



COFFEY ENGINEERING, INC.

Water Quality Technical Report

Ross Residence
Via Grimaldi, Del Mar, CA. 92014
APN 301-061-48

Prepared For:
Charles Ross
and
The City of San Diego



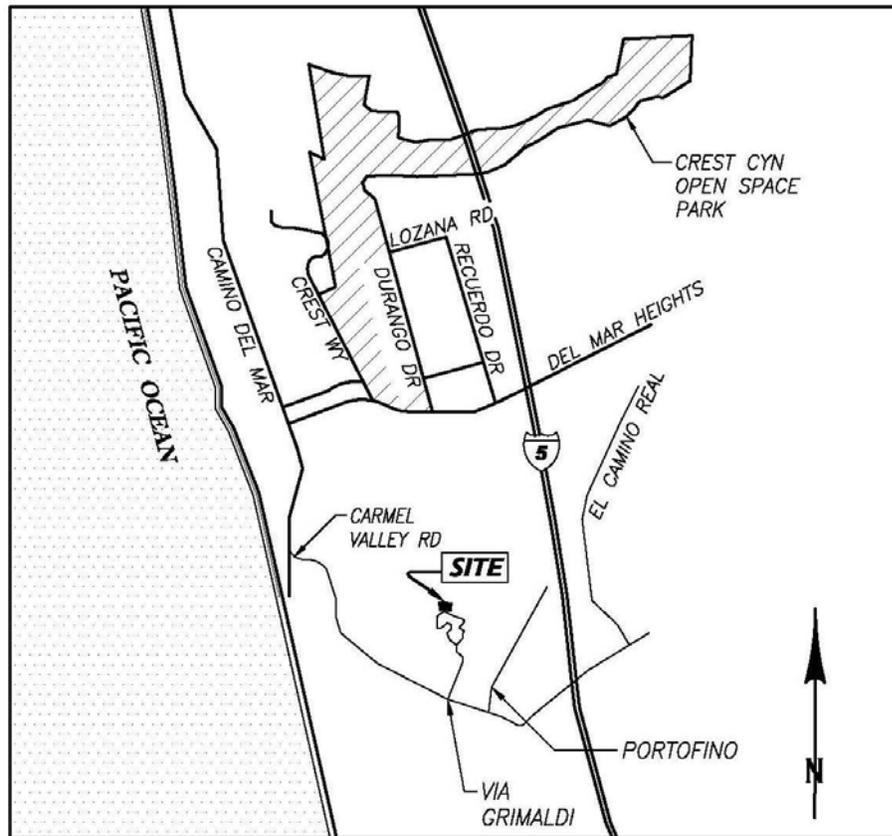
Michael C Kinnear

Original: December 7, 2015

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1.0 Vicinity Map



VICINITY MAP

THOMAS BROS. MAP 1207-H1
NO SCALE

2.0 Project Description

The site is located in San Diego, 0.6 miles northwest of the I-5/SR-56 interchange. The approximately 0.1 acre lot is currently undeveloped. The project proposes to develop a single family residence with associated hardscape and landscape features. The development will have an impervious footprint of approximately 3,018 ft² (62.4% impervious), this is an increase of 62.4% from the existing impervious footprint of 0 ft² (0% impervious). The proposed development is not part of a larger master development. The site qualifies as a priority development project due to its location in a Water Quality Sensitive Area and its creation of 2,500 SF or more of impervious area. The project developer is Charles Ross (619.246.8010, chuck@fiestadereyes.com).

The site lies approximately 2,500 feet west of the I-5 and 3,800 feet east of the Pacific Ocean, with a general drainage pattern that flows from east to west through the site.

The existing drainage pattern consists of one drainage basin (Basin X). Basin X consists of the undeveloped site. Storm water sheet flows east across the site where it is deposited into a local canyon to the northwest. During the 100 year storm the site will experience flows of 0.22 CFS. Refer to Drainage Map – Existing Conditions found in Appendix D of this report for the pre-construction basin map.

The proposed drainage pattern consists of three drainage basins. Basin A consists of a small sliver of the eastern property line and directs offsite run-on around the site and into the local canyon to the northwest. Basin B consists of Drainage from the driveway, single family residence, and associated hardscape. Storm flows will be pitched to the surrounding landscaping before sheet flowing to a biofiltration system on the north edge of the site. After being treated, the storm water will be drained to Basin C via a PVC drain line. Basin C is a small remnant of the site that will be undeveloped and release via sheet flow to the local canyon to the northwest.

During the 100 year storm the proposed site will experience a flow of 0.27 CFS. Refer to Drainage Map – Proposed Conditions found in Appendix D of this report for the post-construction basin map.

Approximately 98% of the site will experience some level of re-development during the construction process. After construction the site will be split into three distinct drainage basins with each basin mimicking the general drainage pattern of the existing condition. Refer to Drainage Map – Proposed Conditions found in Appendix A of this report for the post-construction basin map.

2.1 Flow Path Description

Storm water runoff from the site will flow northwest down a local canyon until it reaches a public storm drain inlet at Via Esperia 500 feet west of the project. The stormwater once in the public drainage system will travel to the Los Penasquitos Lagoon and then into the Pacific Ocean.

3.0 Pollutants and Conditions of Concern

The proposed construction most closely falls under the general project category of *Detached Residential Housing Development*. The following pollutants are listed as anticipated pollutants generated from this type of development:

- Sediment
- Nutrients
- Trash & Debris
- Oxygen Demanding Substances
- Oil & Grease

- Bacteria & Viruses
- Pesticides

(per Section 4.1.5, table 4-1 of the City of San Diego-Storm Water Standards Manual, January 2012)

The subject site is located in Calwater watershed 906.10 (San Diego region 9, Penasquitos Hydrologic Unit 06, Miramar Reservoir HA 10). The following table lists the bodies of water on the CWA section 303(d) list within this watershed:

Name	Pollutant Stressor
Los Penasquitos Creek	Enterococcus Fecal Coliform Selenium Total Dissolved Solids Total Nitrogen as N Toxicity
Los Penasquitos Lagoon	Sedimentation/Siltation
Miramar Reservoir	Total Nitrogen as N
Pacific Ocean Shoreline, Miramar Reservoir HA, at Los Penasquitos River Mouth	Total Coliform
Soledad Canyon	Sediment Toxicity Selenium

Required Pollutant Removal Efficiency

Name	High	Medium
Sediment	X	
Nutrients	X	
Trash & Debris		X
Oxygen Demanding Substances		X
Oil & Grease		X
Bacteria & Viruses	X	
Pesticides		X

The nearest impacted area for this watershed would be Los Penasquitos Lagoon, approximately 2,000 feet to the South (see the CWA 303(d) list for a complete listing of impacted areas for this watershed).

Beneficial Uses of Receiving Water

Reservoirs & Lakes	Hydrologic Unit Basin Number	MUN	AGR	IND	PROC	GWR	FRESH	REC1	REC2	WARM	COLD	WILD	RARE	POW		
Miramar Reservoir	6.10	●		●				●	●	●		●		●		
Ground Water	Hydrologic Unit Basin Number	MUN	AGR	IND	PROC	FRESH	GWR									
Miramar Reservoir	6.10	●	●	●												
Coastal Waters	Hydrologic Unit Basin Number	IND	NAV	REC.1	REC.2	COMM	BIOL	EST	WILD	RARE	MAR	AQUA	MIGR	SPWN	WARM	SHELL
Pacific Ocean		●	●	●	●	●	●		●	●	●	●	●	●		●
Los Penasquitos Lagoon	6.10			●	●	●	●	●	●	●	●		●	●		●
Inland Surface Waters	Hydrologic Unit Basin Number	MUN	AGR	IND	PROC	GWR	FRESH	POW	REC1	REC2	BIOL	WARM	COLD	WILD	RARE	SPWN
Soledad Canyon	6.10	+	●	●					○	●		●	●	●		
Carol Canyon	6.10	+	●	●					○	●		●	●	●	●	
Los Penasquitos Creek	6.10	+	●	●					○	●	●	●		●		
Unnamed Tributary	6.10	+	●	●					○	●		●		●	●	
Carmel Valley	6.10	+	●	●					○	●		●		●		
Deer Canyon	6.10	+	●	●					○	●		●		●		
McGonigle Canyon	6.10	+	●	●					○	●		●		●		
Bell Valley	6.10	+	●	●					○	●		●		●		
Shaw Valley	6.10	+	●	●					○	●		●		●		

+ Excepted from Municipal ● Existing Beneficial Use ○ Potential Beneficial Use

Structural BMP devices were chosen based on a multifaceted approach. First any device that did not treat for bacteria and viruses, sediment, and nutrients with a high efficiency was removed. The remaining devices were infiltration basins, bio-retention facilities, cistern plus bio-retention, vault plus bio-retention, self retaining areas, dry wells, constructed wetlands, and flow through planter boxes. Second any device that would require a large footprint was removed due to site constraints. The remaining devices were bio-retention facilities, vault plus bio-retention, dry wells, and flow through planter boxes. Devices that required large underground structures were removed due to construction constraints. The remaining devices were bio-retention facilities and flow through planter boxes. Due to the site location and proximity to natural slopes flow-through planter boxes were chosen as the most appropriate for the site.

Table 4-3. Structural BMP Treatment Control Selection Matrix

BMP	LID	HMP Control	Sediment	Nutrients	Trash	Metals	Bacteria	Oils and Grease	Organics
Infiltration Basin	Y	Y	H	H	H	H	H	H	H
Bioretention Basin	Y	Y	H	M	H	H	H	H	H
Cistern Plus Bioretention	Y	Y	H	M	H	H	H	H	H
Vault plus Bioretention	Y	Y	H	M	H	H	H	H	H
Self-retaining Area	Y	Y	H	H	H	H	H	H	H
Dry Wells	Y	Y	H	H	H	H	H	H	H
Constructed Wetlands	Y	Y	H	M	H	H	H	H	H
Extended Detention Basin	Y	Y	M	L	H	M	M	M	M
Vegetated Swale	Y	N	M	L	L	M	L	M	M
Vegetated Buffer Strips	Y	N	H	L	M	H	L	H	M
Flow-Through Planter Boxes	Y	Y	H	M	H	H	H	H	H
Vortex Separator or Wet Vault	N	N	M	L	M	L	L	L	L
Media Filter	N	N	H	L	H	H	M	H	H

H High removal efficiency
M Medium removal efficiency
L Low removal efficiency

4.0 Types of BMPs

4.1 Site Design/Low Impact Development BMPs

- Optimize the Site Layout - The proposed project will take advantage of the site's current drainage patterns and grading will be kept to a minimum. The majority of the earthwork will involve the grading to accommodate the new residence and new landscape and hardscape.
- Minimize Impervious Footprint - Proposed hardscape will be limited, extensive landscaping will be installed throughout the site.
- Disperse Runoff to Adjacent Landscaping - Runoff will be directed to landscaping. Hardscapes will be pitched to landscape wherever possible. Flows will travel through landscaped areas and a biofiltration facility before being released from the site.
- Construction Considerations - Soil compaction shall be minimized in landscaped areas. Soil amendments will be used to enhance and support continued vegetative growth.
- Install energy dissipaters - An energy dissipater will be installed after the PVC drain line that releases from basin B.
- Vegetated disturbed soils with either native or drought tolerant vegetation - Landscaping of disturbed soils will be implemented.
- Convey runoff safely away from tops of slopes - sheet flow and area drains will be utilized to safely convey storm water on-site.

LID BMP's Not Used:

- Stabilize permanent channel crossings - no channels or crossings within project.
- Design and Implementation of Pervious Surfaces - Hardscape will consist of impervious materials, only pervious surfaces are landscape areas.

4.2 Source Control BMPs

- (4.2.6) Efficient Irrigation - The irrigation system will be designed with sensitivity to each landscape area's water requirements (per CASQA BMP SD-12).
- (4.2.7) Trash Storage - Trash containers will have attached lids to prevent trash contact with storm water (per CASQA BMP SD-32).
- (4.2.8) Materials Storage - In the event that any landscaping or construction or any other material that could contaminate rainwater is stored onsite they will be stored in such a way as to eliminate contact with storm water. This includes but is not limited to: storing material above ground on pallets, using plastic covers, and employing secondary containment as needed (per CASQA BMP SD-34).
- (4.2.10) Employ integrated pest management principles - Plants in landscaped areas will be chosen to prevent pests (either native or pest-resistant plants) to reduce the need for pesticide use.

- (4.2.11) Provide concrete stamping on storm water inlets and catch basins – Generally site drainage is managed through the use of small area drains - however in the event a catch basin or storm drain inlet is utilized, stamping or signage notifying of a direct connection to the storm drain will be employed.
- (4.2.12) Design fire sprinkler system to discharge to sanitary sewer – If fire sprinkler system will be incorporated into the units all interior drains will be connected to the sanitary sewer per the California Building Code.
- (4.2.13) Manage Air Conditioning Condensate – Air conditioning condensate shall be directed to adjacent landscaping.
- (4.2.14) Use Non-Toxic Roofing Materials Where Feasible – The roof will be constructed with a non-toxic material. Metallic roofing will not be used.
- (4.2.15) Other Source Control Requirements – Site shall be stabilized with landscaping wherever possible. Pet wastes (if any) shall be collected and disposed of in proper waste containers (trash cans).

*Numbers in parenthesis represent section within the City of San Diego Storm Water Standards Manual, Jan. 2012.

Source Control BMP's Not Used:

- (4.2.1) Maintenance Bays - Project is a single family residence, no maintenance bays are proposed.
- (4.2.2) Vehicle and Equipment Wash Areas - Project is a single family residence, no wash areas are proposed.
- (4.2.3) Outdoor Processing Areas - Project is a single family residence, no outdoor processing areas are proposed.
- (4.2.4) Retail and Non-Retail Fueling Areas - Project is a single family residence, no fueling areas are proposed.
- (4.2.5) Steep Hillside Landscaping – No steep hillsides on site.
- (4.2.9) Design Loading Docks to Reduce Pollutant Contribution – Project is a single family residence, no loading docks are proposed.

*Numbers in parenthesis represent sections within the City of San Diego Storm Water Standards Manual, Jan. 2012.

4.4 Treatment Control BMPs

Treatment will only be required in one of the three new basins (Basin B). Basin A includes a small portion of the site to the east that accepts offsite run-on and directs it to the north around the development area. This basin will include no new impervious surfaces therefore it will not require water quality treatment. Basin B includes the new residence, driveway, and associated hardscape. Drainage will be conveyed via sheetflow and minor landscape drains to a biofiltration basin along the northern edge of

the site. Calculations show that Basin B requires a treatment facility with a surface area of 85.53 ft² and a total biofiltered volume of 158.04 ft³. The provided biofiltration surface area will be 87.5 sqft with a biofiltered volume of 288.65 ft³. Ultimately Basin B storm water will be drained to basin C and released to an energy dissipater before discharging to the local canyon to the north with a flow rate of 0.24 CFS (100 Year Storm Conditions). Sizing calculations are included in Appendix B. Basin C includes a small portion of the site in the northwest corner that will remain undeveloped. This basin will include no impervious surfaces therefore it will not require water quality treatment.

Maintenance Conditions

In general, the financial and physical responsibility for BMP maintenance will be the property's owners, successors and/or assigns, in perpetuity. The large majority of these costs should fall within the typical responsibilities for landscape maintenance on the site.

Regarding the biofiltration basin, maintenance generally consists of routine periodic maintenance that is required of any landscape area. Routine maintenance should include a biannual health evaluation of the vegetation and subsequent removal of dead or diseased vegetation. Routine inspection for standing water and corrective measures to restore proper infiltration rates are necessary to prevent creating mosquito and other vector habitats. Should the infiltration rate drop below the minimum required by the City of San Diego Storm Water Standards Manual replacement of the engineered soil mix may be required.

5.0 Hydromodification Compliance

This project qualifies for exemption from hydromodification as it is not located in a potential critical coarse sediment yield area (PCCSYA). The implementation of a biofiltration basin will be used in order to treat the site drainage, but is not necessary to comply with hydromodification mitigation measures. The PCCSYA map is included in appendix C.

6.0 Buffer Measures

The proposed biofiltration basin and landscaping will act as buffer zones in order to protect any natural water bodies.

7.0 Declaration of Responsible Charge

This Water Quality Technical Report (WQTR) has been prepared under the direction of the following Registered Civil Engineer. The Registered Civil Engineer (Engineer) attests to the technical information contained herein and the engineering data upon which the following design, recommendations, conclusions, and decisions are based. The selection, sizing, and design of stormwater treatment and other control measures in this report meet the requirements of Regional Water Quality Control Board Order R9-2007-0001 and subsequent amendments.



Michael Kinnear
RCE 76785
Exp. 12-31-16

12/7/15

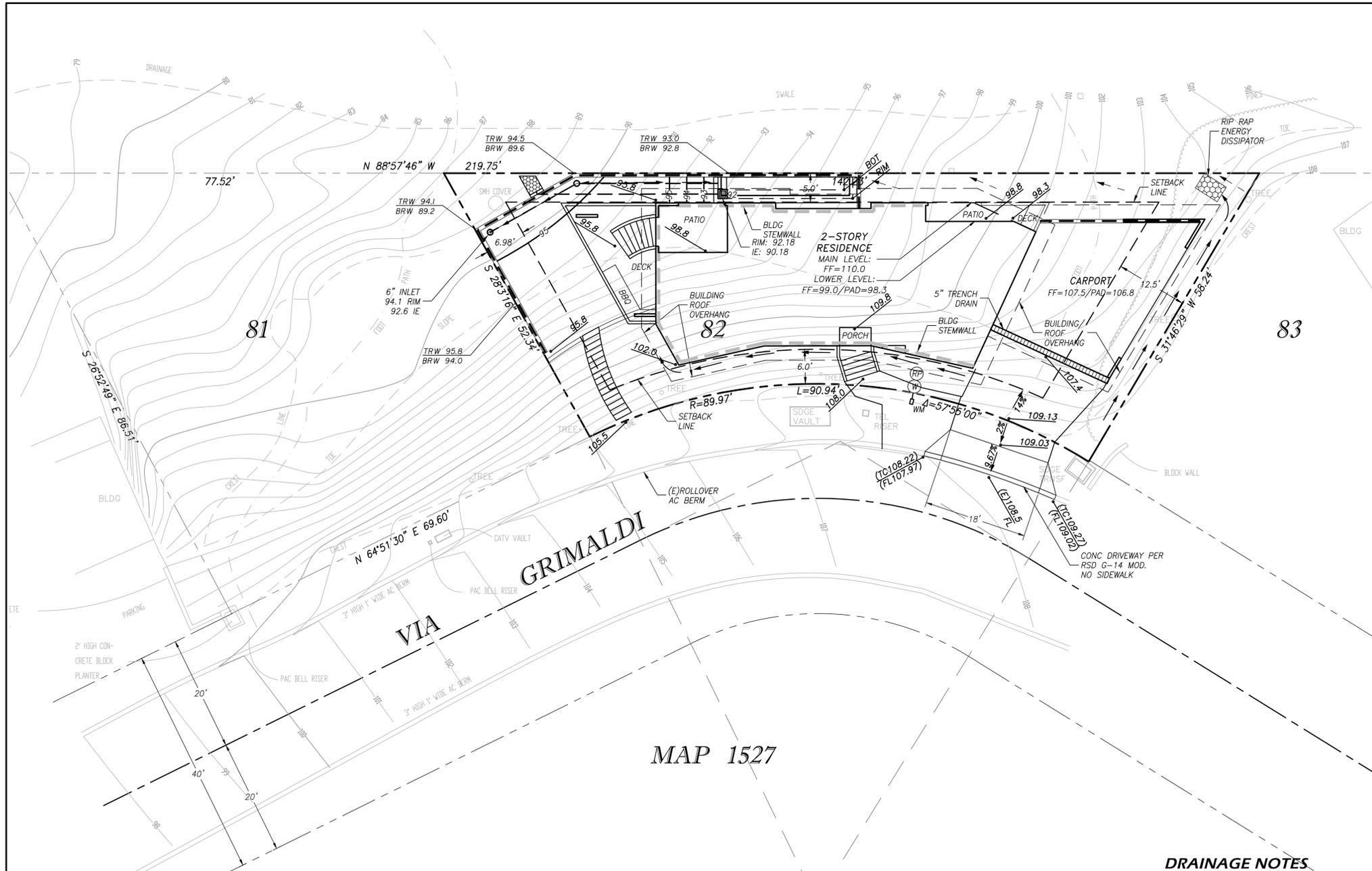
Date



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Appendix A-Site Map

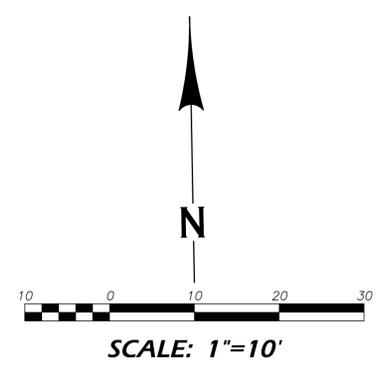


LEGEND

DESCRIPTION	STD DWG	SYMBOL
PROPERTY LINE		N45°45'45\"W
PROPERTY LINE - OFFSITE		---
STREET CENTERLINE		---
EX CONTOUR		90
PR CONTOUR		90
PR SPOT ELEVATION		100.00
PR DRAINAGE SWALE OR DIRECTION OF FLOW		→
BUILDING FOOTPRINT		▭
PR CMU RETAINING WALL		▬▬▬▬
PR FREE STANDING WALL		▬▬▬▬
PR LANDSCAPE DRAIN	(NDS OR EQ)	○
PR CLEANOUT	(NDS OR EQ)	○
PR PVC DRAIN LINE	SDR-35 SCH 40	▬▬▬▬
PR TRENCH DRAIN	(NDS OR EQ)	▬▬▬▬
PR RIP RAP		▬▬▬▬
PR 1\" WATER SERVICE w/RP BACKFLOW PREVENTION ASSY		○
EX TREE CANOPY/ BRUSH LINE		~

ABBREVIATIONS

BLDG	BUILDING	E; FL	FLOW LINE
BRW	BOTTOM OF RETAINING WALL GRADE	H	HEIGHT
CL	CENTER LINE	HP	HIGH POINT
CB	CATCH BASIN	IE	INVERT ELEVATION
CMU	CONCRETE MASONRY UNIT	(P); PR	PROPOSED
CO	CLEANOUT	SMH	SEWER MANHOLE
(E); EX	EXISTING	TRW	TOP OF RETAINING WALL GRADE
FF	FINISH FLOOR	WM	WATER METER



DRAINAGE NOTES

- ALL MAIN DRAIN LINES SHOWN TO BE 6\" PVC @ 1% MINIMUM SLOPE UNLESS OTHERWISE NOTED.
- ALL CATCH BASIN LEADS TO BE 4\" PVC @ 2% MINIMUM SLOPE UNLESS OTHERWISE NOTED.
- HARDSCAPE GRADES TO BE 1% MINIMUM TO DRAINS AND AWAY FROM STRUCTURE.
- SOFTSCAPE GRADES TO BE 2% MINIMUM TO DRAINS (1% WHERE FLOW IS CONCENTRATED) AND 2% MINIMUM AWAY FROM STRUCTURE.
- SOIL COVER ABOVE DRAIN LINES SHALL BE 12\" MINIMUM UNLESS OTHERWISE NOTED.
- NOTIFY CIVIL ENGINEER IF ANY NON-DRAINING SUMP CONDITIONS BECOME APPARANT DURING CONSTRUCTION.

GRADING PLAN NOTES

- PRIOR TO THE ISSUANCE OF ANY CONSTRUCTION PERMIT, THE APPLICANT SHALL INCORPORATE ANY CONSTRUCTION BEST MANAGEMENT PRACTICES NECESSARY TO COMPLY WITH CHAPTER 14, ARTICLE 2, DIVISION 1 (GRADING REGULATIONS) OF THE SAN DIEGO MUNICIPAL CODE, INTO THE CONSTRUCTION PLANS OR SPECIFICATIONS.
- PRIOR TO THE ISSUANCE OF ANY CONSTRUCTION PERMIT, THE APPLICANT SHALL SUBMIT A WATER POLLUTION CONTROL PLAN (WPCP). THE WPCP SHALL BE PREPARED IN ACCORDANCE WITH THE GUIDELINES IN APPENDIX E OF THE CITY'S STORM WATER STANDARDS.
- PRIOR TO THE ISSUANCE OF ANY CONSTRUCTION PERMIT, THE OWNER/PERMITEE SHALL ENTER INTO A MAINTENANCE AGREEMENT FOR THE ONGOING PERMANENT BMP MAINTENANCE, SATISFACTORY TO THE CITY ENGINEER.
- PRIOR TO THE ISSUANCE OF ANY CONSTRUCTION PERMIT, AN EMRA WILL BE NECESSARY FOR ANY PRIVATE IMPROVEMENTS WITHIN THE PUBLIC RIGHT OF WAY.

SOURCE OF TOPO:

THE SOURCE OF TOPOGRAPHIC INFORMATION ON THIS PLAN WAS FROM A GROUND-BASED FIELD SURVEY BY MONUMENT PEAK LAND SURVEYING, NOVEMBER 20, 1996, ROBERT LEE McCOMB, PLS 4441. BOUNDARY INFORMATION ON THIS PLAN FROM GROUND BASED SURVEY BY PATRICK ENGINEERING & SURVEYING JUNE 30, 2015, PATRICK L. BROWN, RCE 18067.

EASEMENTS

THIS PLAN WAS PREPARED WITHOUT THE BENEFIT OF A TITLE REPORT. EASEMENTS MAY BE PRESENT ON THE SUBJECT PROPERTY.

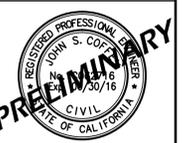
NOTES:

- THIS GRADING PLAN IS BASED ON A TOPOGRAPHIC SURVEY, NOT A BOUNDARY SURVEY OR RECORD OF SURVEY. THE PROPERTY LINES DEPICTED ON THIS PLAN ARE GENERATED FROM EXISTING PUBLIC RECORD MAPS, DRAWINGS, OR DESCRIPTIONS. THE PROPERTY LINES AND/OR EASEMENTS SHOWN HEREON HAVE BEEN INCLUDED TO REPRESENT THEIR APPROXIMATE LOCATIONS RELATIVE TO THE TOPOGRAPHIC FEATURES.
- THE LOCATIONS OF UTILITIES, IF ANY, SHOWN ON THIS PLAN ARE GENERATED FROM RECORDS PROVIDED BY UTILITY/GOVERNING AGENCIES AND/OR FIELD DATA COLLECTED DURING THE SURVEY. THE PLOTTING OF UTILITIES ON THIS PLAN DOES NOT CONSTITUTE A GUARANTEE OF THEIR LOCATION, DEPTH, SIZE, OR TYPE.

MAP 1527

GRADING TABULATIONS	
TOTAL AMOUNT OF SITE TO BE GRADED:	0.1 ACRE
AMOUNT OF CUT:	0.000 CUBIC YARDS
AMOUNT OF FILL:	0.000 CUBIC YARDS
MAXIMUM HEIGHT OF CUT SLOPE(S):	2.0 FEET
MAXIMUM HEIGHT OF CUT SLOPE(S):	N/A FEET
AMOUNT OF IMPORT/ EXPORT SOIL:	2.000 CUBIC YARDS
RETAINING/ CRIB WALLS: LENGTH	99 FEET
% OF TOTAL SITE:	76.6%
MAXIMUM DEPTH OF CUT:	7.0 FEET
MAXIMUM DEPTH OF FILL:	5.0 FEET
SLOPE RATIO:	2:1
SLOPE RATIO:	N/A
MAXIMUM HEIGHT:	4.9 FEET

COFFEY ENGINEERING, INC.
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ROSS RESIDENCE
 13000 Bk Via Grimaldi
 Del Mar, CA 92014

DRAWN BY:	MK
CHECKED BY:	JC
ORIGINAL	11/6/15
REVISION 1	
REVISION 2	
REVISION 3	
REVISION 4	
REVISION 5	

GRADING PLAN

SCALE: 1" = 10'

C.1

SHT 1 OF 1 SHTS

Appendix B-Calculations

Design Capture Volume		Worksheet B.2-1		
1	85th Percentile 24-hr storm depth from Figure b.1-1	d =	0.48	inches
2	Area tributary to BMP (s)	A =	0.1	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1)	C =	0.68	unitless
4	Street trees volume reduction	TCV =	0	cubic-feet
5	Rain barrels volume reduction	RCV =	0	cubic-feet
6	Calculated DCV = (360 x C x d x A) - TCV - RCV	DCV =	118.48	cubic-feet

Simple Sizing Method for Biofiltration BMPs		Worksheet B.5-1	
1	Remaining DCV after implementing retention BMPs	118.48	cubic-feet
Partial Retention			
2	Infiltration from Worksheet D.5-1 if partial infiltration is feasible	0	in / hr
3	Allowable drawdown time for aggregate storage below underdrain	36	hours
4	Depth of runoff that can be infiltrated [Line 2 x Line 3]	0	inches
5	Aggregate pore space	0.4	in / in
6	Required depth of gravel below the underdrain [Line 4 / Line 5]	0	inches
7	Assumed surface area of the biofiltration BMP	87.5	sq-ft
8	Media retained pore space	0.1	in / in
9	Volume retained by BMP $[(\text{Line 4} + (\text{Line 12} \times \text{Line 8}))/12] \times \text{Line 7}$	13.125	cubic-feet
10	DCV that requires biofiltration [Line 1 - Line 9]	105.36	cubic-feet
BMP Parameters			
11	Surface Ponding [6 inches minimum, 12 inches maximum]	6	inches
12	Media Thickness [18 inches minimum]	18	inches
13	Aggregate Storage above underdrain invert (12 inches typical) - use 0 inches for sizing if the aggregate is not over the entire bottom surface area	0	inches
14	Media available pore space	0.2	in / in
15	Media filtration rate to be used for sizing	5	in / hr
Baseline Calculations			
16	Allowable Routing Time for sizing	6	hours
17	Depth filtered during storm [Line 15 x Line 16]	30	inches
18	Depth of Detention Storage [Line 11+ (Line 12 x Line 14) + (Line 13 x Line 5)]	9.60	inches
19	Total Depth Treated [Line 17 + Line 18]	39.6	inches
Option 1 - Biofilter 1.5 times the DCV			
20	Required biofiltered volume [1.5 x Line 10]	158.04	cubic-feet
21	Required Footprint [Line 20 / Line 19] x 12	47.89	sq-ft
Option 2 - Store 0.75 of the remaining DCV in pores and ponding			
22	Required Storage (surface + pores) Volume [0.75 x Line 10]	79.02	cubic-feet
23	Required Footprint [Line 22 / Line 18] x 12	98.77	sq-ft
Footprint of the BMP			
24	Area draining to the BMP	4192.56	sq-ft
25	Adjusted Runoff Factor for drainage area (Refer to Appendix B.1 and B.2)	0.68	
26	Minimum BMP Footprint [Line 24 x Line 25 x 0.03]	85.53	sq-ft
27	Footprint of the BMP = Maximum(Minimum(Line 21, Line 23), Line 26)	85.53	sq-ft

Note: Line 7 is used to estimate the amount of volume retained by the BMP. Update assumed surface area in line 7 until its equivalent to the required biofiltration footprint (either Line 21 or Line 23)

Proposed Condition DMA Summary

Basin A: Total Area: 529.06 ft²
Impervious Area: 0 ft²
Pervious Area: 529.06 ft²

Basin B: Total Area: 4,192.56 ft²
Impervious Area: 3,017.74 ft²
Pervious Area: 1,174.82 ft²

Basin C: Total Area: 111.21 ft²
Impervious Area: 0 ft²
Pervious Area: 111.21 ft²

Total Site: Total Area: 4832.83 ft²
Impervious Area: 3,017.74 ft²
Pervious Area: 1,815.09 ft²

Treatment Methods

Self-Treating Areas:

Basin A
Basin C

IMP Devices

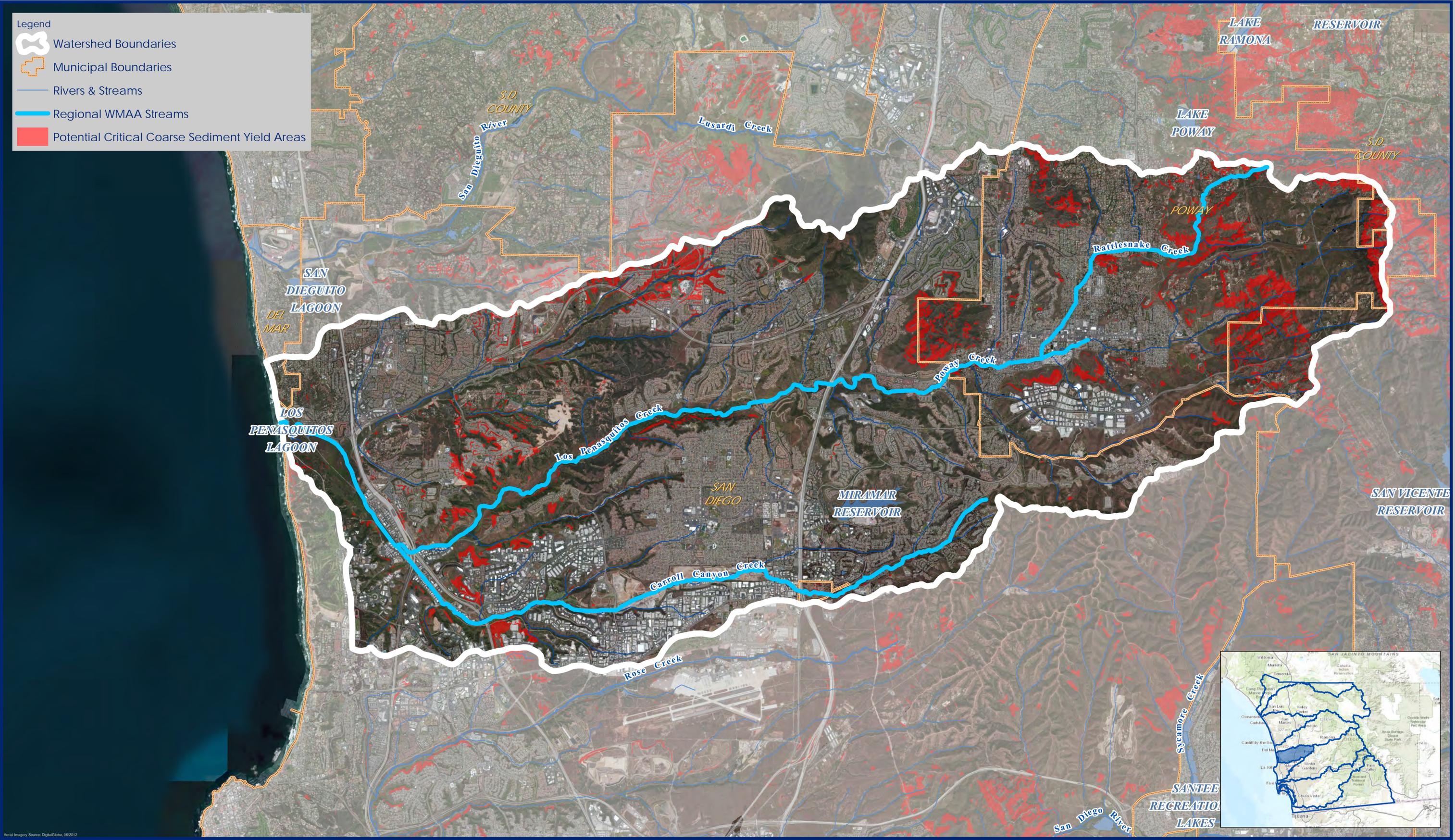
IMP Device 1 (87.5 ft² biofiltration basin)
Basin B

	Required Surface Area	Proposed Surface Area
Basin B	85.83	87.5

	Required Biofiltered Volume	Proposed Biofiltered Volume
Basin B	158.04	288.65

Appendix C-Supplemental Documents

- Legend
-  Watershed Boundaries
 -  Municipal Boundaries
 -  Rivers & Streams
 -  Regional WMAA Streams
 -  Potential Critical Coarse Sediment Yield Areas



Potential Critical Coarse Sediment Yield Areas

Los Penasquitos Watershed - HU 906.00, 94 mi²

Exhibit Date: Sept. 8, 2014



Aerial Imagery Source: DigitalGlobe, 09/2012



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

THE CITY OF SAN DIEGO

Storm Water Requirements Applicability Checklist

FORM
DS-560
 JANUARY 2011

Project Address:	Project Number (for City Use Only):
------------------	-------------------------------------

SECTION 1. Permanent Storm Water BMP Requirements:

Additional information for determining the requirements is found in the [Storm Water Standards Manual](#).

Part A: Determine if Exempt from Permanent Storm Water BMP Requirements.

Projects that are considered maintenance, or are otherwise not categorized as “development projects” or “redevelopment projects” according to the Storm Water Standards manual are not required to install permanent storm water BMPs. **If “Yes” is checked for any line in Part A, proceed to Part C and check the box labeled “Exempt Project.” If “No” is checked for all of the lines, continue to Part B.**

- | | |
|---|--|
| 1. The project is not a Development Project as defined in the Storm Water Standards Manual : for example habitat restoration projects, and construction inside an existing building. | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| 2. The project is only the construction of underground or overhead linear utilities. | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| 3. The project qualifies as routine maintenance (replaces or renews existing surface materials because of failed or deteriorating condition). This includes roof replacement, pavement spot repairs and resurfacing treatments such as asphalt overlay or slurry seal, and replacement of damaged pavement. | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| 4. The project only installs sidewalks, bike lanes, or pedestrian ramps on an existing road, and does not change sheet flow condition to a concentrated flow condition. | <input type="checkbox"/> Yes <input type="checkbox"/> No |

Part B: Determine if Subject to Priority Development Project Requirements.

Projects that match one of the definitions below are subject to additional requirements including preparation of a Water Quality Technical Report.

If “Yes” is checked for any line in Part B, proceed to Part C and check the box labeled “Priority Development Project.” If “No” is checked for all of the lines, continue to Part C and check the box labeled “Standard Development Project.”

- | | |
|--|--|
| 1. Residential development of 10 or more units. | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| 2. Commercial development and similar non-residential development greater than one acre. Hospitals; laboratories and other medical facilities; educational institutions; recreational facilities; municipal facilities; commercial nurseries; multi-apartment buildings; car wash facilities; mini-malls and other business complexes; shopping malls; hotels; office buildings; public warehouses; automotive dealerships; and other light industrial facilities. | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| 3. Heavy industrial development greater than one acre. Manufacturing plants, food processing plants, metal working facilities, printing plants, and fleet storage areas. | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| 4. Automotive repair shop. Facilities categorized in any one of Standard Industrial Classification (SIC) codes 5013, 5014, 5541, 7532-7534, or 7536-7539. | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| 5. Restaurant. Facilities that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (SIC code 5812), and where the land area for development is greater than 5,000 square feet. | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| 6. Hillside development greater than 5,000 square feet. Development that creates 5,000 square feet of impervious surface and is located in an area with known erosive soil conditions and where the development will grade on any natural slope that is twenty-five percent or greater. | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| 7. Water Quality Sensitive Area. Development located within, directly adjacent to, or discharging directly to a Water Quality Sensitive Area (as depicted in Appendix C) in which the project either creates 2,500 square feet of impervious surface on a proposed project site or increases the area of imperviousness of a proposed project site to 10% or more of its naturally occurring condition. “Directly adjacent” is defined as being situated within 200 feet of the Water Quality Sensitive Area. “Discharging directly to” is defined as outflow from a drainage conveyance system that is composed entirely of flows from the subject development or redevelopment site, and not commingled with flows from adjacent lands. | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| 8. Parking lot with a minimum area of 5,000 square feet or a minimum of 15 parking spaces and potential exposure to urban runoff (unless it meets the exclusion for parking lot reconfiguration on line 11). | <input type="checkbox"/> Yes <input type="checkbox"/> No |

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Upon request, this information is available in alternative formats for persons with disabilities.

- 9. **Street, road, highway, or freeway.** New paved surface in excess of 5,000 square feet used for the transportation of automobiles, trucks, motorcycles, and other vehicles (unless it meets the exclusion for road reconfiguration on line 11). Yes No
- 10. **Retail Gasoline Outlet (RGO)** that is: (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
- 11. **Significant Redevelopment;** project installs and/or replaces 5,000 square feet or more of impervious surface and the existing site meets at least one of the categories above. The project is not considered Significant Redevelopment if reconfiguring an existing road or parking lot without a change to the footprint of an existing developed road or parking lot. The existing footprint is defined as the outside curb or the outside edge of pavement when there is no curb. Yes No
- 12. **Other Pollutant Generating Project.** Any other project not covered in the categories above, that disturbs one acre or more and is not excluded by the criteria below. Yes No
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 or if they sheet flow to surrounding pervious surfaces.

Part C: Select the appropriate category based on the outcome of Parts A & B.

- 1. If “Yes” is checked for any line in Part A, then check this box. Continue to Section 2. Exempt Project
- 2. If “No” is checked for all lines in Part A, and Part B, then check this box. Continue to Section 2. Standard Development Project
- 3. If “No” is checked for all lines in Part A, and “Yes” is checked for at least one of the lines in Part B, then check this box. Continue to Section 2. See the Storm Water Standards Manual for guidance on determining if Hydromodification Management Plan requirements apply. Priority Development Project

SECTION 2. Construction Storm Water BMP Requirements:
For all projects, complete Part D. If “Yes” is checked for any line in Part D, then continue to Part E.

Part D: 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? (See State Water Resources Control Board [Order No. 2009-0009-DWQ](#) for rules on enrollment) Yes No
- 2. Does the project propose grading or soil disturbance? Yes No
- 3. Would storm water or urban runoff have the potential to contact any portion of the construction area, including washing and staging areas? Yes No
- 4. Would the project use any construction materials that could negatively affect water quality if discharged from the site (such as, paints, solvents, concrete, and stucco)? Yes No
- 5. Check this box if “Yes” is checked for line 1. Continue to Part E. SWPPP Required
- 6. Check this box if “No” is checked for line 1, and “Yes is checked for any line 2-4. Continue to Part E. WPCP Required
- 7. Check this box if “No” is checked for all lines 1-4. Part E does not apply. No Document Required

Part E: Determine Construction Site Priority

This prioritization must be completed with this form, noted on the plans, and included in the SWPPP or WPCP. The City reserves the right to adjust the priority of the projects both before and during construction. [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.]

- 1. High Priority**
 a) Projects where the site is 50 acres or more and grading will occur during the wet season
 b) Projects 1 acre or more and tributary to an impaired water body for sediment (e.g., Peñasquitos watershed)
 c) Projects 1 acre or more within or directly adjacent to or discharging directly to a coastal lagoon or other receiving water within a Water Quality Sensitive Area.
 d) Projects subject to phased grading or advanced treatment requirements.
- 2 Medium Priority.** Projects 1 acre or more but not subject to a high priority designation.
- 3 Low Priority.** Projects requiring a Water Pollution Control Plan but not subject to a medium or high priority designation.

Name of Owner or Agent (Please Print): _____ Title: _____

Signature: _____ Date: _____



THE CITY OF SAN DIEGO

RECORDING REQUESTED BY:
THE CITY OF SAN DIEGO
AND WHEN RECORDED MAIL TO:

(THIS SPACE IS FOR RECORDER'S USE ONLY)

STORM WATER MANAGEMENT AND DISCHARGE CONTROL MAINTENANCE AGREEMENT

APPROVAL NUMBER:

ASSESSORS 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 Water Quality Technical Report [WQTR] 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 Exhibit(s): _____

(Owner Signature)

(Print Name and Title)

(Company/Organization Name)

(Date)

THE CITY OF SAN DIEGO

(Engineer Signature)

(Print Name)

(Date)



City of San Diego
Development Services
 1222 First Ave., MS-501
 San Diego, CA 92101
 (619) 236-5500

Permanent BMP Construction

Self Certification Form

**FORM
 DS-563**
 FEBRUARY 2013

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 Standard Urban Storm Water Mitigation Plan (SUSMP) 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. R9-2007-0001. 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 treatment control BMP's required per the approved SUSMP 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. R9-2007-0001 of the San Diego Regional Water Quality Control Board.

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

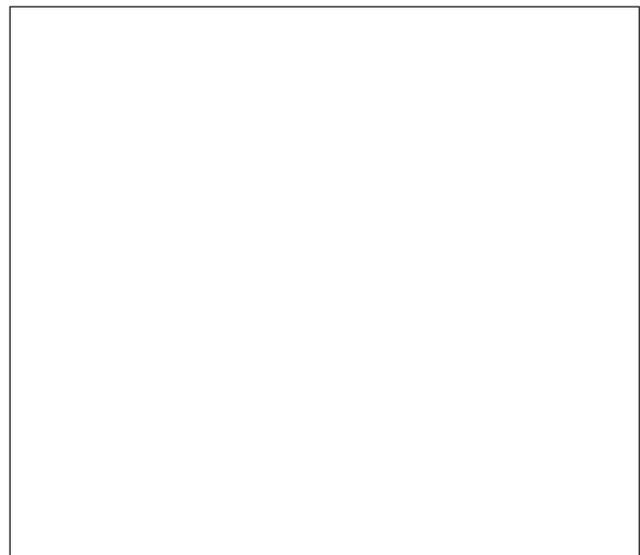
Signature: _____

Date of Signature: _____

Printed Name: _____

Title: _____

Phone No. _____



Engineer's Stamp

Appendix D-Hydrology Study



COFFEY ENGINEERING, INC.

Preliminary Drainage Study

**Ross Residence
Via Grimaldi, Del Mar, CA. 92014
APN 301-061-48**

Prepared For:
Charles Ross
and
The City of San Diego

December 7, 2015

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3. Purpose and Scope of Report	3
4. Method of Calculations	3, 4
5. Results and Conclusions:	4
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Appendix

- Drainage Map ‘A’ – Existing Conditions
- Drainage Map ‘B’ – Proposed Conditions
- Soil Hydrology Groups
- Table 3-1 – Runoff Coefficients
- Figure 3-1– Intensity-Duration Design Chart
- Initial time of concentration Table 3-2
- 100-year, 6-hour Isopluvial map
- 100-year, 24-hour Isopluvial map

1. Existing Conditions

The site is located in San Diego, 0.6 miles north west of the I-5/SR-56 interchange. The approximately 0.1 acre lot is currently undeveloped.

The site lies approximately 2,500 feet west of the I-5 and 3,800 feet east of the Pacific Ocean, with a general drainage pattern that flows from east to west through the site.

See Drainage Map – (E) in the appendix for existing conditions.

2. Proposed Project

The project proposes to develop a single family residence with associated hardscape and landscape features. The development will have an impervious footprint of approximately 3,018 ft² (62.4% impervious), this is an increase of 62.4% from the existing impervious footprint of 0 ft² (0% impervious). The proposed development is not part of a larger master development. The site qualifies as a priority development project due to its location in a Water Quality Sensitive Area and its creation of 2,500 SF or more of impervious area. The project developer is Charles Ross.

See Drainage Map – (P) in the appendix for proposed conditions.

3. Purpose and Scope of Report

In addition to addressing any general drainage concerns for the property, this report will evaluate the pre-construction hydrologic conditions and compare them to post-construction to determine the required detention/flow attenuation. The runoff quantities were calculated using a 100-year storm, see isopluvial maps attached in the appendix of this report.

The following will be evaluated:

- Pre-construction flows: Basins X (see Drainage Map – (E))
- Post Construction flows: Basins A, B, & C (see Drainage Map – (P))
- General site conditions/observations pertaining to drainage.

4. Method of Calculations

The Rational Method, as defined by the City of San Diego Drainage Design Manual (1984), will be used to calculate storm water flow rates. Where noted, the following calculations were used to determine flow properties:

Rainfall Characteristics

$Q = C * I * A$, where

Q = Flow rate (ft³/sec)

C = Runoff coefficient

I = Rainfall intensity (in/hr)
A = Area (acres)

$$I = 7.44 * P_6 * D^{-0.645}, \text{ where}$$

I = Rainfall intensity (in/hr)
 P_6 = Adjusted 6-hour precipitation (inches)
D = Storm duration (min), equal to T_c for time-of-concentration storms

$T_c = T_i + T_t + T_p$ (time-of-concentration), where
 T_i = Over land initial time.
 T_t = Travel time on natural watersheds.
 T_p = Travel time on drainage structures (pipes, brow ditch, gutter etc.)

$$T_i = 1.8(1.1 - C) D^{0.50} / (s^{0.33}) \quad (\text{Overland initial time of concentration formula}), \text{ where}$$

D = Watercourse Distance (feet) (see table 3-2 for the max. overland flow length)
s = Slope (%)
C = Runoff Coefficient
 T_i = Initial time of concentration (min.)

$$T_t = (11.9 * L^3 / \Delta H)^{0.385} \quad (\text{formula for travel time for natural watersheds}), \text{ where}$$

T_c = Time of Concentration or Travel time (hours)
L = Length of watercourse (miles)
 ΔH = Change in effective slope height (ft)

Pipe and Open Channel Flow Characteristics

$$V = 1/n * R^{2/3} * S^{1/2} \quad (\text{from Manning}), \text{ where}$$

V = Average cross-sectional velocity (ft/sec)
n = Manning roughness coefficient
R = Hydraulic radius (ft)
S = Slope of water surface (ft height/ft length)

$$p/\gamma + V^2/2g + z_1 + h_L = p/\gamma + V^2/2g + z_2 \quad (\text{from Bernoulli}), \text{ where}$$

p = pressure (lbs/ft²)
 γ = density (lbs/ft³)
V = velocity (ft/sec)
g = gravity (ft/sec/sec)
z = height of fluid (ft)
 h_L = head loss (ft)

5. Results and Conclusions:

During the 100 year storm the site will experience a flow of 0.27 CFS. This is 0.05 CFS greater than the existing 100 year storm flow of 0.22 CFS this increase can be attributed to the development of the site including the residence and associated hardscape.

6. Declaration of Responsible Charge

I hereby declare that I am the Civil 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 professions code, and that the design is consistent with current design.

I understand that the check of project drawings and specifications by the City of San Diego is confined to a review only and does not relieve me, as Engineer of Work, of my responsibilities for project design.



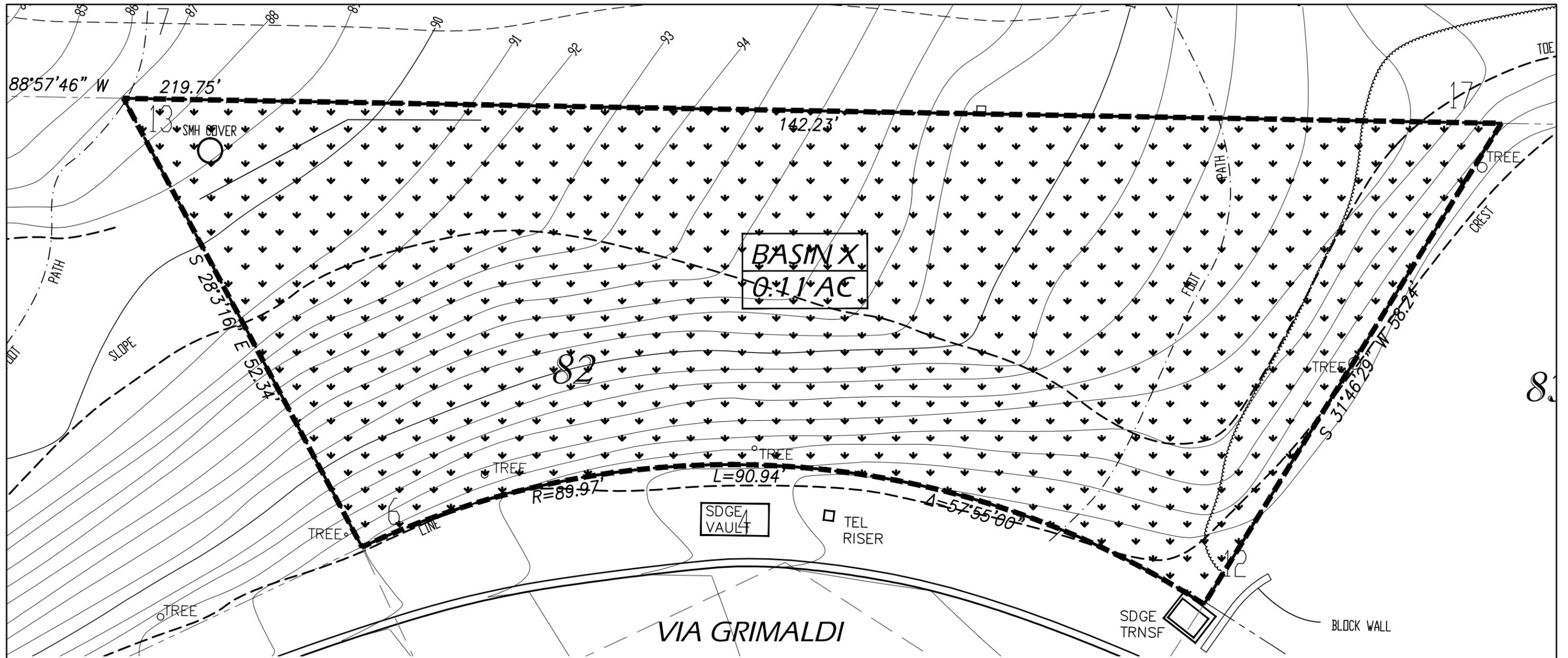
Michael Kinnear
RCE 76785
Exp. 12-31-16

12/7/15

Date



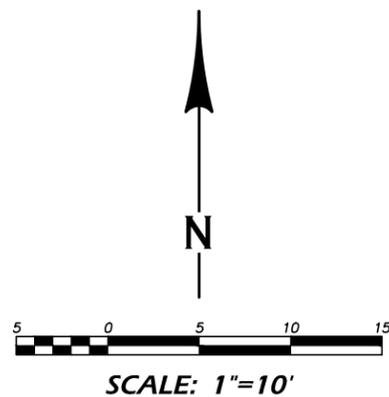
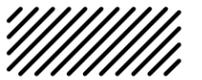
Appendix



BASIN X: STEEP TERRAIN, SOIL TYPE D
 RUNOFF COEFFICIENT: 0.45
 TOTAL AREA: 4,832.83 SQFT = 0.11AC

IMPERVIOUS AREA: 0 SQFT

PERVIOUS AREA: 4,832.83 SQFT



DRAINAGE MAP - (E)

DRAINAGE MANAGEMENT AREAS

Water Quality Event

Table B - Pre Construction Flow Conditions								
		Summary						
Flow ID (Basin)	Runoff Coefficient, C	(5 min minimum) Total time-of-concentration, T _c (min)	Rainfall Intensity, I (in/hr)	Basin Area, A (acres)	Q (cfs)	Flow ID (Basin)	Flow Description	
X	0.45	5.00	0.20	0.11	0.01	X	Sheet-flow to street	

Sum = 0.01

Table B - Post Construction Flow Conditions								
		Summary						
Flow ID (Basin)	Runoff Coefficient, C	(5 min minimum) Total time-of-concentration, T _c (min)	Rainfall Intensity, I (in/hr)	Basin Area, A (acres)	Q (cfs)	Flow ID (Basin)	Flow Description	
A	0.55	5.00	0.20	0.01	0.00	A	Divert Off-site	
B	0.55	5.00	0.20	0.10	0.01	B	Residence	
C	0.55	5.00	0.20	0.00	0.00	C	Remainder	

Sum = 0.01

2 Year Storm

Table B - Pre Construction Flow Conditions								
		Summary						
Flow ID (Basin)	Runoff Coefficient, C	(5 min minimum) Total time-of-concentration, T _c (min)	Rainfall Intensity, I (in/hr)	Basin Area, A (acres)	Q (cfs)	Flow ID (Basin)	Flow Description	
X	0.45	5.00	2.40	0.11	0.12	X	Sheet-flow to street	

Sum = 0.12

Table B - Post Construction Flow Conditions								
		Summary						
Flow ID (Basin)	Runoff Coefficient, C	(5 min minimum) Total time-of-concentration, T _c (min)	Rainfall Intensity, I (in/hr)	Basin Area, A (acres)	Q (cfs)	Flow ID (Basin)	Flow Description	
A	0.55	5.00	2.40	0.01	0.01	A	Divert Off-site	
B	0.55	5.00	2.40	0.10	0.13	B	Residence	
C	0.55	5.00	2.40	0.00	0.00	C	Remainder	

Sum = 0.15

10 Year Storm

Table B - Pre Construction Flow Conditions								
		Summary						
Flow ID (Basin)	Runoff Coefficient, C	(5 min minimum) Total time-of-concentration, T _c (min)	Rainfall Intensity, I (in/hr)	Basin Area, A (acres)	Q (cfs)	Flow ID (Basin)	Flow Description	
X	0.45	5.00	3.40	0.11	0.17	X	Sheet-flow to street	

Sum = 0.17

Table B - Post Construction Flow Conditions								
		Summary						
Flow ID (Basin)	Runoff Coefficient, C	(5 min minimum) Total time-of-concentration, T _c (min)	Rainfall Intensity, I (in/hr)	Basin Area, A (acres)	Q (cfs)	Flow ID (Basin)	Flow Description	
A	0.55	5.00	3.40	0.01	0.02	A	Divert Off-site	
B	0.55	5.00	3.40	0.10	0.19	B	Residence	
C	0.55	5.00	3.40	0.00	0.00	C	Remainder	

Sum = 0.21

100 Year Storm

Table B - Pre Construction Flow Conditions								
		Summary						
Flow ID (Basin)	Runoff Coefficient, C	(5 min minimum) Total time-of-concentration, T _c (min)	Rainfall Intensity, I (in/hr)	Basin Area, A (acres)		Q (cfs)	Flow ID (Basin)	Flow Description
X	0.45	5.00	4.40	0.11		0.22	X	Sheet-flow to street

Sum = 0.22

Table B - Post Construction Flow Conditions							Table B - Hydraulics of Proposed Structures	
		Summary						
Flow ID (Basin)	Runoff Coefficient, C	(5 min minimum) Total time-of-concentration, T _c (min)	Rainfall Intensity, I (in/hr)	Basin Area, A (acres)		Q (cfs)	Flow ID (Basin)	Flow Description
A	0.55	5.00	4.40	0.01		0.02	A	Divert Off-site
B	0.55	5.00	4.40	0.10		0.24	B	Residence
C	0.55	5.00	4.40	0.00		0.00	C	Remainder

Sum = 0.27

TABLE 2

RUNOFF COEFFICIENTS (RATIONAL METHOD)

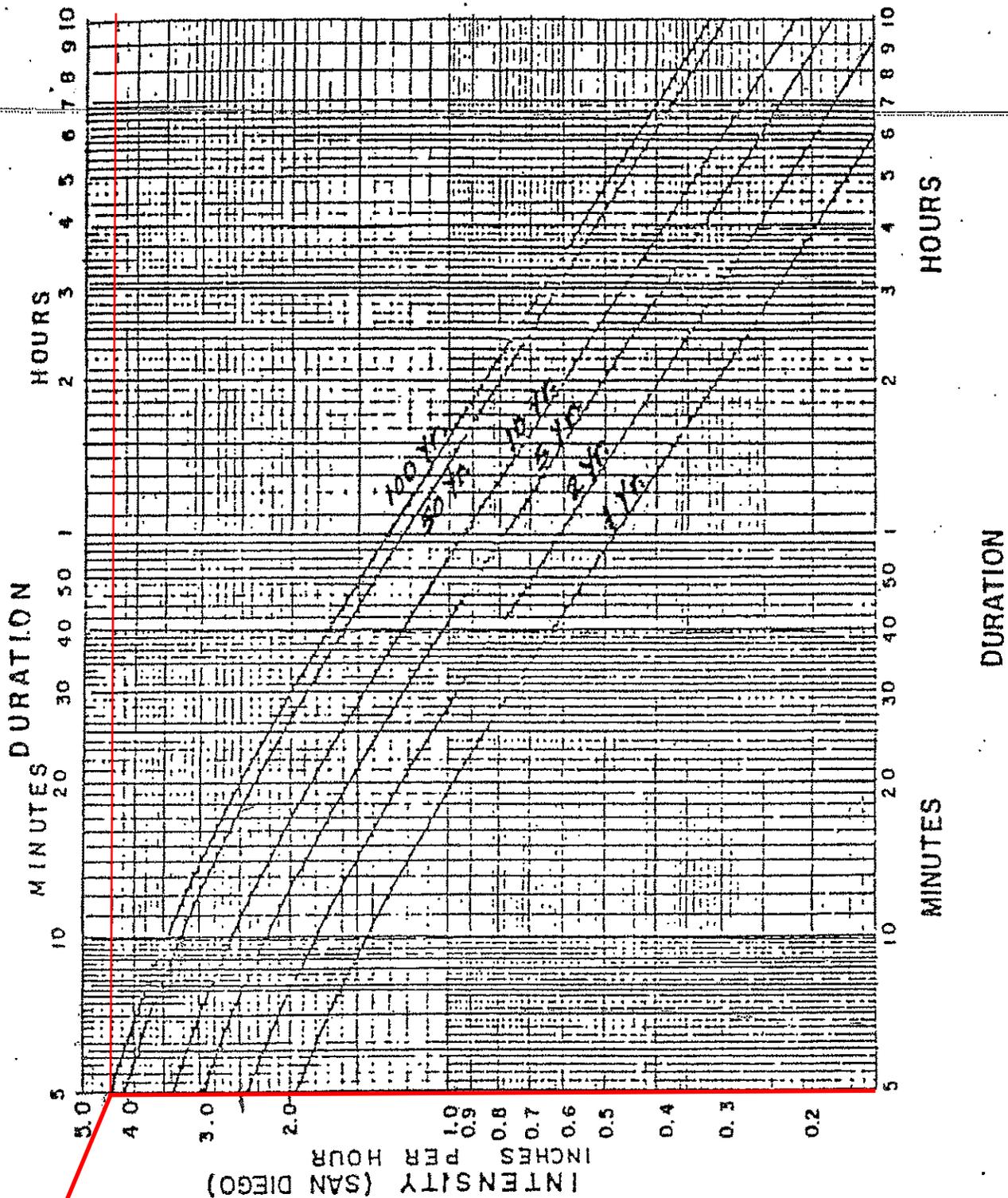
DEVELOPED AREAS (URBAN)

<u>Land Use</u>	<u>Coefficient, C</u> <u>Soil Type (1)</u>
Residential:	<u>D</u>
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.

$$\begin{aligned}
 \text{Actual imperviousness} &= 50\% \\
 \text{Tabulated imperviousness} &= 80\% \\
 \text{Revised C} &= \frac{50}{80} \times 0.85 = 0.53
 \end{aligned}$$



$I_{15min} = 4.4$

ELEV.	FACTOR
0-1500	1.00
1500-3000	1.25
3000-4000	1.42
4000-5000	1.50
5000-6000	1.70
DESERT	1.25

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

RAINFALL
 INTENSITY - DURATION - FREQUENCY
 CURVES
 for
 COUNTY OF SAN DIEGO