



Thienes Engineering, Inc.

CIVIL ENGINEERING • LAND SURVEYING

**PRELIMINARY HYDROLOGY
CALCULATIONS**

FOR

SIERRA AVENUE INDUSTRIAL BUILDING
SEC EAST OF SIERRA AVENUE AND NORTH OF CASA GRANDE
DRIVE
FONTANA, CALIFORNIA

PREPARED FOR

SHEA PROPERTIES
130 VANTIS, SUITE 200
ALISO VIEJO, CA 92656
PHONE: (949) 389-7000

AUGUST 4, 2021
REVISED MARCH 1, 2022

JOB NO. 3971

PREPARED BY

THIENES ENGINEERING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
(714) 521-4811

HYDROLOGY AND HYDRAULIC CALCULATIONS

FOR

SIERRA AVENUE INDUSTRIAL BUILDING

PREPARED
UNDER THE SUPERVISION OF

REINHARD STENZEL DATE:
R.C.E. 56155
EXP. 12/31/22

INTRODUCTION

A: PROJECT LOCATION

The project site is located on the easterly side of Sierra Avenue and approximately 700 ft north of Casa Grande Avenue in Fontana, California. Please see next page for vicinity map.

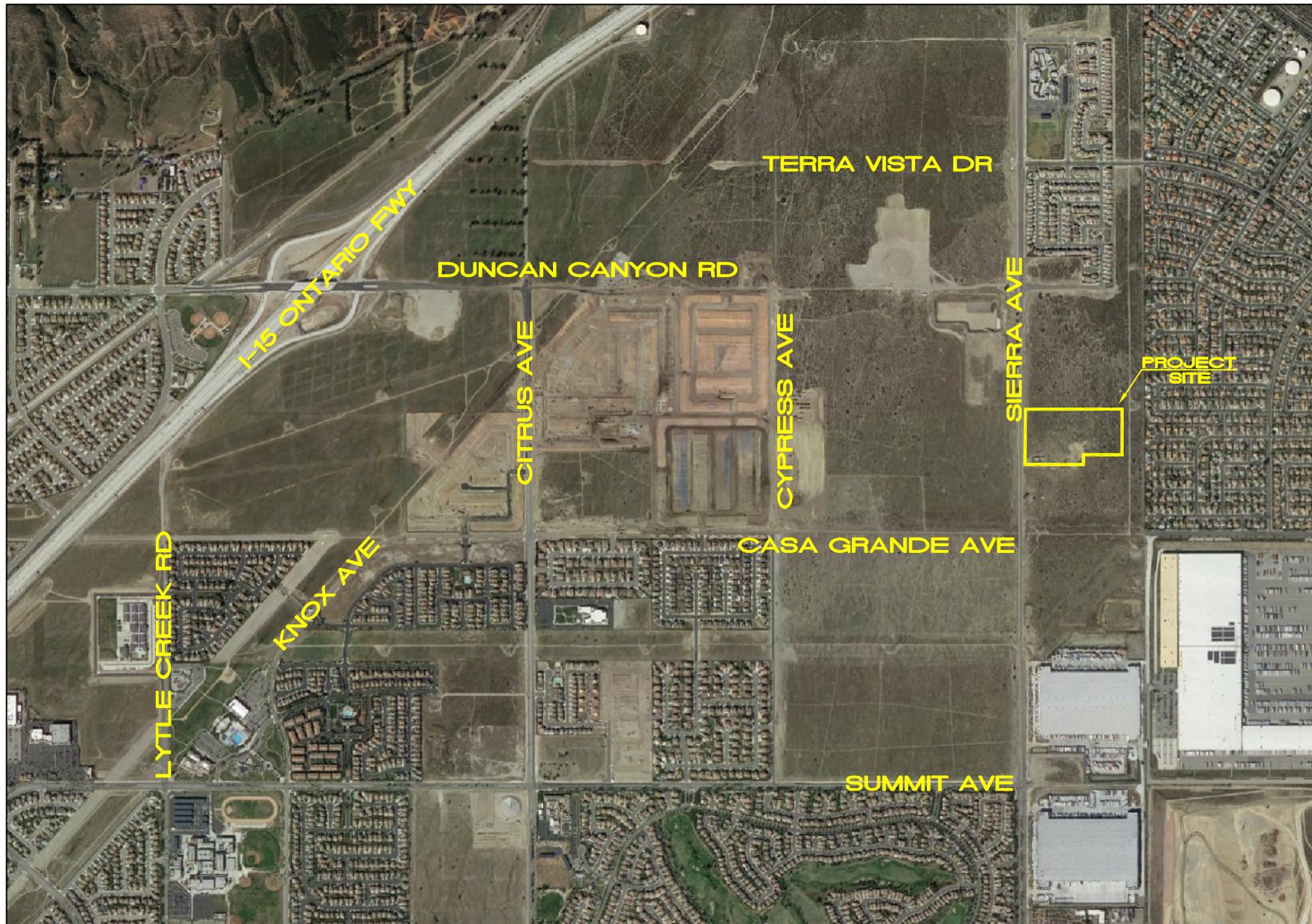
B: STUDY PURPOSE

The purpose of this study is to determine the proposed condition 100-year peak flow rate from the project site that is ultimately tributary to an existing storm drain in Sierra Avenue.

C: PROJECT STAFF:

Thienes Engineering staff involved in this study include:

Reinhard Stenzel
Morgan Holve
Kristie Ferronato



TH *Thienes Engineering, Inc.*
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH. (714) 521-4811 FAX (714) 521-4173

"VICINITY MAP"
FOR
SIERRA AVENUE INDUSTRIAL BUILDING



DISCUSSION

The project site encompasses approximately 11.05 acres. Proposed improvements to the site include one warehouse-type building of approximately 203,000 square feet. There is a truck yard on the south side of the building with drive aisles and vehicle parking on the north, east and west sides. There is landscaping adjacent to the street and located throughout the site.

Existing Condition

The project site is currently an undeveloped dirt lot. The site generally drains from north to south. The 100-year peak flow rate from the site is approximately 25.2 cfs.

See Appendix “B” for existing condition hydrology calculations and Appendix “D” for existing condition hydrology map.

Off Site Drainage

The project site is bound on the north property line by an undeveloped lot. The area north of the property generally sheet flows north to south. This off-site tributary area is approximately 26.95 acres of undeveloped land, with natural weeds and grasses. The 100-year peak flow rate from the northerly offsite is approximately 42.7 cfs. This flow will be captured in a temporary CMP riser and confluenced in existing public storm drain (DWG. No. 6130) lateral B1-13, in Sierra Avenue.

A small portion of the Edison easement to the east of the project site (approximately 0.30 acres) drains westerly toward the project site. This will be collected in a U-channel and catch basin along the easterly property line. This runoff will be conveyed onsite through a storm drain and confluenced with the proposed onsite system in the easterly drive aisle.

See Appendix “B” for existing off-site rational method and Appendix “D” for existing offsite hydrology map.

Proposed Condition

In the proposed condition, runoff continues to drain from north to south. Runoff from the northerly portion of the building and northern drive aisle (Nodes 100-102) will drain to catch basins located in the northern drive aisle. A storm drain will convey the runoff to the east, then south through the easterly drive aisle. Runoff from the westerly drive aisle (Node 103) is collected in a catch basin located in the southeast corner of the site

Runoff from the southerly portion of the building and southerly truck yard will be collected in catch basins located in the truck yard (Nodes 104-108). The storm drain system will continue westerly through the truck yard. Flows from the southwesterly water quality basin (Node 109), the westerly drive aisle (Node 110) and the southerly driveway (Node 111) will be confluenced with the system in the southerly driveway. The proposed onsite

system will continue to Sierra Avenue where it will connect to the existing public lateral. The 100-year peak flowrate from the site is approximately 40.3 cfs.

See Appendix “B” for proposed condition hydrology calculations and Appendix “D” for proposed condition hydrology map.

Detention

Discharge from the site will be limited to 8.8 cfs per redlines made to DWG. No. 6130 by Thienes Engineering, Inc.

The westerly drive aisle (Node 110) and southerly driveway (Node 111) will leave the site undetained. The allowable discharge from the truck yard is approximately 5.5 cfs (8.8 cfs-1.1 cfs-2.4 cfs). Remaining flows will be temporarily detained in the truck yard.

A small-area unit hydrograph was established for the areas of the site tributary to the southerly truck yard. An orifice equation was used to determine the allowable discharge from the truck yard per unit depth of 0.2'. The discharge vs. depth data was routed through the small-area unit hydrograph to determine the discharge from the truck yard, storage volume and storage depth.

During the 100-year storm event, the truck yard will discharge approximately 5.5 cfs. Required volume for storage will be approximately 0.78 acre-ft at an approximate depth of 1.1' feet. With detention, the 100-year discharge from the site is approximately 9.0 cfs.

See Appendix “C” for detention analysis.

Methodology

Hydrology calculations were computed using the San Bernardino County Rational Method program (by AES Software). The soil type is “A” per the San Bernardino County Hydrology Manual. See Appendix “A” for pertinent reference materials.

APPENDIX

DESCRIPTION

A

REFERENCE MATERIALS

B

HYDROLOGY CALCULATIONS

C

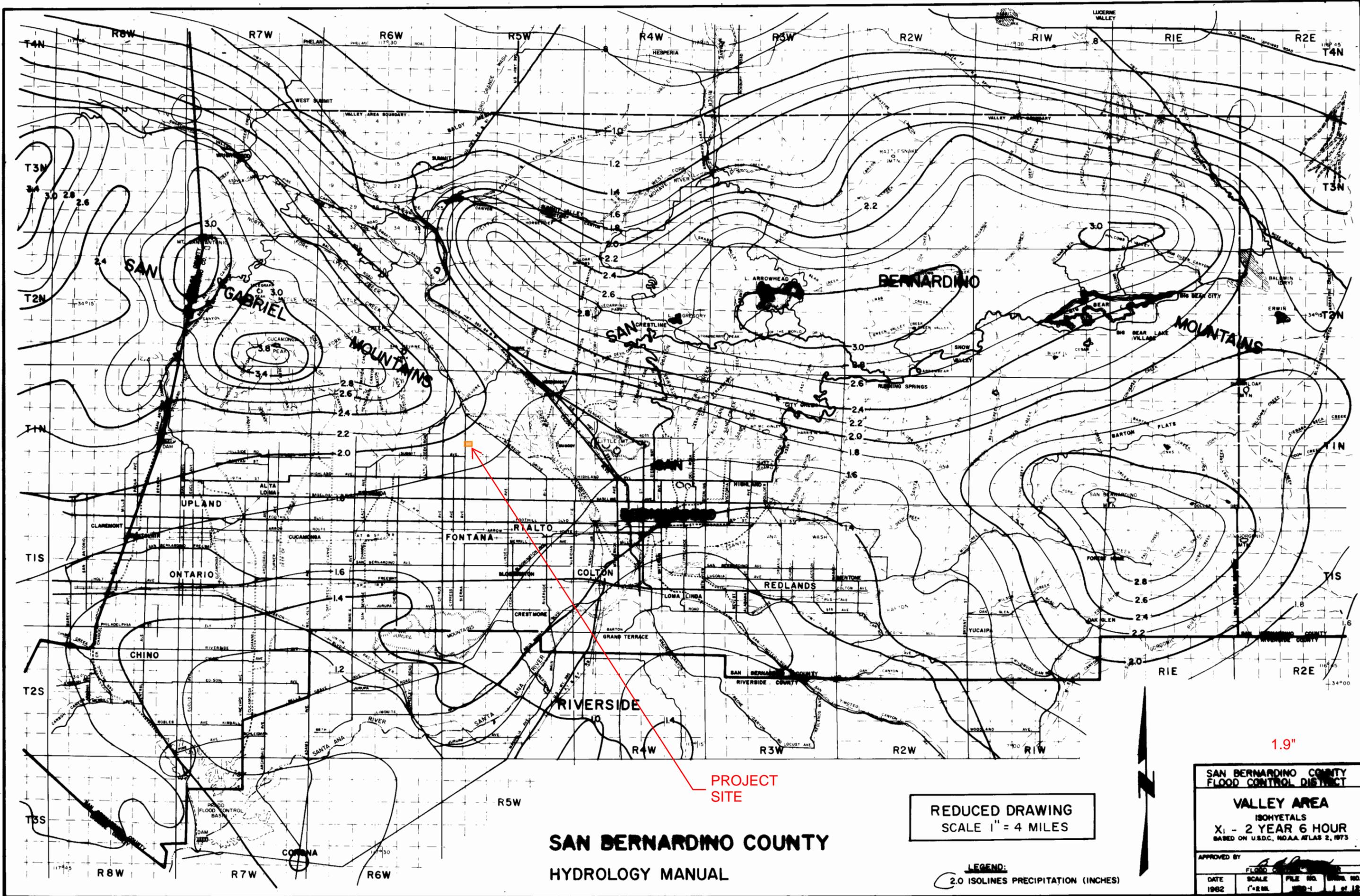
DETENTION CALCULATIONS

D

HYDROLOGY MAPS

APPENDIX A

REFERENCE MATERIALS



**SAN BERNARDINO COUNTY
HYDROLOGY MANUAL**

REDUCED DRAWING
SCALE 1" = 4 MILES

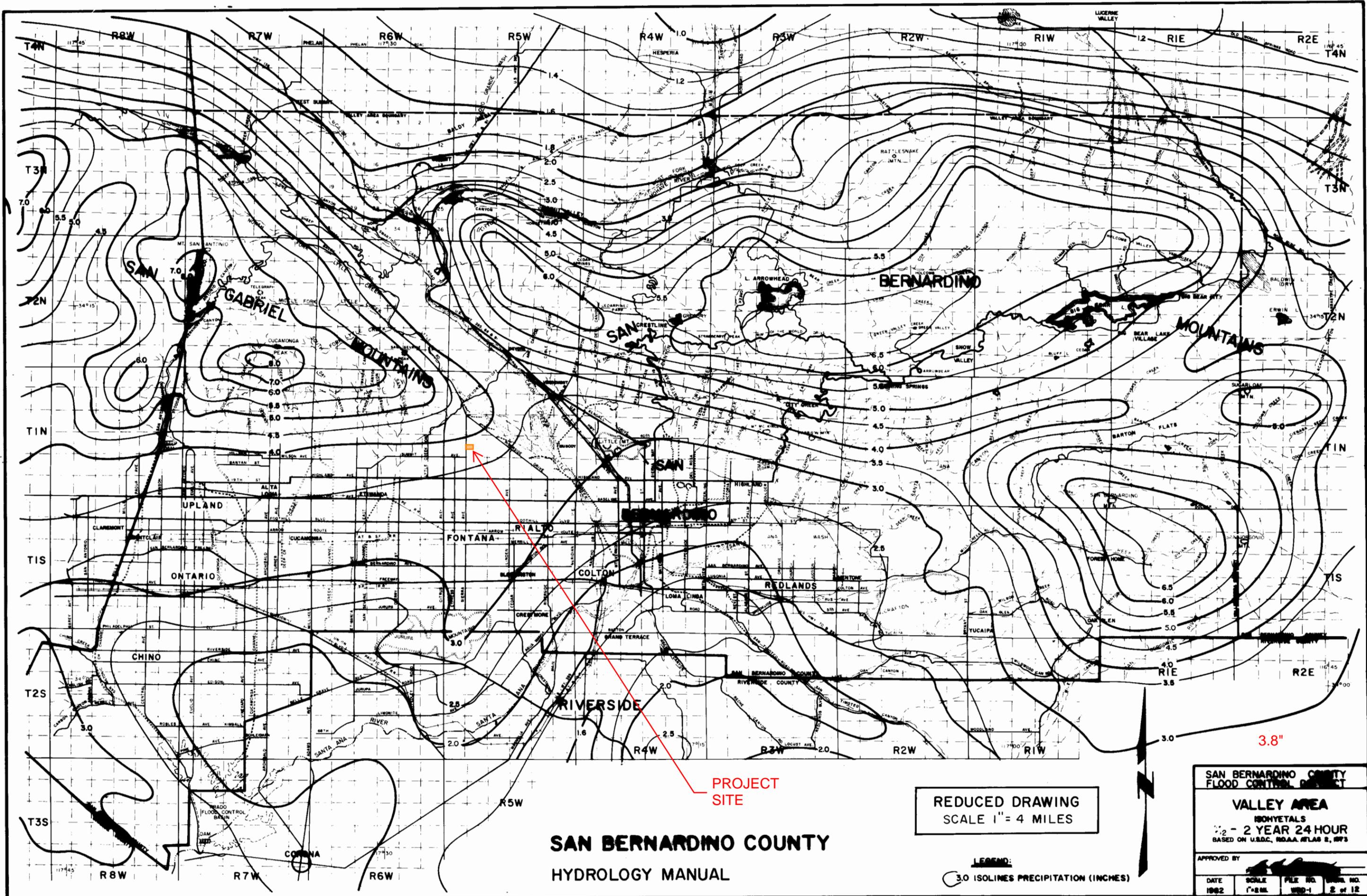
LEGEND:
2.0 ISOLINES PRECIPITATION (INCHES)

**SAN BERNARDINO COUNTY
FLOOD CONTROL DISTRICT**

VALLEY AREA
ISOHYETALS
X1 - 2 YEAR 6 HOUR
BASED ON U.S.D.C. NOAA ATLAS 2, 1973

APPROVED BY _____

DATE	SCALE	FILE NO.	DRAW. NO.
1982	1" = 4 MILES	100-1	1 of 12



**SAN BERNARDINO COUNTY
HYDROLOGY MANUAL**

REDUCED DRAWING
SCALE 1" = 4 MILES

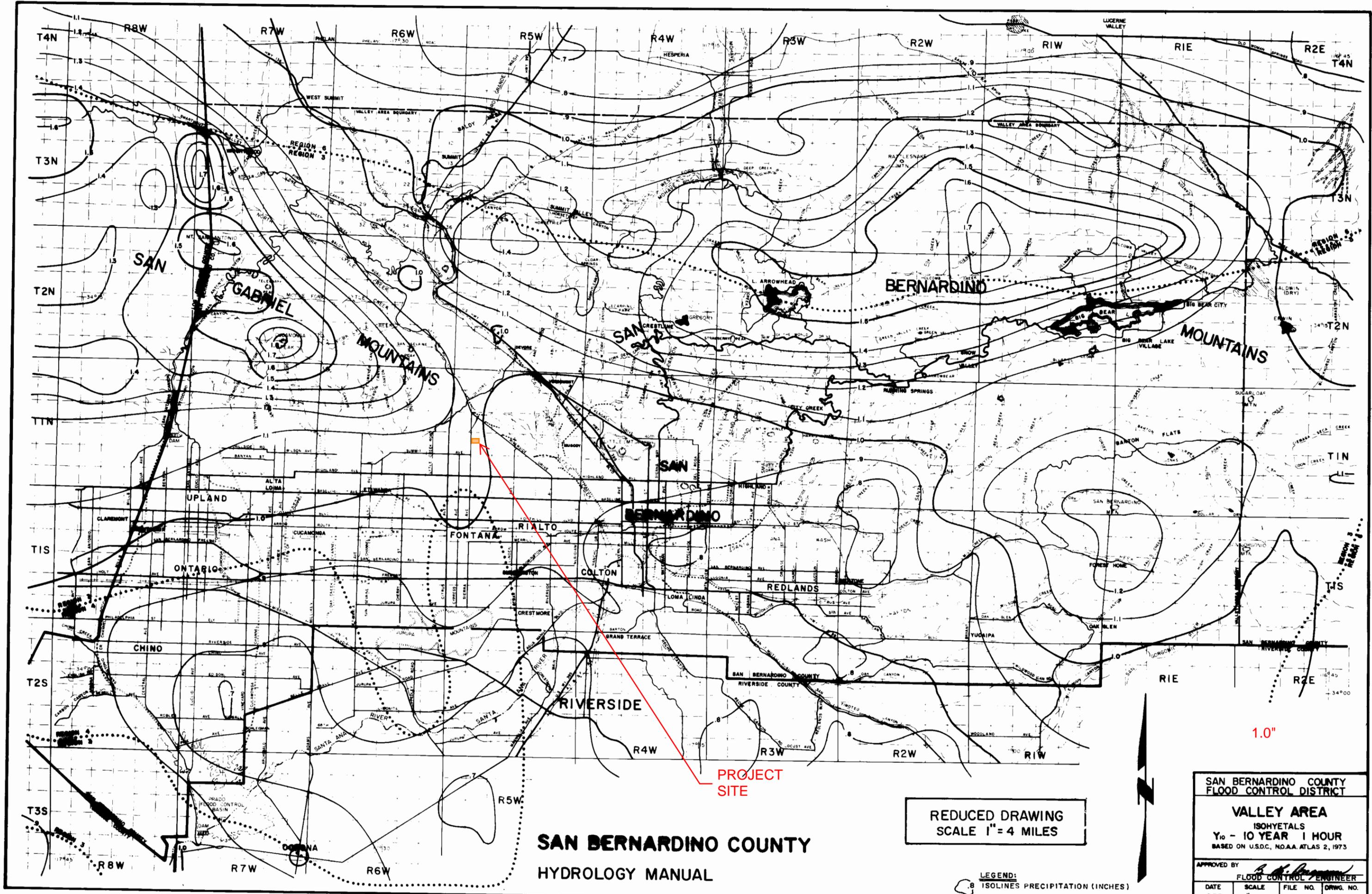
LEGEND:
3.0 ISOLINES PRECIPITATION (INCHES)

SAN BERNARDINO COUNTY
FLOOD CONTROL DISTRICT

VALLEY AREA
ISOHYETALS
2 - 2 YEAR 24 HOUR
BASED ON U.S.D.C. NOAA ATLAS 2, 1973

APPROVED BY _____

DATE	SCALE	FILE NO.	DRAW. NO.
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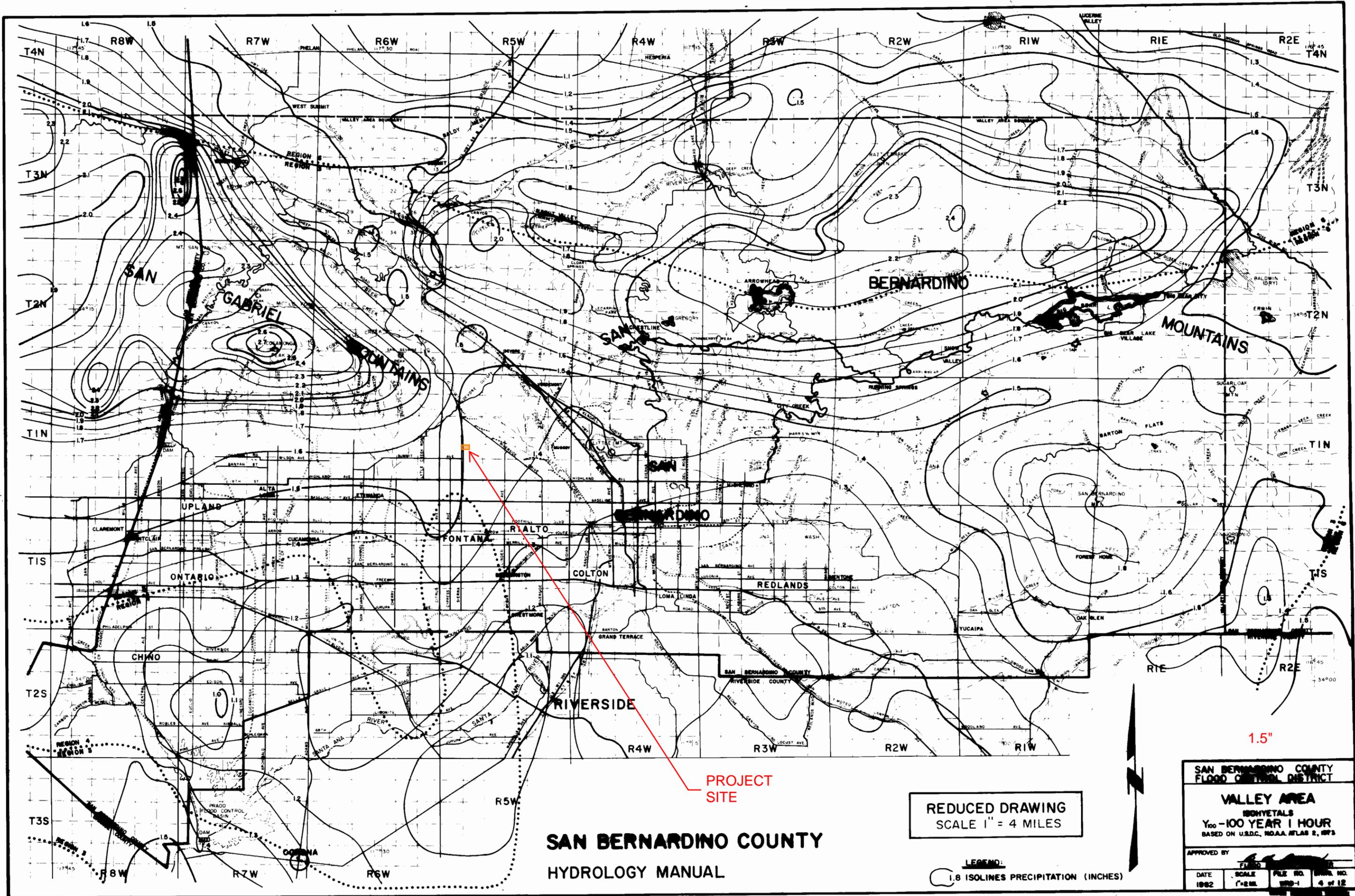


**SAN BERNARDINO COUNTY
HYDROLOGY MANUAL**

REDUCED DRAWING
SCALE 1" = 4 MILES

LEGEND:
0.8 ISOLINES PRECIPITATION (INCHES)

SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT			
VALLEY AREA ISOHYETALS Y ₁₀ - 10 YEAR 1 HOUR BASED ON U.S.D.C. NO.AA. ATLAS 2, 1973			
APPROVED BY <i>[Signature]</i>			
FLOOD CONTROL ENGINEER			
DATE 1982	SCALE 1"=2M.	FILE NO. WRD-1	DRWG. NO. 3 of 12



**SAN BERNARDINO COUNTY
HYDROLOGY MANUAL**

**REDUCED DRAWING
SCALE 1" = 4 MILES**

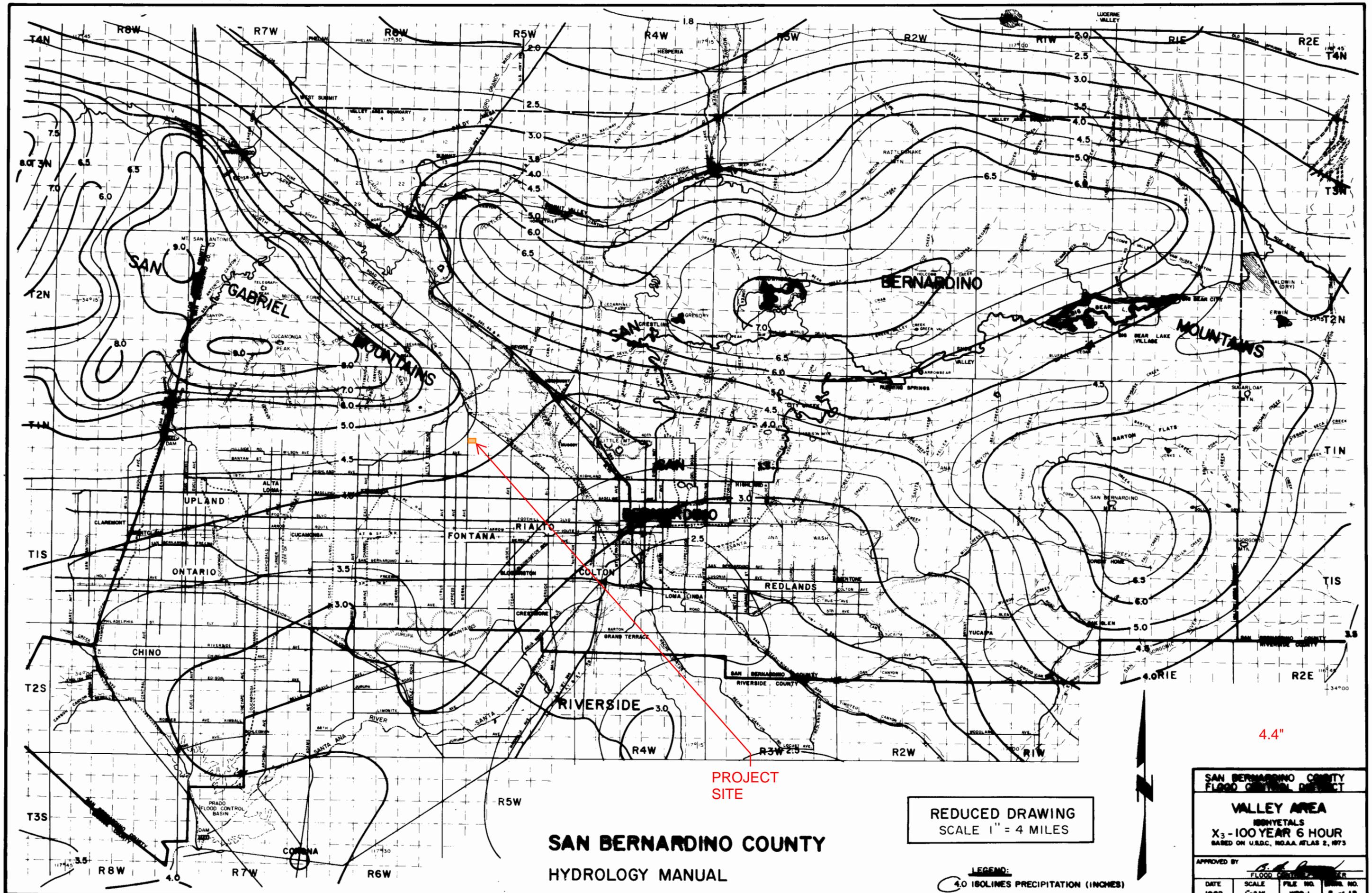
LEGEND:
○ 1.8 ISOLINES PRECIPITATION (INCHES)

**SAN BERNARDINO COUNTY
FLOOD CONTROL DISTRICT**

**VALLEY AREA
ISOHYETALS
Y₁₀₀ - 100 YEAR 1 HOUR
BASED ON U.S.D.C. NOAA ATLAS 2, 1973**

APPROVED BY: _____

DATE	SCALE	FILE NO.	SHEET NO.
1982	1"=4 MI.	WB-1	4 of 12



SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

REDUCED DRAWING
 SCALE 1" = 4 MILES

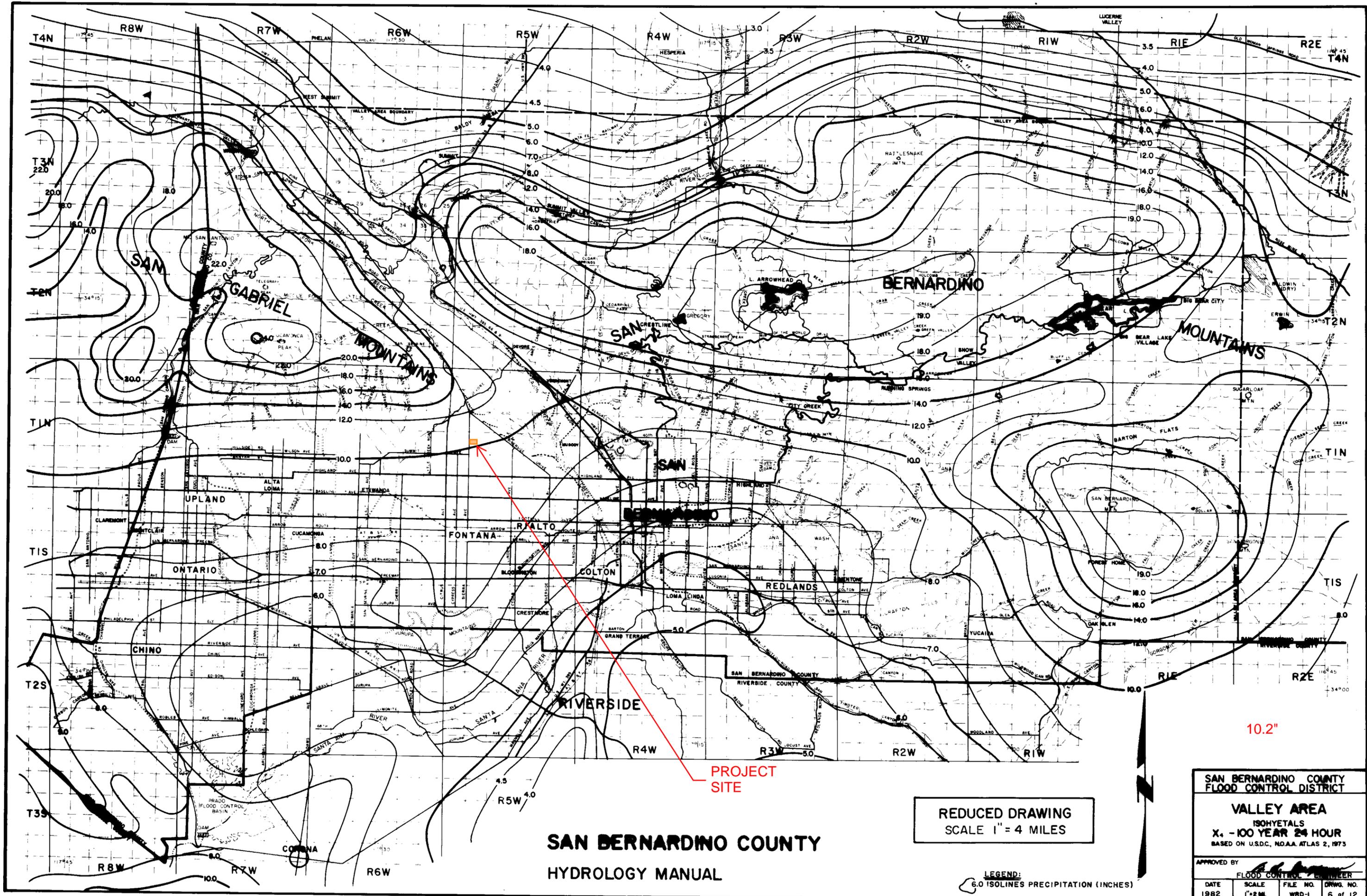
LEGEND:
 4.0 ISOLINES PRECIPITATION (INCHES)

SAN BERNARDINO COUNTY
 FLOOD CONTROL DISTRICT

VALLEY AREA
 1800 HOURS
 X₃ - 100 YEAR 6 HOUR
 BASED ON U.S.D.C. NOAA ATLAS 2, 1973

APPROVED BY: *[Signature]*

DATE	SCALE	FILE NO.	DRAW. NO.
1982	1"=2 M.	WB-1	5 of 12

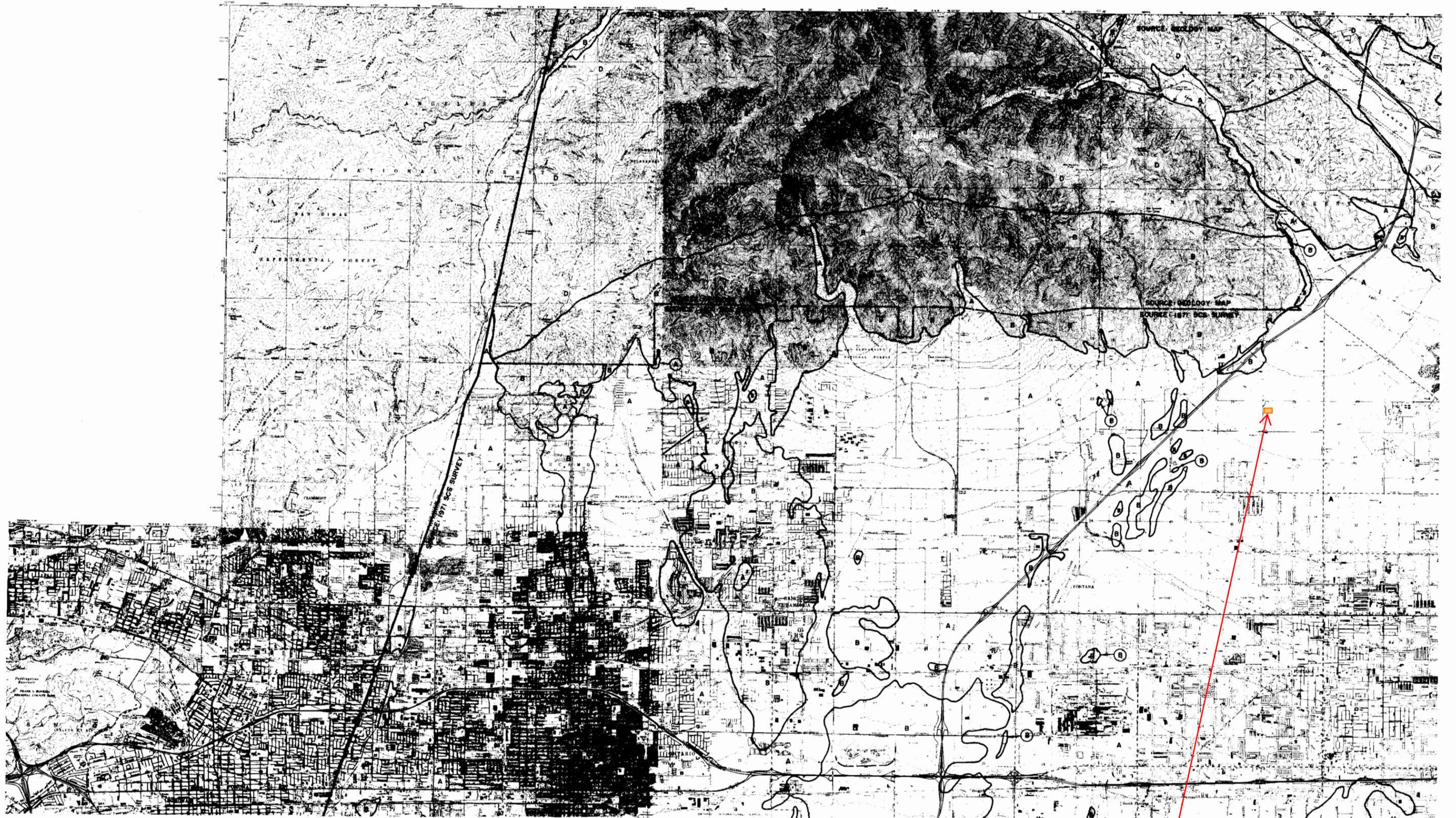


**SAN BERNARDINO COUNTY
HYDROLOGY MANUAL**

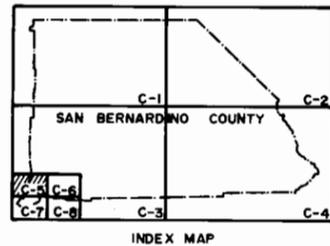
**REDUCED DRAWING
SCALE 1" = 4 MILES**

LEGEND:
6.0 ISOLINES PRECIPITATION (INCHES)

SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT			
VALLEY AREA			
ISOHYETALS X ₄ - 100 YEAR 24 HOUR BASED ON U.S.D.C. NOAA ATLAS 2, 1973			
APPROVED BY: 			
DATE	SCALE	FILE NO.	DRWG. NO.
1982	1" = 2 MI.	WRD-1	6 of 12



SAN BERNARDINO COUNTY
HYDROLOGY MANUAL



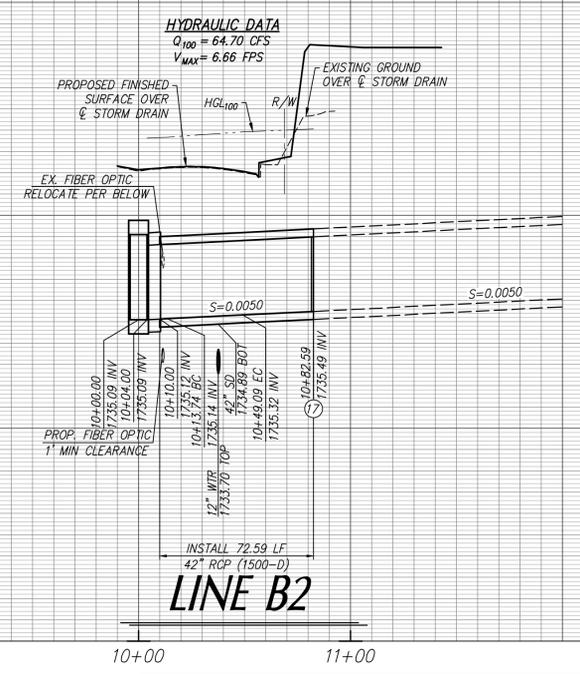
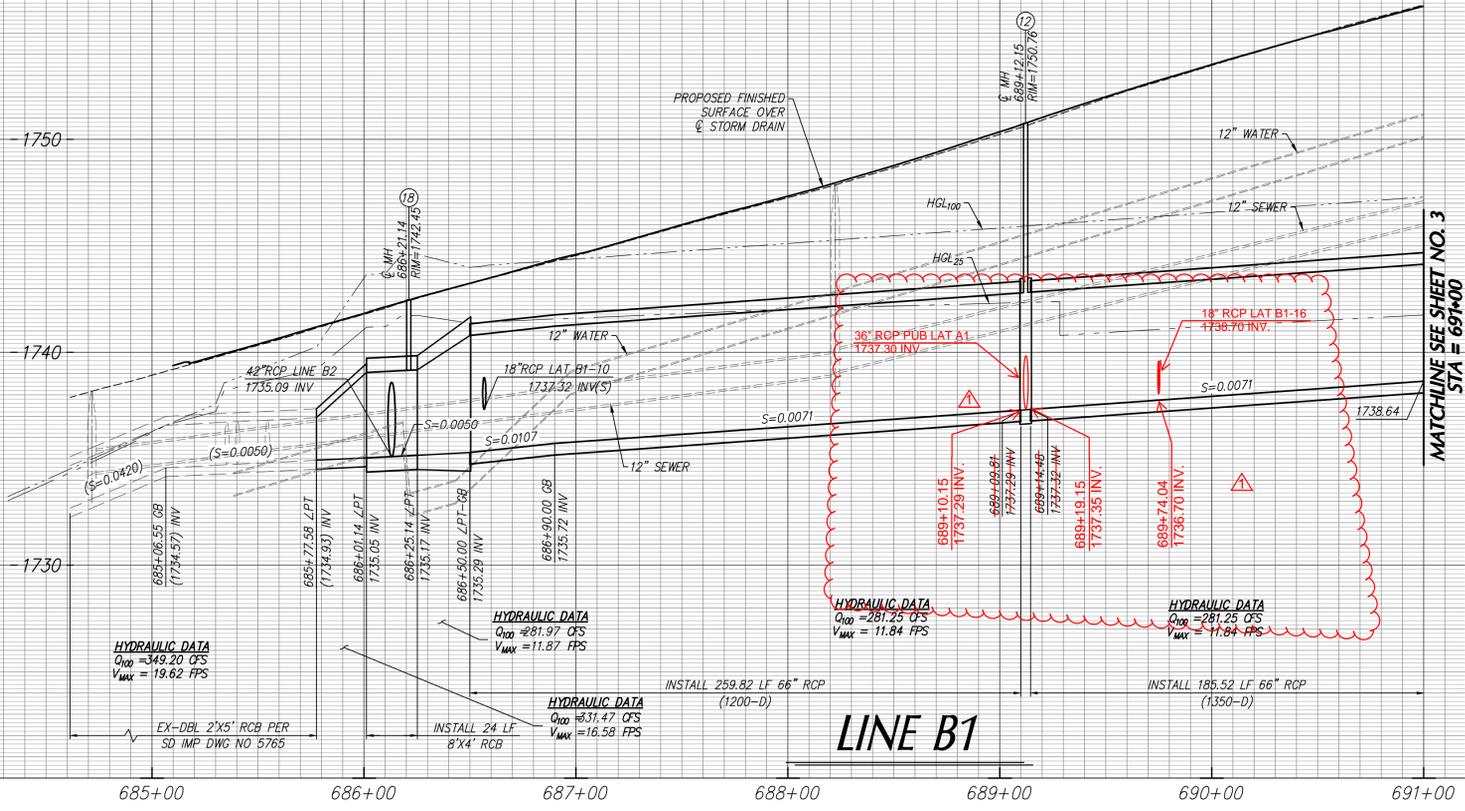
- LEGEND
- SOIL GROUP BOUNDARY
 - A SOIL GROUP DESIGNATION
 - - - BOUNDARY OF INDICATED SOURCE

SCALE 1:48,000
SCALE REDUCED BY 1/2

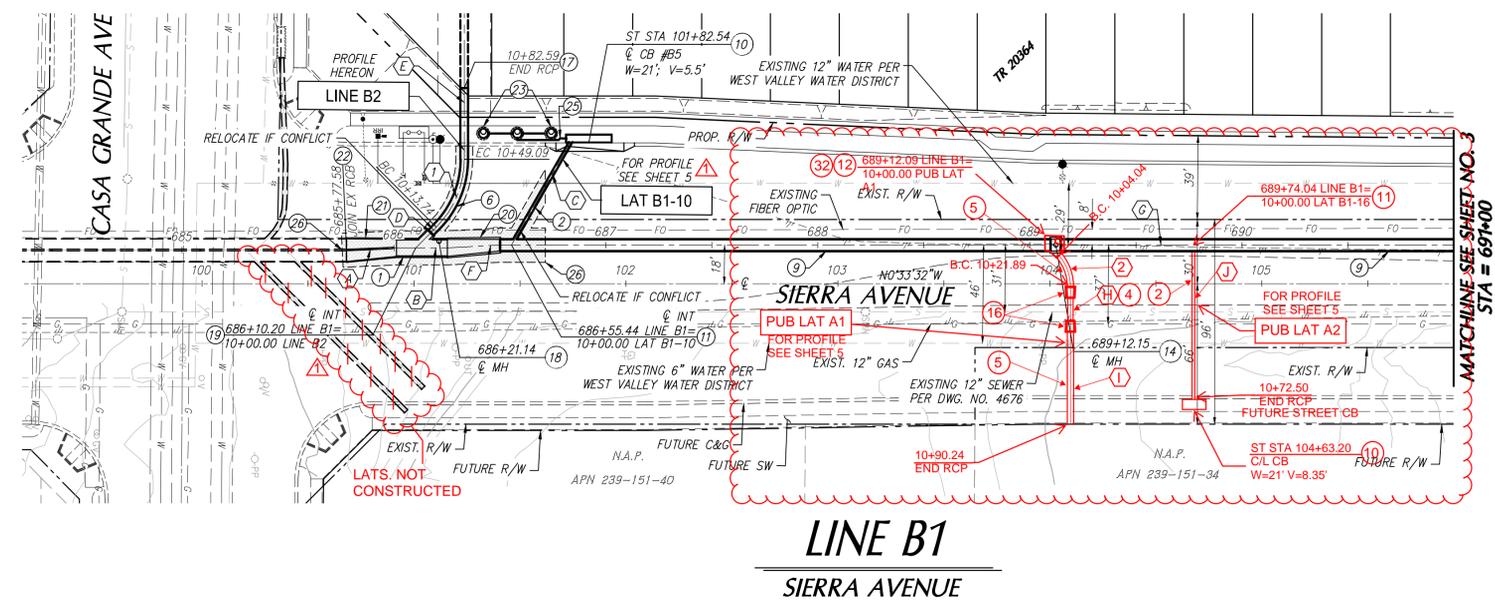
PROJECT SITE (indicated by a red arrow pointing to a red square on the map)
SOIL TYPE A (indicated by a red arrow pointing to a red square on the map)

HYDROLOGIC SOILS GROUP MAP
FOR
SOUTHWEST-A AREA

NOTE:
CONTRACTOR TO VERIFY ELEVATION &
LOCATION PRIOR TO CONSTRUCTION &
NOTIFY ENGINEER IF DIFFERENT THAN PLAN.



PROFILE SCALE
HORZ: 1" = 40'
VERT: 1" = 4'



CONSTRUCTION NOTES

NO.	DESCRIPTION
1	INSTALL 8'X4' RCB PER SPPWC STD. PLAN 390-1 (SEE SHEET 9-11)
2	INSTALL 18" RCP (D-LOAD PER PROFILE)
6	INSTALL 42" RCP (D-LOAD PER PROFILE)
9	INSTALL 66" RCP (D-LOAD PER PROFILE)
10	CONSTRUCT CATCH BASIN PER CITY OF FONTANA STD. PLAN NO. 3004 (WIDTH PER PLAN)
11	CONSTRUCT JUNCTION STRUCTURE PER CITY OF FONTANA STD. PLAN NO. 3009
14	CONSTRUCT MANHOLE PER CITY OF FONTANA STD. PLAN NO. 3012
17	CONSTRUCT CONCRETE BULKHEAD PER DETAIL ON SHEET 9
18	CONSTRUCT MANHOLE (PRESSURE) - CONCRETE BOX STORM DRAIN PER SPPWC STD. 323-2 & 328-2 (SEE SHEET 8)
19	CONSTRUCT JUNCTION STRUCTURE PER SPPWC STD. 333-2 (SEE SHEET 8)
20	CONSTRUCT TRANSITION STRUCTURE PER SPPWC STD. 342-2 (SEE SHEET 8)
21	CONSTRUCT TRANSITION STRUCTURE PER SPPWC STD. 343-2 (SEE SHEET 9)
22	REMOVE CONCRETE BULKHEAD AND JOIN EXISTING RCB
23	INSTALL DOUBLE DRYWELL (CATCH BASIN #B5) PER DETAILS ON SHEET 7
25	INSTALL 6" PVC STORM DRAIN PIPE
26	CONSTRUCT STANDARD TRENCH REPAIR PER CITY OF FONTANA STD. PLAN NO. 1008

LINE DATA

LINE	BEARING	LENGTH
A	N3°05'20"W	23.56'
B	N0°33'32"W	24.00'
C	N60°33'32"W	56.00'
D	N45°33'32"W	11.97'
E	N89°26'28"E	33.50'

CURVE DATA

LINE	DELTA	RADIUS	LENGTH	TANGENT
1	45°00'00"	45.00'	35.34'	18.64'
2	45°00'00"	22.50'	17.84'	9.42'

MANHOLE DATA

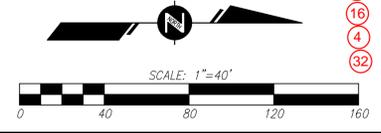
H	N89°52'25"	11.29'
I	N89°52'25"	46.90'
J	N89°26'25"	45.49'



PREPARED UNDER THE SUPERVISION OF:
Richard Stanzel
Richard Stanzel, R.C.E. 56155 EXP. 12/31/22
Director of Engineer

ENGINEER:
Ti Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH: (714) 521-4811 FAX: (714) 521-4173

* NOTE:
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LOCATION PRIOR TO CONSTRUCTION &
NOTIFY ENGINEER IF DIFFERENT THAN PLAN.



JUNCTION STRUCTURE DATA

LATERAL	A	B	C	S
LINE B2	43'	42'	6'	1735.09
PUB LAT A1	45'	36'	4'	1737.30



REV.	REVISION DESCRIPTION	ENGR.	DATE	CITY	DATE
1	ADD PUB LAT A1 AND A2 & JUNCTION STR.	RCS	1/7/22		

SHOULD CONSTRUCTION OF REQUIRED IMPROVEMENTS NOT COMMENCE WITHIN TWO YEARS OF THE DATE OF APPROVAL SHOWN HEREON AND CARRIED FORTH IN A DILIGENT MANNER, THE CITY ENGINEER MAY REQUIRE REVISIONS TO THE PLANS TO BRING THEM INTO CONFORMANCE WITH STANDARDS IN EFFECT.

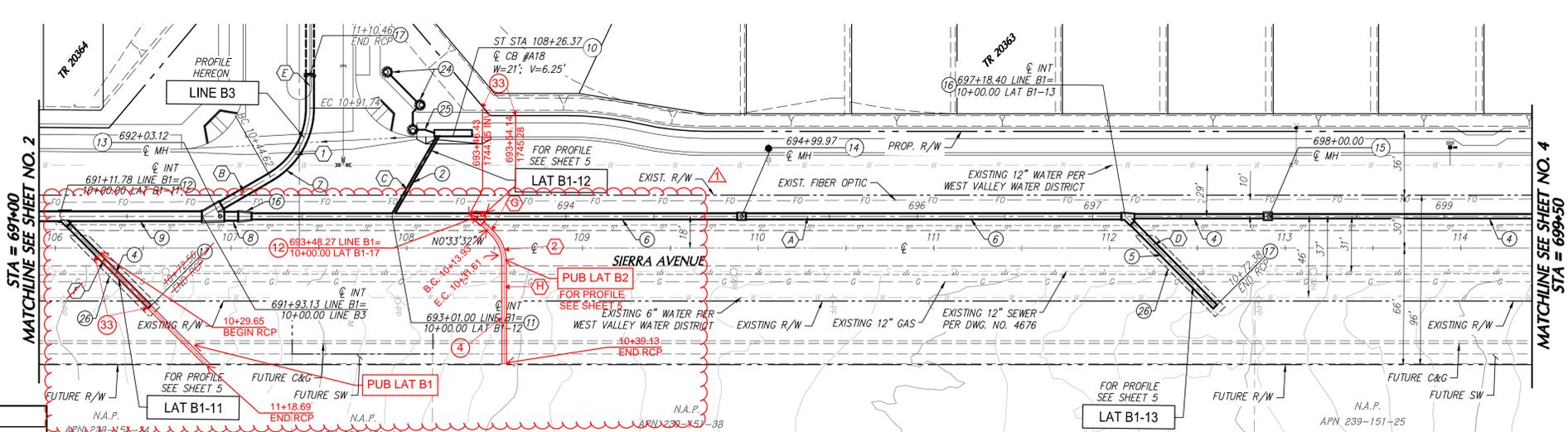
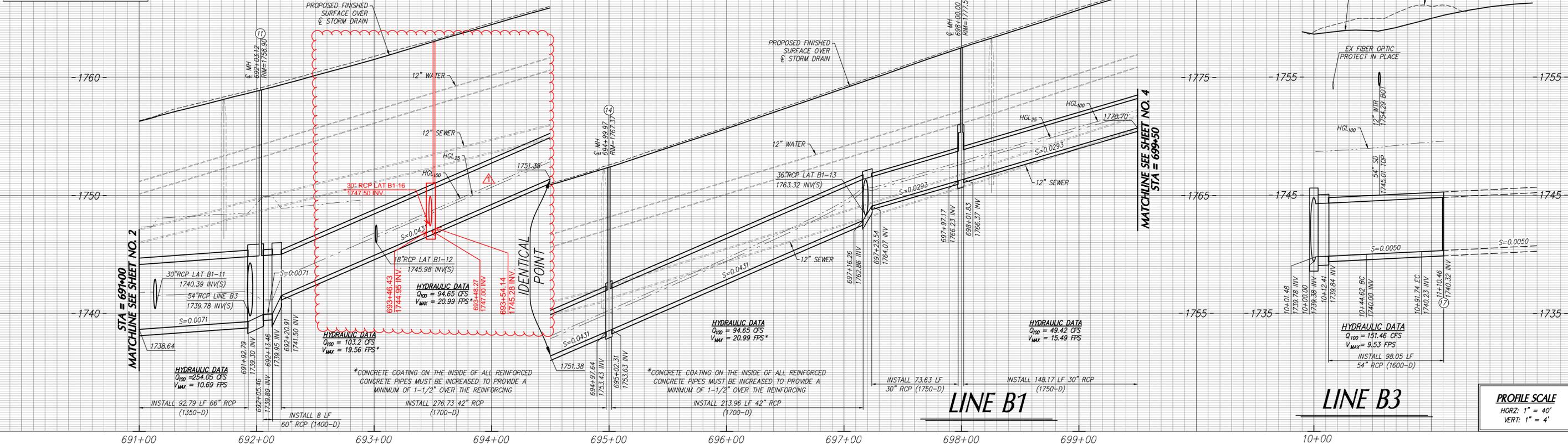
PREPARED FOR:
NORTH FONTANA INVESTMENT COMPANY, LLC
1156 N. MOUNTAIN AVENUE
UPLAND, CA 91786
(909) 989-0971

BASIS OF BEARING:
THE BASIS OF BEARINGS FOR THIS SURVEY IS THE EAST LINE OF THE SE 1/4 OF SECTION 19, ALSO BEING THE CENTERLINE OF SIERRA AVENUE, PER PARCEL MAP NO. 19434, P.M.B. 242/97-98.
BENCHMARK:
CALTRANS BENCHMARK #B-17
BRASS DISK LOCATED IN S.C.E. TOWER LEG LOCATED 343' N/O 1-210, 0.2 MILES WEST OF SAN SEVINA ROAD.
ELEVATION=1428.609

KA ENGINEERING
LAND PLANNING SURVEYING
357 N. SHERIDAN STREET
SUITE 117
CORONA, CALIFORNIA 92880
TEL. (951) 279-1800
FAX (951) 279-4380
No. 55534
AMIR H. FALLAHI, RCE 55534
09/02/2021
DATE

CITY OF FONTANA, CALIFORNIA
OFF-SITE STORM DRAIN IMPROVEMENT PLAN
DESIGNED BY: LS/BB/ARA
DRAWN BY: LS/ARA/BM
CHECKED BY: AHF
THE GARDENS AT THE ARBORETUM
SIERRA AVENUE
LINE B1 - STA. 685+00 TO 691+00 & LINE B2
APPROVED BY: *Richard Stanzel*
CITY ENGINEER
DATE 10/11/2021
RCE 51152
SCALE: AS NOTED
DATE: SEPTEMBER 2021
DRAWING NO: 6130
2/11

NOTE:
CONTRACTOR TO VERIFY ELEVATION &
LOCATION PRIOR TO CONSTRUCTION &
NOTIFY ENGINEER IF DIFFERENT THAN PLAN.



CONSTRUCTION NOTES

NO.	DESCRIPTION
2	INSTALL 18" RCP (D-LOAD PER PROFILE)
4	INSTALL 30" RCP (D-LOAD PER PROFILE)
5	INSTALL 36" RCP (D-LOAD PER PROFILE)
6	INSTALL 42" RCP (D-LOAD PER PROFILE)
7	INSTALL 54" RCP (D-LOAD PER PROFILE)
8	INSTALL 60" RCP (D-LOAD PER PROFILE)
9	INSTALL 66" RCP (D-LOAD PER PROFILE)
10	CONSTRUCT CATCH BASIN PER CITY OF FONTANA STD. PLAN NO. 3004 (WIDTH PER PLAN)
11	CONSTRUCT JUNCTION STRUCTURE PER CITY OF FONTANA STD. PLAN NO. 3009
12	CONSTRUCT JUNCTION STRUCTURE PER CITY OF FONTANA STD. PLAN NO. 3010
13	CONSTRUCT MANHOLE PER CITY OF FONTANA STD. PLAN NO. 3011
14	CONSTRUCT MANHOLE PER CITY OF FONTANA STD. PLAN NO. 3012
15	CONSTRUCT MANHOLE PER CITY OF FONTANA STD. PLAN NO. 3013
16	CONSTRUCT TRANSITION STRUCTURE PER CITY OF FONTANA STD. PLAN NO. 3026
17	CONSTRUCT CONCRETE BULKHEAD PER DETAIL ON SHEET 9
24	INSTALL DOUBLE DRYWELL (CATCH BASIN #A18) PER DETAILS ON SHEET 6
25	INSTALL 6" PVC STORM DRAIN PIPE
33	REMOVE EXISTING RCP

LINE DATA

BEARING	LENGTH
A	N0°33'32"W 850.01'
B	N30°33'32"W 44.62'
C	N60°33'32"W 52.54'
D	N44°26'28"E 72.38'
E	N89°26'28"E 18.72'
F	N44°26'28"E 72.56'
G	N44°51'12"E 8.30'
H	N89°54'12"E 25.99'

CURVE DATA

DELTA	RADIUS	LENGTH	TANGENT
2	45°00'00"	22.50'	17.67'
3	47°12'00"	25.98'	9.32'



PREPARED UNDER THE SUPERVISION OF:
Richard Stenzel
Richard Stenzel, R.C.E. 96185 EXP. 12/31/22
Director of Engineer

ENGINEER:
Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173

* NOTE:
CONTRACTOR TO VERIFY ELEVATION &
LOCATION PRIOR TO CONSTRUCTION &
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MANHOLE / TRANSITION STRUCTURE DATA

LATERAL	A	B	C	D ₁	D ₂	R	S
LINE B3	30"	54"	7.11'	60"	66"	1739.84	1739.78
LAT B1-11	45"	30"	3.11'	60"	-	-	-
LAT B1-13	45"	36"	3.38'	30"	42"	-	-

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DIAL BEFORE YOU DIG
TWO WORKING DAYS BEFORE YOU DIG
TOLL FREE 1-800-4-A-DIG
A PUBLIC SERVICE BY UNDERGROUND SERVICE ALERT

REV.	REVISION DESCRIPTION	ENGR.	DATE	CITY	DATE
1	ADD PUB LAT B1, B2 & JUNCTION STR.	RCS	1/7/22		

SHOULD CONSTRUCTION OF REQUIRED IMPROVEMENTS NOT COMMENCE WITHIN TWO YEARS OF THE DATE OF APPROVAL SHOWN HEREON AND CARRIED FORTH IN A DILIGENT MANNER, THE CITY ENGINEER MAY REQUIRE REVISIONS TO THE PLANS TO BRING THEM INTO CONFORMANCE WITH STANDARDS IN EFFECT.

PREPARED FOR:
NORTH FONTANA INVESTMENT COMPANY, LLC
1156 N. MOUNTAIN AVENUE
UPLAND, CA 91786
(909) 989-0971

BASIS OF BEARING:
THE BASIS OF BEARINGS FOR THIS SURVEY IS THE EAST LINE OF THE SE 1/4 OF SECTION 19, ALSO BEING THE CENTERLINE OF SIERRA AVENUE, BEING: N00°33'32"W

BENCHMARK:
CALTRANS BENCHMARK #8-17
BRASS DISK LOCATED IN S.E.C. TOWER LEG LOCATED 343' N/O 1-210, 0.2 MILES WEST OF SAN SEVINA ROAD.
ELEVATION=1428.609

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LAND PLANNING SURVEYING
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SUITE 117
CORONA, CALIFORNIA 92880
TEL. (951) 279-1800
FAX (951) 279-4380

AMIR H. FALLAHI, RCE 55534
09/02/2021
DATE

CITY OF FONTANA, CALIFORNIA
OFF-SITE STORM DRAIN IMPROVEMENT PLAN

DESIGNED BY: LS/BB/ARA
DRAWN BY: LS/ARA/BM
CHECKED BY: AHF

THE GARDENS AT THE ARBORETUM
SIERRA AVENUE
LINE B1 - STA. 691+00 TO 699+50 & LINE B3

APPROVED BY: CITY ENGINEER
DATE 10/11/2021
RCE 51152

SCALE: AS NOTED
DATE: SEPTEMBER 2021
DRAWING NO: 6130
3/11



Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING

REDLINE CORRECTIONS TO K&A PUBLIC STORM DRAIN PLANS

FOR

NORTH SIERRA DISTRIBUTION CENTER
NORTHEAST CORNER OF SIERRA AVENUE
AND CASA GRANDE AVENUE
FONTANA, CA

PREPARED FOR

BSREP III SIERRA CASA GRANDE LLC
2101 ROSECRANS AVENUE, SUITE 6250
EL SEGUNDO, CA 90245
PHONE: (310) 765-3265

January 25, 2022

JOB NO. 3963

PREPARED BY

THIENES ENGINEERING
14349 FIRESTONE BLVD.
LA MIRADA, CALIFORNIA 90638
PHONE: (714) 521-4811
FAX: (714) 521-4173

HYDROLOGY AND HYDRAULIC CALCULATIONS

FOR

REDLINE CORRECTIONS TO K&A PUBLIC STORM DRAIN PLANS

PREPARED UNDER
THE SUPERVISION OF




REINHARD STENZEL
R.C.E. 56155
EXP. 12/31/2022

1/25/22
DATE:

Discussion

Design revisions to the public storm drain laterals in Sierra Avenue, north of Casa Grande Avenue (DWG. No. 6130, designed by K&A Engineering for "The Gardens at the Arboretum") were made to accommodate project sites designed by Thienes Engineering on the east side of Sierra Avenue. A storm drain lateral for the Brookfield project at the north-east corner of Sierra and Casa Grande was added (the 2 existing laterals shown on plan at curb return were not constructed due to utility conflicts with existing gas line). An 18" lateral has been added for a proposed public catch basin, a portion of a 30" lateral has been removed to accommodate Brookfield project and a 30" lateral has been added for the Shea project just north of the Brookfield project. The revisions have minimal impact on the HGL of the original plans, and therefore no impact on the downstream hydraulic conditions of the existing Sierra Avenue storm drain south of Casa Grande Avenue. The "Water Surface and Pressure Gradient for Windows" (WSPGW) program was used for all hydraulic calculations. Rational method calculations were performed with Advanced Engineering Software's (AES) Rational Method Hydrology Program for San Bernardino County and K&A Engineering's provided hydrology calculations from CIVILD.

RATIONAL METHOD

HYDROLOGY CALCULATIONS

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
(c) Copyright 1983-2016 Advanced Engineering Software (aes)
Ver. 23.0 Release Date: 07/01/2016 License ID 1435

Analysis prepared by:

THIENES ENGINEERING, INC.
14349 FIRESTONE BLVD
LA MIRIADA, CA 90638
714-521-4811

***** DESCRIPTION OF STUDY *****
* * * * *

FILE NAME: W:\3963\BOTTOM.DAT
TIME/DATE OF STUDY: 15:17 12/14/2021

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 45.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.5000

ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	WIDTH (FT)	CROSSFALL (FT)	IN- / SIDE	OUT- / SIDE	/PARK- WAY	HEIGHT (FT)	WIDTH (FT)	LIP (FT)	HIKE (FT)	FACTOR (n)
1	30.0	20.0	0.018/0.018	0.018/0.020		0.67	2.00	0.0313	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET
as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

*USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

FLOW PROCESS FROM NODE 21.00 TO NODE 21.00 IS CODE = 7

>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<

USER-SPECIFIED VALUES ARE AS FOLLOWS:

TC(MIN.) = 15.33 RAINFALL INTENSITY(INCH/HR) = 3.40
EFFECTIVE AREA(ACRES) = 82.85
TOTAL AREA(ACRES) = 83.23 PEAK FLOW RATE(CFS) = 254.05
AREA-AVERAGED Fm(INCH/HR) = 0.03 AREA-AVERAGED Fp(INCH/HR) = 0.18
AREA-AVERAGED Ap = 0.19
NOTE: EFFECTIVE AREA IS USED AS THE TOTAL CONTRIBUTING AREA FOR ALL
CONFLUENCE ANALYSES.

FLOW PROCESS FROM NODE 21.00 TO NODE 22.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1740.00 DOWNSTREAM(FEET) = 1738.50
FLOW LENGTH(FEET) = 81.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 54.0 INCH PIPE IS 43.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 18.69
ESTIMATED PIPE DIAMETER(INCH) = 54.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 254.05
PIPE TRAVEL TIME(MIN.) = 0.07 Tc(MIN.) = 15.40

LONGEST FLOWPATH FROM NODE 21.00 TO NODE 22.00 = 81.00 FEET.

FLOW PROCESS FROM NODE 22.00 TO NODE 22.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 15.40
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.392
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 5.35 0.98 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.97
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 5.35 SUBAREA RUNOFF(CFS) = 15.86
EFFECTIVE AREA(ACRES) = 88.20 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.21 AREA-AVERAGED Ap = 0.18
TOTAL AREA(ACRES) = 88.6 PEAK FLOW RATE(CFS) = 266.28

PROJECT SITE



FLOW PROCESS FROM NODE 22.00 TO NODE 22.10 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1738.50 DOWNSTREAM(FEET) = 1735.66
FLOW LENGTH(FEET) = 269.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 63.0 INCH PIPE IS 46.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 15.52
ESTIMATED PIPE DIAMETER(INCH) = 63.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 266.28
PIPE TRAVEL TIME(MIN.) = 0.29 Tc(MIN.) = 15.69
LONGEST FLOWPATH FROM NODE 21.00 TO NODE 22.10 = 350.00 FEET.

FLOW PROCESS FROM NODE 22.10 TO NODE 22.10 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 15.69
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.354
SUBAREA LOSS RATE DATA(AMC II):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 8.00 0.98 0.100 32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.98
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 8.00 SUBAREA RUNOFF(CFS) = 23.45
EFFECTIVE AREA(ACRES) = 96.20 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.17
TOTAL AREA(ACRES) = 96.6 PEAK FLOW RATE(CFS) = 286.74

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 96.6 TC(MIN.) = 15.69
EFFECTIVE AREA(ACRES) = 96.20 AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.24 AREA-AVERAGED Ap = 0.173
PEAK FLOW RATE(CFS) = 286.74

END OF RATIONAL METHOD ANALYSIS



**SIERRA AVENUE STORM DRAIN
HYDRAULIC CALCULATIONS**

T1 SIERRA AVENUE PUBLIC STORM DRAIN
T2 UPDATED K&A SD DESIGN
T3 100-YEAR

SO	68431.94	1731.44	1			1733.22							
R	68451.63	1732.26	1	.014			.00	.00	.00	0			
R	68484.01	1733.63	1	.014			.00	.00	.00	0			
R	68506.55	1734.58	1	.014			.00	.00	.00	0			
R	68530.00	1734.70	1	.014			.00	.00	.00	0			
JX	68534.00	1734.72	1	2	.014	9.4	1734.72	45.00		.00			
R	68577.58	1734.93	1	.014			.00	.00	2.53	0			
TS	68601.14	1735.05	4	.014									
R	68610.20	1735.09	4	.014			.00	.00	2.53	0			
JX	68617.20	1735.13	4	5	.014	49.6	1735.11	45.00		.00			
R	68625.14	1735.17	4	.014			.00	.00	2.88	1			
TS	68650.00	1735.29	6	.014									
R	68655.44	1735.30	6	.013			.00	.00	2.88	0			
JX	68658.44	1735.31	6	7	.013	0.6	1737.32	60.00		.00			
R	68842.98	1735.66	6	.013			.00	.00	.00	0			
JX	68842.98	1735.66	6	11	.013	20.5	1735.66	30.00		.00			
R	68909.81	1735.88	6	.013			.00	.00	.00	0			
R	68914.48	1735.94	6	.013			.00	.00	.00	0			
R	68974.04	1736.70	6	.013			.00	.00	.00	0			
JX	68974.04	1736.70	6	7	.013	1.0	1738.70	90.00		.00			
R	69111.78	1738.32	6	.013			.00	.00	.00	1			
JX	69115.78	1738.37	6	8	.013	11.2	1740.68	45.00		.00			
R	69192.79	1739.30	6	.013			.00	.00	.00	0			
JX	69205.46	1739.89	10	9	.013	158.1	1739.78	30.00		.00			
R	69213.46	1739.95	10	.013			.00	.00	.00	0			
TS	69220.91	1741.50	5	.013									
R	69301.00	1744.95	5	.013			.00	.00	.00	0			
JX	69303.00	1745.04	5	7	.013	8.4	1745.98	45.00		.00			
R	69348.27	1746.20	5	.013			.00	.00	.00	0			
JX	69348.27	1746.20	5	8	.013	8.8	1746.7	45.00		.00			
R	69716.26	1762.86	5	.013			.00	.00	.00	1			
JX	69723.54	1764.07	8	11	.013	36.0	1763.32	45.00		.00			
R	70327.64	1781.76	8	.013			.00	.00	.00	1			
JX	70333.52	1782.43	2	2	.013	18.8	1782.21	45.00		.00			
R	70679.57	1792.56	2	.013			.00	.00	.00	1			
R	70684.24	1792.74	2	.013			.00	.00	.00	1			
R	70719.58	1794.10	2	.013			.00	45.00	.00	0			
R	70778.85	1796.37	2	.013			.00	.00	.00	0			
SH	70778.85	1796.37	2				1796.37						
CD	1	3	1	0.70	2.00	10.70	.00	.00	.00	.00			
CD	2	4	1	.00	2.00	.00	.00	.00	.00	.00			
CD	4	3	0	.00	4.00	8.00	.00	.00	.00	.00			
CD	5	4	1	.00	3.50	.00	.00	.00	.00	.00			
CD	6	4	1	.00	5.50	.00	.00	.00	.00	.00			
CD	7	4	1	.00	1.50	.00	.00	.00	.00	.00			
CD	8	4	1	.00	2.50	.00	.00	.00	.00	.00			
CD	9	4	1	.00	4.50	.00	.00	.00	.00	.00			
CD	10	4	1	.00	5.00	.00	.00	.00	.00	.00			
CD	11	4	1	.00	3.00	.00	.00	.00	.00	.00			
CD	12	4	1	.00	2.00	.00	.00	.00	.00	.00			
Q		26.800	.0										

ALLOWABLE
DISCHARGE FROM
PROJECT SITE

Program Package Serial Number: 1872

WATER SURFACE PROFILE LISTING

Date:12-15-2021 Time: 2:42:32

SIERRA AVENUE PUBLIC STORM DRAIN

UPDATED K&A SD DESIGN

100-YEAR

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
68431.940	1731.440	1.780	1733.220	349.20	19.62	5.97	1739.19	.00	2.00	10.70	2.000	10.700	.00	1 .7
	19.695 .0416					.0315	.62	1.78	2.68	1.63	.014	.00	.00	BOX
68451.630	1732.260	1.816	1734.076	349.20	19.23	5.74	1739.82	.00	2.00	10.70	2.000	10.700	.00	1 .7
	.539 .0423					.0306	.02	1.82	2.60	1.62	.014	.00	.00	BOX
----- WARNING - Flow depth near top of box conduit -----														
68452.170	1732.283	1.817	1734.100	349.20	19.22	5.73	1739.83	.00	2.00	10.70	2.000	10.700	.00	1 .7
	31.836 .0423					.0287	.91	1.82	2.60	1.62	.014	.00	.00	BOX
----- WARNING - Flow depth near top of box conduit -----														
68484.010	1733.630	1.906	1735.536	349.20	18.32	5.21	1740.75	.00	2.00	10.70	2.000	10.700	.00	1 .7
	.078 .0421					.0268	.00	1.91	2.42	1.62	.014	.00	.00	BOX
----- WARNING - Flow depth near top of box conduit -----														
68484.090	1733.633	1.906	1735.539	349.20	18.32	5.21	1740.75	.00	2.00	10.70	2.000	10.700	.00	1 .7
	22.461 .0421					.0346	.78	1.91	2.42	1.62	.014	.00	.00	BOX
----- WARNING - Flow depth near top of box conduit -----														

Program Package Serial Number: 1872

WATER SURFACE PROFILE LISTING

Date:12-15-2021 Time: 2:42:32

SIERRA AVENUE PUBLIC STORM DRAIN

UPDATED K&A SD DESIGN

100-YEAR

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
68506.550	1734.580	2.000	1736.580	349.20	17.46	4.73	1741.31	.00	2.00	10.70	2.000	10.700	.00	1 .7
	23.453 .0051					.0424	.99	2.00	2.25	2.00	.014	.00	.00	BOX
68530.000	1734.700	2.874	1737.574	349.20	17.46	4.73	1742.31	.00	2.00	10.70	2.000	10.700	.00	1 .7
JUNCT STR	.0050					.0401	.16	2.87	2.25		.014	.00	.00	BOX

68534.000	1734.720	3.491	1738.211	339.80	16.99	4.48	1742.69	.00	2.00	10.70	2.000	10.700	.00	1	.7
43.578	.0048					.0401	1.75	3.49	2.19	2.00	.014	.00	.00	BOX	
68577.580	1734.930	5.067	1739.997	339.80	16.99	4.48	1744.48	.00	2.00	10.70	2.000	10.700	.00	1	.7
TRANS STR	.0051					.0068	.16	5.07	2.19		.014	.00	.00	BOX	
68601.140	1735.050	8.505	1743.555	339.80	10.62	1.75	1745.31	.00	3.83	8.00	4.000	8.000	.00	0	.0
9.063	.0044					.0068	.06	8.50	.94	3.85	.014	.00	.00	BOX	
68610.200	1735.090	8.541	1743.631	339.80	10.62	1.75	1745.38	.00	3.83	8.00	4.000	8.000	.00	0	.0
JUNCT STR	.0057					.0050	.03	8.54	.94		.014	.00	.00	BOX	
68617.200	1735.130	9.314	1744.444	290.20	9.07	1.28	1745.72	.00	3.44	8.00	4.000	8.000	.00	0	.0
7.938	.0050					.0050	.04	9.31	.80	3.26	.014	.00	.00	BOX	
68625.140	1735.170	9.390	1744.560	290.20	9.07	1.28	1745.84	.00	3.44	8.00	4.000	8.000	.00	0	.0
TRANS STR	.0048					.0068	.17	9.39	.80		.014	.00	.00	BOX	
68650.000	1735.290	8.608	1743.898	290.20	12.21	2.32	1746.21	.00	4.70	.00	5.500	.000	.00	1	.0
5.438	.0018					.0075	.04	8.61	.00	5.50	.013	.00	.00	PIPE	

▲ FILE: PUBTH.WSW

W S P G W - CIVILDESIGN Version 14.06

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SIERRA AVENUE PUBLIC STORM DRAIN
 UPDATED K&A SD DESIGN
 100-YEAR

WATER SURFACE PROFILE LISTING

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
68655.440	1735.300	8.660	1743.960	290.20	12.21	2.32	1746.28	.00	4.70	.00	5.500	.000	.00	1 .0
JUNCT STR	.0033					.0075	.02	8.66	.00		.013	.00	.00	PIPE
68658.440	1735.310	8.692	1744.002	289.60	12.19	2.31	1746.31	.00	4.70	.00	5.500	.000	.00	1 .0
184.539	.0019					.0074	1.37	8.69	.00	5.50	.013	.00	.00	PIPE
68842.980	1735.660	9.714	1745.374	289.60	12.19	2.31	1747.68	.00	4.70	.00	5.500	.000	.00	1 .0
JUNCT STR	.0000					.0069	.00	9.71	.00		.013	.00	.00	PIPE
68842.980	1735.660	10.277	1745.937	269.10	11.33	1.99	1747.93	.00	4.56	.00	5.500	.000	.00	1 .0
66.836	.0033					.0064	.43	10.28	.00	5.50	.013	.00	.00	PIPE
68909.810	1735.880	10.486	1746.366	269.10	11.33	1.99	1748.36	.00	4.56	.00	5.500	.000	.00	1 .0

4.664	.0129					.0064	.03	10.49	.00	3.41	.013	.00	.00	PIPE
68914.480	1735.940	10.456	1746.396	269.10	11.33	1.99	1748.39	.00	4.56	.00	5.500	.000	.00	1 .0
59.563	.0128					.0064	.38	10.46	.00	3.42	.013	.00	.00	PIPE
68974.040	1736.700	10.079	1746.779	269.10	11.33	1.99	1748.77	.00	4.56	.00	5.500	.000	.00	1 .0
JUNCT STR	.0000					.0064	.00	10.08	.00		.013	.00	.00	PIPE
68974.040	1736.700	10.108	1746.808	268.10	11.28	1.98	1748.79	.00	4.55	.00	5.500	.000	.00	1 .0
137.742	.0118					.0064	.88	10.11	.00	3.51	.013	.00	.00	PIPE
69111.780	1738.320	9.465	1747.785	268.10	11.28	1.98	1749.76	.00	4.55	.00	5.500	.000	.00	1 .0
JUNCT STR	.0125					.0061	.02	9.46	.00		.013	.00	.00	PIPE

Program Package Serial Number: 1872 WATER SURFACE PROFILE LISTING Date:12-15-2021 Time: 2:42:32

SIERRA AVENUE PUBLIC STORM DRAIN
 UPDATED K&A SD DESIGN
 100-YEAR

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
69115.780	1738.370	9.739	1748.109	256.90	10.81	1.82	1749.92	.00	4.46	.00	5.500	.000	.00	1 .0
77.008	.0121					.0059	.45	9.74	.00	3.38	.013	.00	.00	PIPE
69192.790	1739.300	9.260	1748.560	256.90	10.81	1.82	1750.38	.00	4.46	.00	5.500	.000	.00	1 .0
JUNCT STR	.0466					.0036	.05	9.26	.00		.013	.00	.00	PIPE
69205.460	1739.890	10.139	1750.029	98.80	5.03	.39	1750.42	.00	2.83	.00	5.000	.000	.00	1 .0
8.000	.0075					.0014	.01	10.14	.00	2.32	.013	.00	.00	PIPE
69213.460	1739.950	10.090	1750.040	98.80	5.03	.39	1750.43	.00	2.83	.00	5.000	.000	.00	1 .0
TRANS STR	.2082					.0055	.04	10.09	.00		.013	.00	.00	PIPE
69220.910	1741.500	7.602	1749.102	98.80	10.27	1.64	1750.74	.00	3.06	.00	3.500	.000	.00	1 .0
80.094	.0431					.0096	.77	7.60	.00	1.69	.013	.00	.00	PIPE
69301.000	1744.950	4.924	1749.874	98.80	10.27	1.64	1751.51	.00	3.06	.00	3.500	.000	.00	1 .0
JUNCT STR	.0450					.0089	.02	4.92	.00		.013	.00	.00	PIPE
69303.000	1745.040	5.294	1750.334	90.40	9.40	1.37	1751.70	.00	2.95	.00	3.500	.000	.00	1 .0

Program Package Serial Number: 1872

WATER SURFACE PROFILE LISTING

Date:12-15-2021 Time: 2:42:32

SIERRA AVENUE PUBLIC STORM DRAIN

UPDATED K&A SD DESIGN

100-YEAR

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
69687.410	1761.554	1.985	1763.539	81.60	14.50	3.26	1766.80	.00	2.82	3.47	3.500	.000	.00	1 .0
	7.516 .0453					.0164	.12	1.98	2.01	1.50	.013	.00	.00	PIPE
69694.930	1761.895	2.064	1763.958	81.60	13.82	2.97	1766.93	.00	2.82	3.44	3.500	.000	.00	1 .0
	6.031 .0453					.0145	.09	2.06	1.86	1.50	.013	.00	.00	PIPE
69700.960	1762.167	2.148	1764.315	81.60	13.18	2.70	1767.01	.00	2.82	3.41	3.500	.000	.00	1 .0
	4.805 .0453					.0128	.06	2.15	1.72	1.50	.013	.00	.00	PIPE
69705.770	1762.385	2.237	1764.622	81.60	12.57	2.45	1767.07	.00	2.82	3.36	3.500	.000	.00	1 .0
	3.773 .0453					.0114	.04	2.24	1.59	1.50	.013	.00	.00	PIPE
69709.540	1762.556	2.332	1764.888	81.60	11.98	2.23	1767.12	.00	2.82	3.30	3.500	.000	.00	1 .0
	2.867 .0453					.0101	.03	2.33	1.47	1.50	.013	.00	.00	PIPE
69712.410	1762.686	2.434	1765.120	81.60	11.42	2.03	1767.15	.00	2.82	3.22	3.500	.000	.00	1 .0
	2.047 .0453					.0090	.02	2.43	1.35	1.50	.013	.00	.00	PIPE
69714.450	1762.778	2.544	1765.323	81.60	10.89	1.84	1767.16	.00	2.82	3.12	3.500	.000	.00	1 .0
	1.281 .0453					.0081	.01	2.54	1.24	1.50	.013	.00	.00	PIPE
69715.730	1762.836	2.664	1765.500	81.60	10.38	1.67	1767.17	.00	2.82	2.98	3.500	.000	.00	1 .0
	.523 .0453					.0073	.00	2.66	1.13	1.50	.013	.00	.00	PIPE
69716.260	1762.860	2.796	1765.656	81.60	9.90	1.52	1767.18	.00	2.82	2.81	3.500	.000	.00	1 .0
JUNCT STR	.1662					.0181	.13	2.80	1.02		.013	.00	.00	PIPE

Program Package Serial Number: 1872

WATER SURFACE PROFILE LISTING

Date:12-15-2021 Time: 2:42:32

SIERRA AVENUE PUBLIC STORM DRAIN

UPDATED K&A SD DESIGN

100-YEAR

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
---------	-------------	------------	------------	---------	-----------	----------	----------------	------------	----------------	----------------	----------------	-----------------	----	----------------

L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
69723.550	1764.070	1.468	1765.538	45.60	15.22	3.60	1769.14	.00	2.24	2.46	2.500	.000	.00	1 .0
206.117	.0293					.0293	6.04	1.47	2.43	1.47	.013	.00	.00	PIPE
69929.660	1770.106	1.468	1771.574	45.60	15.22	3.60	1775.17	.00	2.24	2.46	2.500	.000	.00	1 .0
158.414	.0293					.0291	4.60	1.47	2.43	1.47	.013	.00	.00	PIPE
70088.080	1774.745	1.475	1776.220	45.60	15.13	3.55	1779.77	.00	2.24	2.46	2.500	.000	.00	1 .0
123.984	.0293					.0272	3.37	1.48	2.41	1.47	.013	.00	.00	PIPE
70212.060	1778.375	1.535	1779.911	45.60	14.42	3.23	1783.14	.00	2.24	2.43	2.500	.000	.00	1 .0
44.016	.0293					.0241	1.06	1.54	2.23	1.47	.013	.00	.00	PIPE
70256.080	1779.664	1.599	1781.264	45.60	13.75	2.94	1784.20	.00	2.24	2.40	2.500	.000	.00	1 .0
25.078	.0293					.0214	.54	1.60	2.06	1.47	.013	.00	.00	PIPE
70281.160	1780.399	1.667	1782.066	45.60	13.11	2.67	1784.74	.00	2.24	2.36	2.500	.000	.00	1 .0
16.508	.0293					.0190	.31	1.67	1.90	1.47	.013	.00	.00	PIPE
70297.660	1780.882	1.740	1782.622	45.60	12.50	2.43	1785.05	.00	2.24	2.30	2.500	.000	.00	1 .0
11.500	.0293					.0169	.19	1.74	1.75	1.47	.013	.00	.00	PIPE
70309.160	1781.219	1.819	1783.038	45.60	11.92	2.21	1785.24	.00	2.24	2.23	2.500	.000	.00	1 .0
8.141	.0293					.0152	.12	1.82	1.60	1.47	.013	.00	.00	PIPE
70317.300	1781.457	1.904	1783.362	45.60	11.36	2.01	1785.37	.00	2.24	2.13	2.500	.000	.00	1 .0
5.594	.0293					.0136	.08	1.90	1.46	1.47	.013	.00	.00	PIPE

Program Package Serial Number: 1872

SIERRA AVENUE PUBLIC STORM DRAIN
 UPDATED K&A SD DESIGN
 100-YEAR

Date:12-15-2021 Time: 2:42:32

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
70322.900	1781.621	1.999	1783.620	45.60	10.84	1.82	1785.44	.00	2.24	2.00	2.500	.000	.00	1 .0
3.453	.0293					.0124	.04	2.00	1.32	1.47	.013	.00	.00	PIPE
70326.350	1781.722	2.107	1783.829	45.60	10.33	1.66	1785.49	.00	2.24	1.82	2.500	.000	.00	1 .0

1.289	.0293					.0114	.01	2.11	1.17	1.47	.013	.00	.00	PIPE
70327.640	1781.760	2.235	1783.995	45.60	9.85	1.51	1785.50	.00	2.24	1.54	2.500	.000	.00	1 .0
JUNCT STR	.1139					.0125	.07	2.24	1.00		.013	.00	.00	PIPE
70333.520	1782.430	2.764	1785.194	26.80	8.53	1.13	1786.32	.00	1.80	.00	2.000	.000	.00	1 .0
10.664	.0293					.0140	.15	2.76	.00	1.22	.013	.00	.00	PIPE
70344.190	1782.742	2.597	1785.339	26.80	8.53	1.13	1786.47	.00	1.80	.00	2.000	.000	.00	1 .0
HYDRAULIC JUMP														
70344.190	1782.742	1.224	1783.966	26.80	13.30	2.75	1786.71	.00	1.80	1.95	2.000	.000	.00	1 .0
126.727	.0293					.0293	3.71	1.22	2.31	1.22	.013	.00	.00	PIPE
70470.910	1786.452	1.224	1787.676	26.80	13.30	2.75	1790.42	.00	1.80	1.95	2.000	.000	.00	1 .0
119.633	.0293					.0296	3.54	1.22	2.31	1.22	.013	.00	.00	PIPE
70590.550	1789.954	1.215	1791.169	26.80	13.42	2.80	1793.96	.00	1.80	1.95	2.000	.000	.00	1 .0
89.023	.0293					.0319	2.84	1.22	2.34	1.22	.013	.00	.00	PIPE
70679.570	1792.560	1.168	1793.728	26.80	14.07	3.07	1796.80	.00	1.80	1.97	2.000	.000	.00	1 .0
4.672	.0385					.0336	.16	1.17	2.52	1.12	.013	.00	.00	PIPE

SIERRA AVENUE PUBLIC STORM DRAIN
 UPDATED K&A SD DESIGN
 100-YEAR

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
70684.240	1792.740	1.172	1793.912	26.80	14.01	3.05	1796.96	.27	1.80	1.97	2.000	.000	.00	1 .0
3.820	.0385					.0333	.13	1.44	2.51	1.12	.013	.00	.00	PIPE
70688.060	1792.887	1.175	1794.062	26.80	13.97	3.03	1797.09	.27	1.80	1.97	2.000	.000	.00	1 .0
31.516	.0385					.0313	.99	1.44	2.49	1.12	.013	.00	.00	PIPE
70719.570	1794.100	1.223	1795.323	26.80	13.32	2.75	1798.08	.00	1.80	1.95	2.000	.000	.00	1 .0
5.430	.0383					.0289	.16	1.22	2.31	1.12	.013	.00	.00	PIPE
70725.000	1794.308	1.235	1795.543	26.80	13.16	2.69	1798.23	.00	1.80	1.94	2.000	.000	.00	1 .0

16.930	.0383					.0269	.46	1.23	2.27	1.12	.013	.00	.00	PIPE
70741.930	1794.956	1.286	1796.243	26.80	12.55	2.45	1798.69	.00	1.80	1.92	2.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
11.609	.0383					.0239	.28	1.29	2.09	1.12	.013	.00	.00	PIPE
70753.540	1795.401	1.341	1796.742	26.80	11.97	2.22	1798.97	.00	1.80	1.88	2.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
8.398	.0383					.0212	.18	1.34	1.93	1.12	.013	.00	.00	PIPE
70761.940	1795.722	1.400	1797.123	26.80	11.41	2.02	1799.14	.00	1.80	1.83	2.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
6.211	.0383					.0190	.12	1.40	1.78	1.12	.013	.00	.00	PIPE
70768.150	1795.960	1.464	1797.424	26.80	10.88	1.84	1799.26	.00	1.80	1.77	2.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
4.578	.0383					.0170	.08	1.46	1.63	1.12	.013	.00	.00	PIPE
70772.730	1796.135	1.533	1797.669	26.80	10.37	1.67	1799.34	.00	1.80	1.69	2.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
3.258	.0383					.0153	.05	1.53	1.48	1.12	.013	.00	.00	PIPE

▲ FILE: PUBTH.WSW W S P G W - CIVILDESIGN Version 14.06 PAGE 10

Program Package Serial Number: 1872 WATER SURFACE PROFILE LISTING Date:12-15-2021 Time: 2:42:32

SIERRA AVENUE PUBLIC STORM DRAIN
 UPDATED K&A SD DESIGN
 100-YEAR

Station	Invert Elev	Depth (FT)	Water Elev	Q (CFS)	Vel (FPS)	Vel Head	Energy Grd.El.	Super Elev	Critical Depth	Flow Top Width	Height/Dia.-FT	Base Wt or I.D.	ZL	No Wth Prs/Pip
L/Elem	Ch Slope					SF Ave	HF	SE Dpth	Froude N	Norm Dp	"N"	X-Fall	ZR	Type Ch
70775.980	1796.260	1.610	1797.870	26.80	9.89	1.52	1799.39	.00	1.80	1.58	2.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
2.070	.0383					.0139	.03	1.61	1.33	1.12	.013	.00	.00	PIPE
70778.050	1796.340	1.697	1798.037	26.80	9.43	1.38	1799.42	.00	1.80	1.43	2.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -
.797	.0383					.0128	.01	1.70	1.18	1.12	.013	.00	.00	PIPE
70778.850	1796.370	1.804	1798.174	26.80	8.99	1.25	1799.43	.00	1.80	1.19	2.000	.000	.00	1 .0
- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -

▲

APPENDIX B

HYDROLOGY CALCULATIONS

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
(c) Copyright 1983-99 Advanced Engineering Software (aes)
Ver. 8.0 Release Date: 01/01/99 License ID 1435

Analysis prepared by:

THIENES ENGINEERING
16800 VALLEY VIEW AVENUE
LA MIRADA CA 90638
PH: (714) 521-4811 FAX: (714) 521-4173

***** DESCRIPTION OF STUDY *****
* TEI JOB NUMBER 3971 *
* SIERRA AVENUE AND DUNCAN CANYON ROAD *
* EXISTING CONDITION 100-YR *

FILE NAME: C:\XDRIVE\3994\100X.DAT
TIME/DATE OF STUDY: 11:41 08/13/2021

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.5000

ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD

FLOW PROCESS FROM NODE 100.00 TO NODE 101.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 751.00
ELEVATION DATA: UPSTREAM(FEET) = 1813.80 DOWNSTREAM(FEET) = 1789.40

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 26.225
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.465
SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
NATURAL GOOD COVER "OPEN BRUSH"	A	5.10	0.69	1.00	61	26.23

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.69
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.00
SUBAREA RUNOFF(CFS) = 8.16
TOTAL AREA(ACRES) = 5.10 PEAK FLOW RATE(CFS) = 8.16

FLOW PROCESS FROM NODE 101.00 TO NODE 102.00 IS CODE = 52

>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
>>>>TRAVELTIME THRU SUBAREA<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1789.40 DOWNSTREAM(FEET) = 1772.50
CHANNEL LENGTH THRU SUBAREA(FEET) = 540.00 CHANNEL SLOPE = 0.0313
CHANNEL FLOW THRU SUBAREA(CFS) = 8.16
FLOW VELOCITY(FEET/SEC) = 4.20 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) = 2.14 Tc(MIN.) = 28.37
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 102.00 = 1291.00 FEET.

FLOW PROCESS FROM NODE 101.00 TO NODE 102.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN) = 28.37

* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.351

SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
-------------------------------	-------------------	-----------------	-----------------	-----------------	-----------

NATURAL GOOD COVER

"OPEN BRUSH"	A	5.55	0.69	1.00	61
--------------	---	------	------	------	----

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.69

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.00

SUBAREA AREA(ACRES) = 5.55 SUBAREA RUNOFF(CFS) = 8.32

EFFECTIVE AREA(ACRES) = 10.65 AREA-AVERAGED Fm(INCH/HR) = 0.69

AREA-AVERAGED Fp(INCH/HR) = 0.69 AREA-AVERAGED Ap = 1.00

TOTAL AREA(ACRES) = 10.65 PEAK FLOW RATE(CFS) = 15.96

=====
END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 10.65 TC(MIN.) = 28.37

EFFECTIVE AREA(ACRES) = 10.65 AREA-AVERAGED Fm(INCH/HR)= 0.69

AREA-AVERAGED Fp(INCH/HR) = 0.69 AREA-AVERAGED Ap = 1.00

PEAK FLOW RATE(CFS) = 15.96
=====

END OF RATIONAL METHOD ANALYSIS

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
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Ver. 8.0 Release Date: 01/01/99 License ID 1435

Analysis prepared by:

THIENES ENGINEERING
16800 VALLEY VIEW AVENUE
LA MIRADA CA 90638
PH: (714) 521-4811 FAX: (714) 521-4173

***** DESCRIPTION OF STUDY *****
* TEI JOB NUMBER 3971 *
* SIERRA AVENUE AND DUNCAN CANYON ROAD *
* EXISTING CONDITION 100-YR *

FILE NAME: C:\3994\110X.DAT
TIME/DATE OF STUDY: 10:42 08/13/2021

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.5000

ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD

FLOW PROCESS FROM NODE 110.00 TO NODE 111.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 678.00
ELEVATION DATA: UPSTREAM(FEET) = 1793.10 DOWNSTREAM(FEET) = 1774.50

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 26.040
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.475
SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
NATURAL GOOD COVER "OPEN BRUSH"	A	8.35	0.69	1.00	61	26.04

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.69
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.00
SUBAREA RUNOFF(CFS) = 13.45
TOTAL AREA(ACRES) = 8.35 PEAK FLOW RATE(CFS) = 13.45

=====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES)	=	8.35	TC(MIN.)	=	26.04
EFFECTIVE AREA(ACRES)	=	8.35	AREA-AVERAGED Fm(INCH/HR)	=	0.69
AREA-AVERAGED Fp(INCH/HR)	=	0.69	AREA-AVERAGED Ap	=	1.00
PEAK FLOW RATE(CFS)	=	13.45			

=====

END OF RATIONAL METHOD ANALYSIS

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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Ver. 8.0 Release Date: 01/01/99 License ID 1435

Analysis prepared by:

THIENES ENGINEERING
16800 VALLEY VIEW AVENUE
LA MIRADA CA 90638
PH: (714) 521-4811 FAX: (714) 521-4173

***** DESCRIPTION OF STUDY *****
* TEI JOB NUMBER 3971 *
* SIERRA AVENUE AND DUNCAN CANYON ROAD *
* EXISTING CONDITION 100-YR *

FILE NAME: C:\3994\200X.DAT
TIME/DATE OF STUDY: 10:47 08/13/2021

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.5000

ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD

FLOW PROCESS FROM NODE 200.00 TO NODE 201.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 664.00
ELEVATION DATA: UPSTREAM(FEET) = 1815.70 DOWNSTREAM(FEET) = 1793.80

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 24.890
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.543

SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
NATURAL GOOD COVER "OPEN BRUSH"	A	7.95	0.69	1.00	61	24.89

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.69
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.00

SUBAREA RUNOFF(CFS) = 13.29
TOTAL AREA(ACRES) = 7.95 PEAK FLOW RATE(CFS) = 13.29

=====

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 7.95 TC(MIN.) = 24.89
EFFECTIVE AREA(ACRES) = 7.95 AREA-AVERAGED Fm(INCH/HR) = 0.69
AREA-AVERAGED Fp(INCH/HR) = 0.69 AREA-AVERAGED Ap = 1.00
PEAK FLOW RATE(CFS) = 13.29

=====

END OF RATIONAL METHOD ANALYSIS

EXISTING CONDITION

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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Ver. 8.0 Release Date: 01/01/99 License ID 1435

Analysis prepared by:

THIENES ENGINEERING
16800 VALLEY VIEW AVENUE
LA MIRADA CA 90638
PH: (714) 521-4811 FAX: (714) 521-4173

***** DESCRIPTION OF STUDY *****
* TEI JOB NUMBER 3971 *
* EXISTING CONDITION *
* 100 YEAR STORM EVENT *

FILE NAME: C:\XDRIVE\3971\X100.DAT
TIME/DATE OF STUDY: 10:25 08/04/2021

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.5000

ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD

FLOW PROCESS FROM NODE 100.00 TO NODE 101.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 613.00
ELEVATION DATA: UPSTREAM(FEET) = 1775.80 DOWNSTREAM(FEET) = 1759.60

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 19.027
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.988

SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
NATURAL FAIR COVER "OPEN BRUSH"	A	3.50	0.61	1.00	66	19.03

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.61
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.00

SUBAREA RUNOFF(CFS) = 7.48
TOTAL AREA(ACRES) = 3.50 PEAK FLOW RATE(CFS) = 7.48

=====

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 3.50 TC(MIN.) = 19.03
EFFECTIVE AREA(ACRES) = 3.50 AREA-AVERAGED Fm(INCH/HR)= 0.61
AREA-AVERAGED Fp(INCH/HR) = 0.61 AREA-AVERAGED Ap = 1.00
PEAK FLOW RATE(CFS) = 7.48

=====

END OF RATIONAL METHOD ANALYSIS

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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Analysis prepared by:

THIENES ENGINEERING
16800 VALLEY VIEW AVENUE
LA MIRADA CA 90638
PH: (714) 521-4811 FAX: (714) 521-4173

***** DESCRIPTION OF STUDY *****
* TEI JOB NUMBER 3971 *
* EXISTING CONDITION *
* 100 YEAR STORM EVENT *

FILE NAME: C:\XDRIVE\3971\X110.DAT
TIME/DATE OF STUDY: 10:37 08/04/2021

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USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.5000

ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD

FLOW PROCESS FROM NODE 110.00 TO NODE 111.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 564.00
ELEVATION DATA: UPSTREAM(FEET) = 1774.50 DOWNSTREAM(FEET) = 1726.50

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 14.565
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.507

SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
NATURAL FAIR COVER "OPEN BRUSH"	A	2.55	0.61	1.00	66	14.57

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.61
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.00
SUBAREA RUNOFF(CFS) = 6.64
TOTAL AREA(ACRES) = 2.55 PEAK FLOW RATE(CFS) = 6.64

=====

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 2.55 TC(MIN.) = 14.57
EFFECTIVE AREA(ACRES) = 2.55 AREA-AVERAGED Fm(INCH/HR)= 0.61
AREA-AVERAGED Fp(INCH/HR) = 0.61 AREA-AVERAGED Ap = 1.00
PEAK FLOW RATE(CFS) = 6.64

=====

END OF RATIONAL METHOD ANALYSIS

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Analysis prepared by:

THIENES ENGINEERING
16800 VALLEY VIEW AVENUE
LA MIRADA CA 90638
PH: (714) 521-4811 FAX: (714) 521-4173

***** DESCRIPTION OF STUDY *****
* TEI JOB NUMBER 3971 *
* EXISTING CONDITION *
* 100 YEAR STORM EVENT *

FILE NAME: C:\XDRIVE\3971\X120.DAT
TIME/DATE OF STUDY: 10:49 08/04/2021

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USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

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--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.5000

ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD

FLOW PROCESS FROM NODE 120.00 TO NODE 121.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 509.00
ELEVATION DATA: UPSTREAM(FEET) = 1772.40 DOWNSTREAM(FEET) = 1761.10

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 18.290
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.060
SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
NATURAL FAIR COVER "OPEN BRUSH"	A	3.75	0.61	1.00	66	18.29

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.61
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.00
SUBAREA RUNOFF(CFS) = 8.25
TOTAL AREA(ACRES) = 3.75 PEAK FLOW RATE(CFS) = 8.25

=====

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 3.75 TC(MIN.) = 18.29
EFFECTIVE AREA(ACRES) = 3.75 AREA-AVERAGED Fm(INCH/HR) = 0.61
AREA-AVERAGED Fp(INCH/HR) = 0.61 AREA-AVERAGED Ap = 1.00
PEAK FLOW RATE(CFS) = 8.25

=====

END OF RATIONAL METHOD ANALYSIS

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Analysis prepared by:

THIENES ENGINEERING
16800 VALLEY VIEW AVENUE
LA MIRADA CA 90638
PH: (714) 521-4811 FAX: (714) 521-4173

***** DESCRIPTION OF STUDY *****
* TEI JOB NUMBER 3971 *
* EXISTING CONDITION *
* 100 YEAR STORM EVENT *

FILE NAME: C:\XDRIVE\3071\X130.DAT
TIME/DATE OF STUDY: 11:05 08/04/2021

=====

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

=====

--*TIME-OF-CONCENTRATION MODEL*--

USER SPECIFIED STORM EVENT(YEAR) = 100.00
SPECIFIED MINIMUM PIPE SIZE(INCH) = 12.00
SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL

SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.5000

ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD

FLOW PROCESS FROM NODE 130.00 TO NODE 131.00 IS CODE = 21

>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 498.00
ELEVATION DATA: UPSTREAM(FEET) = 1773.20 DOWNSTREAM(FEET) = 1760.70

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 17.691
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.121

SUBAREA Tc AND LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
NATURAL FAIR COVER "OPEN BRUSH"	A	1.25	0.61	1.00	66	17.69

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.61
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.00

SUBAREA RUNOFF(CFS) = 2.82
TOTAL AREA(ACRES) = 1.25 PEAK FLOW RATE(CFS) = 2.82

=====

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 1.25 TC(MIN.) = 17.69
EFFECTIVE AREA(ACRES) = 1.25 AREA-AVERAGED Fm(INCH/HR) = 0.61
AREA-AVERAGED Fp(INCH/HR) = 0.61 AREA-AVERAGED Ap = 1.00
PEAK FLOW RATE(CFS) = 2.82

=====

END OF RATIONAL METHOD ANALYSIS

PROPOSED CONDITION

ELEVATION DATA: UPSTREAM(FEET) = 1764.67 DOWNSTREAM(FEET) = 1762.74
FLOW LENGTH(FEET) = 386.00 MANNING'S N = 0.012
DEPTH OF FLOW IN 21.0 INCH PIPE IS 14.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.48
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 9.64
PIPE TRAVEL TIME(MIN.) = 1.17 Tc(MIN.) = 7.41
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 102.00 = 676.00 FEET.

FLOW PROCESS FROM NODE 102.00 TO NODE 102.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 7.41
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 5.260
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	1.72	0.74	0.100	52

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.74
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.72 SUBAREA RUNOFF(CFS) = 8.03
EFFECTIVE AREA(ACRES) = 3.58 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.74 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 3.6 PEAK FLOW RATE(CFS) = 16.71

FLOW PROCESS FROM NODE 102.00 TO NODE 102.10 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1062.74 DOWNSTREAM(FEET) = 1060.37
FLOW LENGTH(FEET) = 468.00 MANNING'S N = 0.012
DEPTH OF FLOW IN 24.0 INCH PIPE IS 19.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.17
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 16.71
PIPE TRAVEL TIME(MIN.) = 1.26 Tc(MIN.) = 8.68
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 102.10 = 1144.00 FEET.

FLOW PROCESS FROM NODE 102.10 TO NODE 102.10 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 8.68
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.786
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
NATURAL FAIR COVER "OPEN BRUSH"	A	0.31	0.55	1.000	66

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.55
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.000
SUBAREA AREA(ACRES) = 0.31 SUBAREA RUNOFF(CFS) = 1.18
EFFECTIVE AREA(ACRES) = 3.89 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.65 AREA-AVERAGED Ap = 0.17
TOTAL AREA(ACRES) = 3.9 PEAK FLOW RATE(CFS) = 16.71
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

FLOW PROCESS FROM NODE 102.10 TO NODE 103.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1760.37 DOWNSTREAM(FEET) = 1759.74
FLOW LENGTH(FEET) = 125.00 MANNING'S N = 0.012
DEPTH OF FLOW IN 24.0 INCH PIPE IS 19.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.15
ESTIMATED PIPE DIAMETER(INCH) = 24.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 16.71
PIPE TRAVEL TIME(MIN.) = 0.34 Tc(MIN.) = 9.02
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 103.00 = 1269.00 FEET.

FLOW PROCESS FROM NODE 103.00 TO NODE 103.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 9.02
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.677
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 1.35 0.74 0.100 52
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.74
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.35 SUBAREA RUNOFF(CFS) = 5.59
EFFECTIVE AREA(ACRES) = 5.24 AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.67 AREA-AVERAGED Ap = 0.15
TOTAL AREA(ACRES) = 5.2 PEAK FLOW RATE(CFS) = 21.57

FLOW PROCESS FROM NODE 103.00 TO NODE 104.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1759.74 DOWNSTREAM(FEET) = 1758.86
FLOW LENGTH(FEET) = 176.00 MANNING'S N = 0.012
DEPTH OF FLOW IN 27.0 INCH PIPE IS 20.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.61
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 21.57
PIPE TRAVEL TIME(MIN.) = 0.44 Tc(MIN.) = 9.46
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 104.00 = 1445.00 FEET.

FLOW PROCESS FROM NODE 104.00 TO NODE 104.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 9.46
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.544
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 0.77 0.74 0.100 52
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.74
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.77 SUBAREA RUNOFF(CFS) = 3.10
EFFECTIVE AREA(ACRES) = 6.01 AREA-AVERAGED Fm(INCH/HR) = 0.10
AREA-AVERAGED Fp(INCH/HR) = 0.67 AREA-AVERAGED Ap = 0.15
TOTAL AREA(ACRES) = 6.0 PEAK FLOW RATE(CFS) = 24.04

FLOW PROCESS FROM NODE 104.00 TO NODE 105.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

ELEVATION DATA: UPSTREAM(FEET) = 1758.86 DOWNSTREAM(FEET) = 1758.35
FLOW LENGTH(FEET) = 102.00 MANNING'S N = 0.012
DEPTH OF FLOW IN 30.0 INCH PIPE IS 20.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 6.91
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 24.04
PIPE TRAVEL TIME(MIN.) = 0.25 Tc(MIN.) = 9.71
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 105.00 = 1547.00 FEET.

FLOW PROCESS FROM NODE 105.00 TO NODE 105.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

MAINLINE Tc(MIN.) = 9.71
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.474
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 0.68 0.74 0.100 52
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.74
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.68 SUBAREA RUNOFF(CFS) = 2.69
EFFECTIVE AREA(ACRES) = 6.69 AREA-AVERAGED Fm(INCH/HR) = 0.10

AREA-AVERAGED Fp(INCH/HR) = 0.68 AREA-AVERAGED Ap = 0.14
TOTAL AREA(ACRES) = 6.7 PEAK FLOW RATE(CFS) = 26.36

FLOW PROCESS FROM NODE 105.00 TO NODE 106.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1758.35 DOWNSTREAM(FEET) = 1757.84
FLOW LENGTH(FEET) = 102.00 MANNING'S N = 0.012
DEPTH OF FLOW IN 30.0 INCH PIPE IS 21.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.02
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 26.36
PIPE TRAVEL TIME(MIN.) = 0.24 Tc(MIN.) = 9.95
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 106.00 = 1649.00 FEET.

FLOW PROCESS FROM NODE 106.00 TO NODE 106.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 9.95
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.409
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	0.87	0.74	0.100	52

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.74
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.87 SUBAREA RUNOFF(CFS) = 3.39
EFFECTIVE AREA(ACRES) = 7.56 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.68 AREA-AVERAGED Ap = 0.14
TOTAL AREA(ACRES) = 7.6 PEAK FLOW RATE(CFS) = 29.36

FLOW PROCESS FROM NODE 106.00 TO NODE 107.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1757.84 DOWNSTREAM(FEET) = 1757.33
FLOW LENGTH(FEET) = 102.00 MANNING'S N = 0.012
DEPTH OF FLOW IN 30.0 INCH PIPE IS 23.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.10
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 29.36
PIPE TRAVEL TIME(MIN.) = 0.24 Tc(MIN.) = 10.19
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 107.00 = 1751.00 FEET.

FLOW PROCESS FROM NODE 107.00 TO NODE 107.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 10.19
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.346
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	0.87	0.74	0.100	52

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.74
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.87 SUBAREA RUNOFF(CFS) = 3.35
EFFECTIVE AREA(ACRES) = 8.43 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.69 AREA-AVERAGED Ap = 0.13
TOTAL AREA(ACRES) = 8.4 PEAK FLOW RATE(CFS) = 32.28

FLOW PROCESS FROM NODE 107.00 TO NODE 108.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1757.33 DOWNSTREAM(FEET) = 1756.95
FLOW LENGTH(FEET) = 77.00 MANNING'S N = 0.012
DEPTH OF FLOW IN 33.0 INCH PIPE IS 22.8 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.37

ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 32.28
PIPE TRAVEL TIME(MIN.) = 0.17 Tc(MIN.) = 10.36
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 108.00 = 1828.00 FEET.

FLOW PROCESS FROM NODE 108.00 TO NODE 108.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 10.36
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.302
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 1.39 0.74 0.100 52
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.74
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 1.39 SUBAREA RUNOFF(CFS) = 5.29
EFFECTIVE AREA(ACRES) = 9.82 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.69 AREA-AVERAGED Ap = 0.13
TOTAL AREA(ACRES) = 9.8 PEAK FLOW RATE(CFS) = 37.24

FLOW PROCESS FROM NODE 108.00 TO NODE 109.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1756.95 DOWNSTREAM(FEET) = 1755.75
FLOW LENGTH(FEET) = 240.00 MANNING'S N = 0.012
DEPTH OF FLOW IN 33.0 INCH PIPE IS 25.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.56
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 37.24
PIPE TRAVEL TIME(MIN.) = 0.53 Tc(MIN.) = 10.89
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 109.00 = 2068.00 FEET.

FLOW PROCESS FROM NODE 109.00 TO NODE 109.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 10.89
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.176
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 0.50 0.74 0.100 52
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.74
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA AREA(ACRES) = 0.50 SUBAREA RUNOFF(CFS) = 1.85
EFFECTIVE AREA(ACRES) = 10.32 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.70 AREA-AVERAGED Ap = 0.13
TOTAL AREA(ACRES) = 10.3 PEAK FLOW RATE(CFS) = 37.96

FLOW PROCESS FROM NODE 109.00 TO NODE 110.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1755.75 DOWNSTREAM(FEET) = 1755.69
FLOW LENGTH(FEET) = 11.00 MANNING'S N = 0.012
DEPTH OF FLOW IN 33.0 INCH PIPE IS 24.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 7.88
ESTIMATED PIPE DIAMETER(INCH) = 33.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 37.96
PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 10.91
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 110.00 = 2079.00 FEET.

FLOW PROCESS FROM NODE 110.00 TO NODE 110.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 10.91
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.170
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	0.65	0.74	0.100	52
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.74					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100					
SUBAREA AREA(ACRES) =		0.65	SUBAREA RUNOFF(CFS) =		2.40
EFFECTIVE AREA(ACRES) =		10.97	AREA-AVERAGED Fm(INCH/HR) =		0.09
AREA-AVERAGED Fp(INCH/HR) =		0.70	AREA-AVERAGED Ap =		0.13
TOTAL AREA(ACRES) =		11.0	PEAK FLOW RATE(CFS) =		40.31

FLOW PROCESS FROM NODE 110.00 TO NODE 111.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<

=====

ELEVATION DATA: UPSTREAM(FEET) = 1755.69 DOWNSTREAM(FEET) = 1748.22
FLOW LENGTH(FEET) = 40.00 MANNING'S N = 0.012
DEPTH OF FLOW IN 18.0 INCH PIPE IS 12.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 30.39
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 40.31
PIPE TRAVEL TIME(MIN.) = 0.02 Tc(MIN.) = 10.94
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 111.00 = 2119.00 FEET.

FLOW PROCESS FROM NODE 111.00 TO NODE 111.00 IS CODE = 81

>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

=====

MAINLINE Tc(MIN.) = 10.94
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.165
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	A	0.31	0.74	0.100	52
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.74					
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100					
SUBAREA AREA(ACRES) =		0.31	SUBAREA RUNOFF(CFS) =		1.14
EFFECTIVE AREA(ACRES) =		11.28	AREA-AVERAGED Fm(INCH/HR) =		0.09
AREA-AVERAGED Fp(INCH/HR) =		0.70	AREA-AVERAGED Ap =		0.12
TOTAL AREA(ACRES) =		11.3	PEAK FLOW RATE(CFS) =		41.40

=====

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 11.3 TC(MIN.) = 10.94
EFFECTIVE AREA(ACRES) = 11.28 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.70 AREA-AVERAGED Ap = 0.125
PEAK FLOW RATE(CFS) = 41.40

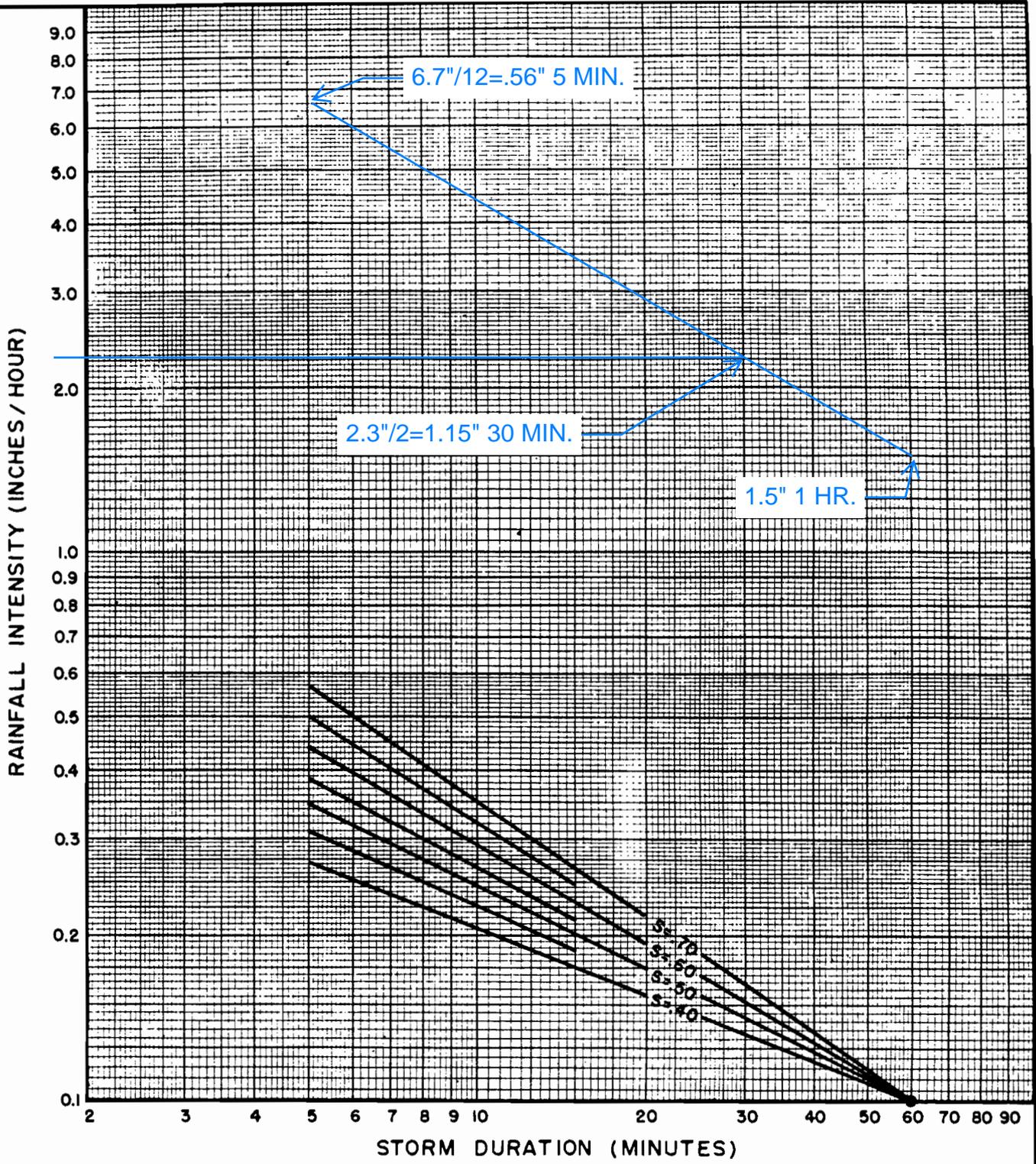
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END OF RATIONAL METHOD ANALYSIS

▲

APPENDIX C

DETENTION CALCULATIONS



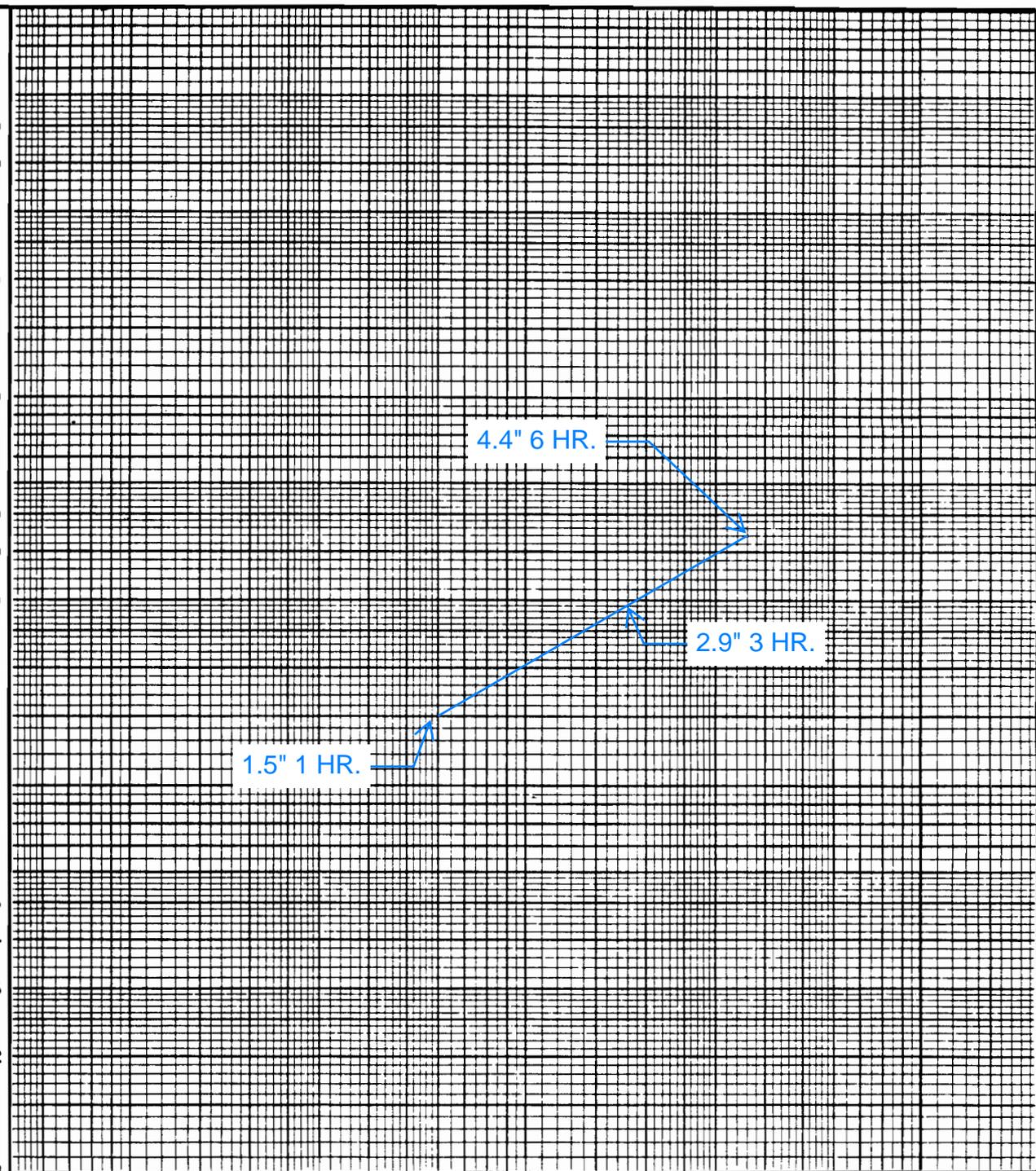
DESIGN STORM FREQUENCY = 100 YEARS
 ONE HOUR POINT RAINFALL = 1.5 INCHES
 LOG-LOG SLOPE = 0.6
 PROJECT LOCATION = SIERRA AVENUE

SAN BERNARDINO COUNTY
 HYDROLOGY MANUAL

**INTENSITY - DURATION
 CURVES
 CALCULATION SHEET**

POINT RAINFALL - INCHES

50.0
40.0
30.0
20.0
10.0
5.0
4.0
3.0
2.0
1.0
0.5
0.4
0.3
0.2
0.1



5 10 20 30 40 50 100 200 300 400 500 1000

STORM DURATION - MINUTES

PROJECT LOCATION SIERRA AVENUE

NOTES TEI JOB NUMBER 3971

SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

AREA - AVERAGED
MASS RAINFALL
PLOTTING SHEET

115

SIERRA INDUSTRIAL DEVELOPMENT
PONDING AT SOUTHERLY TRUCK YARD

Elevation	Depth (feet)	Area (sq. ft.)	Volume (c.f.)	Σ Volume (c.f.)	Σ Volume (ac-ft)	Discharge (c.f.s.)
1765.61	0.00	0	579	579	0.01	4.20
1765.80	0.19	6097	2958	3,537	0.08	4.50
1766.00	0.39	23482	6262	9,799	0.22	4.80
1766.20	0.59	39140	9396	19,195	0.44	5.10
1766.40	0.79	54821	12632	31,827	0.73	5.40
1766.60	0.99	71496	15767	47,594	1.09	5.60
1766.80	1.19	86170	17354	64,948	1.49	5.90
1767.00	1.39	87371				

 NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
 AND LOW LOSS FRACTION ESTIMATIONS
 =====

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Analysis prepared by:

THIENES ENGINEERING, INC.
 14349 FIRESTONE BLVD
 LA MIRIADA, CA 90638
 714-521-4811

Problem Descriptions:
 TEI JOB NUMBER 3971
 PONDING AT SOUTHERLY TRUCK YARD
 100-YEAR STORM EVENT

 *** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
 AND LOW LOSS FRACTION ESTIMATIONS FOR AMC III:

TOTAL 24-HOUR DURATION RAINFALL DEPTH = 10.20 (inches)

SOIL-COVER TYPE	AREA (Acres)	PERCENT OF PERVIOUS AREA	SCS CURVE NUMBER	LOSS RATE Fp (in./hr.)	YIELD
1	9.82	10.00	32. (AMC II)	0.742	0.918

TOTAL AREA (Acres) = 9.82

AREA-AVERAGED LOSS RATE, \bar{F}_m (in./hr.) = 0.074

AREA-AVERAGED LOW LOSS FRACTION, \bar{Y} = 0.082

Problem Descriptions:
 TEI JOB NUMBER 3971
 PONDING AT SOUTHERLY TRUCK YARD
 100-YEAR STORM EVENT

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
 TOTAL CATCHMENT AREA (ACRES) = 9.82
 SOIL-LOSS RATE, F_m , (INCH/HR) = 0.074
 LOW LOSS FRACTION = 0.082
 TIME OF CONCENTRATION (MIN.) = 10.40
 SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
 USER SPECIFIED RAINFALL VALUES ARE USED
 RETURN FREQUENCY (YEARS) = 100
 5-MINUTE POINT RAINFALL VALUE (INCHES) = 0.56
 30-MINUTE POINT RAINFALL VALUE (INCHES) = 1.15
 1-HOUR POINT RAINFALL VALUE (INCHES) = 1.50
 3-HOUR POINT RAINFALL VALUE (INCHES) = 2.90
 6-HOUR POINT RAINFALL VALUE (INCHES) = 4.40
 24-HOUR POINT RAINFALL VALUE (INCHES) = 10.20

TOTAL CATCHMENT RUNOFF VOLUME (ACRE-FEET) = 6.90
 TOTAL CATCHMENT SOIL-LOSS VOLUME (ACRE-FEET) = 1.45

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	10.0	20.0	30.0	40.0
0.05	0.0000	0.00	Q	.	.	.	.
0.23	0.0150	2.10	. Q	.	.	.	.
0.40	0.0451	2.10	. Q	.	.	.	.

0.57	0.0753	2.12	. Q	.	.	.	.
0.75	0.1057	2.12	. Q	.	.	.	.
0.92	0.1361	2.13	. Q	.	.	.	.
1.09	0.1668	2.14	. Q	.	.	.	.
1.27	0.1975	2.15	. Q	.	.	.	.
1.44	0.2284	2.16	. Q	.	.	.	.
1.61	0.2595	2.17	. Q	.	.	.	.
1.79	0.2907	2.18	. Q	.	.	.	.
1.96	0.3220	2.19	. Q	.	.	.	.
2.13	0.3535	2.20	. Q	.	.	.	.
2.31	0.3851	2.22	. Q	.	.	.	.
2.48	0.4169	2.22	. Q	.	.	.	.
2.65	0.4489	2.24	. Q	.	.	.	.
2.83	0.4810	2.25	. Q	.	.	.	.
3.00	0.5133	2.26	. Q	.	.	.	.
3.17	0.5457	2.27	. Q	.	.	.	.
3.35	0.5784	2.29	. Q	.	.	.	.
3.52	0.6111	2.29	. Q	.	.	.	.
3.69	0.6441	2.31	. Q	.	.	.	.
3.87	0.6773	2.32	. Q	.	.	.	.
4.04	0.7106	2.34	. Q	.	.	.	.
4.21	0.7442	2.35	. Q	.	.	.	.
4.39	0.7779	2.36	. Q	.	.	.	.
4.56	0.8118	2.37	. Q	.	.	.	.
4.73	0.8459	2.39	. Q	.	.	.	.
4.91	0.8802	2.40	. Q	.	.	.	.
5.08	0.9148	2.42	. Q	.	.	.	.
5.25	0.9495	2.43	. Q	.	.	.	.
5.43	0.9845	2.45	. Q	.	.	.	.
5.60	1.0197	2.46	. Q	.	.	.	.
5.77	1.0551	2.48	. Q	.	.	.	.
5.95	1.0907	2.49	. Q	.	.	.	.
6.12	1.1266	2.52	. Q	.	.	.	.
6.29	1.1627	2.53	. Q	.	.	.	.
6.47	1.1991	2.55	. Q	.	.	.	.
6.64	1.2358	2.56	. Q	.	.	.	.
6.81	1.2727	2.59	. Q	.	.	.	.
6.99	1.3099	2.60	. Q	.	.	.	.
7.16	1.3473	2.63	. Q	.	.	.	.
7.33	1.3851	2.64	. Q	.	.	.	.
7.51	1.4231	2.67	. Q	.	.	.	.
7.68	1.4614	2.68	. Q	.	.	.	.
7.85	1.5001	2.71	. Q	.	.	.	.
8.03	1.5390	2.73	. Q	.	.	.	.
8.20	1.5783	2.76	. Q	.	.	.	.
8.37	1.6180	2.77	. Q	.	.	.	.
8.55	1.6579	2.81	. Q	.	.	.	.
8.72	1.6983	2.82	. Q	.	.	.	.
8.89	1.7390	2.86	. Q	.	.	.	.
9.07	1.7801	2.88	. Q	.	.	.	.
9.24	1.8216	2.92	. Q	.	.	.	.
9.41	1.8635	2.94	. Q	.	.	.	.
9.59	1.9058	2.98	. Q	.	.	.	.
9.76	1.9486	3.00	. Q	.	.	.	.
9.93	1.9919	3.04	. Q	.	.	.	.
10.11	2.0356	3.06	. Q	.	.	.	.
10.28	2.0798	3.11	. Q	.	.	.	.
10.45	2.1245	3.13	. Q	.	.	.	.
10.63	2.1698	3.19	. Q	.	.	.	.
10.80	2.2156	3.21	. Q	.	.	.	.
10.97	2.2621	3.27	. Q	.	.	.	.
11.15	2.3091	3.30	. Q	.	.	.	.
11.32	2.3568	3.36	. Q	.	.	.	.
11.49	2.4052	3.39	. Q	.	.	.	.
11.67	2.4542	3.46	. Q	.	.	.	.
11.84	2.5041	3.50	. Q	.	.	.	.
12.01	2.5547	3.57	. Q	.	.	.	.
12.19	2.6060	3.59	. Q	.	.	.	.
12.36	2.6581	3.67	. Q	.	.	.	.
12.53	2.7110	3.72	. Q	.	.	.	.
12.71	2.7649	3.81	. Q	.	.	.	.
12.88	2.8199	3.87	. Q	.	.	.	.
13.05	2.8761	3.98	. Q	.	.	.	.

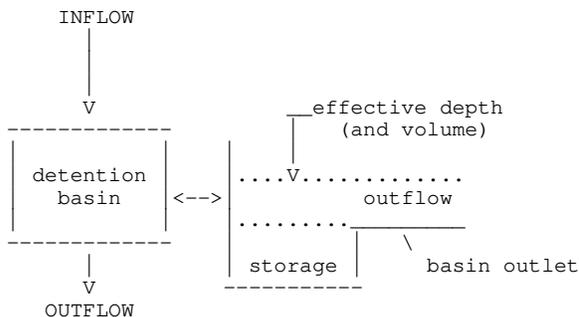
Percentage	Value
0%	1445.6
10%	312.0
20%	31.2
30%	20.8
40%	10.4
50%	10.4
60%	10.4
70%	10.4
80%	10.4
90%	10.4

Problem Descriptions:
 TEI JOB NUMBER 3971
 PONDING AT SOUTHERLY TRUCK YARD
 100-YEAR STORM EVENT

=====

FLOW-THROUGH DETENTION BASIN MODEL

SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:
 CONSTANT HYDROGRAPH TIME UNIT (MINUTES) = 10.400
 DEAD STORAGE (AF) = 0.00
 SPECIFIED DEAD STORAGE (AF) FILLED = 0.00
 ASSUMED INITIAL DEPTH (FEET) IN STORAGE BASIN = 0.00



DEPTH-VS.-STORAGE AND DEPTH-VS.-DISCHARGE INFORMATION:

TOTAL NUMBER OF BASIN DEPTH INFORMATION ENTRIES = 8

* BASIN-DEPTH (FEET)	STORAGE (ACRE-FEET)	OUTFLOW (CFS)	** BASIN-DEPTH (FEET)	STORAGE (ACRE-FEET)	OUTFLOW (CFS)
* 0.000	0.000	0.000**	0.190	0.010	4.200*
* 0.390	0.080	4.500**	0.590	0.220	4.800*
* 0.790	0.440	5.100**	0.990	0.730	5.400*
* 1.190	1.090	5.600**	1.390	1.490	5.900*

BASIN STORAGE, OUTFLOW AND DEPTH ROUTING VALUES:

INTERVAL NUMBER	DEPTH (FEET)	{S-O*DT/2} (ACRE-FEET)	{S+O*DT/2} (ACRE-FEET)
1	0.00	0.00000	0.00000
2	0.19	-0.02008	0.04008
3	0.39	0.04777	0.11223
4	0.59	0.18562	0.25438
5	0.79	0.40347	0.47653
6	0.99	0.69132	0.76868
7	1.19	1.04989	1.13011
8	1.39	1.44774	1.53226

WHERE S=STORAGE (AF) ; O=OUTFLOW (AF/MIN.) ; DT=UNIT INTERVAL (MIN.)

DETENTION BASIN ROUTING RESULTS:

NOTE: COMPUTED BASIN DEPTH, OUTFLOW, AND STORAGE QUANTITIES OCCUR AT THE GIVEN TIME. BASIN INFLOW VALUES REPRESENT THE AVERAGE INFLOW DURING THE RECENT HYDROGRAPH UNIT INTERVAL.

TIME DEAD-STORAGE INFLOW EFFECTIVE OUTFLOW EFFECTIVE

(HRS)	FILLED (AF)	(CFS)	DEPTH (FT)	(CFS)	VOLUME (AF)
0.053	0.000	0.00	0.00	0.00	0.000
0.227	0.000	2.10	0.14	1.57	0.007
0.400	0.000	2.10	0.14	3.15	0.008
0.573	0.000	2.12	0.14	3.17	0.008
0.747	0.000	2.12	0.14	3.18	0.008
0.920	0.000	2.13	0.14	3.19	0.008
1.093	0.000	2.14	0.15	3.21	0.008
1.267	0.000	2.15	0.15	3.22	0.008
1.440	0.000	2.16	0.15	3.24	0.008
1.613	0.000	2.17	0.15	3.25	0.008
1.787	0.000	2.18	0.15	3.27	0.008
1.960	0.000	2.19	0.15	3.28	0.008
2.133	0.000	2.20	0.15	3.30	0.008
2.307	0.000	2.22	0.15	3.32	0.008
2.480	0.000	2.22	0.15	3.33	0.008
2.653	0.000	2.24	0.15	3.35	0.008
2.827	0.000	2.25	0.15	3.37	0.008
3.000	0.000	2.26	0.15	3.38	0.008
3.173	0.000	2.27	0.15	3.40	0.008
3.347	0.000	2.29	0.16	3.42	0.008
3.520	0.000	2.29	0.16	3.44	0.008
3.693	0.000	2.31	0.16	3.46	0.008
3.867	0.000	2.32	0.16	3.47	0.008
4.040	0.000	2.34	0.16	3.49	0.008
4.213	0.000	2.35	0.16	3.51	0.008
4.387	0.000	2.36	0.16	3.53	0.008
4.560	0.000	2.37	0.16	3.55	0.008
4.733	0.000	2.39	0.16	3.58	0.009
4.907	0.000	2.40	0.16	3.60	0.009
5.080	0.000	2.42	0.16	3.62	0.009
5.253	0.000	2.43	0.17	3.64	0.009
5.427	0.000	2.45	0.17	3.66	0.009
5.600	0.000	2.46	0.17	3.69	0.009
5.773	0.000	2.48	0.17	3.71	0.009
5.947	0.000	2.49	0.17	3.74	0.009
6.120	0.000	2.52	0.17	3.76	0.009
6.293	0.000	2.53	0.17	3.79	0.009
6.467	0.000	2.55	0.17	3.81	0.009
6.640	0.000	2.56	0.17	3.84	0.009
6.813	0.000	2.59	0.18	3.87	0.009
6.987	0.000	2.60	0.18	3.90	0.009
7.160	0.000	2.63	0.18	3.92	0.009
7.333	0.000	2.64	0.18	3.95	0.009
7.507	0.000	2.67	0.18	3.99	0.010
7.680	0.000	2.68	0.18	4.02	0.010
7.853	0.000	2.71	0.18	4.05	0.010
8.027	0.000	2.73	0.19	4.08	0.010
8.200	0.000	2.76	0.19	4.12	0.010
8.373	0.000	2.77	0.19	4.15	0.010
8.547	0.000	2.81	0.19	4.18	0.010
8.720	0.000	2.82	0.19	4.20	0.010
8.893	0.000	2.86	0.19	4.20	0.011
9.067	0.000	2.88	0.19	4.20	0.011
9.240	0.000	2.92	0.19	4.21	0.012
9.413	0.000	2.94	0.20	4.21	0.012
9.587	0.000	2.98	0.20	4.21	0.012
9.760	0.000	3.00	0.20	4.21	0.013
9.933	0.000	3.04	0.20	4.21	0.013
10.107	0.000	3.06	0.20	4.22	0.014
10.280	0.000	3.11	0.20	4.22	0.014
10.453	0.000	3.13	0.20	4.22	0.015
10.627	0.000	3.19	0.21	4.22	0.015
10.800	0.000	3.21	0.21	4.22	0.016
10.973	0.000	3.27	0.21	4.23	0.017
11.147	0.000	3.30	0.21	4.23	0.017
11.320	0.000	3.36	0.21	4.23	0.018
11.493	0.000	3.39	0.21	4.23	0.018
11.667	0.000	3.46	0.22	4.24	0.019
11.840	0.000	3.50	0.22	4.24	0.020
12.013	0.000	3.57	0.22	4.24	0.021
12.187	0.000	3.59	0.22	4.25	0.021

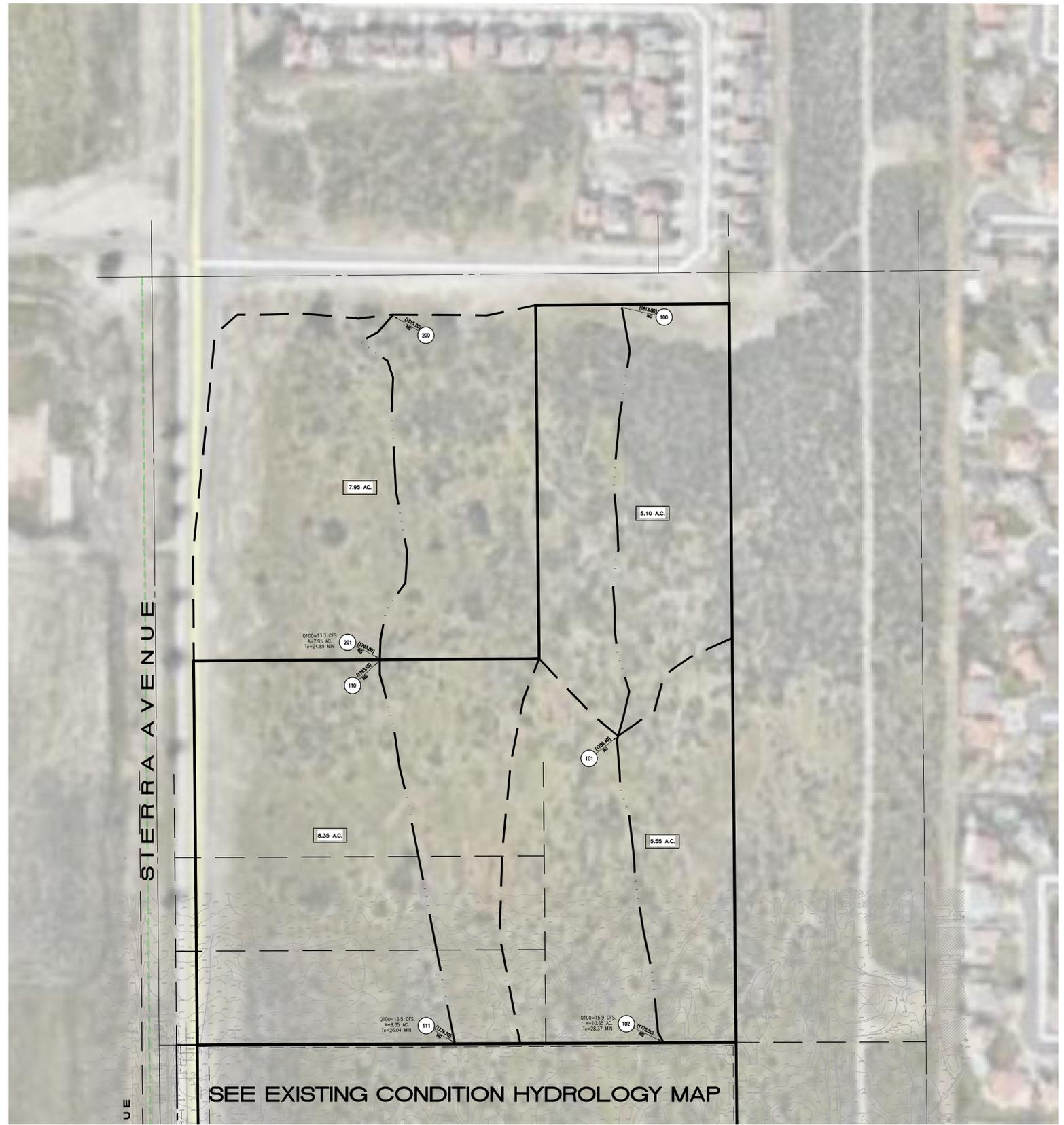
12.360	0.000	3.67	0.22	4.25	0.022
12.533	0.000	3.72	0.23	4.25	0.023
12.707	0.000	3.81	0.23	4.26	0.024
12.880	0.000	3.87	0.23	4.26	0.025
13.053	0.000	3.98	0.24	4.27	0.026
13.227	0.000	4.04	0.24	4.27	0.027
13.400	0.000	4.18	0.24	4.28	0.029
13.573	0.000	4.25	0.25	4.28	0.030
13.747	0.000	4.41	0.25	4.29	0.032
13.920	0.000	4.50	0.26	4.30	0.035
14.093	0.000	4.69	0.28	4.32	0.041
14.267	0.000	4.80	0.30	4.34	0.047
14.440	0.000	5.05	0.32	4.38	0.057
14.613	0.000	5.20	0.36	4.42	0.068
14.787	0.000	5.54	0.39	4.48	0.083
14.960	0.000	5.75	0.42	4.53	0.101
15.133	0.000	6.26	0.45	4.57	0.125
15.307	0.000	6.58	0.49	4.63	0.153
15.480	0.000	5.42	0.51	4.67	0.163
15.653	0.000	5.45	0.52	4.69	0.174
15.827	0.000	8.25	0.59	4.75	0.224
16.000	0.000	11.64	0.68	4.87	0.322
16.173	0.000	37.66	1.02	5.18	0.787
16.347	0.000	6.37	1.03	5.44	0.800
16.520	0.000	6.97	1.04	5.45	0.822
16.693	0.000	5.98	1.05	5.45	0.830
16.867	0.000	5.36	1.04	5.45	0.828
17.040	0.000	4.92	1.04	5.45	0.821
17.213	0.000	4.59	1.03	5.45	0.808
17.387	0.000	4.33	1.02	5.44	0.792
17.560	0.000	4.11	1.01	5.43	0.773
17.733	0.000	3.92	1.00	5.42	0.752
17.907	0.000	3.76	0.99	5.41	0.729
18.080	0.000	3.63	0.97	5.39	0.703
18.253	0.000	3.53	0.95	5.36	0.677
18.427	0.000	3.43	0.93	5.33	0.650
18.600	0.000	3.33	0.92	5.30	0.622
18.773	0.000	3.24	0.90	5.27	0.592
18.947	0.000	3.16	0.87	5.24	0.563
19.120	0.000	3.09	0.85	5.21	0.532
19.293	0.000	3.02	0.83	5.18	0.501
19.467	0.000	2.96	0.81	5.15	0.470
19.640	0.000	2.90	0.79	5.11	0.438
19.813	0.000	2.84	0.76	5.08	0.406
19.987	0.000	2.79	0.73	5.03	0.374
20.160	0.000	2.74	0.70	4.99	0.342
20.333	0.000	2.70	0.67	4.94	0.310
20.507	0.000	2.65	0.64	4.90	0.277
20.680	0.000	2.61	0.61	4.86	0.245
20.853	0.000	2.58	0.58	4.81	0.213
21.027	0.000	2.54	0.54	4.75	0.182
21.200	0.000	2.51	0.49	4.68	0.150
21.373	0.000	2.47	0.45	4.62	0.120
21.547	0.000	2.44	0.40	4.55	0.089
21.720	0.000	2.41	0.33	4.47	0.060
21.893	0.000	2.38	0.25	4.35	0.032
22.067	0.000	2.35	0.16	3.97	0.009
22.240	0.000	2.33	0.16	3.57	0.008
22.413	0.000	2.30	0.16	3.47	0.008
22.587	0.000	2.28	0.15	3.44	0.008
22.760	0.000	2.25	0.15	3.40	0.008
22.933	0.000	2.23	0.15	3.37	0.008
23.107	0.000	2.21	0.15	3.33	0.008
23.280	0.000	2.19	0.15	3.30	0.008
23.453	0.000	2.17	0.15	3.27	0.008
23.627	0.000	2.15	0.15	3.24	0.008
23.800	0.000	2.13	0.14	3.21	0.008
23.973	0.000	2.11	0.14	3.18	0.008
24.147	0.000	2.09	0.14	3.15	0.007
24.320	0.000	0.00	0.00	1.57	0.000
24.493	0.000	0.00	0.00	0.00	0.000

PEAK DISCHARGE



APPENDIX D

HYDROLOGY MAPS

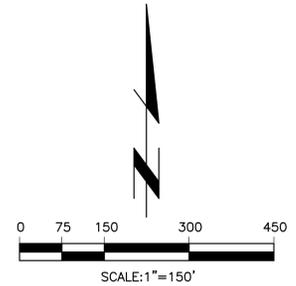


SIERRA AVENUE

U E

SEE EXISTING CONDITION HYDROLOGY MAP

LEGEND	
	PROJECT BOUNDARY
	SUBAREA BOUNDARY
	FLOW PATH
	SUBAREA AREA
	NODE NUMBER



Last Update: 3/1/22
O:\3900-3999\3971\3971HYD-EX-OFFSITE.dwg

CITY OF FONTANA
PUBLIC WORKS DEPARTMENT

OFF-SITE HYDROLOGY MAP
CASA GRANDE DRIVE AT
SIERRA AVENUE

Designed by _____ Date _____ Checked by _____ Date _____ Designed by _____ Date _____ Checked by _____ Date _____	Approved by _____ Date _____ Public Works Director _____ R.C.E. XXXXX
Sheet 1 of 1 Sheets	

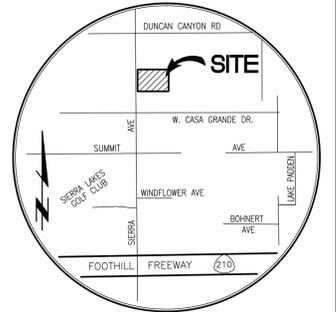
PREPARED FOR:

SHEA PROPERTIES
 130 VANTIS, SUITE 200
 ALISO VIEJO, CA 92656
 PHONE: (949) 389-7000

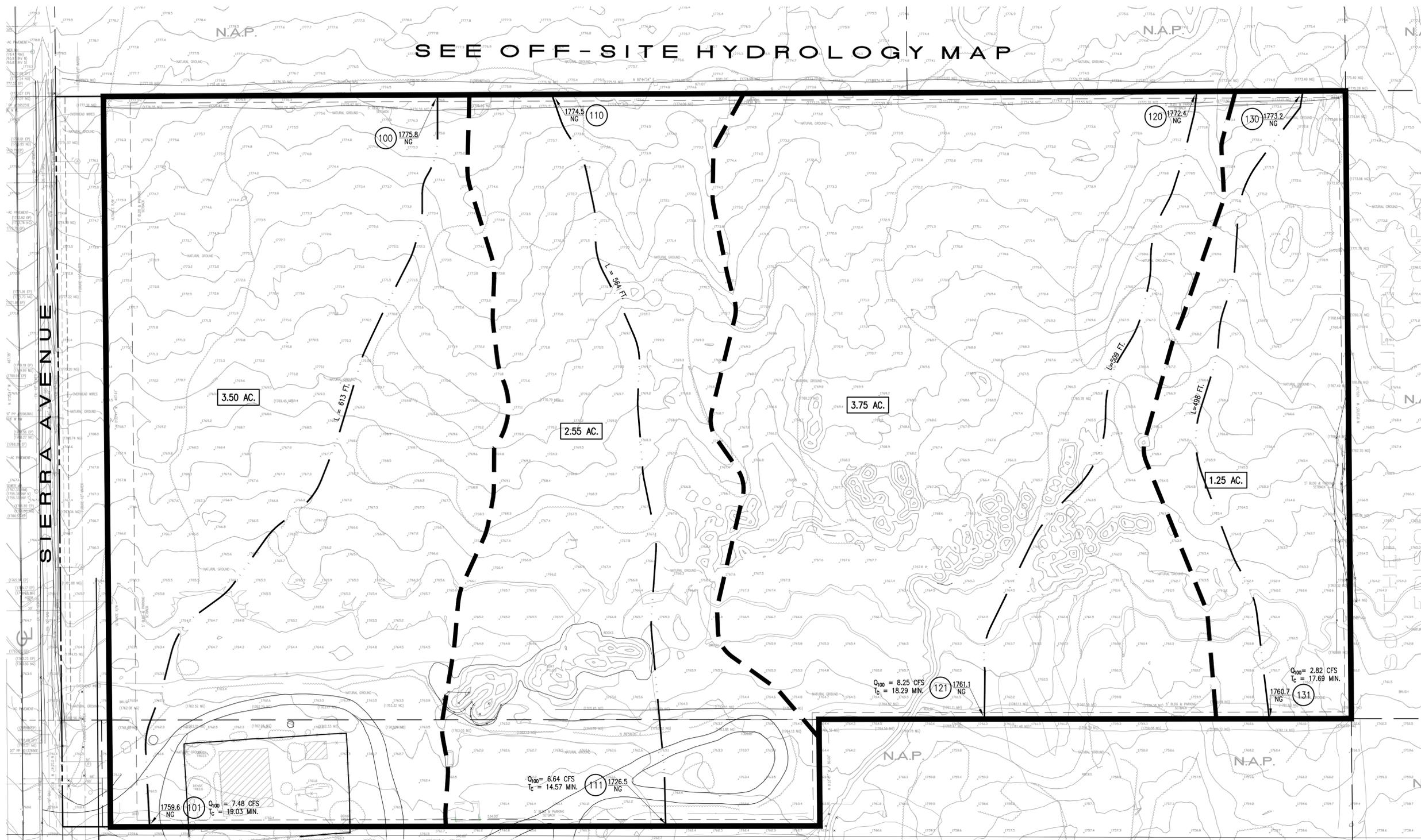


3971/1 OF 1 SHEET

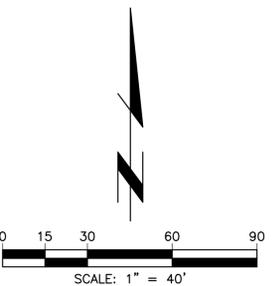
SEE OFF-SITE HYDROLOGY MAP



VICINITY MAP
N.T.S.



LEGEND	
	PROJECT BOUNDARY
	SUBAREA BOUNDARY
	FLOW PATH
	SUBAREA AREA
	NODE NUMBER



PREPARED FOR:

130 VANTIS, SUITE 200
ALISO VIEJO, CA 92656
PHONE: (949) 389-7000



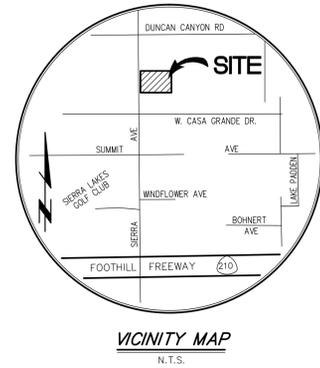
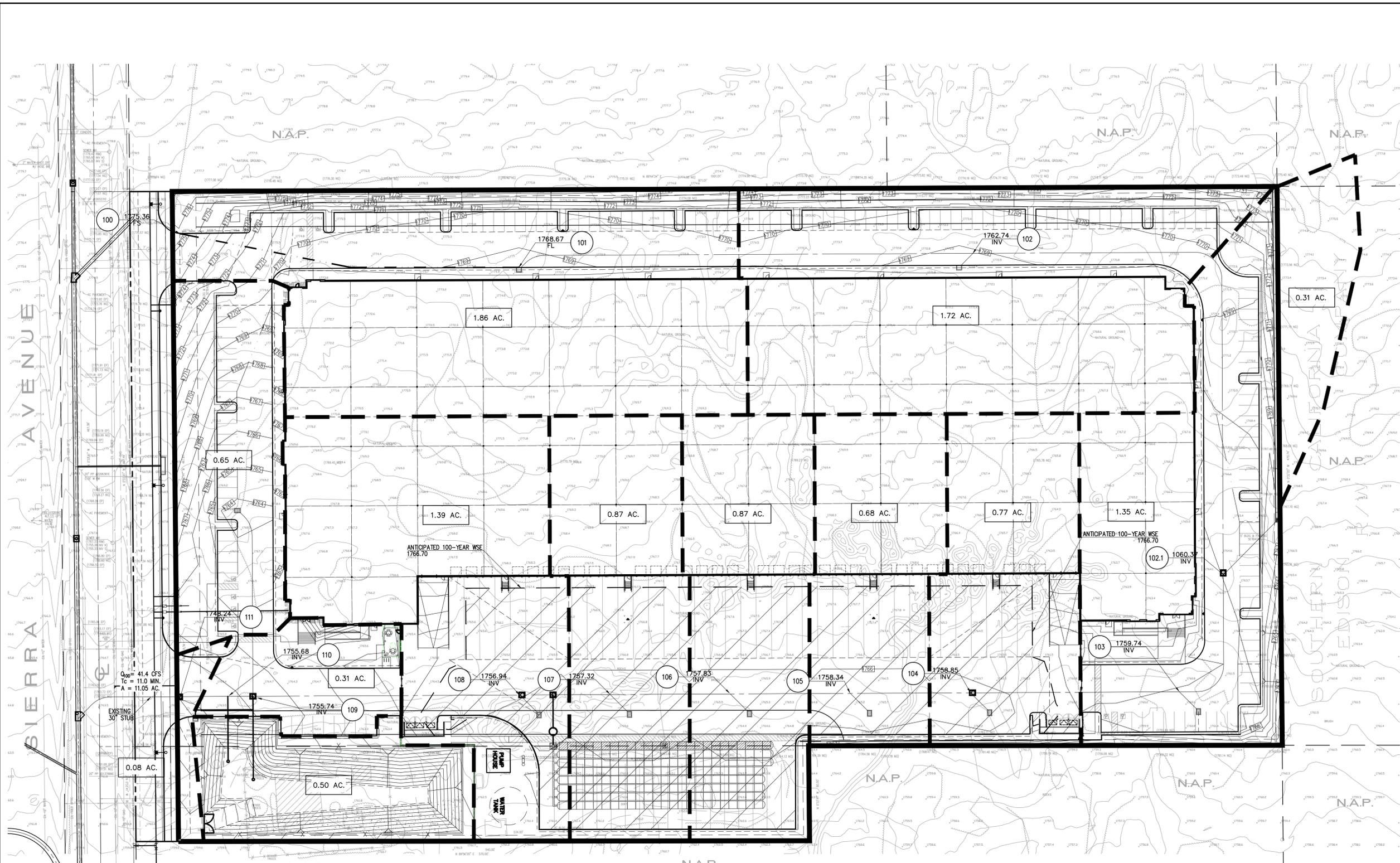
Last Update: 8/5/21
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CITY OF FONTANA
PUBLIC WORKS DEPARTMENT

EXISTING HYDROLOGY MAP
CASA GRANDE DRIVE AT
SIERRA AVENUE

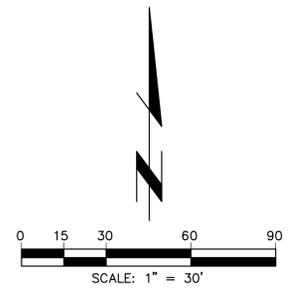
Designed by _____	Approved by _____	Date _____
Checked by _____	Public Works Director _____	R.C.E.
Designed by _____		
Date _____		
Checked by _____		
Date _____		

Sheet **1** of **1** Sheets



LEGEND	
	PROJECT BOUNDARY
	SUBAREA BOUNDARY
	FLOW PATH
	SUBAREA AREA
	NODE NUMBER
	FLOW DIRECTION
	PONDING LIMITS

$Q_{max} = 41.4 \text{ CFS}$
 $T_c = 11.0 \text{ MIN.}$
 $A = 11.05 \text{ AC.}$



PREPARED FOR:
 SHEA PROPERTIES
 130 VANTIS, SUITE 200
 ALISO VIEJO, CA 92656
 PHONE: (949) 389-7000



CITY OF FONTANA PUBLIC WORKS DEPARTMENT	
CONCEPTUAL HYDROLOGY MAP CASA GRANDE DRIVE AT SIERRA AVENUE	
Designed by _____ Date _____ Checked by _____ Date _____	Approved by _____ Date _____ Public Works Director R.C.E. XXXXXX
Designed by _____ Date _____ Checked by _____ Date _____	Sheet 1 of 1 Sheets

Last Update: 3/1/22
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3971/1 OF 1 SHEET