PRELIMINARY DRAINAGE STUDY
for
Morrow Residence

Project Number:
APN: 346-050-04-00
8460 El Paseo Grande, La Jolla, CA 92037

Prepared By:

STRUCTURAL ENGINEERING • CIVIL ENGINEERING • SURVEYING • LAND PLANNING

9449 Balboa Avenue, Suite 270
San Diego, CA 92123
Contact Person: Sven Gierlichs
Phone: (619) 299-5550
sgierlichs@bwesd.com
BWE Job #: 14098U.1.0

Date: October 30, 2025

Existing Legal Description:

Lot 4 of Ocean Terrace in the City of San Diego, County of San Diego, State of California, according to Map thereof no. 2615, filed in the office of the County recorder of San Diego County, January 20, 1950.
Excepting there from that portion hereto or now lying below the mean high tide line of the Pacific Ocean.

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 DRAWING 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.

October 30, 2025

Sven U. Gierlichs
R.C.E. # C 83931
EXP. 09/30/2025

DATE:

Table of Contents

Appendices

1. Purpose

The purpose of this preliminary drainage study is to analyze the existing and proposed drainage patterns, and peak flow rates generated from the Morrow residence located at 8460 El Paseo Grande, La Jolla, California. (See Appendix A for Vicinity and Imagery Maps)

This study also provides recommendations to mitigate stormwater runoff in the proposed condition to match or decrease the pre-development peak flow rates.

To determine the impacts of the proposed development on the existing drainage patterns, the pre- and post- development peak flow rates are analyzed and compared for the 100-year storm event using the Rational Method. The City of San Diego's rational method was used in the CivilD hydrologic analysis. The report has been prepared in accordance with the requirements of the City of San Diego Drainage Design Manual (2017).

2. Background

The goal of this project is to demolish the existing residence including all existing improvements such as patio, driveway, masonry wall and associated landscape areas. A new two-story residence with basement, associated driveway, hardscape, landscape, outdoor living area as well as dry and wet utilities are proposed. There are two concrete walls adjacent to the neighbors' properties to be protected in place, and there is an existing sea wall to be protected in place.

This project is located in Region Number 9, Peñasquitos Watershed, Scripps Hydrologic Area and undefined Hydrologic Subarea (HSA 906.30) as defined in the Regional Water Quality Control Board's Water Quality Control Plan. The site discharges indirectly onto La Jolla Shores Beach and ultimately into the Pacific Ocean.

The Federal Emergency Management Agency (FEMA) Firmette 06073C1582H, dated 12/20/2019 categorizes the project site as Zone X, where Zone X is the area determined to be outside the 500-year floodplain. Appendix D illustrates the FEMA floodplain mapping within the vicinity of the project site.

The site does not consist of, nor will this project disturb any Waters of the United States. Therefore, the site is not subject to the Regional Water Quality Control Board requirements under the Federal Clean Water Act section 401 or 404. The project does not require approval from the Regional Water Quality Board.

3. Existing Condition

The existing site consists of a 2-story residence with an existing concrete driveway and associated garage, patio, masonry wall, concrete walls, landscape areas and associated utilities. Topography can be described as relatively flat with elevations ranging from 8 to 19 feet above sea level.

Runoff from the westernly portion of the site is captured by a series of downspouts as well as area drains that are connected to a private onsite storm drain system that conveys runoff toward the west and discharges through the existing sea wall and onto La Jolla Shores Beach at Discharge Point #1 as shown the Existing Condition Hydrology Map in Appendix B. The ultimate point of discharge is the Pacific Ocean.

Runoff generated from the easterly portion of the project site sheet flows towards El Paseo Grande at Discharge Point #2 as shown on the Existing Condition Hydrology Map in Appendix B. The runoff travels in southerly direction along curb and gutter and into a public curb inlet located approximately 450 feet south of the residence. Runoff is then conveyed via an existing public 18" reinforced storm drain that discharges thru the existing sea wall and onto La Jolla Shores Beach.

4. Proposed Improvements

The proposed project consists of construction of a new two-story residence with basement, associated driveway, hardscape, landscape, outdoor living area as well as dry and wet utilities are proposed.

The existing drainage patterns will slightly change to accommodate for the redevelopment and prevent the proposed improvements from discharging directly west to La Jolla Shores Beach, which is designated as an environmentally sensitive area (ESA).

Only runoff from an existing and undisturbed shared path on the western edge of the site continues to drain west to La Jolla Shores Beach as shown at Discharge Point #1 on the Proposed Condition Hydrology Map in Appendix C.

Runoff generated from proposed improvements will be captured by a series of downspouts and catch basins that will be connected to a private onsite storm drain system. Runoff generated from larger storm events will then be conveyed to a proposed dual pump system. Runoff is then pumped through a proposed curb outlet and into the curb and gutter at El Paseo Grande at Discharge Point #2 as shown on the Proposed Condition Hydrology Map in Appendix C. The runoff then travels in a southerly direction along the curb and gutter into a public curb inlet located approximately 450 feet south of the residence. The runoff is then conveyed via an existing 18" public storm drain that will discharge onto La Jolla Shores Beach thru an existing sea wall.

5. Soil Characteristics

Preliminary investigation per the USDA Web Soil Survey shows Hydrologic Soil Group (HSG) A soils on-site. Therefore, hydrologic analysis is performed by assuming soil type A. The city nomograph method for hydrologic analysis uses HSG D soils.

6. Methodology

Rational Method: A rational method analysis was utilized to perform hydrologic calculations in this study.

Rational Equation: $Q = C * I * A$

Where;
Q = Peak discharge, cfs
C = Rational method runoff coefficient
I = Rainfall intensity, inch/hour
A = Drainage area, acre

A computer model CivilD is used to automate the hydrology analysis process. This computer version of the rational method analysis allows user to develop a node-link model of the watershed. CivilD computer program has the capability of performing calculations utilizing mathematical functions. These functions are assigned code numbers, which appear in the printed results. The code numbers and their corresponding functions are described below;

Sub area Hydrologic Processes;

Code 1 - INITIAL subarea input, top of stream
Code 2 - STREET flow through subarea, includes subarea runoff
Code 3 - ADDITION of runoff from subarea to stream
Code 4 - STREET INLET + parallel street & pipe flow + area
Code 5 - PIPEFLOW travel time (program estimated pipe size)**
Code 6 - PIPEFLOW travel time (user specified pipe size)
Code 7 - IMPROVED channel travel time (open or box)**
Code 8 - IRREGULAR channel travel time**
Code 9 - USER specified entry of data at a point
Code 10 - CONFLUENCE at downstream point in current stream
Code 11 - CONFLUENCE of mainstreams
**NOTE: These options do not include subarea runoff
**NOTE: (#) - Required pipe size determined by the hydrology program

7. Calculations

a. Impervious and Pervious Areas

The impervious and pervious areas are calculated for both the existing and proposed site conditions. The site does not increase the impervious area as shown in Table 7-1.

Table 7-1 Summary of Areas

	Area (Acres)			Percent Impervious Area	Percent Pervious Area
	Total	Impervious (Ai)	Pervious (Ap)		
Existing	0.20	0.180	0.02	90.4%	9.6%
Proposed	0.20	0.16	0.03	82.9%	17.1%
% Change from Existing	**0.0%**	**-8.4%**	**17.1%**		

b. Runoff Coefficient

The coefficients of runoff for the site are determined by utilizing Table A-1 of the City of San Diego Drainage Design Manual by assuming residential type land use.

A runoff coefficient (C value) of 0.95 has been used for existing and 0.85 for proposed conditions respectively.

See Appendices B and C respectively for existing and proposed conditions runoff coefficient calculations.

c. Peak Flow Rates

The rational method is used to perform the hydrologic analysis. The CivilD computer program, which utilizes the rational method of analysis, is used to determine peak flow rates in this study.

The peak flow rates for the 100-year storm events are calculated for both existing as well as proposed conditions and summarized in Table 7-2 for comparison purpose. The detailed calculations (CivilD results) for existing and proposed conditions analysis can be found in Appendices B and C respectively.

Table 7-2 Existing and Proposed Conditions Peak Flow Rates Summary

	Drainage Area (acres)		100 Yr Flow (cfs)		
Discharge Point #	**Existing Condition**	**Proposed Condition**	**Existing Condition**	**Proposed Condition (Unmitigated)**	**% Change from Existing Condition**
1	0.127	0.006	0.49	0.03	**-94.93%**
2	0.068	0.190	0.25	0.68	**168.92%**
Total	0.196	0.196	0.74	0.71	**-4.05%**

8. Downstream Drainage Impact Analysis

The existing drainage pattern will change slightly to accommodate the redevelopment and the associated grading change. In existing conditions, runoff from the western portion of the site discharges directly to La Jolla Shores Beach. In proposed conditions, runoff from the proposed site will discharge east towards El Paseo Grande, which will then be conveyed by City of San Diego curb and gutter and storm drains and eventually be discharged at La Jolla Shores Beach.

The peak flow rate for the entire site will decrease in proposed conditions. The project should not create any negative impacts to downstream properties since the site is designated to maintain and mitigate the drainage impacts.

9. Conclusion

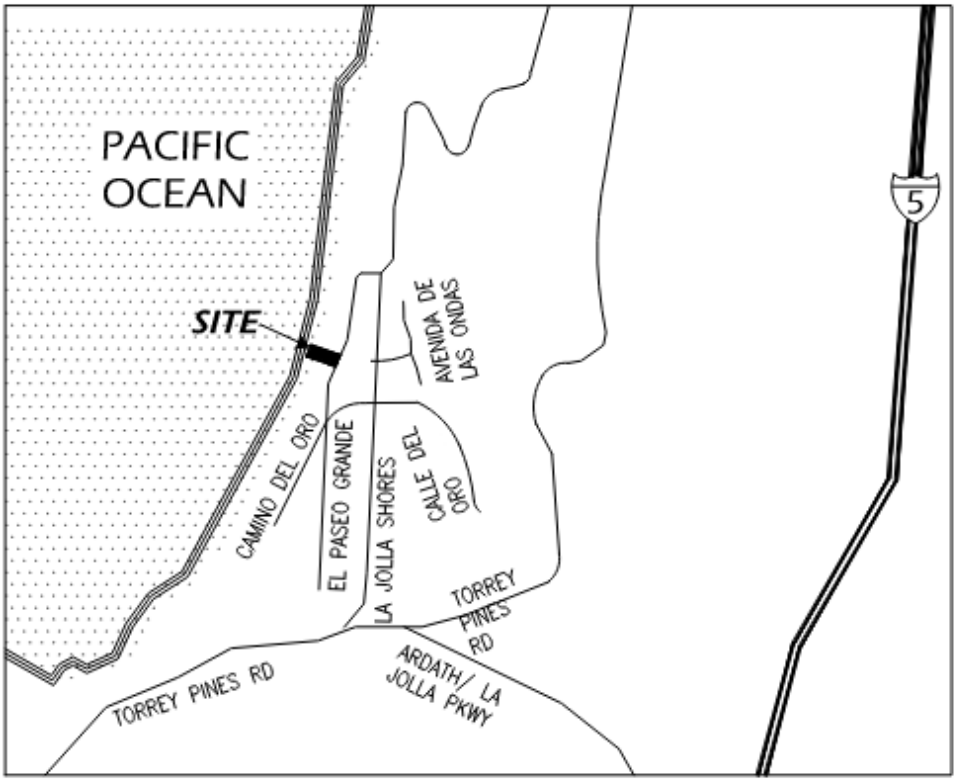
The proposed site is designed to maintain/mitigate the drainage impacts due to the redevelopment. The project should not create any negative impacts to downstream properties.

10. References

- City of San Diego Drainage Design Manual, 2017

APPENDIX A:

Site Vicinity/Imagery Maps



VICINITY MAP
NTS

APPENDIX B:

Existing Condition Hydrology Calculations
Existing Condition Hydrology Map

Runoff Coefficient Calculation (Existing Condition)

Project: Morrow Residence

Similar impervious percentage as Industrial Development

C = 0.95 (Per Table A-1, Soil Class D, Drainage Design Manual)

% imperviousness= 90%

Revised C= (Actual % Imp./Tabulated % Imp.)*0.95

Area	Area (Acres)		Actual % Imperviousness	Calculated Revised Runoff Coeff. (C)	Used Runoff Coef. (C)
	Total Area	Imp. Area (Ai)			
A-1	0.017	0.017	100%	1.06	0.95
A-2	0.093	0.092	98%	1.04	0.95
A-3	0.017	0.012	71%	0.75	0.75
B-1	0.010	0.009	89%	0.94	0.94
B-2	0.058	0.047	81%	0.85	0.85
Total	0.196	0.177	90%	0.95	0.95

*C value for commercial development shall not be less than = 0.5

Example:

Actual Imperviousness =	87%	(per plan)
Tabulated Imperviousness =	90%	(Industrial Land Use Per table A-1)
Revised C =	(87/90)*0.95	
C =	0.92	

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                San Diego County Rational Hydrology Program

      CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2005 Version
6.5

      Rational method hydrology  program based on
      San Diego County Flood Control Division 1985 hydrology manual
            Rational Hydrology Study        Date: 09/10/24
      ---------------------------------------------------------------
------
      14098 Morrow Residence Existing Condition 100yr Discharge Point 1



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       *********   Hydrology Study Control Information **********

      ---------------------------------------------------------------
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      Program License Serial Number 6116

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      Rational hydrology study storm event year is   100.0
      English (in-lb) input data Units used
      English (in) rainfall data used

      Standard intensity of Appendix I-B used for year and
      Elevation 0 - 1500 feet
      Factor (to multiply * intensity)  =  1.000
      Only used if inside City of San Diego
      San Diego hydrology manual 'C' values used
      Runoff coefficients by rational method


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      Process from Point/Station      101.000 to Point/Station
102.000
      **** INITIAL AREA EVALUATION ****
      ___________________________________________________________________
____
      User specified 'C' value of 0.950 given for subarea
      Initial subarea flow distance  =   56.500(Ft.)
      Highest elevation =   20.020(Ft.)
      Lowest elevation =   18.250(Ft.)
      Elevation difference =    1.770(Ft.)
      Time of concentration calculated by the urban
      areas overland flow method (App X-C) =     1.39 min.
      TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
      TC = [1.8*(1.1-0.9500)*(  56.500^.5)/(   3.133^(1/3)]=   1.39
      Setting time of concentration to 5 minutes
      Rainfall intensity (I) =      4.389(In/Hr) for a   100.0 year
storm
      Effective runoff coefficient used for area (Q=KCIA) is C = 0.950
      Subarea runoff =      0.071(CFS)
      Total initial stream area =        0.017(Ac.)
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      Process from Point/Station      102.000 to Point/Station
103.000
      **** IMPROVED CHANNEL TRAVEL TIME ****
      ------------------------------------------------------------------------
____
      Upstream point elevation =    18.250(Ft.)
      Downstream point elevation =    16.610(Ft.)
      Channel length thru subarea  =    46.400(Ft.)
      Channel base width      =    4.000(Ft.)
      Slope or 'Z' of left channel bank =  10.000
      Slope or 'Z' of right channel bank =  10.000
      Estimated mean flow rate at midpoint of channel =      0.265(CFS)
      Manning's 'N'    = 0.030
      Maximum depth of channel  =    0.250(Ft.)
      Flow(q) thru subarea =      0.265(CFS)
      Depth of flow =   0.050(Ft.), Average velocity =   1.177(Ft/s)
      Channel flow top width =    5.000(Ft.)
      Flow Velocity =    1.18(Ft/s)
      Travel time  =    0.66 min.
      Time of concentration =    5.66 min.
      Critical depth =      0.049(Ft.)
       Adding area flow to channel
      User specified 'C' value of 0.950 given for subarea
      Rainfall intensity =      4.176(In/Hr) for a   100.0 year storm
      Runoff coefficient used for sub-area, Rational method,Q=KCIA, C =
0.950
      Subarea runoff =      0.369(CFS) for    0.093(Ac.)
      Total runoff =      0.440(CFS)      Total area =        0.11(Ac.)


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      Process from Point/Station      103.000 to Point/Station
104.000
      **** IMPROVED CHANNEL TRAVEL TIME ****
      ------------------------------------------------------------------------
____
      Upstream point elevation =    16.610(Ft.)
      Downstream point elevation =    13.480(Ft.)
      Channel length thru subarea  =    17.800(Ft.)
      Channel base width      =    4.000(Ft.)
      Slope or 'Z' of left channel bank =  10.000
      Slope or 'Z' of right channel bank =  10.000
      Estimated mean flow rate at midpoint of channel =      0.474(CFS)
      Manning's 'N'    = 0.013
      Maximum depth of channel  =    0.250(Ft.)
      Flow(q) thru subarea =      0.474(CFS)
      Depth of flow =   0.027(Ft.), Average velocity =   4.129(Ft/s)
      Channel flow top width =    4.538(Ft.)
      Flow Velocity =    4.13(Ft/s)
      Travel time  =    0.07 min.
      Time of concentration =    5.73 min.
      Critical depth =      0.071(Ft.)
       Adding area flow to channel
      User specified 'C' value of 0.750 given for subarea
      Rainfall intensity =      4.155(In/Hr) for a   100.0 year storm
      Runoff coefficient used for sub-area, Rational method,Q=KCIA, C =
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0.750
      Subarea runoff =      0.053(CFS) for    0.017(Ac.)
      Total runoff =      0.493(CFS)      Total area =        0.13(Ac.)
      End of computations, total study area =           0.127 (Ac.)
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San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2005 Version 6.5

Rational method hydrology program based on
San Diego County Flood Control Division 1985 hydrology manual
Rational Hydrology Study Date: 09/10/24

14098 Morrow Residence Existing Condition Discharge Point 2

********* Hydrology Study Control Information **********

Program License Serial Number 6116

Rational hydrology study storm event year is 100.0
English (in-lb) input data Units used
English (in) rainfall data used

Standard intensity of Appendix I-B used for year and
Elevation 0 - 1500 feet
Factor (to multiply * intensity) = 1.000
Only used if inside City of San Diego
San Diego hydrology manual 'C' values used
Runoff coefficients by rational method

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Process from Point/Station 201.000 to Point/Station 202.000
**** INITIAL AREA EVALUATION ****

User specified 'C' value of 0.940 given for subarea
Initial subarea flow distance = 40.000(Ft.)
Highest elevation = 20.470(Ft.)
Lowest elevation = 20.380(Ft.)
Elevation difference = 0.090(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 2.99 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9400)*(40.000^.5)/(0.225^(1/3)]= 2.99
Setting time of concentration to 5 minutes
Rainfall intensity (I) = 4.389(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.940
Subarea runoff = 0.041(CFS)
Total initial stream area = 0.010(Ac.)

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      Process from Point/Station      202.000 to Point/Station
203.000
      **** IMPROVED CHANNEL TRAVEL TIME ****
      ____________________________________________________________________
____
      Covered channel
      Upstream point elevation =    20.380(Ft.)
      Downstream point elevation =    18.360(Ft.)
      Channel length thru subarea  =    43.700(Ft.)
      Channel base width      =    4.000(Ft.)
      Slope or 'Z' of left channel bank =  10.000
      Slope or 'Z' of right channel bank =  10.000
      Estimated mean flow rate at midpoint of channel =      0.161(CFS)
      Manning's 'N'    = 0.013
      Maximum depth of channel  =    0.250(Ft.)
      Flow(q) thru subarea =      0.161(CFS)
      Depth of flow =   0.021(Ft.), Average velocity =   1.814(Ft/s)
      Channel flow top width =    4.421(Ft.)
      Flow Velocity =    1.81(Ft/s)
      Travel time  =    0.40 min.
      Time of concentration =    5.40 min.
      Critical depth =      0.036(Ft.)
       Adding area flow to channel
      User specified 'C' value of 0.850 given for subarea
      Rainfall intensity =      4.254(In/Hr) for a   100.0 year storm
      Runoff coefficient used for sub-area, Rational method,Q=KCIA, C =
0.850
      Subarea runoff =      0.210(CFS) for    0.058(Ac.)
      Total runoff =      0.251(CFS)      Total area =        0.07(Ac.)
      End of computations, total study area =           0.068 (Ac.)
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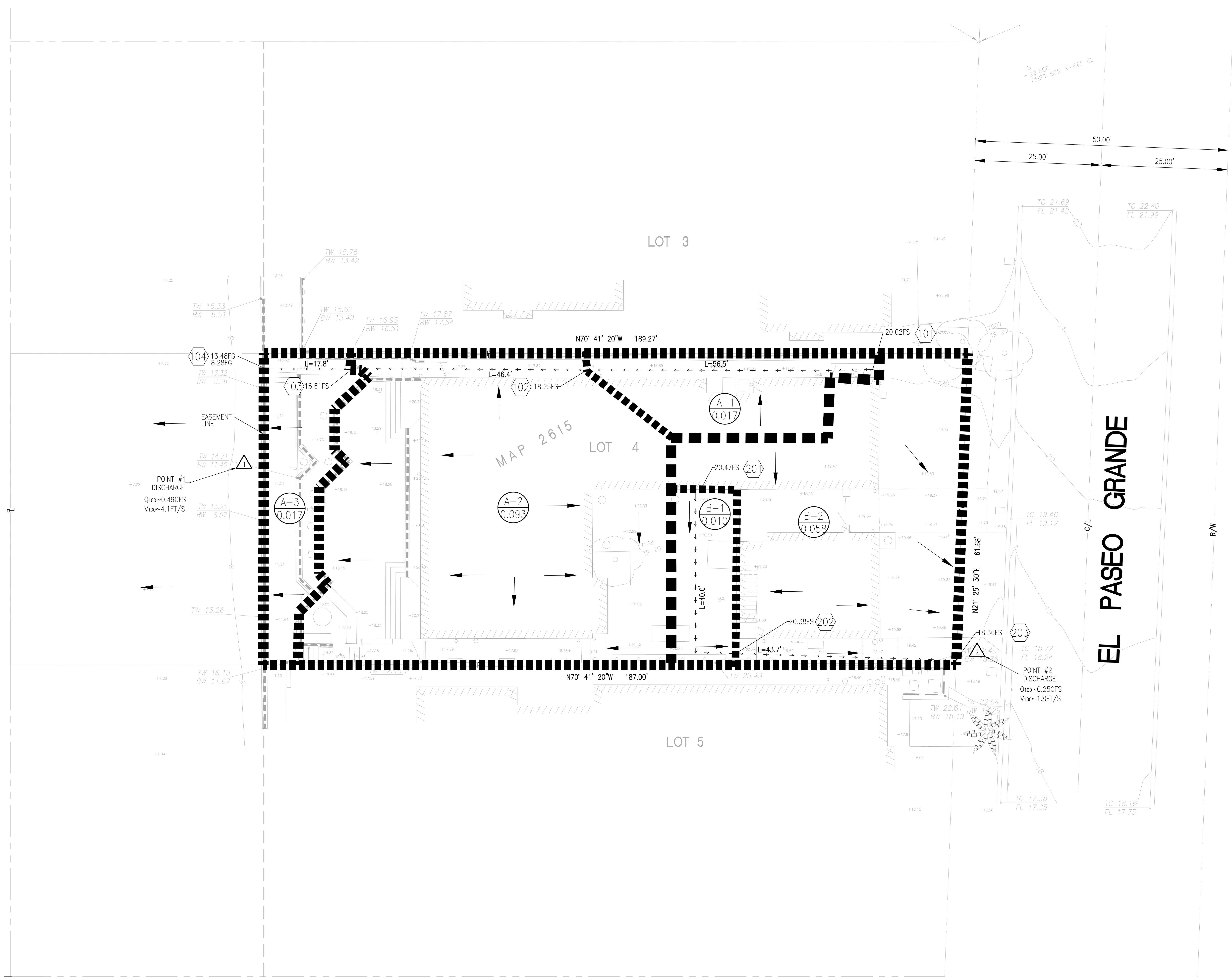

LEGEND — SYMBOL

OUTER BASIN BOUNDARY
MAJOR BASIN BOUNDARY
MINOR BASIN BOUNDARY
EXISTING CONCRETE BROW DITCH
EXISTING CONTOUR
FLOW DIRECTION
FLOW PATH
FLOW LENGTH — L=XXX.X'
NODE/CONTOUR ELEVATION — 212.24FL 239.26FG
HYDROLOGY NODE — 200
ANALYSIS/EXIT POINT — 1
DRAINAGE BASIN MARKER & AREA (AC) — A-X X.XX

NOTES:
1) PEAK FLOW RATES ARE CALCULATED UTILIZING CITY OF SD DRAINAGE DESIGN MANUAL. THE CITY OF SAN DIEGO NOMOGRAPH METHOD WAS USED TO CALCULATED FLOW RATES.
2) THE SITE CONTAINS HSG B SOILS.

10 5 0 10 20 30
SCALE: 1"=10'

BWE
CIVIL•STRUCTURAL•SURVEY•PLANNING
9449 BALBOA AVE, STE 270
SAN DIEGO, CA 92123 619.299.5550

SYM | DESCRIPTION | DATE | APPR

BENCHMARK:
ISSUE DATE:
DRAWN BY:
CHECKED BY:
B&W JOB NUMBER:
CLIENT JOB NUMBER:

PROJECT
MORROW RESIDENCE

SHEET TITLE
EXISTING DRAINAGE MAP

LEGAL DESCRIPTION

SHEET 1 OF 1

BWE
CIVIL•STRUCTURAL•SURVEY•PLANNING
9449 BALBOA AVE, STE 270
SAN DIEGO, CA 92123 619.299.5550

PLOT: M:\PROJECTS\14000\14098J.100 - MORROW RESIDENCE\DWGS\EXHIBITS\DRAINAGE\EX-DRAINAGE MAP_R1.DWG Josh Gallardo 10/30/2025 1:23 PM

APPENDIX C:

Proposed Condition Hydrology Calculations
Proposed Condition Hydrology Map

Runoff Coefficient Calculation (Proposed Condition)

Project: Morrow Residence

Similar Impervious to Commercial Development

C = 0.85 (Per Table A-1, Soil Class D, Drainage Design Manual)

% impv.= 80%

Revised C= (Actual % Imp./Tabulated % Imp.)*0.85

Discharge Point #	Area (Acres)		Actual % Imperviousness	Calculated Revised Runoff Coeff. (C)	Used Runoff Coeff. (C)
	Total Area	Imp. Area (Ai)			
A-1	0.006	0.006	100%	1.06	0.95
B-1	0.006	0.004	76%	0.81	0.81
B-2	0.077	0.066	87%	0.92	0.92
B-3	0.107	0.086	80%	0.85	0.85
Total	0.196	0.162	83%	0.88	0.88

*C value for commercial development shall not be less than = 0.5

Example:

Actual Imperviousness =	77%	(per plan)
Tabulated Imperviousnes	80%	(Commercial Land Use Per table A-1)
Revised C =	(77/80)*0.85	
C =	0.82	

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2005 Version 6.5

Rational method hydrology program based on
San Diego County Flood Control Division 1985 hydrology manual
Rational Hydrology Study Date: 09/10/24

14098 Morrow Residence Proposed Condition 100yr Discharge Point 1

********* Hydrology Study Control Information **********

Program License Serial Number 6116

Rational hydrology study storm event year is 100.0
English (in-lb) input data Units used
English (in) rainfall data used

Standard intensity of Appendix I-B used for year and
Elevation 0 - 1500 feet
Factor (to multiply * intensity) = 1.000
Only used if inside City of San Diego
San Diego hydrology manual 'C' values used
Runoff coefficients by rational method

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Process from Point/Station 101.000 to Point/Station 102.000
**** INITIAL AREA EVALUATION ****

User specified 'C' value of 0.950 given for subarea
Initial subarea flow distance = 5.000(Ft.)
Highest elevation = 13.550(Ft.)
Lowest elevation = 13.480(Ft.)
Elevation difference = 0.070(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 0.54 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.9500)*(5.000^.5)/(1.400^(1/3)]= 0.54
Setting time of concentration to 5 minutes
Rainfall intensity (I) = 4.389(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.950
Subarea runoff = 0.025(CFS)
Total initial stream area = 0.006(Ac.)

End of computations, total study area = 0.006 (Ac.)

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2005 Version 6.5

Rational method hydrology program based on
San Diego County Flood Control Division 1985 hydrology manual
Rational Hydrology Study Date: 09/10/24

14098 Morrow Residence Proposed Condition 100yr Discharge Point 2

********* Hydrology Study Control Information **********

Program License Serial Number 6116

Rational hydrology study storm event year is 100.0
English (in-lb) input data Units used
English (in) rainfall data used

Standard intensity of Appendix I-B used for year and
Elevation 0 - 1500 feet
Factor (to multiply * intensity) = 1.000
Only used if inside City of San Diego
San Diego hydrology manual 'C' values used
Runoff coefficients by rational method

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Process from Point/Station 201.000 to Point/Station 202.000
**** INITIAL AREA EVALUATION ****

User specified 'C' value of 0.810 given for subarea
Initial subarea flow distance = 18.000(Ft.)
Highest elevation = 20.000(Ft.)
Lowest elevation = 19.510(Ft.)
Elevation difference = 0.490(Ft.)
Time of concentration calculated by the urban
areas overland flow method (App X-C) = 1.59 min.
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.8100)*(18.000^.5)/(2.722^(1/3)]= 1.59
Setting time of concentration to 5 minutes
Rainfall intensity (I) = 4.389(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.810
Subarea runoff = 0.021(CFS)
Total initial stream area = 0.006(Ac.)

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      Process from Point/Station      202.000 to Point/Station
203.000
      **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
      ------------------------------------------------------------------------
----
      Upstream point/station elevation =    18.010(Ft.)
      Downstream point/station elevation =    10.000(Ft.)
      Pipe length  =   155.70(Ft.)   Manning's N = 0.013
      No. of pipes = 1  Required pipe flow  =     0.021(CFS)
      Nearest computed pipe diameter  =      3.00(In.)
      Calculated individual pipe flow  =     0.021(CFS)
      Normal flow depth in pipe =    0.66(In.)
      Flow top width inside pipe =    2.49(In.)
      Critical Depth =    1.03(In.)
      Pipe flow velocity =      2.66(Ft/s)
      Travel time through pipe =    0.98 min.
      Time of concentration (TC) =     5.98 min.


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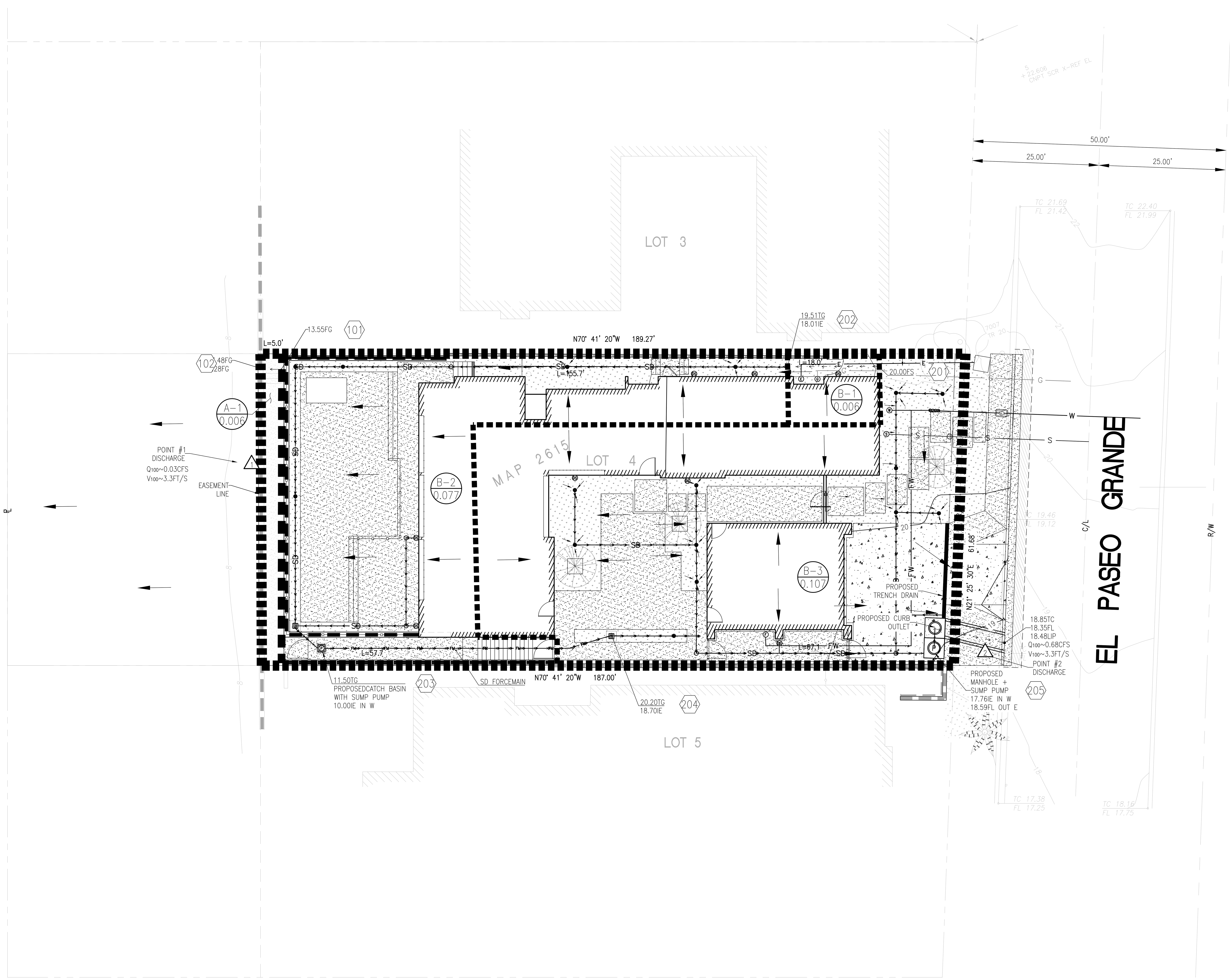
      Process from Point/Station      202.000 to Point/Station
203.000
      **** SUBAREA FLOW ADDITION ****
      ------------------------------------------------------------------------
----
      User specified 'C' value of 0.920 given for subarea
      Time of concentration =     5.98 min.
      Rainfall intensity =      4.087(In/Hr) for a   100.0 year storm
      Runoff coefficient used for sub-area, Rational method,Q=KCIA, C =
0.920
      Subarea runoff =      0.290(CFS) for    0.077(Ac.)
      Total runoff =      0.311(CFS)      Total area =        0.08(Ac.)


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station      203.000 to Point/Station
204.000
      **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
      ------------------------------------------------------------------------
----
      Upstream point/station elevation =    18.710(Ft.)
      Downstream point/station elevation =    18.700(Ft.)
      Pipe length  =     0.10(Ft.)   Manning's N = 0.013
      No. of pipes = 1  Required pipe flow  =     0.311(CFS)
      Nearest computed pipe diameter  =      6.00(In.)
      Calculated individual pipe flow  =     0.311(CFS)
      Normal flow depth in pipe =    1.70(In.)
      Flow top width inside pipe =    5.41(In.)
      Critical Depth =    3.38(In.)
      Pipe flow velocity =      6.79(Ft/s)
      Travel time through pipe =    0.00 min.
      Time of concentration (TC) =     5.98 min.


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
```

```
++++
      Process from Point/Station      204.000 to Point/Station
205.000
      **** PIPEFLOW TRAVEL TIME (Program estimated size) ****
      ------------------------------------------------------------------------
____
      Upstream point/station elevation =    18.700(Ft.)
      Downstream point/station elevation =    17.760(Ft.)
      Pipe length  =    67.10(Ft.)   Manning's N = 0.013
      No. of pipes = 1  Required pipe flow  =     0.311(CFS)
      Nearest computed pipe diameter  =      6.00(In.)
      Calculated individual pipe flow  =     0.311(CFS)
      Normal flow depth in pipe =    2.89(In.)
      Flow top width inside pipe =    6.00(In.)
      Critical Depth =    3.38(In.)
      Pipe flow velocity =      3.33(Ft/s)
      Travel time through pipe =    0.34 min.
      Time of concentration (TC) =     6.31 min.


      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
++++
      Process from Point/Station      204.000 to Point/Station
205.000
      **** SUBAREA FLOW ADDITION ****
      ------------------------------------------------------------------------
____
      User specified 'C' value of 0.850 given for subarea
      Time of concentration =     6.31 min.
      Rainfall intensity =      4.001(In/Hr) for a   100.0 year storm
      Runoff coefficient used for sub-area, Rational method,Q=KCIA, C =
0.850
      Subarea runoff =      0.364(CFS) for    0.107(Ac.)
      Total runoff =      0.675(CFS)      Total area =        0.19(Ac.)
      End of computations, total study area =           0.190 (Ac.)
```



10 5 0 10 20 30

SCALE: 1"=10'

LEGEND

	SYMBOL
OUTER BASIN BOUNDARY	
MAJOR BASIN BOUNDARY	
MINOR BASIN BOUNDARY	
EXISTING CONCRETE BROW DITCH	
EXISTING CONTOUR	
FLOW DIRECTION	
FLOW PATH	
FLOW LENGTH	L=XXX.X'
NODE/CONTOUR ELEVATION	212.24FL 239.26FG
HYDROLOGY NODE	200
ANALYSIS/EXIT POINT	1
DRAINAGE BASIN MARKER & AREA (AC)	A-X X.XX
NEW PVT. ROOF DRAIN & DOWNSPOUT (POC)	DS
NEW PVT 6" PVC STORM DRAIN	SD
NEW PVT AREA DRAIN (NDS OR APPROVED EQUAL)	SD
NEW PVT FORCE MAIN	FM
NEW PVT SD CLEANOUT (NDS OR APPROVED EQUAL)	SD
NEW PVT TRENCH DRAIN, PRE-SLOPED, HEEL PROOF, BOLTED DOWN (NDS OR APPROVED EQUAL)	
NEW PVT MODIFIED CURB OUTLET	
NEW PVT CATCH BASIN	
NEW PVT CATCH BASIN WITH SUMP PUMP	P

NOTES:
1) PEAK FLOW RATES ARE CALCULATED UTILIZING CITY OF SD DRAINAGE DESIGN MANUAL. THE CITY OF SAN DIEGO NOMOGRAPH METHOD WAS USED TO CALCULATED FLOW RATES.
2) THE SITE CONTAINS HSG D SOILS.

BWE
CIVIL • STRUCTURAL • SURVEY • PLANNING
9449 BALBOA AVE, STE 270
SAN DIEGO, CA 92123
619.299.5550

SYM	DESCRIPTION	DATE	APPR

BENCHMARK:

ISSUE DATE:
DRAWN BY:
CHECKED BY:
B&W JOB NUMBER:
CLIENT JOB NUMBER:

PROJECT
MORROW RESIDENCE

SHEET TITLE
PROPOSED DRAINAGE MAP

LEGAL DESCRIPTION

SHEET 1 OF 1

PLOT: M:\PROJECTS\14000\14098\L100 - MORROW RESIDENCE\DWGS\EXHIBITS\DRAINAGE\PROP-DRAINAGE MAP_R1.DWG Josh Gallardo 10/30/2025 2:11 PM

APPENDIX D:

FEMA Floodplain Map

National Flood Hazard Layer FIRMette

FEMA

117°15'38"W 32°51'53"N

117°15'1"W 32°51'22"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 9/27/2023 at 12:33 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.