



Thienes Engineering, Inc.

CIVIL ENGINEERING LAND SURVEYING



PRELIMINARY HYDROLOGY CALCULATIONS

FOR

**SANTA ANA AVENUE INDUSTRIAL DEVELOPMENT
(BUILDING 3)**

**NEC OF SANTA ANA AVE. AND OLEANDER AVE.
FONTANA, CA**

PREPARED FOR

ACACIA REAL ESTATE GROUP, INC.

P.O. BOX 12665

NEWPORT BEACH, CA 92658

PHONE: (949) 640-9995

CONTACT: DAVID PITTMAN

David.pittman@acaciareg.com

APRIL 4, 2022

REVISED AUGUST 19, 2022

JOB NO. 3615

PREPARED BY

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

**PRELIMINARY HYDROLOGY
CALCULATIONS**

FOR

**SANTA ANA AVENUE INDUSTRIAL
DEVELOPMENT
(BUILDING 3)**

PREPARED UNDER
THE SUPERVISION OF



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

INTRODUCTION

A: PROJECT LOCATION

The project site is located north of Santa Ana Avenue between Oleander Avenue and Cypress Avenue in the City of Fontana. See following page for vicinity map.

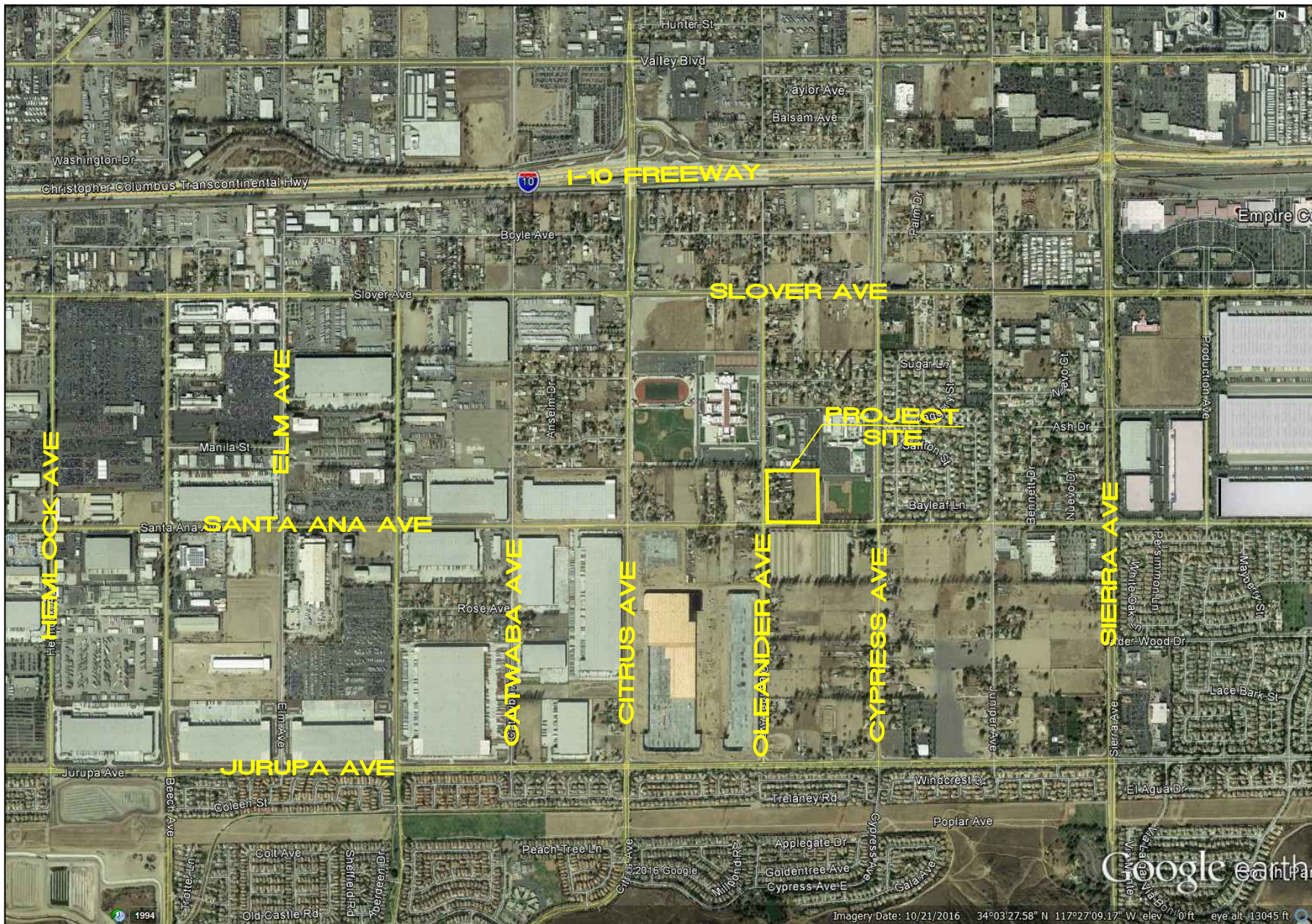
B: STUDY PURPOSE

The purpose of this study is to determine the existing and proposed condition 100-year peak flow rate from the site that drains to an existing storm drain system at Santa Ana Avenue.

C: PROJECT STAFF:

Thienes Engineering staff involved in this study include:

Reinhard Stenzel, PE
Eduardo Toledanes



"VICINITY MAP"

FOR

**SANTA ANA AVENUE INDUSTRIAL DEVELOPMENT
(BUILDING 3)**

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

DISCUSSION

The proposed project site encompasses a total area of approximately 8.73 acres. There will be one proposed warehouse type building with a floor area of approximately 184,895 square feet. A truck yard will be located on the easterly side of the building. Proposed driveways will be located at the northwest and the southeasterly corner of the site adjacent to the streets. Vehicle parking will be provided on the westerly side and the southeasterly corner of the site. The remaining areas will be landscaped adjacent to Oleander Avenue and Santa Ana Avenue.

Master Plan of Drainage

Per City of Fontana's Public Storm Drain WID# 8 36C374407 DR 13-018 dwg. no. 5709 prepared by Thienes Engineering, Inc. dated May 2018, the project site is tabled to an existing 90" R.C.P. public storm drain Line "B" as commercial land use in Santa Ana Avenue that connects to an existing 96" R.C.P. storm drain system at Oleander Avenue downstream.

Please see Appendix "A" for portions of the City's Master Plan of Drainage and downstream existing storm drain plans.

Existing Condition

The site is currently a residential area where runoff from the site drains southerly towards Santa Ana Avenue. Flow appears to discharge to the street via the existing driveways. Runoff from the site drains southerly to an existing 90" R.C.P. in Santa Ana Avenue that connects to an existing 96" R.C.P. storm drain system in Oleander Avenue. The 100-year peak flow rate tributary to the project site at existing condition is approximately 24.8 cfs.

See Appendix "B" for existing condition hydrology calculations and Appendix "C" for existing condition hydrology map.

Proposed Condition

Flows from Building 3 will maintain the drainage pattern at existing condition. Runoff from the easterly portion of Building 3 (node 300-312) will drain south via proposed storm drain system. The remaining westerly portion of Building 3 (node 310-312) will drain south and traverses east and connects to the new storm drain line downstream. The 100-year storm event from this area (node 312) is approximately 27.2 cfs. The remaining landscaped areas adjacent Oleander Avenue and Santa Ana Avenue will drain to an existing curb opening catch basin at the southwest corner of Building 3. The 100-year storm event at

this location (node 321) is approximately 1.0 cfs. The total 100-year peak flow rate tributary to project site (Building 3) at proposed condition is approximately 28.2 cfs. (27.2 cfs + 1.0 cfs).

Water Quality

Runoff from Building 3 will drain to proposed grate inlet catch basins at the easterly truck yard and conveyed to proposed underground chambers via proposed onsite storm drain system. Here, initial runoff from the project site will drain to proposed CDS unit for water quality purposes and conveyed to underground chambers for infiltration. Runoff volume that exceeds water quality volume will be conveyed back to the main onsite storm drain line and ultimately discharged to an existing storm drain facilities downstream

Methodology

Hydrology calculations were computed using San Bernardino County rational method program (by AES software). WSPG was used for the hydraulic calculations. The soil type is "B" per San Bernardino County Hydrology Manual.

See Appendix "A" for reference material from the San Bernardino County Hydrology Manual

APPENDIX

DESCRIPTION

A

REFERENCE MATERIALS

B

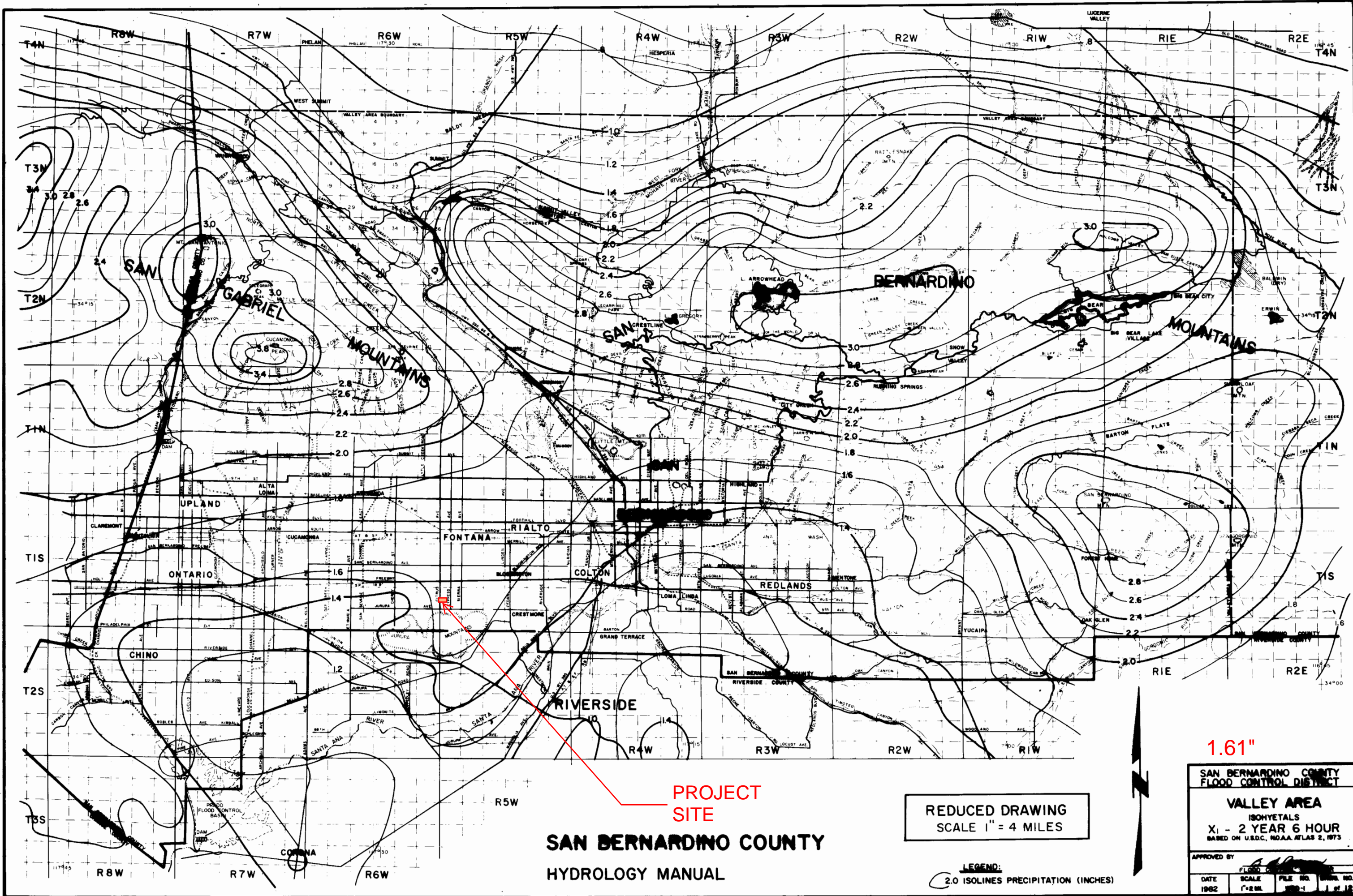
HYDROLOGY CALCULATIONS

C

HYDROLOGY MAP

APPENDIX A

REFERENCE MATERIALS



PROJECT SITE

SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

REDUCED DRAWING
SCALE 1" = 4 MILES

LEGEND:
2.0 ISOLINES PRECIPITATION (INCHES)

1.61"

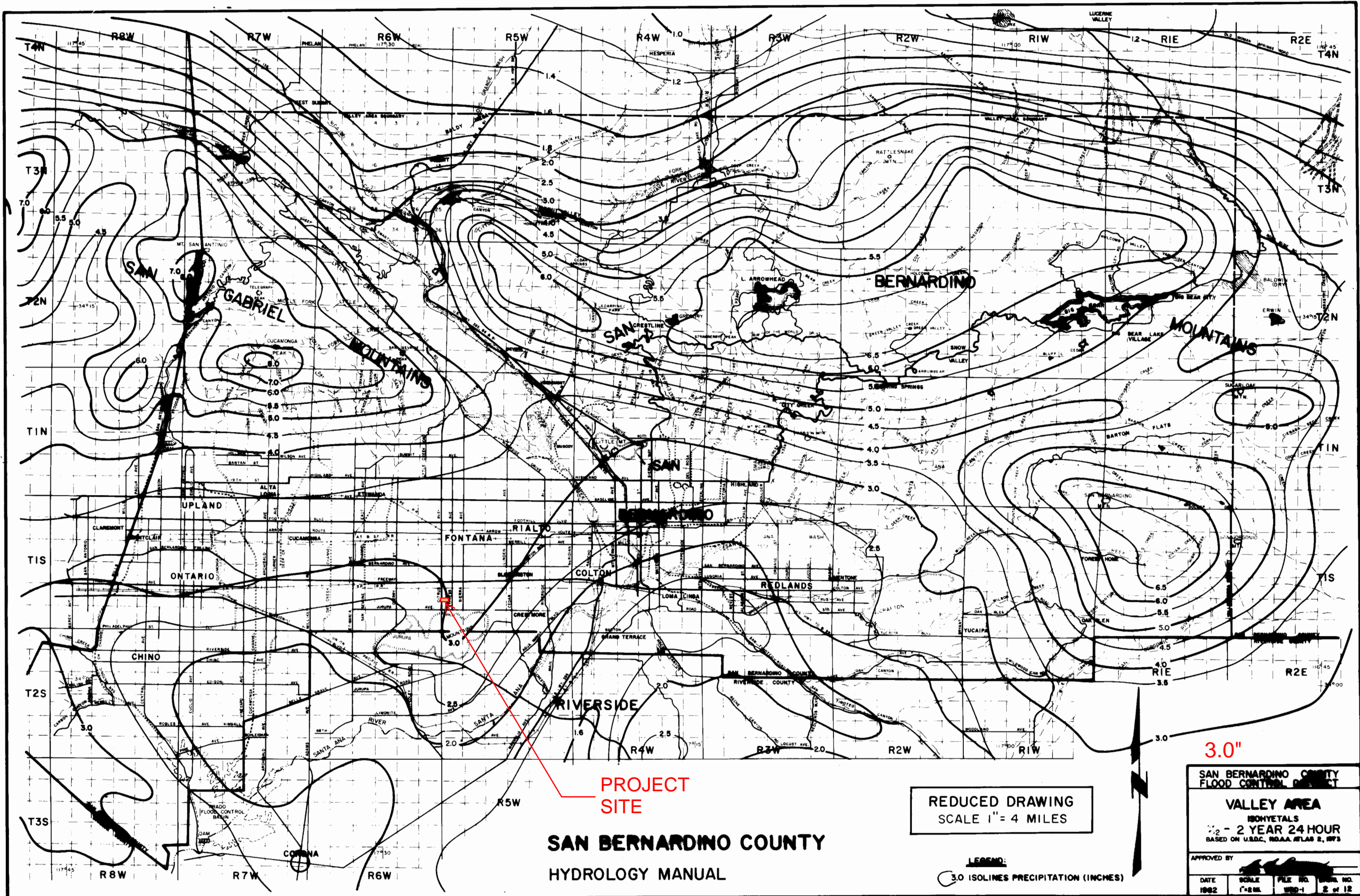
SAN BERNARDINO COUNTY
FLOOD CONTROL DISTRICT

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	VFD-1	1 of 12



PROJECT SITE

**SAN BERNARDINO COUNTY
HYDROLOGY MANUAL**

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

LEGEND:
3.0 ISOLINES PRECIPITATION (INCHES)

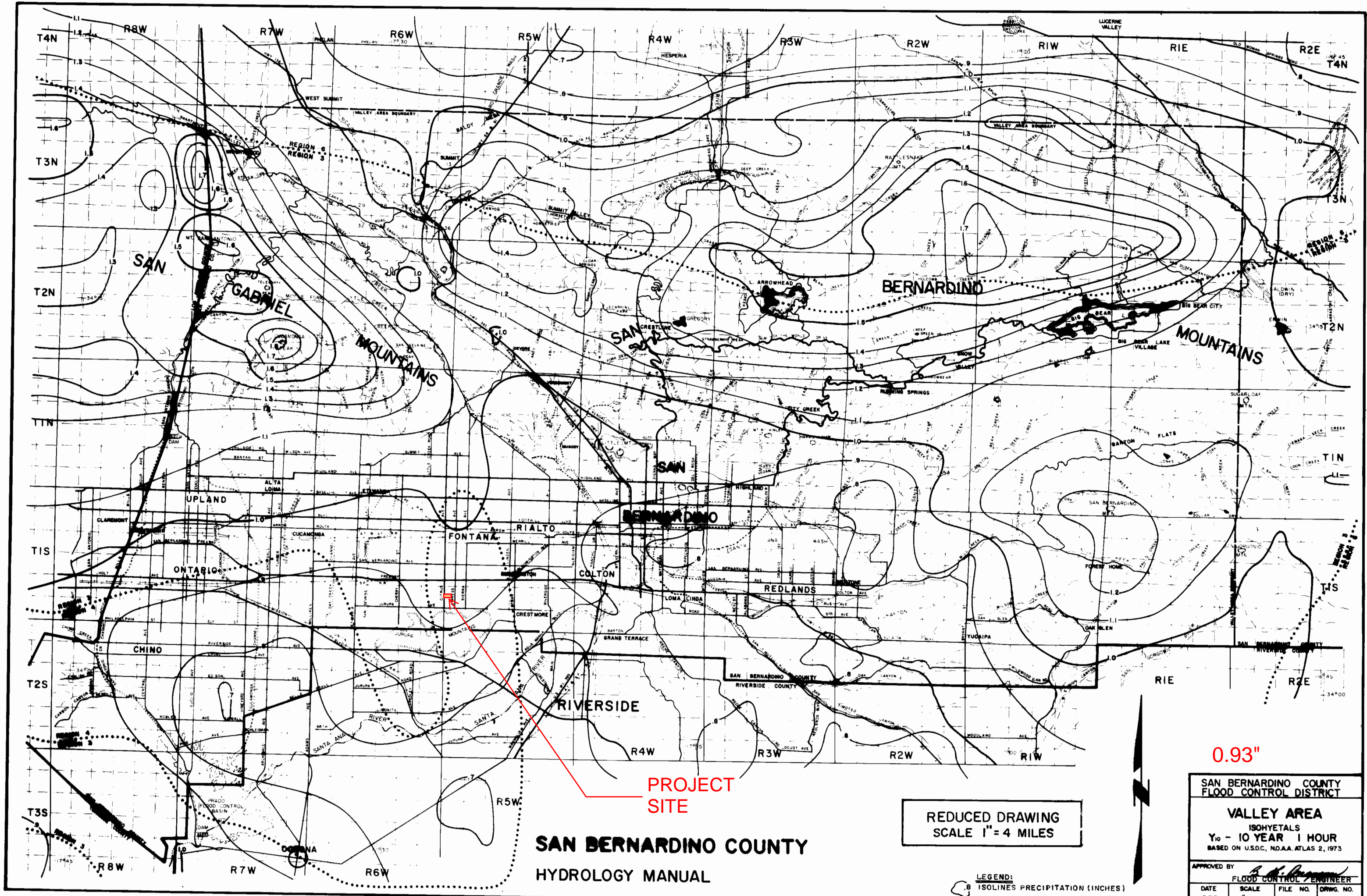
3.0"

**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.	DRAWING NO.
1982	1"=4M.	WB-1	2 of 12



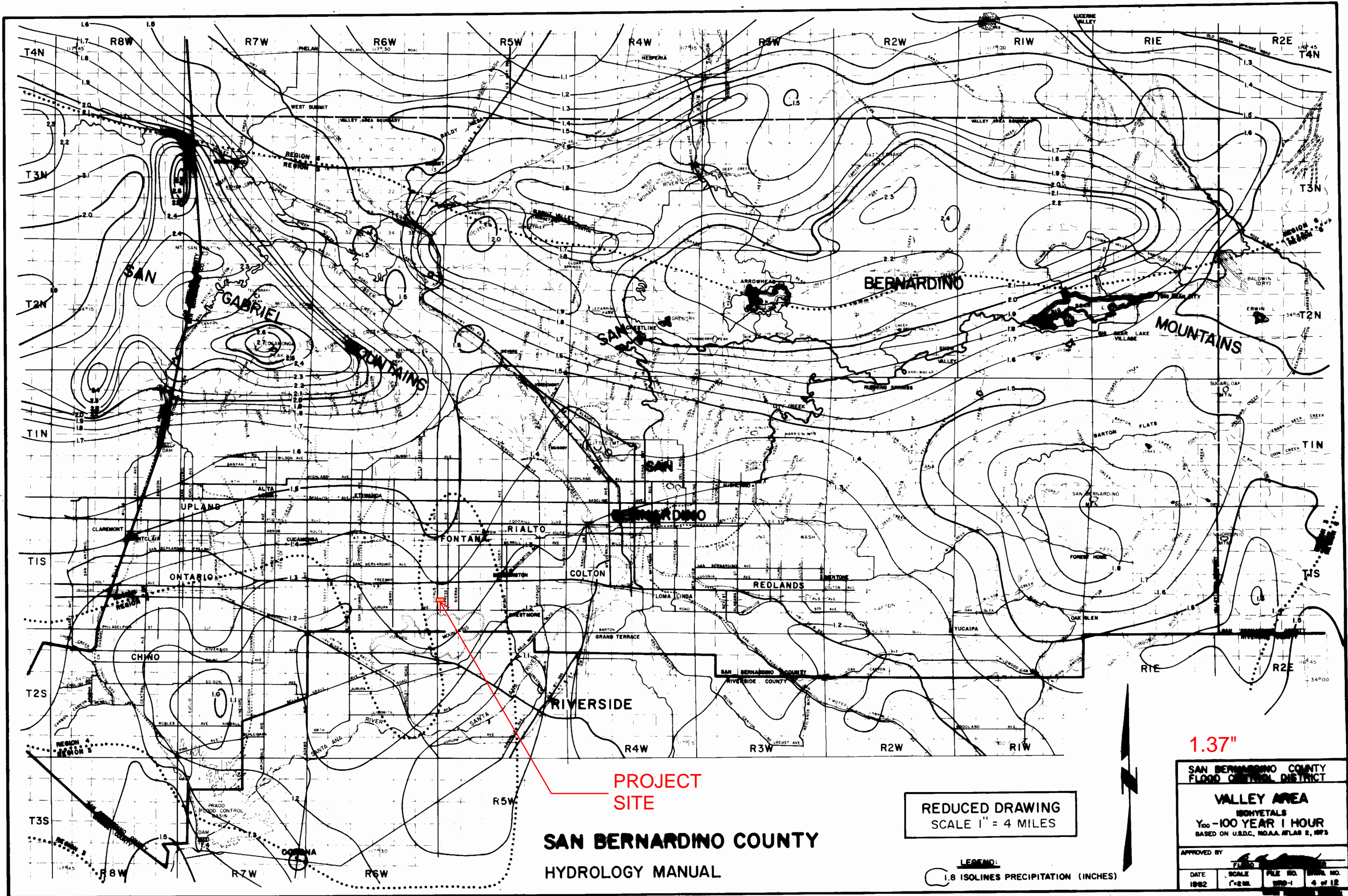
SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

REDUCED DRAWING
 SCALE 1" = 4 MILES

LEGEND:
 0.8 ISOLINES PRECIPITATION (INCHES)

0.93"

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	SCALE	FILE NO.	DRWG. NO.
1982	1"=2M.	WRD-1	3 of 12



**SAN BERNARDINO COUNTY
HYDROLOGY MANUAL**

REDUCED DRAWING
SCALE 1" = 4 MILES

LEGEND:
1.8 ISOLINES PRECIPITATION (INCHES)

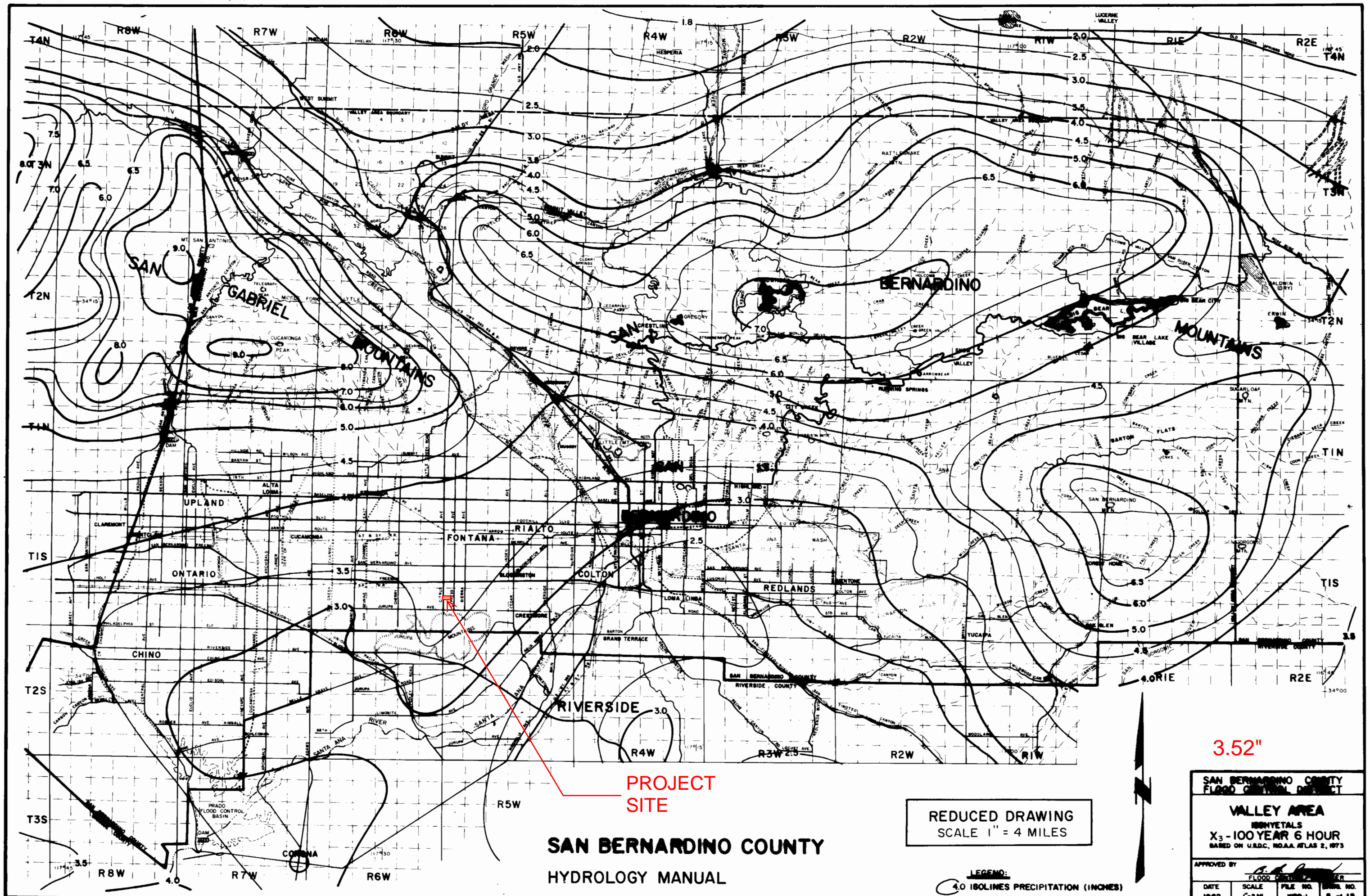
1.37"

**SAN BERNARDINO COUNTY
FLOOD CONTROL DISTRICT**

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

APPROVED BY _____

DATE	SCALE	FILE NO.	SHEET NO.
1982	1"=2 MI.	WB-1	4 of 12



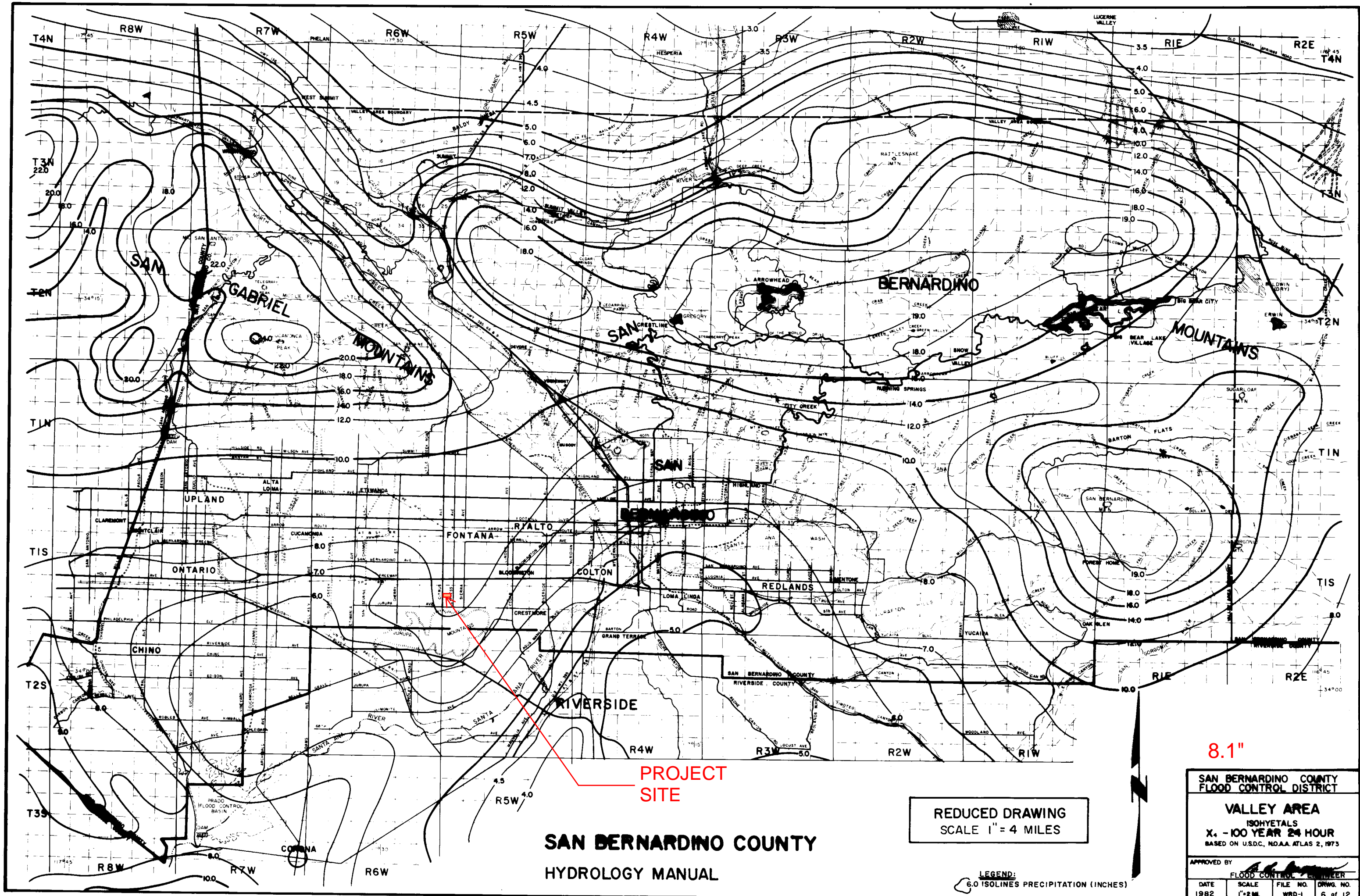
SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

REDUCED DRAWING
 SCALE 1" = 4 MILES

LEGEND:
 4.0 ISOLINES PRECIPITATION (INCHES)

3.52"

SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT			
VALLEY AREA ISOHYETALS X ₃ - 100 YEAR 6 HOUR BASED ON U.S.D.C. NOAA ATLAS 2, 1973			
APPROVED BY: <i>[Signature]</i>			
DATE	SCALE	FILE NO.	DRAW. NO.
1982	1" = 2 M.	WB-1	5 of 12



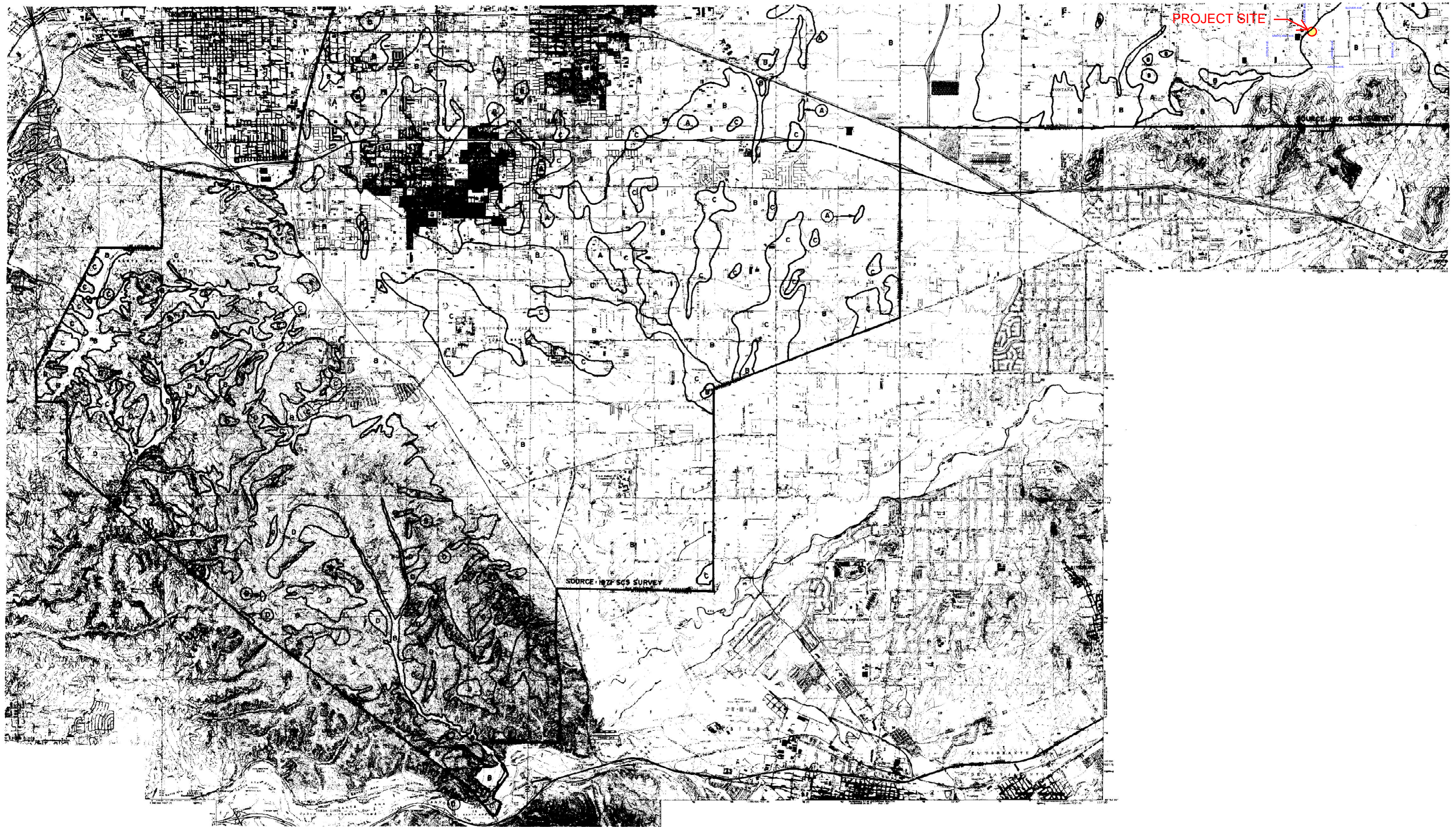
**SAN BERNARDINO COUNTY
HYDROLOGY MANUAL**

REDUCED DRAWING
SCALE 1" = 4 MILES

LEGEND:
6.0 ISOLINES PRECIPITATION (INCHES)

8.1"

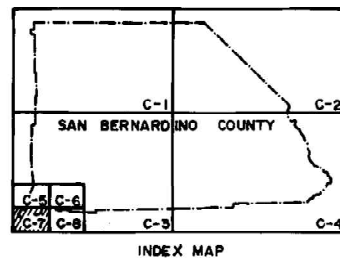
SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT			
VALLEY AREA			
ISOHYETALS			
X ₄ - 100 YEAR 24 HOUR			
BASED ON U.S.D.C. NOAA ATLAS 2, 1973			
APPROVED BY: _____			
FLOOD CONTROL ENGINEER			
DATE	SCALE	FILE NO.	DRWG. NO.
1982	1" = 2 MI.	WRD-1	6 of 12



PROJECT SITE →

SOURCE: 1927 SCS SURVEY

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

SOIL TYPE "B"

HYDROLOGIC SOILS GROUP MAP
FOR
SOUTHWEST-C AREA

I-10 to Sarupa
Oleander to Cypress

OLEANDER AVENUE STORM DRAIN

(FONTANA MASTER PLAN LINE DZ-5)

+ *I-10 to Sarupa*
Oleander to Exercise

DRAINAGE REPORT

Job No. 5147

Prepared for:
THE CITY OF FONTANA
8353 Sierra Avenue
Fontana, CA 92335
(909)350-7613

Prepared by:
HALL & FOREMAN, INC.
545 North Mountain Avenue, Suite 106
Upland, California 91786
(909) 982-7777



Harold A. Garcelon, R.C.E. 31681
License Expires 12/31/99

January 5, 1999
Revised: April 13, 1999



Hall & Foreman, Inc.

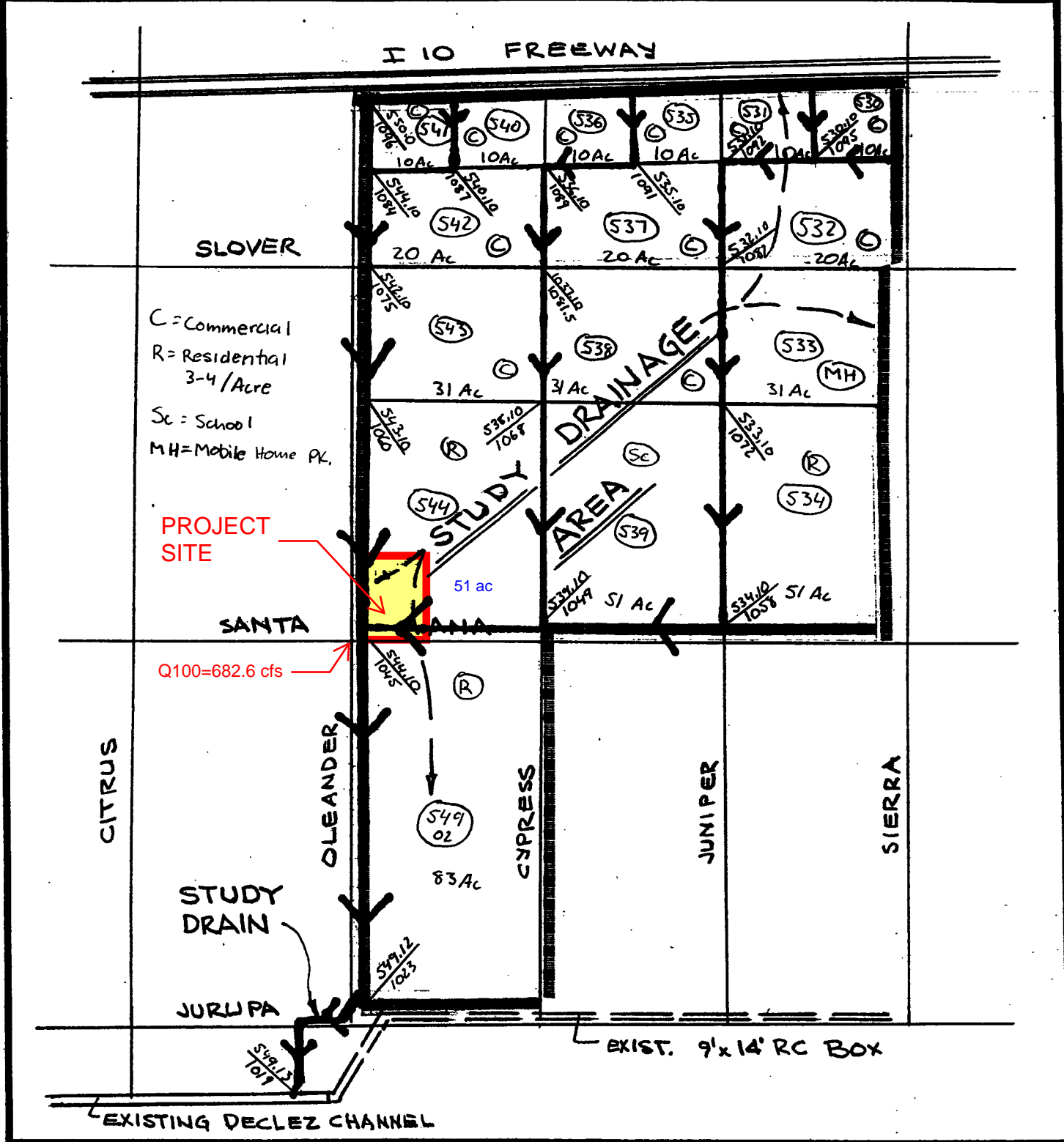
Civil Engineering • Planning • Surveying • Public Works



Hall & Foreman, Inc.

Civil Engineering • Planning • Surveying • Public Works

SUBJECT	HYDROLOGY MAP	BY	H G	DATE	7-30-93	JOB NO.	4013-083	SHEET	OF
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TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
 TIME OF CONCENTRATION(MIN.) = 21.99
 RAINFALL INTENSITY(INCH/HR) = 2.47
 AVERAGED Fm(INCH/HR) = .24
 EFFECTIVE STREAM AREA(ACRES) = 122.00
 TOTAL STREAM AREA(ACRES) = 122.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 243.84

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

**** PEAK FLOW RATE TABLE ****

	Q(CFS)	Tc(MIN.)	Fm(INCH/HR)	Ae(ACRES)
1	480.09	22.94	.276	244.00
2	483.69	21.99	.276	238.93

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) = 483.69 Tc(MIN.) = 21.992
 EFFECTIVE AREA(ACRES) = 238.93 AVERAGED Fm(INCH/HR) = .28
 TOTAL AREA(ACRES) = 244.00

 FLOW PROCESS FROM NODE 539.10 TO NODE 544.10 IS CODE = 3

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

DEPTH OF FLOW IN 96.0 INCH PIPE IS 78.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 11.0
 UPSTREAM NODE ELEVATION(FEET) = 1049.00
 DOWNSTREAM NODE ELEVATION(FEET) = 1045.00
 FLOW LENGTH(FEET) = 1350.00 MANNING'S N = .013
 ESTIMATED PIPE DIAMETER(INCH) = 96.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 483.69
 TRAVEL TIME(MIN.) = 2.05 TC(MIN.) = 24.04

 FLOW PROCESS FROM NODE 544.00 TO NODE 544.10 IS CODE = 8

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

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 2.337
 SOIL CLASSIFICATION IS "B"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) = .4500
 SUBAREA AREA(ACRES) = 51.00 SUBAREA RUNOFF(CFS) = 86.61
 EFFECTIVE AREA(ACRES) = 289.93
 AVERAGED Fm(INCH/HR) = .306
 TOTAL AREA(ACRES) = 295.00
 PEAK FLOW RATE(CFS) = 529.88
 TC(MIN) = 24.04

 FLOW PROCESS FROM NODE 544.10 TO NODE 544.10 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
 TIME OF CONCENTRATION(MIN.) = 24.04
 RAINFALL INTENSITY(INCH/HR) = 2.34
 AVERAGED Fm(INCH/HR) = .31
 EFFECTIVE STREAM AREA(ACRES) = 289.93
 TOTAL STREAM AREA(ACRES) = 295.00

PEAK FLOW RATE(CFS) = 682.59 Tc(MIN.) = 24.042
 EFFECTIVE AREA(ACRES) = 360.93 AVERAGED Fm(INCH/HR) = .27
 TOTAL AREA(ACRES) = 366.00

 FLOW PROCESS FROM NODE 544.10 TO NODE 549.12 IS CODE = 3

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

DEPTH OF FLOW IN 93.0 INCH PIPE IS 70.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 17.7
 UPSTREAM NODE ELEVATION(FEET) = 1045.00
 DOWNSTREAM NODE ELEVATION(FEET) = 1023.00
 FLOW LENGTH(FEET) = 2700.00 MANNING'S N = .013
 ESTIMATED PIPE DIAMETER(INCH) = 93.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 682.59
 TRAVEL TIME(MIN.) = 2.54 TC(MIN.) = 26.58

 FLOW PROCESS FROM NODE 549.02 TO NODE 549.12 IS CODE = 8

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

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 2.200
 SOIL CLASSIFICATION IS "B"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) = .4500
 SUBAREA AREA(ACRES) = 83.00 SUBAREA RUNOFF(CFS) = 130.76
 EFFECTIVE AREA(ACRES) = 443.93
 AVERAGED Fm(INCH/HR) = .300
 TOTAL AREA(ACRES) = 449.00
 PEAK FLOW RATE(CFS) = 759.44
 TC(MIN) = 26.58

 FLOW PROCESS FROM NODE 549.12 TO NODE 549.13 IS CODE = 3

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

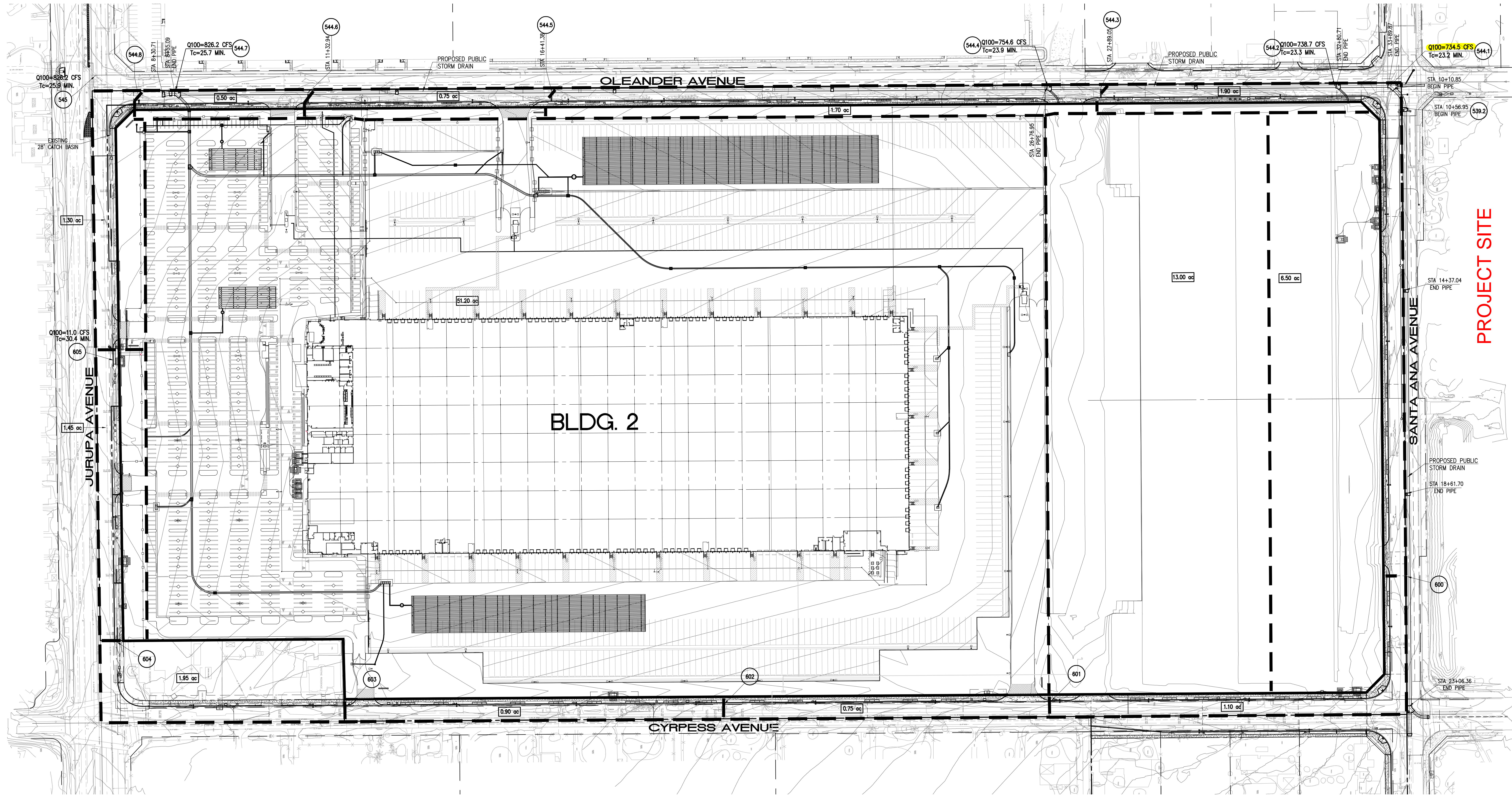
DEPTH OF FLOW IN 108.0 INCH PIPE IS 85.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) = 14.1
 UPSTREAM NODE ELEVATION(FEET) = 1023.00
 DOWNSTREAM NODE ELEVATION(FEET) = 1019.00
 FLOW LENGTH(FEET) = 950.00 MANNING'S N = .013
 ESTIMATED PIPE DIAMETER(INCH) = 108.00 NUMBER OF PIPES = 1
 PIPE-FLOW(CFS) = 759.44
 TRAVEL TIME(MIN.) = 1.12 TC(MIN.) = 27.70

END OF STUDY SUMMARY:
 TOTAL AREA(ACRES) = 449.00 TC(MIN.) = 27.70
 EFFECTIVE AREA(ACRES) = 443.93 AVERAGED Fm(INCH/HR) = .30
 PEAK FLOW RATE(CFS) = 759.44

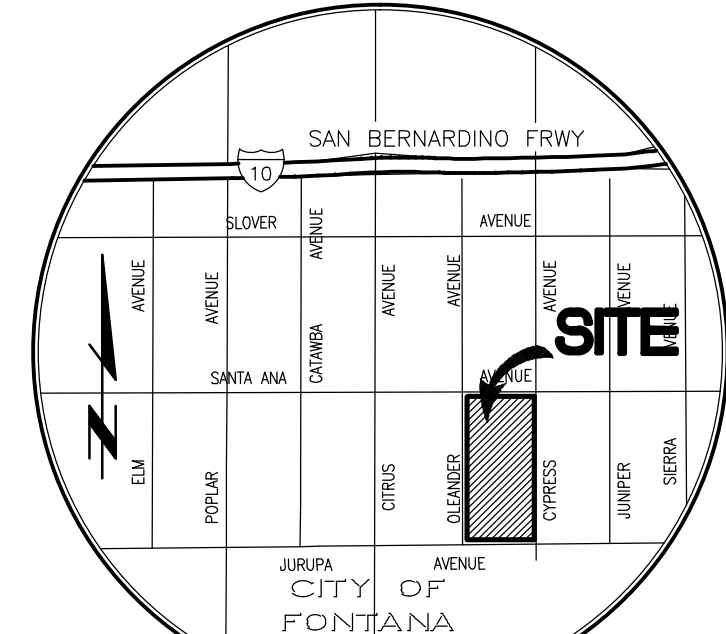
*** PEAK FLOW RATE TABLE ***

	Q(CFS)	Tc(MIN.)	Fm(INCH/HR)	Ac(ACRES)
1	759.44	27.70	.300	443.93
2	748.62	28.70	.300	449.00
3	757.05	25.13	.299	412.36

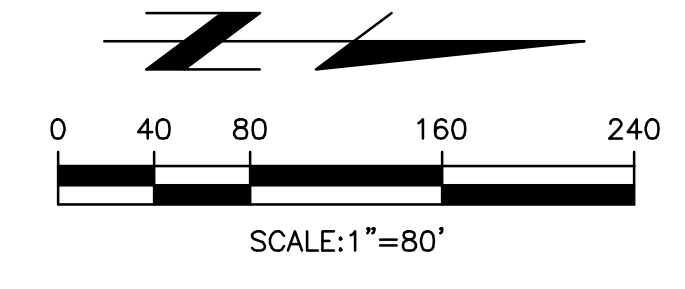
END OF RATIONAL METHOD ANALYSIS



PROJECT SITE



VICINITY MAP
N.T.S.



LEGEND	
	PROJECT BOUNDARY
	SUBAREA BOUNDARY
	SUBAREA AREA
	NODE NUMBER

PREPARED FOR:
GMAP DEVELOPMENT LLC
 18201 VON KARMAN #1170
 IRVINE, CA 92612
 PHONE: (949) 502-5500
 FAX: (949) 502-5505



CITY OF FONTANA
PUBLIC WORKS DEPARTMENT

**MASTER PLAN
HYDROLOGY MAP
OLEANDER AVENUE AND
SANTA ANA AVENUE
STORM DRAINS**

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

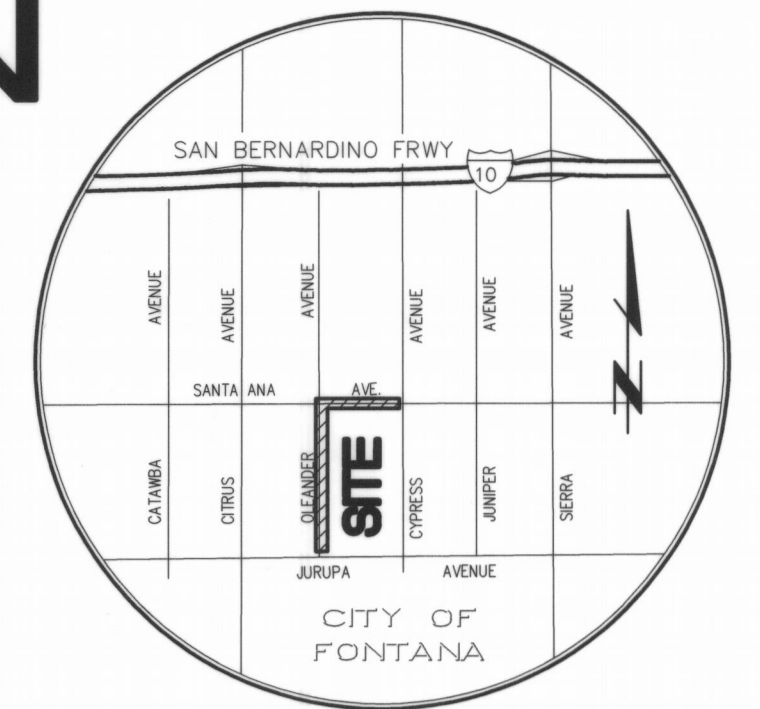
Sheet **1** of **1** Sheets

3417/1 OF 1 SHEET

Last Update: 4/2/18
 01_3400-3499_3417_3417HYD-SD.dwg

PUBLIC STORM DRAIN IMPROVEMENT PLAN

OLEANDER AVENUE AND SANTA ANA AVENUE FONTANA, CALIFORNIA



VICINITY MAP
N.T.S.

STORM DRAIN IMPROVEMENT GENERAL NOTES

- ALL WORK SHALL BE IN ACCORDANCE WITH THESE PLANS, THE CITY OF FONTANA STANDARD PLANS, THE CONTRACT PROVISIONS AND THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION ("GREEN BOOK"). ALL REFERENCE SPECIFICATIONS AND STANDARDS SHALL BE THE LATEST EDITION UNLESS OTHERWISE NOTED.
- WHEN A TECHNICAL CONFLICT IS FOUND TO EXIST IN THE CONTRACT DOCUMENTS THAT CAN NOT BE RESOLVED BY REFERENCE TO PRECEDENCE PROVISIONS IN THE "GREEN BOOK", THE CONTRACTOR SHALL IMMEDIATELY REPORT SAID CONFLICT TO THE CITY ENGINEER FOR RESOLUTION.
- ALL MATERIALS AND METHODS ARE SUBJECT TO THE APPROVAL OF THE CITY ENGINEER.
- ADVANCE CONSTRUCTION SIGNING INDICATING DURATION OF PROJECT SHALL BE IN PLACE ONE WEEK PRIOR TO IMPLEMENTING DETOURS.
- CONSTRUCTION PERMITS SHALL BE OBTAINED FROM THE CITY OF FONTANA COMMUNITY DEVELOPMENT DEPARTMENT, ENGINEERING DIVISION PRIOR TO THE START OF ANY WORK. INSPECTION COORDINATION SHALL BE REQUESTED AT LEAST TWO WORKING DAYS PRIOR TO THE START OF ANY WORK IN PUBLIC RIGHT-OF-WAY WITHIN THE CITY LIMITS. CALL (909) 350-7610.
- THE CONTRACTOR SHALL CONFORM TO ALL TRAFFIC CONTROL POLICIES, METHODS AND PROCEDURES DESCRIBED IN THE STATE OF CALIFORNIA MANUAL OF TRAFFIC CONTROLS, LATEST NON-METRIC EDITION UNLESS OTHERWISE DIRECTED BY THE CITY TRAFFIC ENGINEER.
- IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO MAINTAIN BARRICADES, DELINEATORS OR OTHER TRAFFIC CONTROL DEVICES AT ALL TIMES.
- THE CONTRACTOR SHALL OBTAIN A PERMIT TO PERFORM EXCAVATION OR TRENCH WORK FOR TRENCHES 5 FEET OR GREATER IN DEPTH FROM THE CALIFORNIA STATE DIVISION OF INDUSTRIAL SAFETY.
- THE WALLS AND FACES OF ALL EXCAVATIONS GREATER THAN FIVE (5) FEET IN DEPTH SHALL BE GUARDED BY SHORING, SLOPING OF THE GROUND OR OTHER APPROVED MEANS PURSUANT TO THE REQUIREMENTS OF THE DIVISION OF INDUSTRIAL SAFETY OF THE STATE OF CALIFORNIA. TRENCHES LESS THAN FIVE (5) FEET SHALL ALSO BE GUARDED WHEN THE POTENTIAL EXISTS FOR GROUND MOVEMENT.
- NO MATERIAL OR EQUIPMENT SHALL BE STORED IN THE PUBLIC RIGHT OF WAY WITHOUT OBTAINING A SEPARATE PERMIT FOR THAT PURPOSE.
- THE LOCATIONS OF UTILITIES SHOWN HAVE BEEN DETERMINED FROM AVAILABLE INFORMATION, HOWEVER, IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE, IN THE FIELD, THE TRUE LOCATION AND ELEVATION OF ANY EXISTING UTILITIES, AND TO EXERCISE PROPER PRECAUTION TO AVOID DAMAGE THERETO. THE CONTRACTOR SHALL CONTACT UNDERGROUND SERVICE ALERT AT 1-800-227-2600 TWO WORKING DAYS BEFORE EXCAVATION.
- THE CONTRACTOR SHALL COORDINATE CONSTRUCTION WITH ALL UTILITY COMPANIES INCLUDING, BUT NOT LIMITED TO, GAS, TELEPHONE, ELECTRIC, CABLE TELEVISION, LANDSCAPING, LANDSCAPE IRRIGATION, DOMESTIC WATER, SEWER, STORM DRAIN, FLOOD CONTROL AND CALTRANS. ALL UTILITY COMPANIES SHALL BE GIVEN TWO WORKING DAYS NOTICE PRIOR TO WORK AROUND THEIR FACILITIES.
- THE CONTRACTOR SHALL NOT OPERATE ANY FIRE HYDRANT OR WATER MAIN VALVES WITHOUT APPROPRIATE AGENCY AUTHORIZATION. CONTRACTOR SHALL COORDINATE WITH THE APPROPRIATE WATER COMPANY FOR VALVE OPERATION AND WATER REQUIREMENTS.
- STATIONING REFERS TO THE CENTERLINE OF STORM DRAIN EXCEPT WHERE OTHERWISE NOTED.
- ADEQUATE CONSTRUCTION CONTROL STAKES SHALL BE SET BY THE ENGINEER TO ENABLE THE CONTRACTOR TO CONSTRUCT THE WORK TO THE PLAN GRADES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PRESERVATION OF BENCHMARKS AND CONSTRUCTION CONTROL STAKING DURING CONSTRUCTION.
- THE CONTRACTOR SHALL NOT DISTURB EXISTING SURVEY MONUMENTS, MONUMENT TIES OR BENCH MARKS WITHOUT PRIOR NOTIFICATION TO THE CITY ENGINEER.
- REMOVAL AND REPLACEMENT OF EXISTING SURVEY CONTROL, INCLUDING SURVEY MONUMENTS, MONUMENT TIES AND BENCH MARKS, SHALL BE DONE BY A REGISTERED CIVIL ENGINEER OR LICENSED LAND SURVEYOR. SURVEY MONUMENTS THAT WILL BE DESTROYED AS A RESULT OF THIS CONSTRUCTION SHALL BE REPLACED. THE CONTRACTOR SHALL NOTIFY THE ENGINEER ONE WEEK PRIOR TO CONSTRUCTION SO THAT TIES TO MONUMENTS CAN BE ESTABLISHED FOR LATER REPLACEMENT OF THE MONUMENT.
- THE CONTRACTOR SHALL MAINTAIN ACCESS FOR LOCAL RESIDENTS AND BUSINESSES AT ALL TIMES. A MINIMUM 12 FOOT LANE SHALL BE MAINTAINED AT ALL TIMES IN THE CONSTRUCTION AREA FOR RESIDENTS AND EMERGENCY VEHICLES.
- THE CONTRACTOR SHALL PROVIDE AND MAINTAIN AN EFFECTIVE MEANS OF DUST CONTROL, INCLUDING ADEQUATE WATERING, AT ALL TIMES.
- THE CONTRACTOR SHALL NOT CAUSE ANY EXCAVATED MATERIAL, MUD, SILT OR DEBRIS TO BE DEPOSITED ONTO PUBLIC OR PRIVATE PROPERTY ADJACENT TO THE RIGHT OF WAY DURING CONSTRUCTION WITHOUT PRIOR WRITTEN APPROVAL.
- NO TRENCH BACKFILL SHALL TAKE PLACE WITHOUT PRIOR APPROVAL OF THE CITY INSPECTOR.
- A GEOTECHNICAL ENGINEER SHALL CERTIFY ALL BACKFILL COMPACTION. FAILURE TO OBTAIN THE REQUIRED DENSITY SHALL REQUIRE RE-WORKING OF THAT PORTION OF THE WORK UNTIL THE SPECIFIED DENSITY IS OBTAINED.
- CARE SHOULD BE TAKEN TO PREVENT GRADES, DITCHES, AND SWALES FROM UNDERMINING STREET IMPROVEMENTS. UPON INSPECTION OF THE SITE, THE CITY ENGINEER MAY REQUIRE TEMPORARY NON-ERODEABLE SWALES ENTERING OR LEAVING IMPROVEMENTS.
- ALL EXPOSED CONCRETE SURFACES SHALL CONFORM IN GRADE, COLOR AND FINISH TO MATCH EXISTING CONCRETE.
- NO OPEN TRENCH SHALL BE ALLOWED AT THE END OF THE DAY WITHOUT PRIOR APPROVAL OF THE CITY ENGINEER.
- PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL EXPOSE EXISTING FACILITIES, AND VERIFY ELEVATION AND LOCATION OF CONNECTIONS. CITY APPROVAL OF CONNECTIONS TO EXISTING FACILITIES DOES NOT IMPLY CORRECTNESS OF ELEVATIONS OR LOCATIONS SHOWN ON THE PLANS.
- IF EXISTING UTILITIES OR ANY OTHER FACILITIES CONFLICT WITH THE PROPOSED IMPROVEMENTS, THE CONTRACTOR SHALL NOTIFY THE ENGINEER AND ALL AFFECTED AGENCIES IMMEDIATELY.
- NO CONCRETE SHALL BE PLACED UNTIL THE FORMS AND REINFORCING STEEL HAVE BEEN PLACED, INSPECTED AND APPROVED.
- ALL UNDERGROUND UTILITIES SHALL BE INSTALLED, TESTED AND APPROVED PRIOR TO PAVING OF STREETS.
- APPROVED SOIL STERILANT IS REQUIRED UNDER ALL NEW ASPHALT PAVEMENT PRIOR TO PLACEMENT.
- ALL MANHOLES, CLEANOUT FRAMES, COVERS AND VALVE BOXES SHALL BE RAISED TO FINISHED GRADE BY THE PAVING CONTRACTOR UPON COMPLETION OF PAVING.
- UPON COMPLETION OF CONSTRUCTION, CONTRACTOR SHALL RESTORE ALL SIGNING, STRIPING, BARRICADES AND OTHER TRAFFIC CONTROL DEVICES TO THE SATISFACTION OF THE CITY TRAFFIC ENGINEER.
- AS-BUILT DRAWINGS SHALL BE PROVIDED BY THE CONTRACTOR TO THE ENGINEER OF RECORD, WHO SHALL PROVIDE RECORD DRAWINGS TO THE CITY ENGINEER.

UTILITY CONTACTS

SAN BERNARDINO COUNTY FLOOD CONTROL
825 E. THIRD STREET, ROOM 140
SAN BERNARDINO, CA 92415-0835
PHONE: (909) 387-8256
ATTN: TOM WILLIAMS

FONTANA WATER COMPANY
15966 ARROW ROUTE
FONTANA, CA 92355
PHONE: (909) 822-2201
ATTN: BRENDA FOWLER

SOUTHERN CALIFORNIA GAS COMPANY
1981 W. LUGONIA AVE.
REDLANDS, CA
PHONE: (909) 335-7965
ATTN: ED SANTILLAN

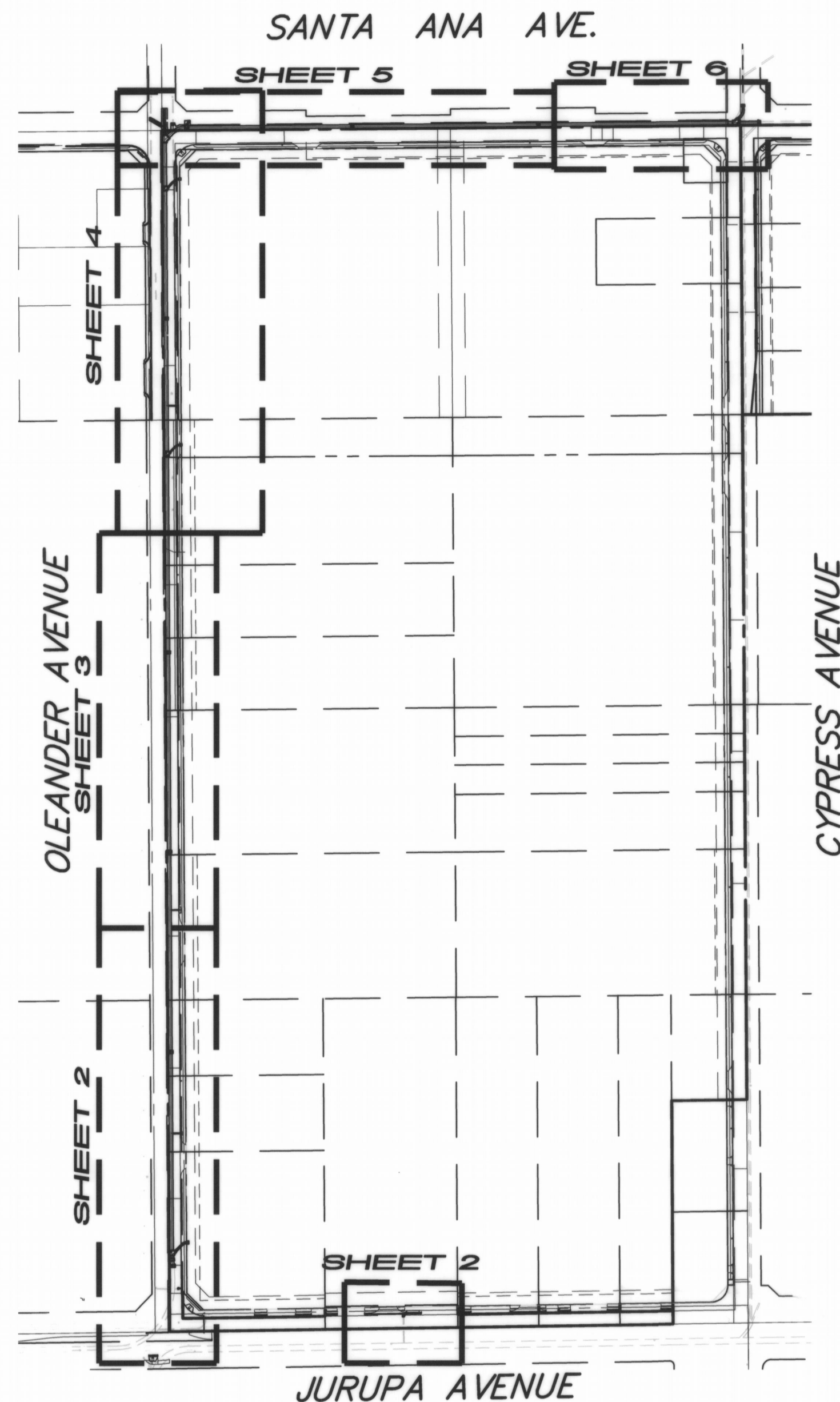
AT&T
1265 VAN BUREN ST. #80
ANAHEIM, CA 92807
PHONE: (714) 666-5614
ATTN: LEE QUEST

SOUTHERN CALIFORNIA EDISON
7951 REDWOOD AVENUE
FONTANA, CA 92336
PHONE: (909) 549-5345
ATTN: JEFF HUDSON

TIME WARNER
17777 CENTER COURT DR. 8TH FLOOR
CERRITOS, CA 90703
PHONE: (562) 677-0263
ATTN: JOHN CHRISTIANSEN

FONTANA UNITED SCHOOL DISTRICT
9680 CITRUS AVENUE
FONTANA, CA 92335
PHONE: (909) 357-5000 X 29455
ATTN: SHERRI WHITTEN

INLAND EMPIRE UTILITY AGENCY
(FOR SEWER)
6075 KIMBALL AVENUE
CHINO, CA 91708
PHONE: (909) 993-1696
ATTN: LIZA MUNOZ



STORM DRAIN CONSTRUCTION NOTES

- | NO. | DESCRIPTION | QUANTITIES |
|-----|--|------------|
| 1 | CONSTRUCT 18" R.C.P. BEDDING AND TRENCH REPAIR PER CITY OF FONTANA STD. 1008. | 61 L.F. |
| 2 | CONSTRUCT 24" R.C.P. BEDDING AND TRENCH REPAIR PER CITY OF FONTANA STD. 1008. | 75 L.F. |
| 3 | CONSTRUCT 36" R.C.P. BEDDING AND TRENCH REPAIR PER CITY OF FONTANA STD. 1008. | 67 L.F. |
| 4 | CONSTRUCT 54" R.C.P. BEDDING AND TRENCH REPAIR PER CITY OF FONTANA STD. 1008. | 24 L.F. |
| 5 | CONSTRUCT 60" R.C.P. BEDDING AND TRENCH REPAIR PER CITY OF FONTANA STD. 1008. | 42 L.F. |
| 6 | CONSTRUCT 90" R.C.P. BEDDING AND TRENCH REPAIR PER CITY OF FONTANA STD. 1008. | 1302 L.F. |
| 7 | CONSTRUCT 96" R.C.P. BEDDING AND TRENCH REPAIR PER CITY OF FONTANA STD. 1008. | 2460 L.F. |
| 8 | CONSTRUCT 102" R.C.P. BEDDING AND TRENCH REPAIR PER CITY OF FONTANA STD. 1008. | 24 L.F. |
| 9 | CONSTRUCT MANHOLE PIPE-TO-PIPE PER CITY OF FONTANA STD. PLAN 3011. | 4 EA. |
| 10 | CONSTRUCT MANHOLE PIPE-TO-PIPE PER CITY OF FONTANA STD. PLAN 3012. | 6 EA. |
| 11 | CONSTRUCT JUNCTION STRUCTURE - PIPE-TO-PIPE PER CITY OF FONTANA STD. PLAN 3009. | 5 EA. |
| 12 | ABANDON IN PLACE. | 2 EA. |
| 13 | CONSTRUCT CONCRETE COLLAR FOR RCP PER CITY OF FONTANA STD. PLAN 3022. | 7 EA. |
| 14 | CONSTRUCT PIPE ANCHORS PER S.P.P.W.C. STD. DWG. NO. 221-2. | 6 EA. |
| 15 | REMOVE EXISTING CATCH BASIN. | 2 EA. |
| 16 | CONNECT TO EXISTING STORM DRAIN. | 4 EA. |
| 17 | CONSTRUCT CURB OPENING CATCH BASIN PER CITY OF FONTANA STD. PLAN 3004, "W" AND "Y" PER PLAN. | 4 EA. |
| 18 | INSTALL PIPE CLOSURE PER S.B.C.F.C.D. STD. SP. 176A, SEE DETAIL ON SHEET 6. | 6 EA. |
| 19 | INSTALL STORM DRAIN INLET SIGNAGE PER CITY OF FONTANA STD. PLAN 6002. | 4 EA. |
| 20 | CONSTRUCT LOCAL DEPRESSION PER CITY OF FONTANA STD. PLAN 3003, CASE C. | 4 EA. |
| 21 | REMOVE EXISTING BULKHEAD, MANHOLE, STORM DRAIN AND APPURTENANCES. | 3 EA. |
| 22 | CONSTRUCT 84" R.C.P. BEDDING AND TRENCH REPAIR PER CITY OF FONTANA STD. 1008. | 48 L.F. |
| 23 | CONSTRUCT TRANSITION STRUCTURE PER S.P.P.W.C. STD. DWG. NO. 340-2. | 4 EA. |
| 24 | CONSTRUCT MONOLITHIC CATCH BASIN CONNECTION PER CITY OF FONTANA STD. PLAN 3005. | 1 EA. |
| 25 | CONSTRUCT PRESSURE MANHOLE SHAFT AND PRESSURE PLATE PER CITY OF FONTANA STD. PLAN 3017. | 1 EA. |

LEGEND

A.B.	-AGGREGATE BASE	M.H.	-MANHOLE
A.C.	-ASPHALT CONCRETE	N.G.	-NATURAL GRADE
B.C.R.	-BEGINNING OF CURVE	R	-PROPERTY LINE
BLDG	-BUILDING	PB	-PULL BOX
B.O.W.	-BOTTOM OF WALL	P.P.	-POWER POLE
B.W.	-BACK OF WALK	R/W	-RIGHT OF WAY
C.L.F.	-CHAIN LINK FENCE	R.D.	-ROOF DRAIN
CONC.	-CONCRETE	TRANS PAD	-TRANSFORMER PAD
C.F.	-CURB FACE	T.B.	-TOP OF BERM
C.B.	-CATCH BASIN	S	-SLOPE
CL	-CENTERLINE	S.D.	-STORM DRAIN
E.C.R.	-END OF CURVE	S.L.	-SIGHT LINE
EXIST.	-EXISTING	S.L.T.	-STREET LIGHT
E.P.	-EDGE OF PAVEMENT	T.G.	-TOP OF GRATE
F.G.	-FINISH GRADE	T.C.	-TOP OF CURB
F.F.	-FINISH FLOOR	TOP	-TOP OF SLOPE
F.L.	-FLOW LINE	TOE	-TOE OF SLOPE
F.S.	-FINISH SURFACE	WM	-WATER METER
F.H.	-FIRE HYDRANT	WV	-WATER VALVE
G.B.	-GRADE BREAK		
H.C.	-HANDICAP		
H.P.	-HIGH POINT		
INV.	-INVERT		

PRIVATE ENGINEERS NOTE TO CONTRACTOR

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITY PIPES, CONDUITS, OR STRUCTURES SHOWN ON THESE PLANS ARE OBTAINED BY A SEARCH OF THE AVAILABLE RECORDS. TO THE BEST OF OUR KNOWLEDGE THERE ARE NO EXISTING UTILITIES EXCEPT AS SHOWN ON THESE PLANS. THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT THE UTILITIES SHOWN ON THESE DRAWINGS. THE CONTRACTOR FURTHER ASSUMES ALL LIABILITY AND RESPONSIBILITY FOR THE UTILITY PIPES, CONDUITS OR STRUCTURES SHOWN ON THESE DRAWINGS.

CONTRACTOR AGREES THAT HE SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY, THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS, AND THAT THE CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD THE COUNTY OF SAN BERNARDINO, THE OWNER AND THE ENGINEER HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING FOR LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE OWNER OR THE ENGINEER.

PREPARED FOR:

GOODMAN BIRTCHER
18201 VON KARMAN AVE., SUITE 1170
IRVINE, CA 92612
PHONE: (949) 407-0100
FAX: (949) 502-5505

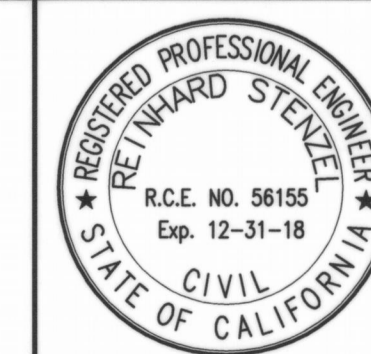
SOILS ENGINEER:

SOUTHERN CALIFORNIA GEOTECHNICAL
SOILS & GEOTECHNICAL CONSULTANTS
22885 E. SAVI RANCH PARKWAY, SUITE E
YORBA LINDA, CA 92887
PHONE: (714) 685-1115 FAX: (714) 685-1118



REV.	REVISION DESCRIPTION	DATE	ENGR.	QTY	DATE

SHOULD CONSTRUCTION OF THE 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 Under The Supervision Of:
Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14348 FRIESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH: (714) 521-4811 FAX: (714) 521-4173
Date: 5/1/18
REINHARD STENZEL RCE NO. 56155

SHEET INDEX

1	TITLE SHEET - CONSTRUCTION NOTES & QUANTITY ESTIMATES
2	PLAN AND PROFILE LINE "A" STA 8+30.71 TO STA 16+00.00
3	PLAN AND PROFILE LINE "A" STA 16+00.00 TO STA 25+00.00
4	PLAN AND PROFILE LINE "A" STA 25+00.00 TO STA 34+14.16
5	PLAN AND PROFILE LINE "B" STA 10+00.00 TO STA 19+00.00
6	PLAN AND PROFILE LINE "B" STA 19+00.00 TO STA 23+64.52
7	PROFILE VIEW OF STORM DRAIN LATERALS

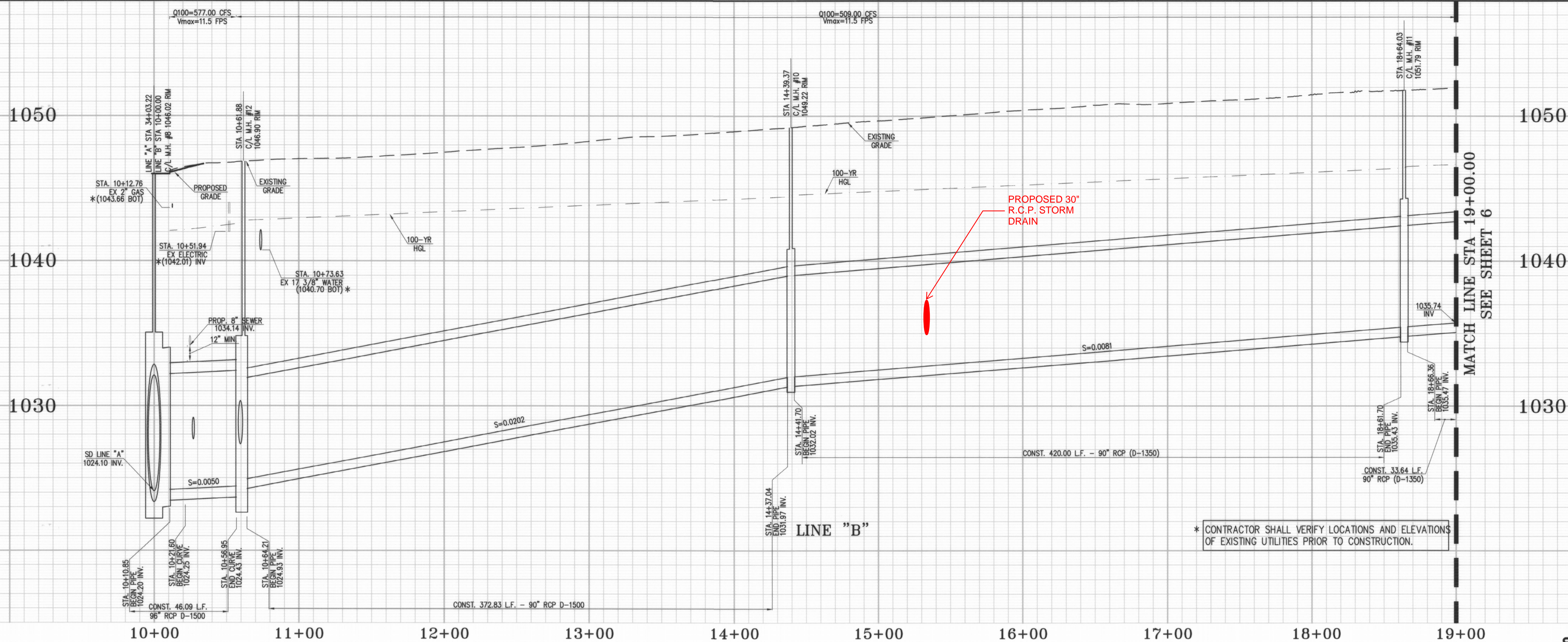
WDID# 8 36C374407

DR 13-018

CITY OF FONTANA, CALIFORNIA STORM DRAIN IMPROVEMENT PLAN

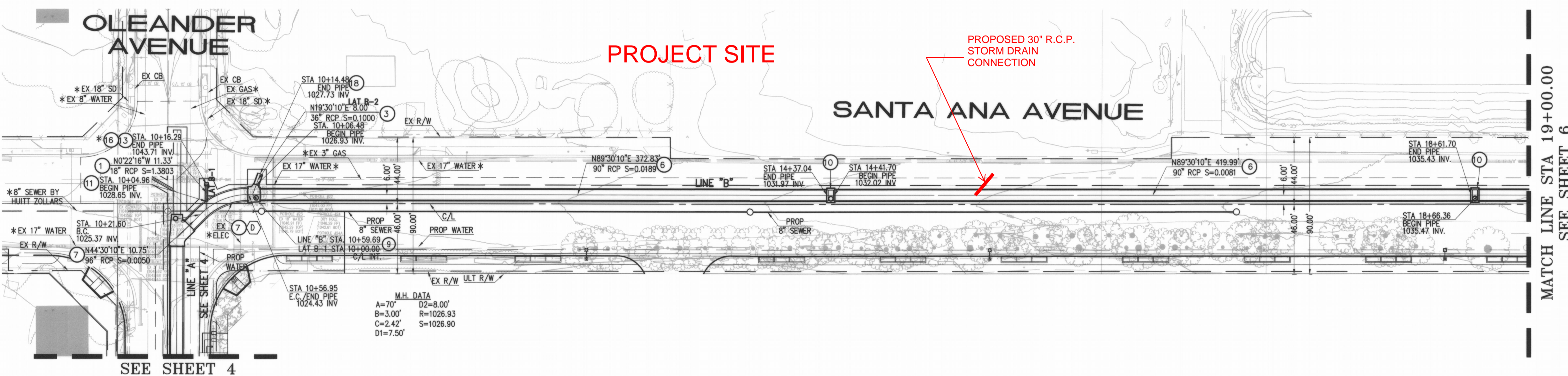
DRAWN BY: MC	OLEANDER AVENUE & SANTA ANA AVENUE PUBLIC STORM DRAIN	SCALE: AS SHOWN
DESIGNED BY: BW		DATE: 5.2.18
CHECKED BY: MR	APPROVED BY: <i>[Signature]</i> CITY ENGINEER	DRAWING NO.: 5709

Last Updated: 2/2/18
C:\3600-368\368\1717\STORM DRAIN PUBLIC\34173001.dwg



MATCH LINE STA 19+00.00
SEE SHEET 6

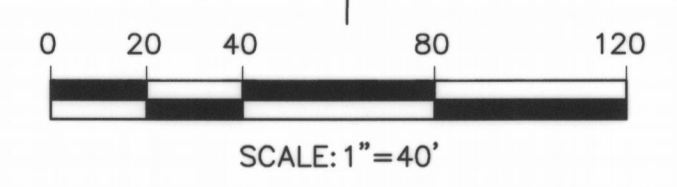
PROFILE SCALE:
HORIZ. - 1" = 40'
VERT. - 1" = 4'



STORM DRAIN CONSTRUCTION NOTES

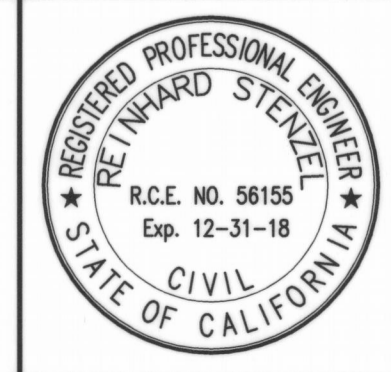
1. CONSTRUCT 18" R.C.P. BEDDING AND TRENCH REPAIR PER CITY OF FONTANA STD. 1008.
2. CONSTRUCT 24" R.C.P. BEDDING AND TRENCH REPAIR PER CITY OF FONTANA STD. 1008.
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25. CONSTRUCT PRESSURE MANHOLE SHAFT AND PRESSURE PLATE PER CITY OF FONTANA STD. PLAN 3017.

STORM DRAIN CURVE DATA			
INDEX	DELTA	RADIUS	TANGENT LENGTH
(D)	45°00'00"	45.00'	18.64'



REV.	REVISION DESCRIPTION	DATE	ENGR.	QTY	DATE

SHOULD CONSTRUCTION OF THE 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.



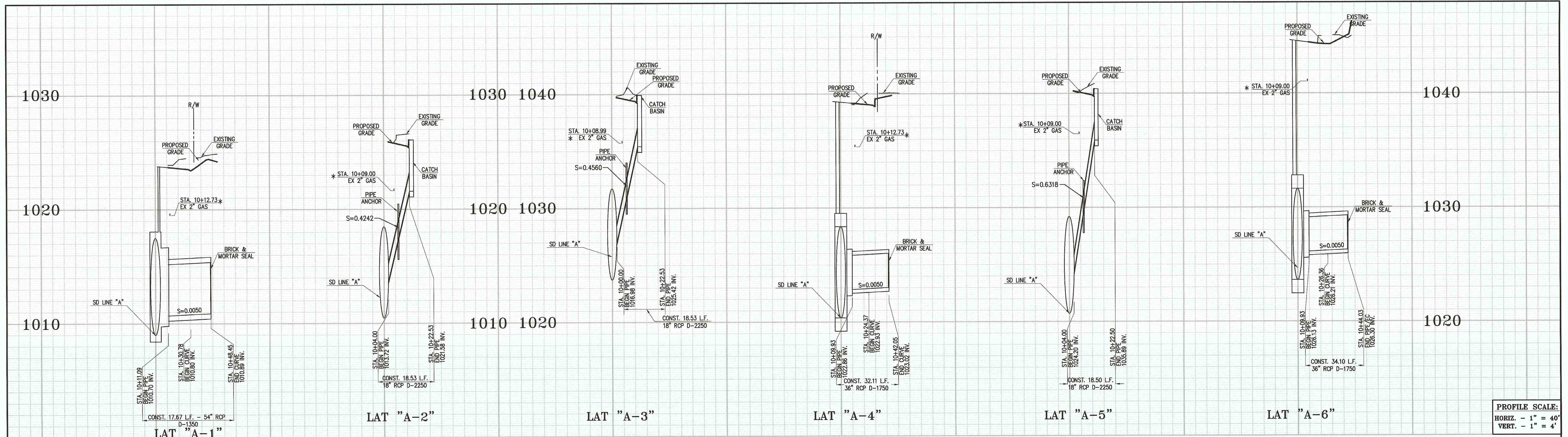
Prepared Under The Supervision of:
Thienes Engineering, Inc.
CIVIL ENGINEERING - LAND SURVEYING
14345 FRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH: (714) 921-1811 FAX: (714) 921-4173
Date: 5/1/18
REINHARD STENZEL R.C.E. NO. 56155

WDID# 8 36C374407 DR 13-018

CITY OF FONTANA, CALIFORNIA
STORM DRAIN IMPROVEMENT PLAN

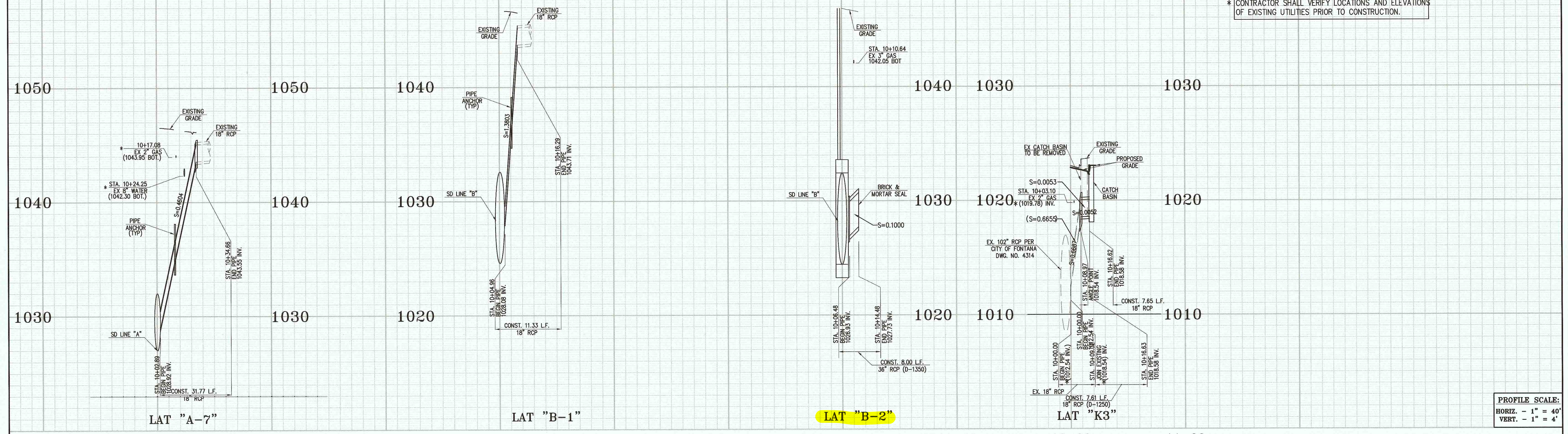
DRAWN BY: MC	SCALE: AS SHOWN
DESIGNED BY: BW	DATE: 5/1/18
CHECKED BY: MR	DRAWING NO.: 5709

APPROVED BY: [Signature] DATE: 5.2.18
CITY ENGINEER R.C.E. 51152



1030 1020 1010 1040 1030 1020
 LAT "A-1" LAT "A-2" LAT "A-3" LAT "A-4" LAT "A-5" LAT "A-6"

PROFILE SCALE:
 HORIZ. - 1" = 40'
 VERT. - 1" = 4'



1050 1040 1030 1040 1030 1020 1010 1030 1020 1010
 LAT "A-7" LAT "B-1" LAT "B-2" LAT "K3"

* CONTRACTOR SHALL VERIFY LOCATIONS AND ELEVATIONS OF EXISTING UTILITIES PRIOR TO CONSTRUCTION.

PROFILE SCALE:
 HORIZ. - 1" = 40'
 VERT. - 1" = 4'

<p> DIAL BEFORE YOU DIG TWO WORKING DAYS BEFORE YOU DIG TOLL FREE 1-800-227-2600 A PUBLIC SERVICE BY UNDERGROUND SERVICE ALERT </p>	REV. REVISION DESCRIPTION DATE ENGR. CITY DATE	SHOULD CONSTRUCTION OF THE 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 Under The Supervision Of: Thienes Engineering, Inc. CIVIL ENGINEERING - LAND SURVEYING 14349 FIRESTONE BOULEVARD LA MIRADA, CALIFORNIA 90638 PH: (714) 521-4811 FAX: (714) 521-4173 Date: 5/1/18 REINHARD STENZEL R.C.E. NO. 56155	CITY OF FONTANA, CALIFORNIA STORM DRAIN IMPROVEMENT PLAN DRAWN BY: MC DESIGNED BY: BW CHECKED BY: MR OLEANDER AVENUE & SANTA ANA AVENUE LATERAL PROFILES APPROVED BY: [Signature] CITY ENGINEER DATE: 5.2.18 R.C.E. 51152	SCALE: AS SHOWN DATE: DRAWING NO.: 5709/77
	WDID# 8 36C374407 DR 13-018		13:400-3489/3471 STORM DRAIN PUBLIC/4472507.dwg			

APPENDIX B

HYDROLOGY CALCULATIONS

EXISTING CONDITION

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 *****

* JOB #3615 SANTA ANA, FONTANA *
* EXISTING CONDITION 100-YEAR *
* NODES 300-301 300X.DAT *

FILE NAME: C:\XDRIVE\3615\300X.DAT
TIME/DATE OF STUDY: 16:44 08/19/2022

=====

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) = 1.3700

ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD

FLOW PROCESS FROM NODE 300.00 TO NODE 301.00 IS CODE = 21

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

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 643.00
ELEVATION DATA: UPSTREAM(FEET) = 1057.00 DOWNSTREAM(FEET) = 1048.51

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 13.003
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.429

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.)
RESIDENTIAL						
"3-4 DWELLINGS/ACRE"	B	4.08	0.45	0.60	76	13.00
RESIDENTIAL						
"3-4 DWELLINGS/ACRE"	B	4.65	0.45	0.60	76	13.00

SUBAREA AVERAGE PERVIOUS LOSS RATE, $F_p(\text{INCH/HR}) = 0.45$
SUBAREA AVERAGE PERVIOUS AREA FRACTION, $A_p = 0.60$
SUBAREA RUNOFF(CFS) = 24.81
TOTAL AREA(ACRES) = 8.73 PEAK FLOW RATE(CFS) = 24.81

=====

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 8.73 TC(MIN.) = 13.00
EFFECTIVE AREA(ACRES) = 8.73 AREA-AVERAGED $F_m(\text{INCH/HR}) = 0.27$
AREA-AVERAGED $F_p(\text{INCH/HR}) = 0.45$ AREA-AVERAGED $A_p = 0.60$
PEAK FLOW RATE(CFS) = 24.81

=====

=====

END OF RATIONAL METHOD ANALYSIS

PROPOSED CONDITION

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 *****

* JOB #3615 SANTA ANA, FONTANA *
* PROPOSED CONDITION 100-YEAR *
* NODES 300-312 300P.DAT *

FILE NAME: C:\XDRIVE\3615\300P.DAT
TIME/DATE OF STUDY: 16:35 08/19/2022

=====

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) = 1.3700

ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD

FLOW PROCESS FROM NODE 300.00 TO NODE 301.00 IS CODE = 21

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

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 761.00
ELEVATION DATA: UPSTREAM(FEET) = 1054.49 DOWNSTREAM(FEET) = 1048.61

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 11.424
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.706

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.)
COMMERCIAL	B	5.77	0.45	0.10	76	11.42

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.45

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.10

SUBAREA RUNOFF(CFS) = 19.01

TOTAL AREA(ACRES) = 5.77 PEAK FLOW RATE(CFS) = 19.01

FLOW PROCESS FROM NODE 301.00 TO NODE 302.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 1043.92 DOWNSTREAM(FEET) = 1043.14
FLOW LENGTH(FEET) = 220.00 MANNING'S N = 0.012
DEPTH OF FLOW IN 27.0 INCH PIPE IS 21.6 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.58
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 19.01
PIPE TRAVEL TIME(MIN.) = 0.66 Tc(MIN.) = 12.08
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 302.00 = 981.00 FEET.

FLOW PROCESS FROM NODE 302.00 TO NODE 302.00 IS CODE = 81

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

=====

MAINLINE Tc(MIN) = 12.08
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.584
SUBAREA LOSS RATE DATA(AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN
COMMERCIAL	B	0.38	0.45	0.10	76

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.45
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.10
SUBAREA AREA(ACRES) = 0.38 SUBAREA RUNOFF(CFS) = 1.21
EFFECTIVE AREA(ACRES) = 6.15 AREA-AVERAGED Fm(INCH/HR) = 0.05
AREA-AVERAGED Fp(INCH/HR) = 0.45 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 6.15 PEAK FLOW RATE(CFS) = 19.59

FLOW PROCESS FROM NODE 302.00 TO NODE 312.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 1043.14 DOWNSTREAM(FEET) = 1042.99
FLOW LENGTH(FEET) = 47.00 MANNING'S N = 0.012
DEPTH OF FLOW IN 30.0 INCH PIPE IS 20.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.54
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 19.59
PIPE TRAVEL TIME(MIN.) = 0.14 Tc(MIN.) = 12.22
LONGEST FLOWPATH FROM NODE 300.00 TO NODE 312.00 = 1028.00 FEET.

FLOW PROCESS FROM NODE 312.00 TO NODE 312.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:

TIME OF CONCENTRATION(MIN.) = 12.22
RAINFALL INTENSITY(INCH/HR) = 3.56
AREA-AVERAGED Fm(INCH/HR) = 0.05
AREA-AVERAGED Fp(INCH/HR) = 0.45
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 6.15
TOTAL STREAM AREA(ACRES) = 6.15
PEAK FLOW RATE(CFS) AT CONFLUENCE = 19.59

FLOW PROCESS FROM NODE 310.00 TO NODE 311.00 IS CODE = 21

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

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 369.00
ELEVATION DATA: UPSTREAM(FEET) = 1054.47 DOWNSTREAM(FEET) = 1049.37

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.613
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.728
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.)
COMMERCIAL	B	2.07	0.45	0.10	76	7.61

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.45
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.10
SUBAREA RUNOFF(CFS) = 8.72
TOTAL AREA(ACRES) = 2.07 PEAK FLOW RATE(CFS) = 8.72

FLOW PROCESS FROM NODE 311.00 TO NODE 312.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM(FEET) = 1046.08 DOWNSTREAM(FEET) = 1042.99
FLOW LENGTH(FEET) = 678.00 MANNING'S N = 0.012
DEPTH OF FLOW IN 21.0 INCH PIPE IS 13.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.18
ESTIMATED PIPE DIAMETER(INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 8.72
PIPE TRAVEL TIME(MIN.) = 2.18 Tc(MIN.) = 9.79
LONGEST FLOWPATH FROM NODE 310.00 TO NODE 312.00 = 1047.00 FEET.

FLOW PROCESS FROM NODE 312.00 TO NODE 312.00 IS CODE = 1

>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

=====

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 9.79
RAINFALL INTENSITY(INCH/HR) = 4.06
AREA-AVERAGED Fm(INCH/HR) = 0.05
AREA-AVERAGED Fp(INCH/HR) = 0.45

AREA-AVERAGED $A_p = 0.10$
 EFFECTIVE STREAM AREA(ACRES) = 2.07
 TOTAL STREAM AREA(ACRES) = 2.07
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 8.72

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap (ACRES)	Ae (ACRES)	HEADWATER NODE
1	19.59	12.22	3.559	0.45(0.05)	0.10	6.2	300.00
2	8.72	9.79	4.065	0.45(0.05)	0.10	2.1	310.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR 2 STREAMS.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap (ACRES)	Ae (ACRES)	HEADWATER NODE
1	27.21	12.22	3.559	0.45(0.05)	0.10	8.2	300.00
2	26.68	9.79	4.065	0.45(0.05)	0.10	7.0	310.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:

PEAK FLOW RATE(CFS) = 27.21 Tc(MIN.) = 12.22
 EFFECTIVE AREA(ACRES) = 8.22 AREA-AVERAGED Fm(INCH/HR) = 0.05
 AREA-AVERAGED Fp(INCH/HR) = 0.45 AREA-AVERAGED Ap = 0.10
 TOTAL AREA(ACRES) = 8.22
 LONGEST FLOWPATH FROM NODE 310.00 TO NODE 312.00 = 1047.00 FEET.

=====
 END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 8.22 TC(MIN.) = 12.22
 EFFECTIVE AREA(ACRES) = 8.22 AREA-AVERAGED Fm(INCH/HR)= 0.05
 AREA-AVERAGED Fp(INCH/HR) = 0.45 AREA-AVERAGED Ap = 0.10
 PEAK FLOW RATE(CFS) = 27.21

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap (ACRES)	Ae (ACRES)	HEADWATER NODE
1	26.68	9.79	4.065	0.45(0.05)	0.10	7.0	310.00
2	27.21	12.22	3.559	0.45(0.05)	0.10	8.2	300.00

=====
 END OF RATIONAL METHOD ANALYSIS

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
(Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
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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 *****

* JOB #3615 SANTA ANA, FONTANA *
* PROPOSED CONDITION 100-YEAR *
* NODES 320-321 320P.DAT *

FILE NAME: C:\XDRIVE\3615\320P.DAT
TIME/DATE OF STUDY: 16:41 08/19/2022

=====

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) = 1.3700

ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD

FLOW PROCESS FROM NODE 320.00 TO NODE 321.00 IS CODE = 21

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

=====

INITIAL SUBAREA FLOW-LENGTH(FEET) = 576.00
ELEVATION DATA: UPSTREAM(FEET) = 1052.68 DOWNSTREAM(FEET) = 1045.06

$T_c = K * [(LENGTH ** 3.00) / (ELEVATION CHANGE)] ** 0.20$
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 21.314
* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 2.549

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"	B	0.51	0.31	1.00	84	21.31

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.31
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 1.00

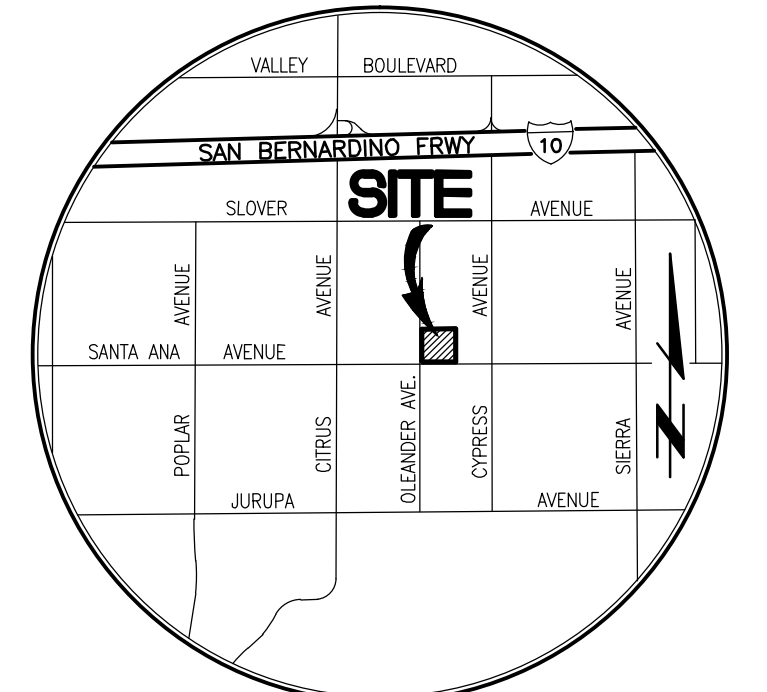
SUBAREA RUNOFF(CFS) = 1.03
TOTAL AREA(ACRES) = 0.51 PEAK FLOW RATE(CFS) = 1.03

=====
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 0.51 TC(MIN.) = 21.31
EFFECTIVE AREA(ACRES) = 0.51 AREA-AVERAGED Fm(INCH/HR)= 0.31
AREA-AVERAGED Fp(INCH/HR) = 0.31 AREA-AVERAGED Ap = 1.00
PEAK FLOW RATE(CFS) = 1.03

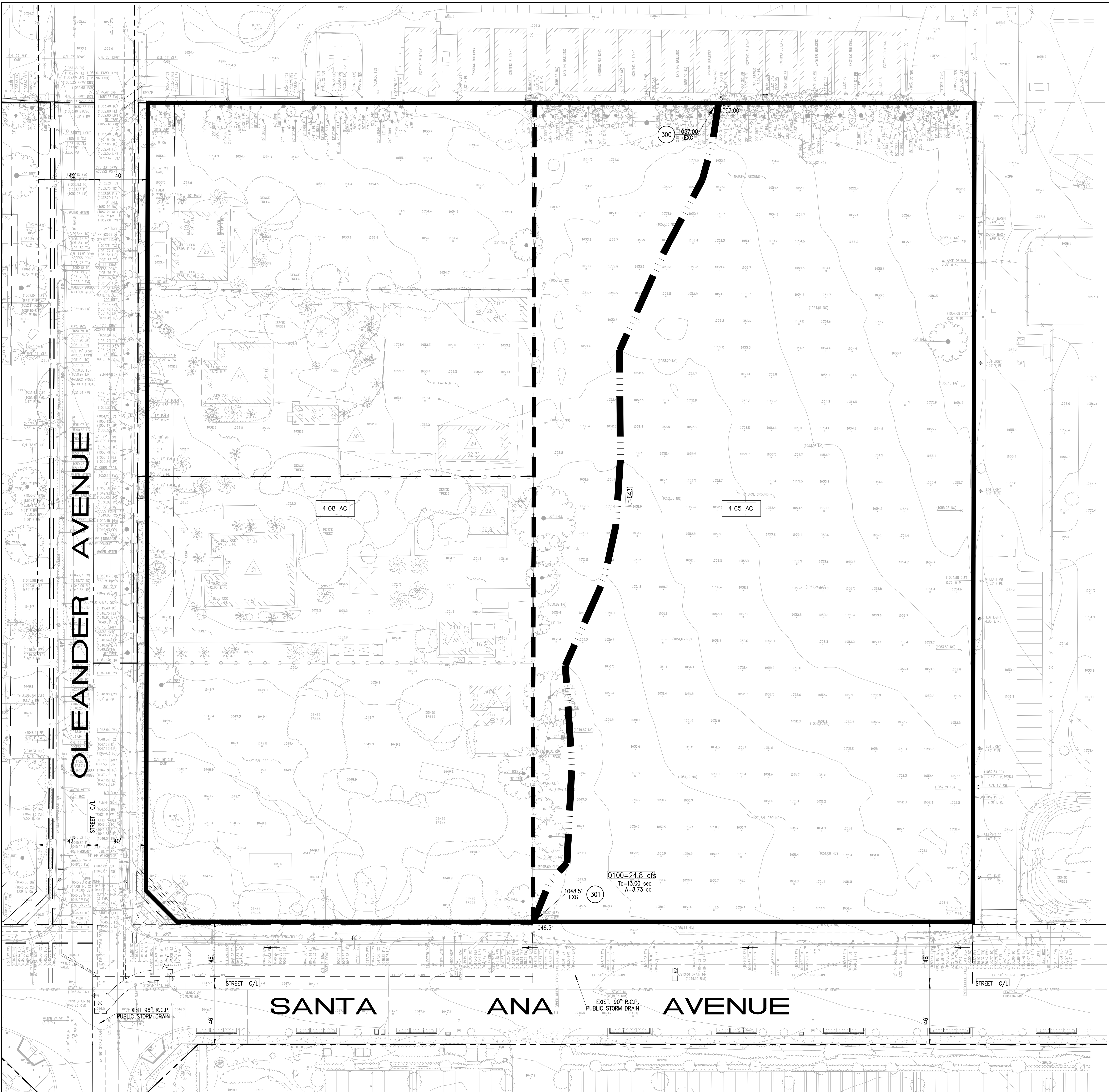
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END OF RATIONAL METHOD ANALYSIS

APPENDIX C

HYDROLOGY MAP

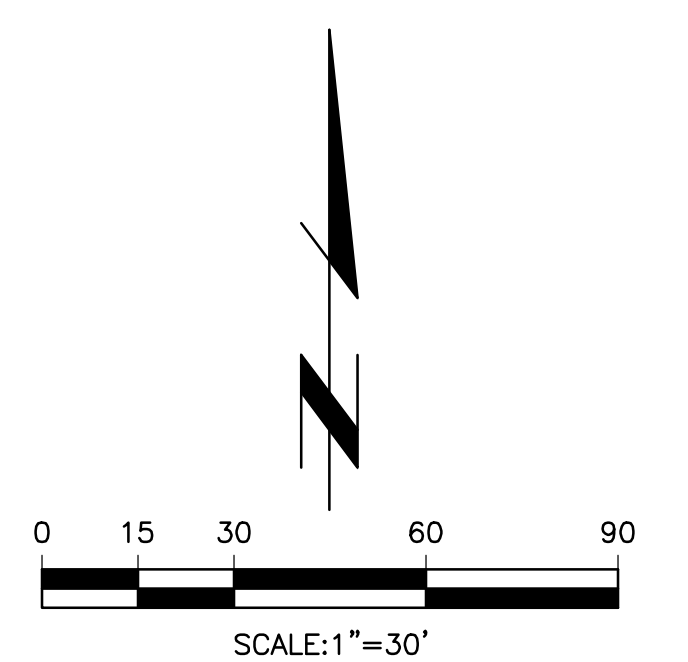


VICINITY MAP
N.T.S.



LEGEND

- PROJECT BOUNDARY
- SUBAREA BOUNDARY
- FLOW PATH
- 1.00 AC. SUBAREA AREA
- NODE NUMBER



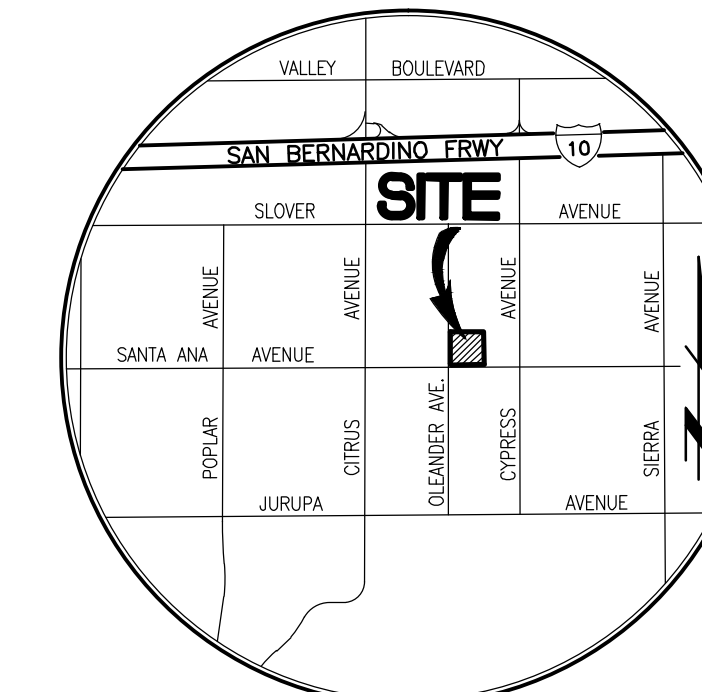
Last Update: 8/18/22
 01\3600-2689\3615\Building 3\3615 B3 HYD-EX-PREL.dwg
CITY OF FONTANA
 ENGINEERING DEPARTMENT
HYDROLOGY MAP
(EXISTING CONDITION)
BUILDING 3
SANTA ANA AVENUE
INDUSTRIAL DEVELOPMENT
FONTANA, CA

PREPARED FOR:
 ACACIA REAL ESTATE GROUP
 260 NEWPORT CENTER DR, SUITE 100
 NEWPORT BEACH, CA 92660
 PHONE: (949) 640-9955

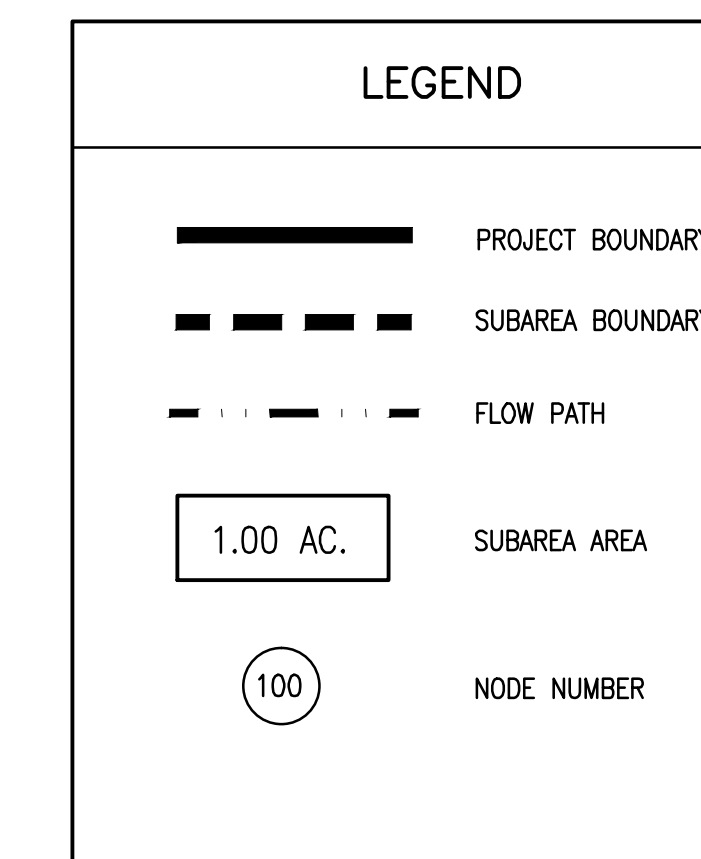
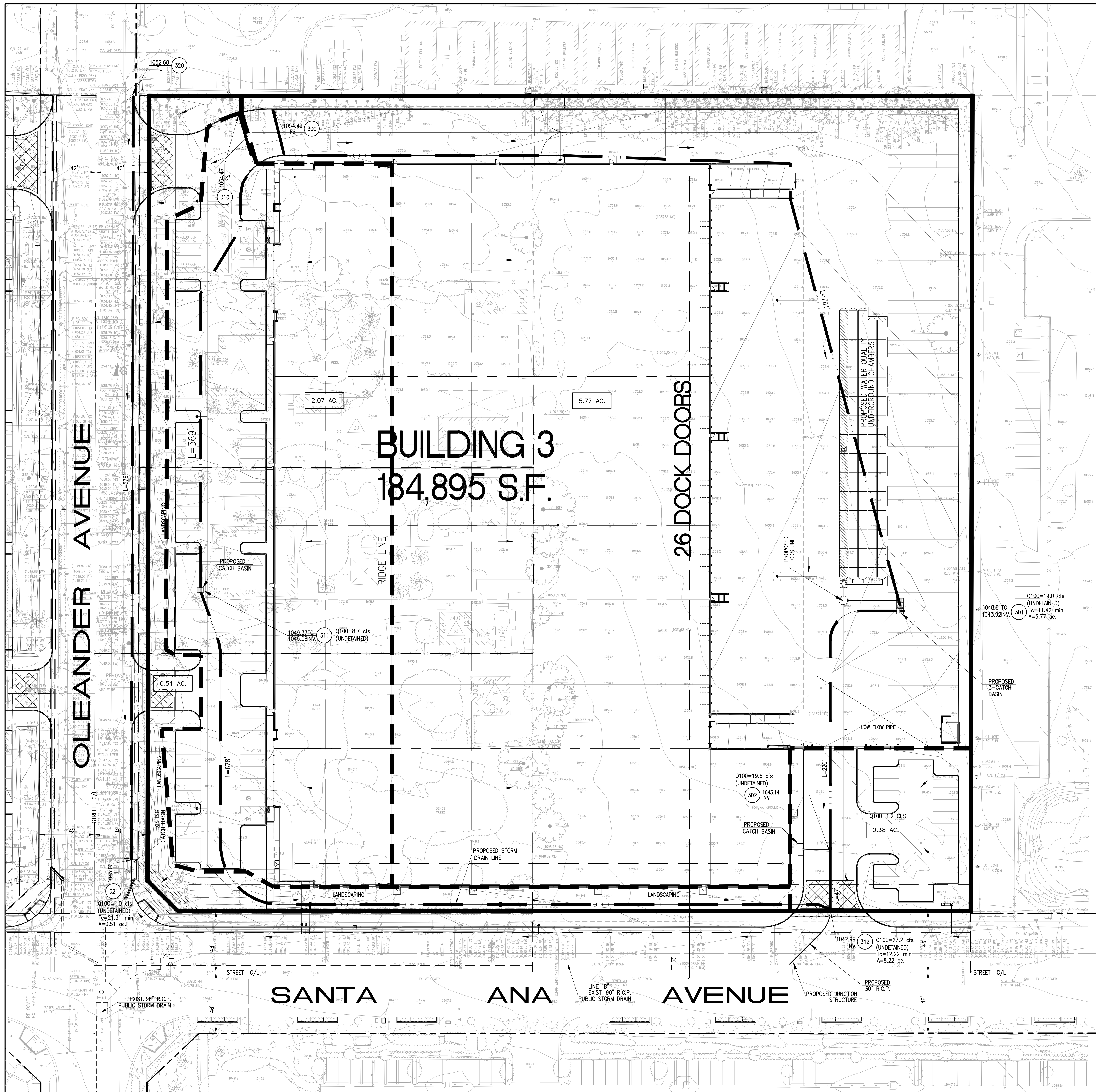
PREPARED BY:
Thienes Engineering, Inc.
 CIVIL ENGINEERING & LAND SURVEYING
 14346 FORESTONE BOULEVARD
 LA HABRA, CALIFORNIA 90638
 PH: (714) 521-4811 FAX: (714) 521-4173

Designed by _____	Approved by _____	Date _____
Checked by _____	Public Works Director _____	R.C.E. XXXXX
Designed by _____		
Checked by _____		
Date _____	Sheet 1 of 2	Sheets

3615/1 OF 2 SHEETS



VICINITY MAP
N.T.S.



Last Update: 8/19/22
 C:\3600-3899\3815\Building_3\3815_B3_HYD-PRELIM.dwg

CITY OF FONTANA
 ENGINEERING DEPARTMENT
HYDROLOGY MAP
(EXISTING CONDITION)
BUILDING 3
SANTA ANA AVENUE
INDUSTRIAL DEVELOPMENT
FONTANA, CA

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

Sheet **1** of **2** Sheets

PREPARED FOR:
 ACACIA REAL ESTATE GROUP
 280 NEWPORT CENTER DR, SUITE 100
 NEWPORT BEACH, CA 92660
 PHONE: (949) 640-9995

PREPARED BY:

3615/1 OF 2 SHEETS