole
Manhole ○	Deadman

Standard Drawings

9-S-B (11-1-54) — 304-S-B (7-7-54)

122-S-B (11-23-54) — 200-S-B (9-15-54)

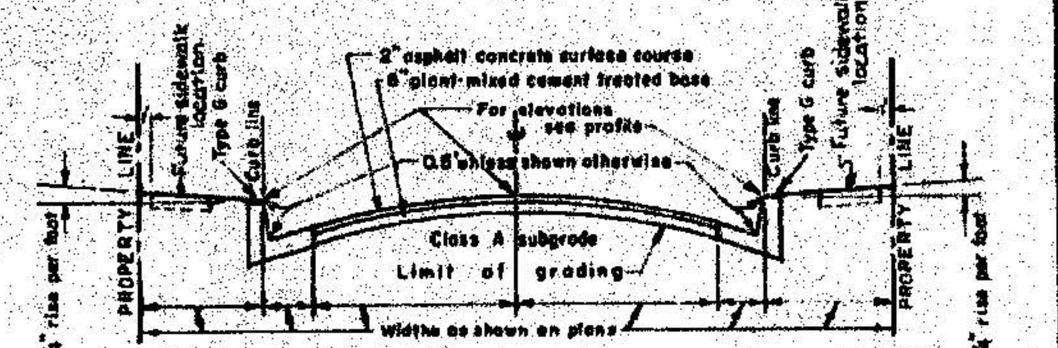
Specifications

Standard Specifications filed July 7, 1954

Legend

Property divisions by deed

Curb and sidewalk lines



TYPICAL CROSS SECTION

Plat No. 2697

CITY OF SAN DIEGO
ENGINEERING DEPARTMENT

Plans for the improvement of CALLE DEL ORO between the easterly line of La Jolla Shores Drive and the westerly boundary line of La Jolla Shores Terrace, and LA JOLLA SHORES DRIVE between the westerly prolongations of the northerly and southerly lines of Calle Del Oro.

Water Department / Sewer Department / Drainage / Field Check / Office Check / Planning Commission / Grades / Supervisor

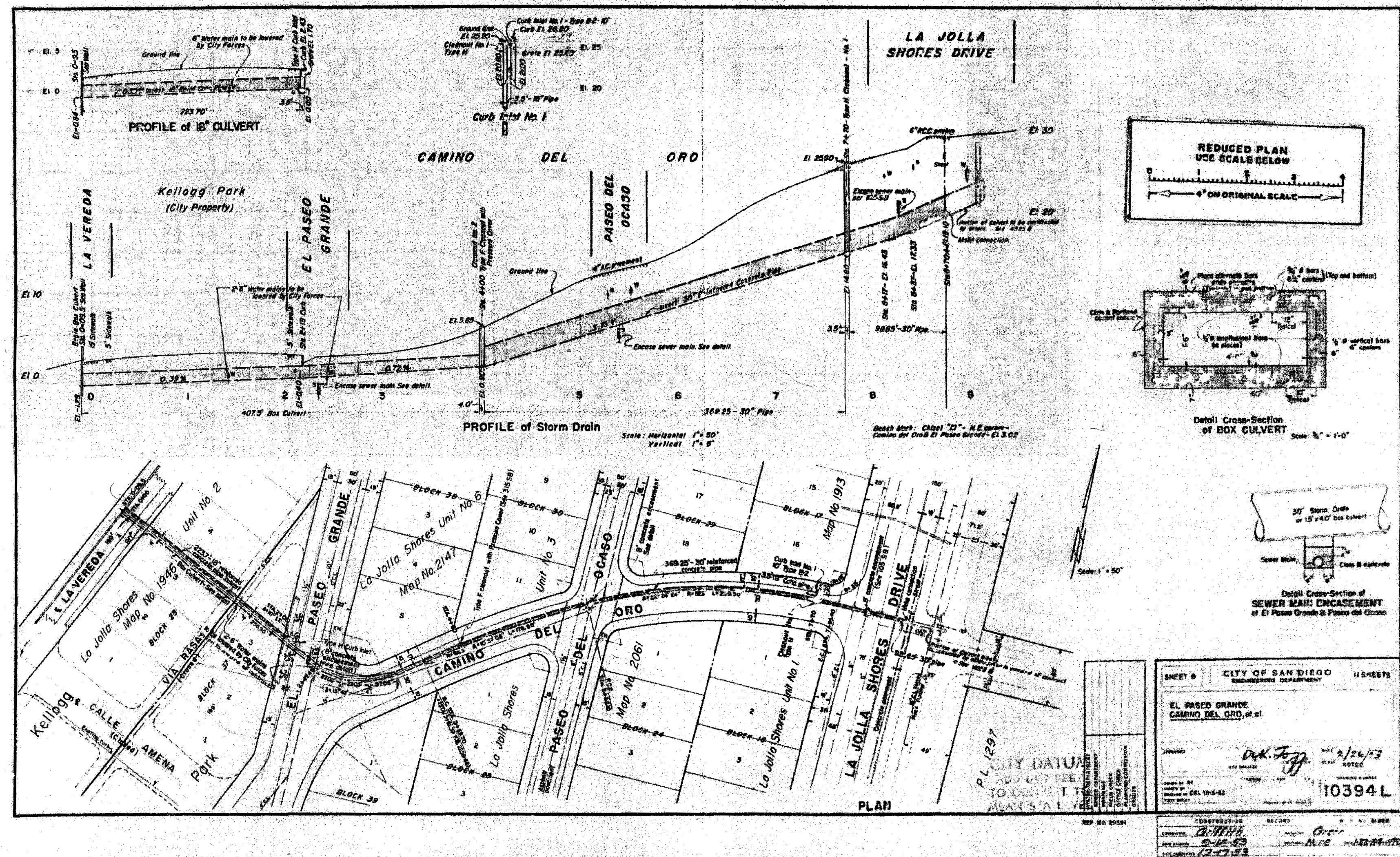
Approved: A K Fogg, City Engineer — Date 2/4/55 — Scale Noted

Drawn by Hilmington 1-7-55 — Checked by V.S.W. 1-27-55 — Field Books 2346-8

MICROFILMED JUN 27 1958

Drawing Number 11944L

CONSTRUCTION RECORD		W. O. No. 32424
Contractor: Griffith	Inspector: Boyd	
Date Started: 8-17-55	Revisions: ①	Date 12-5-55
Date Completed: 11-4-55		


PROFILE of 18" CULVERT
Curb Inlet No. 1
CAMINO DEL ORO
LA JOLLA SHORES DRIVE
Kellogg Park
(City Property)
LA VEREDA
EL PASEO GRANDE
PASEO DEL OCASO
Ground line
Excess sewer main. See detail.
407.5' Box Culvert
369.25 - 30" Pipe
98.85'-30" Pipe
PROFILE of Storm Drain
Scale: Horizontal 1" = 50'
Vertical 1" = 5'
REDUCED PLAN
USE SCALE BELOW
4" ON ORIGINAL SCALE
Detail Cross-Section of BOX CULVERT
Detail Cross-Section of SEWER MAIN ENCASEMENT
of El Paseo Grande & Paseo del Ocaso
La Jolla Shores Unit No. 6
Map No. 2147
Lo Jolla Shores Map No. 1946
Unit No. 2
Unit No. 3
Map No. 2061
Lo Jolla Shores Unit No. 1
Map No. 1913
CALLE AMENA
VIA RASANTE
Kellogg Park
PLAN
CITY OF SAN DIEGO
ENGINEERING DEPARTMENT
EL PASEO GRANDE
CAMINO DEL ORO, et al.
2/26/53
10394 L
CITY DATUM

ATTACHMENT 6
GEOTECHNICAL AND GROUNDWATER INVESTIGATION REPORT

Attach project's geotechnical and groundwater investigation report. Refer to Appendix C.4 to determine the reporting requirements

CHRISTIAN WHEELER
ENGINEERING

August 24, 2017

James and Tricia Riha
c/o Beacham Construction
405 Via Del Norte
La Jolla, California 92037

Report 2160564.03

Subject: **Report of Geotechnical Infiltration Feasibility Study**
Proposed Residential Subdivision, 8303 La Jolla Shores Drive, La Jolla, California

References: 1) Christian Wheeler Engineering, Report 2160564.01, Geologic Reconnaissance, 8303 La Jolla Shores Drive, dated January 9, 2017
2) Christensen Engineering & Surveying, Preliminary Grading Plan, 8303 La Jolla Shores Drive, dated February 3, 2017

Dear Mr. and Mrs. Riha:

In accordance with your request and our proposal dated April 28, 2017, we have prepared this report to present the results of our geotechnical infiltration feasibility study during the discretionary phase of the project. In general, the purpose of our investigation was to provide design infiltration rates based on percolation rates measured in the field. We understand that the subject site will be developed into an eight unit residential subdivision. We also understand that each lot will be designed to include a dedicated storm water basin, and two additional basins will be constructed to accommodate storm water runoff originating from the paved areas of the subdivision.

FINDINGS

SITE DESCRIPTION: The subject site is comprised of three adjacent residential lots identified as Assessor's Parcel Numbers 346-250-08 through -10. The lot is located adjacent to and east of Calle Frescota and south of Calle del Cielo in the La Jolla Shores area of San Diego, California. The site currently supports a single-story, single-family residence with a garage, storage structures and other normally associated improvements. Topographically, the site ascends gently from west to east with an approximately 50-foot-high slope along the eastern margin of the site.

FIELD INVESTIGATION: Our subsurface exploration of the site consisted of nine small-diameter, geotechnical borings that were advanced using a truck-mounted drill rig between May 11 and May 12, 2017. The borings were advanced to the depths ranging from 11½ feet to 19½ feet below existing grades. Eleven percolation test borings were also advanced with a truck-mounted drill rig on May 12, 2017, and were located in areas identified by the project civil engineer as potential storm water infiltration zones. The percolation test borings were advanced to depths ranging from 5 to 11 feet below existing grades. The approximate locations of the borings and percolation test borings are shown on Plate No. 1 of this report. Logs of the explorations are presented in Appendix A of this report. The borings were logged in detail with emphasis on describing the soil profile. No evidence of soil contamination was detected within the samples obtained.

GEOLOGIC SETTING AND SOIL DESCRIPTION: Based upon the findings of our subsurface explorations, it was determined that the proposed storm water basin locations are underlain by old paralic deposits, primarily consisting of sandy clays (CL) with lesser amounts of interbedded clayey sand lenses (SC).

INFILTRATION RATE DETERMINATION

FIELD MEASUREMENTS: Percolation testing was performed on May 15, 2017 in the eleven percolation test borings that were drilled at the locations of the proposed storm water basins, as directed by the project Civil Engineer. The seven-inch-diameter borings, designated as PT-1 through PT-11, were drilled to depths of 5 to 11 feet below existing grade, and cleaned of loose soils. The borings were drilled to the approximate bottom of the proposed storm water basins. Three-inch diameter perforated pipes were set in the holes and the pipes were surrounded by ¾-inch gravel to prevent caving. After pipe installation, the test holes were presoaked.

The field percolation rates were determined the following Monday (two days after pre-soaking) by using the falling head test method. It should be noted that the water placed within the percolation test borings on the day the subsurface exploration was conducted did not fully infiltrate by the time of the start of percolation testing. The initial water level was established by refilling the test holes to near the tops of the proposed storm water basins. Percolation rates were monitored and recorded every 30 minutes over a period of 6 hours until the infiltration rates stabilized. Measurements were taken using a water level meter (Solinst, Model 101) with an accuracy measured to 0.005 foot increments (0.06 inch increments). To account for the use of gravel placed around the perforated pipe, an adjustment factor of 0.47 was used in the calculation of the percolation and

infiltration rates. The measured gravel adjusted percolation and calculated infiltration rates are presented in Table I.

TABLE I: PERCOLATION AND INFILTRATION RATES

Test No.	Location	Soil Underlying BMP	Depth of Testing	Gravel Adjusted Percolation Rate	Infiltration Rate
PT-1	West Side of Lot 5	Old Paralic Deposits	5 feet	0.24 inches per hour	0.00 inches per hour
PT-2	NW Corner of Lot 6	Old Paralic Deposits	5 feet	0.96 inches per hour	0.04 inches per hour
PT-3	NW Corner of Lot 7	Old Paralic Deposits	5 feet	0.24 inches per hour	0.01 inches per hour
PT-4	NW Corner of Lot 8	Old Paralic Deposits	5 feet	0.24 inches per hour	0.01 inches per hour
PT-5	NW Corner of Lot 8	Old Paralic Deposits	5 feet	0.24 inches per hour	0.01 inches per hour
PT-6	NE Corner of Lot 1	Old Paralic Deposits	5 feet	0.24 inches per hour	0.01 inches per hour
PT-7	NW Corner of Lot 2	Old Paralic Deposits	5 feet	0.24 inches per hour	0.01 inches per hour
PT-8	West Side of Lot 1	Old Paralic Deposits	5 feet	0.24 inches per hour	0.01 inches per hour
PT-9	NW Corner of Lot 3	Old Paralic Deposits	10 feet	0.48 inches per hour	0.01 inches per hour
PT-10	SW Corner of Lot 3	Old Paralic Deposits	10 feet	0.48 inches per hour	0.02 inches per hour
PT-11	West Side of Lot 4	Old Paralic Deposits	10.9 feet	1.44 inches per hour	0.03 inches per hour

Infiltration and percolation are two related but different processes describing the movement of moisture through soil. Infiltration is the downward entry of water into the soil or rock surface and percolation is the flow (lateral and vertical) of water through soil and porous or fractured rock. The direct measurement yielded by a percolation test tends to overestimate the infiltration rate, except in cases where a storm water basin or a

dry well is similarly dimensioned to the borehole. As such, the measured percolation rates were converted into infiltration rates using the Porchet Method. The spreadsheet used for the conversion is included in Appendix C of this report.

The average infiltration rate for the natural soils at a depth of 5 feet below existing grades at locations PT-1 through PT-9 and at depths of 10 and 11 feet below existing grade at locations PT-10 and PT-11 was approximately 0.01 inches per hour.

FACTOR OF SAFETY: The City of San Diego Storm Water Standards Design Manual states that "a maximum factor of safety of 2.0 is recommended for infiltration feasibility screening such that an artificially high factor of safety cannot be used to inappropriately rule out infiltration, unless justified. If the site passes the feasibility analysis at a factor of safety of 2.0, then infiltration must be investigated, but a higher factor of safety may be selected at the discretion of the design engineer. Using a FOS of 2.0, an infiltration rate of 0.005 inches per hour can be used for the feasibility analysis for the proposed storm water basins.

The infiltration rate calculated based on the results of the percolation testing is not considered an appreciable rate of infiltration, which indicates a No Infiltration Condition as an appropriate characterization for the project site. Also, based on our professional opinion and the findings of the site investigation, the soil infiltration properties across the areas of the site available for the storm water infiltration are likely to be uniform.

GEOTECHNICAL CRITERIA FOR STORM WATER BASINS

GENERAL: Based on the current Storm Water Standards, BMP Design Manual, certain geotechnical criteria need to be addressed when assessing the feasibility and desirability of the use of storm water basins for a project site. Those criteria, Per Section C.2 of the manual, are addressed below.

C2.1 SOIL AND GEOLOGIC CONDITIONS: Site soil and geologic conditions influence the rate at ~~which water can physically enter the soils. Based on the conditions observed in our exploratory borings,~~ the site is underlain by artificial fill and old paralic deposits. As observed within our borings, the artificial fill consisted of clayey sand/sandy clay (SC/CL) and the old paralic deposits consisted of sandy clay and clayey sand (CL/SC). Groundwater was not encountered within our subsurface investigation.

C2.2 SETTLEMENT AND VOLUME CHANGE: Settlement and volume change can occur when water is introduced below grade. Based upon the soil conditions observed in our borings the artificial fill is subject to a higher potential for hydro collapse upon wetting, while the potential for hydro-collapse within the underlying old paralic deposits is considered to be relatively low. This can be mitigated by a combination of remedial grading and incorporating impermeable liners or cut-off walls. The artificial fill is comprised of clayey sand/sandy clay (SC/CL) which we believe to have a low to moderate expansive potential. There is a potential for heaving within the fill when water is introduced.

C2.3 SLOPE STABILITY: Infiltration of water has the potential to increase the risk of failure to nearby slopes. However, the underlying old paralic deposits are not expected to be prone to slope stability issues provided sound engineering recommendations and construction practices are followed.

C2.4 UTILITY CONSIDERATIONS: Utilities are either public or private infrastructure components that include underground pipelines, vaults, and wires/conduit, and above ground wiring and associated structures. Infiltration of water can pose a risk to subsurface utilities, or geotechnical hazards can occur within the utility trenches when water is introduced. However, based on the infeasibility of infiltration within the approximate boundaries of the site, no further utility considerations in relation to storm water infiltration can be advised at this time.

C2.5 GROUNDWATER MOUNDING: Groundwater mounding occurs when infiltrated water creates a rise in the groundwater table beneath the facility. Groundwater mounding can affect nearby subterranean structures and utilities. Based on the anticipated depth to groundwater, the potential for groundwater mounding is low.

C2.6 RETAINING WALL AND FOUNDATIONS: Infiltration of water can result in potential increases in lateral pressures and potential reduction in soil strength. Retaining walls and foundations can be negatively impacted by these changes in soil conditions. This should be taken into account when designing the storm water basins, retaining walls and foundations for the site. Based on the currently existing project site conditions and the No Infiltration Condition characterization, no negative impacts associated with storm water infiltration are anticipated to effect proposed retaining walls and foundations.

CONCLUSIONS AND RECOMMENDATIONS

Field infiltration rates within the soils below the proposed storm water basins were very low. Using a factor of safety of 2.0, infiltration rates of 0.005 inches per hour can be used. The infiltration rate of 0.005 inches per hour is not considered an appreciable rate of infiltration, which indicates a No Infiltration Condition existing at the project site. Based on our professional opinion and the findings of the site investigation, the soil infiltration properties across the areas of the site available for the storm water infiltration are likely to be uniform, and as such on-site storm water infiltration should not be considered under the currently existing site conditions.

It is our professional opinion and judgment that our recommendation that infiltration facilities not be used to manage storm water discharge is consistent and in accordance with Appendices C and D of the Model BMP Design Manual San Diego Region (2015). Worksheet C.4-1: Categorization of Infiltration Feasibility Criteria has been completed and signed for the subject project, and is included in Appendix B of this report.

It should be noted that it is not our intent to review the civil engineering plans, notes, details, or calculations, when prepared, to verify that the engineer has complied with any particular storm water design standards. It is the responsibility of the designer to properly prepare the storm water plan based on the municipal requirements considering the planned site development and infiltration rates.

LIMITATIONS

The recommendations and opinions expressed in this report reflect our best estimate of the project requirements based on our limited percolation testing, an evaluation of the subsurface soil conditions encountered at our subsurface exploration locations and the assumption that the infiltration rates and soil conditions do not deviate appreciably from those encountered. It should be recognized that the performance of the infiltration basins 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 soils engineer so that they may make modifications if necessary. In addition, this office should be advised of any changes in the project scope, proposed site grading or storm water basins design so that it may be determined if the recommendations contained herein are appropriate. This should be verified in writing or modified by a written addendum.

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

Respectfully submitted,

CHRISTIAN WHEELER ENGINEERING

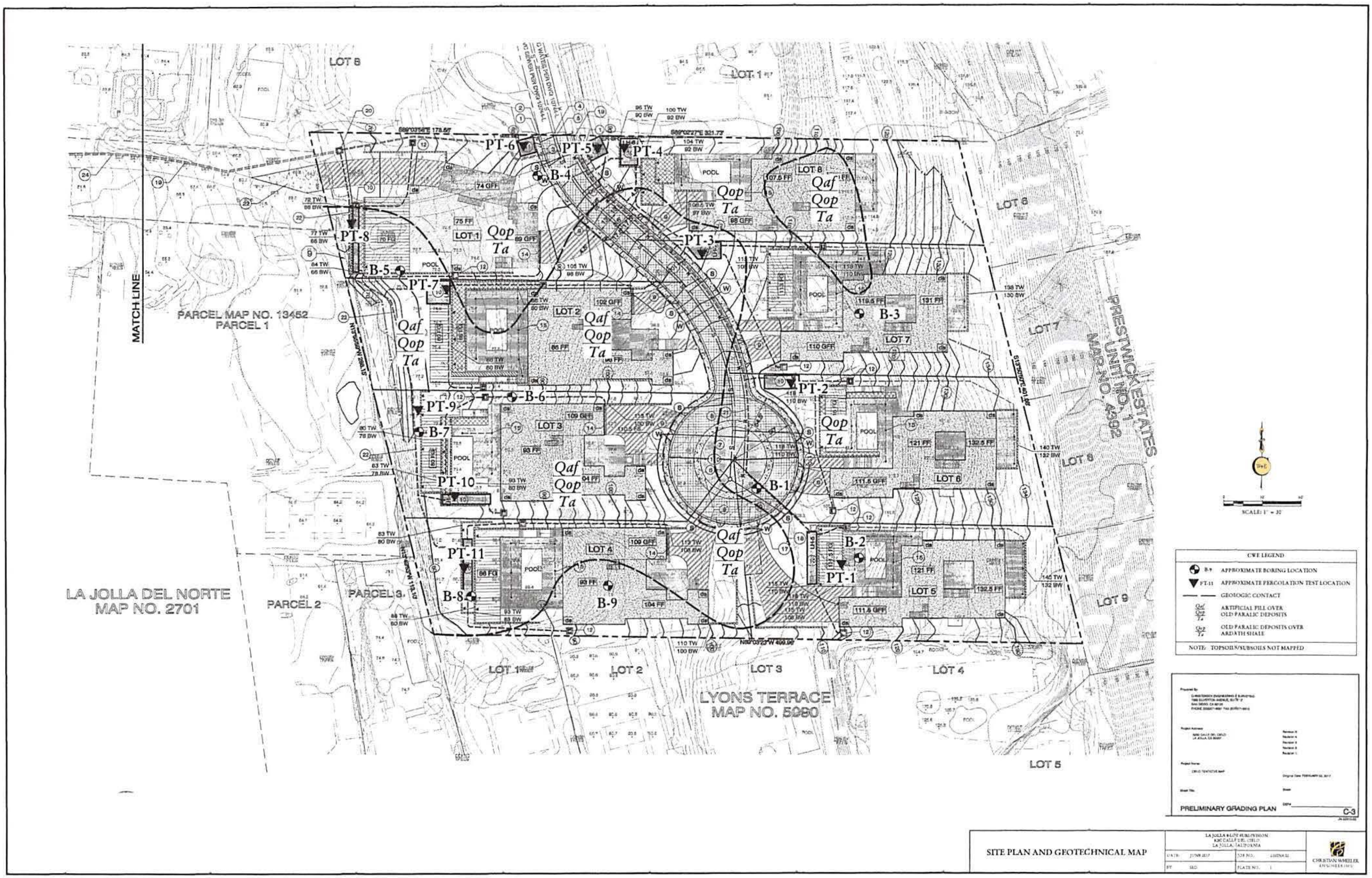
Daniel B. Adler, RCE #36037

David R. Russell, CEG #2215

ec: : lb@beachamconstruction.com; paul@alcornbenton.com; ceands@aol.com

REGISTERED PROFESSIONAL ENGINEER
DANIEL B. ADLER
No. 36037
Exp. 6-30-18
CIVIL
STATE OF CALIFORNIA

CERTIFIED ENGINEERING GEOLOGIST
DAVID R. RUSSELL
No. 2215
STATE OF CALIFORNIA



LOT 1
LOT 2
LOT 3
LOT 4
LOT 5
LOT 6
LOT 7
LOT 8
LOT 9
MATCH LINE
PARCEL MAP NO. 13452
PARCEL 1
PARCEL 2
PARCEL 3
LA JOLLA DEL NORTE
MAP NO. 2701
LYONS TERRACE
MAP NO. 5090
PRESTWICK ESTATES
UNIT NO. 1
MAP NO. 4392
PT-1
PT-2
PT-3
PT-4
PT-5
PT-6
PT-7
PT-8
PT-9
PT-10
PT-11
B-1
B-2
B-3
B-4
B-5
B-6
B-7
B-8
B-9
Qaf
Qop
Ta
POOL
SCALE: 1" = 30'
CWE LEGEND
B-9 APPROXIMATE BORING LOCATION
PT-11 APPROXIMATE PERCOLATION TEST LOCATION
GEOLOGIC CONTACT
Qaf/Qop/Ta ARTIFICIAL FILL OVER OLD PARALIC DEPOSITS
Qop/Ta OLD PARALIC DEPOSITS OVER ARDATH SHALE
NOTE: TOPSOILS/SUBSOILS NOT MAPPED
PRELIMINARY GRADING PLAN
C-3
SITE PLAN AND GEOTECHNICAL MAP
LA JOLLA 8-LOT SUBDIVISION
LA JOLLA, CALIFORNIA
DATE: JUNE 2017
BY: SRD
PLATE NO. 1
CHRISTIAN WHEELER ENGINEERING

Appendix A

Boring Logs

LOG OF TEST BORING B-1

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	7 inch Hollow Stem
Existing Elevation:	100.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	110.0 feet	Depth to Water:	Unknown

Sample Type and Laboratory Test Legend

Cal Modified California Sampler
SPT Standard Penetration Test
ST Shelby Tube
CK Chunk
DR Drive Ring

MD Max Density
SO4 Soluble Sulfates
SA Sieve Analysis
HA Hydrometer
SE Sand Equivalent
PI Plasticity Index
CP Collapse Potential
DS Direct Shear
Con Consolidation
EI Expansion Index
R-Val Resistance Value
Chl Soluble Chlorides
Res pH & Resistivity
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				4" of AC.							
			CL	<u>Old Paralic Deposits (Qop)</u>: Light brown to yellowish-brown, damp, stiff, SANDY CLAY, mottled, upper 3' moderately weathered, porous. Expansion Index of 82 (Medium).	18	Cal					SA EI SO4 DS
			CL	Brown to reddish-brown, moist.	14	SPT					
5											
					27	Cal		11.9	114.3		
10			SC	Light brown, moist, medium dense, very fine- to medium-grained, CLAYEY SAND with gravels.	16	Cal		11.9	105.9		
			SM	Light brown, moist, medium dense, very fine- to medium-grained, SILTY SAND with trace gravels, mottled.							
15					28	Cal					
			SM-SP	Light brown to black, moist, dense, very fine- to coarse-grained, POORLY GRADED SAND with silt.	57	Cal		6.7	128.0		
20				Boring terminated at 19.5 feet. No groundwater or seepage encountered.							
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	AUGUST 2017	JOB NO.:	2160564.03
BY:	SRD	FIGURE NO.:	A-1

CHRISTIAN WHEELER ENGINEERING

LOG OF TEST BORING B-2

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	7 inch Hollow Stem
Existing Elevation:	108.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	111.0 feet	Depth to Water:	Unknown

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				3" of AC.							
			CL	**Old Paralic Deposits (Qop):** Dark brown, moist, stiff, SANDY CLAY, mottled, upper 2' weathered with rootlets.							
					18	Cal					
			CL	Light orangish-brown to light gray.							
5					42	Cal					
					27	Cal					
			SC	Light brown, moist, medium dense, very fine- to medium-grained, CLAYEY SAND with trace gravels.							
10			SM	Light yellowish-brown, damp, medium dense, very fine- to medium-grained, VERY SILTY SAND with trace gravels.	28	Cal					
				Boring terminated at 11.5 feet. No groundwater or seepage encountered.							
15											
20											
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	AUGUST 2017	JOB NO.:	2160564.03
BY:	SRD	FIGURE NO.:	A-2

CHRISTIAN WHEELER ENGINEERING

LOG OF TEST BORING B-3

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	7 inch Hollow Stem
Existing Elevation:	111.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	119.0 feet	Depth to Water:	Unknown

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			CL	**Old Paralic Deposits (Qop):** Dark brown, damp, loose, SANDY CLAY, mottled, upper 2' moderately weathered.							
					28	Cal					
			SC	Light yellowish-brown, moist, medium dense, very fine- to medium-grained, CLAYEY SAND.	39	Cal		15.2	111.1		DS
5											
			SM	Light yellowish-brown, moist, medium dense, very fine- to medium-grained, VERY SILTY SAND.							
					25	Cal		13.9	106.1		
10											
			SP-SM	Light gray, damp, medium dense, very fine- to medium-grained, POORLY GRADED SAND with silt and gravels.							
15				Gravel/cobble bed at 16 to 17 feet.	50/5"	Cal**					
					50/1"	SPT*					
				Boring terminated at 17 feet. No groundwater or seepage encountered.							
20											
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	AUGUST 2017	JOB NO.:	2160564.03
BY:	SRD	FIGURE NO.:	A-3

CHRISTIAN WHEELER ENGINEERING

LOG OF TEST BORING B-4

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

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	7 inch Hollow Stem
Existing Elevation:	82.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	74.0 feet	Depth to Water:	Unknown

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				4" of AC.							
			SC	**Old Paralic Deposits (Qop):** Brown to reddish-brown, dry, loose to medium dense, very fine- to medium-grained, CLAYEY SAND, mottled, upper 2' highly weathered.							
				Moist, medium dense.	18	Cal					
			SM	Light brown, moist, medium dense, very fine- to medium-grained, SILTY SAND.	13	Cal		8.8	116.1		
5											
			SM	Light brown to light grayish-brown, dense, fine- to coarse-grained, SILTY SAND with clay, mottled.	41	Cal					
10											
					50/4"	Cal					
15			ML	**Ardath Shale (Ta):** Light yellowish-brown, moist, hard, CLAYEY SILT with sand.							
					50/5"	Cal		13.2	112.6		DS
				Boring terminated at 19 feet. No groundwater or seepage encountered.							
20											
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	AUGUST 2017	JOB NO.:	2160564.03
BY:	SRD	FIGURE NO.:	A-4

CHRISTIAN WHEELER ENGINEERING

LOG OF TEST BORING B-5

Sample Type and Laboratory Test Legend

Cal Modified California Sampler; SPT Standard Penetration Test; ST Shelby Tube; CK Chunk; DR Drive Ring

MD Max Density; SO4 Soluble Sulfates; SA Sieve Analysis; HA Hydrometer; SE Sand Equivalent; PI Plasticity Index; CP Collapse Potential; DS Direct Shear; Con Consolidation; EI Expansion Index; R-Val Resistance Value; Chl Soluble Chlorides; Res pH & Resistivity; SD Sample Density

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	7 inch Hollow Stem
Existing Elevation:	73.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	70.0 feet	Depth to Water:	Unknown

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			SC	**Artificial Fill (Qaf):** Brown, damp, loose to medium dense, very fine- to medium-grained, SANDY CLAY.							
				Moist, medium dense.	19	Cal					
			SC	**Old Paralic Deposits (Qop):** Orangish-brown to brown, moist, medium dense, very fine- to medium-grained, CLAYEY SAND, mottled.	21	Cal					
5											
10					34	Cal					
			CL	**Ardath Shale (Ta):** Yellowish-brown, moist, very stiff, SILTY CLAY with sand, moderately weathered to 16 feet.							
15					25	SPT					
				Hard.							SA
					50/5"	SPT					PI
				Boring terminated at 19 feet. No groundwater or seepage encountered.							
20											
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	AUGUST 2017	JOB NO.:	2160564.03
BY:	SRD	FIGURE NO.:	A-5

CHRISTIAN WHEELER ENGINEERING

LOG OF TEST BORING B-6

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	7 inch Hollow Stem
Existing Elevation:	79.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	93.0 feet	Depth to Water:	Unknown

Sample Type and Laboratory Test Legend

Cal Modified California Sampler
SPT Standard Penetration Test
ST Shelby Tube
CK Chunk
DR Drive Ring

MD Max Density
SO4 Soluble Sulfates
SA Sieve Analysis
HA Hydrometer
SE Sand Equivalent
PI Plasticity Index
CP Collapse Potential
DS Direct Shear
Con Consolidation
EI Expansion Index
R-Val Resistance Value
Chl Soluble Chlorides
Res pH & Resistivity
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			SC	Artificial Fill (Qaf): Brown, damp, loose to medium dense, very fine- to medium-grained, CLAYEY SAND with brick and concrete debris.							
			CL	Old Paralic Deposits (Qop): Brown to reddish-brown, moist, stiff to very stiff, SANDY CLAY. Expansion Index of 36 (Low).	32	Cal		10.9	115.2		SA EI
5					24	Cal		15.4	112.6		CP
				Fine- to coarse-grained at contact.							
10			CH	Ardath Shale (Ta): Greenish-gray, moist, very stiff, SILTY CLAY, highly weathered.	19	SPT					SA PI
			ML-CL	Light yellowish-brown to light gray, moist, very stiff, CLAYEY SILT/SILTY CLAY, slightly weathered.							
15					28	SPT					
				Boring terminated at 15 feet. No groundwater or seepage encountered.							
20											
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	AUGUST 2017	JOB NO.:	2160564.03
BY:	SRD	FIGURE NO.:	A-6

CHRISTIAN WHEELER ENGINEERING

LOG OF TEST BORING B-7

Sample Type and Laboratory Test Legend

Cal Modified California Sampler; SPT Standard Penetration Test; ST Shelby Tube; CK Chunk; DR Drive Ring

MD Max Density; SO4 Soluble Sulfates; SA Sieve Analysis; HA Hydrometer; SE Sand Equivalent; PI Plasticity Index; CP Collapse Potential; DS Direct Shear; Con Consolidation; EI Expansion Index; R-Val Resistance Value; Chl Soluble Chlorides; Res pH & Resistivity; SD Sample Density

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	7 inch Hollow Stem
Existing Elevation:	78.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	80.0 feet	Depth to Water:	Unknown

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			CL	**Artificial Fill (Qaf):** Brown, dry, medium stiff, SANDY CLAY with concrete debris in the upper 2 feet. Expansion Index of 58 (Medium).							SA EI SO4 DS
				Stiff.	14	Cal					
5											
					14	Cal					
10			CL	**Old Paralic Deposits (Qop):** Reddish-brown to brown, moist, very stiff to stiff, SANDY CLAY, mottled.							
					38	Cal		15.0	117.4		SA PI
15											
				Fine- to coarse-grained with gravels at contact.							
			ML/CL	**Ardath Shale (Ta):** Yellowish-brown to light gray, moist, very stiff, CLAYEY SILT/SILTY CLAY.	26	SPT					
20				Boring terminated at 20 feet. No groundwater or seepage encountered.							
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	AUGUST 2017	JOB NO.:	2160564.03
BY:	SRD	FIGURE NO.:	A-7

CHRISTIAN WHEELER ENGINEERING

LOG OF TEST BORING B-8

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	7 inch Hollow Stem
Existing Elevation:	83.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	86.0 feet	Depth to Water:	Unknown

Sample Type and Laboratory Test Legend

Cal Modified California Sampler
SPT Standard Penetration Test
ST Shelby Tube
CK Chunk
DR Drive Ring

MD Max Density
SO4 Soluble Sulfates
SA Sieve Analysis
HA Hydrometer
SE Sand Equivalent
PI Plasticity Index
CP Collapse Potential
DS Direct Shear
Con Consolidation
EI Expansion Index
R-Val Resistance Value
Chl Soluble Chlorides
Res pH & Resistivity
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			SC	**Artificial Fill (Qaf):** Brown, dry, loose to medium dense, very fine- to medium-grained, CLAYEY SAND with gravels and concrete debris.							
				Moist, medium dense.	18	Cal					
5				Brick debris at 5 feet.	20	Cal					
			SC	**Old Paralic Deposits (Qop):** Reddish-brown to brown, moist, dense, very fine- to medium-grained, CLAYEY SAND/SANDY CLAY.	44	Cal					
10			SM	Light brown, moist, dense, very fine- to medium-grained, SILTY SAND.							
			SC	Reddish-brown to light gray, moist, dense, very fine- to medium-grained, CLAYEY SAND.	57	Cal					
15				Boring terminated at 14.5 feet. No groundwater or seepage encountered.							
20											
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	AUGUST 2017	JOB NO.:	2160564.03
BY:	SRD	FIGURE NO.:	A-8

CHRISTIAN WHEELER ENGINEERING

LOG OF TEST BORING B-9

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

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	7 inch Hollow Stem
Existing Elevation:	89.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	93.0 feet	Depth to Water:	Unknown

DEPTH (ft)	ELEVATION (ft)	GRAPHIC LOG	USCS SYMBOL	SUMMARY OF SUBSURFACE CONDITIONS (based on Unified Soil Classification System)	PENETRATION (blows per foot)	SAMPLE TYPE	BULK	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	RELATIVE COMPACTION (%)	LABORATORY TESTS
0			SM	**Topsoil:** Brown, dry, loose, very fine- to medium-grained, CLAYEY SAND, porous.							
			CL	**Old Paralic Deposits (Qop):** Brown, moist, very stiff, SANDY CLAY, upper 12" highly weathered, porous.	33	Cal					SA
				Very stiff..							
5			SC	Orangish-brown, moist, medium dense, very fine- to medium-grained, CLAYEY SAND.	20	Cal		8.1	117.3		
			SM	Light brown to light orangish-brown, moist, dense, very fine- to medium-grained, SILTY SAND.	38	Cal		9.2	111.9		
10			SP-SM	Light brown, moist, dense, fine- to coarse-grained, POORLY GRADED SAND with silt.							
15					64	Cal					
				Boring terminated at 16.5 feet. No groundwater or seepage encountered.							
20											
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	AUGUST 2017	JOB NO.:	2160564.03
BY:	SRD	FIGURE NO.:	A-9

CHRISTIAN WHEELER
ENGINEERING

Appendix B

Worksheet C.4-1: Categorization of Infiltration Feasibility Condition

Worksheet C.4-1: Categorization of Infiltration Feasibility Condition

Categorization of Infiltration Feasibility Condition		Worksheet C.4-1	
Part 1 - Full Infiltration Feasibility Screening Criteria Would infiltration of the full design volume be feasible from a physical perspective without any undesirable consequences that cannot be reasonably mitigated?			
Criteria	Screening Question	Yes	No
1	Is the estimated reliable infiltration rate below proposed facility locations greater than 0.5 inches per hour? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.		X
Provide basis: An infiltration rate assessment has been performed for the soils beneath the area of the proposed on-site storm water infiltration basins as presented in the Report of Geotechnical Infiltration Feasibility Study (CWE 2160564.03). The measured percolation rates were converted to infiltration rates using the Porchet Method. The City of San Diego Storm Water Standards BMP Design Manual states that "a maximum factor of safety (FOS) of 2.0 is recommended for infiltration feasibility screening such that an artificially high factor of safety cannot be used to inappropriately rule out infiltration, unless justified." Using a FOS of 2.0, the average infiltration rate for the soils below the proposed storm water basins was 0.006 inches per hour.			
2	Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.	X	
Provide basis: An infiltration rate assessment has been performed for the subject site. Based on the underlying soil conditions and our recommendations presented in our report, we anticipate that infiltration greater than 0.5 inches per hour can be allowed without increasing risk of geologic hazards that cannot be mitigated to an acceptable level.			

Worksheet C.4-1 Page 2 of			
Criteria	Screening Question	Yes	No
3	Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of groundwater contamination (shallow water table, storm water pollutants or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: An infiltration rate assessment has been performed for the subject site. Based on the underlying soil conditions and our recommendations presented in our report, we anticipate that infiltration greater than 0.5 inches per hour can be allowed without increasing risk of groundwater contamination that cannot be mitigated to an acceptable level. The seasonal high groundwater table is estimated to be at greater than 30 feet below existing grades.			
4	Can infiltration greater than 0.5 inches per hour be allowed without causing potential water balance issues such as change of seasonality of ephemeral streams or increased discharge of contaminated groundwater to surface waters? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: There does not appear to be a high risk of causing potential water balance issues such as change of seasonality of ephemeral streams or increased discharge of contaminated groundwater to surface waters by allowing infiltration greater than 0.5 inches per hour.			
Part 1 Result*	If all answers to rows 1 - 4 are "Yes" a full infiltration design is potentially feasible. The feasibility screening category is Full Infiltration If any answer from row 1-4 is "No", infiltration may be possible to some extent but would not generally be feasible or desirable to achieve a "full infiltration" design. Proceed to Part 2		

*To be completed using gathered site information and best professional judgment considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by City Engineer to substantiate findings.

Worksheet C.4-1 Page 3 of			
Part 2 – Partial Infiltration vs. No Infiltration Feasibility Screening Criteria Would infiltration of water in any appreciable amount be physically feasible without any negative consequences that cannot be reasonably mitigated?			
Criteria	Screening Question	Yes	No
5	Do soil and geologic conditions allow for infiltration in any appreciable rate or volume? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.		X
Provide basis: An infiltration rate assessment has been performed for the soils beneath the area of the proposed biofiltration basins as presented in the Report of Geotechnical Infiltration Feasibility Study (CWE 2160564.03). The measured percolation rates were converted to infiltration rates using the Porchet Method. The City of San Diego Storm Water Standards BMP Design Manual states that "a maximum factor of safety (FOS) of 2.0 is recommended for infiltration feasibility screening such that an artificially high factor of safety cannot be used to inappropriately rule out infiltration, unless justified." Using a FOS of 2.0, an infiltration rate of 0.006 inches per hour can be used for the feasibility analysis for the proposed biofiltration basins. The estimated design infiltration rate is less than 0.01 inches per hour, which is not considered an appreciable rate or volume.			
6	Can Infiltration in any appreciable quantity be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.	X	
Provide basis: An infiltration rate assessment has been performed for the subject site. Based on the underlying soil conditions and our recommendations presented in our report, we anticipate that infiltration in any appreciable quantity can be allowed without increasing risk of geologic hazards that cannot be mitigated to an acceptable level. C.2.2 The underlying old paralic deposits are not expected to be prone to hydro collapse, consolidation or heave to a degree that cannot be mitigated. C.2.3 The underlying old paralic deposits are not expected to be prone to slope stability issues provided sound engineering recommendations and construction practices are followed. C.2.4 Vertical liners could be used to prevent lateral migration into nearby utility trenches. C.2.5 Groundwater mounding is not expected to be a concern. C.2.6 Where biofiltration basins are located within 10 feet of a structure or retaining walls cut-off wall could be constructed around the perimeter of the basins.			

Worksheet C.4-1 Page 4 of			
Criteria	Screening Question	Yes	No
7	Can Infiltration in any appreciable quantity be allowed without posing significant risk for groundwater related concerns (shallow water table, storm water pollutants or other factors)? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: An infiltration rate assessment has been performed for the subject site. Based on the underlying soil conditions and our recommendations presented in our report, we anticipate that an infiltration rate of 0.006 inches per hour can be allowed without increasing risk of groundwater contamination that cannot be mitigated to an acceptable level. The seasonal high groundwater table is estimated to be at greater than 30 feet below existing grades. C.3.1 We have no knowledge of groundwater or soil contamination onsite or down-gradient from the site. C.3.2 The seasonal high groundwater table is estimated to be at greater than 30 feet below existing grade. C.3.3 No existing wellheads are known within the vicinity of the subject site. C.3.4 We have no knowledge of a previous industrial use.			
8	Can infiltration be allowed without violating downstream water rights? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: We did not perform a study regarding water rights. However, these rights are not typical in the San Diego area.			
Part 2 Result*	If all answers from row 1-4 are yes then partial infiltration design is potentially feasible. The feasibility screening category is Partial Infiltration. If any answer from row 5-8 is no, then infiltration of any volume is considered to be infeasible within the drainage area. The feasibility screening category is No Infiltration.	No Infiltration	

*To be completed using gathered site information and best professional judgment considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by City Engineer to substantiate findings

Appendix C

Porchet Method- Percolation to Infiltration Conversion

Spreadsheet

Percolation to Infiltration Rate Conversion (Porchet Method)

La Jolla Shores Drive

CWE 2160564.03

Perc Test #	Gravel Adjustment Factor	Effective Radius (inches) r	Depth of Hole Below Existing Grade (inches)	Time Interval (min.) Δt	Height of pipe above surface (feet)	Initial Water Depth without correction (feet)	Final Water Depth without correction (feet)	Initial Water Height with correction (inches) H_o	Final Water Height with correction (inches) H_f	Change in head (inches) ΔH	Average Head Height (inches) H_{avg}	Tested Infiltration Rate (inch/hour) I_t
1	0.47	3.5	60	30	0.25	1.88	1.89	40.44	40.32	0.12	40.38	0.00
2	0.47	3.5	60	30	0.00	3.32	3.36	20.16	19.68	0.48	19.92	0.04
3	0.47	3.5	60	30	0.33	3.71	3.72	19.44	19.32	0.12	19.38	0.01
4	0.47	3.5	60	30	0.00	2.63	2.64	28.44	28.32	0.12	28.38	0.01
5	0.47	3.5	60	30	0.00	2.78	2.79	26.64	26.52	0.12	26.58	0.01
6	0.47	3.5	60	30	0.00	3.11	3.12	22.68	22.56	0.12	22.62	0.01
7	0.47	3.5	60	30	0.00	3.64	3.65	16.32	16.20	0.12	16.26	0.01
8	0.47	3.5	60	30	0.00	2.67	2.68	27.96	27.84	0.12	27.90	0.01
9	0.47	3.5	120	30	0.00	6.21	6.23	45.48	45.24	0.24	45.36	0.01
10	0.47	3.5	120	30	0.00	8.10	8.12	22.80	22.56	0.24	22.68	0.02
11	0.47	3.5	131	30	3.00	10.60	10.66	39.80	39.08	0.72	39.44	0.03

"Initial and final water depth without correction" are measurements taken from top of pipe if pipe is sticking out of ground (most cases)
"Initial and final water height with correction" factors in the height of pipe above surface, and provides measurement of water above bottom of pipe
If measurements are taken from grade "Height of pipe above surface" = 0

Gravel Adjustment Factor:

4-inch Diameter Pipe: 1.00 - No Gravel Used (No Caving)
0.51 - 3/4 inch gravel with 8 inch diameter hole
0.56 - 3/4 inch gravel with 7 inch diameter hole
0.64 - 3/4 inch gravel with 6 inch diameter hole

3-inch Diameter Pipe: 1.00 - No Gravel Used (No Caving)
0.44 - 3/4 inch gravel with 8 inch diameter hole
0.47 - 3/4 inch gravel with 7 inch diameter hole
0.51 - 3/4 inch gravel with 6 inch diameter hole

Porchet Method - Tested Percolation Rate Conversion to Tested Infiltration Rate

$$I_t = \frac{\Delta H \, 60 \, r}{\Delta t \, (r + 2H_{avg})}$$

I_t = tested infiltration rate, inches per hour
ΔH = change in head over the time interval, inches
Δt = time interval, minutes
r = effective radius of test hole
H_{avg} = average head over the time interval, inches

CHRISTIAN WHEELER
ENGINEERING

June 6, 2016

James and Tricia Riha
c/o Beacham Construction
405 Via del Norte
La Jolla, California 92037
Attention: Louis Beacham

CWE 2160564.02

Subject: Report of Preliminary Findings and Recommendations
Proposed 8-Lot Residential Subdivision, 8303 La Jolla Shores Drive, La Jolla, California

Ladies and Gentlemen:

In accordance with the request of Louis Beacham, we have prepared this report to present preliminary geotechnical findings and recommendations for the subject project.

PRELIMINARY SITE INFORMATION AND PROJECT DESCRIPTION

The subject site is comprised of three adjacent residential lots identified as Assessor's Parcel Numbers 346-250-08 through -10. The lot is located adjacent to and east of Calle Frescota and south of Calle del Cielo in the La Jolla Shores area of San Diego, California. The site currently supports a single-story, single-family residence with a garage, storage structures and other normally associated improvements. Topographically, the site ascends gently from west to east with an approximately 50-foot-high slope along the eastern margin of the site.

We understand that the three existing parcels that comprise the subject site are to be subdivided to create a total of ±8 residential parcels. We anticipate that each of the parcels will be developed to receive one-to two-story single-family split level residences that are of conventional, wood-frame and masonry construction. The structures will be supported by shallow foundations and incorporate on-grade concrete floor slabs. All the lots will also have swimming pools. Access to the new lots will be afforded by a new cul-de-sac that connects to Calle Del Cielo. Grading to accommodate the proposed improvements is expected to consist of cuts and fills of less than about 10 feet and 15 feet from existing site grades, respectively. Retaining walls up to about

12 feet high are proposed. It is further anticipated that imported fill soils will be necessary to achieve proposed site grades.

To assist in the preparation of this report, we were provided with a preliminary grading plan prepared by Christensen Engineering & Surveying, dated April 21, 2017. A copy of the plan was used as a base map for our Site Plan and Geologic Map, and is included herein as Plate No. 1. In addition, we reviewed our report prepared for the subject site titled "Report of Geologic Reconnaissance, Proposed Residential Subdivision", dated January 9, 2017 (CWE 2160564.01).

PRELIMINARY FINDINGS

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 generally underlain by artificial fill, topsoil, Quaternary-age old paralic deposits, and Tertiary age sedimentary deposits of the Ardath Shale. A site plan and geotechnical map, which depicts the location of our borings, is included herein as Plates No.1. The boring logs are provided in Appendix A of this report. The materials encountered in the subsurface explorations are described below:

ARTIFICIAL FILL (Qaf): A surficial veneer of man-placed caps much of the central and western portions of the site and also within the area of a relatively level, graded pad area within the northeast portion of the site. As encountered in our exploratory borings, the artificial fill extended a maximum depth of about 9 feet from existing grade (Borings B-7 and B-8). Deeper fill soils may exist in areas of the site not investigated. The fill materials generally consisted of brown, loose to medium dense, dry to moist, clayey sand (SC). The artificial fill was judged to have a medium expansion potential (EI between 51 and 90).

TOPSOIL: An approximately 1-foot-thick layer of topsoil was encountered in Boring B-9. Where not removed by previous site grading, a similar veneer of topsoil is expected across other areas of

the site not investigated. The encountered topsoil consisted of brown, dry, loose, silty sand (SM). The topsoil was judged to have a low expansion potential (EI between 21 and 50).

OLD PARALIC DEPOSITS (Qop): Quaternary-age old paralic deposits were encountered underlying the surficial soils (topsoil and artificial fill) or at grade throughout the site. These soils generally consisted of brown, orangish-brown, reddish-brown, light gray, and light brown, damp to moist, interbedded, stiff, sandy clay (CL), medium dense silty and sand (SM) and clayey sand (SC), and dense poorly graded sand with silt (SP-SM) and clayey sand/sandy clay (SC/CL). In addition, some of the near surface, old paralic deposits were found to be loose to medium dense. The sandy portions of the old paralic deposits (SM and SP-SM) were judged to have a very low to low expansion potential (EI between 0 and 50), whereas the clayey old paralic deposits (CL and SC/CL) were judged to have a low to medium expansion potential (EI between 51 and 90).

ARDATH SHALE (Ta): Tertiary-age sedimentary deposits of the Ardath Shale underlie the old paralic deposits across the site and crop out along the engineered slope along and adjacent to the site's eastern perimeter. These soils generally consisted of light yellowish-brown, greenish-gray and light gray, moist, very stiff to hard, silty clay (CL), clayey silt (ML), and clayey silt/silty clay (ML/CL). These formational deposits were judged to have a medium to high expansion potential (EI between 51 and 130).

GROUNDWATER: In general, no groundwater or major seepage was encountered in our subsurface explorations.

PRELIMINARY CONCLUSIONS

In general, it is our professional opinion and judgment that the subject property is suitable for the construction of the proposed residential subdivision and associated improvements provided the recommendations presented herein are implemented. The main geotechnical conditions affecting the proposed project consist of potentially compressible artificial fill, topsoil and portions of the upper, old paralic deposits, cut/fill transitions across proposed building pads, and expansive soils. These conditions are discussed hereinafter.

The site is underlain by potentially compressible artificial fill, topsoil, and old paralic deposits. As encountered in our borings the artificial fill underlies the west-central portion of the site, and extends to a maximum depth of about 9 feet from existing grade (Borings B-7 and B-8). Deeper fill soils and topsoil may exist in areas of the site not investigated. Relatively shallow layers of potentially compressible topsoil and old paralic deposits were also encountered. It is estimated that these materials do not exceed about 2 feet in thickness. The fill soils, topsoil, and potentially compressible, upper old paralic 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 in areas to receive settlement sensitive improvements and new fills.

The removal and recompaction of existing loose surficial soils as well as the proposed grading will result in cut/fill transition areas under some of the proposed structures and associated improvements. This configuration may result in differential settlements due to the potential of fill soils and native materials to settle differently. In order to mitigate this condition, it is recommended that the cut portions of the lots be undercut as described hereinafter.

Some of the anticipated foundation soils are moderately to highly expansive (EI between 51 and 130). Select grading is recommended to mitigate this condition.

The following foundation recommendations should be considered preliminary, and may require revisions after the results of laboratory tests currently being performed are analyzed.

PRELIMINARY 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 or our Report of Preliminary Geotechnical Investigation, which will be provided under separate cover.

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

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

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

SITE PREPARATION: It is recommended that existing potentially compressible soils underlying the proposed structures, associated improvements and new fills be removed in their entirety. Based on our findings, the maximum removal depth is about 9 feet below existing grade (Borings B-7 and B-8). Deeper removals may be necessary in areas of the site not investigated or due to unforeseen conditions. Lateral removals limits should extend at least 5 feet from the perimeter of the structures, associated 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.

UNDERCUT: Native soils within 3 feet from finish pad grade should be undercut. The undercut material may be replaced as compacted fill. In areas where footings deeper than the minimum recommended undercut are proposed, undercuts extending to a minimum depth of 1 foot below the bottom of the footing or retaining wall key are recommended. The removals and undercuts should be performed in such a way as to provide for a continuous contact between the fill and native soils that drains away from the proposed structures, and avoids adjacent zones with different undercut depths that may impair subsurface drainage.

SELECT GRADING: It is recommended that moderately to highly expansive soils (EI between 51 and 130) within 5 feet from finish pad grade be mixed with low expansive on-site soil or imported (EI between 21 and 50) to create a low expansive mix for use as structural fill.

IMPORTED FILL SOILS: Imported fill soils should consist of clayey and/or silty sands that have a low expansion potential (EI between 21 and 50), relatively high strength, and relatively low permeability characteristics. At least 72 hours will be necessary to perform necessary laboratory test to approve an import source.

PROCESSING OF FILL AREAS: Prior to placing any new fill soils or constructing any new improvements in areas that have been cleaned out to receive fill, the exposed soils should be scarified to a depth of 12 inches, watered thoroughly, and compacted to at least 90 percent relative compaction. In areas to support fill slopes, keys should be cut into the competent supporting materials. The keys should be at least 10 feet wide, and be sloped back into the hillside at least 2 percent. The keys should extend at least 1 foot into the competent supporting materials. Where the existing ground has a slope of 5:1 (horizontal to vertical) or steeper, it should be benched into as the fill extends upward from the keyway.

FILL SLOPES: Fill slopes should be compacted by back-rolling with a sheepsfoot compactor at vertical intervals not exceeding four feet in vertical dimension as the fill is being placed. The face of fill slopes constructed at a 2:1 (horizontal to vertical) or flatter inclination should also be track-walked when the slope is completed. As an alternative, fill slopes can be overfilled by at least three feet and cut back to the compacted core at the design finish contour.

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 6 to 8 inches thick, with each lift compacted by mechanical means. Fills should consist of approved earth material, free of trash or debris, roots, vegetation, or other materials determined to be unsuitable by the Geotechnical Consultant. Fill material should be free of rocks or lumps of soil in excess of three inches in maximum dimension.

Utility trench backfill within 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 and the top of slopes into controlled drainage devices are recommended.

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

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

TEMPORARY CONSTRUCTION SLOPES: A temporary cut slopes up to about 12 feet in height will be necessary for the construction of proposed structures. Temporary cut slopes may be constructed vertically for the lower 4 feet (including footing excavation) and at a continous1:1 (horizontal to vertical) inclination thereafter. All temporary slopes should be observed by the engineering geologist during grading to ascertain that no unforeseen adverse conditions exist. No surcharge loads such as adjacent building foundations, soil or equipment stockpiles, vehicles, etc. should be allowed within a distance from the top of temporary slopes equal to half the slope height.

It should be noted that the contractor is solely responsible for designing and constructing stable, temporary excavations and may need to shore, slope, or bench the sides of trench excavations as required to maintain the stability of the excavation sides. The contractor's "competent person", as defined in the OSHA Construction Standards for Excavations, 29 CFR, Part 1926, should evaluate the

soil exposed in the excavations as part of the contractor's safety process. Temporary cut slopes should be constructed in accordance with the recommendations presented in this section. In no other case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations.

FOUNDATIONS

GENERAL: Based on our findings and engineering judgment, the proposed structures and associated improvements may be supported by conventional shallow continuous and isolated spread footings. The following recommendations are considered the minimum based on the anticipated soil conditions, 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 structures should be embedded at least 18 inches below lowest adjacent finish pad grade. Spread footings supporting the proposed light exterior 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 18 inches deep and 24 inches wide.

BEARING CAPACITY: Spread footings supporting the proposed structures may be designed for an allowable soil bearing pressure of 2,500 pounds per square foot (psf). 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 light exterior improvements may be designed for an allowable soil bearing pressure of 2,000 pounds per square foot (psf). These values 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 the 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.

PROPOSED SWIMMING POOLS: Foundation recommendations for the proposed swimming pools will be provided on an individual basis after grading is performed. However, it is recommended that the proposed swimming pools be founded on old paralic deposits or Ardath Shale.

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: Provided select grading as recommended herein is performed, the prevailing foundation soils are assumed to have a low expansive potential (EI between 21 and 50). The recommendations within this report reflect these conditions.

FOUNDATION PLAN REVIEW: The final foundation plan and accompanying details and notes should be submitted to this office for review. The intent of our review will be to verify that the plans used for construction reflect the minimum dimensioning and reinforcing criteria presented in this section and that no additional criteria are required due to changes in the foundation type or layout. It is not our intent to

review structural plans, notes, details, or calculations to verify that the design engineer has correctly applied the geotechnical design values. It is the responsibility of the design engineer to properly design/specify the foundations and other structural elements based on the requirements of the structure and considering the information presented in this report.

SEISMIC DESIGN FACTORS

The seismic design factors applicable to the subject site are provided below. The seismic design factors were determined in accordance with the 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	32.857° -117.251°
Site Class	D
Site Coefficient F_a	1.0
Site Coefficient F_v	1.5
Spectral Response Acceleration at Short Periods S_s	1.305 g
Spectral Response Acceleration at 1 Second Period S_1	0.507 g
$S_{MS}=F_aS_s$	1.305 g
$S_{M1}=F_vS_1$	0.760 g
$S_{DS}=2/3*S_{MS}$	0.870 g
$S_{D1}=2/3*S_{M1}$	0.507 g

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

ON-GRADE SLABS

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

INTERIOR FLOOR SLABS: The minimum slab thickness should be 4 inches (actual) and the slab should be reinforced with at least No. 3 bars spaced at 18 inches on center each way. Slab reinforcement should be supported on chairs such that the reinforcing bars are positioned at mid-height in the floor slab. The slab reinforcement should extend down into the perimeter footings at least 6 inches.

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

EXTERIOR CONCRETE FLATWORK: Exterior concrete slabs on grade should have a minimum thickness of 4 inches and be reinforced with at least No. 3 bars placed at 18 inches on center each way (ocew). Driveway slabs should have a minimum thickness of 5 inches and be reinforced with at least No. 4 bars placed at 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 43 and 62 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 10.5H pounds per square foot (where H = wall height in feet) occurring at the top of the wall.

WATERPROOFING AND WALL DRAINAGE SYSTEMS: The need for waterproofing should be evaluated by others. If required, the project architect should provide (or coordinate) waterproofing details for the retaining walls. The design values presented above are based on a drained backfill condition and do not consider hydrostatic pressures. Unless hydrostatic pressures are incorporated into the design, the retaining wall designer should provide a detail for a wall drainage system. Typical retaining wall drain system details are presented in Plate No. 2 of this report for informational purposes. Additionally, outlets points for the retaining wall drain system should be coordinated with the project civil engineer.

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

CLOSURE

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

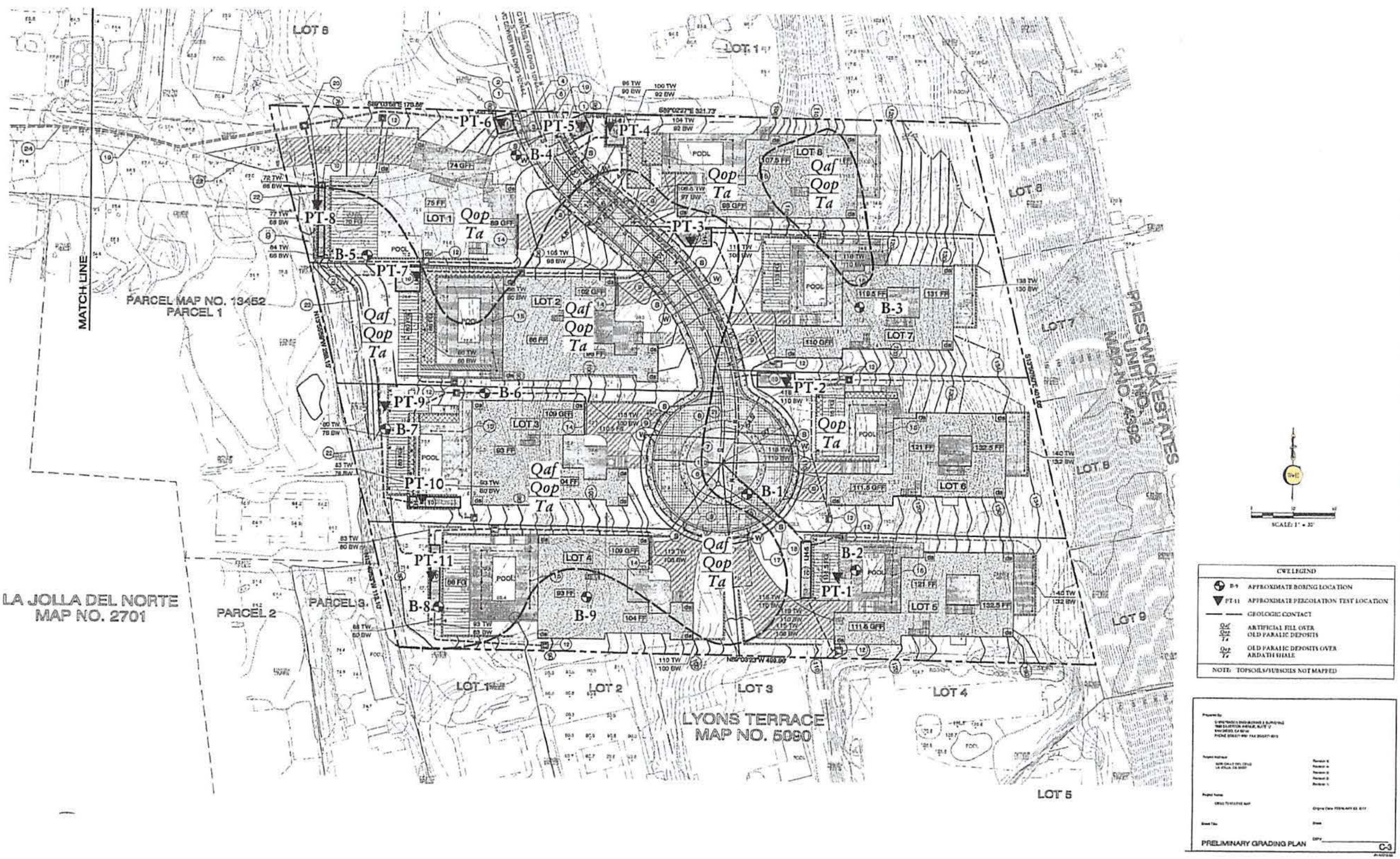
Respectfully submitted,

CHRISTIAN WHEELER ENGINEERING

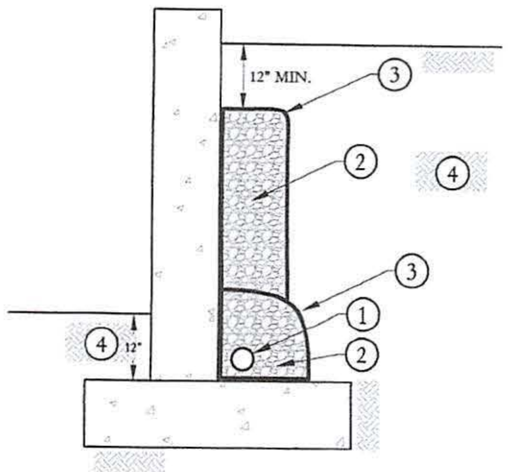
Daniel B. Adler, RCE #36037

David R. Russell, RCE #2215

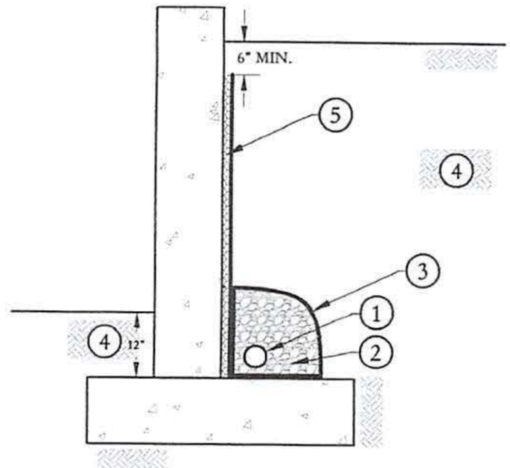
ec: : lb@beachamconstruction.com
paul@alcornbenton.com



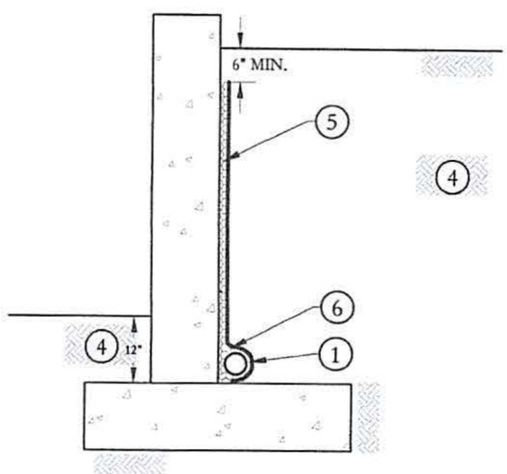
SITE PLAN AND GEOTECHNICAL MAP	LA JOLLA 8-LOT SUBDIVISION LA JOLLA, CALIFORNIA		CHRISTIAN WHEELER ENGINEERING
	DATE: JUNE 2017	JOB NO.:	
	BY:	PLATE NO.: 1	



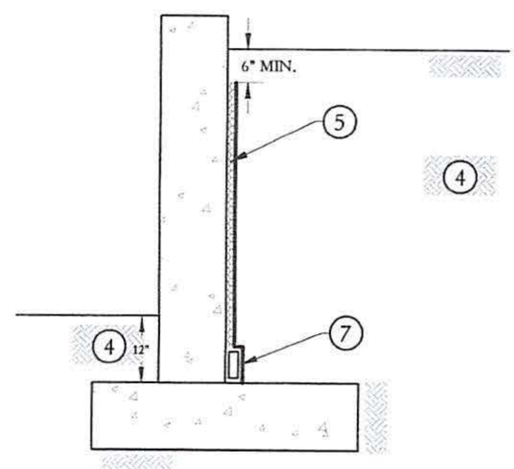
1 DETAIL



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	LA JOLLA 8-LOT SUBDIVISION 8280 CALLE DEL CIELO LA JOLLA, CALIFORNIA			CHRISTIAN WHEELER ENGINEERING
	DATE: JUNE 2017		JOB NO.: 2160564.02	
	BY: SRD		PLATE NO.: 2	

Appendix A

Exploration Logs

LOG OF TEST BORING B-1

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	8 inch Solid Flight
Existing Elevation:	100.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	110.0 feet	Depth to Water:	Unknown

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				4" of AC.							
			CL	Old Paralic Deposits (Qop): Light brown to yellowish-brown, damp, stiff, SANDY CLAY, mottled, upper 3' moderately weathered, porous.							
					18	Cal					
			CL	Brown to reddish-brown, moist.							
5					14	SPT					
					27	Cal					
10			SC	Light brown, moist, medium dense, very fine- to medium-grained, CLAYEY SAND with gravels.	16	Cal					
			SM	Light brown, moist, medium dense, very fine- to medium-grained, SILTY SAND with trace gravels, mottled.							
15					28	Cal					
			SM-SP	Light brown to black, moist, dense, very fine- to coarse-grained, POORLY GRADED SAND with silt.	57	Cal					
20				Boring terminated at 19.5 feet. No groundwater or seepage encountered.							
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	JUNE 2017	JOB NO.:	2160564.02
BY:	SRD	FIGURE NO.:	A-1

CHRISTIAN WHEELER ENGINEERING

LOG OF TEST BORING B-2

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	8 inch Solid Flight
Existing Elevation:	108.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	111.0 feet	Depth to Water:	Unknown

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				3" of AC.							
			CL	Old Paralic Deposits (Qop): Dark brown, moist, stiff, SANDY CLAY, mottled, upper 2' weathered with rootlets.							
					18	Cal					
			CL	Light orangish-brown to light gray.							
5					42	Cal					
					27	Cal					
			SC	Light brown, moist, medium dense, very fine- to medium-grained, CLAYEY SAND with trace gravels.							
10			SM	Light yellowish-brown, damp, medium dense, very fine- to medium-grained, VERY SILTY SAND with trace gravels.	28	Cal					
				Boring terminated at 11.5 feet. No groundwater or seepage encountered.							
15											
20											
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	JUNE 2017	JOB NO.:	2160564.02
BY:	SRD	FIGURE NO.:	A-2

CHRISTIAN WHEELER ENGINEERING

LOG OF TEST BORING B-3

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	8 inch Solid Flight
Existing Elevation:	111.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	119.0 feet	Depth to Water:	Unknown

Sample Type and Laboratory Test Legend

Cal Modified California Sampler
SPT Standard Penetration Test
ST Shelby Tube
CK Chunk
DR Drive Ring

MD Max Density
SO4 Soluble Sulfates
SA Sieve Analysis
HA Hydrometer
SE Sand Equivalent
PI Plasticity Index
CP Collapse Potential
DS Direct Shear
Con Consolidation
EI Expansion Index
R-Val Resistance Value
Chl Soluble Chlorides
Res pH & Resistivity
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			CL	Old Paralic Deposits (Qop): Dark brown, damp, loose, SANDY CLAY, mottled, upper 2' moderately weathered.							
					28	Cal					
5			SC	Light yellowish-brown, moist, medium dense, very fine- to medium-grained, CLAYEY SAND.	39	Cal					
			SM	Light yellowish-brown, moist, medium dense, very fine- to medium-grained, VERY SILTY SAND.							
10					25	Cal					
15			SP-SM	Light gray, damp, medium dense, very fine- to medium-grained, POORLY GRADED SAND with silt and gravels.	50/5"	Cal**					
				Gravel/cobble bed at 16 to 17 feet.	50/1"	SPT*					
				Boring terminated at 17 feet. No groundwater or seepage encountered.							
20											
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION 8280 CALLE DEL CIELO LA JOLLA, CALIFORNIA			
DATE:	JUNE 2017	JOB NO.:	2160564.02
BY:	SRD	FIGURE NO.:	A-3

CHRISTIAN WHEELER ENGINEERING

LOG OF TEST BORING B-4

Sample Type and Laboratory Test Legend

Cal Modified California Sampler
SPT Standard Penetration Test
ST Shelby Tube
CK Chunk
DR Drive Ring

MD Max Density
SO4 Soluble Sulfates
SA Sieve Analysis
HA Hydrometer
SE Sand Equivalent
PI Plasticity Index
CP Collapse Potential
DS Direct Shear
Con Consolidation
EI Expansion Index
R-Val Resistance Value
Chl Soluble Chlorides
Res pH & Resistivity
SD Sample Density

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	8 inch Solid Flight
Existing Elevation:	82.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	74.0 feet	Depth to Water:	Unknown

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				4" of AC.							
			SC	Old Paralic Deposits (Qop): Brown to reddish-brown, dry, loose to medium dense, very fine- to medium-grained, CLAYEY SAND, mottled, upper 2' highly weathered.	18	Cal					
				Moist, medium dense.							
5			SM	Light brown, moist, medium dense, very fine- to medium-grained, SILTY SAND.	13	Cal					
			SM	Light brown to light grayish-brown, dense, fine- to coarse-grained, SILTY SAND with clay, mottled.	41	Cal					
10											
					50/4"	Cal					
15			ML	Ardath Shale (Ta): Light yellowish-brown, moist, hard, CLAYEY SILT with sand.	50/5"	Cal					
				Boring terminated at 19 feet. No groundwater or seepage encountered.							
20											
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	JUNE 2017	JOB NO.:	2160564.02
BY:	SRD	FIGURE NO.:	A-4

CHRISTIAN WHEELER ENGINEERING

LOG OF TEST BORING B-5

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

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	8 inch Solid Flight
Existing Elevation:	73.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	70.0 feet	Depth to Water:	Unknown

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			SC	Artificial Fill (Qaf): Brown, damp, loose to medium dense, very fine- to medium-grained, SANDY CLAY.							
				Moist, medium dense.	19	Cal					
5			SC	Old Paralic Deposits (Qop): Orangish-brown to brown, moist, medium dense, very fine- to medium-grained, CLAYEY SAND, mottled.	21	Cal					
10					34	Cal					
			ML	Ardath Shale (Ta): Yellowish-brown, moist, very stiff, CLAYEY SILT with sand, moderately weathered to 16 feet.							
15					25	SPT					
				Hard.							
					50/5"	SPT					
20				Boring terminated at 19 feet. No groundwater or seepage encountered.							
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	JUNE 2017	JOB NO.:	2160564.02
BY:	SRD	FIGURE NO.:	A-5

CHRISTIAN WHEELER
ENGINEERING

LOG OF TEST BORING B-6

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	8 inch Solid Flight
Existing Elevation:	79.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	93.0 feet	Depth to Water:	Unknown

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			SC	Artificial Fill (Qaf): Brown, damp, loose to medium dense, very fine- to medium-grained, CLAYEY SAND with brick and concrete debris.							
			SC	Old Paralic Deposits (Qop): Brown to reddish-brown, damp, medium dense, very fine- to medium-grained, CLAYEY SAND.	32	Cal					
5					24	Cal					
				Fine- to coarse-grained at contact.							
10			CL	Ardath Shale (Ta): Greenish-gray, moist, very stiff, SILTY CLAY, highly weathered.	19	SPT					
			ML-CL	Light yellowish-brown to light gray, moist, very stiff, CLAYEY SILT/SILTY CLAY, slightly weathered.							
15					28	SPT					
				Boring terminated at 15 feet. No groundwater or seepage encountered.							
20											
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	JUNE 2017	JOB NO.:	2160564.02
BY:	SRD	FIGURE NO.:	A-6

CHRISTIAN WHEELER
ENGINEERING

LOG OF TEST BORING B-7

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	8 inch Solid Flight
Existing Elevation:	78.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	80.0 feet	Depth to Water:	Unknown

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			SC	Artificial Fill (Qaf): Brown, dry, loose to medium dense, very fine- to medium-grained, CLAYEY SAND with concrete debris in the upper 2 feet.							
				Medium dense.	14	Cal					
5					14	Cal					
10			SC/ CL	Old Paralic Deposits (Qop): Reddish-brown to brown, moist, dense, very fine- to medium-grained, CLAYEY SAND/SANDY CLAY, mottled.	38	Cal					
15											
				Fine- to coarse-grained with gravels at contact.							
20			ML/ CL	Ardath Shale (Ta): Yellowish-brown to light gray, moist, very stiff, CLAYEY SILT/SILTY CLAY.	26	SPT					
				Boring terminated at 20 feet. No groundwater or seepage encountered.							
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	JUNE 2017	JOB NO.:	2160564.02
BY:	SRD	FIGURE NO.:	A-7

CHRISTIAN WHEELER
ENGINEERING

LOG OF TEST BORING B-8

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	8 inch Solid Flight
Existing Elevation:	83.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	86.0 feet	Depth to Water:	Unknown

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			SC	**Artificial Fill (Qaf):** Brown, dry, loose to medium dense, very fine- to medium-grained, CLAYEY SAND with gravels and concrete debris.							
				Moist, medium dense.	18	Cal					
5				Brick debris at 5 feet.	20	Cal					
10			SC	**Old Paralic Deposits (Qop):** Reddish-brown to brown, moist, dense, very fine- to medium-grained, CLAYEY SAND/SANDY CLAY.	44	Cal					
			SM	Light brown, moist, dense, very fine- to medium-grained, SILTY SAND.							
			SC	Reddish-brown to light gray, moist, dense, very fine- to medium-grained, CLAYEY SAND.	57	Cal					
15				Boring terminated at 14.5 feet. No groundwater or seepage encountered.							
20											
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	JUNE 2017	JOB NO.:	2160564.02
BY:	SRD	FIGURE NO.:	A-8

CHRISTIAN WHEELER ENGINEERING

LOG OF TEST BORING B-9

Date Logged:	5/11/2017	Equipment:	Diedrich D-50
Logged By:	DJF	Auger Type:	8 inch Solid Flight
Existing Elevation:	89.0 feet	Drive Type:	140lbs/30 inches
Proposed Elevation:	93.0 feet	Depth to Water:	Unknown

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:** Brown, dry, loose, very fine- to medium-grained, CLAYEY SAND, porous.							
			CL	Old Paralic Deposits (Qop): Brown, moist, very stiff, SANDY CLAY, upper 12" highly weathered, porous.	33	Cal					
				Very stiff..							
5			SC	Orangish-brown, moist, medium dense, very fine- to medium-grained, CLAYEY SAND.	20	Cal					
			SM	Light brown to light orangish-brown, moist, dense, very fine- to medium-grained, SILTY SAND.	38	Cal					
10			SP-SM	Light brown, moist, dense, fine- to coarse-grained, POORLY GRADED SAND with silt.							
15					64	Cal					
				Boring terminated at 16.5 feet. No groundwater or seepage encountered.							
20											
25											
30											

Notes:

Symbol Legend

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

LA JOLLA 8-LOT SUBDIVISION
8280 CALLE DEL CIELO
LA JOLLA, CALIFORNIA

DATE:	JUNE 2017	JOB NO.:	2160564.02
BY:	SRD	FIGURE NO.:	A-9

CHRISTIAN WHEELER
ENGINEERING