Preliminary Drainage Study
Hornblend Units

Westerly ½ of Lot 25 and Lots 26 through 29,
Block 214, Map No. 854
1956 Hornblend Street
San Diego, California 92109

Prepared for:
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August 22, 2019

PTS No. 632156

Introduction

This project involves the demolition of all existing improvements on the property located at 1956 Hornblend Street and the construction of 14 residential apartment units together with driveway, utilities, treatment BMPs and landscaping.

The attached drainage area maps are from a topographic survey by Christensen Engineering & Surveying, prepared in December of 2018. As shown on the pre-construction drainage area map, drainage from the site is by surface flow and is urban in character. Prior to construction site runoff flows southerly onto Hornblend Street (0.75 cfs for the 100-yr storm). No offsite runon flows through the project site. The project prior to development is single-family residential with no drainage conveyance system nor runoff treatment.

Following construction, the same general pattern of flow persists but with a small area conveying runoff northerly to the adjacent unnamed alley. The runoff flowing northerly, onto the alley will increase to 0.02 cfs. The flow to Hornblend will increase from 0.75 cfs to 0.92 cfs. Total site and alley runoff will increase from 0.75 cfs to 0.94 cfs. The site has 0.026 ac of imperviousness existing and a proposed 0.306 ac of imperviousness, following development, a change from of 8.0% to 94.7% area of imperviousness.

Impervious area runoff will be treated by two standard Filterra units due to the site being hydromodification exempt and being classified a non-infiltration site. The site is required to treat 1.5 times the flow based runoff (weight adjusted runoff coefficient times 0.2 in/hr times the area flowing to the Filterra units). After treatment, runoff is pumped to a curb outlet in Hornblend Street. The required retention element of the project is achieved through using amended soil, everywhere landscaping occurs. The projects discharges runoff to a hardened conveyance system that discharges to an exempt water body (Mission Bay). Runoff flows onto Hornblend then flows easterly to Morrell Street then flows southerly to a curb inlet located therein. From there it flows within the public storm drain system to Grand Avenue and then flows easterly to Olney Avenue and then flows southerly to an outlet into Mission Bay that is lower than the 100-yr BFE of 6'. It discharges from a 60" pipe at an elevation of 2.24' NGVD29 which equates to 4.33' NAVD88.

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. See separate SWQMP.

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.

Antony K. Christensen
RCE 54021 Exp. 12-31-19
JN A2018-104

08-22-19
Date

Calculations

1. Intensity Calculation

From the City of San Diego Drainage Design Manual, Figure A-4
Tc = Time of concentration

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

Since the difference in elevation is 6' (68'-62') and the distance traveled is 168', S=3.6%. C = 0.70

Tc = 6.1 minutes.

From Figure A-1

I_{100} = 4.2 inches

2. Coefficient Determination

Pre-Construction:

From Table A-1 for Single-Family residential:

C= 0.55

Post-Construction:

From Table A-1 for Multi-Family residential:

C= 0.70

3. *Volume calculations*

Q = CIA

Areas of Drainage

Pre-Construction

Area draining to Hornblend	A = 0.323 Ac

Post-Construction

Area draining to Alley	PC-A = 0.008 Ac
Area draining to Hornblend St from curb outlet	PC-H= 0.315 Ac

Pre-Construction

Q_{100A} = (0.55) (4.2) (0.323)

Q_{100A} = 0.75 cfs

Post-Construction

$Q_{100PC-A}$ = (0.70) (4.2) (0.008)
$Q_{100PC-H}$ = (0.70) (4.2) (0.315)

$Q_{100PC-A}$ = 0.02 cfs
$Q_{100PC-H}$ = 0.92 cfs

Water Quality Volume

For Flow Through WQV (runoff to be treated by two Filterra units)

Q = (0.2 in) * C * A * 1.5

Q = CIA

This runoff coefficient is a weighted average using 0.9 for impermeable surfaces and 0.1 for permeable surfaces. The area conveying runoff to the treatment facilities is as follows:

13711 sf (0.315 ac) total area
464 sf (0.011 ac) permeable area
13247 sf (0.304 ac) impermeable area

C= ((0.011 * 0.1) + (0.304 * 0.9))/0.315 = 0.87

Q_{WQV} = (0.87) (0.2) (0.315) (1.5)

Q_{WQV} = 0.08 cfs (to be treated by Filterra Units)

Each Filterra unit is capable of treating 0.06 cfs and so is adequate.

4. Discussion

Due to the change in imperviousness the calculated runoff is expected to increase by 0.19 cfs for the 100-yr storm. The practical effect of this change is negligible. The slight increase will have no detrimental effect on the public storm drains system.

Type of conveyance is a: Curb Outlet
Depth of channel equals .25 Feet
Bottom Width Equals 3
Side slope equals .01
Slope of conveyance equals 1.5 %
Roughness equals .013
Flow quantity equals .9267731 CFS
Area equals .3121082 Square Feet
Velocity equals 2.947695 FPS
Depth of flow equals .104 Feet

APPENDIX

Table A-1. Runoff Coefficients for Rational Method

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

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

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

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

A.1.3. Rainfall Intensity

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

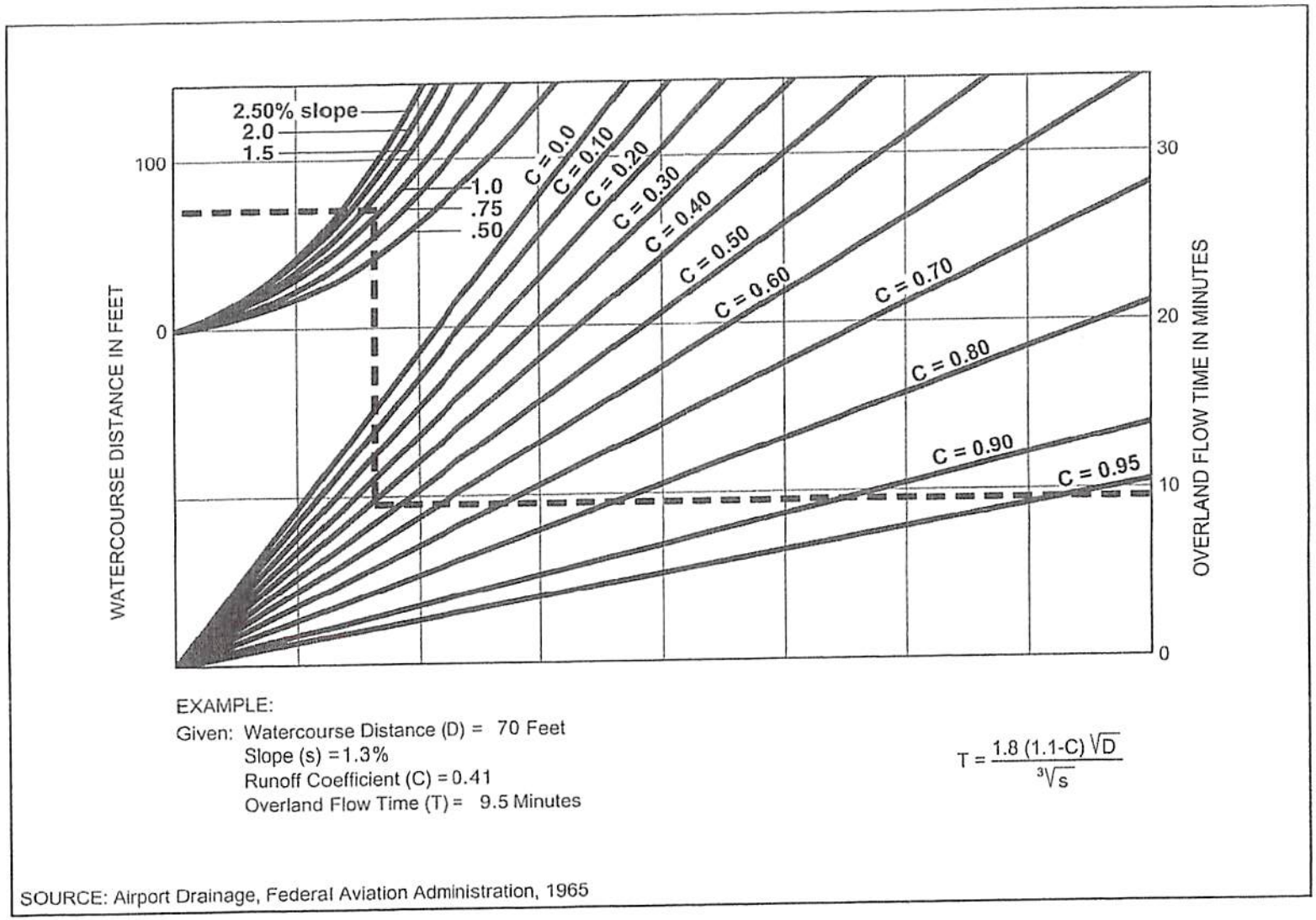


Figure A-4. Rational Formula – Overland Time of Flow Nomograph

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

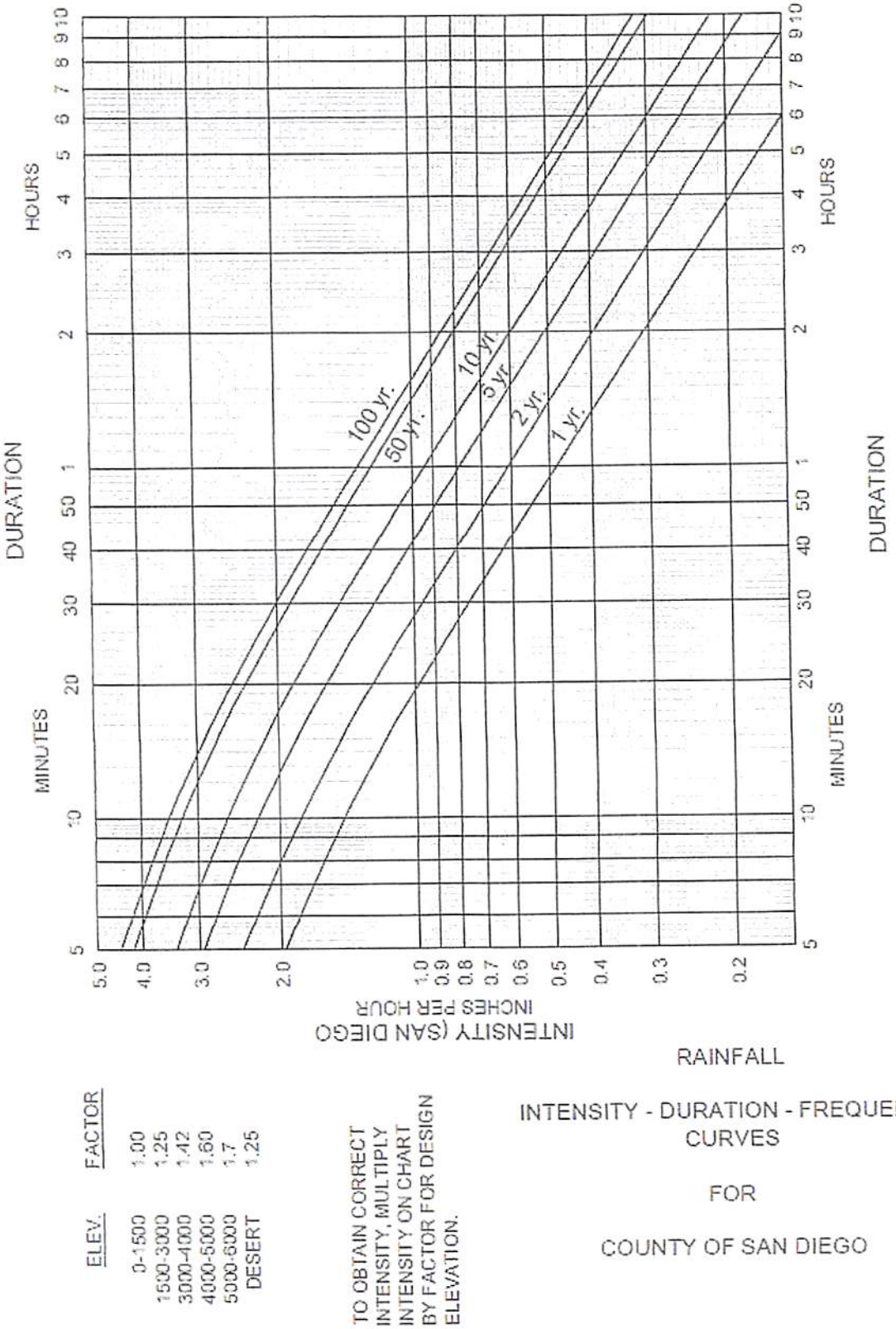


Figure A-1. Intensity-Duration-Frequency Design Chart

DRAINAGE AREA MAPS

PRE-DEVELOPMENT DRAINAGE AREA MAP

PRE-CONSTRUCTION DRAINAGE AREA MAP

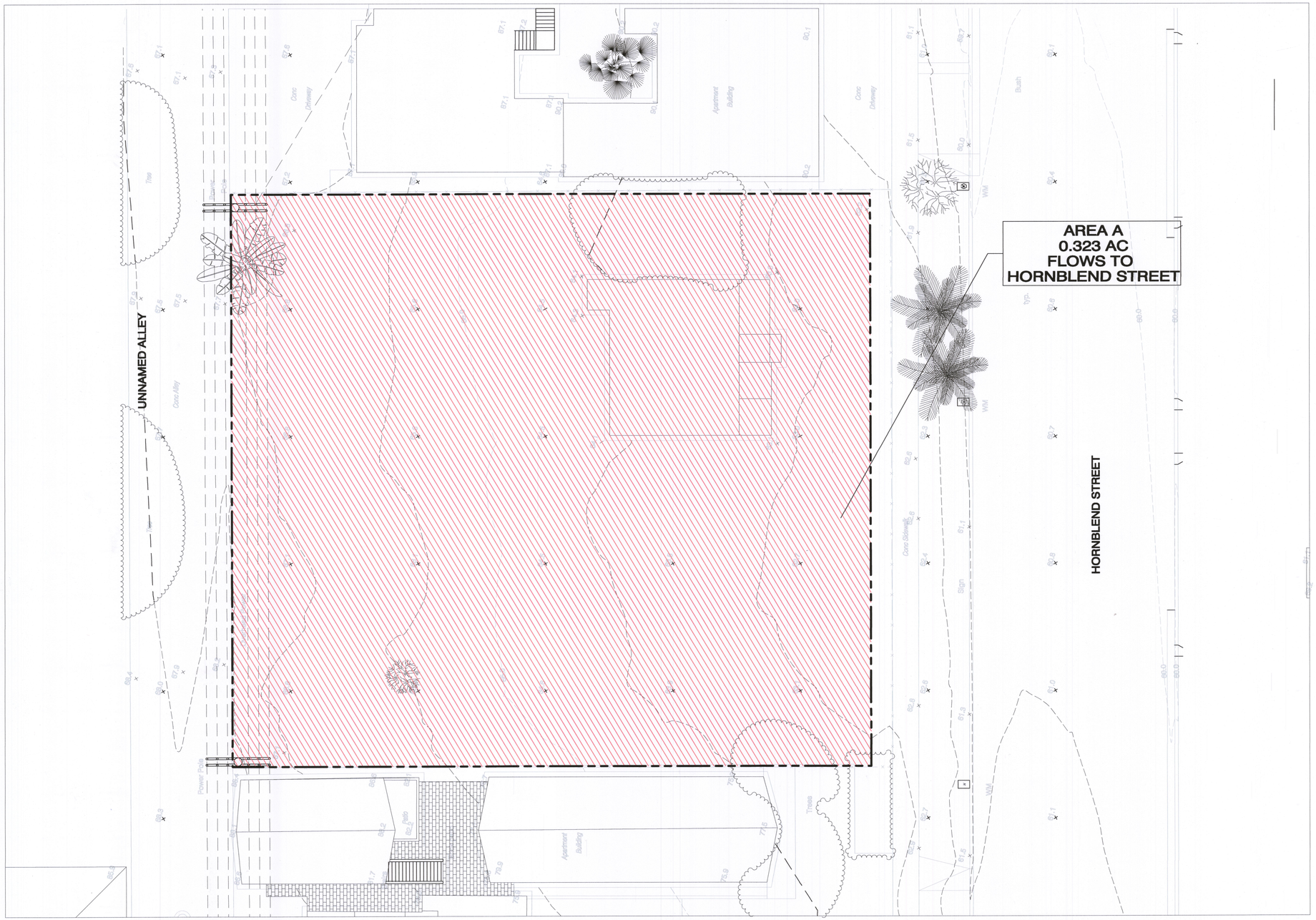
LEGAL DESCRIPTION:

THE WESTERLY HALF OF LOT 25 AND LOTS 26 THROUGH 29, IN BLOCK 214 OF PACIFIC BEACH, IN THE CITY OF SAN DIEGO, COUNTY OF SAN DIEGO, STATE OF CALIFORNIA, ACCORDING TO MAP THEREOF NO. 854, FILED IN THE OFFICE OF THE COUNTY RECORDER OF SAN DIEGO COUNTY SEPTEMBER 28 1898.

APN: 424-041-07 & 08-00

BENCHMARK

CITY OF SAN DIEGO BRASS PLUG LOCATED AT THE NORTHWESTERLY CORNER OF HORNBLEND STREET AND MORRELL STREET. ELEVATION 60.642' MEAN SEA LEVEL. (N.G.V.D. 1929).



SCALE: 1" = 10'
CONTOUR INTERVAL: 1'

0 10 20 30 40

REGISTERED PROFESSIONAL ENGINEER
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No. 54021
Exp. 12-31-19
CIVIL
STATE OF CALIFORNIA

FEBRUARY 23, 2019
ANTONY K. CHRISTENSEN, RCE 54021 Date

UNAUTHORIZED CHANGES & USES

CAUTION: The Engineer preparing these plans will not be responsible for, or liable for, unauthorized change to or uses of these plans. All changes to the plans must be in writing and must be approved by the preparer of these plans.

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Project Address:
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SAN DIEGO, CA 92109

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

Project Name:
HORNBLEND UNITS

Original Date: FEBRUARY 23, 2019

Sheet Title:
PRE-CONSTRUCTION DRAINAGE AREA MAP

Sheet 4 of 23 Sheets

DEP# _____

JN A2018-104

POST-DEVELOPMENT DRAINAGE AREA MAP

POST-CONSTRUCTION DRAINAGE AREA MAP

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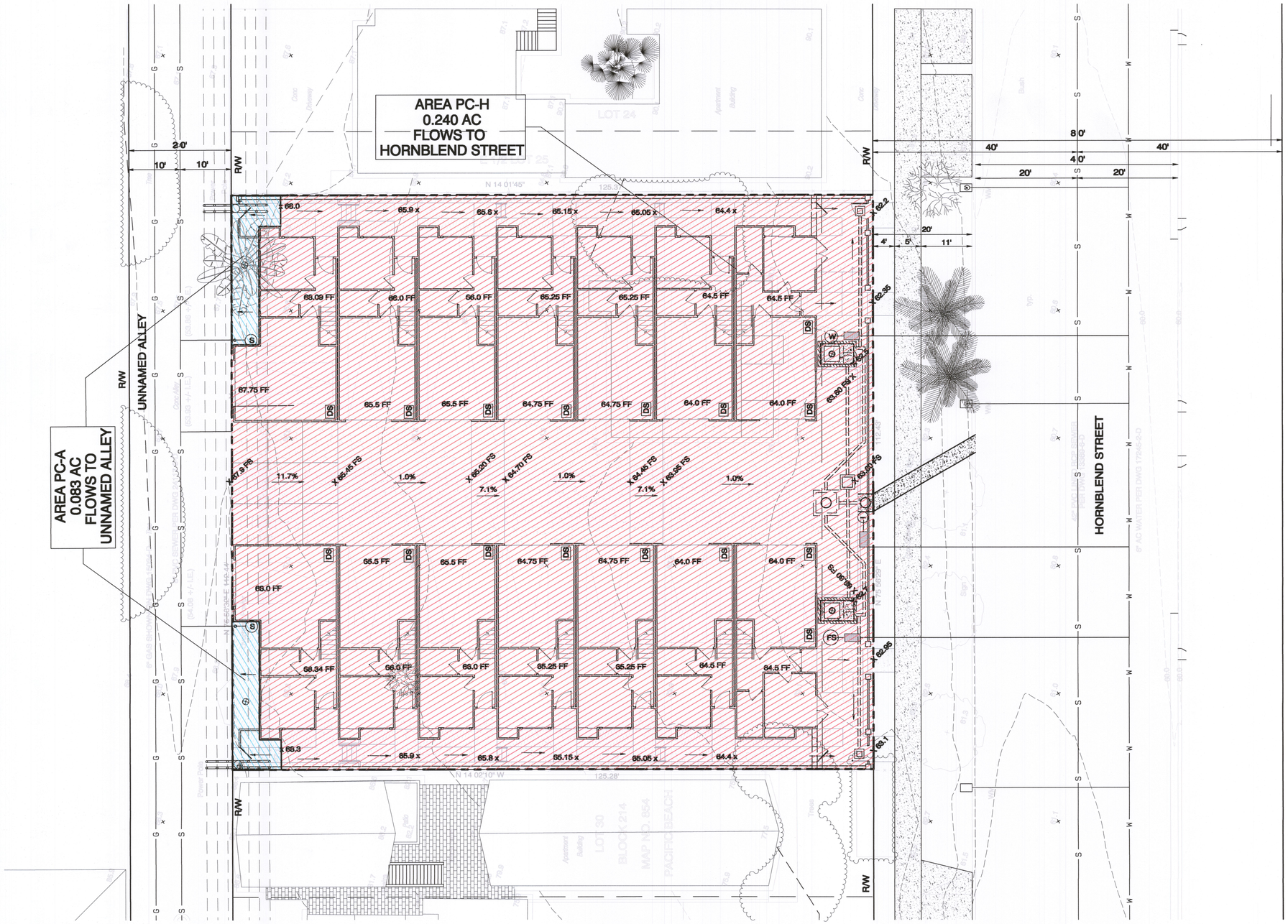

SCALE: 1" = 10'

CONTOUR INTERVAL: 1'

0 10 20 30 40

AUGUST 22, 2019

ANTONY K. CHRISTENSEN, RCE 54021 Date

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POST-CONSTRUCTION DRAINAGE AREA MAP

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