



CONCEPTUAL HYDROLOGY STUDY

FOR

**Tentative Tract Map No. 84400
SW Corner Avenue H-4 & Challenger Way
Lancaster, CA 93534**

March 2024

Prepared For:

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JN 23-030**



Engineer's Certification

The Registered Professional Engineer certifies that the flood and storm facilities have been designed in accordance with the City of Lancaster Engineering Design Guidelines, Policies, and Procedures and Los Angeles County Standards.

Introduction

This conceptual drainage study is for Tentative Tract No. 84400 located on the southwest corner of Avenue H-4 & Challenger Way in the City of Lancaster (see sht.7). The proposed tentative tract consists of 8 lots and approximately 2.62 AC and will be developed on a vacant lot. There is off-site runoff that will be contributory to the proposed tract from the vacant lot to the south and future tract development along with the proposed street improvement (Avenue H-4 & Challenger). The proposed storm drain system will consist of two catch basin one located on Challenger Way and the other on Avenue H-4. The proposed catch basin "A" on Avenue H-4 will be a bubbler system that will route the flow northerly across Avenue H-4. The proposed catch basin "B" on Challenger Way will connect to the existing 84" storm drain in Challenger Way. This study will determine the off & on-site runoff along with the size the proposed storm drain system.

Purpose

The purpose of this study is to determine the runoff that affects the proposed tentative tract and size the appropriate drainage facilities.

Rainfall Data

This site has the following rainfall data, etc.

Isohyet Line	=	2.6	(see sht. 4)
Soil number	=	120	
Storm frequency	=	50 YR	(Residential/Storm Drain)

Storm Runoff

The L.A. County MODRAT model is used to determine the storm runoff. The off & on-site runoffs are calculated by using the WMS computer program. The area data, etc. for input into the program is shown below. For the component areas, see the hydro-maps, H1-H2 in Appendix "C".

Post-Developed Proposed & Future Off & On-site (See Appendix A for 50-Yr. Areas)

Tc calculations are as follow:

$$TC = 0.31 * (C_d * I_t)^{-0.519} * (L)^{0.483} * (S)^{-0.135}$$

$(C_d * I_t)$ = Rainfall excess in inches per hour

$C_d = (0.9 * IMP) + (1 - IMP) * C_u$; (Runoff Coefficient adjusted for development)

$I_t = I_{1440} * (I_t / I_{1440})$; (Rain fall intensity at t-minutes in inches per hour)

$L =$ Longest flow path

$S =$ Slope

CONVEYANCE

POST-DEVELOPED OFF-SITE & ON-SITE SEE MAP H1 APPENDIX “C”

Area A & B

The off-site area consists of pre-developed runoff from the vacant area to the south of the proposed tentative tract. This runoff will join the on-site runoff in the proposed private street. The proposed private street will route the off and onsite runoff ($Q_{50} = 1.88$ CFS) to a proposed curb inlet catch basin “A” located in Avenue H-4 see calculations below. This catch basin will be attached to a bubbler system that will outlet to the north of Avenue H-4.

Area C

This proposed project will construct a portion of Challenger Way to the street ultimate developed condition. A proposed (7') catch basin will be installed on the southwest corner of Avenue H-4 & Challenger Way on the west side of Challenger Way. This catch basin (catch basin B) will collect the runoff from the proposed expansion of Challenger Way and a portion of undeveloped street area to the south of the proposed site. A flow of (Q_{50}) 0.61 CFS will be generated by Area C and collected by catch basin B see catch basin calculation below. Catch basin B will connect to the existing 84" pipe located in Challenger Way.

POST-DEVELOPED OFF-SITE & ON-SITE SEE MAP H2 APPENDIX “C” (FUTURE DEVELOPMENT)

Area A & B (Future Development)

The off-site area consists of the development of a future tract to the south of the south of the proposed tentative tract. This runoff will join the on-site runoff in the proposed private street. The proposed private street will route the off and onsite runoff ($Q_{50} = 2.22$ CFS) to a proposed curb inlet catch basin “B” located in Avenue H-4 see calculations below.

Area C (future street construction)

Area C consist of a portion of Challenger Way that will be constructed by the proposed project and a future portion of Challenger Way that will be constructed by the future tract to the south. The flow generated (0.67 CFS) by the future construction of Challenger Way will be routed into a proposed 7' catch basin see catch basin calculation below.

NOTE: The future development to the south and Challenger Way was included in this report to size the offsite public catch basin. Any increase in contributory area other then what was included will result in future adding additional catch basin.

CATCH BASIN SIZING

Catch Basin A

$$Q = 4.3AD^{0.6} \text{ (See Appendix B for equation)}$$

A = Area of opening (W x 0.25)

W = length of catch basin

D = depth of flow

$$Q = 4.3 (7' \times 0.25) 0.25^{0.6} = 3.27 \text{ CFS} > 2.22 \text{ CFS, therefore,}$$

Catch basin Size is sufficient for the proposed & future tract development.

Catch Basin B

$$Q = 4.3AD^{0.6} \text{ (See Appendix B for equation)}$$

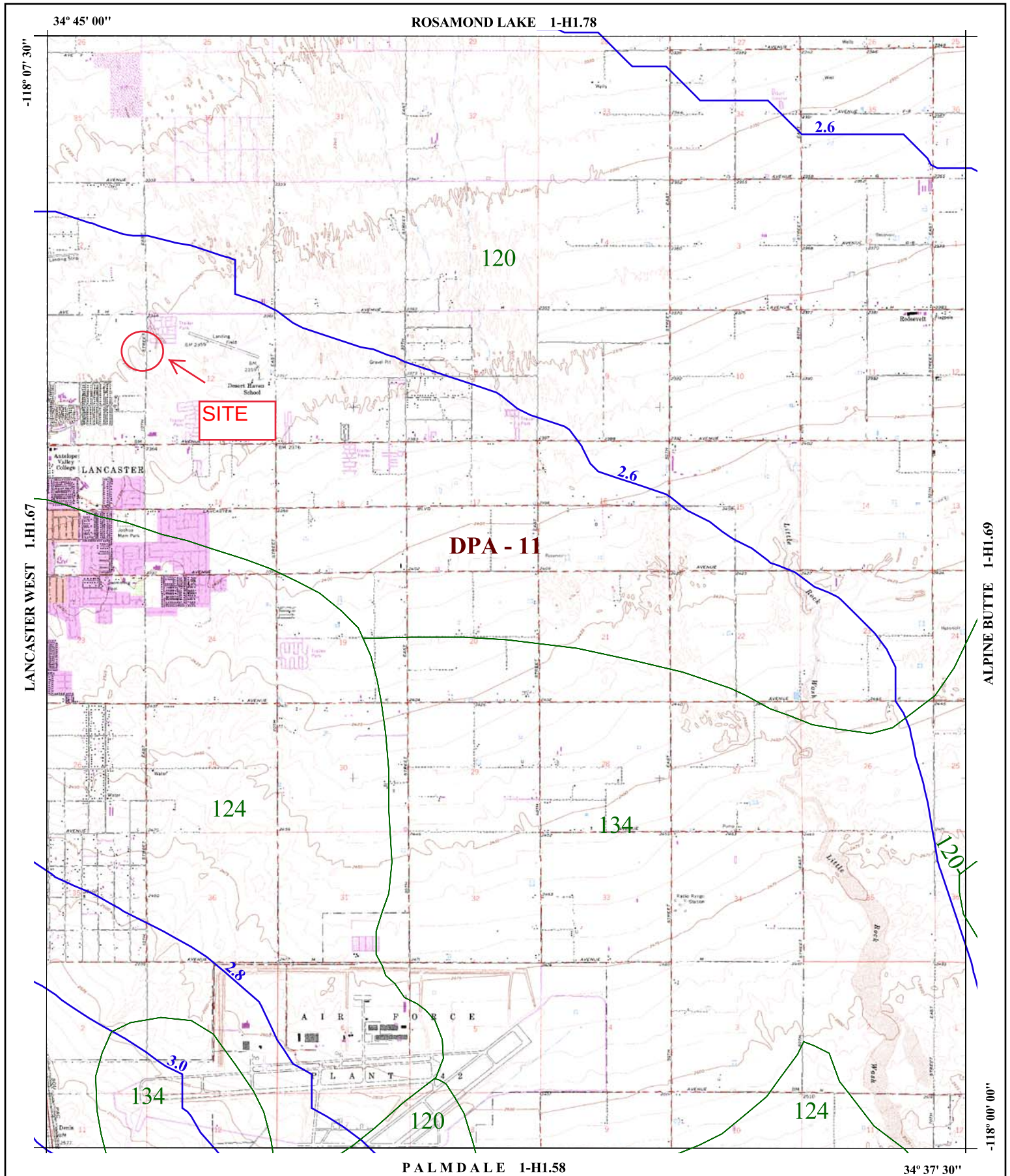
A = Area of opening (W x 0.16)

W = length of catch basin

D = depth of flow

$$Q = 4.3 (7' \times 0.16) 0.16^{0.6} = 1.60 \text{ CFS} > 0.67 \text{ CFS, therefore,}$$

Catch basin size is sufficient for the proposed & future Street development.



016 SOIL CLASSIFICATION AREA

7.2 INCHES OF RAINFALL

DPA - 6 DEBRIS POTENTIAL AREA

1 0 1 2 Miles

25-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.878
10-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.714

LANCASTER EAST
50-YEAR 24-HOUR ISOHYET

1-H1.68
SHEET 4



APPENDIX A

POST DEVELOPED OFF & ON- SITE RUNOFF

AREAS A & B RUNOFF AREAS

File name: POST25.lac

Run date: Tue Mar 12 12:10:02 2024

Los Angeles County Flood Control District
Modified Rational Method Hydrology

LOCATION	SUBAREA		Storm Day 1		Storm Frequency 50		CONV SLOPE (FT/FT)	CONV SIZE	CONV Z	CONTROL Q (CFS)	SOIL NAME	RAIN TC (IN)	PCT IMPV
	AREA (ACRES)	Q (CFS)	TOTAL AREA (ACRES)	TOTAL Q (CFS)	TOTAL VOLUME (AC-FT)	CONV LENGTH (FT)							
1 1A	0.2	0.07	0.2	0.07	0.005	0 150	0.00600	0.00	0.00	0	120 12	2.60	0.01
1 2A	0.4	0.14	0.6	0.21	0.016	0 150	0.00600	0.00	0.00	0	120 12	2.60	0.01
1 3A	0.6	0.21	1.2	0.42	0.031	0 150	0.00600	0.00	0.00	0	120 12	2.60	0.01
1 4A	1.1	0.57	2.3	0.98	0.141	0 334	0.00400	0.00	0.00	0	120 15	2.60	0.45
1 5B	0.2	0.07	0.2	0.07	0.005	0 175	0.01000	0.00	0.00	0	120 12	2.60	0.01
1 6B	0.4	0.14	0.6	0.21	0.016	0 175	0.01000	0.00	0.00	0	120 12	2.60	0.01
1 7B	0.3	0.19	0.9	0.39	0.024	0 70	0.01000	0.00	0.00	0	120 6	2.60	0.01
1 8B	1.1	0.52	2.0	0.91	0.133	0 387	0.00400	0.00	0.00	0	120 17	2.60	0.45
1 9AB	2.0	0.00	4.3	1.88	0.273	0 0	0.00000	0.00	0.00	0	120 0	2.60	0.00

Normal End of MODRAT

AREA C RUNOFF AREAS

File name: POST50.lac Run date: Tue Mar 12 13:43:07 2024

Los Angeles County Flood Control District
Modified Rational Method Hydrology

LOCATION	SUBAREA		Storm Day 1		Storm Frequency 50		CONV SLOPE (FT/FT)	CONV SIZE	CONV Z	CONTROL Q (CFS)	SOIL NAME	RAIN TC (IN)	PCT IMPV
	AREA (ACRES)	SUBAREA	Q (CFS)	TOTAL AREA (ACRES)	TOTAL Q (CFS)	TOTAL VOLUME (AC-FT)							
1 1C	0.8		0.32	0.8	0.32	0.086	0	0.00	0.00	0	120	2.60	0.50
1 2C	0.3		0.29	1.1	0.61	0.141	0	0.00	0.00	0	120	2.60	0.95

Normal End of MODRAT

POST DEVELOPED OFF & ON-
SITE RUNOFF
(FUTURE DEVELOPMENT)

AREAS A & B RUNOFF AREAS

File name: POST50FUT.lac Run date: Wed Mar 13 10:46:55 2024

Los Angeles County Flood Control District
Modified Rational Method Hydrology

LOCATION	SUBAREA		Storm Day 1		Storm Frequency 50				CONV SIZE	CONV Z	CONTROL Q (CFS)	SOIL NAME	RAIN		PCT IMPV
	AREA (ACRES)	SUBAREA (CFS)	Q (ACRES)	TOTAL AREA	TOTAL Q (CFS)	VOLUME (AC-FT)	CONV TYPE	CONV LNTH (FT)					TC (MIN)	(IN)	
1 1A	1.1	0.57	1.1	1.1	0.57	0.109	0	329	0.00	0.00	0	120	15	2.60	0.45
1 2A	1.1	0.57	2.2	2.2	1.13	0.219	0	324	0.00	0.00	0	120	15	2.60	0.45
1 3B	1.1	0.57	1.1	1.1	0.57	0.109	0	329	0.00	0.00	0	120	15	2.60	0.45
1 4B	1.1	0.52	2.2	2.2	1.08	0.219	0	387	0.00	0.00	0	120	17	2.60	0.45
1 5AB	2.2	0.00	4.4	4.4	2.22	0.438	0	0	0.00	0.00	0	120	0	2.60	0.00

Normal End of MODRAT

AREA C RUNOFF AREAS

File name: POST50FUT.lac Run date: Wed Mar 13 10:55:10 2024

Los Angeles County Flood Control District
Modified Rational Method Hydrology

LOCATION	SUBAREA		Storm Day 1		Storm Frequency 50		CONV SLOPE (FT/FT)	CONV LNGTH (FT)	CONV TYPE	CONV VOLUME (AC-FT)	TOTAL		CONV Q (CFS)	CONV SLOPE (FT/FT)	CONV SIZE	CONV Z	CONTROL Q (CFS)	SOIL NAME	RAIN TC (IN)	PCT IMPV
	AREA (ACRES)	SUBAREA Q (CFS)	TOTAL AREA (ACRES)	Q (CFS)	TOTAL VOLUME (AC-FT)	Q (CFS)					Q (CFS)	Q (CFS)								
1 1C	0.4	0.37	0.4	0.37	0.074	0.37	0.074	0	0	0.328	0.00500	0.00	0.00	0.00	0.00	0	120	11	2.60	0.95
1 2C	0.3	0.29	0.7	0.67	0.129	0.67	0.129	0	0	0.291	0.00500	0.00	0.00	0.00	0.00	0	120	10	2.60	0.95

Normal End of MODRAT

APPENDIX B

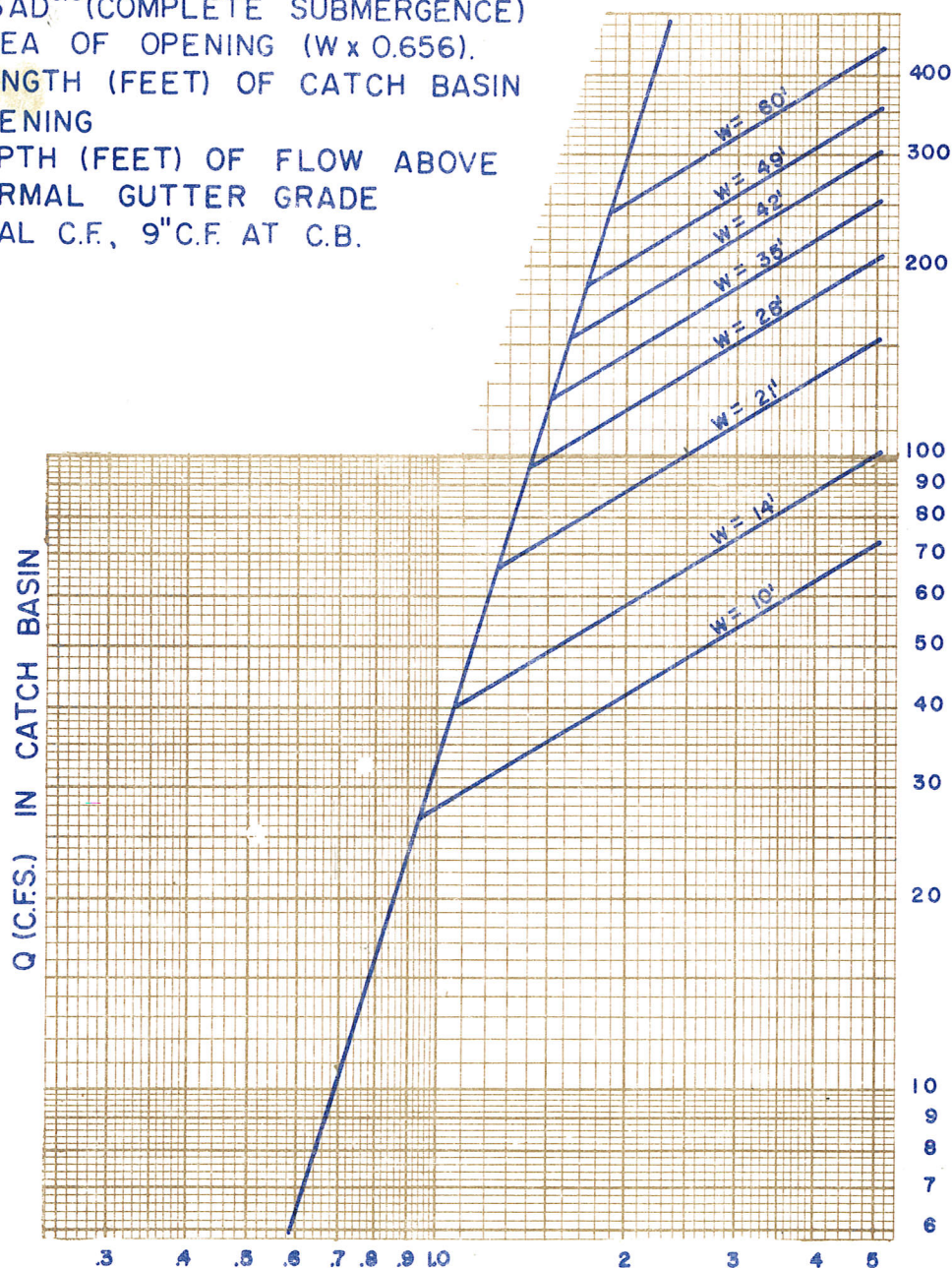
SUMP FORMULA

 $Q = 4.3AD^{0.6}$ (COMPLETE SUBMERGENCE)

A = AREA OF OPENING (W x 0.656).

W = LENGTH (FEET) OF CATCH BASIN
OPENINGD = DEPTH (FEET) OF FLOW ABOVE
NORMAL GUTTER GRADE

8" NORMAL C.F., 9"C.F. AT C.B.



D = DEPTH OF FLOW (FT.) ABOVE NORMAL GUTTER GRADE

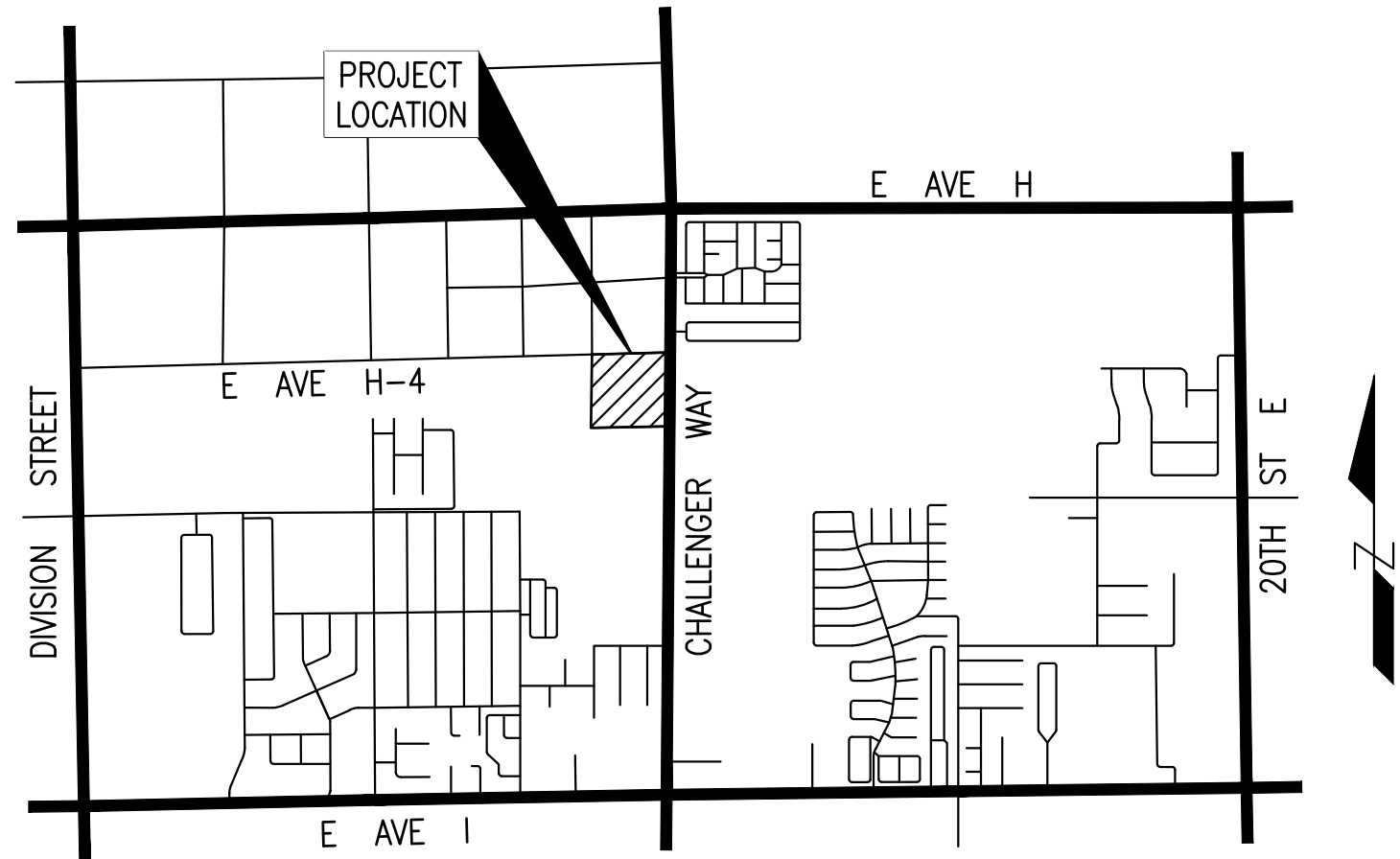
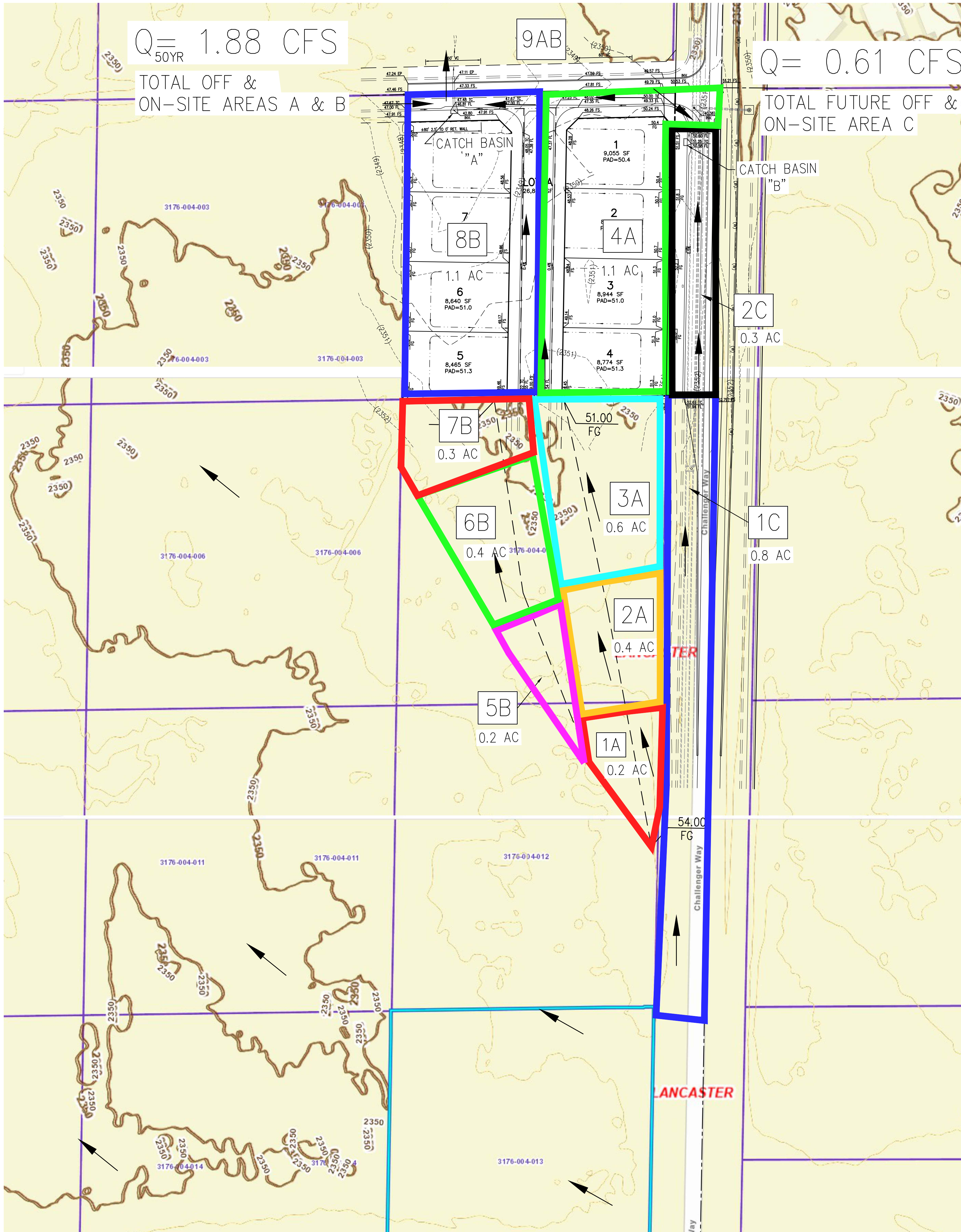
Los Angeles County Flood Control District

CATCH BASIN CAPACITIES
FOR SUMP CONDITION

TO BE USED FOR C.B. NOS. 1, 2 & 3

APPENDIX C

F:\PROJECTS\23030\DWG\TM\HYDROLOGY\23030.DWG HYDROLOGY.DWG Plot Date: 3/19/2024 By: Mark Duran Last Saved: MDRM



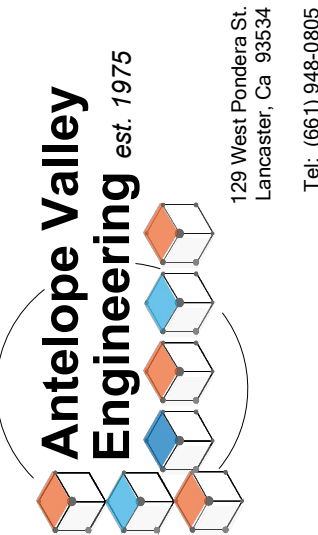
VICINITY MAP
SCALE: N.T.S.

HYDROLOGY DATA
SOIL # 120
STORM FREQUENCY 50YR.
ISOHYET LINE 2.6

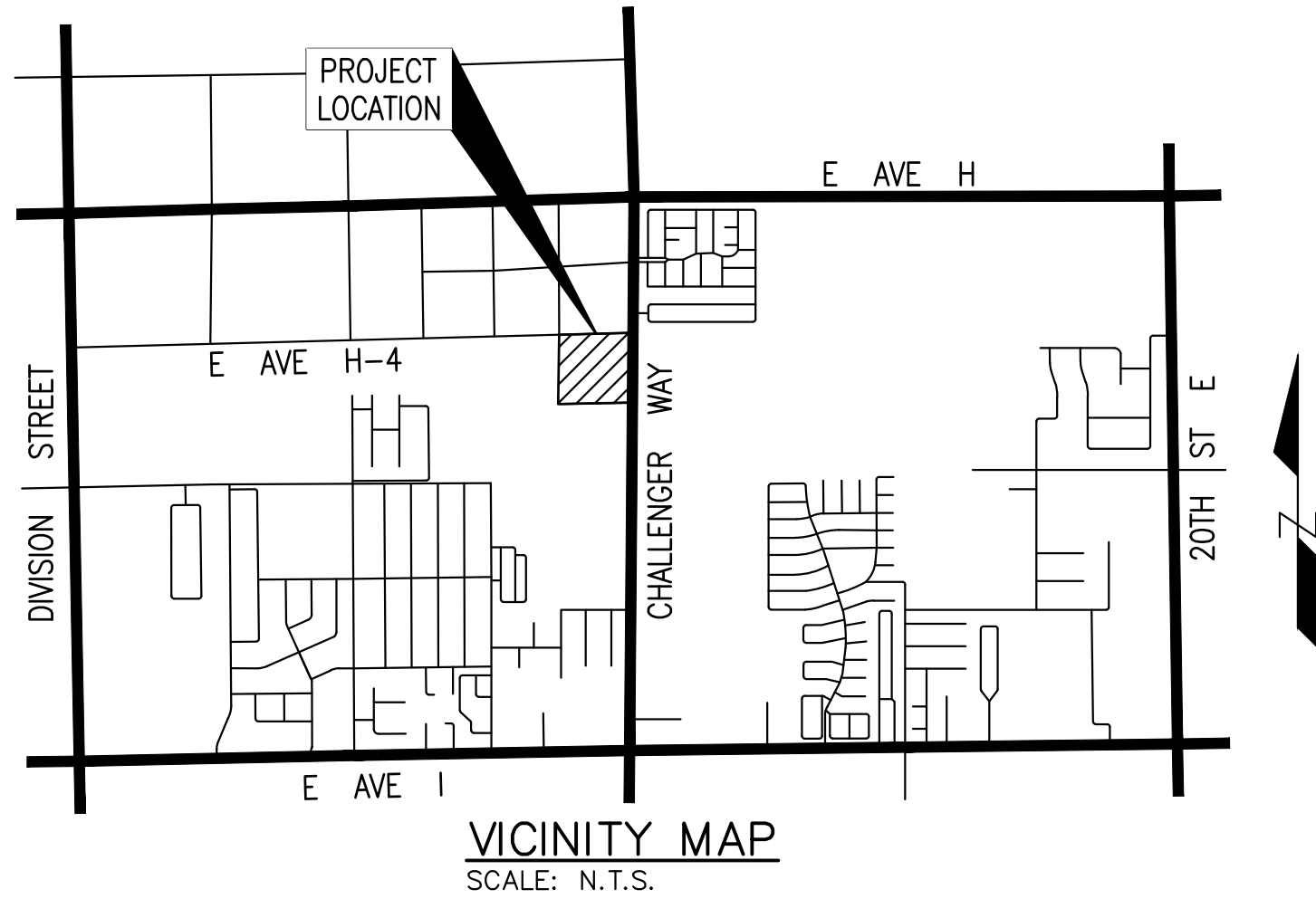
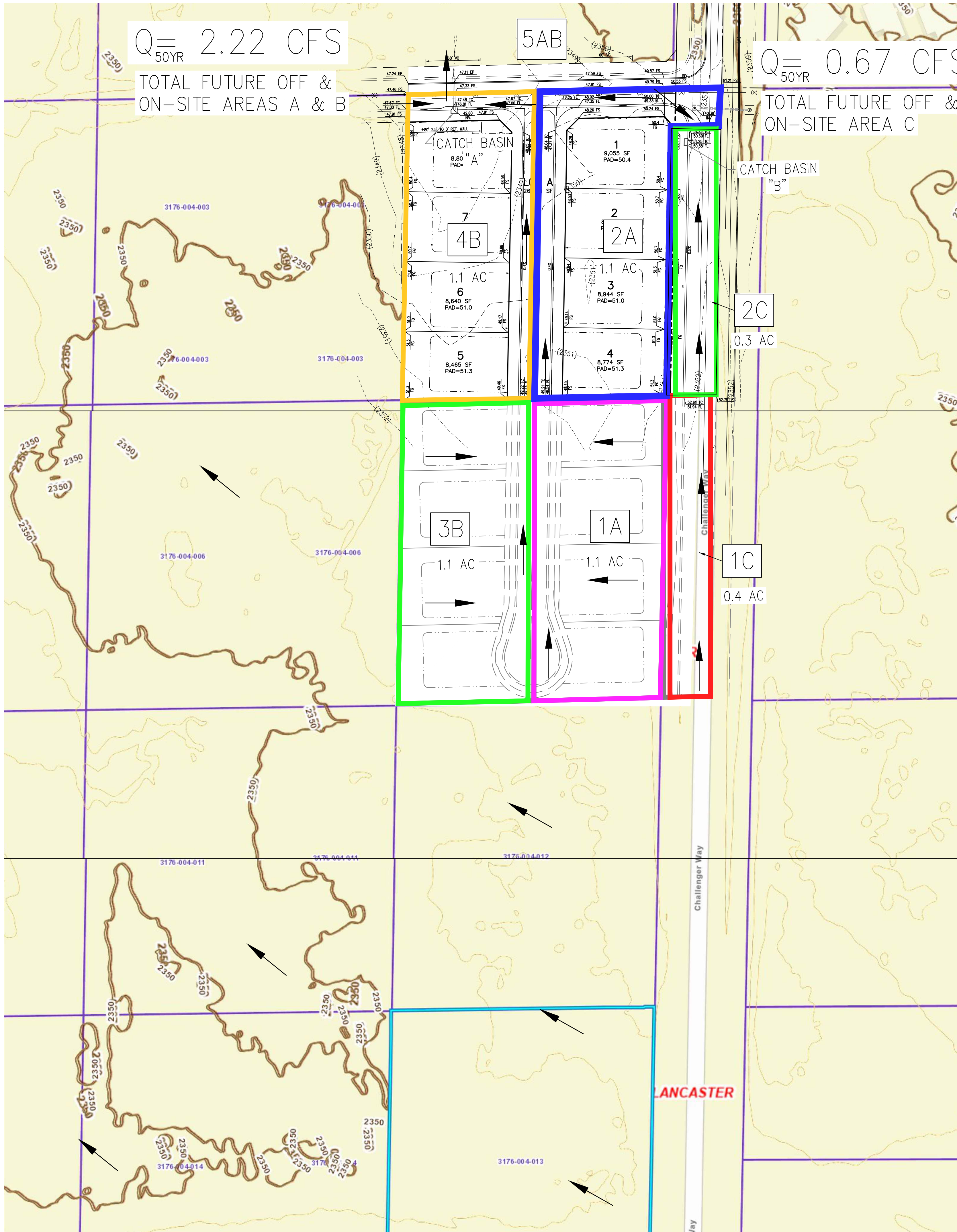
SCALE 1"=60'

REV.	DESCRIPTION	DATE	APPR.
1		-/-	

SHEET TITLE	PROJECT	OWNER
HYDROLOGY MAP OFF & ON-SITE PRE & POST DEVELOPED AREAS	TENTATIVE TRACT MAP NO. 84400 APN: 3176-004-004 NORTHWEST CORNER AVENUE H-4 AND CHALLENGER WAY LANCASTER, CA	TEFFANIE DO 3918 TRIESTE CIRCLE STOCKTON, CA 95205 (408) 206-8489



DRAWN:	RG/MD/JM
DATE:	
JOB No.:	23-030
SHEET:	H1
OF	2 SHEETS



HYDROLOGY DATA
SOIL # 120
STORM FREQUENCY 50YR.
ISOHYET LINE 2.6

SCALE 1"=60'

REV.	DESCRIPTION	DATE	APPR.
1		-/-	

OWNER
TEFFANIE DO 3918 TRIESTE CIRCLE STOCKTON, CA 95205 (408) 206-8489

PROJECT
TENTATIVE TRACT MAP NO. 84400 APN: 3176-004-004 NORTHWEST CORNER AVENUE H-4 AND CHALLENGER WAY LANCASTER, CA

SHEET TITLE
HYDROLOGY MAP OFF & ON-SITE FUTURE DEVELOPED AREAS



DRAWN:	RG/MD/JM
DATE:	
JOB No.:	23-030
SHEET:	H2
OF	2 SHEETS