

# **Preliminary Drainage Study**

## **Vardy Residence**

13074 Polvera Ave  
San Diego, CA 92128

Prepared for:  
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July 8, 2019

PTS No.

# Introduction

This project, located at 13074 Polvera Avenue, on Lot 2332 of Bernardo Trails Unit 4 of Map No. 8879. The project proposes the construction of a single-family residence and appurtenances

The attached drainage area map is from a topographic survey by Landmark Consulting dated March 14, 2017. The attached drainage area maps depict the areas of runoff associated with this project in both its pre-construction and post-construction condition. Only the disturbed area onsite and offsite contributing to runoff flow to area disturbed, is considered in the analysis. Pre-construction runoff flows northerly. There is run-on from the offsite area southerly. Following construction, the disturbed areas are designated "PC-A", "PC-B", "PC-C" and "PC-D". Area "PC-A" is the 2-story house, garage and the pervious pavers court yard and discharges to a trench drain then is conveyed northerly. Area "PC-B" is conveyed northerly by sheet flow. Area "PC-C" drains to catch basin then conveyed northerly and area "PC-D" drains northerly. Run-on from area "PC-E" flows to a proposed ditch then discharges through trench drain and then conveyed northerly while area "PC-F" drains to catch basin then conveyed northerly.

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

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

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



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Exp. 12-31-19  
JN A2018-101

07-8-19  
Date



# Calculations

## 1. Intensity Calculation

(From the City of San Diego Drainage Design Manual)

T<sub>c</sub> = Time of concentration

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

The difference in elevation before construction is 35' (485'-450') and the distance traveled is 120' (S=29%). C=0.45

The difference in elevation after construction is 26' (476'-450') and the distance traveled is 120' (S=22%). C=0.55

T<sub>c</sub> = 4.17 minutes before construction

T<sub>c</sub> = 3.87 minutes after construction

From table in Manual:

$$I_{100} = 4.2 \text{ inches}$$

## 2. Coefficient Determination

Pre-Construction:

The site is undeveloped.

$$C = 0.45$$

Post-Construction:

Single-family residence.

$$C = 0.55$$

### 3. **Volume calculations**

$$Q = CIA$$

#### **Areas of Drainage**

##### **Pre-Construction**

Area of site to be disturbed X = 0.370 Acre

Area offsite draining to  
area disturbed Y = 0.337 Acre

##### **Post-Construction**

Area of site draining to trench drain  
then conveyed northerly PC-A = 0.227 Acre

Area of site draining northerly by  
sheet flow PC-B = 0.120 Acre

Area offsite draining to ditch  
then to trench drain then  
conveyed northerly PC-C = 0.300 Acre

Area onsite draining  
to catch basin then conveyed  
northerly PC-D = 0.015 Acre

Area offsite and onsite draining  
northerly PC-E = 0.006 Acre

Area offsite draining  
to catch basin then conveyed  
northerly PC-F = 0.027 Acre

### **Pre-Construction**

$$Q_{100X} = (0.45) (4.2) (0.370)$$

$$Q_{100Y} = (0.45) (4.2) (0.327)$$

$$Q_{100X} = 0.70 \text{ cfs}$$

$$Q_{100Y} = 0.62 \text{ cfs}$$

### **Post-Construction**

$$Q_{100PC-A} = (0.55) (4.2) (0.229)$$

$$Q_{100PC-B} = (0.55) (4.2) (0.120)$$

$$Q_{100PC-C} = (0.55) (4.2) (0.015)$$

$$Q_{100PC-D} = (0.55) (4.2) (0.006)$$

$$Q_{100PC-E} = (0.45) (4.2) (0.300)$$

$$Q_{100PC-F} = (0.45) (4.2) (0.027)$$

$$Q_{100PC-A} = 0.53 \text{ cfs}$$

$$Q_{100PC-B} = 0.28 \text{ cfs}$$

$$Q_{100PC-C} = 0.03 \text{ cfs}$$

$$Q_{100PC-D} = 0.01 \text{ cfs}$$

$$Q_{100PC-E} = 0.57 \text{ cfs}$$

$$Q_{100PC-F} = 0.05 \text{ cfs}$$

#### **4. Discussion**

Prior to development the site discharges northerly by sheet flow. There is run-on from southerly offsite. Following construction all onsite runoff will continue to be conveyed northerly. Run-on will remain the same. Due to the increase of imperviousness and classification of the property (undeveloped to single-family residential) there will be slight increase of 0.15 cfs of runoff from disturbed area (0.70 cfs to 0.85 cfs)

# APPENDIX

## APPENDIX A: RATIONAL METHOD AND MODIFIED RATIONAL METHOD

**Table A-1. Runoff Coefficients for Rational Method**

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

**Note:**

<sup>(1)</sup> Type D soil to be used for all areas.

<sup>(2)</sup> Where actual conditions deviate significantly from the tabulated imperviousness values of 80% or 90%, the values given for coefficient C, may be revised by multiplying 80% or 90% by the ratio of actual imperviousness to the tabulated imperviousness. However, in case shall the final coefficient be less than 0.50. For example: Consider commercial property on D soil.

$$\begin{array}{lcl}
 \text{Actual imperviousness} & = & 50\% \\
 \text{Tabulated imperviousness} & = & 80\% \\
 \text{Revised C} & = & (50/80) \times 0.85 = 0.53
 \end{array}$$

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

### **A.1.3. Rainfall Intensity**

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



APPENDIX A: RATIONAL METHOD AND MODIFIED RATIONAL METHOD

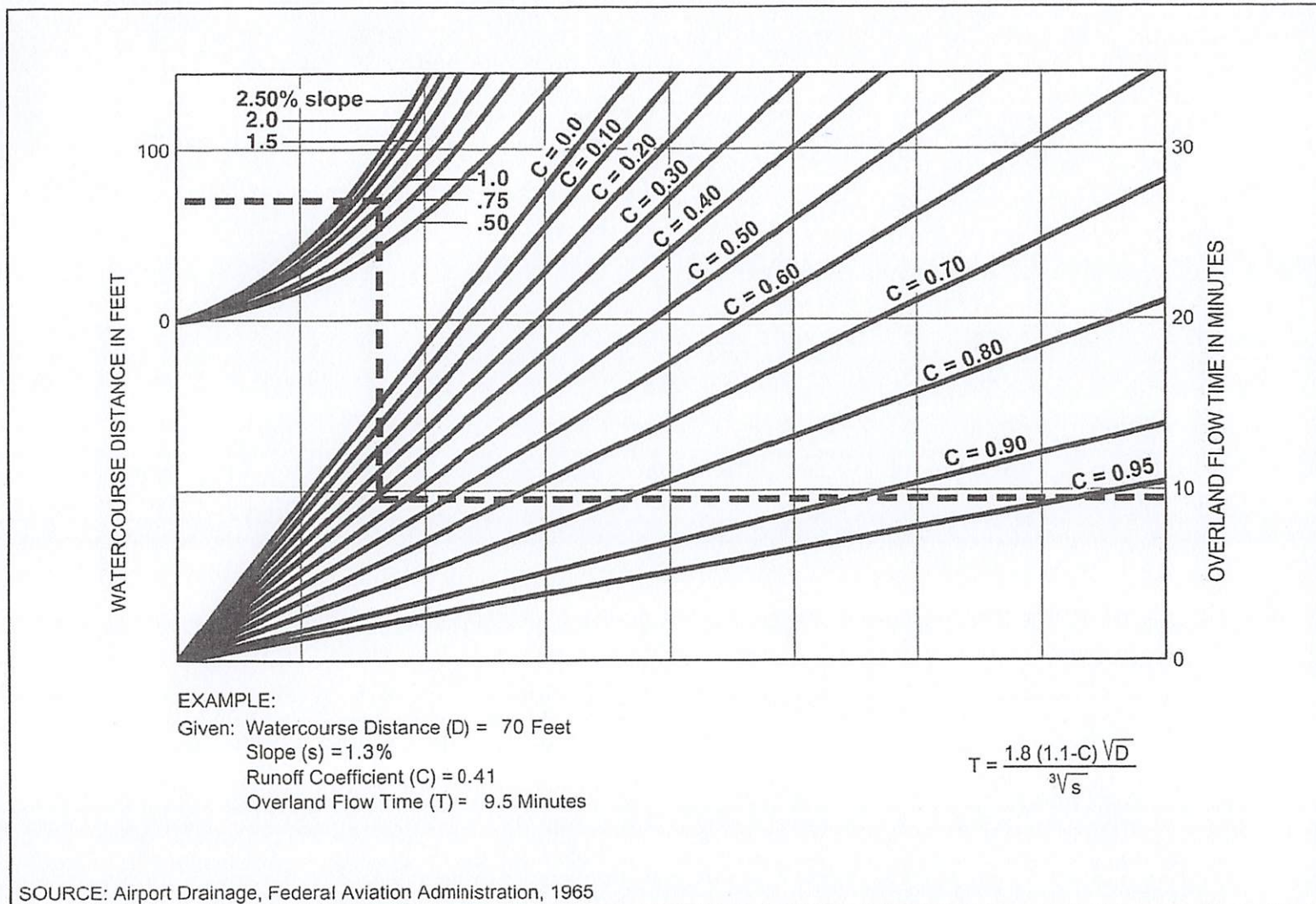


Figure A-4. Rational Formula - Overland Time of Flow Nomograph

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

# APPENDIX A: RATIONAL METHOD AND MODIFIED RATIONAL METHOD

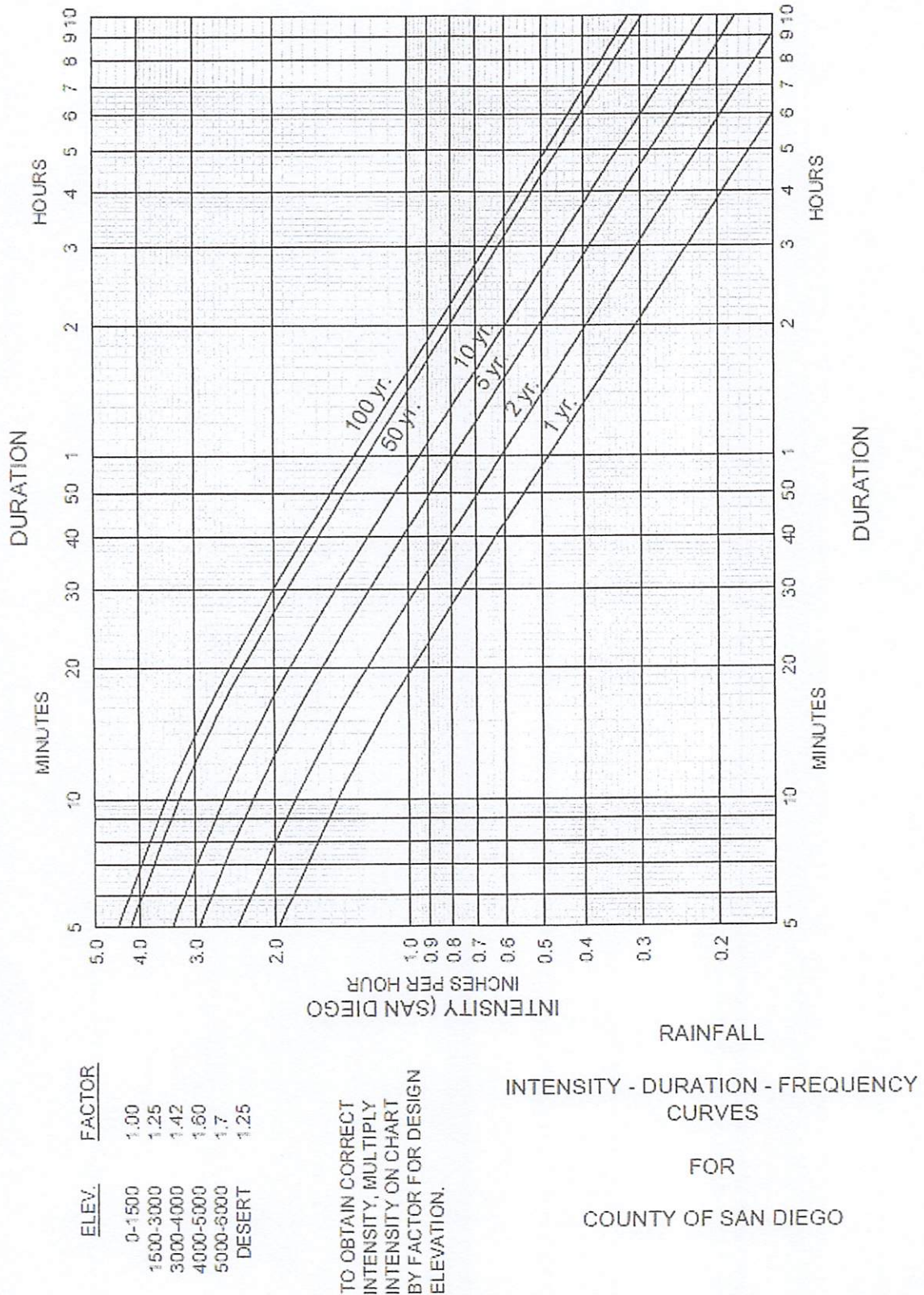


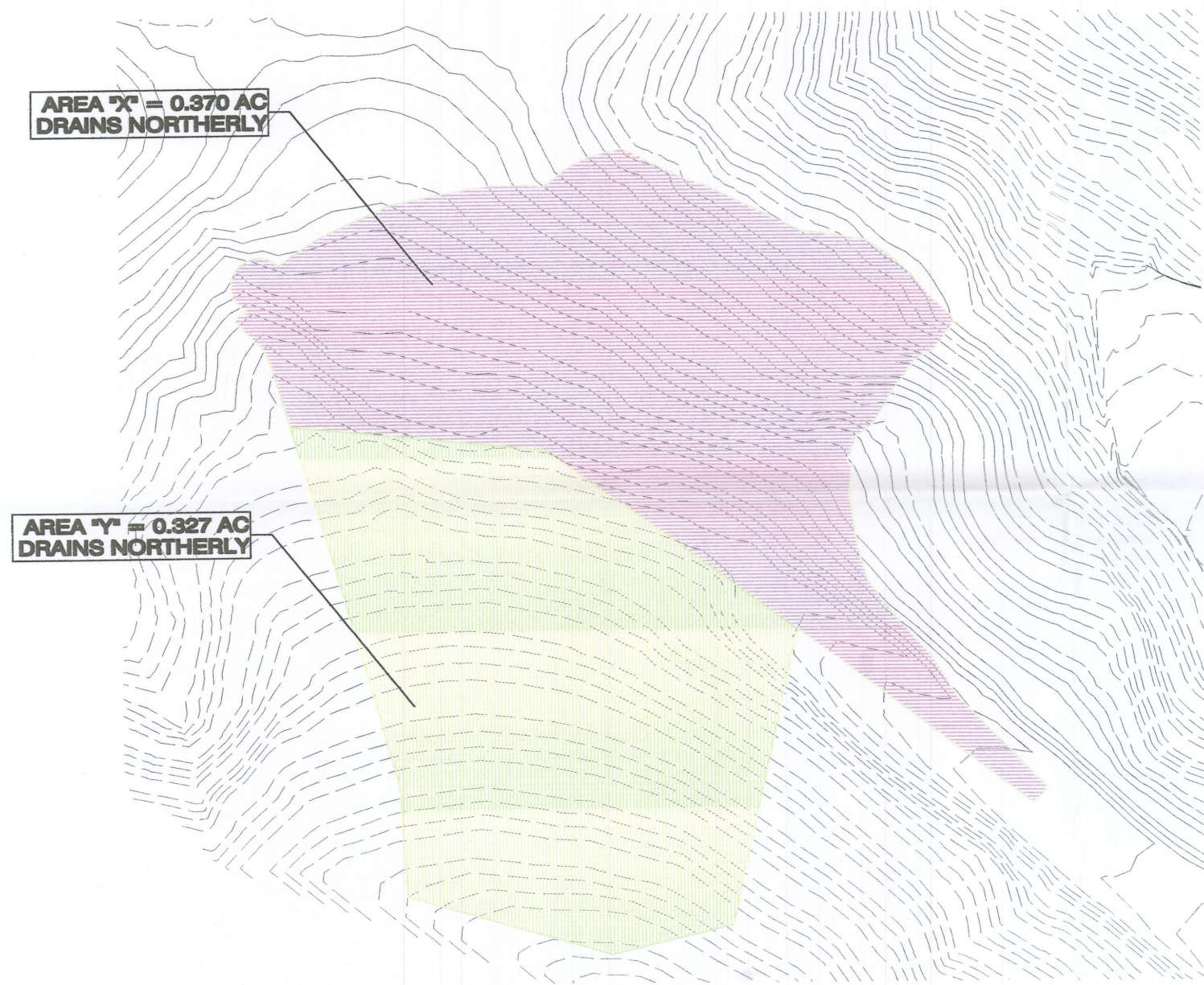
Figure A-1. Intensity-Duration-Frequency Design Chart



# **DRAINAGE AREA MAPS**

# **PRE-DEVELOPMENT DRAINAGE AREA MAP**

**PRE-CONSTRUCTION DRAINAGE MAP**



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

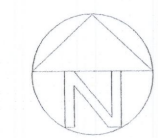
Project Name:  
VARDY HOUSE

Original Date: JULY 8, 2019

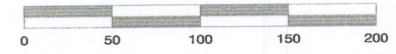
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SCALE: 1" = 50'  
CONTOUR INTERVAL: 1'



# **POST-DEVELOPMENT DRAINAGE AREA MAP**

# SITE DEVELOPMENT PERMIT

## LEGAL DESCRIPTION:

LOT 2332 OF BERNARDO TRAILS UNIT 4, IN THE CITY OF SAN DIEGO, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO MAP THEREOF NO. 8878, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY JUNE 10, 1978.

APN: 346-202-05-00 & 346-890-18-00

## BENCHMARK

CITY OF SAN DIEGO BENCHMARK LOCATED AT THE TOP OF NORTH-WESTERLY CURB AT THE INTERSECTION OF POLVERA AVENUE AND LUNADA PLACE. ELEVATION 347.41' MEAN SEA LEVEL (N.G.V.D. 1929).

## NOTES

1. THE SOURCE OF THE TOPOGRAPHIC INFORMATION SHOWN HEREON IS TOPOGRAPHIC SURVEY LANDMARK CONSULTING, DATED AUGUST 25, 2016 AND FEBRUARY 28, 2017.
2. THE USE OF PROPOSED LOT IS FOR SINGLE-FAMILY RESIDENTIAL.
3. THE SUBJECT PROPERTY IS SERVED BY SANITARY SEWER LATERALS AND WATER SERVICES CONNECTED TO CITY OF SAN DIEGO MAINS.
4. PRIOR TO ISSUANCE OF ANY CONSTRUCTION PERMIT, THE OWNER SHALL ENTER INTO A MAINTENANCE AGREEMENT FOR THE ONGOING PERMANENT BMP MAINTENANCE.
5. PRIOR TO THE ISSUANCE OF ANY CONSTRUCTION PERMIT, THE OWNER 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.
6. EASEMENT EXIST ONSITE AS SHOWN.
7. AN ENCROACHMENT MAINTENANCE AND REMOVAL AGREEMENT WILL BE REQUIRED FOR PRIVATE CURB OUTLET AND WALKWAYS WITHIN THE PUBLIC RIGHT OF WAY.
8. SITE RUNOFF WILL BE DIRECTED TO BIORFILTRATION BASIN FOR TREATMENT BEFORE LEAVING SITE AT CURB OUTLET.
9. FOR LANDSCAPE AND HARDSCAPE, SEE LANDSCAPE PLAN.

## GRADING DATA

AREA OF SITE - 137,734 S.F. (3.182 AC)  
 AREA OF SITE TO BE GRADED - 17,914 SF  
 PERCENT OF SITE TO BE GRADED - 13%  
 AMOUNT OF SITE WITH 25% SLOPES OR GREATER: AREA - 101,289 SF  
 PERCENT OF TOTAL SITE - 73.5%  
 AMOUNT OF CUT - 650 C.Y. (TO FINISH SURFACE)  
 AMOUNT OF FILL - 1,299 C.Y.  
 AMOUNT OF EXPORT - 616 C.Y.  
 MAXIMUM HEIGHT OF FILL SLOPE - 9 FEET  
 MAXIMUM HEIGHT OF CUT SLOPE - 7 FEET  
 MAXIMUM HEIGHT OF VERTICAL CUT: 9 FEET  
 MAXIMUM HEIGHT OF VERTICAL FILL: 10 FEET  
 EXISTING IMPERVIOUS AREA = 0 AC (0%)  
 PROPOSED CREATED/REPLACED IMPERVIOUS AREA = 0.057 AC (1.81%)

## POST-CONSTRUCTION DRAINAGE MAP

### LEGEND:

SYMBOL	DESCRIPTION
---	PROPERTY LINE
- - - -	EXISTING CONTOUR
G	EXISTING GAS LINE
S	EXISTING SEWER LINE
W	EXISTING WATER LINE
W	PROPOSED WATER SERVICE
---	PROPOSED 1' TRENCH DRAIN
---	PROPOSED PVC DRAIN
DS	PROPOSED DOWNSPOUT
---	PROPOSED SHORING WALL
---	PROPOSED PERVIOUS ACCESS ROAD
---	PROPOSED PERMEABLE PAVERS
---	PROPOSED 2' BENCH
---	PROPOSED DITCH
---	PROPOSED RIPRAP
S	PROPOSED SEWER LATERAL

**AREA PC-A = 0.229 AC  
DRAINS TO TRENCH DRAIN  
THEN CONVEY BY PIPE  
TO NORTHERLY PORTION  
OF PROPERTY**

**AREA PC-B = 0.120 AC  
DRAINS NORTHERLY**

**AREA PC-C = 0.015 AC  
DRAINS TO CATCH BASIN  
THEN CONVEY BY PIPE  
NORTHERLY**

**AREA PC-F = 0.027 AC  
DRAINS TO CATCH BASIN  
THEN CONVEY BY PIPE  
NORTHERLY**

**AREA PC-E = 0.300 AC  
DRAINS TO DITCH  
THEN TO TRENCH DRAIN  
THEN CONVEY BY PIPE  
TO NORTHERLY PORTION  
OF PROPERTY**

**AREA PC-D = 0.006 AC  
DRAINS NORTHERLY**



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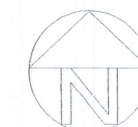
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PRELIMINARY GRADING PLAN

DEP#

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