Thienes Engineering, Inc.
CIVIL ENGINEERING LAND SURVEYING

PRELIMINARY HYDROLOGY CALCULATIONS

FOR

SANTA ANA AVENUE INDUSTRIAL DEVELOPMENT
(BUILDING 2)
NEC OF SANTA ANA AVE. AND CITRUS AVE.
FONTANA, CA 92337

P21-471

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

MARCH 31, 2022
REVISED AUGUST 18,2022

JOB NO. 3615B

PREPARED BY

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

PRELIMINARY HYDROLOGY CALCULATIONS

FOR

SANTA ANA AVENUE INDUSTRIAL DEVELOPMENT (BUILDING 2)

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 and west of Oleander Avenue in the City of Fontana. See following page for vicinity map.

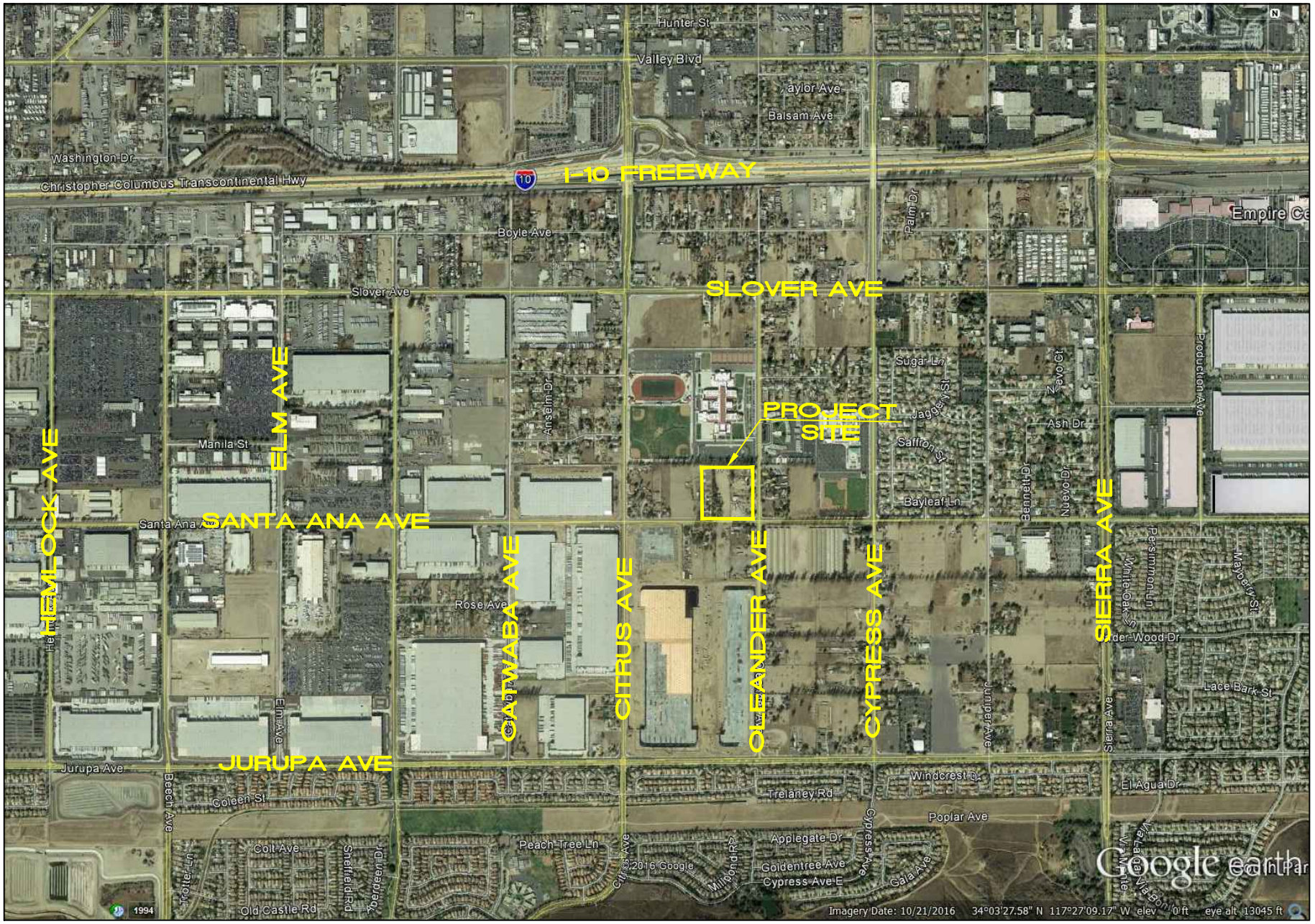
B: STUDY PURPOSE

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 2)

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

Last Update: 3/30/22
O:\3600-3699\3615\3615VicMap.dwg

DISCUSSION

The proposed project site encompasses a total area of approximately 8.7 acres. There will be one proposed warehouse type building with a floor area of approximately 188,336 square feet. A truck yard will be located on the westerly side of the building. Proposed driveways will be located adjacent to the streets. Vehicle parking will be provided on the east and southwesterly side of the proposed buildings. There will be landscaping around the area and adjacent to Santa Ana Avenue and Oleander Avenue. A proposed CDS unit and underground chambers west of the proposed building for water quality purposes.

Master Plan of Drainage

Per City of Fontana's Master Plan of Drainage Plan Line DZ-8 prepared by L.D. King dated May 2000, The project site is tabled to the existing 30" R.C.P. public storm drain Line "A" in Santa Ana Avenue south of the project site which connects to an existing 54" R.C.P. storm drain at Citrus Avenue.

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 low-density residential with open space area where runoff from the project site drains southerly towards Santa Ana Avenue. Flow appears to discharge to the street via the existing driveways and conveyed westerly to an existing curb opening catch basin that drains to an existing 30" R.C.P. public storm drain in Santa Ana Avenue. The existing 30" R.C.P. connects to an existing 54" R.C.P. at the intersection of Santa Ana Avenue and Citrus Avenue. The existing condition 100-year peak flow rate tributary to the site is approximately 22.1 cfs.

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

Proposed Condition

Runoff from the project site at proposed condition will be limited to existing condition. Flows from Buildings #2 will maintain the drainage pattern at existing condition. Runoff from the westerly portion of the building (node 200-201) will drain into a proposed catch basin at the truck yard and conveyed south via a proposed storm drain Line A2. Flows from the easterly parking area (node 210-212) will drain and connect to Line A2 downstream.

A southwesterly parking area will drain and connects (node 202) to Line A2. The 100-year peak flow rate from these locations (node 212) is approximately 27.6 cfs. undetained.
The remaining southerly (node 220-221) and easterly (node 230-231) landscaped area adjacent to Santa Ana Avenue and Oleander Avenue will drain south and into an existing catch basin downstream. The 100-year peak flow rate at node 221 and node 231 are approximately 0.3 cfs. and 0.2 cfs. Therefore, the total 100-year peak flow rate tributary to the project site (Building #2) at proposed condition is approximately 28.1 cfs (27.6 cfs + 0.3 cfs + 0.2 cfs) undetained.

Runoff from Building #2 at proposed condition is higher than the existing condition 22.1 cfs). Therefore, temporary detention is required onsite to limit runoff volume discharge from the site. Temporary storage will be provide at the westerly truck yard.
.

Detention

Runoff discharge from Building #2 will be limited to existing condition. Runoff volume that exceeds the allowable condition will be stored temporarily at the truck yard. Discharge from Building #2 will be limited to or should be less than 22.1 cfs. The additional runoff volume will be temporarily detained above ground in the easterly truck yard. This will require approximately 0.098 acre-feet (4,269 cubic feet) of storage with a ponding depth of approximately 0.95'.

The total 100-year peak flow rate from the project site tributary to the existing 30" R.C.P. in Santa Ana Avenue is approximately 22.1 cfs. (21.6 cfs. + 0.3 cfs + 0.2 cfs.) at detained condition which is comparable to the existing condition. Therefore, the project site improvements will not impose a negative impact on the existing offsite drainage facilities downstream. Onsite storm drain pipe lateral sizes and hydraulics will be determined during the project's final design phase to reduce proposed condition discharge to existing condition discharge.

See Appendix "C" for Detention Calculations.

Water Quality

Runoff from Buildings #2 will drain to proposed catch basins and conveyed to proposed underground chambers located at the westerly truck yard 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 “A” 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 EXISTING CONDITION PROPOSED CONDITION
C	DETENTION ANALYSIS
D	HYDROLOGY MAP

APPENDIX A

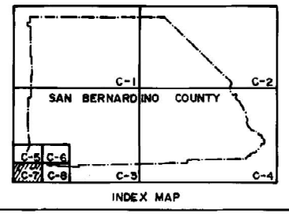
REFERENCE MATERIALS

PROJECT SITE

SOURCE: 1977 SCS SURVEY

SOIL TYPE "A"

SAN BERNARDINO COUNTY
HYDROLOGY MANUAL



INDEX MAP

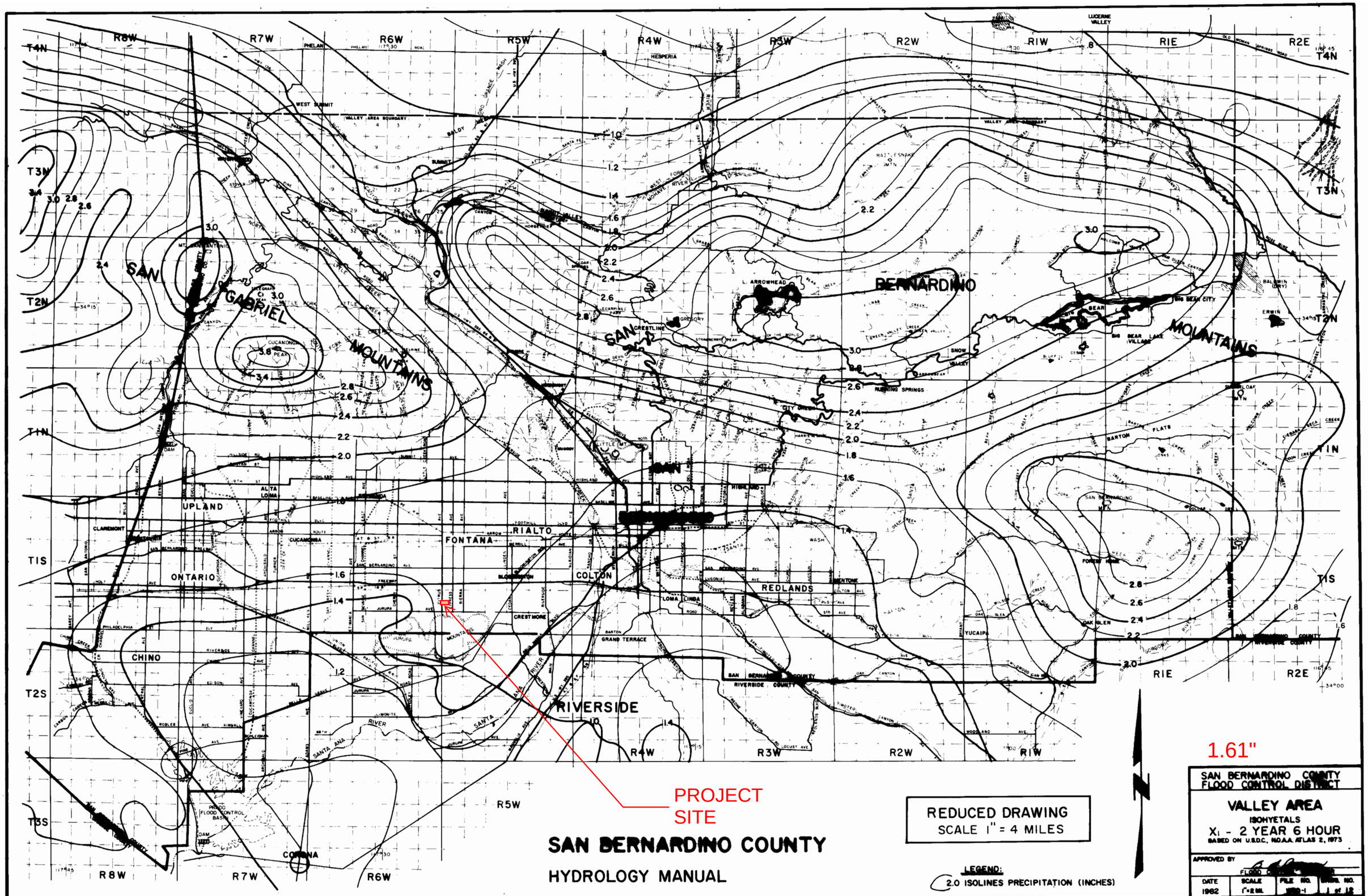
LEGEND
- SOIL GROUP BOUNDARY
- A — SOIL GROUP DESIGNATION
- BOUNDARY OF INDICATED SOURCE

SCALE 1:48,000

SCALE REDUCED BY 1/2

HYDROLOGIC SOILS GROUP MAP
FOR
SOUTHWEST-C AREA

FIGURE C-15



SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

REDUCED DRAWING
SCALE 1" = 4 MILES

LEGEND:
2.0 ISOLINES PRECIPITATION (INCHES)

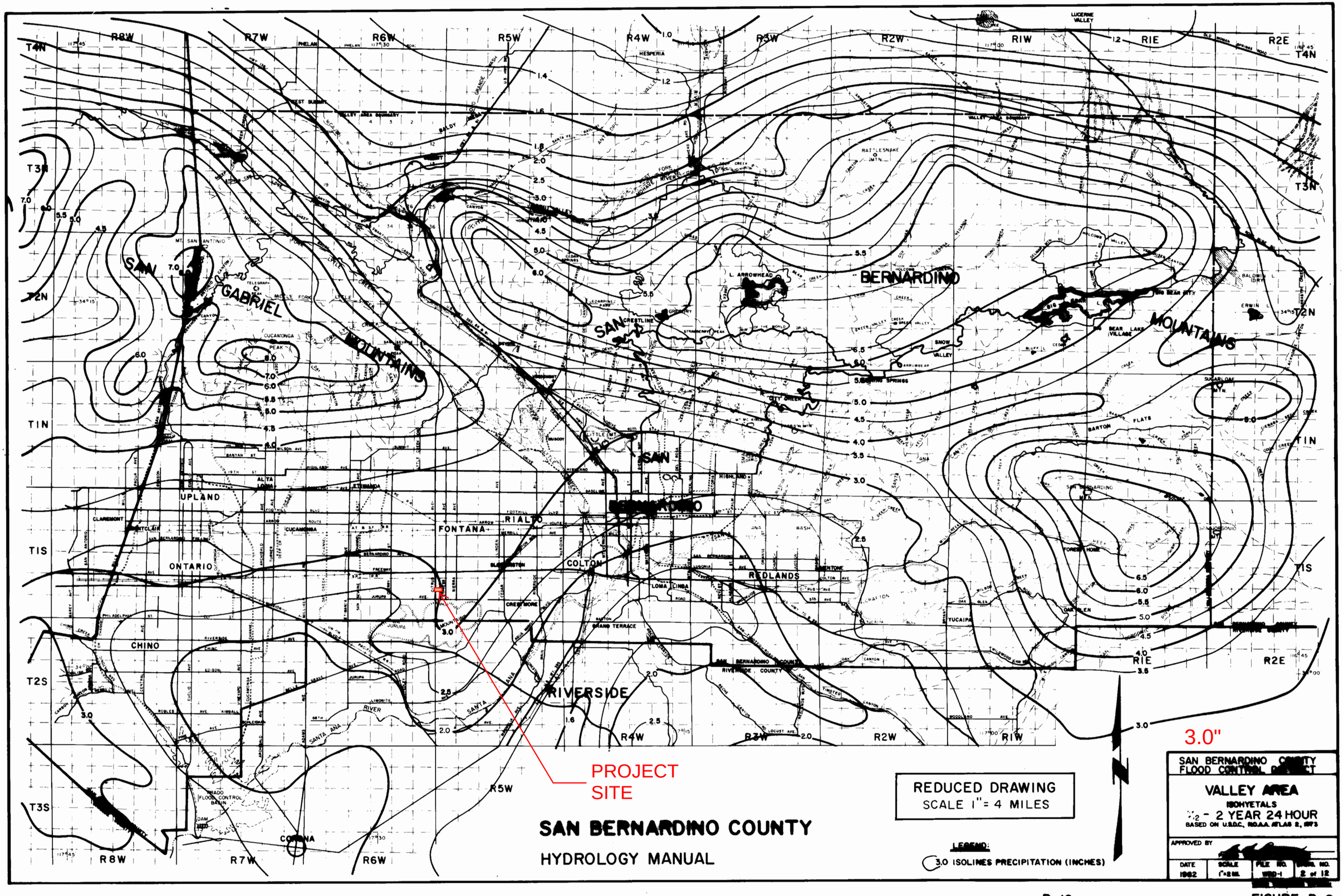
SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT

VALLEY AREA
ISOHYETALS
X_1 - 2 YEAR 6 HOUR
BASED ON U.S.D.C., N.O.A.A. ATLAS 2, 1973

APPROVED BY
FLOOD CONTROL ENGINEER

DATE	SCALE	FILE NO.	DRWG. NO.
1982	1"=2 MI.		1 of 12

FIGURE B-1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R7W
R6W
R5W
R4W
R3W
R2W
R1W
R1E
R2E
T4N
T3N
T2N
T1N
T1S
T2S
T3S
SAN GABRIEL MOUNTAINS
SAN BERNARDINO MOUNTAINS
UPLAND
ONTARIO
CHINO
FONTANA
RIALTO
COLTON
REDLANDS
LOMA LINDA
CRESTMORE
RIVERSIDE
CORONA
SAN BERNARDINO
HESPERIA
VICTORVILLE
APPLE VALLEY
LUCERNE VALLEY
BIG BEAR CITY
BIG BEAR LAKE
BIG BEAR VILLAGE
SNOW VALLEY
ARROWBEAR
L. ARROWHEAD
L. GREGORY
CRESTLINE
RATTLESNAKE MTN
SAN BERNARDINO MTN
YUCAIPA
BARTON FLATS
SUGARLOAF
ERWIN L.
BALDWIN L. (DRY)
PROJECT SITE
3.0"
REDUCED DRAWING
SCALE 1" = 4 MILES
LEGEND:
3.0 ISOLINES PRECIPITATION (INCHES)
SAN BERNARDINO COUNTY
HYDROLOGY MANUAL
SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT
VALLEY AREA
ISOHYETALS
½ - 2 YEAR 24 HOUR
BASED ON U.S.D.C., N.O.A.A. ATLAS 2, 1973
APPROVED BY
DATE 1982
SCALE 1"=2 MI.
FILE NO. HYD-1
DRWG. NO. 2 of 12

FIGURE B-2

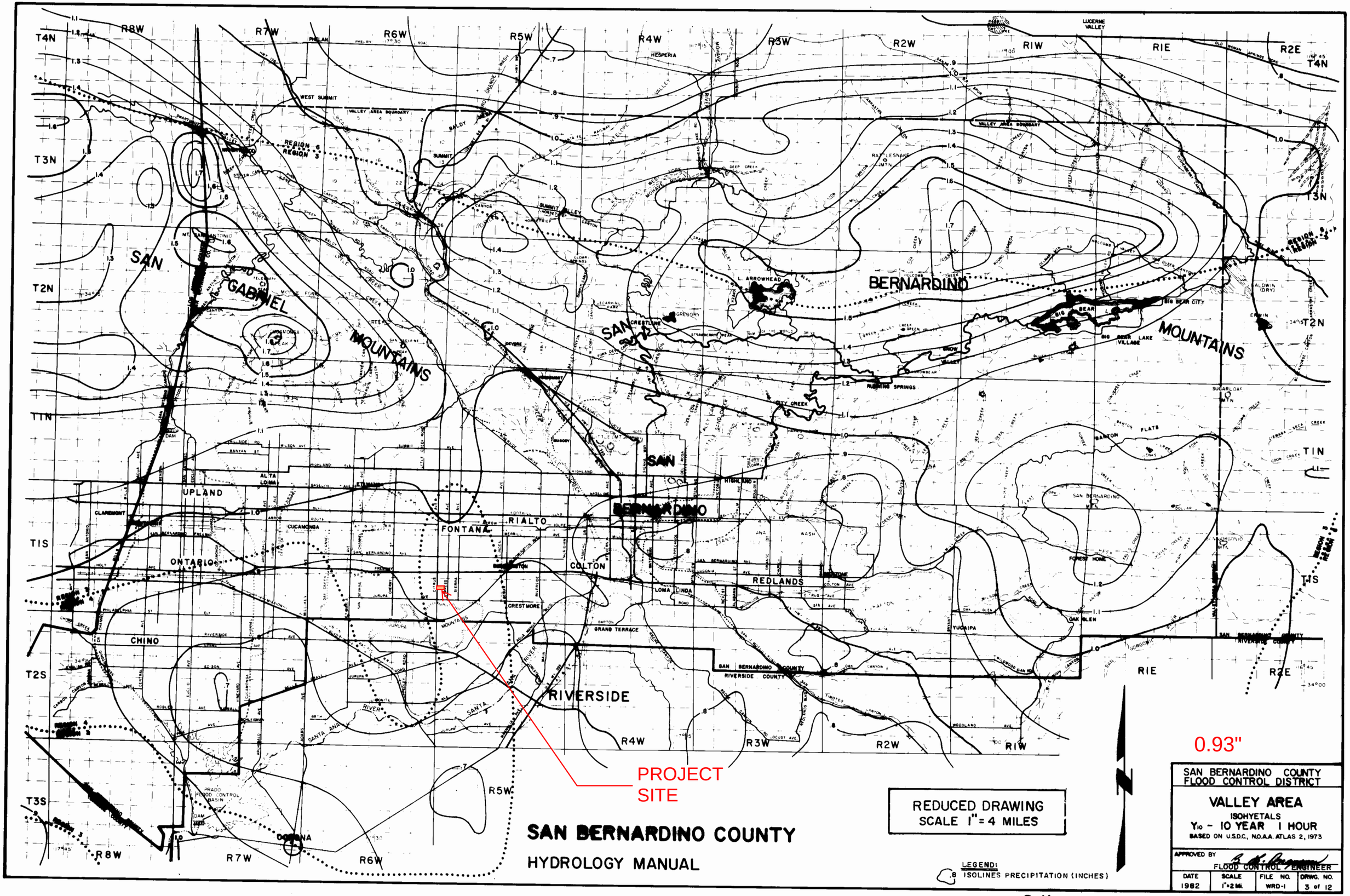

R8W
R7W
R6W
R5W
R4W
R3W
R2W
R1W
R1E
R2E
T4N
T3N
T2N
T1N
T1S
T2S
T3S
SAN GABRIEL MOUNTAINS
SAN BERNARDINO MOUNTAINS
SAN BERNARDINO
RIVERSIDE
UPLAND
ONTARIO
CHINO
CLAREMONT
ALTA LOMA
CUCAMONGA
FONTANA
RIALTO
COLTON
REDLANDS
LOMA LINDA
GRAND TERRACE
CREST MORE
YUCAIPA
CRESTLINE
LAKE ARROWHEAD
RUNNING SPRINGS
BIG BEAR LAKE
BIG BEAR CITY
BIG BEAR LAKE VILLAGE
SNOW VALLEY
HESPERIA
LUCERNE VALLEY
ALDWIN (DRY)
ERWIN
FOREST HOME
OAK GLEN
BARTON FLATS
SUGARLOAF MTN.
SAN BERNARDINO MTN.
MT. SAN ANTONIO
RATTLESNAKE MTN.
WEST SUMMIT
SUMMIT
SUMMIT VALLEY
VALLEY AREA BOUNDARY
REGION 6
REGION 3
REGION 5
REGION 4
SAN BERNARDINO COUNTY
RIVERSIDE COUNTY
PRADO FLOOD CONTROL BASIN
CORONA
PROJECT SITE
SAN BERNARDINO COUNTY
HYDROLOGY MANUAL
REDUCED DRAWING
SCALE 1" = 4 MILES
LEGEND:
.8 ISOLINES PRECIPITATION (INCHES)
0.93"
SAN BERNARDINO COUNTY
FLOOD CONTROL DISTRICT
VALLEY AREA
ISOHYETALS
Y10 - 10 YEAR 1 HOUR
BASED ON U.S.D.C., N.O.A.A. ATLAS 2, 1973
APPROVED BY
FLOOD CONTROL ENGINEER
DATE 1982
SCALE 1"=2 Mi.
FILE NO. WRD-1
DRWG. NO. 3 of 12

FIGURE B-3

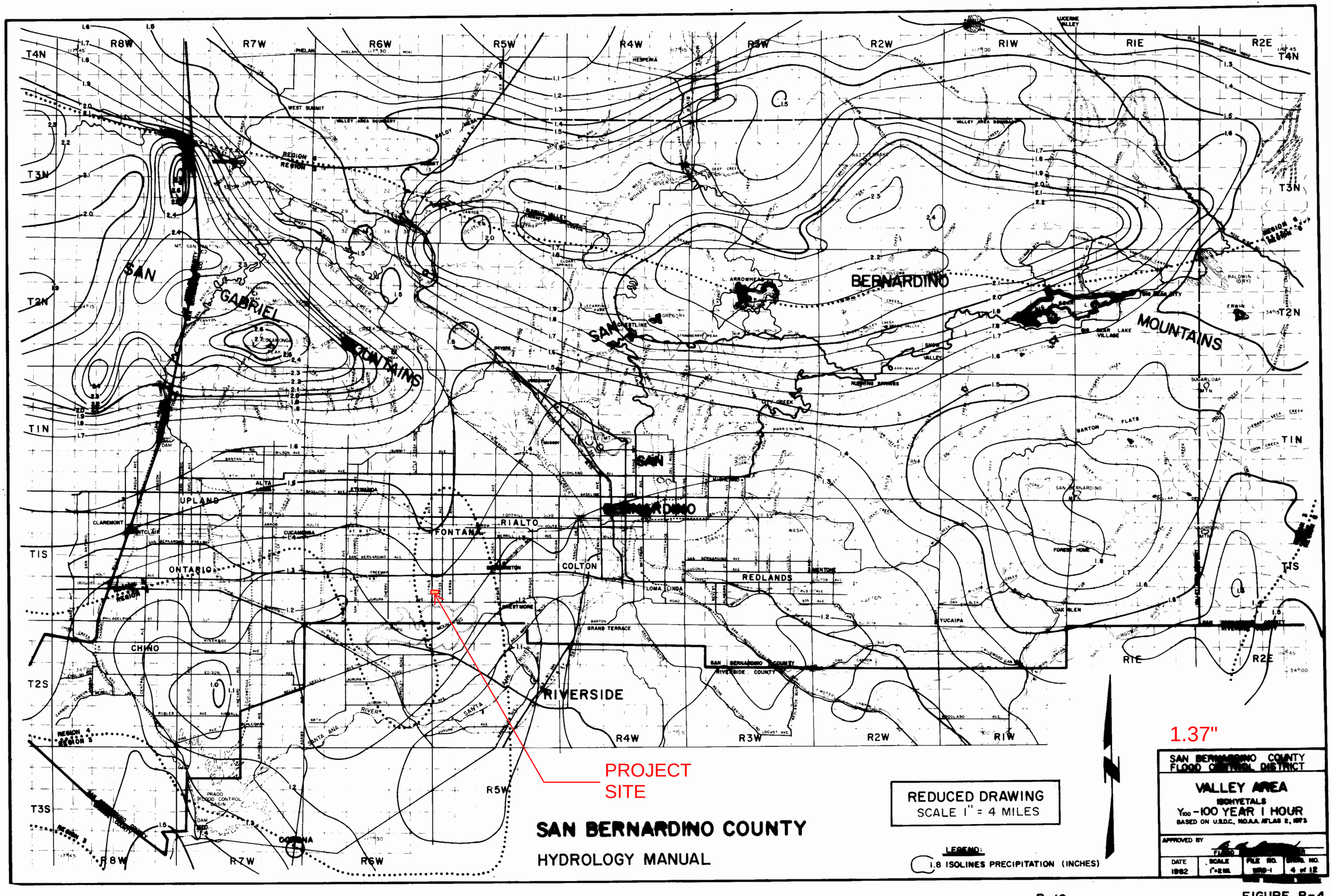
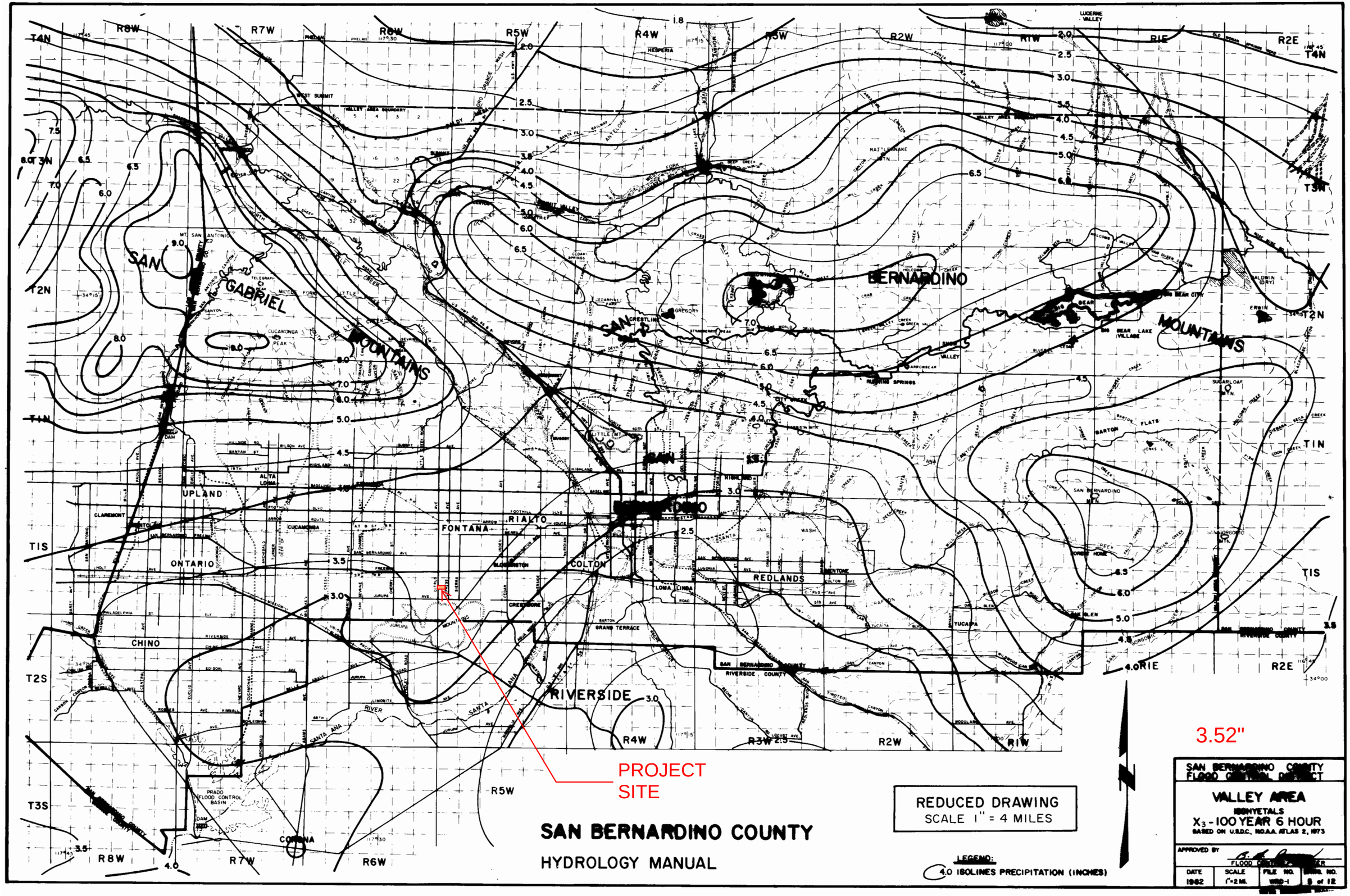

R8W
R7W
R6W
R5W
R4W
R3W
R2W
R1W
R1E
R2E
T4N
T3N
T2N
T1N
T1S
T2S
T3S
SAN GABRIEL MOUNTAINS
SAN BERNARDINO MOUNTAINS
UPLAND
CLAREMONT
ONTARIO
CHINO
FONTANA
RIALTO
COLTON
REDLANDS
LOMA LINDA
YUCAIPA
RIVERSIDE
SAN BERNARDINO
HESPERIA
PHELAN
WEST SUMMIT
LUCERNE VALLEY
BALDWIN L. (DRY)
ERWIN L.
BIG BEAR LAKE
BIG BEAR CITY
L. ARROWHEAD
RUNNING SPRINGS
SNOW VALLEY
BARTON FLATS
SUGARLOAF MTN
SAN BERNARDINO MTN
OLD WOMAN SPRINGS ROAD
PRADO FLOOD CONTROL BASIN
PROJECT SITE
REDUCED DRAWING
SCALE 1" = 4 MILES
LEGEND:
1.8 ISOLINES PRECIPITATION (INCHES)
SAN BERNARDINO COUNTY
HYDROLOGY MANUAL
1.37"
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 1982
SCALE 1"=2MI.
FILE NO. SHD-1
SHEET NO. 4 of 12

FIGURE B-4



B-13

FIGURE B-5

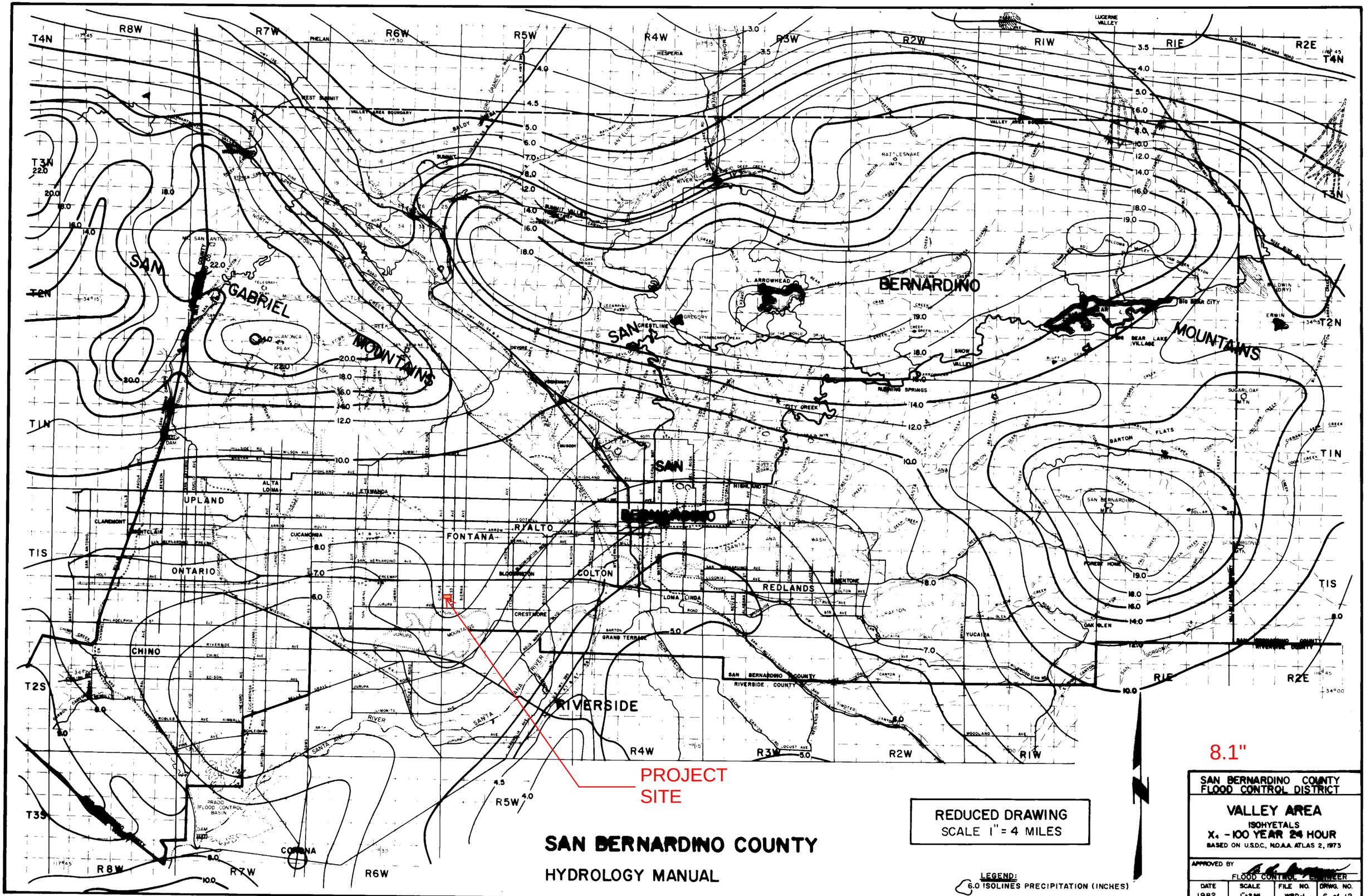

SAN GABRIEL MOUNTAINS
SAN BERNARDINO MOUNTAINS
SAN BERNARDINO
RIVERSIDE
PROJECT SITE
T4N
T3N
T2N
T1N
T1S
T2S
T3S
R8W
R7W
R6W
R5W
R4W
R3W
R2W
R1W
R1E
R2E
UPLAND
ONTARIO
CHINO
FONTANA
RIALTO
COLTON
REDLANDS
LOMA LINDA
CRESTLINE
RUNNING SPRINGS
SNOW VALLEY
BIG BEAR CITY
BEAR LAKE VILLAGE
ERWIN
FAWNSKIN
SUGARLOAF
HESPERIA
APPLE VALLEY
LUCERNE VALLEY
YUCAIPA
CORONA
PRADO FLOOD CONTROL BASIN
SAN BERNARDINO COUNTY
RIVERSIDE COUNTY
REDUCED DRAWING
SCALE 1" = 4 MILES
LEGEND:
6.0 ISOLINES PRECIPITATION (INCHES)
8.1"
SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT
VALLEY AREA
ISOHYETALS
X₆ - 100 YEAR 24 HOUR
BASED ON U.S.D.C., N.O.A.A. ATLAS 2, 1973
APPROVED BY
FLOOD CONTROL ENGINEER
DATE 1982
SCALE 1"=2 MI.
FILE NO. WRD-1
DRWG. NO. 6 of 12
SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

FIGURE B-6

124-02.4
6-28-00

FINAL ENGINEERING REPORT

FOR THE
CITRUS AVENUE STORM DRAIN
(Fontana Master Plan Line DZ-8)

Prepared For:

CITY OF FONTANA
8353 Sierra Avenue
Fontana, California 92335

Prepared By:

L.D. KING, INC.
2151 Convention Center Way, Suite 100
Ontario, California 91764
Telephone: (909) 937-0200
Fax: (909) 937-0202

Please return to (sole copy) 9/2003

Douglas H. Mays, P.E. 6/13/00 R.C.E. 21062

May, 2000

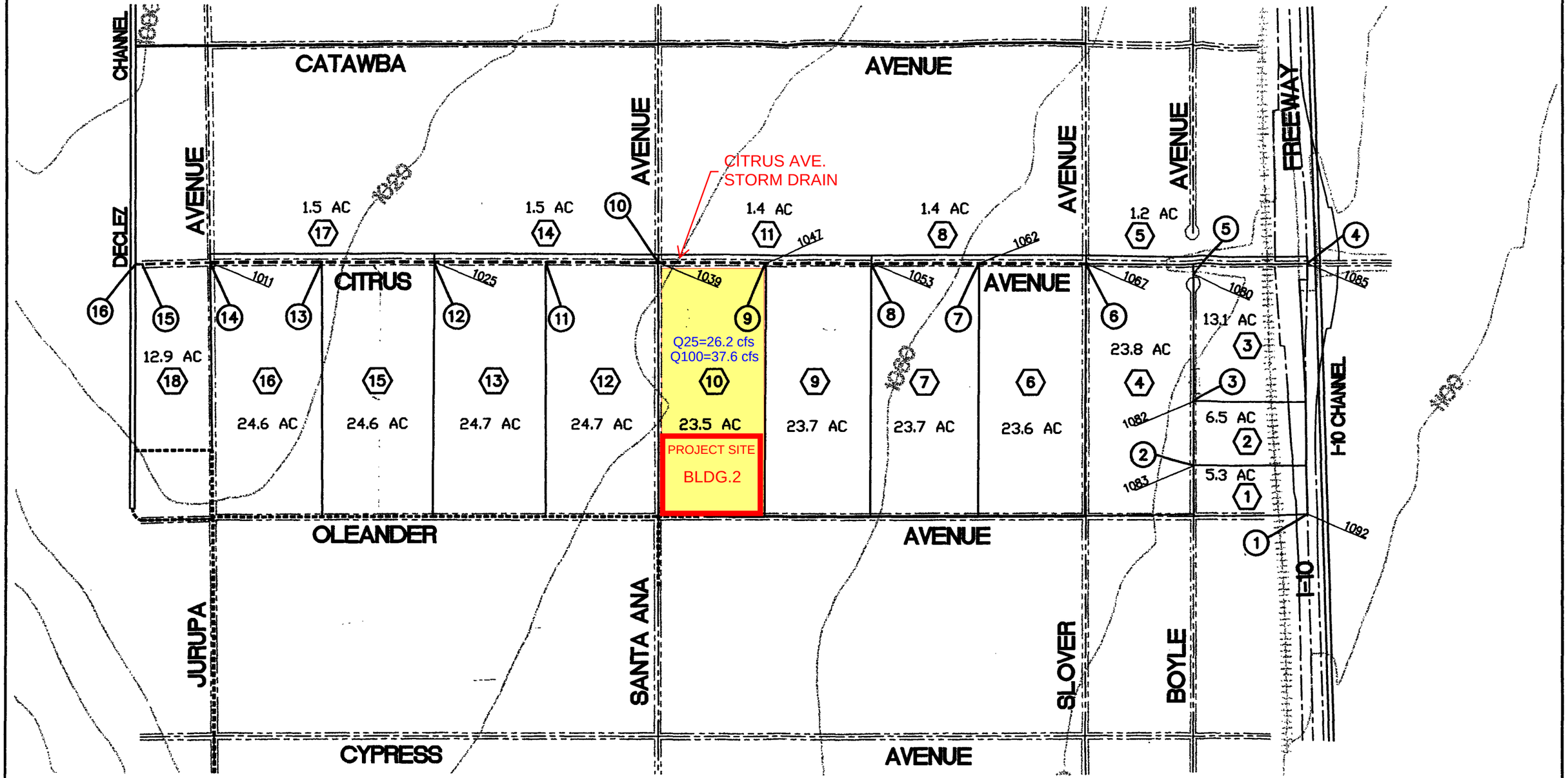
LDKING

CITY OF FONTANA

Graciela Martinez
Assistant Engineer

Voice (909) 350-6522
Fax (909) 350-6618
gmartinez@fontana.org
www.fontana.org

Community Development Department
8353 Sierra Avenue, Fontana, California 92335



LEGEND

- NODE
- SUBAREA
- GROUND SURFACE ELEVATION
- STUDY AREA BOUNDARY
- MASTER PLAN STORM DRAINS
- EXISTING MASTER PLAN STORM DRAINS
- FUTURE MASTER PLAN STORM DRAINS
- PROPOSED STORM DRAIN

SCALE: 1" = 600'

L.D. KING, INC.
2151 CONVENTION CENTER WAY
SUITE 100
ONTARIO, CA 91764
(909) 937-0200

CITY OF FONTANA

FIGURE 6
DRAINAGE SUBAREAS MAP

Table IIIb
City of Fontana
Citrus Avenue Storm Drain
Preliminary Engineering

Hydrologic Analysis Results

Subarea	Total Area (ac)	25-Year Runoff (cfs)		100-Year Runoff (cfs)
1	5.3	13.3		16.8
2	6.5	14.1		17.9
3	13.1	22.9		29.7
4	23.8	40.6		52.7
5	1.2	2.0		2.6
6	23.6	40.1	1.)	52.7
7	23.7	27.8		39.6
8	1.4	1.7		2.4
9	23.7	26.9		38.6
10	23.5	26.0		37.4
11	1.4	1.6		2.2
12	24.7	26.6		38.4
13	24.7	25.9		37.6
14	1.5	1.6		2.3
15	24.6	25.2		36.6
16	24.6	24.6		35.9
17	1.5	1.5		2.2
18	12.9	12.4		18.2
Total:	**261.7**	**307.9**		**436.3**

1.) Combined Flow = 43.6 cfs

```
 PIPE TRAVEL TIME(MIN.) =    0.77     Tc(MIN.) =   25.83
 LONGEST FLOWPATH FROM NODE       1.00 TO NODE      10.00 =   5468.10 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE       9.00 TO NODE      10.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  25.83
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  1.824
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN

 RESIDENTIAL
 "3-4 DWELLINGS/ACRE"         A       23.50     0.98        0.60     32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.60          Q25
 SUBAREA AREA(ACRES) =    23.50      SUBAREA RUNOFF(CFS) =    26.20
 EFFECTIVE AREA(ACRES) =   145.80    AREA-AVERAGED Fm(INCH/HR) =  0.34
 AREA-AVERAGED Fp(INCH/HR) =  0.98   AREA-AVERAGED Ap =  0.35
 TOTAL AREA(ACRES) =   145.80        PEAK FLOW RATE(CFS) =     194.32

****************************************************************************
 FLOW PROCESS FROM NODE       8.00 TO NODE      10.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  25.83
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  1.824
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN

 RESIDENTIAL
 "3-4 DWELLINGS/ACRE"         A        1.40     0.98        0.60     32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.60
 SUBAREA AREA(ACRES) =     1.40      SUBAREA RUNOFF(CFS) =     1.56
 EFFECTIVE AREA(ACRES) =   147.20    AREA-AVERAGED Fm(INCH/HR) =  0.35
 AREA-AVERAGED Fp(INCH/HR) =  0.98   AREA-AVERAGED Ap =  0.35
 TOTAL AREA(ACRES) =   147.20        PEAK FLOW RATE(CFS) =     195.88

****************************************************************************
 FLOW PROCESS FROM NODE      10.00 TO NODE      11.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1039.00  DOWNSTREAM(FEET) =  1032.00
 FLOW LENGTH(FEET) =   692.25   MANNING'S N =  0.013
 DEPTH OF FLOW IN  57.0 INCH PIPE IS  41.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  14.18
 ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    195.88
 PIPE TRAVEL TIME(MIN.) =    0.81     Tc(MIN.) =   26.65
 LONGEST FLOWPATH FROM NODE       1.00 TO NODE      11.00 =   6160.35 FEET.

****************************************************************************
```

```
 PIPE TRAVEL TIME(MIN.) =    0.71     Tc(MIN.) =  25.03
 LONGEST FLOWPATH FROM NODE       1.00 TO NODE      10.00 =  5468.10 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE       9.00 TO NODE      10.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  25.03
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.365
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE"         A       23.50     0.98        0.60    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.60
 SUBAREA AREA(ACRES) =  23.50      SUBAREA RUNOFF(CFS) =  37.65
 EFFECTIVE AREA(ACRES) =  145.80   AREA-AVERAGED Fm(INCH/HR) =  0.34
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.35
 TOTAL AREA(ACRES) =  145.80       PEAK FLOW RATE(CFS) =  265.39

****************************************************************************
 FLOW PROCESS FROM NODE       8.00 TO NODE      10.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN) =  25.03
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.365
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "3-4 DWELLINGS/ACRE"         A        1.40     0.98        0.60    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.60
 SUBAREA AREA(ACRES) =  1.40       SUBAREA RUNOFF(CFS) =  2.24
 EFFECTIVE AREA(ACRES) =  147.20   AREA-AVERAGED Fm(INCH/HR) =  0.35
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.35
 TOTAL AREA(ACRES) =  147.20       PEAK FLOW RATE(CFS) =  267.63

****************************************************************************
 FLOW PROCESS FROM NODE      10.00 TO NODE      11.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1039.00  DOWNSTREAM(FEET) =  1032.00
 FLOW LENGTH(FEET) =  692.25   MANNING'S N =  0.013
 DEPTH OF FLOW IN  63.0 INCH PIPE IS  47.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  15.24
 ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =  1
 PIPE-FLOW(CFS) =  267.63
 PIPE TRAVEL TIME(MIN.) =  0.76     Tc(MIN.) =  25.79
 LONGEST FLOWPATH FROM NODE       1.00 TO NODE      11.00 =  6160.35 FEET.

****************************************************************************
```

Q100

STORM DRAIN IMPROVEMENT PLANS
FOR
CITRUS AVENUE
FROM JURUPA AVENUE TO SLOVER AVENUE
IN THE CITY OF FONTANA
AND THE
COUNTY OF SAN BERNARDINO

NOTICE TO CONTRACTORS

California Council of Civil Engineers & Land Surveyors

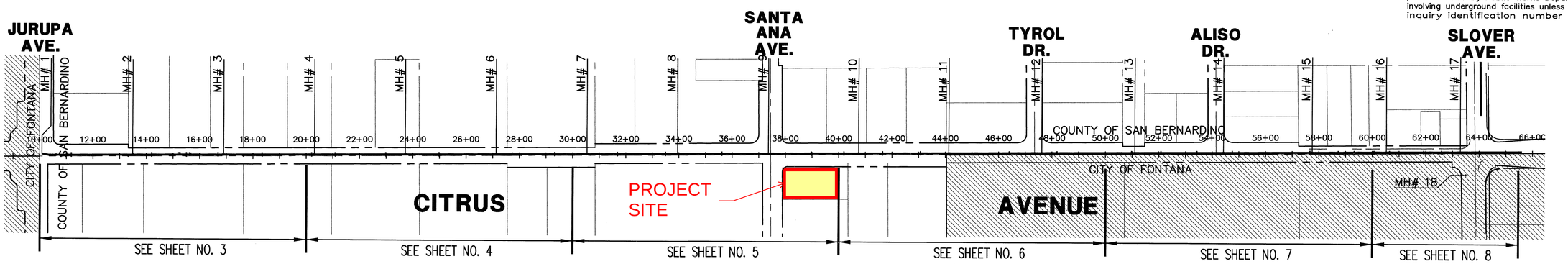
Construction contractor agrees that in accordance with generally accepted construction practices, construction contractor will be required to assume sole and complete responsibility for job site conditions during the course of construction of the project, including safety of all persons and property; that this requirement shall be made to apply continuously and not be limited to normal working hours, and construction contractor further agrees to defend, indemnify and hold design professional harmless from any and all liability, real or alleged, in connection with the performance of work on this project, excepting liability arising from the sole negligence of design professional.

All contractor and subcontractors performing work shown on or related to these plans shall conduct their operations so that employees are provided a safe place to work and the public is protected. All contractors and subcontractors shall comply with the "Occupational Safety and Health Regulations" of the U.S. Department of Labor and with the State of California Department of Industrial Relations "Construction Safety Orders". The Civil Engineer shall not be responsible in any way for the contractor or subcontractors compliance with said regulations and orders.

PRIVATE ENGINEER'S NOTICES TO CONTRACTORS

The existence and approximate location of any underground utilities or structures shown on these plans are obtained by a search of available records. To the best of our knowledge, there are no existing utilities or structures except as shown on these plans. The engineer assumes no liability as to the exact location of said lines nor for utilities or irrigation lines whose locations are not shown. The contractor shall be responsible for notifying all utility and irrigation companies prior to work on excavation to determine exact location of all lines affecting this work, whether or not shown heron, and for any damage or protection of these lines.

The contractor shall call in a location request to Underground Service Alert (U.S.A.) Phone 1-800-227-2600 two (2) working days prior to digging. No construction permit issued by Public Works Department shall be valid involving underground facilities unless the applicant has an inquiry identification number issued by U.S.A.



CONSTRUCTION NOTES

1. CONSTRUCT 66" R.C.P. (1350D)
2. CONSTRUCT 60" R.C.P. (1350D)
3. CONSTRUCT 54" R.C.P. (1350D)
4. CONSTRUCT 48" R.C.P. (1350D)
5. CONSTRUCT 42" R.C.P. (1350D)
6. NOT USED
7. CONSTRUCT 30" R.C.P. (2000D)
8. CONSTRUCT 24" R.C.P. (2000D)
9. CONSTRUCT MANHOLE PER AMERICAN PUBLIC WORKS ASSOCIATION STANDARD PLAN 320-1 EXCEPT MANHOLE COVER PER SAN BERNARDINO COUNTY TRANSPORTATION DEPARTMENT STANDARD PLAN 205
10. CONSTRUCT JUNCTION STRUCTURE PER AMERICAN PUBLIC WORKS ASSOCIATION STANDARD PLAN 332-1, CASE 1
11. CONSTRUCT CATCH BASIN PER SAN BERNARDINO COUNTY TRANSPORTATION DEPARTMENT STANDARD DWG. 206 AND 206A WITH LOCAL DEPRESSION PER SBCTD STD. DWG. 203B
12. CONSTRUCT TRANSITION STRUCTURE RCB TO PIPE PER A.P.W.A. STD. PLAN 342-1 AND 342-2
13. CONSTRUCT CONCRETE BULKHEAD PER DETAIL "C" ON SHEET NO. 9
14. REMOVE EXISTING INLET AND LATERAL
15. CONSTRUCT STORM DRAIN INLET PER DETAIL "B" SHEET 8
16. CONSTRUCT CAST-IN-PLACE REINFORCED CONCRETE SINGLE BOX CULVERT PER CALTRANS STD. PLAN D80 (SPAN=8', HEIGHT=3', T1=8.5", T2=7", T3=8", STEEL SPACING=6", "a" BAR=#7, "b" BAR=#7)
17. CONSTRUCT CONCRETE COLLAR FOR R.C.P. PER AMERICAN PUBLIC WORKS ASSOCIATION STD. PLAN 380-2

LEGEND

℄	=	CENTERLINE
	=	EDGE OF EXISTING ASPHALT CONCRETE PAVEMENT
EXIST. C & G	=	EXISTING CURB AND GUTTER
R/W	=	EXISTING RIGHT-OF-WAY
LF	=	LINEAR FEET
	=	PROPOSED SEWER
	=	PROPOSED STORM DRAIN
	=	PROPOSED STORM DRAIN MANHOLE
INV.	=	STORM DRAIN INVERT ELEVATION
	=	SURVEY CONTROL TARGET

LEGEND CONT.

(TV)	=	UTILITY INTERFERENCE FLAG (APPROXIMATE LOCATION OF INTERFERENCE WITH TYPE OF UTILITY INDICATED BY: T-TELEPHONE, E-ELECTRIC, W-WATER, G-GAS, SD-STORM DRAIN, S-SEWER, TV-CABLE TELEVISION, U-UNKNOWN UTILITY, IRR-IRRIGATION
(#)	=	#-CURVE DATA
●	=	RECORD SURVEY MONUMENT
EX. A.C. CURB	=	EXISTING ASPHALT CONCRETE CURB
	=	EXISTING DRIVEWAY
UTILITY (ELEV)	=	POTHOLED UTILITY

SHEET INDEX

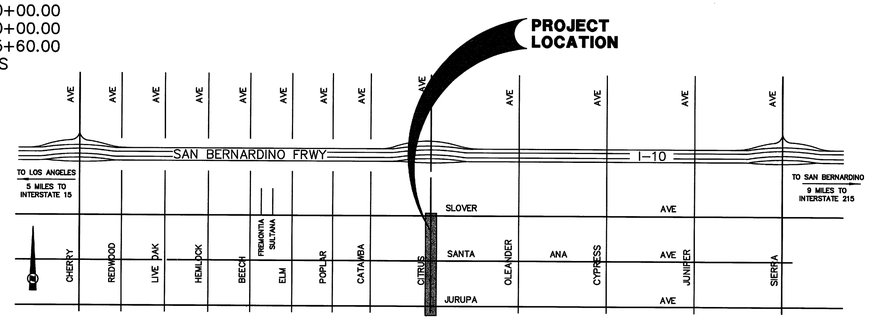
Index Map

SCALE = 1" = 200'

RECORD DRAWINGS

2

THESE RECORD DRAWINGS HAVE BEEN PREPARED, IN PART ON THE BASIS OF INFORMATION COMPILED AND FURNISHED BY OTHERS. THE ENGINEER WILL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH HAVE BEEN INCORPORATED INTO THESE DOCUMENTS AS A RESULT THEREOF.



Vicinity Map

SCALE = N.T.S.

CITY BENCHMARK NO. 289
ELEVATION = 1031.22
RR SPIKE IN POLE NO. 61319 NE COR. OF SANTA ANA AVENUE AND CATAWBA AVENUE

Underground Service Alert

SECTION 4216/4217 OF THE GOVERNMENT CODE REQUIRES A DIG ALERT IDENTIFICATION NUMBER BE ISSUED BEFORE A PERMIT TO EXCAVATE WILL BE VALID FOR YOUR DIG ALERT I.D. NUMBER CALL UNDERGROUND SERVICE ALERT TOLL FREE 1-800-227-2600 TWO WORKING DAYS BEFORE YOU DIG

REV.	REVISION DESCRIPTION	DATE	ENGR.	CITY	DATE
2	RECORD DRAWING	3/02	CHL		
1	Revised Sheets 3, 4, 5, 7, 8, 9	12/00	LDKing		1/3/01

REGISTERED PROFESSIONAL ENGINEER CARL J. FREEMAN No. 16434 Exp. 6/30/01 CIVIL STATE OF CALIFORNIA

LDKING L.D. KING, INC.
2151 CONVENTION CENTER WAY
SUITE 100B
ONTARIO, CA 91764
(909) 937-0200

CARL J. FREEMAN, R.C.E. No. 16434
EXPIRES 6-30-01

12-15-00 DATE

TITLE SHEET
STORM DRAIN IMPROVEMENTS
CITRUS AVENUE
FROM JURUPA AVE. TO SLOVER AVE.

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 CONDITIONS AND STANDARDS IN EFFECT.

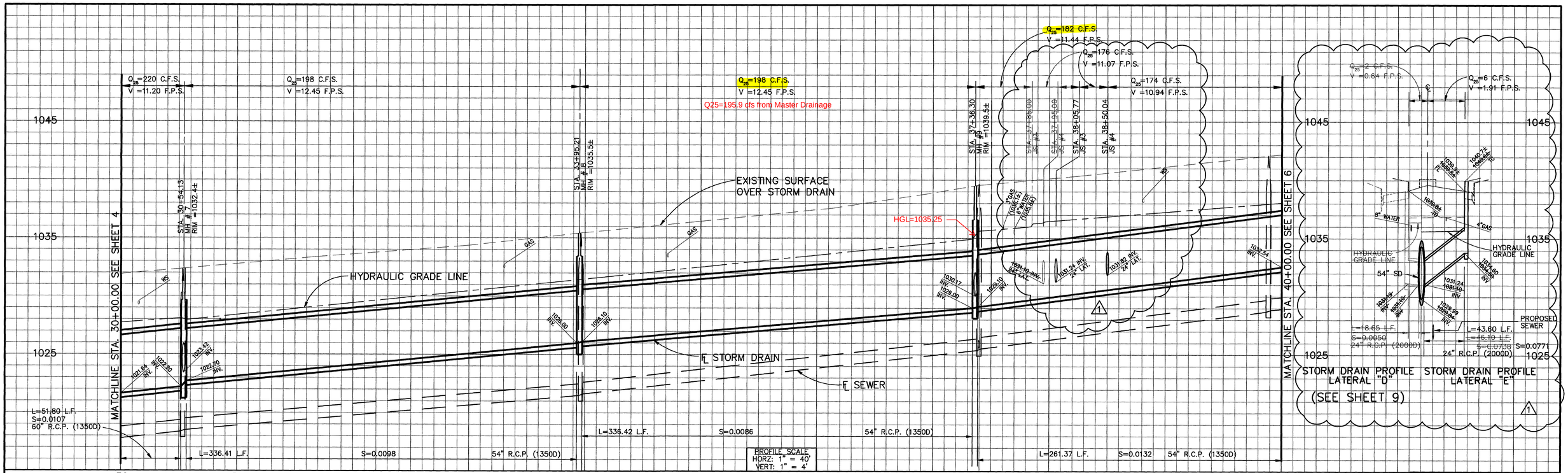
CITY OF FONTANA, CALIFORNIA
CITRUS AVENUE

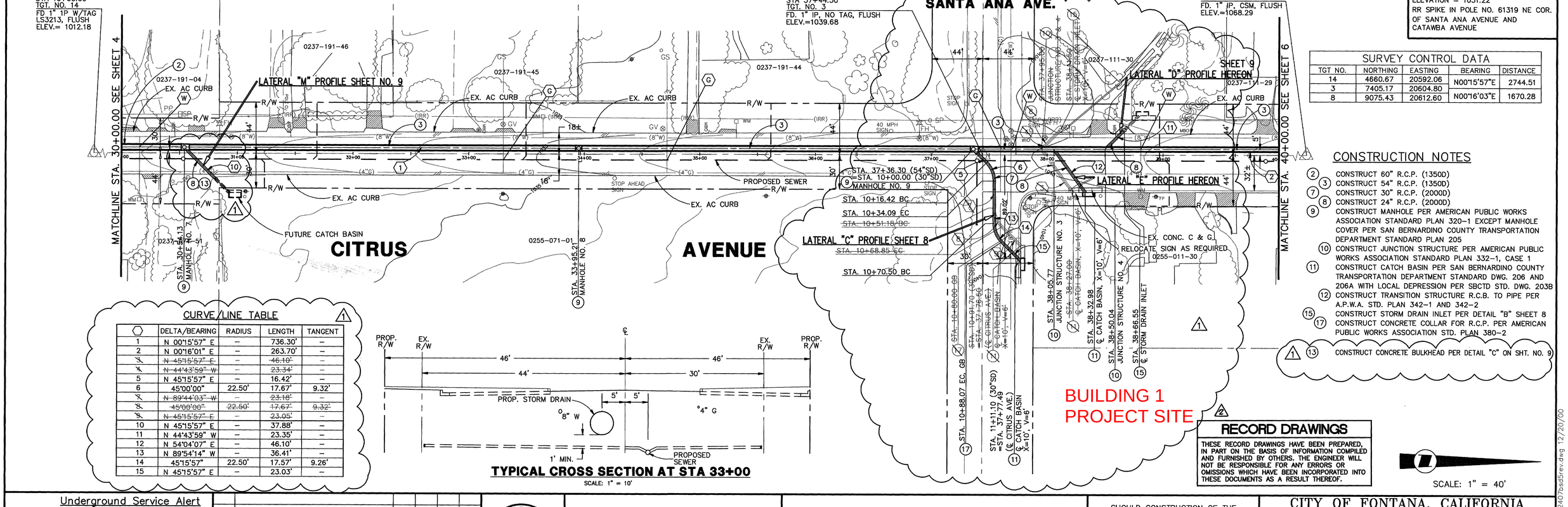
DRAWN BY: CCP	CITRUS AVENUE STORM DRAIN TITLE SHEET	SCALE: AS SHOWN
DESIGNED BY: MPT		DATE: JUNE 2000
CHECKED BY: DHM	APPROVED BY: ACTING CITY ENGINEER R.C.E. No. 51152 DATE: 1/3/01	DRAWING NO.: 2832 1/9

CLIENT: CITY OF FONTANA
LDK JOB #: 124-07

D:_CADD\124-07\124075SD1rev.dwg 12/01/00

1112-SD





CURVE/LINE TABLE

	DELTA/BEARING	RADIUS	LENGTH	TANGENT
1	N 00°15'57" E	–	736.30'	–
2	N 00°16'01" E	–	263.70'	–
~~3~~	~~N 45°15'57" E~~	–	~~46.10'~~	–
~~4~~	~~N 44°43'59" W~~	–	~~23.34'~~	–
5	N 45°15'57" E	–	16.42'	–
6	45°00'00"	22.50'	17.67'	9.32'
~~7~~	~~N 89°44'03" W~~	–	~~23.18'~~	–
~~8~~	~~45°00'00"~~	~~22.50'~~	~~17.67'~~	~~9.32'~~
~~9~~	~~N 45°15'57" E~~	–	~~23.05'~~	–
10	N 45°15'57" E	–	37.88'	–
11	N 44°43'59" W	–	23.35'	–
12	N 54°04'07" E	–	46.10'	–
13	N 89°54'14" W	–	36.41'	–
14	45°15'57"	22.50'	17.57'	9.26'
15	N 45°15'57" E	–	23.03'	–

TYPICAL CROSS SECTION AT STA 33+00
SCALE: 1" = 10'

SURVEY CONTROL DATA

TGT NO.	NORTHING	EASTING	BEARING	DISTANCE
14	4660.67	20592.06	N00°15'57"E	2744.51
3	7405.17	20604.80		
8	9075.43	20612.60	N00°16'03"E	1670.28

BENCHMARK NO. 289
ELEVATION = 1031.22
RR SPIKE IN POLE NO. 61319 NE COR. OF SANTA ANA AVENUE AND CATAWBA AVENUE

CONSTRUCTION NOTES

(2) CONSTRUCT 60" R.C.P. (1350D)
(3) CONSTRUCT 54" R.C.P. (1350D)
(7) CONSTRUCT 30" R.C.P. (2000D)
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(15) (17) CONSTRUCT STORM DRAIN INLET PER DETAIL "B" SHEET 8 CONSTRUCT CONCRETE COLLAR FOR R.C.P. PER AMERICAN PUBLIC WORKS ASSOCIATION STD. PLAN 380-2
(1) (13) CONSTRUCT CONCRETE BULKHEAD PER DETAIL "C" ON SHT. NO. 9

RECORD DRAWINGS

THESE RECORD DRAWINGS HAVE BEEN PREPARED, IN PART ON THE BASIS OF INFORMATION COMPILED AND FURNISHED BY OTHERS. THE ENGINEER WILL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH HAVE BEEN INCORPORATED INTO THESE DOCUMENTS AS A RESULT THEREOF.

SCALE: 1" = 40'

Underground Service Alert

SECTION 4216/4217 OF THE GOVERNMENT CODE REQUIRES A DIG ALERT IDENTIFICATION NUMBER BE ISSUED BEFORE A PERMIT TO EXCAVATE WILL BE VALID FOR YOUR DIG ALERT I.D. NUMBER CALL UNDERGROUND SERVICE ALERT TOLL FREE 1-800-227-2600 TWO WORKING DAYS BEFORE YOU DIG

REV.	REVISION DESCRIPTION	DATE	ENGR.	CITY	DATE
2	RECORD DRAWING	3/02	SH		
1	Revised CB & Lateral Locations/Profiles	12/00	LDKing		1/3/01

CLIENT: CITY OF FONTANA
LDK JOB #: 124-07

LDKING L.D. KING, INC.
2151 CONVENTION CENTER WAY
SUITE 100B
ONTARIO, CA 91764
(909) 937-0200

REGISTERED PROFESSIONAL ENGINEER CARL J. FREEMAN No. 16434 Exp. 6/30/01 CIVIL STATE OF CALIFORNIA

CARL J. FREEMAN, R.C.E. No. 16434 EXPIRES 6-30-01 — 12-20-00 DATE

PLAN / PROFILE FOR STORM DRAIN IMPROVEMENTS CITRUS AVENUE FROM JURUPA AVE. TO SLOVER AVE.

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 CONDITIONS AND STANDARDS IN EFFECT.

CITY OF FONTANA, CALIFORNIA
CITRUS AVENUE

DRAWN BY: CCP	CITRUS AVENUE STORM DRAIN STA. 30+00.00 TO 40+00.00	SCALE: AS SHOWN
DESIGNED BY: CCP		DATE: JUNE 2000
CHECKED BY: MPT	APPROVED BY: ACTING CITY ENGINEER R.C.E. No. 51152 DATE: 1/3/01	DRAWING NO.: 2832 — 5/9

D:_CADD\124-07\12407bsd5rev.dwg 12/20/00

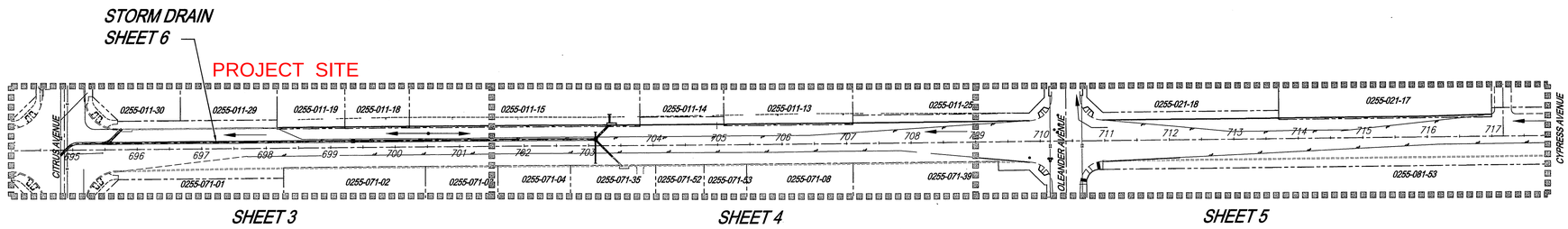
1112-SD

CITY OF FONTANA

SANTA ANA AVENUE

STREET & STORM DRAIN IMPROVEMENT PLAN

CITRUS AVENUE TO CYPRESS AVENUE



SANTA ANA AVENUE

INDEX MAP

SCALE: 1"=100'

POTHOLE VERIFICATION

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITY PIPES OR STRUCTURES SHOWN ON THESE PLANS WAS OBTAINED BY A SEARCH OF THE AVAILABLE RECORDS. ADDITIONAL UNDERGROUND FACILITIES MAY EXIST, OR THE LOCATION OF FACILITIES MAY DIFFER FROM THE LOCATIONS SHOWN ON THE PLANS. THE CONTRACTOR SHALL AT HIS OWN EXPENSE DETERMINE THE EXACT LOCATION OF ALL SUCH UNDERGROUND UTILITIES PRIOR TO DOING ANY WORK OR TAKING ANY ACTION THAT MAY DAMAGE SUCH FACILITIES OR INTERFERE WITH THEIR CONTINUOUS OPERATIONS UPON LEARNING OF THE EXISTENCE AND LOCATION OF ANY UNDERGROUND FACILITIES NOT SHOWN ACCURATELY ON THESE PLANS OR NOT PROPERLY MARKED BY THE UTILITY OWNER. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE UTILITY OWNER AND THE ENGINEER BY TELEPHONE AND IN WRITING.

NOTICE TO CONTRACTOR

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITY PIPES OR STRUCTURES SHOWN ON THESE PLANS WERE OBTAINED BY SEARCH OF ALL AVAILABLE RECORDS. THESE LOCATIONS ARE APPROXIMATE AND SHALL BE CONFIRMED BY A CONTRACTOR, SO THAT ANY NECESSARY ADJUSTMENT CAN BE MADE IN ALIGNMENT AND/OR GRADE OF THE PROPOSED IMPROVEMENT. THE CONTRACTOR IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT ANY UTILITY LINES SHOWN OR NOT SHOWN ON THESE PLANS.

CONSTRUCTION CONTRACTOR AGREES THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, CONSTRUCTION CONTRACTOR WILL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THE PROJECT, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY. THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS, AND CONSTRUCTION CONTRACTOR FURTHER AGREES TO DEFEND, INDEMNIFY AND HOLD CITY OF FONTANA HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTION LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF DESIGN PROFESSIONAL.

ALL CONTRACTORS AND SUB CONTRACTORS SHALL COMPLY WITH THE "OCCUPATIONAL SAFETY AND HEALTH REGULATIONS" OF THE US DEPARTMENT OF LABOR AND WITH THE STATE OF CALIFORNIA DEPARTMENT OF INDUSTRIAL RELATIONS "CONSTRUCTION SAFETY ORDERS". THE CITY OF FONTANA SHALL NOT BE RESPONSIBLE IN ANY WAY FOR THE CONTRACTOR OR SUBCONTRACTORS COMPLIANCE WITH SAID REGULATIONS AND ORDERS.

UNAUTHORIZED CHANGES & USES: THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE OR LIABLE FOR UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES TO THE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY THE ENGINEER PREPARING THESE PLANS.

CONSTRUCTION NOTES

		QUANTITIES
1	CONSTRUCT 6-1/2" MIN. A.C. PAVEMENT OVER 12" MIN. OF 95% COMPACTED NATIVE	4,031 TONS
2	CONSTRUCT COMMERCIAL CONCRETE DRIVEWAY PER CITY OF FONTANA STD. NO. 1002 (WIDTH PER PLAN)	2 EA
3	SAW CUT AND REMOVE EXISTING A.C. PAVEMENT	71,224 SF
4	CONSTRUCT 8" AC DIKE PER CITY OF FONTANA STD. DETAIL NO. 1007	200 LF
5	CONSTRUCT 8" CURB AND GUTTER PER CITY OF FONTANA STD. NO. 1000	1,439 LF
6	CONSTRUCT 4" PCC SIDEWALK PER CITY OF FONTANA STD. NO. 1006 (W=6')	11,705 SF
7	CONSTRUCT RESIDENTIAL CONCRETE DRIVEWAY PER CITY OF FONTANA STD. NO. 1002 (WIDTH PER PLAN)	8 EA
8	INSTALL STREET LIGHT 16,000 LUMEN PER CITY OF FONTANA STD NO. 404 (BY OTHERS)	6 EA
9	RELOCATE EXISTING POWER POLES (BY OTHERS)	9 EA
10	ADJUST EXISTING WATER METER TO GRADE (BY OTHERS)	6 EA
11	ADJUST WATER VALVE TO GRADE PER CITY OF FONTANA STD DETAIL NO. 6000	8 EA
12	SIGN TO BE REMOVED, REFER TO SIGNING AND STRIPING PLAN FOR DETAILS	4 EA
13	REMOVE & CONSTRUCT NEW CHAIN LINK FENCE AND GATES @ NEW RIGHT OF WAY LINE	893 LF
14	RELOCATE EXISTING MAILBOX	4 EA
15	REMOVE EXISTING TREES AND BUSHES WITHIN PROPOSED PUBLIC RIGHT OF WAY	35 EA
16	PROTECT IN PLACE	-- EA
17	INSTALL 3" THICK MULCH IN PARKWAY	11,083 SF
18	CONSTRUCT CATCH BASIN PER CITY OF FONTANA STD. NO. 3004 (W & V PER PLAN)	1 EA
19	CONSTRUCT LOCAL DEPRESSION PER CITY OF FONTANA STD. NO. 3003 CASE C	1 EA
20	REMOVE EXISTING 18" CMP PIPE AND HEADWALLS	1 LS
21	CONSTRUCT MANHOLE PER CITY OF FONTANA STD NO. 3011	1 EA
22	CONSTRUCT MANHOLE PER CITY OF FONTANA STD NO. 3013	2 EA
23	CONSTRUCT 30" R.C.P. PIPE "D" LOAD PER PLAN	759 LF
24	CONSTRUCT 24" R.C.P. PIPE "D" LOAD PER PLAN	29 LF
25	CONSTRUCT 18" R.C.P. PIPE "D" LOAD PER PLAN	36 LF
26	REMOVE EXIST 30" R.C.P. PIPE	18 LF
27	CONSTRUCT PIPE CLOSURE PER DETAIL ON SHEET NO. 2	1 EA
28	INSTALL STREET LIGHT CONDUITS PER EDISON PLAN	1 LS
29	CONSTRUCT 15"x21" CMP ARCH PIPE	13 LF
30	CONSTRUCT PIPE HEADWALL PER CALTRANS STANDARD D89A, SEE SHT 2.	1 EA
31	CONSTRUCT CONCRETE COLLAR PER CITY OF FONTANA STD NO. 3022	1 EA
32	GRADE AND CONSTRUCT 4" THICK PCC OVER COMPACTED NATIVE BEHIND WALK OR DRIVEWAY (LIMITS PER PLAN)	2 EA
33	GRADE AND CONSTRUCT 4" THICK AC OVER COMPACTED NATIVE BEHIND WALK OR DRIVEWAY (LIMITS PER PLAN)	6 EA
34	MODIFY LANDSCAPE & IRRIGATION LINES AS NEEDED	1 LS
35	ADJUST EXISTING FENCE AND GATE PER FINAL GRADE ELEVATION	283 LF
36	CONSTRUCT 6" A.C. CURB PER CITY OF FONTANA STD. NO. 1006	369 LF
37	REMOVE AND CONSTRUCT GUTTER AS SHOWN ON SHEET 5	40 LF
38	CONSTRUCT 3" A.C. SIDEWALK PER CITY OF FONTANA STD. DETAIL NO. 1007 (W=4')	1,484 SF
39	CONSTUCT CONCRETE WALL PER "WALL DETAIL" ON SHEET 3	410 LF

UTILITY NOTIFICATION LIST

AT&T DISTRIBUTION
1265 N VAN BUREN ST #180
ANAHEIM, CA 92807
(714) 666-5401

FONTANA WATER COMPANY
11142 GARVEY AVE
EL MONTE, CA 91733
(626) 448-6183

LEVEL 3 COMMUNICATIONS
1025 ELDORADO BLVD
BLDG 33A-522
BROOMFIELD, CO 80021
(720) 888-6482

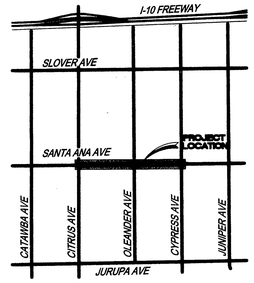
TIME WARNER CABLE
1500 AUTO CENTER DR
ONTARIO, CA 91761
(909)975-3343

KINDER MORGAN ENERGY PARTNERS
1100 TOWN & COUNTRY RD
ORANGE, CA 92868
(714) 560-4409

SC GAS
1981 W LUGONIA AVE
REDLANDS, CA 92374
(909) 335-7755

UTILIQUEST FOR SCE DIST
EDISON DISTRIBUTION
7951 REDWOOD AVE
FONTANA, CA 92336
(909) 357-6221

SEWER
CITY OF FONTANA
8353 SIERRA AVENUE
FONTANA, CA 92335
(909) 350-6632



VICINITY MAP

NTS

LEGEND

	CONSTRUCT NEW AC PAVEMENT
	PROP SIDEWALK
	EXIST SIDEWALK
GAS	EXISTING GAS LINE
W	EXISTING WATER LINE
S	EXISTING SEWER LINE
SD	EXISTING SD LINE
	PROPOSED WALL
	FLOW DIRECTION
FS	FINISH SURFACE
TC	TOP OF CURB
EG	EXISTING GROUND
EP	EDGE OF PAVEMENT
ES	EXISTING SURFACE

SHEET INDEX

BASIS OF BEARING

CENTERLINE OF SLOVER AVENUE BETWEEN SAN BERNARDINO CO. SURV. GPS CONTROL MONUMENT NO'S. 21158 & 21219, BEING THE INTERSECTION OF CITRUS AVENUE & CYPRESS AVENUE RESPECTFULLY, BEING: N89°30'14"E.

BENCHMARK NO. 291 PERPETUATED:

TRANSFERRED ELEVATION FROM CITY OF FONTANA BM 291, A RR SPIKE IN PP NO. 5869624, LOCATED AT THE NE CORNER OF OLEANDER AVE & SANTA ANA AVE, ELEV. 1047.36, TO THE TOP A "PK" NAIL & BRASS WASHER, STAMPED "CITY OF FONTANA BM", SET ON THE TOP OF CURB 1' NORTH OF THE NORTHERLY END OF THE NE CURB RETURN AT OLEANDER AVE & SANTA ANA AVE ELEVATION: 1044.75

DIGALERT
DIAL BEFORE YOU DIG
TWO WORKING DAYS BEFORE YOU DIG
TOLL FREE 800-227-2600
A PUBLIC SERVICE BY UNDERGROUND SERVICE ALERT

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.

REGISTERED PROFESSIONAL ENGINEER
FELIPE U. MOLINOS
No. 40964
CIVIL
STATE OF CALIFORNIA

Prepared Under The Supervision Of :

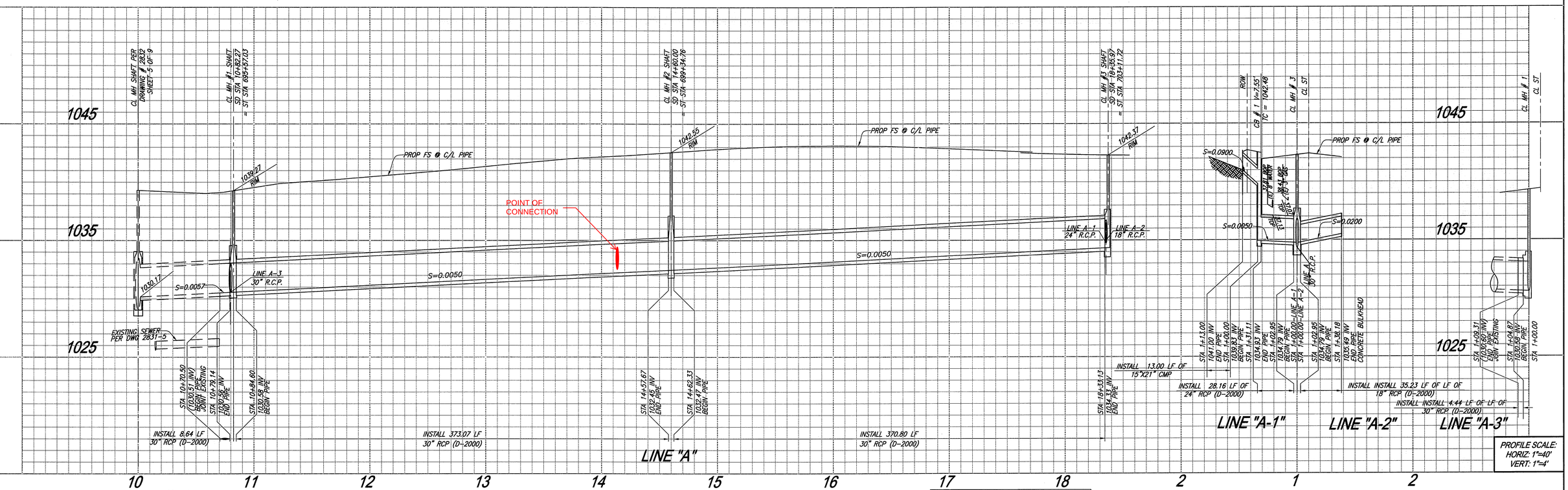
Date :

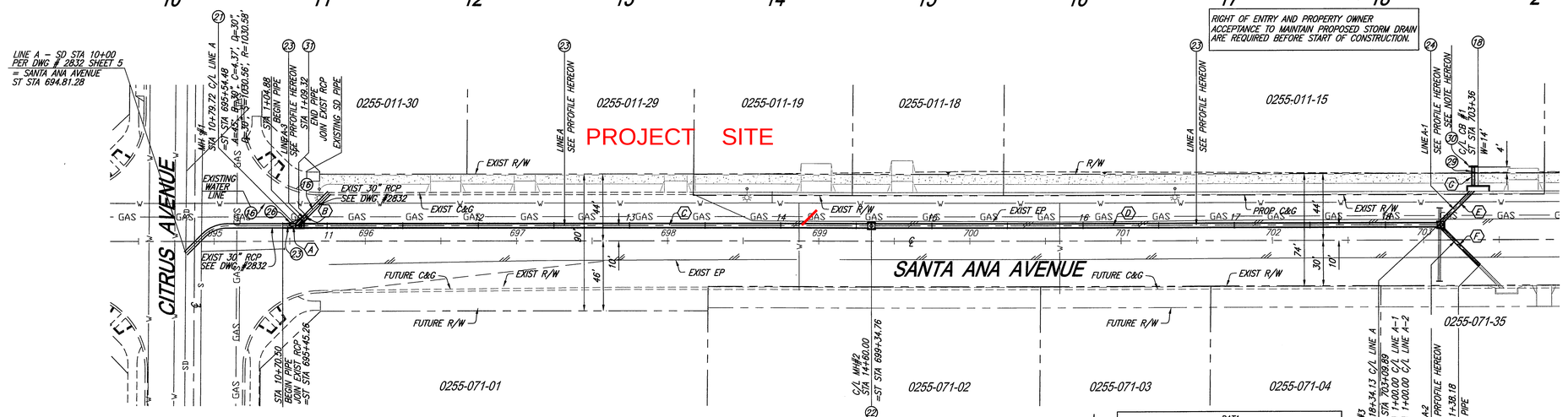
FELIPE U. MOLINOS R.C.E. 40964

CITY OF FONTANA, CALIFORNIA
STREET IMPROVEMENT PLAN

DRAWN BY: VA	SANTA ANA AVENUE TITLE SHEET INDEX MAP, VICINITY MAP, & QUANTITIES	SCALE: AS SHOWN
DESIGNED BY: VA/SN		DATE: 12/06/10
CHECKED BY: SN	APPROVED BY: CITY ENGINEER R.C.E. 51152 DATE 6.5.11	DRAWING NO.: 4859 1/6

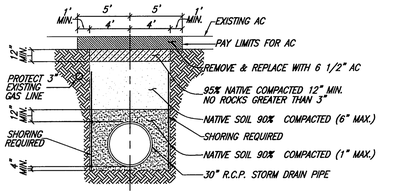
S:\DESIGN SECTION\CIP IMPROVEMENTS\SANTA ANA - CITRUS TO CYPRESS\SHEET 1.dwg Mar 14, 11 - 5:30pm





CONSTRUCTION NOTES

(16) PROTECT IN PLACE
(18) CONSTRUCT CATCH BASIN PER CITY OF FONTANA STD. NO. 3004 (W & V PER PLAN)
(21) CONSTRUCT MANHOLE PER CITY OF FONTANA STD NO. 3011
(22) CONSTRUCT MANHOLE PER CITY OF FONTANA STD NO. 3013
(23) CONSTRUCT 30" R.C.P. PIPE "D" LOAD PER PLAN
(24) CONSTRUCT 24" R.C.P. PIPE "D" LOAD PER PLAN
(25) CONSTRUCT 18" R.C.P. PIPE "D" LOAD PER PLAN
(26) REMOVE 30" EXISTING R.C.P. PIPE
(27) CONSTURCT PIPE CLOSURE PER DETAIL ON SHEET NO. 2
(28) CONSTRUCT 15"x21" CMP ARCH PIPE
(30) CONSTRUCT PIPE HEADWALL PER CALTRANS STANDARD DB9A, SEE SHT 2.
(31) CONSTRUCT CONCRETE COLLAR PER CITY OF FONTANA STD NO. 3022



* REMOVAL AND REPLACEMENTS OF EXISTING AC APPLIES FROM THE DOWN STREAM OF STORM DRAIN LINE UP TO STREET STA 697+70

TRENCH DETAIL
N.T.S.

DATA				
	BEARING	RADIUS	LENGTH	TANGENT
A	N 89°30'50" E	---	8.64'	---
B	N 44°31'07" E	---	9.32'	---
C	N 89°30'50" E	---	380.86'	---
D	N 89°30'14"	---	374.13'	---
E	N 44°30'14" E	---	31.11'	---
F	N 45°29'46" W	---	38.18'	---
G	N 00°29'46" W	---	13.00'	---

40' 0 40' 80' 120'
SCALE IN FEET

LINES A, A-1, A-2 & A-3

RIGHT OF ENTRY AND PROPERTY OWNER ACCEPTANCE TO MAINTAIN PROPOSED STORM DRAIN ARE REQUIRED BEFORE START OF CONSTRUCTION.

BASIS OF BEARING
CENTERLINE OF SLOVER AVENUE BETWEEN SAN BERNARDINO CO. SURV. GPS CONTROL MONUMENT NO'S. 21158 & 21219, BEING THE INTERSECTION OF CITRUS AVENUE & CYPRESS AVENUE RESPECTFULLY, BEING: N89°30'14"E.

BENCHMARK NO. 291 PERPETUATED:
TRANSFERRED ELEVATION FROM CITY OF FONTANA BM 291, A RR SPIKE IN PP NO. 586962H, LOCATED AT THE NE CORNER OF OLEANDER AVE & SANTA ANA AVE, ELEV. 1047.36, TO THE TOP A "PK" NAIL & BRASS WASHER, STAMPED "CITY OF FONTANA BM", SET ON THE TOP OF CURB 1' NORTH OF THE NORTHERLY END OF THE NE CURB RETURN AT OLEANDER AVE & SANTA ANA AVE ELEVATION: 1044.75

DIGALERT
DIAL BEFORE YOU DIG
TWO WORKING DAYS BEFORE YOU DIG
TOLL FREE 1-800-227-2600
A PUBLIC SERVICE BY UNDERGROUND SERVICE ALERT

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.

REGISTERED PROFESSIONAL ENGINEER
FELIPE U. MOLINOS
No. 40964
CIVIL
STATE OF CALIFORNIA

Prepared Under The Supervision Of :

Date :
FELIPE U. MOLINOS R.C.E. 40964

CITY OF FONTANA, CALIFORNIA
STORM DRAIN IMPROVEMENT PLAN

DRAWN BY: VA	SANTA ANA AVENUE STORM DRAIN LINES A, A-1, A-2, & A-3	SCALE: AS SHOWN
DESIGNED BY: VA/SN		DATE: 12/06/10
CHECKED BY: SN	APPROVED BY: CITY ENGINEER R.C.E. 51152 DATE: 5-9-11	DRAWING NO.: 4859 | 6/6

S:\DESIGN SECTION\CIP IMPROVEMENTS\SANTA ANA - CITRUS TO CYPRESS\SHEET 6.dwg Mar 14, 11 - 6:08pm

APPENDIX B

HYDROLOGY CALCULATIONS

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 ************************
* JOB #3615 SANTA ANA, FONTANA                                           *
* EXISTING CONDITION 100-YEAR                                            *
* NODES 200-201     200X.DAT                                             *
 ************************************************************************

  FILE NAME: C:\XDRIVE\3615\200X.DAT
  TIME/DATE OF STUDY: 13:32 08/22/2022
==============================================================================
  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    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) =   644.00
  ELEVATION DATA: UPSTREAM(FEET) =   1051.80  DOWNSTREAM(FEET) =   1045.31

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.600
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.199
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL(ARID)
  "2 DWELLINGS/ACRE"         A        8.70      0.55      0.70  52/81  14.60
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.55
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.70
```

```
  SUBAREA RUNOFF(CFS) =     22.05
  TOTAL AREA(ACRES) =      8.70   PEAK FLOW RATE(CFS) =     22.05
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      8.70  TC(MIN.) =     14.60
  EFFECTIVE AREA(ACRES) =      8.70  AREA-AVERAGED Fm(INCH/HR)=  0.38
  AREA-AVERAGED Fp(INCH/HR) =  0.55  AREA-AVERAGED Ap =  0.70
  PEAK FLOW RATE(CFS)   =     22.05
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS

1
```

PROPOSED CONDITION

```
_____________________________________________________________________________
*****************************************************************************
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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 200-212     200P.DAT                                             *
 ************************************************************************

  FILE NAME: C:\XDRIVE\3615\200P.DAT
  TIME/DATE OF STUDY: 00:05 08/17/2022
============================================================================
  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    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) =   717.00
  ELEVATION DATA: UPSTREAM(FEET) =   1050.72  DOWNSTREAM(FEET) =   1043.93

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.711
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.852
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        5.72      0.80       0.10    52   10.71
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
  SUBAREA RUNOFF(CFS) =     19.42
```

```
  TOTAL AREA(ACRES) =      5.72   PEAK FLOW RATE(CFS) =     19.42

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1039.33  DOWNSTREAM(FEET) =  1038.63
  FLOW LENGTH(FEET) =   234.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.38
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     19.42
  PIPE TRAVEL TIME(MIN.) =   0.72    Tc(MIN.) =  11.43
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =   951.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  11.43
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.704
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.35      0.80      0.10    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
  SUBAREA AREA(ACRES) =    0.35      SUBAREA RUNOFF(CFS) =    1.14
  EFFECTIVE AREA(ACRES) =     6.07   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =     6.07       PEAK FLOW RATE(CFS) =      19.80

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    212.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1038.63  DOWNSTREAM(FEET) =  1038.48
  FLOW LENGTH(FEET) =    51.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.36
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     19.80
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =  11.59
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    212.00 =  1002.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    212.00 TO NODE    212.00 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.) =  11.59
  RAINFALL INTENSITY(INCH/HR) =   3.67
  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.80
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =    6.07
  TOTAL STREAM AREA(ACRES) =    6.07
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     19.80

****************************************************************************
  FLOW PROCESS FROM NODE    210.00 TO NODE    211.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   595.00
  ELEVATION DATA: UPSTREAM(FEET) =   1052.84  DOWNSTREAM(FEET) =   1047.06

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.890
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.041
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        2.25      0.80       0.10    52    9.89
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
  SUBAREA RUNOFF(CFS) =      8.02
  TOTAL AREA(ACRES) =      2.25   PEAK FLOW RATE(CFS) =      8.02

****************************************************************************
  FLOW PROCESS FROM NODE    211.00 TO NODE    212.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1043.53  DOWNSTREAM(FEET) =  1038.48
  FLOW LENGTH(FEET) =   458.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.11
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      8.02
  PIPE TRAVEL TIME(MIN.) =   1.07    Tc(MIN.) =  10.96
  LONGEST FLOWPATH FROM NODE    210.00 TO NODE    212.00 =  1053.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    212.00 TO NODE    212.00 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.) =  10.96
  RAINFALL INTENSITY(INCH/HR) =   3.80
  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.80
```

```
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =    2.25
  TOTAL STREAM AREA(ACRES) =    2.25
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.02

  ** CONFLUENCE DATA **
   STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
   NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
      1     19.80  11.59    3.674  0.80( 0.08) 0.10     6.1     200.00
      2      8.02  10.96    3.799  0.80( 0.08) 0.10     2.3     210.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
   NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
      1     27.55  11.59    3.674  0.80( 0.08) 0.10     8.3     200.00
      2     27.40  10.96    3.799  0.80( 0.08) 0.10     8.0     210.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     27.55    Tc(MIN.) =    11.59
  EFFECTIVE AREA(ACRES) =     8.32   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =      8.32
  LONGEST FLOWPATH FROM NODE    210.00 TO NODE    212.00 =  1053.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      8.32  TC(MIN.) =     11.59
  EFFECTIVE AREA(ACRES) =      8.32  AREA-AVERAGED Fm(INCH/HR)=  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.10
  PEAK FLOW RATE(CFS)   =     27.55

  ** PEAK FLOW RATE TABLE **
   STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
   NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
      1     27.40  10.96    3.799  0.80( 0.08) 0.10     8.0     210.00
      2     27.55  11.59    3.674  0.80( 0.08) 0.10     8.3     200.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS

1
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_____________________________________________________________________________
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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 220-221     220P.DAT                                             *
 ************************************************************************

  FILE NAME: C:\XDRIVE\3615\220P.DAT
  TIME/DATE OF STUDY: 00:12 08/17/2022
============================================================================
  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    220.00 TO NODE    221.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   704.00
  ELEVATION DATA: UPSTREAM(FEET) =   1046.50  DOWNSTREAM(FEET) =   1043.21

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   28.439
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.144
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"               A        0.25      0.61      1.00    66   28.44
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.61
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.00
```

```
  SUBAREA RUNOFF(CFS) =      0.34
  TOTAL AREA(ACRES) =      0.25   PEAK FLOW RATE(CFS) =      0.34
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      0.25  TC(MIN.) =     28.44
  EFFECTIVE AREA(ACRES) =      0.25  AREA-AVERAGED Fm(INCH/HR)=  0.61
  AREA-AVERAGED Fp(INCH/HR) =  0.61  AREA-AVERAGED Ap =  1.00
  PEAK FLOW RATE(CFS)   =      0.34
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS

1
```

```
_____________________________________________________________________________
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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 230-231     230P.DAT                                             *
 ************************************************************************

  FILE NAME: C:\XDRIVE\3615\230P.DAT
  TIME/DATE OF STUDY: 00:21 08/17/2022
==============================================================================
  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    230.00 TO NODE    231.00 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   491.00
  ELEVATION DATA: UPSTREAM(FEET) =   1051.71  DOWNSTREAM(FEET) =   1045.49

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   20.170
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.635
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"               A        0.10      0.61      1.00    66   20.17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.61
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.00
```

```
  SUBAREA RUNOFF(CFS) =      0.18
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.18

****************************************************************************
  FLOW PROCESS FROM NODE    230.00 TO NODE    231.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  20.17
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.635
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               A        0.03      0.61      1.00    66
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.61
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.00
  SUBAREA AREA(ACRES) =    0.03      SUBAREA RUNOFF(CFS) =    0.05
  EFFECTIVE AREA(ACRES) =     0.13   AREA-AVERAGED Fm(INCH/HR) =  0.61
  AREA-AVERAGED Fp(INCH/HR) =  0.61  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =     0.13       PEAK FLOW RATE(CFS) =       0.24
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      0.13  TC(MIN.) =     20.17
  EFFECTIVE AREA(ACRES) =      0.13  AREA-AVERAGED Fm(INCH/HR)=  0.61
  AREA-AVERAGED Fp(INCH/HR) =  0.61  AREA-AVERAGED Ap =  1.00
  PEAK FLOW RATE(CFS)   =      0.24
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS

1
```

APPENDIX C

DETENTION CALCULATIONS

****

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

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

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

TOTAL 24-HOUR DURATION RAINFALL DEPTH = 8.10 (inches)

SOIL-COVER TYPE	AREA (Acres)	PERCENT OF PERVIOUS AREA	SCS CURVE NUMBER	LOSS RATE Fp(in./hr.)	YIELD
1	5.72	10.00	52.(32.)	0.742	0.905

TOTAL AREA (Acres) = 5.72

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

AREA-AVERAGED LOW LOSS FRACTION, $\bar{Y}$ = 0.095
1

```
_______________________________________________________________________________
*******************************************************************************
                     SMALL AREA UNIT HYDROGRAPH MODEL

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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



    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =    5.72
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.074
    LOW LOSS FRACTION = 0.095
    TIME OF CONCENTRATION(MIN.) = 10.71
    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) =  0.50
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  1.02
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.37
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  2.40
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  3.52
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  8.10

-------------------------------------------------------------------------------

    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     3.15
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     0.71

*******************************************************************************
  TIME     VOLUME       Q    0.        5.0      10.0      15.0      20.0
 (HOURS)    (AF)      (CFS)
-------------------------------------------------------------------------------
  0.11      0.0044      0.95  .Q        .         .         .         .
  0.29      0.0184      0.95  .Q        .         .         .         .
  0.47      0.0324      0.95  .Q        .         .         .         .
  0.65      0.0465      0.96  .Q        .         .         .         .
  0.83      0.0607      0.96  .Q        .         .         .         .
  1.01      0.0749      0.97  .Q        .         .         .         .
  1.18      0.0892      0.97  .Q        .         .         .         .
  1.36      0.1035      0.97  .Q        .         .         .         .
  1.54      0.1180      0.98  .Q        .         .         .         .
  1.72      0.1325      0.98  .Q        .         .         .         .
  1.90      0.1470      0.99  .Q        .         .         .         .
  2.08      0.1617      0.99  .Q        .         .         .         .
  2.26      0.1764      1.00  . Q       .         .         .         .
  2.43      0.1912      1.00  . Q       .         .         .         .
  2.61      0.2060      1.01  . Q       .         .         .         .
  2.79      0.2210      1.01  . Q       .         .         .         .
  2.97      0.2360      1.02  . Q       .         .         .         .
```

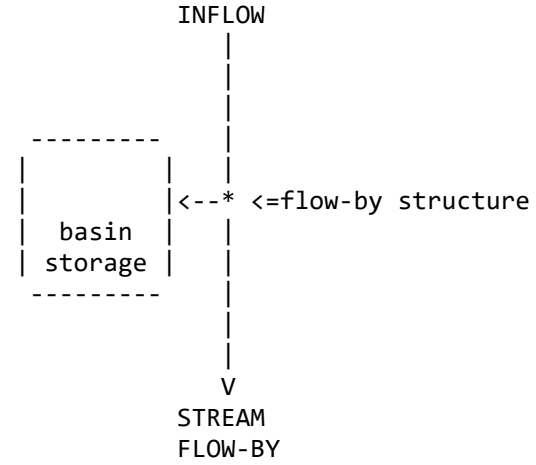
3.15	0.2511	1.03	. Q	.	.	.	.
3.33	0.2663	1.03	. Q	.	.	.	.
3.51	0.2816	1.04	. Q	.	.	.	.
3.68	0.2970	1.05	. Q	.	.	.	.
3.86	0.3124	1.05	. Q	.	.	.	.
4.04	0.3279	1.06	. Q	.	.	.	.
4.22	0.3436	1.06	. Q	.	.	.	.
4.40	0.3593	1.07	. Q	.	.	.	.
4.58	0.3751	1.07	. Q	.	.	.	.
4.75	0.3910	1.08	. Q	.	.	.	.
4.93	0.4071	1.09	. Q	.	.	.	.
5.11	0.4232	1.10	. Q	.	.	.	.
5.29	0.4394	1.10	. Q	.	.	.	.
5.47	0.4557	1.11	. Q	.	.	.	.
5.65	0.4722	1.12	. Q	.	.	.	.
5.83	0.4887	1.13	. Q	.	.	.	.
6.00	0.5054	1.13	. Q	.	.	.	.
6.18	0.5222	1.14	. Q	.	.	.	.
6.36	0.5391	1.15	. Q	.	.	.	.
6.54	0.5561	1.16	. Q	.	.	.	.
6.72	0.5732	1.17	. Q	.	.	.	.
6.90	0.5905	1.18	. Q	.	.	.	.
7.07	0.6079	1.18	. Q	.	.	.	.
7.25	0.6255	1.20	. Q	.	.	.	.
7.43	0.6432	1.20	. Q	.	.	.	.
7.61	0.6610	1.22	. Q	.	.	.	.
7.79	0.6790	1.22	. Q	.	.	.	.
7.97	0.6972	1.24	. Q	.	.	.	.
8.15	0.7155	1.24	. Q	.	.	.	.
8.32	0.7339	1.26	. Q	.	.	.	.
8.50	0.7526	1.27	. Q	.	.	.	.
8.68	0.7714	1.28	. Q	.	.	.	.
8.86	0.7904	1.29	. Q	.	.	.	.
9.04	0.8095	1.31	. Q	.	.	.	.
9.22	0.8289	1.32	. Q	.	.	.	.
9.40	0.8485	1.34	. Q	.	.	.	.
9.57	0.8683	1.35	. Q	.	.	.	.
9.75	0.8883	1.37	. Q	.	.	.	.
9.93	0.9085	1.38	. Q	.	.	.	.
10.11	0.9289	1.40	. Q	.	.	.	.
10.29	0.9496	1.41	. Q	.	.	.	.
10.47	0.9706	1.43	. Q	.	.	.	.
10.65	0.9918	1.44	. Q	.	.	.	.
10.82	1.0132	1.47	. Q	.	.	.	.
11.00	1.0350	1.48	. Q	.	.	.	.
11.18	1.0571	1.51	. Q	.	.	.	.
11.36	1.0795	1.53	. Q	.	.	.	.
11.54	1.1022	1.56	. Q	.	.	.	.
11.72	1.1253	1.57	. Q	.	.	.	.
11.89	1.1488	1.61	. Q	.	.	.	.
12.07	1.1726	1.63	. Q	.	.	.	.
12.25	1.1959	1.53	. Q	.	.	.	.
12.43	1.2187	1.55	. Q	.	.	.	.
12.61	1.2420	1.60	. Q	.	.	.	.
12.79	1.2658	1.63	. Q	.	.	.	.
12.97	1.2902	1.68	. Q	.	.	.	.
13.14	1.3152	1.71	. Q	.	.	.	.

13.32	1.3409	1.77	.	Q	.	.	.	.
13.50	1.3673	1.81	.	Q	.	.	.	.
13.68	1.3945	1.88	.	Q	.	.	.	.
13.86	1.4226	1.93	.	Q	.	.	.	.
14.04	1.4517	2.02	.	Q	.	.	.	.
14.22	1.4810	1.95	.	Q	.	.	.	.
14.39	1.5105	2.04	.	Q	.	.	.	.
14.57	1.5412	2.12	.	Q	.	.	.	.
14.75	1.5737	2.29	.	Q	.	.	.	.
14.93	1.6083	2.40	.	Q	.	.	.	.
15.11	1.6456	2.66	.	Q	.	.	.	.
15.29	1.6860	2.83	.	Q	.	.	.	.
15.46	1.7287	2.96	.	Q	.	.	.	.
15.64	1.7733	3.09	.	Q	.	.	.	.
15.82	1.8269	4.18	.	Q	.	.	.	.
16.00	1.9007	5.82	.	.Q	.	.	.	.
16.18	2.0848	19.14	.	.	.	.	Q	.
16.36	2.2524	3.57	.	Q	.	.	.	.
16.54	2.3011	3.03	.	Q	.	.	.	.
16.71	2.3420	2.52	.	Q	.	.	.	.
16.89	2.3768	2.20	.	Q	.	.	.	.
17.07	2.4076	1.98	.	Q	.	.	.	.
17.25	2.4367	1.97	.	Q	.	.	.	.
17.43	2.4649	1.84	.	Q	.	.	.	.
17.61	2.4913	1.74	.	Q	.	.	.	.
17.78	2.5164	1.65	.	Q	.	.	.	.
17.96	2.5402	1.58	.	Q	.	.	.	.
18.14	2.5634	1.56	.	Q	.	.	.	.
18.32	2.5866	1.59	.	Q	.	.	.	.
18.50	2.6097	1.54	.	Q	.	.	.	.
18.68	2.6321	1.50	.	Q	.	.	.	.
18.86	2.6539	1.46	.	Q	.	.	.	.
19.03	2.6751	1.42	.	Q	.	.	.	.
19.21	2.6958	1.39	.	Q	.	.	.	.
19.39	2.7160	1.36	.	Q	.	.	.	.
19.57	2.7358	1.33	.	Q	.	.	.	.
19.75	2.7552	1.30	.	Q	.	.	.	.
19.93	2.7742	1.27	.	Q	.	.	.	.
20.11	2.7928	1.25	.	Q	.	.	.	.
20.28	2.8111	1.23	.	Q	.	.	.	.
20.46	2.8291	1.21	.	Q	.	.	.	.
20.64	2.8468	1.19	.	Q	.	.	.	.
20.82	2.8642	1.17	.	Q	.	.	.	.
21.00	2.8814	1.15	.	Q	.	.	.	.
21.18	2.8983	1.14	.	Q	.	.	.	.
21.36	2.9149	1.12	.	Q	.	.	.	.
21.53	2.9314	1.11	.	Q	.	.	.	.
21.71	2.9476	1.09	.	Q	.	.	.	.
21.89	2.9636	1.08	.	Q	.	.	.	.
22.07	2.9794	1.07	.	Q	.	.	.	.
22.25	2.9951	1.05	.	Q	.	.	.	.
22.43	3.0105	1.04	.	Q	.	.	.	.
22.60	3.0258	1.03	.	Q	.	.	.	.
22.78	3.0409	1.02	.	Q	.	.	.	.
22.96	3.0559	1.01	.	Q	.	.	.	.
23.14	3.0706	1.00	.	Q	.	.	.	.
23.32	3.0853	0.99	.	Q	.	.	.	.

```
 23.50      3.0998      0.98  .Q        .         .         .         .
 23.68      3.1141      0.97  .Q        .         .         .         .
 23.85      3.1284      0.96  .Q        .         .         .         .
 24.03      3.1425      0.95  .Q        .         .         .         .
 24.21      3.1495      0.00  Q         .         .         .         .
-------------------------------------------------------------------------
```

==========

FLOW PASS A FLOW-BY STRUCTURE:



MAXIMUM FLOW-BY Q(CFS) = 12.50

FLOW-BY BASIN MODELING RESULTS:

MODEL TIME (HRS)	INFLOW (CFS)	FLOW-BY (CFS)	BASIN VOLUME (AF)
0.113	0.95	0.95	0.000
0.292	0.95	0.95	0.000
0.470	0.95	0.95	0.000
0.649	0.96	0.96	0.000
0.827	0.96	0.96	0.000
1.006	0.97	0.97	0.000
1.184	0.97	0.97	0.000
1.363	0.97	0.97	0.000
1.541	0.98	0.98	0.000
1.720	0.98	0.98	0.000
1.898	0.99	0.99	0.000
2.077	0.99	0.99	0.000
2.256	1.00	1.00	0.000
2.434	1.00	1.00	0.000
2.612	1.01	1.01	0.000
2.791	1.01	1.01	0.000
2.970	1.02	1.02	0.000
3.148	1.03	1.03	0.000
3.326	1.03	1.03	0.000

3.505	1.04	1.04	0.000
3.683	1.05	1.05	0.000
3.862	1.05	1.05	0.000
4.040	1.06	1.06	0.000
4.219	1.06	1.06	0.000
4.398	1.07	1.07	0.000
4.576	1.07	1.07	0.000
4.754	1.08	1.08	0.000
4.933	1.09	1.09	0.000
5.112	1.10	1.10	0.000
5.290	1.10	1.10	0.000
5.468	1.11	1.11	0.000
5.647	1.12	1.12	0.000
5.826	1.13	1.13	0.000
6.004	1.13	1.13	0.000
6.183	1.14	1.14	0.000
6.361	1.15	1.15	0.000
6.539	1.16	1.16	0.000
6.718	1.17	1.17	0.000
6.897	1.18	1.18	0.000
7.075	1.18	1.18	0.000
7.253	1.20	1.20	0.000
7.432	1.20	1.20	0.000
7.610	1.22	1.22	0.000
7.789	1.22	1.22	0.000
7.967	1.24	1.24	0.000
8.146	1.24	1.24	0.000
8.325	1.26	1.26	0.000
8.503	1.27	1.27	0.000
8.682	1.28	1.28	0.000
8.860	1.29	1.29	0.000
9.038	1.31	1.31	0.000
9.217	1.32	1.32	0.000
9.395	1.34	1.34	0.000
9.574	1.35	1.35	0.000
9.753	1.37	1.37	0.000
9.931	1.38	1.38	0.000
10.109	1.40	1.40	0.000
10.288	1.41	1.41	0.000
10.467	1.43	1.43	0.000
10.645	1.44	1.44	0.000
10.823	1.47	1.47	0.000
11.002	1.48	1.48	0.000
11.181	1.51	1.51	0.000
11.359	1.53	1.53	0.000
11.538	1.56	1.56	0.000
11.716	1.57	1.57	0.000
11.894	1.61	1.61	0.000
12.073	1.63	1.63	0.000
12.252	1.53	1.53	0.000
12.430	1.55	1.55	0.000
12.609	1.60	1.60	0.000
12.787	1.63	1.63	0.000
12.965	1.68	1.68	0.000
13.144	1.71	1.71	0.000
13.322	1.77	1.77	0.000
13.501	1.81	1.81	0.000

13.680	1.88	1.88	0.000
13.858	1.93	1.93	0.000
14.036	2.02	2.02	0.000
14.215	1.95	1.95	0.000
14.393	2.04	2.04	0.000
14.572	2.12	2.12	0.000
14.751	2.29	2.29	0.000
14.929	2.40	2.40	0.000
15.108	2.66	2.66	0.000
15.286	2.83	2.83	0.000
15.464	2.96	2.96	0.000
15.643	3.09	3.09	0.000
15.821	4.18	4.18	0.000
16.000	5.82	5.82	0.000
16.179	19.14	12.50	0.098
16.357	3.57	3.57	0.098
16.535	3.03	3.03	0.098
16.714	2.52	2.52	0.098
16.892	2.20	2.20	0.098
17.071	1.98	1.98	0.098
17.250	1.97	1.97	0.098
17.428	1.84	1.84	0.098
17.607	1.74	1.74	0.098
17.785	1.65	1.65	0.098
17.964	1.58	1.58	0.098
18.142	1.56	1.56	0.098
18.320	1.59	1.59	0.098
18.499	1.54	1.54	0.098
18.677	1.50	1.50	0.098
18.856	1.46	1.46	0.098
19.034	1.42	1.42	0.098
19.213	1.39	1.39	0.098
19.392	1.36	1.36	0.098
19.570	1.33	1.33	0.098
19.749	1.30	1.30	0.098
19.927	1.27	1.27	0.098
20.105	1.25	1.25	0.098
20.284	1.23	1.23	0.098
20.462	1.21	1.21	0.098
20.641	1.19	1.19	0.098
20.819	1.17	1.17	0.098
20.998	1.15	1.15	0.098
21.177	1.14	1.14	0.098
21.355	1.12	1.12	0.098
21.534	1.11	1.11	0.098
21.712	1.09	1.09	0.098
21.891	1.08	1.08	0.098
22.069	1.07	1.07	0.098
22.247	1.05	1.05	0.098
22.426	1.04	1.04	0.098
22.604	1.03	1.03	0.098
22.783	1.02	1.02	0.098
22.961	1.01	1.01	0.098
23.140	1.00	1.00	0.098
23.319	0.99	0.99	0.098
23.497	0.98	0.98	0.098
23.676	0.97	0.97	0.098

23.854	0.96	0.96	0.098
24.032	0.95	0.95	0.098
24.211	0.00	0.00	0.098

1

```
_______________________________________________________________________________
*******************************************************************************
                     SMALL AREA UNIT HYDROGRAPH MODEL

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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



    RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
    TOTAL CATCHMENT AREA(ACRES) =    5.72
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.074
    LOW LOSS FRACTION = 0.095
    TIME OF CONCENTRATION(MIN.) = 10.71
    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) =  0.50
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  1.02
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.37
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  2.40
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  3.52
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  8.10

-------------------------------------------------------------------------------

    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     3.15
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     0.71

*******************************************************************************
  TIME     VOLUME       Q    0.        5.0      10.0      15.0      20.0
 (HOURS)    (AF)      (CFS)
-------------------------------------------------------------------------------
  0.11      0.0044      0.95  .Q        .         .         .         .
  0.29      0.0184      0.95  .Q        .         .         .         .
  0.47      0.0324      0.95  .Q        .         .         .         .
  0.65      0.0465      0.96  .Q        .         .         .         .
  0.83      0.0607      0.96  .Q        .         .         .         .
  1.01      0.0749      0.97  .Q        .         .         .         .
  1.18      0.0892      0.97  .Q        .         .         .         .
  1.36      0.1035      0.97  .Q        .         .         .         .
  1.54      0.1180      0.98  .Q        .         .         .         .
  1.72      0.1325      0.98  .Q        .         .         .         .
  1.90      0.1470      0.99  .Q        .         .         .         .
  2.08      0.1617      0.99  .Q        .         .         .         .
  2.26      0.1764      1.00  . Q       .         .         .         .
  2.43      0.1912      1.00  . Q       .         .         .         .
  2.61      0.2060      1.01  . Q       .         .         .         .
  2.79      0.2210      1.01  . Q       .         .         .         .
  2.97      0.2360      1.02  . Q       .         .         .         .
```

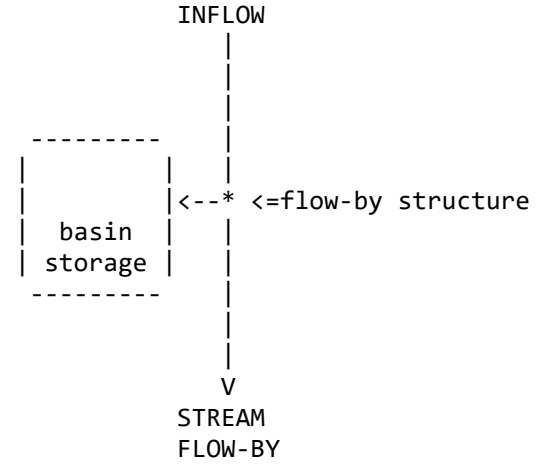
3.15	0.2511	1.03	. Q	.	.	.	.
3.33	0.2663	1.03	. Q	.	.	.	.
3.51	0.2816	1.04	. Q	.	.	.	.
3.68	0.2970	1.05	. Q	.	.	.	.
3.86	0.3124	1.05	. Q	.	.	.	.
4.04	0.3279	1.06	. Q	.	.	.	.
4.22	0.3436	1.06	. Q	.	.	.	.
4.40	0.3593	1.07	. Q	.	.	.	.
4.58	0.3751	1.07	. Q	.	.	.	.
4.75	0.3910	1.08	. Q	.	.	.	.
4.93	0.4071	1.09	. Q	.	.	.	.
5.11	0.4232	1.10	. Q	.	.	.	.
5.29	0.4394	1.10	. Q	.	.	.	.
5.47	0.4557	1.11	. Q	.	.	.	.
5.65	0.4722	1.12	. Q	.	.	.	.
5.83	0.4887	1.13	. Q	.	.	.	.
6.00	0.5054	1.13	. Q	.	.	.	.
6.18	0.5222	1.14	. Q	.	.	.	.
6.36	0.5391	1.15	. Q	.	.	.	.
6.54	0.5561	1.16	. Q	.	.	.	.
6.72	0.5732	1.17	. Q	.	.	.	.
6.90	0.5905	1.18	. Q	.	.	.	.
7.07	0.6079	1.18	. Q	.	.	.	.
7.25	0.6255	1.20	. Q	.	.	.	.
7.43	0.6432	1.20	. Q	.	.	.	.
7.61	0.6610	1.22	. Q	.	.	.	.
7.79	0.6790	1.22	. Q	.	.	.	.
7.97	0.6972	1.24	. Q	.	.	.	.
8.15	0.7155	1.24	. Q	.	.	.	.
8.32	0.7339	1.26	. Q	.	.	.	.
8.50	0.7526	1.27	. Q	.	.	.	.
8.68	0.7714	1.28	. Q	.	.	.	.
8.86	0.7904	1.29	. Q	.	.	.	.
9.04	0.8095	1.31	. Q	.	.	.	.
9.22	0.8289	1.32	. Q	.	.	.	.
9.40	0.8485	1.34	. Q	.	.	.	.
9.57	0.8683	1.35	. Q	.	.	.	.
9.75	0.8883	1.37	. Q	.	.	.	.
9.93	0.9085	1.38	. Q	.	.	.	.
10.11	0.9289	1.40	. Q	.	.	.	.
10.29	0.9496	1.41	. Q	.	.	.	.
10.47	0.9706	1.43	. Q	.	.	.	.
10.65	0.9918	1.44	. Q	.	.	.	.
10.82	1.0132	1.47	. Q	.	.	.	.
11.00	1.0350	1.48	. Q	.	.	.	.
11.18	1.0571	1.51	. Q	.	.	.	.
11.36	1.0795	1.53	. Q	.	.	.	.
11.54	1.1022	1.56	. Q	.	.	.	.
11.72	1.1253	1.57	. Q	.	.	.	.
11.89	1.1488	1.61	. Q	.	.	.	.
12.07	1.1726	1.63	. Q	.	.	.	.
12.25	1.1959	1.53	. Q	.	.	.	.
12.43	1.2187	1.55	. Q	.	.	.	.
12.61	1.2420	1.60	. Q	.	.	.	.
12.79	1.2658	1.63	. Q	.	.	.	.
12.97	1.2902	1.68	. Q	.	.	.	.
13.14	1.3152	1.71	. Q	.	.	.	.

13.32	1.3409	1.77	.	Q	.	.	.	.
13.50	1.3673	1.81	.	Q	.	.	.	.
13.68	1.3945	1.88	.	Q	.	.	.	.
13.86	1.4226	1.93	.	Q	.	.	.	.
14.04	1.4517	2.02	.	Q	.	.	.	.
14.22	1.4810	1.95	.	Q	.	.	.	.
14.39	1.5105	2.04	.	Q	.	.	.	.
14.57	1.5412	2.12	.	Q	.	.	.	.
14.75	1.5737	2.29	.	Q	.	.	.	.
14.93	1.6083	2.40	.	Q	.	.	.	.
15.11	1.6456	2.66	.	Q	.	.	.	.
15.29	1.6860	2.83	.	Q	.	.	.	.
15.46	1.7287	2.96	.	Q	.	.	.	.
15.64	1.7733	3.09	.	Q	.	.	.	.
15.82	1.8269	4.18	.	Q	.	.	.	.
16.00	1.9007	5.82	.	.Q	.	.	.	.
16.18	2.0848	19.14	.	.	.	.	Q	.
16.36	2.2524	3.57	.	Q	.	.	.	.
16.54	2.3011	3.03	.	Q	.	.	.	.
16.71	2.3420	2.52	.	Q	.	.	.	.
16.89	2.3768	2.20	.	Q	.	.	.	.
17.07	2.4076	1.98	.	Q	.	.	.	.
17.25	2.4367	1.97	.	Q	.	.	.	.
17.43	2.4649	1.84	.	Q	.	.	.	.
17.61	2.4913	1.74	.	Q	.	.	.	.
17.78	2.5164	1.65	.	Q	.	.	.	.
17.96	2.5402	1.58	.	Q	.	.	.	.
18.14	2.5634	1.56	.	Q	.	.	.	.
18.32	2.5866	1.59	.	Q	.	.	.	.
18.50	2.6097	1.54	.	Q	.	.	.	.
18.68	2.6321	1.50	.	Q	.	.	.	.
18.86	2.6539	1.46	.	Q	.	.	.	.
19.03	2.6751	1.42	.	Q	.	.	.	.
19.21	2.6958	1.39	.	Q	.	.	.	.
19.39	2.7160	1.36	.	Q	.	.	.	.
19.57	2.7358	1.33	.	Q	.	.	.	.
19.75	2.7552	1.30	.	Q	.	.	.	.
19.93	2.7742	1.27	.	Q	.	.	.	.
20.11	2.7928	1.25	.	Q	.	.	.	.
20.28	2.8111	1.23	.	Q	.	.	.	.
20.46	2.8291	1.21	.	Q	.	.	.	.
20.64	2.8468	1.19	.	Q	.	.	.	.
20.82	2.8642	1.17	.	Q	.	.	.	.
21.00	2.8814	1.15	.	Q	.	.	.	.
21.18	2.8983	1.14	.	Q	.	.	.	.
21.36	2.9149	1.12	.	Q	.	.	.	.
21.53	2.9314	1.11	.	Q	.	.	.	.
21.71	2.9476	1.09	.	Q	.	.	.	.
21.89	2.9636	1.08	.	Q	.	.	.	.
22.07	2.9794	1.07	.	Q	.	.	.	.
22.25	2.9951	1.05	.	Q	.	.	.	.
22.43	3.0105	1.04	.	Q	.	.	.	.
22.60	3.0258	1.03	.	Q	.	.	.	.
22.78	3.0409	1.02	.	Q	.	.	.	.
22.96	3.0559	1.01	.	Q	.	.	.	.
23.14	3.0706	1.00	.	Q	.	.	.	.
23.32	3.0853	0.99	.	Q	.	.	.	.

```
 23.50      3.0998      0.98  .Q        .         .         .         .
 23.68      3.1141      0.97  .Q        .         .         .         .
 23.85      3.1284      0.96  .Q        .         .         .         .
 24.03      3.1425      0.95  .Q        .         .         .         .
 24.21      3.1495      0.00  Q         .         .         .         .
-------------------------------------------------------------------------
```

==========

FLOW PASS A FLOW-BY STRUCTURE:



MAXIMUM FLOW-BY Q(CFS) = 7.60

FLOW-BY BASIN MODELING RESULTS:

MODEL TIME (HRS)	INFLOW (CFS)	FLOW-BY (CFS)	BASIN VOLUME (AF)
0.113	0.95	0.95	0.000
0.292	0.95	0.95	0.000
0.470	0.95	0.95	0.000
0.649	0.96	0.96	0.000
0.827	0.96	0.96	0.000
1.006	0.97	0.97	0.000
1.184	0.97	0.97	0.000
1.363	0.97	0.97	0.000
1.541	0.98	0.98	0.000
1.720	0.98	0.98	0.000
1.898	0.99	0.99	0.000
2.077	0.99	0.99	0.000
2.256	1.00	1.00	0.000
2.434	1.00	1.00	0.000
2.612	1.01	1.01	0.000
2.791	1.01	1.01	0.000
2.970	1.02	1.02	0.000
3.148	1.03	1.03	0.000
3.326	1.03	1.03	0.000

3.505	1.04	1.04	0.000
3.683	1.05	1.05	0.000
3.862	1.05	1.05	0.000
4.040	1.06	1.06	0.000
4.219	1.06	1.06	0.000
4.398	1.07	1.07	0.000
4.576	1.07	1.07	0.000
4.754	1.08	1.08	0.000
4.933	1.09	1.09	0.000
5.112	1.10	1.10	0.000
5.290	1.10	1.10	0.000
5.468	1.11	1.11	0.000
5.647	1.12	1.12	0.000
5.826	1.13	1.13	0.000
6.004	1.13	1.13	0.000
6.183	1.14	1.14	0.000
6.361	1.15	1.15	0.000
6.539	1.16	1.16	0.000
6.718	1.17	1.17	0.000
6.897	1.18	1.18	0.000
7.075	1.18	1.18	0.000
7.253	1.20	1.20	0.000
7.432	1.20	1.20	0.000
7.610	1.22	1.22	0.000
7.789	1.22	1.22	0.000
7.967	1.24	1.24	0.000
8.146	1.24	1.24	0.000
8.325	1.26	1.26	0.000
8.503	1.27	1.27	0.000
8.682	1.28	1.28	0.000
8.860	1.29	1.29	0.000
9.038	1.31	1.31	0.000
9.217	1.32	1.32	0.000
9.395	1.34	1.34	0.000
9.574	1.35	1.35	0.000
9.753	1.37	1.37	0.000
9.931	1.38	1.38	0.000
10.109	1.40	1.40	0.000
10.288	1.41	1.41	0.000
10.467	1.43	1.43	0.000
10.645	1.44	1.44	0.000
10.823	1.47	1.47	0.000
11.002	1.48	1.48	0.000
11.181	1.51	1.51	0.000
11.359	1.53	1.53	0.000
11.538	1.56	1.56	0.000
11.716	1.57	1.57	0.000
11.894	1.61	1.61	0.000
12.073	1.63	1.63	0.000
12.252	1.53	1.53	0.000
12.430	1.55	1.55	0.000
12.609	1.60	1.60	0.000
12.787	1.63	1.63	0.000
12.965	1.68	1.68	0.000
13.144	1.71	1.71	0.000
13.322	1.77	1.77	0.000
13.501	1.81	1.81	0.000

13.680	1.88	1.88	0.000
13.858	1.93	1.93	0.000
14.036	2.02	2.02	0.000
14.215	1.95	1.95	0.000
14.393	2.04	2.04	0.000
14.572	2.12	2.12	0.000
14.751	2.29	2.29	0.000
14.929	2.40	2.40	0.000
15.108	2.66	2.66	0.000
15.286	2.83	2.83	0.000
15.464	2.96	2.96	0.000
15.643	3.09	3.09	0.000
15.821	4.18	4.18	0.000
16.000	5.82	5.82	0.000
16.179	19.14	7.60	0.170
16.357	3.57	3.57	0.170
16.535	3.03	3.03	0.170
16.714	2.52	2.52	0.170
16.892	2.20	2.20	0.170
17.071	1.98	1.98	0.170
17.250	1.97	1.97	0.170
17.428	1.84	1.84	0.170
17.607	1.74	1.74	0.170
17.785	1.65	1.65	0.170
17.964	1.58	1.58	0.170
18.142	1.56	1.56	0.170
18.320	1.59	1.59	0.170
18.499	1.54	1.54	0.170
18.677	1.50	1.50	0.170
18.856	1.46	1.46	0.170
19.034	1.42	1.42	0.170
19.213	1.39	1.39	0.170
19.392	1.36	1.36	0.170
19.570	1.33	1.33	0.170
19.749	1.30	1.30	0.170
19.927	1.27	1.27	0.170
20.105	1.25	1.25	0.170
20.284	1.23	1.23	0.170
20.462	1.21	1.21	0.170
20.641	1.19	1.19	0.170
20.819	1.17	1.17	0.170
20.998	1.15	1.15	0.170
21.177	1.14	1.14	0.170
21.355	1.12	1.12	0.170
21.534	1.11	1.11	0.170
21.712	1.09	1.09	0.170
21.891	1.08	1.08	0.170
22.069	1.07	1.07	0.170
22.247	1.05	1.05	0.170
22.426	1.04	1.04	0.170
22.604	1.03	1.03	0.170
22.783	1.02	1.02	0.170
22.961	1.01	1.01	0.170
23.140	1.00	1.00	0.170
23.319	0.99	0.99	0.170
23.497	0.98	0.98	0.170
23.676	0.97	0.97	0.170

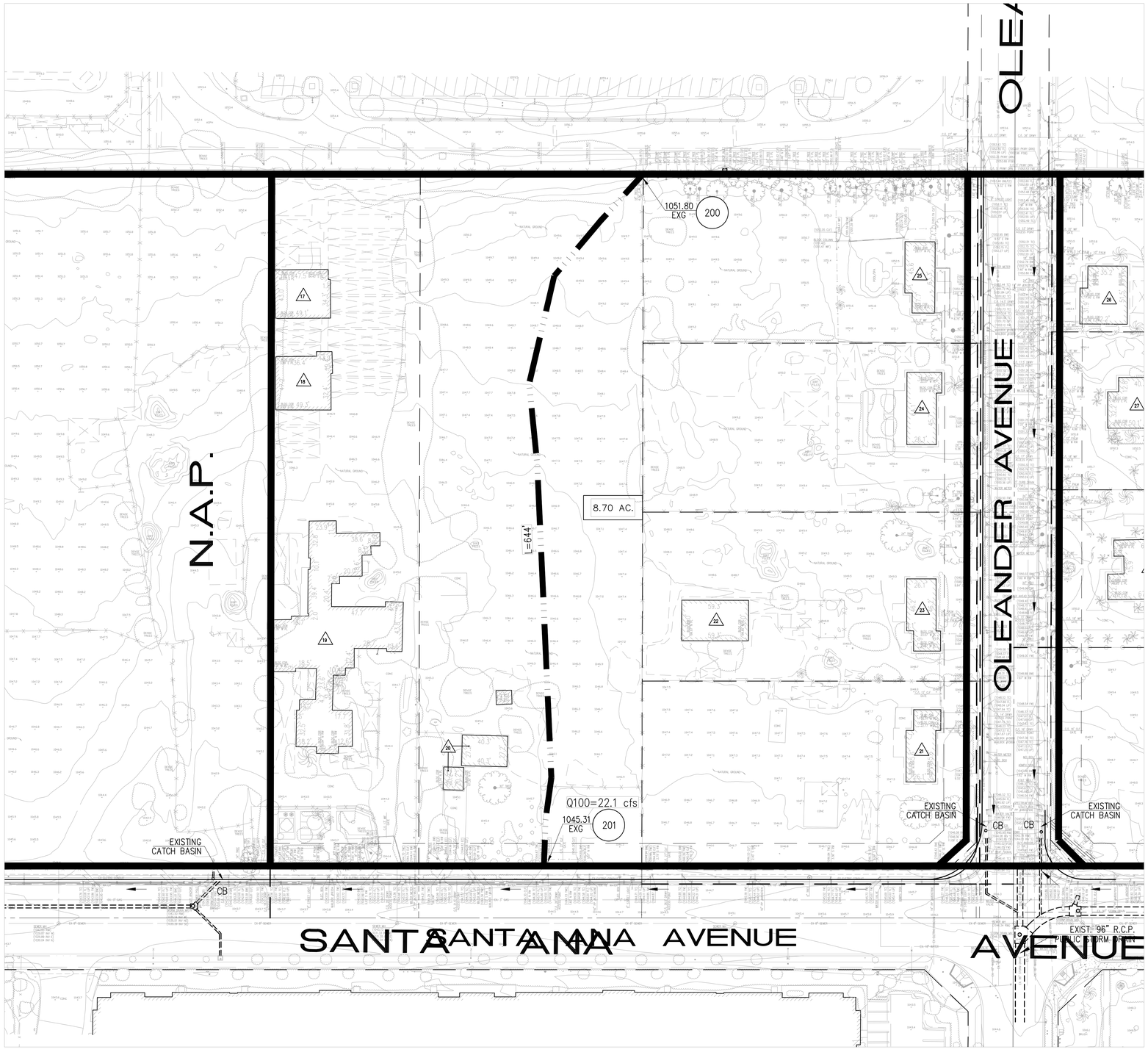
23.854	0.96	0.96	0.170
24.032	0.95	0.95	0.170
24.211	0.00	0.00	0.170

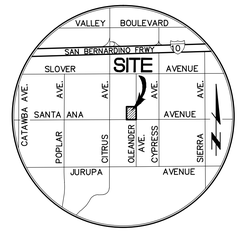
SANTA ANA INDUSTRIAL DEVELOPMENT BLDG. 2
EASTERLY TRUCK YARD PONDING

Elevation	Depth (feet)	Area (sq. ft.)	Volume (c.f.)	Σ Volume (c.f.)	Σ Volume (ac-ft)
1043.24	0.00	46.4			
			32	32	0.00
1043.40	0.16	351			
			480	512	0.012
1043.70	0.46	2851			
			361	873	0.020
1043.80	0.56	4365			
			1447	2,320	0.053
1044.00	0.76	10109			
			2089	4,410	0.101
1044.19	0.95	11883			
			120	4,530	0.104
1044.20	0.96	12113			
			1328	5,858	0.134
1044.30	1.06	14450			

APPENDIX D

HYDROLOGY MAP





VICINITY MAP
N.T.S.

0 20 40 80 120
SCALE: 1"=40'

Last Update:8/16/22
G:\3600-3699\3615\Building 2\3615 B2 HYD-EX-PRELIM.dwg

CITY OF FONTANA
ENGINEERING DEPARTMENT

HYDROLOGY MAP (EXISTING CONDITION) BUILDING 2
SANTA ANA AVENUE INDUSTRIAL DEVELOPMENT
FONTANA, CA

3615/1 OF 2 SHEETS

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

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

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 2 Sheets

N.A.P.

OFFSITE

PROPOSED WATER QUALITY UNDERGROUND CHAMBERS

26 DOCK DOORS

5.72 AC.

BUILDING 2
188,336 S.F.

2.25 AC.

RIDGE LINE

PROPOSED CATCH BASIN

Q100=19.4 cfs (UNDETAINED)

201 1043.93TG 1039.33INV.

QOUT=12.5 cfs A=5.77 AC. Tc=10.71 MIN.

PROPOSED CDS UNIT

APPROX. PONDING WSE=1044.19 D=0.95'

0.35 AC.

Q100=19.8 cfs (UNDETAINED)

202 1038.63 INV.

PROPOSED CATCH BASIN

L=234'

PROPOSED S.D. LINE A2

APPROX. PONDING WSE=1044.0 D=0.26'

EXISTING 15" CMP

RELOCATE EXIST. CATCH BASIN

PROPOSED CATCH BASIN

LANDSCAPING

L=51'

L=458'

LANDSCAPING

0.25 ac

L=704'

PROPOSED 24" R.C.P.

1038.48 INV.

212 Q100=27.6 cfs (UNDETAINED) QOUT=21.6 cfs

OFFSITE

STREET C/L

SANTA ANA AVENUE

OFFSITE

EXISTING CATCH BASIN

1043.21 FL

221 Q100=0.3 cfs (UNDETAINED)

200 1050.72 FS

R=1,174'

42" RCP

40'

230 1051.71 FL

0.10 ac

L=595'

LANDSCAPING

L=491'

OLEANDER AVENUE

STREET C/L

0.03 ac

42"

40'

RELOCATE EXIST. CATCH BASIN

PROPOSED CATCH BASIN

1045.58 FL

Q100=8.0 cfs (UNDETAINED)

211 1047.06FL 1043.53INV.

231 Q100=0.2 cfs (UNDETAINED)

220 1046.50 FL

EXIST. 96" R.C.P. PUBLIC STORM DRAIN

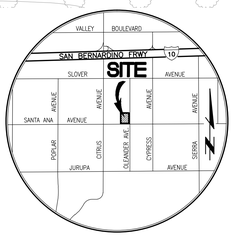
SCALE:1"=30'

0 15 30 60 90

Last Update: 4/19/22
O:\3600-3699\3615\Building 2\3615 B2HYD-PRELIM.dwg

LEGEND

- PROJECT BOUNDARY
- SUBAREA BOUNDARY
- FLOW PATH
- 1.00 AC. — SUBAREA AREA
- 100 — NODE NUMBER
- PONDING LIMITS



VICINITY MAP
N.T.S.

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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 2 Sheets

CITY OF FONTANA
ENGINEERING DEPARTMENT

HYDROLOGY MAP
BUILDING 2
(PROPOSED CONDITION)
SANTA ANA AVENUE
INDUSTRIAL DEVELOPMENT
FONTANA, CA

3615/1 OF 2 SHEETS