CEQA DRAINAGE STUDY
BRIGHTWATER RANCH

County of San Diego, CA
April 20, 2015

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DECLARATION OF RESPONSIBLE CHARGE

I HEREBY DELCARE THAT I AM THE ENGINEER OF WORK FOR THIS PROJECT, THAT I HAVE EXERCISED RESPONSIBLE CHARGE OVER THE DESIGN OF THE PROJECT AS DEFINED IN SECTION 6703 OF THE BUSINESS AND PROFESSSIONS CODE, AND THAT THE DESIGN IS CONSISTENT WITH CURRENT STANDARDS.

I UNDERSTAND THAT THE CHECK OF PROJECT DRAWINGS AND SPECIFICATIONS BY THE COUNTY OF SAN DIEGO IS CONFINED TO A REVIEW ONLY AND DOES NOT RELIEVE ME, AS ENGINEER OR WORK, OF MY RESPONSIBILITIES FOR PROJECT DESIGN.

Greg Shields, RCE 42951 — Date: 4-20-15

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1. INTRODUCTION

This drainage report supports the preliminary design of the proposed storm drain improvements associated with the Brightwater Ranch project, for a Tentative Map (TM) submittal. The project's name was formerly known as Los Coches during previous entitlement work. The project is located in the unincorporated area of the County of San Diego (County) and is approximately 0.3 miles west of business route 8, and 0.4 mile south of Los Coches Road. The project is bounded by 1) undeveloped area to the northwest, 2) an existing subdivision to the north, 3) a mobile home park to the south, and 4) a future development named Jackson Ridge to the east. See Vicinity Map, Figure 1, for the project location. Note that at the time of the preparation of this report, the mass grading plans for Jackson Ridge are being processed by Hunsaker and Associates through the County, and therefore it is assumed that Jackson Ridge would be constructed prior to Brightwater Ranch.

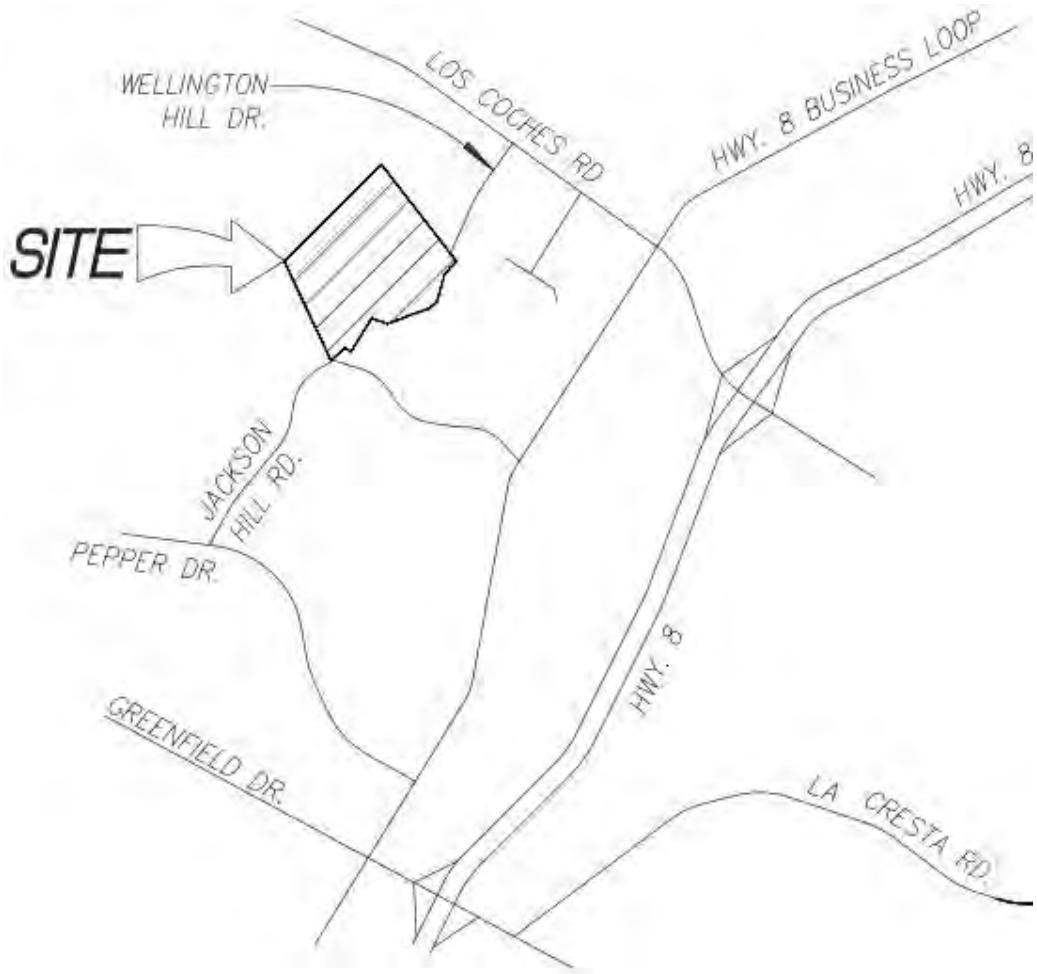


Figure 1: Project Vicinity Map

Brightwater Ranch consists of 76.23 acres. In general, the project when developed will consist of 66 single-family lots of 10,000 to 36,000 square feet, open space, and public right of way for streets, access easements, and necessary utility easements. The existing drainage pattern of the project flows in a northeasterly direction to two main concentration points at the northeast edge of the project. Culverts at the concentration points convey the flow to and within the existing Foxborough Lane and Wellington Hill Drive storm drain systems. The proposed drainage patterns will be preserved in the proposed condition and the storm runoff will be collected and conveyed to the existing storm drain systems in Foxborough Lane and Wellington Hill Drive.

The purpose of this report is to determine hydrologic impact, if any, to the existing storm drain facilities or natural drainage, and provide peak 100-year discharge values for existing and proposed conditions, and to provide the required analysis for an environmental CEQA-level analysis of potential development impacts and mitigations with respect to drainage.

The drainage analyses presented herein reflect a Tentative Map level-of-effort, which include peak 100-year storm event hydrologic analyses using relative street and lot grades. Hydraulic analyses for detention, inlets, pipe inverts and HGL's will be provided during final engineering, although some preliminary calculations are included herein for TM purposes. *Therefore, the purpose of this report submittal is to acquire from the County: 1) concept approval of the proposed storm drain layout and detention basin sizing, 2) approval of the methodology used in the evaluation of the project storm drain system hydrology, and 3) identification of critical path drainage issues that need to be addressed during final engineering.*

The post-construction best management practices (BMPs) for the project are currently being developed in conjunction with the Preliminary Storm Water Management Plan (SMWP) and Preliminary Hydromodification Report for the Brightwater Ranch project.

2. EXISTING AND PROPOSED DRAINAGE PATTERNS AND IMPROVEMENTS

The following sections provide descriptions of the existing and proposed drainage patterns and improvements for the project.

2.1 Existing Drainage Patterns

The site currently consists of unimproved natural terrain, covered with annual grass and some brush, and draining generally from southwest to northeast. Slopes vary from a very steep 40 percent to a moderate 8 percent. Natural drainage channels drain the site. Minimal drainage structures are located on the property. Runoff flows overland down the hillsides. The hilltop creates a ridgeline, so that a small area west of the hilltop sheetflows west to a concrete brow ditch that runs along the western perimeter of the site, discharging into a natural drainage basin approximately 350 feet north of the termination point of Jackson Hill Drive. A small area east the ridgeline sheetflows south to a concrete brow ditch that runs along the southern perimeter of the site (adjacent to the existing trailer park), discharging to a concrete brow ditch that runs along the western perimeter of the existing trailer park. Any flow from these unimproved open spaces reaching the offsite County storm drain systems west of the site would discharge to Forrester Creek. These areas are not being disturbed by construction or impacted in any way by the development; therefore, they are not included in this drainage analysis.

Most of the runoff from the remainder of the site drains to the east and is collected by two existing offsite culverts, which convey flows to and within the existing Foxborough Lane and Wellington Hill Drive storm drain systems. The offsite existing County improvements consist of street curb and gutter systems, curb inlets, and two 30-inch cast-in-place concrete pipes (CIPCPs), which are the main line storm drains on Foxborough Lane and Wellington Hill Drive. Runoff from these storm drains eventually discharge to Los Coches Creek. A copy of the improvement plan for the existing downstream storm drain system is located in Appendix 1.

As shown on Exhibit B in Appendix 2, there is subdivision development to the northwest, northeast, south, and southeast of the proposed project. The northwest and northeast developments abut immediately adjacent to the proposed project boundary, and there is some run-on from the backyards of the adjacent properties northwest of the site. The northeast

perimeter of the site is protected from run-on by an existing brow ditch, which directs runoff to the existing headwall of the Foxborough Lane CIPCP in the northeast and to the existing headwall of the Wellington Hill Drive CIPCP in the east. There is also a small amount of run-on at the eastern corner of the site; however the area of significant run-on is from the south. A portion of the existing trailer park discharges onto the project area. This run-on is accounted for in the hydrology calculations in this report.

2.2 Proposed Drainage Patterns and Improvements

The proposed development consists of 66 single-family lots of 10,000 to 36,000 square feet, several open space lots, and public right of way for streets, access easements, and necessary utility easements. The onsite drainage improvements consist of streets, curbs and gutters, curb inlets (two with inlet inserts), catch basins, one detention basin, one bioretention area, and an underground pipe storm drain system. Flow will be conveyed by the street curb and gutter systems to the proposed curb inlets. The onsite storm drain systems will connect to the existing County storm drain systems on Foxborough Lane and Wellington Hill Drive. The onsite detention facility shall be used for hydromodification and water quality purposes prior to offsite discharge. Post-project discharge rates and durations shall not deviate above the pre-project rates and durations by more than is allowable for the range of flows regulated by the final hydromodification requirements.

It is proposed that the project storm drain connection to the existing Wellington Hill Drive storm drain would tie into the Wellington Hill Drive lateral to be built as part of the Jackson Ridge Parkway storm drain plans. Recent coordination with Hunsaker was completed to ensure that the pipe size and inverts proposed with the Jackson Ridge grading plans will work for the future condition of both projects. Hunsaker revised their grading plan per Construction Change 3 by lowering their original profile design for the Wellington Hill Drive storm drain in order to accommodate a lowered connection point needed for the Brightwater Ranch proposed basin. Refer to Appendix 1 for a copy of Hunsaker's revised Wellington Hill Drive storm drain profile sheet.

3. HYDROLOGY CRITERIA, METHODOLOGY, AND RESULTS

3.1 Hydrology Criteria

The drainage basins were delineated using available topography and the preliminary proposed grading layout for the project. Table 1 summarizes the key hydrology assumptions and criteria used for the hydrologic modeling.

Table 1: Hydrology Criteria

Existing and Proposed Hydrology:	100-year storm frequency
Soil Type:	Hydrologic Soil Group B and C per USDA web soil survey. See Exhibit C (Appendix 2).
Land Use / Runoff Coefficients:	Based on criteria presented in the 2003 County of San Diego Hydrology Manual. Estimate provided for each subarea in hydrologic model.
Rainfall intensity:	Based on intensity duration frequency relationships presented in the 2003 County of San Diego Hydrology Manual.

3.2 Hydrologic Methodology

The hydrology methodology for the project is straightforward. The Modified Rational Method was used to determine the storm flows for the design of the storm drain improvements. The goal of the project hydrology analysis was to:

- Determine post-development storm flows for the sizing of the onsite storm drain system gutters and curb inlets that convey flow to the existing County storm drain improvements. From an analytical perspective, the project hydrology was prepared using relative lot and street grades.
- Verify that the project does not adversely impact the existing County storm drain improvements. A comparative analysis was performed between REC's drainage study (provided in Appendix 10) and the project design storm runoff at various locations. Note that the REC study was prepared using the old County Hydrology Manual, so the results are not directly comparable, but the report is provided for comparison purposes.

The existing condition and proposed condition hydrology models were based on the existing topography and proposed site plan and preliminary grading for the site. Supplemental County of San Diego 200 scale topography was used to supplement the flown aerial topography for the site for the surrounding areas. The area to the west of the project up to the ridgeline has been included in the hydrology calculations, as well as areas contributing run-on to the property, and the area east of the property, which drains into the same backbone storm drain system as Systems 200 and 300 (see Exhibit B). Therefore, all of the applicable drainage areas are included in this drainage study.

Drainage basins for existing and proposed conditions were defined. Soil groups and land use were then overlaid on the drainage boundaries. For subareas with multiple land use zoning and/or soil types, a composite runoff coefficient (C) was calculated for the drainage area. Refer to Appendix 4 for weighted runoff coefficient calculations for existing conditions and Appendix 5 for weighted runoff coefficient calculations for proposed conditions. The weighted runoff coefficient calculations were based on the percentage of soil types, land use and imperviousness within each drainage basin. The land use densities for the onsite proposed conditions are based on the preliminary site plan for Brightwater Ranch and the estimated imperviousness of the surrounding run-on areas.

Existing and proposed storm flows were then developed using the AES Rational Method computer program. The results of these calculations are in Appendix 6 (existing conditions) and Appendix 7 (proposed conditions).

3.3 Description of Hydrologic Modeling Software

The Modified Rational Method was used to determine the 100-year storm flow for the design of the storm system. The AES Rational Method Program was used to perform the hydrologic calculations. This section provides a brief explanation of the computational procedure used in the computer model.

The AES Modified Rational Method Hydrology Program is a computer-aided design program where the user develops a node link model of the watershed. Developing independent node link models for each interior watershed and linking these sub-models together at confluence points

creates the node link model. The intensity-duration-frequency relationships are applied to each of the drainage areas in the model to get the peak flow rates at each point of interest.

3.4 Hydrology Results

Project hydrology results presented herein represent a tentative map level of effort and were used to verify that the project does not adversely impact the existing County storm drain system.

Table 2 is a summary of flows for existing and proposed conditions at the two main drainage outlet points of the project at Foxborough Lane and Wellington Drive.

Table 2: Hydrology Results

	REC STUDY				**PDC STUDY**			
	EXISTING CONDITIONS		**PROPOSED CONDITIONS**		**EXISTING CONDITIONS**		**PROPOSED CONDITIONS WITH MITIGATION**	
Outfall of Interest	***Q_{100} (cfs)***	***Contributing Area (acres)***	***Q_{100} (cfs)***	***Contributing Area (acres)***	***Q_{100} (cfs)***	***Contributing Area (acres)***	***Q_{100} (cfs)***	***Contributing Area (acres)***
Foxborough Lane Storm Drain	28.2	21.2 (Basin X)	27.4	17.1 (Basin A)	26.5	22.0 (System 100)	26.8	18.1 (System 100)
Wellington Hill Drive Storm Drain	60.2	45.2 (Basin Y)	85.1	49.3 (Basin B)	65.3	54.8 (System 200: 300, 400 and 500)	64.7*	59.5 (Systems 200, 300, 400 and 500)
Southwestern Brow Ditch	-	-	-	-	4.1	3.6 (System 700)	4.1	3.1 (System 700)
Total	**88.4**	**66.4**	**112.5**	**66.4**	**95.9**	**80.4**	**95.6**	**80.7**

* This flow rate is the scenario with routing through the Brightwater Ranch onsite detention basin (preliminary routing) with mitigation.

Capacity calculations were made on the existing CIPCP culverts at the Foxborough Lane and Wellington Hill Drive locations and are in Appendix 8. The capacity of the culvert at Foxborough Lane is 62.4 cubic feet per second (cfs) and the capacity of the culvert at Wellington Hill Drive is 109.9 cfs. The as-builts for the Foxborough Lane and Wellington Hill Drive storm drain systems are included in Appendix 1. The two storm drain systems meet approximately 600 feet downstream of the property at the intersection of Foxborough Lane and Wellington Hill Drive. The TM 3747-1 Hydrology Report and plans from the County of San Diego support these

calculations; the proposed flows are less than the design flows for the system and less than existing condition flows.

Table 3: Hydraulic Summary

Existing Pipe	**Size**	**Capacity**
Foxborough Lane CIPCP	30-inch	62.4 cfs (2%)
Wellington Hill Drive Storm Drain	30-inch	109.9 cfs (6.2%)

3.5 Analysis of Hydrology Results for Project Outfalls

The results in Table 2 provide a comparison for the project outfalls. Each outfall is discussed below in relation to the project's impacts and proposed mitigations with respect to increased velocities, concentration of flows, and increased quantities of flows.

Outfall #1/System 100: Due to grading constraints (the requirement to develop the least environmentally sensitive areas) and in order to maintain existing drainage patterns, System 100 cannot drain to the onsite detention basin. Therefore, it is proposed that System 100 storm drain system bypass the detention basin and connect directly to the existing Foxborough Lane culvert. Capacity calculations were made on the proposed culvert discharging to the existing Foxborough Lane 30-inch CIPCP. Because of the very steep slope of this pipe and accompanying high velocities, the existing concrete apron upstream of the Foxborough culvert will be extended up to the proposed culvert's downstream headwall. In addition, several brow ditches will collect runoff and discharge to the existing Foxborough Lane CIPCP: a northern perimeter brow ditch, directing run-on from the subdivision development to the northwest; an eastern perimeter brow ditch, collecting runoff from the slope; and two existing offsite brow ditches, collecting runoff from the subdivision development to the northeast.

Under proposed conditions, the Foxborough Lane storm drain is expected to have only a 0.3 cfs increase in flow rates from the proposed development due to the reduction in the size of its drainage basin; therefore, the proposed 100-year flow at this location (26.8 cfs) is well within the capacity of the culvert. The Foxborough Lane culvert connects with the Wellington Hill Drive culvert approximately 600 feet downstream of the property and discharges to Los Coches Creek. Since flow rates are only increasing by approximately 1% (0.3 cfs) and the time of concentration is only decreasing by approximately 3% (0.3 min), no adverse impacts are expected at the outfall to Los Coches Creek. Therefore, no significant adverse impact is expected due to the minimal increase in peak flow rate for the proposed condition at Outfall #1.

Outfall #2/Systems 200 & 300: Under proposed conditions, the unmitigated peak flow from Systems 200 & 300 is 77.75 cfs, and after routing through the water quality hydromodification basin, the peak discharge rate will be approximately 51.6 cfs, based on the preliminary detention calculations in Appendix 3. The combined flow to the Wellington Hill Drive storm drain will be well below the capacity of the culvert at Wellington Hill Drive. Therefore, the culvert at Wellington Hill Drive will be capable of handling the flow, including the System 400 bypass and offsite flows. Refer to the Preliminary Hydromodification Report for the Brightwater Ranch project, prepared by Project Design Consultants (PDC) under a separate cover, which provides calculations/modeling results supporting the expected reduction in flow rate compared to pre-project conditions due to routing through the onsite detention basin. The basin will be sized to meet hydromodification and water quality requirements for the tributary drainage area, so no significant adverse impact is expected due to the proposed condition at Outfall #2. Final detention basin routing and sizing calculations will be included as part of the final engineering drainage report submittal. Preliminary calculations are included in Appendix 3.

With regard to the existing Wellington Hill Drive 30-inch CIPCP, since upstream flows will be directed into the onsite detention basin, flow collected at the existing headwall will greatly reduce. Therefore, no drainage improvements are required in this area.

Outfall #3/System 700: There will be only minor changes between existing and proposed conditions. System 700 includes steep hillside areas that collect in an existing concrete-lined brow ditch that drains to the south. The proposed condition includes a water easement access

road. The runoff from the new road and the existing hillside will drain to the same brow ditch to match existing conditions.

3.6 Cumulative Analysis of Hydrology Results Compared to Los Coches Creek

Table 2 summarizes the results for each project outfall individually. In order to determine if project impacts exist compared to the overall watershed, a different type of analysis is warranted. With regard to the project's watershed, the offsite storm drain system conveys project flows approximately one and a half miles to the Los Coches Creek, which enters the San Diego River approximately five miles downstream. Since the project is situated at the upstream end of the Lower San Diego Hydrologic Area (HA 907.1), which is still approximately 20 miles upstream of the river's termination at the Pacific Ocean, the peak of the project's runoff will occur within the peak of the overall watershed's hydrograph. Therefore, detention of peak onsite flows is warranted to reduce the downstream peak flow rates during the peak of the hydrograph.

Table 4 below summarizes the results described above in Sections 3.5 and 3.6 with respect to the project's impacts on discharge velocities, concentration of flows, and increased quantities of flows.

Table 4: Summary of Potential Project-Related Drainage Impacts

Outfall of Interest	*a. Increased velocity of discharge*	*b. Concentration of flows*	*c. Increased quantities of flows*
Foxborough Lane Storm Drain (System 100)	Negligible increase: velocity increases from 15.18 ft/s to 15.22 ft/s.	Concentration points roughly mimic existing conditions	Negligible increase: peak flow increases from 26.5 cfs to 26.8 cfs.
Wellington Hill Drive Storm Drain (Systems 200& 300)	Detention basin proposed		Peak flow decreases, and is still less than backbone capacity of 109.9 cfs. Proposed detention basin will attenuate flow such that increase in peak flow is not a significant project impact. Final routing calculations will be performed during final engineering, however, preliminary routing calculations are included in Appendix 3.
Southwestern Brow Ditch (System 700)	No increase	No change	No increase

3.7 Water Quality Basin Sizing

Table 5 summarizes the basin volume required and the proposed basin volume per the tentative map. The water quality volume for each basin was sized according to County of San Diego criteria using the 85th percentile rainfall depth of 0.7 inches. The basin is proposed for water quality and hydromodification purposes, but will attenuate the 100-year hydrograph slightly. Refer to the Preliminary Storm Water Management Plan for further information regarding the post-construction BMPs selected for this project. Per page 77 of the County SUSMP, this facility requires volume for water quality, peak flow detention, and hydromodification. Because both the water quality and hydromodification requirements both detain the smaller storm events, the water quality volume and hydromodification volume can be thought of as partially overlapping in terms of storage requirements in combined facilities. Therefore, the summary table below includes the volume estimates for the 100-year and water quality volume compared to the total basin volume provided. For detailed calculations, refer to the Storm Water Management Plan and Hydromodification reports.

Table 5: Water Quality Basin Summary

Basin #	*Type of Basin*	*System #*	*Drainage Area (ac)*	*C* (WQ)*	*WQ Volume (af)*	*Detention Volume Estimate (af)*	*Proposed Basin Volume (minimum to also address Hydromodification Volume) (af)*
1	WQ / Hydromod	200 & 300	43.03	0.30	0.84	1.0	2.3

* This is a weighted runoff factor based on the percent impervious (% Imper.) from the Land Uses listed in Table 3-1 in the 2003 San Diego County Hydrology Manual 2003 in conjunction with the runoff factors from Table 4-2 in the 2009 Model SUSMP. Refer to Appendix 5 for the weighted runoff coefficient calculations for the water quality (WQ) basin sizing.

3.8 Hydromodification Analysis

It is anticipated that the onsite detention basin will also address hydromodification requirements, since both water quality basins and hydromodification basins produce similar alterations to the flow regime for the smaller, more frequent storm events. For more information regarding how the project complies with the final hydromodification requirements, refer to the Preliminary Hydromodification Management Study, prepared by Project Design Consultants. The stated purpose of the final hydromodification requirements is "…to manage increases in runoff

discharge rates and durations from all Priority Development Projects, where such increased rates and durations are likely to cause increased erosion of channel beds and banks, sediment pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force" (County Final HMP, page ES-1).

Flow duration control is the most common form of hydromodification management, and the project will comply with the hydromodification requirements. The majority of all onsite water will be treated with water quality/hydromodification basin, which will detain the smaller, more frequent events, thereby mitigating the post-development onsite flows. Therefore, no problems are expected downstream of the project as a result of this development.

4. HYDRAULIC CRITERIA, METHODOLOGY, AND RESULTS

Hydraulic calculations for pipes, inlets, and ditches will be performed during final engineering. However, minor hydraulic calculations are necessary for the TM stage. Based on information from the approved downstream storm drain plans (Appendix 1) and the REC drainage study submitted for this project (Appendix 10), normal depth calculations were run to determine curb inlet, catch basin and culvert sizing and capacity (Appendix 8).

The backbone storm drain system is capable to conveying the existing condition 100-year flow. Under existing conditions, the peak flows from Systems 200 & 300 are divided between three culverts; while under proposed conditions, all of the flow would enter the backbone system at one point. The proposed detention basin will attenuate the flow so that the 30-inch backbone pipe will adequately convey the flow.

The project area is shown on one FEMA FIRM panel (Appendix 9). Per FEMA FIRM panel 06073C1660G, the site is outside of any FEMA special flood hazard areas.

5. ENVIRONMENTAL IMPACTS

This section summarizes the following questions for CEQA purposes.

Would the project:

1. **Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or offsite?**

   No, the project's drainage patterns mimic the existing conditions, so no substantial impacts will exist. The project does not propose to alter the downstream waterbodies (Los Coches Creek or San Diego River). Development of the project will not result in substantial erosion or siltation on- or offsite.

2. **Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite?**

   No, existing drainage patterns will be maintained. The project will not substantially increase the rate or amount of surface runoff in a manner that would result in any substantial increase of flooding on- or offsite.

3. **Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems?**

   No, the capacity of the existing 30-inch culverts will not be exceeded with the proposed project flow rates. The project proposes to detain stormwater onsite and does not increase peak flows to the creek; therefore, the project will not contribute runoff water that would substantially change the existing condition or exceed the capacity of existing or planned stormwater drainage systems.

4. **Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map, including County Floodplain Maps? For example; research the foregoing and provide same (to indicate applicability or not) in the study.**

   No, the project is approximately five miles southwest of Los Coches Creek and well above all mapped flood hazard areas. Refer to the FEMA FIRMette in Appendix 9.

5. **Place within a 100-year flood hazard area structures which would impede or redirect flood flows?**

   No, the project is approximately five miles southwest of Los Coches Creek and well above all mapped flood hazard areas. Refer to the FEMA FIRMette in Appendix 9.

6. Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam onsite or offsite?

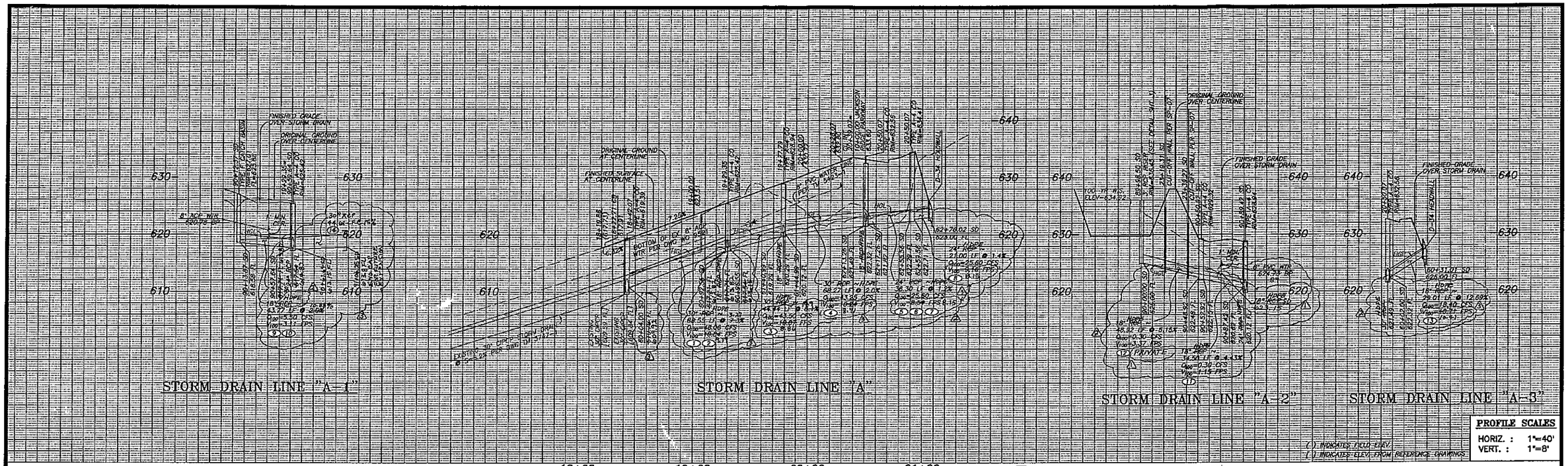
No, there are no dams or levees within or near the project site. The onsite basin may be designed with small berms, but will be designed adequately to reduce the potential for subsurface piping.

6. CONCLUSION

This drainage report has been prepared in support of the preliminary design of the storm drain improvements for the tentative map for the Brightwater Ranch project. The purpose of this report is to provide peak discharges for use in designing the private and public storm drain systems for the project and to address issues regarding comparing the post-project flows to the pre-project flows. The hydrology results indicate that the peak flows from the developed site do not exceed the capacity of existing stormwater drainage systems. Therefore, the storm drain system will be sufficient to satisfy County criteria in the post-development condition.

APPENDIX 1

Approved Downstream Storm Drain Plans



PROFILE SCALES
HORIZ. : 1"=40'
VERT. : 1"=8'

() INDICATES FIELD ELEV.
( ) INDICATES ELEV. FROM REFERENCE DRAWINGS

STORM DRAIN NOTES (TYPICAL)

REINFORCED CONCRETE PIPE (RCP)

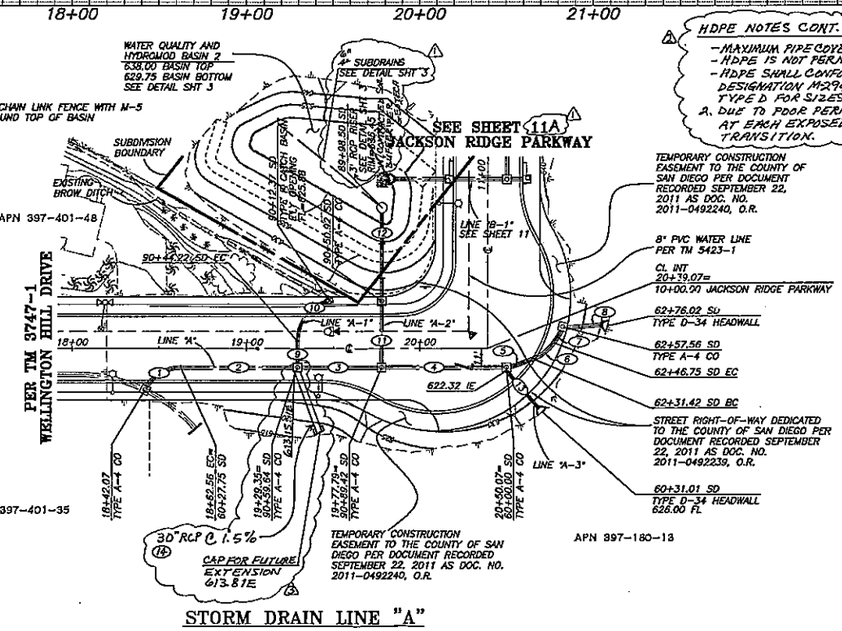
1. AT MINIMUM, RCP'S SHALL BE MANUFACTURED OF TYPE II PORTLAND CEMENT (SEE TABLE B-1 OF THE SAN DIEGO COUNTY DRAINAGE DESIGN MANUAL). TYPE II PORTLAND CEMENT SHALL CONFORM TO ASTM C-150, WITH THE FOLLOWING MODIFICATIONS:
   A) CEMENT SHALL NOT CONTAIN MORE THAN 0.6 PERCENT BY WEIGHT ALKALIS, CALCULATED AS THE PERCENTAGE OF Na_2O PLUS 0.658 TIMES THE PERCENTAGE OF K_2O, DETERMINED BY EITHER DIRECT INTENSITY FLAME PHOTOMETRY OR THE ATOMIC ADSORPTION METHOD (PER ASTM C-114).
   B) AUTOCLAVE EXPANSION SHALL NOT EXCEED 0.5 PERCENT.
   C) MORTAR CONTAINING PORTLAND CEMENT AND SAND SHALL NOT EXPAND IN WATER MORE THAN 0.01 PERCENT AND SHALL NOT CONTRACT IN AIR MORE THAN 0.048 PERCENT.
2. TYPE V PORTLAND CEMENT SHALL CONFORM TO ASTM C-150, WITH THE MODIFICATIONS LISTED ABOVE FOR TYPE II PORTLAND CEMENT.
3. VALUES FOR THE SOLUBLE SULFATE CONTENT OF THE PROPOSED BACKFILL, WATERSHED SOIL, OR RUNOFF SHALL BE PROVIDED WHEN THE SOIL RESISTIVITY MEASURES LESS THAN 3000 OHM-CM.
4. USE OF POROUS CONCRETE PIPE WITH SHELL THICKNESS OF 1 INCH OR LESS IS NOT ADVISABLE WHEN SOIL OR BACKFILL PH IS BELOW 6.5.
5. PROTECTIVE COATINGS (E.G., COAL TAR OR EPOXY) SHALL BE USED WHEN SOIL OR BACKFILL PH IS BELOW 5.5.
6. MINIMUM COVER FOR RCP SHALL BE 2 FT WHEN PLACED UNDER UNPAVED AREAS OR UNDER FLEXIBLE PAVEMENT.
7. MINIMUM COVER FOR RCP SHALL BE 1 FT WHEN PLACED UNDER RIGID PAVEMENTS.
8. MINIMUM PIPE STRENGTH SHALL BE DETERMINED BY PIPE DIAMETER AND DEPTH OF COVER, WITH APPROPRIATE ACCOUNTING FOR BACKFILL PLACEMENT METHOD, AS DESCRIBED IN TABLE B-2 OF THE SAN DIEGO COUNTY DRAINAGE DESIGN MANUAL.

BMP STENCIL PLACEMENT

1. ALL STORM DRAIN INLETS AND CATCH BASINS WITHIN THE PROJECT AREA SHALL HAVE A STENCIL OR TILE PLACED WITH PROHIBITIVE LANGUAGE (SUCH AS: "NO DUMPING — I LIVE IN THE SAN DIEGO RIVER") AND/OR GRAPHICAL ICONS TO DISCOURAGE ILLEGAL DUMPING.
2. SIGNS AND PROHIBITIVE LANGUAGE AND/OR GRAPHICAL ICONS, WHICH PROHIBIT ILLEGAL DUMPING, MUST BE POSTED AT PUBLIC ACCESS POINTS ALONG CHANNELS AND CREEKS WITHIN THE PROJECT AREA.
3. LEGIBILITY OF STENCILS, TILES AND SIGNS MUST BE MAINTAINED AND TILES MUST BE PLACED FLUSH WITH THE TOP OF CONCRETE TO REDUCE TRIPPING BY PEDESTRIANS.

HDPE PIPE

1. PIPES UPTO AND INCLUDING 48-INCH DIAMETER ARE REQUIRED TO BE INSTALLED IN ACCORDANCE WITH THE FOLLOWING:
   - PIPE WILL BE BACKFILLED WITH CRUSHED ROCK IN ACCORDANCE WITH REGIONAL STANDARD DWG. S-4, TYPE C ROCK ENVELOPE. THE CRUSHED ROCK ALSO REQUIRES A FILTER FABRIC "BURRITO" WRAP.
   - THE REMAINDER OF THE TRENCH WILL BE BACKFILLED WITH THE SPECIFIED BACKFILL COMPACTED TO 90 PERCENT RELATIVE COMPACTION PER CALIFORNIA TEST METHOD 216 AS MODIFIED BY THE COUNTY OF SAN DIEGO OR ASTM D 1557 (LATEST EDITION) EXCEPT FOR THE PORTION IN THE PAVEMENT SUBGRADE WHICH SHALL BE COMPACTED TO 95 PERCENT RELATIVE COMPACTION.



STORM DRAIN LINE "A"
WELLINGTON HILL DRIVE
(SEE SHEET NO. 4A FOR GRADING)

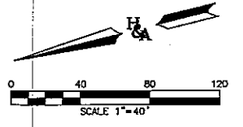
HDPE NOTES CONT.

- MAXIMUM PIPE COVER SHALL NOT EXCEED THE AMOUNT SPECIFIED IN THE CURRENT CALTRANS DESIGN MANUAL.
- HDPE IS NOT PERMITTED IN AREAS OF RUNNING GROUND OR IN AREAS WITH UNSTABLE TRENCH WALLS.
- HDPE SHALL CONFORM TO CURRENT AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO) DESIGNATION M294, TYPE S (SMOOTH INTERIOR) FOR SIZES FROM 4-INCH DIAMETER THROUGH 36-INCH DIAMETER, OR TYPE D FOR SIZES 42-INCHES THROUGH 48-INCHES IN DIAMETER.

2. DUE TO POOR PERFORMANCE OF HDPE WHEN EXPOSED TO FIRE, THE LAST 10-FEET (2 SECTIONS TYPICALLY) OF CULVERT AT EACH EXPOSED END IS REQUIRED TO BE RCP. THIS WILL NECESSITATE A CONCRETE LUG FOR THE HDPE RCP TRANSITION.

STORM DRAIN DATA

	BEARING/DELTA	RADIUS	LENGTH	REMARKS
1	60°29'21"	22.50'	23.75'	30" RCP-1350-D HDPE ASTM F 2306
2	N 14°09'01" E		64.80'	30" RCP-1350-D HDPE ASTM F 2306
3	N 14°09'01" E		44.44'	30" RCP-1350-D HDPE ASTM F 2306
4	N 14°09'01" E		68.27'	30" RCP-1350-D HDPE ASTM F 2306
5	N 5°49'49" W		14.16'	24" RCP-1350-D HDPE ASTM F 2306
6	36°35'34"	24.00'	15.33'	24" RCP-1350-D HDPE ASTM F 2306
7	N 42°25'23" W		8.81'	24" RCP-1350-D HDPE ASTM F 2306
8	N 9°36'43" E		21.00'	24" RCP-1350-D HDPE ASTM F 2306
9	N 75°50'59" W		13.42'	18" RCP-1350-D HDPE ASTM F 2306
10	72°27'08"	24.00'	30.35'	18" RCP-1350-D HDPE ASTM F 2306
11	N 75°50'59" W		34.50'	18" RCP-1350-D HDPE ASTM F 2306
12	N 75°50'59" W		48.92'	18" RCP-1350-D HDPE ASTM F 2306
13	N 64°00'55" E		28.01'	18" RCP-1350-D HDPE ASTM F 2306
14	N 67°01'15" E		44.81'	30" RCP1350-D



HUNSAKER & ASSOCIATES SAN DIEGO INC
PLANNING 9707 Waples Street
ENGINEERING San Diego, Ca 92121
SURVEYING PH(858)558-4500 FX(858)558-1414

RECORD PLAN

BY: _____ DATE: _____
RAYMOND L. MARTIN
RCE NO: 48670 EXPIRES: 6-30-14

REGISTERED PROFESSIONAL ENGINEER RAYMOND L. MARTIN NO. 48670 EXP. 6/30/14 CIVIL STATE OF CALIFORNIA

COUNTY APPROVED CHANGES

NO.	DESCRIPTION:	APPROVED BY:	DATE:
1	REVISE SIZE SUBDRAIN, STORM, CHAS. TOTAL SHEET #	cm	9/11/14
2	REVISE STORM DRAIN	cm	10/15/14
3	REVISE STORM DRAIN & TOTAL SHT. NO.	cm	11/24/14

BENCH MARK

DESCRIPTION: EC 0155 C/L MONUMENT BRASS DISC SET IN CONCRETE BELOW SURFACE
LOCATION: WINTER GARDENS BOULEVARD AT INTERSECTION WITH GOLDEN RIDGE ROAD STA 57/62.06
RECORD FROM: COUNTY OF SAN DIEGO
ELEVATION: 648.738 DATUM: NGVD 29

PRIVATE CONTRACT

SHEET 10 | COUNTY OF SAN DIEGO DEPARTMENT OF PUBLIC WORKS | 29 SHEETS

STORM DRAIN PLAN FOR:

COUNTY OF SAN DIEGO TRACT TM 5423 RPL3

CALIFORNIA COORDINATE INDEX 243-1797 (CCS 27)

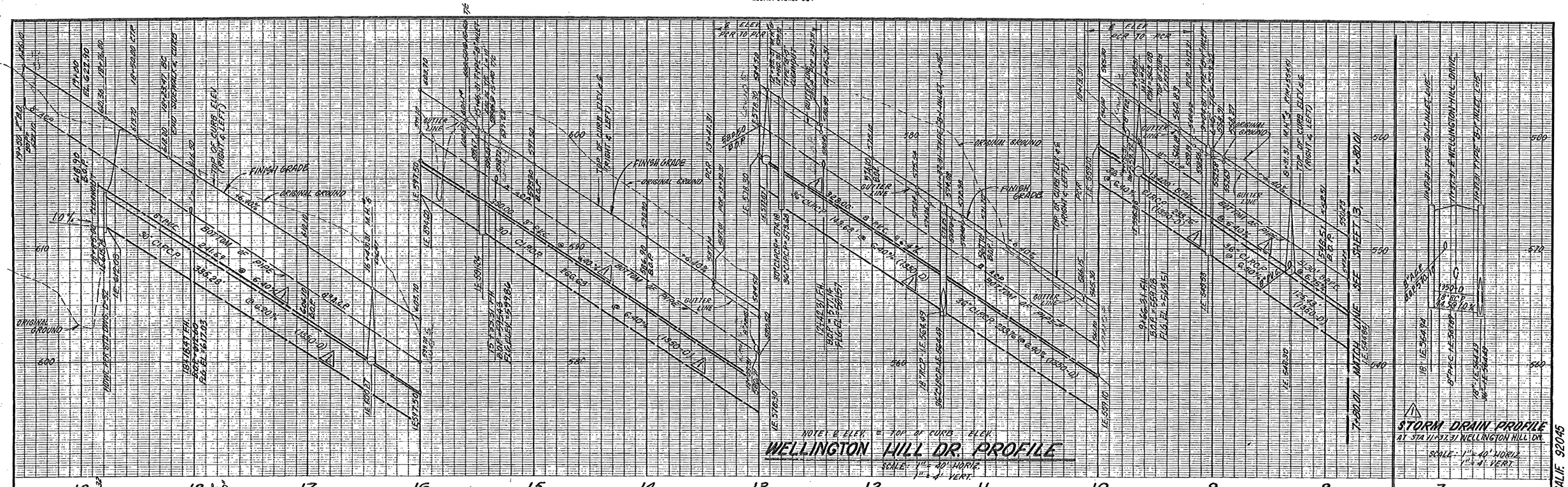
APPROVED FOR: MOHAMAD FAKHRADDINE, COUNTY ENGINEER
BY: _____ DATE: 2/27/14
ENGINEER OF WORK: RAYMOND L. MARTIN, RCE 48670
GRADING PERMIT NO: PDS2013-LDGRMJ-00006

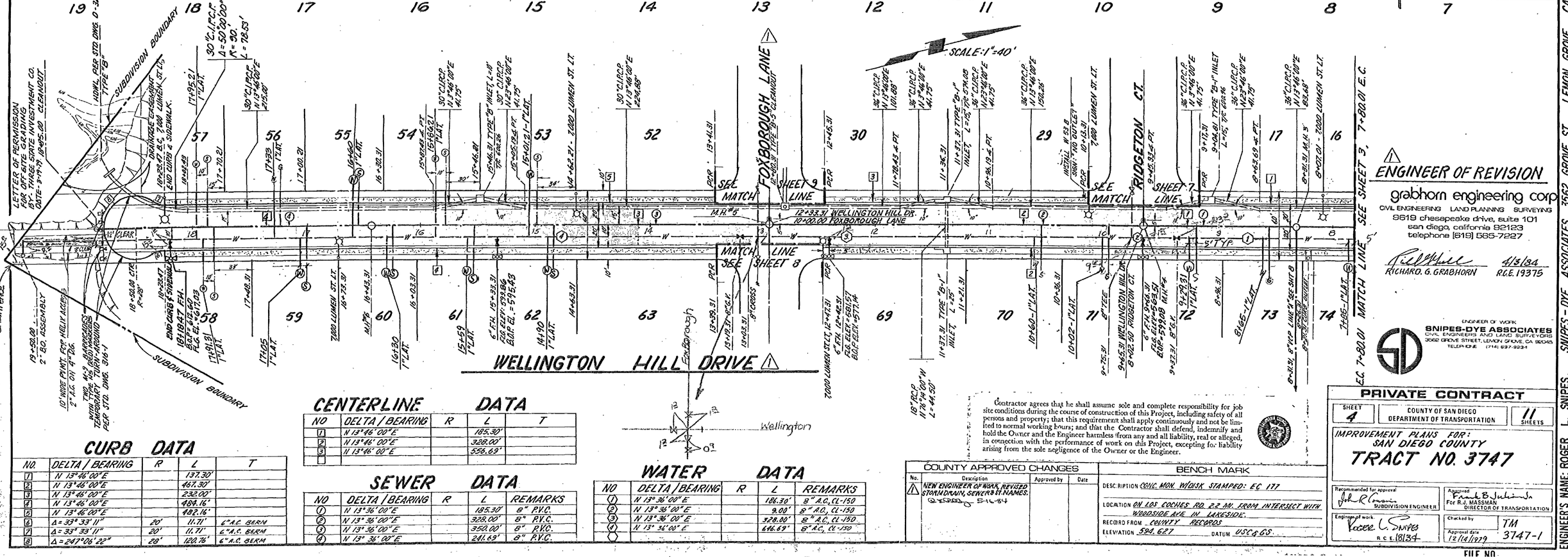
PDS 2014-LDPCHG-00033
PDS 2013-LDPCHG-00090
PDS 2014-LDPCHG-00112

W.O. # 2522-0006
ENGINEER: HUNSAKER & ASSOC., S.D., INC.
PHONE: (858) 558 - 4500

R:\1134\&Eng\Mass Grading\1134$MGSD10.dwg[]Feb-25-2014:15:08

"PERFECT" PROFILE
PLATE A
ROONEY STOKES CO.





CENTERLINE DATA

NO	DELTA / BEARING	R	L	T
1	N 13°46'00"E		185.30'	
2	N 13°46'00"E		328.00'	
3	N 13°46'00"E		556.69'	

CURB DATA

NO.	DELTA / BEARING	R	L	T
1	N 13°46'00"E		137.30'	
2	N 13°46'00"E		467.30'	
3	N 13°46'00"E		232.00'	
4	N 13°46'00"E		484.16'	
5	N 13°46'00"E		482.16'	
6	Δ = 33°33'11"	20'	11.71'	6" A.C. BERM
7	Δ = 33°33'11"	20'	11.71'	6" A.C. BERM
8	Δ = 247°06'22"	28'	120.76'	6" A.C. BERM

SEWER DATA

NO	DELTA / BEARING	R	L	REMARKS
1	N 13°36'00"E		185.30'	8" P.V.C.
2	N 13°36'00"E		328.00'	8" P.V.C.
3	N 13°36'00"E		350.00'	8" P.V.C.
4	N 13°36'00"E		241.69'	8" P.V.C.

WATER DATA

NO	DELTA / BEARING	R	L	REMARKS
1	N 13°36'00"E		186.30'	8" A.C., CL-150
2	N 13°36'00"E		9.00'	8" A.C., CL-150
3	N 13°36'00"E		328.00'	8" A.C., CL-150
4	N 13°36'00"E		646.69'	8" A.C., CL-150
5				

Contractor agrees that he shall assume sole and complete responsibility for job site conditions during the course of construction of this Project, including safety of all persons and property; that this requirement shall apply continuously and not be limited to normal working hours; and that the Contractor shall defend, indemnify and hold the Owner and the Engineer harmless from any and all liability, real or alleged, in connection with the performance of work on this Project, excepting for liability arising from the sole negligence of the Owner or the Engineer.

COUNTY APPROVED CHANGES			
No.	Description	Approved by	Date
1	NEW ENGINEER OF WORK, REVISED STORM DRAIN, SEWER & ST. NAMES. R. ESPINO 5-16-84		

BENCH MARK

DESCRIPTION CONC. MON. W/DISK STAMPED: EC 177

LOCATION ON LOS COCHES RD. 2.2 M. FROM INTERSECT WITH WOODSIDE AVE IN LAKESIDE.

RECORD FROM COUNTY RECORDS

ELEVATION 594.627 DATUM USC&GS

ENGINEER OF REVISION

grabhorn engineering corp
CIVIL ENGINEERING LAND PLANNING SURVEYING
9619 chesapeake drive, suite 101
san diego, california 92123
telephone (619) 565-7227

RICHARD G. GRABHORN 4/3/84
R.C.E. 19375

ENGINEER OF WORK
SNIPES-DYE ASSOCIATES
CIVIL ENGINEERS AND LAND SURVEYORS
3562 GROVE STREET, LEMON GROVE, CA 92045
TELEPHONE (714) 697-9234

PRIVATE CONTRACT

SHEET	COUNTY OF SAN DIEGO DEPARTMENT OF TRANSPORTATION	SHEETS
4		11

IMPROVEMENT PLANS FOR:
SAN DIEGO COUNTY
TRACT NO. 3747

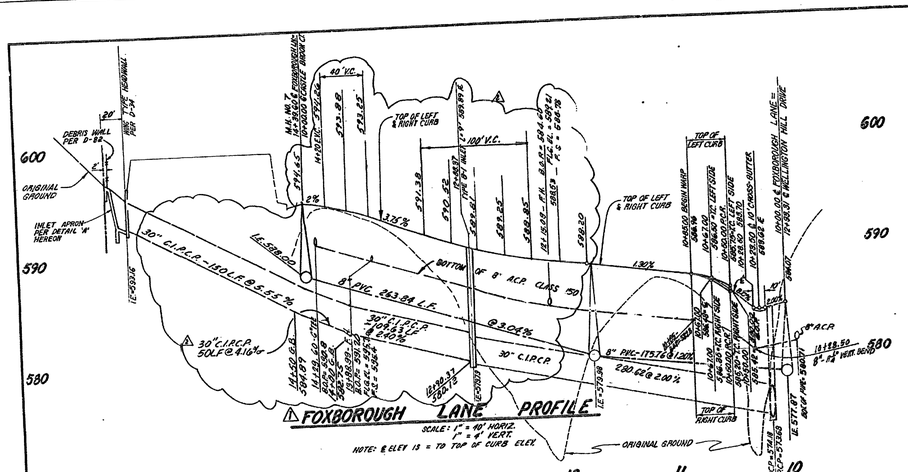
Recommended for approval: SUBDIVISION ENGINEER	Approved: For R.J. MASSMAN DIRECTOR OF TRANSPORTATION
Engineer of work: Roger L. Snipes R.C.E. 18134	Checked by: TM; Approval date: 12/14/1979

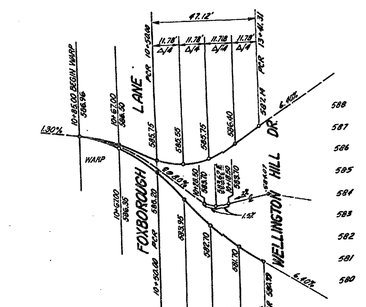
3747-1

FILE NO.

ENGINEER'S NAME: ROGER L. SNIPES, SNIPES - DYE ASSOCIATES, 3562 GROVE ST., LEMON GROVE, CALIF. 92045
PHONE NO. (714) 697-9234

PRINTED BY Reprographic Plotter A BODKET STOKES CO.





⚠ CURB RETURNS AT FOXBOROUGH LN. & WELLINGTON HILL DR.

SCALE: 1"=20' HORIZ.
1"=2' VERT.

CENTERLINE DATA

NO	DELTA / BEARING	R	L	T
1	N 76° 14' 09" W		178.76'	
2	Δ = 42° 25' 00"	300'	222.03'	116.41'
3	N 61° 21' 00" E		81.73'	

CURB DATA

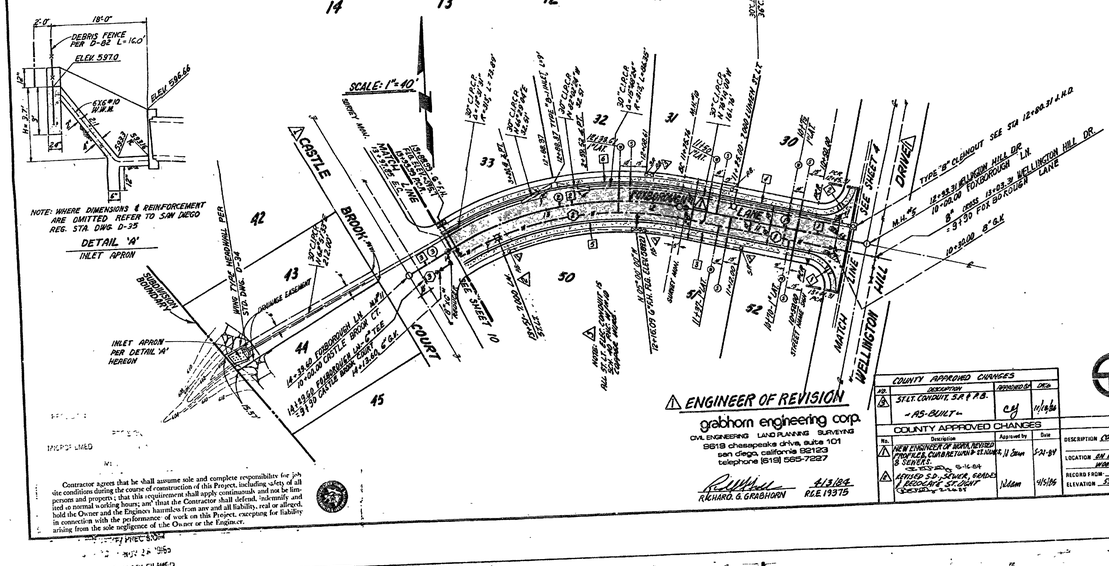
NO	DELTA / BEARING	R	L	T
1	Δ = 90° 00' 00"	20'	31.13'	
2	Δ = 90° 00' 00"	30'	47.12'	
3	N 76° 14' 09" W		178.76'	
4	N 76° 14' 09" W		178.76'	
5	Δ = 41° 57' 24"	282'	206.56'	
6	Δ = 41° 49' 33"	318'	232.24'	

WATER DATA

NO	DELTA / BEARING	R	L	REMARKS
①	N 76° 14' 09" W		185.76'	8" W.P. CL-150
②	Δ = 42° 25' 00"	230'	214.69'	8" A.C.P. CL-150
③	N 61° 21' 00" E		31.79'	8" D.I.P. CL-150
④				

SEWER DATA

NO	DELTA / BEARING	R	L	REMARKS
①	N 76° 14' 09" W		178.76'	8" PVC
②	Δ = 42° 25' 00"	300'	220.09'	8" R.C.P.
③	N 61° 21' 00" E		46.79'	8" PVC



NOTE: WHERE DIMENSIONS & REINFORCEMENT ARE OMITTED REFER TO SAN DIEGO REG. STD. DWG. D-25

DETAIL 'A'
INLET APRON

Contractor agrees that he shall assume sole and complete responsibility for job site conditions during the course of construction of this Project, including safety of all persons and property; that this requirement shall apply continuously and not be limited to normal working hours; and that the Contractor shall defend, indemnify and hold the Owner and the Engineer harmless from any and all liability, real or alleged, in connection with the performance of work on this Project, except for liability arising from the sole negligence of the Owner or the Engineer.

⚠ ENGINEER OF REVISION

grabhorn engineering corp.
CIVIL ENGINEERING LAND PLANNING SURVEYING
9819 chesapeake drive, suite 101
san diego, california 92123
telephone (619) 565-7227

RICHARD G. GRABHORN — 4/13/84 — R.C.E. 19375

COUNTY APPROVED CHANGES			
NO.	DESCRIPTION	APPROVED BY	DATE
⚠ 3	STATE CONTRACT, SR 67 R.B.	cj	11/6/86
	-AS-BUILT-		

COUNTY APPROVED CHANGES			
No.	Description	Approved by	Date
⚠ 1	NEW ENGINEER OF WORK, REVISED PROFILES, CURB RETURNS & STREET 'B' SEWER; 10-16-84	R. Grabhorn, R.C.E. 19375	5-21-87
⚠ 2	REVISED S.D. SCHOOL GRADE & DISCHARGE ST. LIGHT	Nelson	10/5/88

ENGINEER OF WORK
SNIPES-DYE ASSOCIATES
CIVIL ENGINEERING • LAND PLANNING
3592 GROVE STREET LEMON GROVE, CA 92045
TELEPHONE (714) 697-9234

BENCH MARK
DESCRIPTION CONC MON. W/DISK STAMPED: E.C. 177
LOCATION ON LES CROCHES 100 ± M. FROM INTERSECT WITH WOODSIDE AVE. IN LAKESIDE
RECORD FROM COUNTY RECORDS
ELEVATION 574.627 DATUM USC & GS

PRIVATE CONTRACT

SHEET 9 — COUNTY OF SAN DIEGO DEPARTMENT OF TRANSPORTATION — 11 SHEETS

IMPROVEMENT PLANS FOR: SAN DIEGO COUNTY
TRACT NO. 3747

Recommended for approval: [signature] SUBDIVISION ENGINEER
For R.A. NADEAU DIRECTOR OF TRANSPORTATION
Checked by: TM
Approved by: 3747-1
Engineering work by: Roger L. Snipes R.C.E. 18127 — 12/14/1919

FILE NO. 295-003

ENGINEER'S NAME: ROGER L. SNIPES, PHONE NO. (714) 697-9234

SNIPES - DYE ASSOCIATES, 3592 GROVE ST., LEMON GROVE, CALIF. 92045

SL-0504 (R-4)

APPENDIX 2

Drainage Exhibits

Q100=40.3 CFS PER REC STUDY
SYSTEM 100 PER THIS STUDY
Q100=26.5 CFS, AREA=22.0 ACRES

185 Existing headwall and 30" CIPCP to Foxborough Ln. located at Node 185

Wellington Hill Dr.

Q100=74.8 CFS PER REC STUDY
SYSTEM 200 PER THIS STUDY
Q100=67.6 CFS, AREA=54.8 ACRES

Existing headwall and 30" CIPCP to Wellington Hill Dr. located at Node 520

SYSTEM 200 OUTFALL

PROJECT BOUNDARY

175 8.10 ac.

6.91 ac.

6.90 ac.

4.62 ac.

2.65 ac.

0.11 ac.

525 520 515 510 430 425 420

Q_SUM=12.2
A_SUM=10.9

Existing Water Quality Hydromodification Basin 2 located at Node 415

Q100=0.3 cfs
A=4.5 ac
Tc=10 min

415

THIS INFO ENTERED INTO MODEL AS USER- DEFINED INFO AT NODE 415. DATA TAKEN FROM HUNSAKER & ASSOCIATES JACKSON RIDGE DRAINAGE STUDY, DATED FEB 24, 2014, REFER TO REPORT FOR DRAINAGE AREA DELINEATION TO BASIN.

505 357 356

Q_SUM=30.1
A_SUM=19.2

Q_SUM=19.1
A_SUM=17.4

JACKSON RIDGE GRADING & IMPROVEMENTS PER GRADING PERMIT # PDS 2013-LDGRMJ-00006

JACKSON RIDGE PARKWAY

1.06 ac.

320

12.73 ac.

105 0.10 ac.

EXISTING ACCESS ROAD

100 150 410

6.19 ac.

0.13 ac.

400 405

EXISTING WATER TOWER NAP

330 0.12 ac. 335

15.08 ac.

PROJECT BOUNDARY

2.21 ac.

340

325 324 0.59 ac.

323

4.65 ac.

701 0.11 ac. 707 0.43 ac. 708

1.92 ac.

710 321 322 0.13 ac.

1.13 ac. 706

SYSTEM 700 OUTFALL

Existing brow ditch located at Node 710

SYSTEM 700 PER THIS STUDY
Q100=4.1 CFS, A=3.6 ACRES

PLEASE NOTE: ONSITE TOPO FROM PDC PHOTOGRAMMETRY DEPT. REVISED 2013

N

LEGEND

- HYDROLOGY BDY.
- 105 NODE NUMBER
- 2.16 ac. DRAINAGE AREA

SCALE:	1"=80'
JOB #:	2862.02
CREATED:	5/09/14

PREPARED BY:

PROJECT DESIGN CONSULTANTS
Planning | Landscape Architecture | Environmental | Engineering | Survey
701 B Street, Suite 800 San Diego, CA 92101
619.235.6471 Tel 619.234.0349 Fax

COUNTY OF SAN DIEGO

BRIGHTWATER RANCH

HYDROLOGY MAP
EXISTING CONDITIONS
EXHIBIT A

NOTES:

1. ONSITE TOPO FROM PDC PHOTOGRAMMETRY DEPT. REVISED 2013

LEGEND:

- HYDROLOGY BOUNDARY
- 105 — NODE NUMBER
- 2.16 ac. — DRAINAGE AREA (FROM UPSTREAM TO DOWNSTREAM NODE)
- Q=XX.X — 100-YEAR PEAK FLOWRATE IN PIPE

Existing offsite brow ditch starting at Node 180 is still discharging to existing headwall & 30" CIPCP (Foxborough Ln storm drain) at Node 185.

SYSTEM 100: Q100=26.8 CFS, AREA=18.1 ACRES discharging to existing Foxborough Ln storm drain at Node 185.

SYSTEMS 200 & 300: DETAINED Q100=51.6 CFS, AREA=43.0 ACRES discharging to existing Wellington Hill Dr storm drain at Node 515.

Existing offsite brow ditch is still discharging to existing headwall & 30" CIPCP (Wellington Hill Dr storm drain) at Node 520.

SYSTEMS 400 & 500: Q100=64.7 CFS, AREA=59.5 ACRES includes Systems 200 & 300 with routing through the onsite detention basin (Node 230 to Node 235).

SYSTEM 400/500 OUTFALL

SEE INSET AT BOTTOM RIGHT FOR DETAIL OF THIS AREA

Existing Water Quality Hydromodification Basin 2 located at Node 415

Q100=0.3 cfs
A=4.5 ac
Tc=10 min

THIS INFO ENTERED INTO MODEL AS USER- DEFINED INFO AT NODE 415. DATA TAKEN FROM HUNSAKER & ASSOCIATES JACKSON RIDGE DRAINAGE STUDY, DATED FEB 24, 2014, REFER TO REPORT FOR DRAINAGE AREA DELINEATION TO BASIN.

Jackson Ridge grading & improvements per Grading Permit # PDS 2013-LDGRMJ-00006

Existing brow ditch is still located at Node 710.
SYSTEM 700: Q100=4.3 CFS, A=3.6 ACRES

EXISTING WATER TOWER NAP

PROJECT BOUNDARY

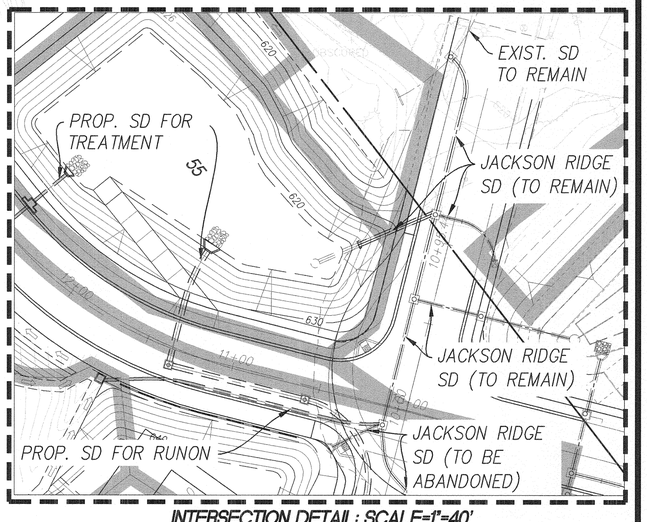
WELLINGTON HILL DRIVE

WINCHESTER HILL COURT

JACKSON RIDGE / FIRE ACCESS ROAD

JACKSON HILL DRIVE

NG ACCESS ROAD



INTERSECTION DETAIL: SCALE=1"=40'

GRAPHICAL SCALE
SCALE: 1" = 80'

SCALE:	1"=80'
JOB #:	2862.02
CREATED:	5/12/14

PREPARED BY:

PROJECT DESIGN CONSULTANTS
Planning | Landscape Architecture | Environmental | Engineering | Survey
701 B Street, Suite 800 San Diego, CA 92101
619.235.6471 Tel 619.234.0349 Fax

COUNTY OF SAN DIEGO
BRIGHTWATER RANCH
HYDROLOGY MAP
PROPOSED CONDITIONS
EXHIBIT B

P:\2862.02\ENGR\REPORTS\DRAIN-TM\EXH(B)Prop Cond.dwg 4/18/2015 5:25:04 PM