PRELIMINARY HYDROLOGY CALCULATIONS

FOR

SLOVER AVENUE INDUSTRIAL BUILDINGS
13592 SLOVER AVENUE
FONTANA, CALIFORNIA

-

PREPARED FOR
ALERE PROPERTY GROUP LLC
100 BAYVIEW CIRCLE, SUITE 310
NEWPORT, CA 92660
PHONE: (949) 509-5000
FAX: (949) 509-5001

MARCH 15, 2021
REVISED JUNE 9,2021

JOB NO. 3950

PREPARED BY

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

PRELIMINARY HYDROLOGY CALCULATIONS

FOR

SLOVER AVENUE INDUSTRIAL BUILDINGS

PREPARED UNDER
THE SUPERVISION OF

REINHARD STENZEL , PE
R.C.E. 5615
EXP. 12/31/22

INTRODUCTION

A: PROJECT LOCATION

The project site is located on the north side of Slover Avenue east of Commerce Way in Fontana, CA.

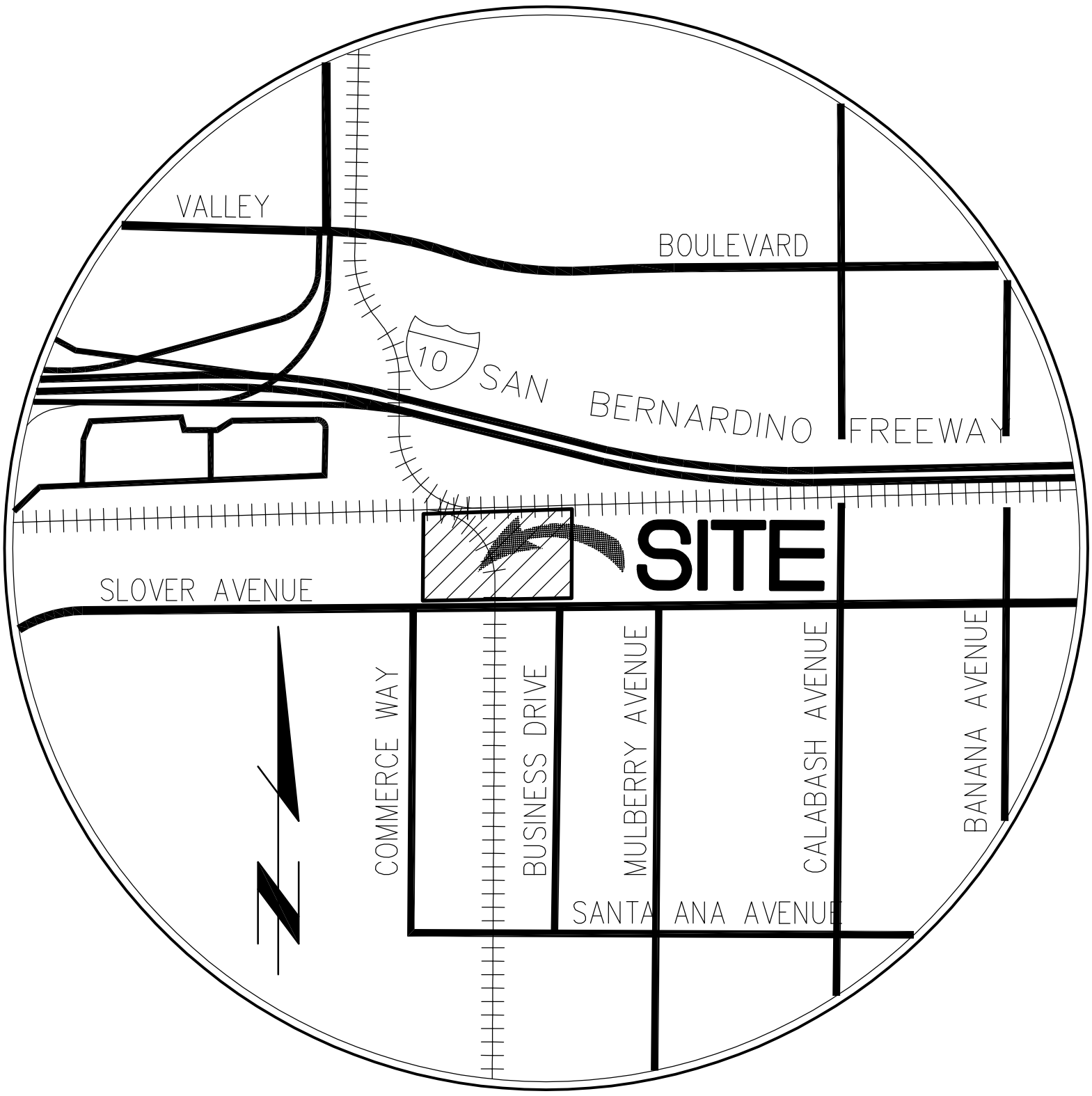
B: STUDY PURPOSE

The purpose of this study is to determine the 100-year, existing and proposed condition peak flow rates from the project site that discharges to the existing storm drain in Slover Avenue.

C: PROJECT STAFF:

Thienes Engineering staff involved in this study include:

Reinhard Stenzel
Kristie Ferronato
Eduardo Toledanes



VICINITY MAP

N.T.S.

DISCUSSION

The project is approximately 18.55 acres. Proposed improvements for the site include a two warehouse buildings of about 144,270 and 210,840 square feet. The site will have two truck yards in between the buildings separated by the railroad spur which will remain. Vehicle parking will be located along the west, south, and east of the site. There will be landscaping fronting Slover Avenue, along with additional landscaping throughout the project site.

Existing Condition

The project site is currently fully paved with a construction supply business. There appears to be material storage scatter throughout the site. The site drains southerly towards Slover. The site is divided east and west by an existing rail road spur.

The eastern portion of the site drains southwesterly towards the east side of the rail road spur. The 100-year peak flow rate is approximately 31.2 cfs. There are 2 existing 21' wide public catch basins here which collects this runoff.

The western portion of the site also drains southeasterly towards the Slover Avenue. The 100-year peak flow rate is approximately 26.9 cfs. There is an existing 21' wide catch basin just west of the project site, which collects the projects runoff. The total 100-year peak flow rate at existing condition is approximately 58.1 cfs.

See Appendix A" for the existing storm drains plans, Appendix "B" for existing condition hydrology calculations and Appendix "C" for existing condition hydrology map.

Off Site Storm Drain

The land north of the project site is Southern Pacific Railroad. There is an existing grated catch basin near the northwest corner of the property. This inlet appears to capture runoff from the rail road right of way. There is a storm drain conveying runoff from north of the rail road to this catch basin. Then an existing 36" storm drains appears to continue southerly connecting to the public storm drain in Slover. The alignment of this storm drain through the project site is not clear at this time. There is an existing storm drain manhole near the southwest property corner. This existing storm drain may need to be relocated to avoid the proposed building and proposed utilities. The drainage pattern will not be altered and the connection point to the Slover storm drain will remain.

Proposed Condition

The runoff from the east building will drain generally to the southwest. The northern drive aisle and west portion of the building (Nodes 100-113) will drain towards the truck yard. A series of catch basins will collect the runoff. A private storm drain will drain southerly towards the driveway. The eastern portion of the building, the east drive aisle (Nodes 110-113) will drain southerly towards an inlet. A private storm drain will convey the runoff westerly towards the drive way. The runoff from the south vehicle parking will collected and confluenced with the runoff from the east. Then the storm drain will connected with the storm drain from the truck yard and continue southerly to the existing storm drain in Slover Avenue. The 100-year peak flow rate (Node 114) is approximately 31.5 cfs.

The runoff from the western portion of the west building and the west drive aisle (Nodes 210-213) drains southerly to a proposed catch basin. The private storm drain will continue easterly to the east side of the building collecting the runoff from the southern drive aisle. The eastern portion of the building and the truck yard (Nodes 200-213) will drain to a series of grated inlets in the truck yard. A private storm drain will convey the runoff southerly and confluence with the runoff from the west. The storm drain will discharge to the existing storm drain in Slover Avenue. The 100-year peak flow rate (Node 214) is approximately 21.6 cfs.

The remaining southerly landscaped areas and portions of the southerly driveways along the frontage of Slover will sheet flow into Slover. The 100-year peak flow rate is approximately 2.1 cfs. (0.7 cfs + 1.0 cfs + 0.4 cfs)

The existing rail road spur which will remain will sheet flow southerly towards Slover along with some landscaping areas for the west building. The 100-year peak flow rate (Node 232) is approximately 2.4 cfs.

The total 100-year peak flow rate at proposed condition is approximately 57.6 cfs.

See Appendix "B" for proposed onsite condition hydrology calculations and Appendix “C” for proposed condition hydrology map.

Summary

The sites drainage patterns are designed to mimic the existing condition drainage patterns. The sites 100-year total discharge in the existing condition is approximately 58.1 cfs. The sites 100-year total discharge in the proposed condition is approximately 57.6 cfs. which is less than the existing condition detention is not required. Therefore, the development of this project is not expected to have an adverse effect on downstream facilities.

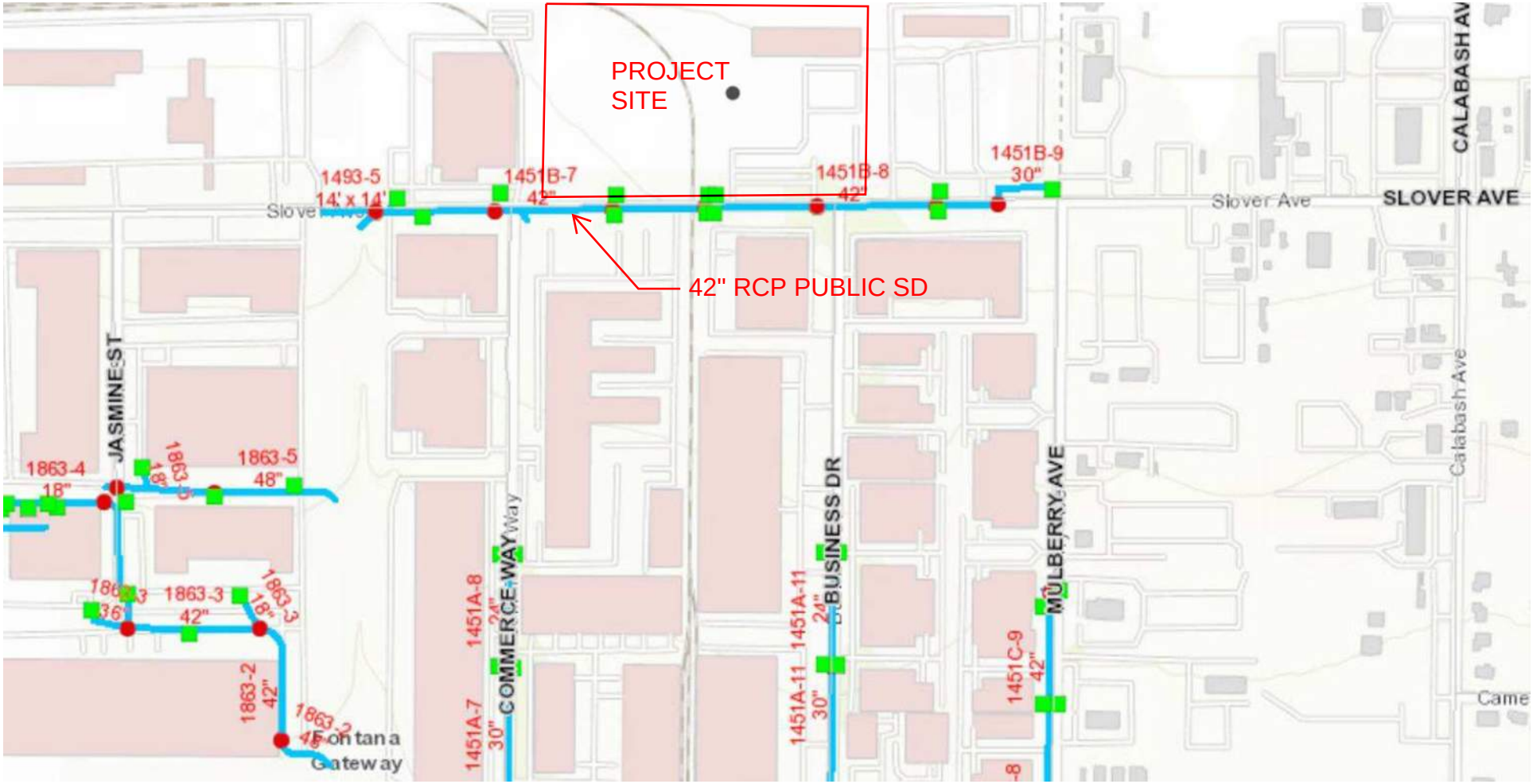
Methodology

Hydrology calculations were computed using San Bernardino County's Rational Method Hydrology AES software. Truck yard detention was modeled via AES software's Small Unit Hydrograph Model. The soil classification was type "A" per the San Bernardino County Hydrology Manual. Please refer to Appendix "A" for reference materials.

APPENDIX	DESCRIPTION
A	REFERENCE MATERIALS
B	HYDROLOGY CALCULATIONS
C	HYDROLOGY MAP

APPENDIX A

REFERENCE MATERIALS


PROJECT SITE
42" RCP PUBLIC SD
1493-5
14' x 14'
1451B-7
42"
1451B-8
42"
1451B-9
30"
Slover Ave
SLOVER AVE
CALABASH AV
Calabash Ave
JASMINE ST
1863-4
18"
1863-5
48"
1863-3
42"
1863-2
42"
1863-2
Montana Gateway
1451A-8
24"
1451A-7
30"
COMMERCE WAY
1451A-11
24"
1451A-11
30"
BUSINESS DR
1451C-9
42"
MULBERRY AVE
Came

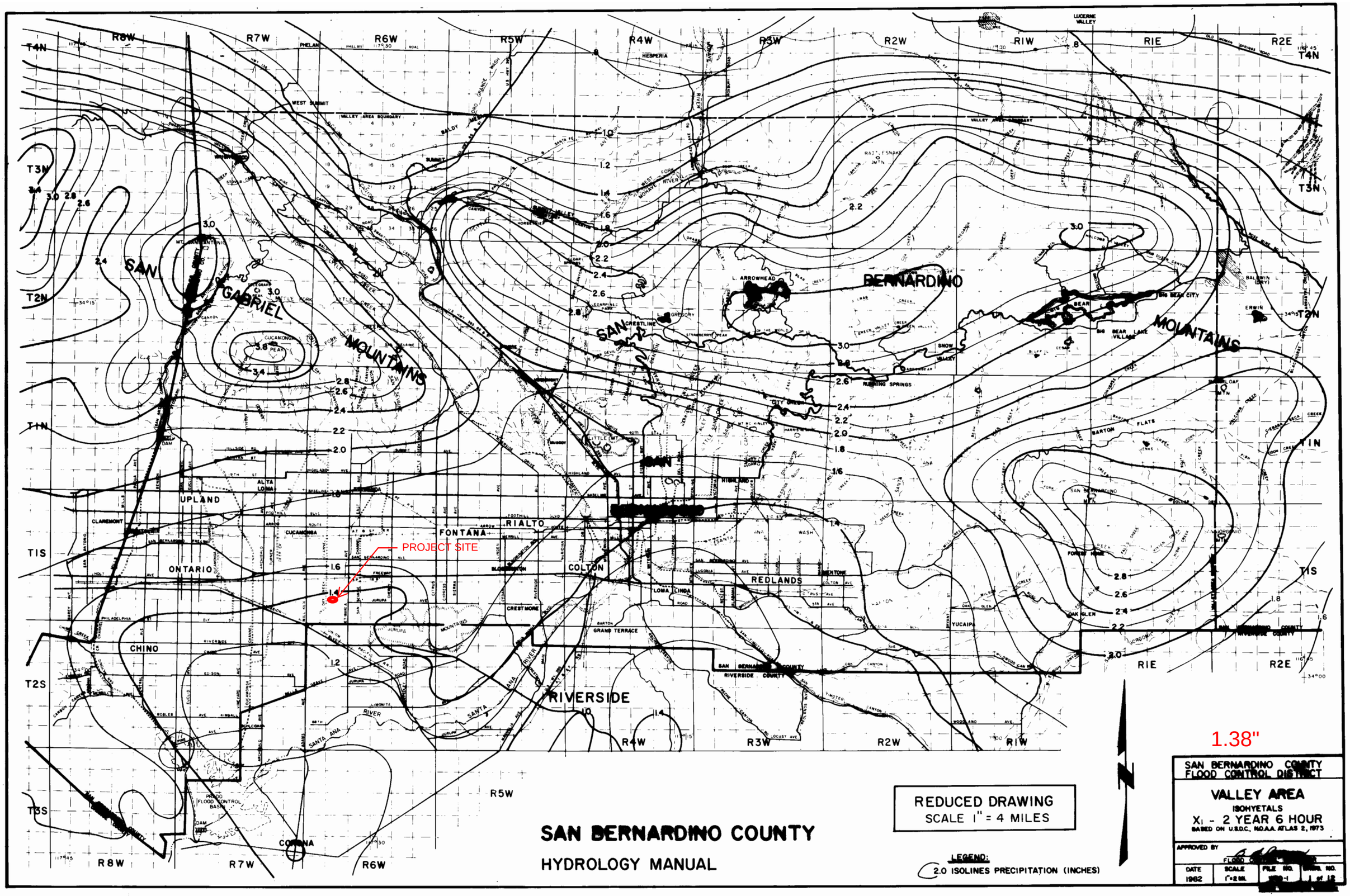

SAN BERNARDINO COUNTY
HYDROLOGY MANUAL
REDUCED DRAWING
SCALE 1" = 4 MILES
LEGEND:
2.0 ISOLINES PRECIPITATION (INCHES)
PROJECT SITE
1.38"
SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT
VALLEY AREA
ISOHYETALS
X1 - 2 YEAR 6 HOUR
BASED ON U.S.D.C., N.O.A.A. ATLAS 2, 1973
APPROVED BY
DATE 1962
SCALE 1"=2 MI.
FILE NO.
DWG. NO.
SAN GABRIEL MOUNTAINS
SAN BERNARDINO MOUNTAINS
SAN BERNARDINO
RIVERSIDE
UPLAND
ONTARIO
CHINO
RIALTO
FONTANA
COLTON
REDLANDS
CORONA
HESPERIA
L. ARROWHEAD
BIG BEAR CITY
BIG BEAR LAKE
SNOW VALLEY
RUNNING SPRINGS
YUCAIPA
GRAND TERRACE
CREST MORE
LOMA LINDA
ALTA LOMA
CLAREMONT
CUCAMONGA
BLOOMINGTON
MENTONE
OAK GLEN
ERWIN
BARTON FLATS
LUCERNE VALLEY
WEST SUMMIT
SUMMIT VALLEY
CITY CREEK
PROPO FLOOD CONTROL BASIN
SANTA ANA RIVER
T4N
T3N
T2N
T1N
T1S
T2S
T3S
R8W
R7W
R6W
R5W
R4W
R3W
R2W
R1W
R1E
R2E

FIGURE B-1

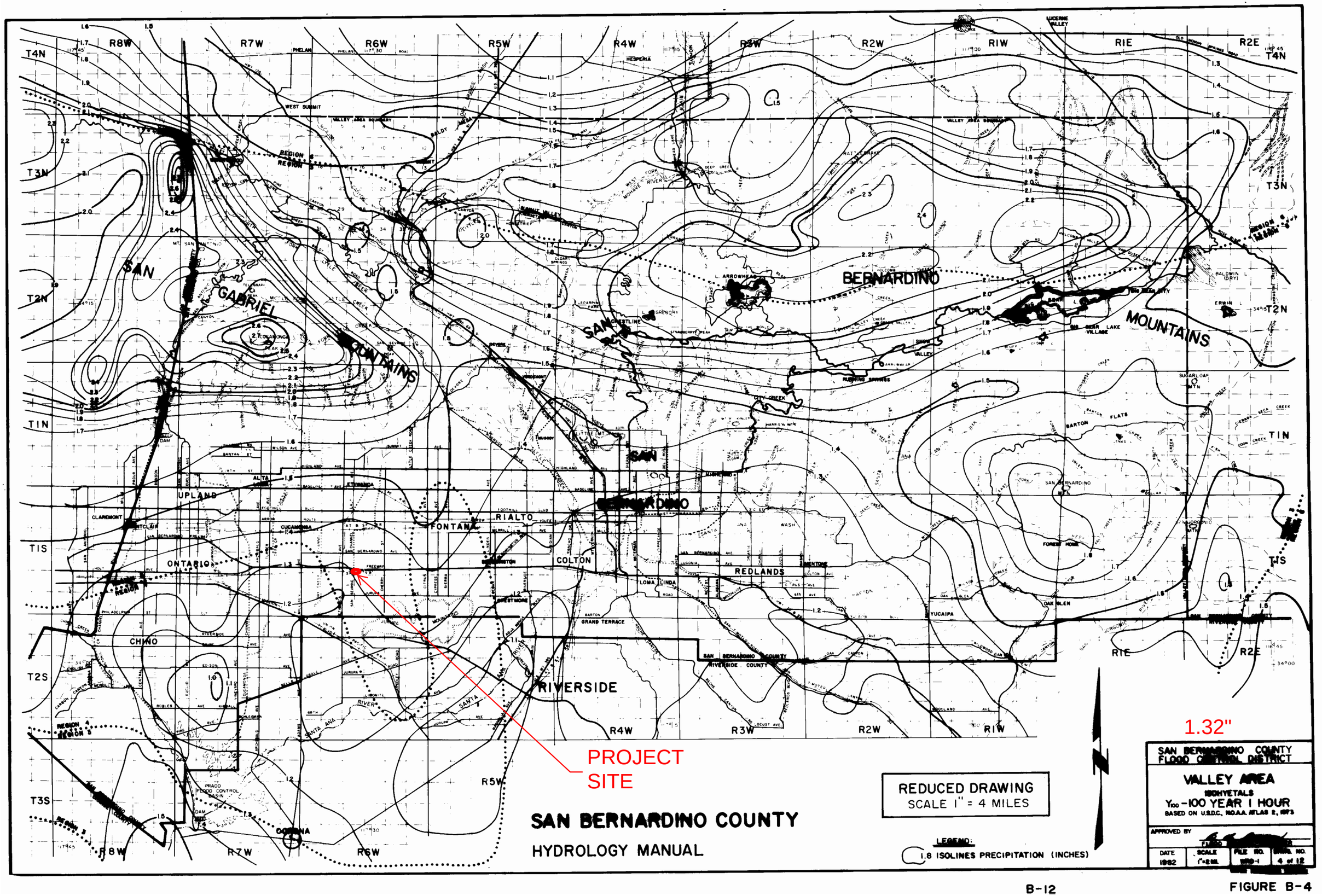

SAN BERNARDINO COUNTY
HYDROLOGY MANUAL
PROJECT SITE
1.32"
REDUCED DRAWING
SCALE 1" = 4 MILES
LEGEND:
1.8 ISOLINES PRECIPITATION (INCHES)
SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT
VALLEY AREA
ISOHYETALS
Y100 -100 YEAR 1 HOUR
BASED ON U.S.D.C., NOAA ATLAS 2, 1973
APPROVED BY
DATE 1982
SCALE 1"=2 MI.
FILE NO. 1910-1
SHEET NO. 4 of 12
SAN GABRIEL MOUNTAINS
SAN BERNARDINO MOUNTAINS
UPLAND
ONTARIO
CHINO
CLAREMONT
FONTANA
RIALTO
COLTON
REDLANDS
LOMA LINDA
YUCAIPA
RIVERSIDE
GRAND TERRACE
OAK GLEN
BIG BEAR LAKE
SAN BERNARDINO COUNTY
RIVERSIDE COUNTY
R8W
R7W
R6W
R5W
R4W
R3W
R2W
R1W
R1E
R2E
T4N
T3N
T2N
T1N
T1S
T2S
T3S

FIGURE B-4

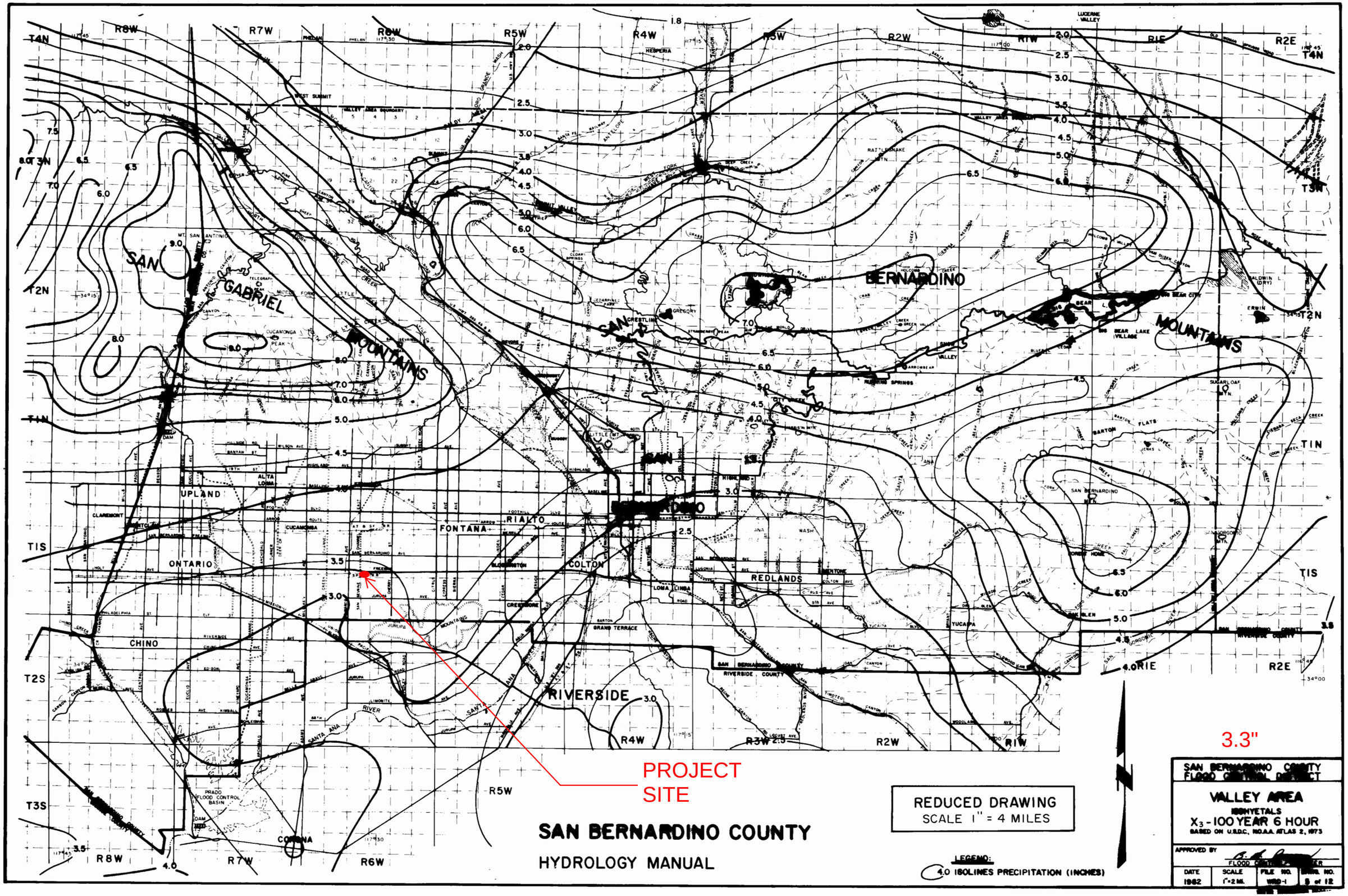

SAN BERNARDINO COUNTY
HYDROLOGY MANUAL
PROJECT SITE
3.3"
REDUCED DRAWING
SCALE 1" = 4 MILES
LEGEND:
4.0 ISOLINES PRECIPITATION (INCHES)
SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT
VALLEY AREA
ISOHYETALS
X3 - 100 YEAR 6 HOUR
BASED ON U.S.D.C., NOAA ATLAS 2, 1973
APPROVED BY
DATE 1982
SCALE 1"=2 MI.
FILE NO. WRD-1
SHEET NO. 8 of 12
SAN BERNARDINO
RIVERSIDE
ONTARIO
UPLAND
CHINO
FONTANA
RIALTO
COLTON
REDLANDS
CRESTLINE
BEAR LAKE VILLAGE
BIG BEAR CITY
SAN GABRIEL MOUNTAINS
SAN BERNARDINO MOUNTAINS
CORONA
PRADO FLOOD CONTROL BASIN
SANTA ANA RIVER
T4N
T3N
T2N
T1N
T1S
T2S
T3S
R8W
R7W
R6W
R5W
R4W
R3W
R2W
R1W
R1E
R2E

FIGURE B-5

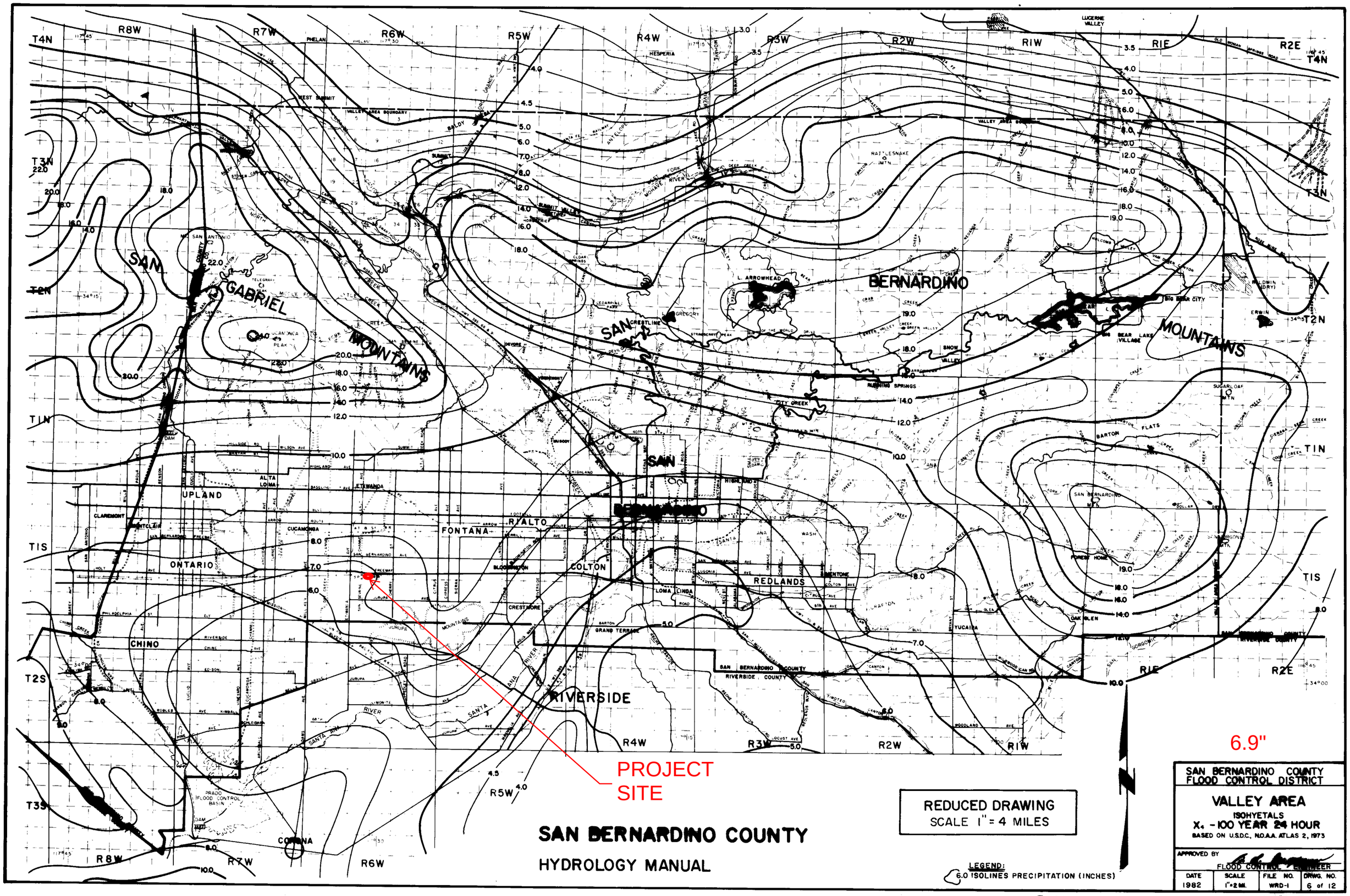
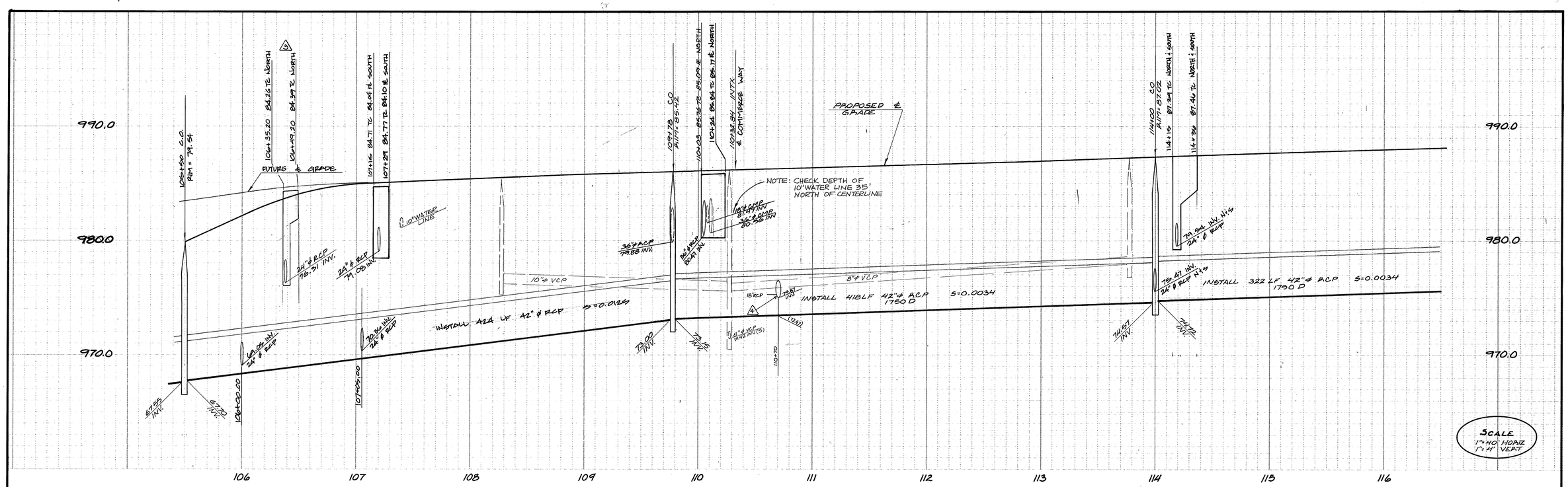
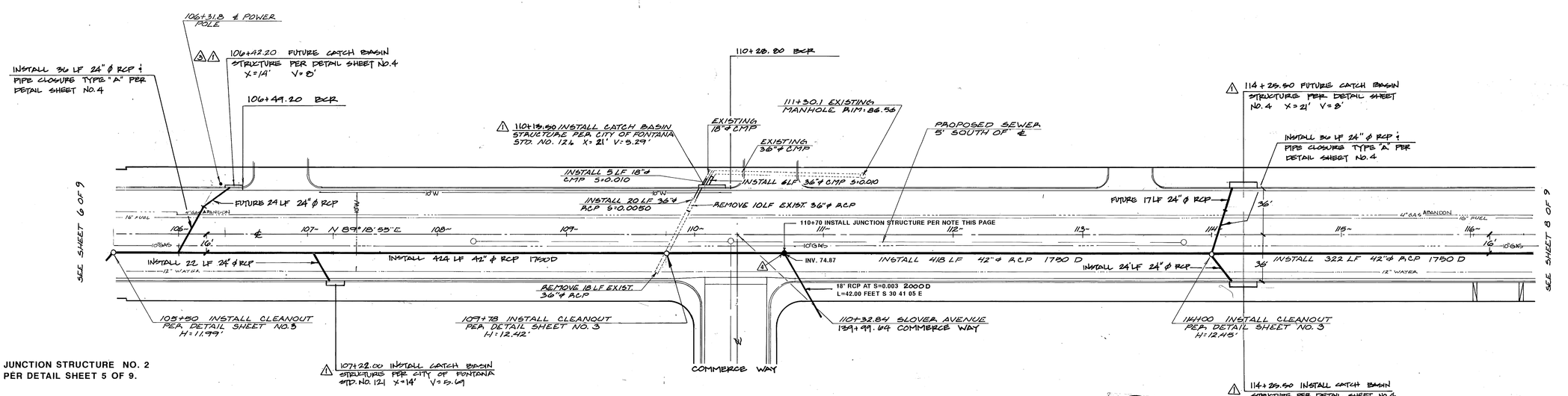

SAN BERNARDINO COUNTY
HYDROLOGY MANUAL
PROJECT SITE
6.9"
REDUCED DRAWING
SCALE 1" = 4 MILES
LEGEND:
6.0 ISOLINES PRECIPITATION (INCHES)
SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT
VALLEY AREA
ISOHYETALS
X4 - 100 YEAR 24 HOUR
BASED ON U.S.D.C., N.O.A.A. ATLAS 2, 1973
APPROVED BY
FLOOD CONTROL ENGINEER
DATE 1982
SCALE 1"=2 MI.
FILE NO. WRD-1
DRWG. NO. 6 of 12
SAN GABRIEL MOUNTAINS
SAN BERNARDINO MOUNTAINS
SAN BERNARDINO
RIVERSIDE
UPLAND
ONTARIO
CHINO
FONTANA
RIALTO
COLTON
REDLANDS
LOMA LINDA
CRESTLINE
L. ARROWHEAD
BIG BEAR CITY
BIG BEAR LAKE VILLAGE
SAN BERNARDINO COUNTY
RIVERSIDE COUNTY
T4N
T3N
T2N
T1N
T1S
T2S
T3S
R8W
R7W
R6W
R5W
R4W
R3W
R2W
R1W
R1E
R2E

FIGURE B-6





4 NOTE: JUNCTION STRUCTURE NO. 2 PER DETAIL SHEET 5 OF 9.

A=60
B=18"
C=8'
D=36"
E=4'
F=9"
G=6"
L=4'
R=74.93
S=74.87
T=4.5"

ENGINEER FOR REVISION 4 ONLY

REGISTERED PROFESSIONAL ENGINEER — 1/4/88 — MELVIN W. THANDIGA III — No. 39993 — Exp. 12-31-89 — CIVIL ENGINEERING — STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER — FRED J. BARBITT — No. 27674 — Exp. 3-31-90 — CIVIL — STATE OF CALIFORNIA

SPECIAL NOTE

Contractor to pothole lateral crossing locations of the existing 16"/10"/4" gas lines prior to construction to verify depth of said gas lines so as to insure that lateral crossings can be accomplished.

SLOVER AVENUE

SCALE 1" = 40'

BENCH MARK

S.B.CO. Brass Disk 13-1
4.5 miles west along S.P.R.R. from Sierra Avenue Overcrossing & 0.5 miles east of Etiwanda Overcrossing, Headwall for Bay of 5 large CMP over Etiwanda Wash.
Elevation 993.449 ft.

Equation: Add 0.26 ft. to plan elevation to obtain benchmark datum.

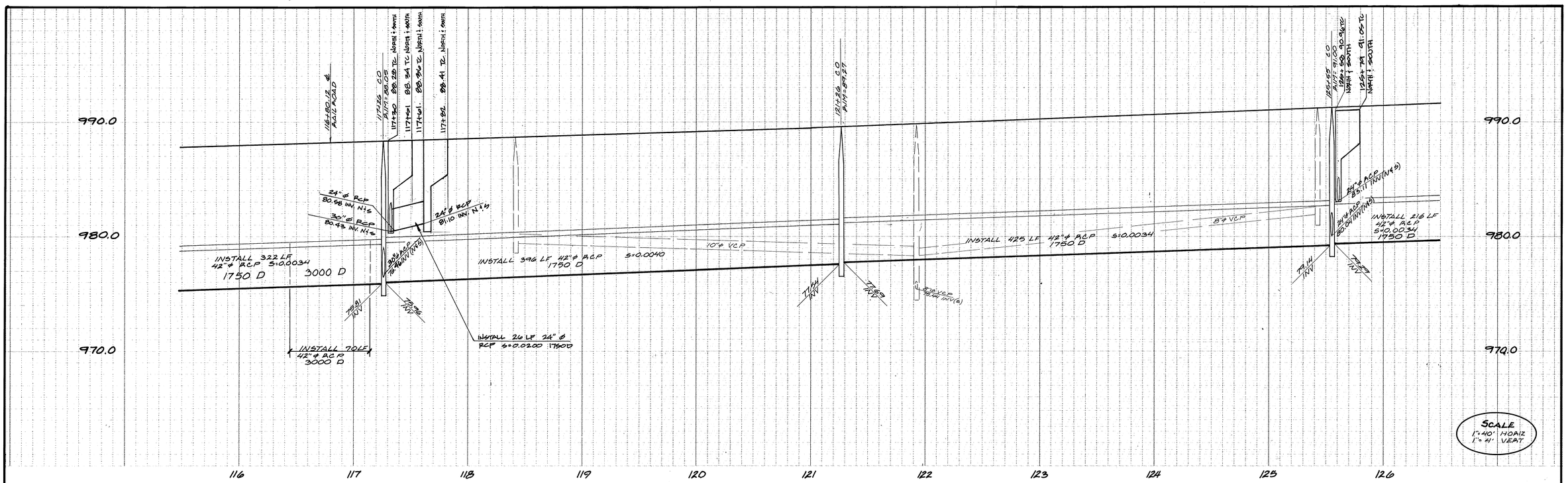
NO.	DATE	BY	REVISION	DATE	APPR.
4	1/4/89	M.W.T.	ADD JUNCTION STRUCTURE STA. 110+70		
3	12/19/88	F.J.B.	DECREASE CATCH BASIN SIZES	12/20/88	F.J.B.
1	11/6/87	F.J.B.	ADD CATCH BASIN & INCREASE CATCH BASIN SIZE	11/7/87	F.J.B.

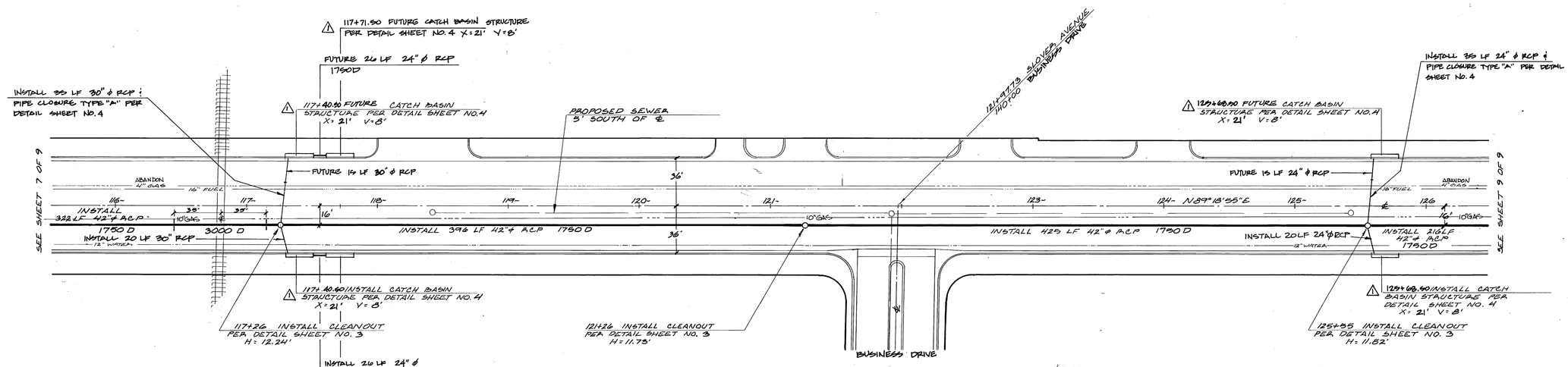
KE — krueper engineering & associates
civil engineering • land surveying
568 north mountain view, suite 230
san bernardino, california 92401
884-2159

Fred J Barbitt — 6-1-87
FRED J BARBITT R.C.E. 27674 EXP. 3-31-90 — DATE

CITY OF FONTANA
PUBLIC WORKS DEPARTMENT

DESIGN BY FJB & FCZ
DRAWN BY JDS
CHECKED BY E.C.
STORM DRAIN PLAN
SLOVER AVENUE
STATION 106+00 TO 116+00
SCALE 1"=40'
DATE 8/28/87
APPROVED BY Robert Schneider — CITY ENGINEER R.C.E. 18932
DWG. NO. 145B 7/9





SPECIAL NOTE

Contractor to pothole lateral crossing locations of the existing 16"/10"/4" gas lines prior to construction to verify depth of said gas lines so as to insure that lateral crossings can be accomplished.

REGISTERED PROFESSIONAL ENGINEER FRED J. BABBITT No. 27674 Exp. 3-31-90 CIVIL STATE OF CALIFORNIA

BENCH MARK

S.B.CO. Brass Disk 13-1
4.5 miles west along S.P.R.R. from Sierra Avenue Overcrossing & 0.5 miles east of Etiwanda Overcrossing, Headwall for Bay of 5 large CMP over Etiwanda Wash.
Elevation 993.449 ft.

Equation: Add 0.26 ft. to plan elevation to obtain benchmark datum.

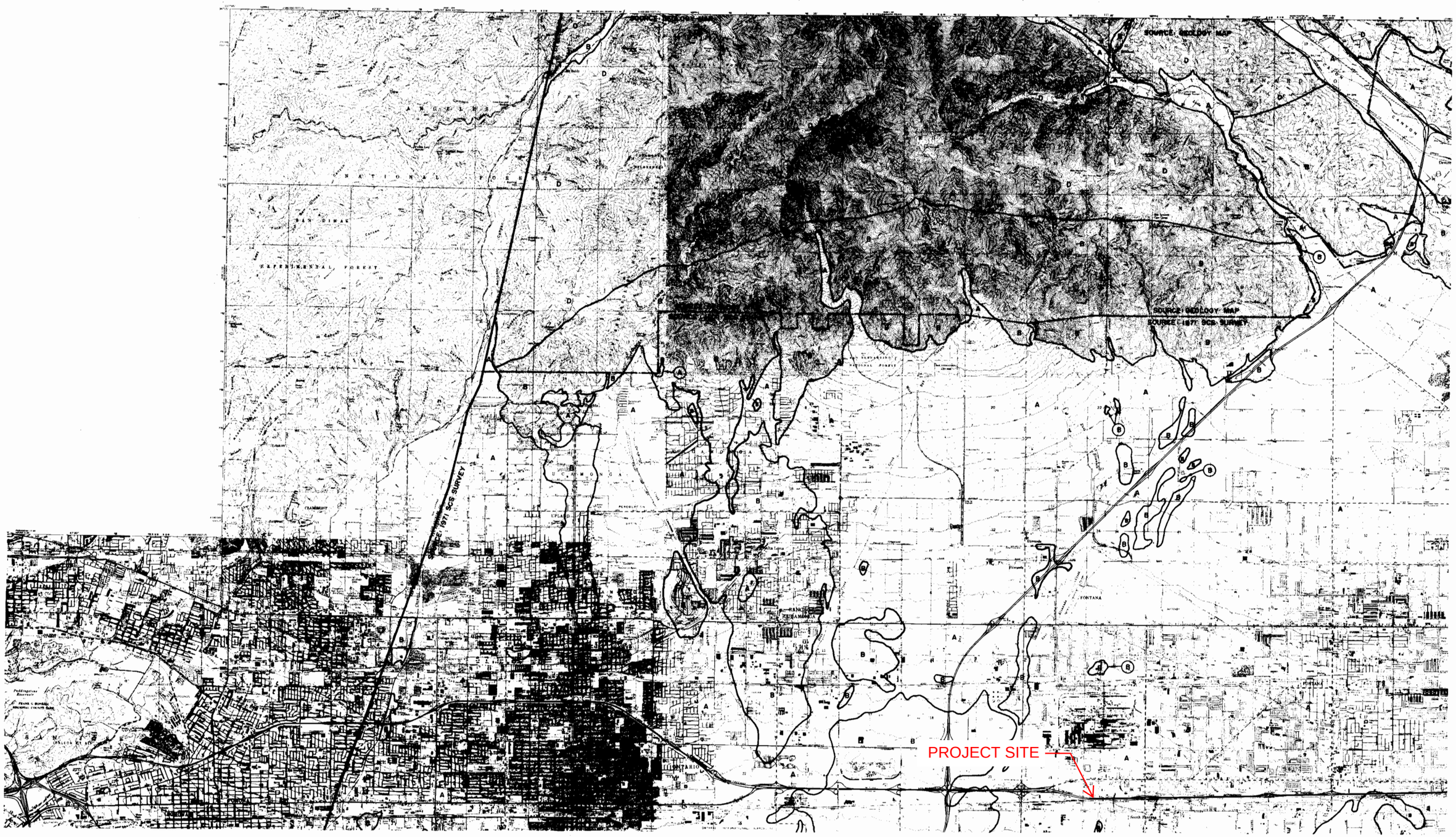
NO.	DATE	BY	REVISION	DATE	APPR.
1	11/6/87	F.J.B.	ADD CATCH BASIN & INCREASE CATCH BASIN SIZE	11/11/87	RJS

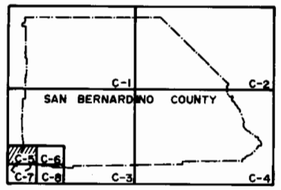
krueper engineering & associates
civil engineering · land surveying
568 north mountain view, suite 230
san bernardino, california 92401
884-2159

Fred J. Babbitt 6-1-87
FRED J. BABBITT R.C.E. 27674 EXP. 3-31-90 DATE

CITY OF FONTANA
PUBLIC WORKS DEPARTMENT

DESIGN BY FJB & FCZ	STORM DRAIN PLAN SLOVER AVENUE	SCALE 1"=40'
DRAWN BY JDS	STATION 116+00 TO 126+00	DATE 8/28/87
CHECKED BY E.C.	APPROVED BY Robert Schroeder CITY ENGINEER R.C.E. 18932	DWG. NO. 1451B 8/9





INDEX MAP

LEGEND

SOIL GROUP BOUNDARY

A SOIL GROUP DESIGNATION

BOUNDARY OF INDICATED SOURCE

SCALE 1:48,000

SCALE REDUCED BY 1/2

SOIL TYPE A

SAN BERNARDINO COUNTY

HYDROLOGY MANUAL

HYDROLOGIC SOILS GROUP MAP
FOR
SOUTHWEST-A AREA

FIGURE C-13

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 #3950 SLOVER AVE INDUSTRIAL BLDG                                  *
* EXISTING CONDITION 100-YEAR                                           *
* NODES 110-111   110xP.DAT                                             *
 ************************************************************************

  FILE NAME: C:\XDRIVE\3950\110X.DAT
  TIME/DATE OF STUDY: 22:31 03/14/2021
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  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) = 1.3200

  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*


****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    111.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   735.00
  ELEVATION DATA: UPSTREAM(FEET) =    995.92  DOWNSTREAM(FEET) =    986.34

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.148
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.834
  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        7.95      0.80      0.10    52   10.15
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
  SUBAREA RUNOFF(CFS) =     26.86
  TOTAL AREA(ACRES) =      7.95   PEAK FLOW RATE(CFS) =     26.86
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      7.95  TC(MIN.) =     10.15
  EFFECTIVE AREA(ACRES) =      7.95  AREA-AVERAGED Fm(INCH/HR)=  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.10
  PEAK FLOW RATE(CFS)   =     26.86
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

1

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

                           Analysis prepared by:

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

 ************************* DESCRIPTION OF STUDY *************************
* TEI JOB NO 3950                                                        *
* EXISTING CONDITION                                                     *
* 100 YEAR STORM EVENT                                                   *
 ************************************************************************

  FILE NAME: W:\3950\X100.DAT
  TIME/DATE OF STUDY: 15:02 03/12/2021
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

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

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.3200

  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   680.00
  ELEVATION DATA: UPSTREAM(FEET) =    999.12  DOWNSTREAM(FEET) =    991.63

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.174
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.828
  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        3.80      0.74     0.100    52   10.17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =     12.84
  TOTAL AREA(ACRES) =      3.80   PEAK FLOW RATE(CFS) =     12.84

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =    991.63
  DOWNSTREAM NODE ELEVATION(FEET) =    990.29
  CHANNEL LENGTH THRU SUBAREA(FEET) =   260.00
  "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.050
  PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.02000
  MAXIMUM DEPTH(FEET) = 100.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.485
```

```
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        3.35      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     17.99
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.51
  AVERAGE FLOW DEPTH(FEET) =   0.39   FLOOD WIDTH(FEET) =   37.71
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   1.73   Tc(MIN.) =   11.90
  SUBAREA AREA(ACRES) =    3.35       SUBAREA RUNOFF(CFS) =   10.28
  EFFECTIVE AREA(ACRES) =    7.15     AREA-AVERAGED Fm(INCH/HR) =   0.07
  AREA-AVERAGED Fp(INCH/HR) =   0.74  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        7.1         PEAK FLOW RATE(CFS) =      21.95

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.42   FLOOD WIDTH(FEET) =   40.76
  FLOW VELOCITY(FEET/SEC.) =   2.63   DEPTH*VELOCITY(FT*FT/SEC) =   1.10
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =     940.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =    990.29
  DOWNSTREAM NODE ELEVATION(FEET) =    988.66
  CHANNEL LENGTH THRU SUBAREA(FEET) =   175.00
  "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.050
  PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.02000
  MAXIMUM DEPTH(FEET) = 100.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.344
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        3.45      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     27.02
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.46
  AVERAGE FLOW DEPTH(FEET) =   0.40   FLOOD WIDTH(FEET) =   39.39
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   0.84   Tc(MIN.) =   12.74
  SUBAREA AREA(ACRES) =    3.45       SUBAREA RUNOFF(CFS) =   10.15
  EFFECTIVE AREA(ACRES) =   10.60     AREA-AVERAGED Fm(INCH/HR) =   0.07
  AREA-AVERAGED Fp(INCH/HR) =   0.74  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =       10.6         PEAK FLOW RATE(CFS) =      31.20

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.43   FLOOD WIDTH(FEET) =   41.68
  FLOW VELOCITY(FEET/SEC.) =   3.57   DEPTH*VELOCITY(FT*FT/SEC) =   1.52
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =    1115.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       10.6  TC(MIN.) =     12.74
  EFFECTIVE AREA(ACRES) =     10.60  AREA-AVERAGED Fm(INCH/HR)=  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap = 0.100
  PEAK FLOW RATE(CFS)   =      31.20
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

PROPOSED 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:

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 ************************* DESCRIPTION OF STUDY *************************
* JOB #3950 SLOVER AVE INDUSTRIAL BLDG                                  *
* PROPOSED CONDITION 100-YEAR                                           *
* NODES 100-114   100P.DAT                                              *
 ************************************************************************

  FILE NAME: C:\XDRIVE\3950\100P.DAT
  TIME/DATE OF STUDY: 19:48 06/09/2021
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

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

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.3200

  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*


****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   561.00
  ELEVATION DATA: UPSTREAM(FEET) =    993.75  DOWNSTREAM(FEET) =    989.95

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.382
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.782
  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        1.70      0.80      0.10    52   10.38
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
  SUBAREA RUNOFF(CFS) =      5.66
  TOTAL AREA(ACRES) =      1.70   PEAK FLOW RATE(CFS) =      5.66

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   986.45  DOWNSTREAM(FEET) =   986.01
  FLOW LENGTH(FEET) =   145.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.93
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      5.66
  PIPE TRAVEL TIME(MIN.) =   0.62    Tc(MIN.) =  11.00
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =   706.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  11.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.653
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        1.50      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) =    1.50      SUBAREA RUNOFF(CFS) =    4.82
  EFFECTIVE AREA(ACRES) =     3.20   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =     3.20       PEAK FLOW RATE(CFS) =      10.29

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   986.01  DOWNSTREAM(FEET) =   985.66
  FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.56
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     10.29
  PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =  11.44
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =   826.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  11.44
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.569
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        1.35      0.80      0.10    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
  SUBAREA AREA(ACRES) =    1.35      SUBAREA RUNOFF(CFS) =    4.24
  EFFECTIVE AREA(ACRES) =     4.55   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =     4.55       PEAK FLOW RATE(CFS) =      14.29

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    104.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   985.66  DOWNSTREAM(FEET) =   985.29
  FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.06
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     14.29
  PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =  11.83
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =   946.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  11.83
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.497
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        1.85      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) =    1.85      SUBAREA RUNOFF(CFS) =    5.69
  EFFECTIVE AREA(ACRES) =     6.40   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =     6.40       PEAK FLOW RATE(CFS) =      19.68

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    113.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   985.29  DOWNSTREAM(FEET) =   984.75
```

```
  FLOW LENGTH(FEET) =   181.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.39
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     19.68
  PIPE TRAVEL TIME(MIN.) =   0.56    Tc(MIN.) =  12.39
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    113.00 =  1127.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    113.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    111.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   416.00
  ELEVATION DATA: UPSTREAM(FEET) =    993.75  DOWNSTREAM(FEET) =    990.63

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.026
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.113
  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        3.00      0.80      0.10    52    9.03
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
  SUBAREA RUNOFF(CFS) =     10.89
  TOTAL AREA(ACRES) =      3.00   PEAK FLOW RATE(CFS) =     10.89

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    112.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   987.13  DOWNSTREAM(FEET) =   985.17
  FLOW LENGTH(FEET) =   619.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.76
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     10.89
  PIPE TRAVEL TIME(MIN.) =   2.17    Tc(MIN.) =  11.19
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    112.00 =  1035.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    112.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
  MAINLINE Tc(MIN) =  11.19
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.615
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.90      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) =    0.90      SUBAREA RUNOFF(CFS) =    2.86
  EFFECTIVE AREA(ACRES) =     3.90   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =     3.90       PEAK FLOW RATE(CFS) =      12.41

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    113.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   985.17  DOWNSTREAM(FEET) =   984.75
  FLOW LENGTH(FEET) =   101.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.45
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     12.41
  PIPE TRAVEL TIME(MIN.) =   0.31    Tc(MIN.) =  11.50
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    113.00 =  1136.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    113.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
   NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
      1     12.41  11.50    3.557  0.80( 0.08) 0.10     3.9     110.00
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    113.00 =  1136.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
   NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
      1     19.68  12.39    3.401  0.80( 0.08) 0.10     6.4     100.00
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    113.00 =     0.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
   NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
      1     31.53  11.50    3.557  0.80( 0.08) 0.10     9.8     110.00
      2     31.54  12.39    3.401  0.80( 0.08) 0.10    10.3     100.00
    TOTAL AREA(ACRES) =     10.30

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       31.54  Tc(MIN.) =   12.391
```

```
  EFFECTIVE AREA(ACRES) =     10.30  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =     10.30
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    113.00 =  1136.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    113.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    113.00 TO NODE    114.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   984.75  DOWNSTREAM(FEET) =   981.39
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.50
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     31.54
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =  12.43
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    114.00 =  1181.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =     10.30  TC(MIN.) =     12.43
  EFFECTIVE AREA(ACRES) =     10.30  AREA-AVERAGED Fm(INCH/HR)=  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.10
  PEAK FLOW RATE(CFS)   =     31.54

  ** PEAK FLOW RATE TABLE **
   STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
   NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
      1     31.53  11.54    3.550  0.80( 0.08) 0.10     9.8     110.00
      2     31.54  12.43    3.395  0.80( 0.08) 0.10    10.3     100.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
____________________________________________________________________________
****************************************************************************
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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 #3950 SLOVER AVE INDUSTRIAL BLDG                                  *
* PROPOSED CONDITION 100-YEAR                                           *
* NODES 200-214   200P.DAT                                              *
 ************************************************************************

  FILE NAME: C:\XDRIVE\3950\200P.DAT
  TIME/DATE OF STUDY: 19:57 06/09/2021
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

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

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.3200

  *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) =   582.00
  ELEVATION DATA: UPSTREAM(FEET) =    991.33  DOWNSTREAM(FEET) =    987.51

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.603
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.734
  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        2.00      0.80      0.10    52   10.60
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
  SUBAREA RUNOFF(CFS) =      6.58
  TOTAL AREA(ACRES) =      2.00   PEAK FLOW RATE(CFS) =      6.58

****************************************************************************
  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) =   983.52  DOWNSTREAM(FEET) =   983.14
  FLOW LENGTH(FEET) =   126.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.15
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      6.58
  PIPE TRAVEL TIME(MIN.) =   0.51    Tc(MIN.) =  11.11
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =   708.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  11.11
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.631
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.95      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) =    0.95      SUBAREA RUNOFF(CFS) =    3.04
  EFFECTIVE AREA(ACRES) =     2.95   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =     2.95       PEAK FLOW RATE(CFS) =       9.43

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    203.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   983.14  DOWNSTREAM(FEET) =   982.78
  FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.53
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      9.43
  PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =  11.55
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    203.00 =   828.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    203.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  11.55
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.548
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        1.15      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) =    1.15      SUBAREA RUNOFF(CFS) =    3.59
  EFFECTIVE AREA(ACRES) =     4.10   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =     4.10       PEAK FLOW RATE(CFS) =      12.80

****************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    213.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   982.78  DOWNSTREAM(FEET) =   982.37
  FLOW LENGTH(FEET) =   138.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  19.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.72
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     12.80
  PIPE TRAVEL TIME(MIN.) =   0.49    Tc(MIN.) =  12.04
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    213.00 =   966.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    213.00 TO NODE    213.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  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) =   577.00
  ELEVATION DATA: UPSTREAM(FEET) =    991.11  DOWNSTREAM(FEET) =    986.94

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.365
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.786
  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        2.05      0.80      0.10    52   10.36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
  SUBAREA RUNOFF(CFS) =      6.84
```

```
  TOTAL AREA(ACRES) =      2.05   PEAK FLOW RATE(CFS) =      6.84

****************************************************************************
  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) =   983.71  DOWNSTREAM(FEET) =   983.48
  FLOW LENGTH(FEET) =    76.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.19
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      6.84
  PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =  10.67
  LONGEST FLOWPATH FROM NODE    210.00 TO NODE    212.00 =   653.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    212.00 TO NODE    212.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  10.67
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.721
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.65      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) =    0.65      SUBAREA RUNOFF(CFS) =    2.13
  EFFECTIVE AREA(ACRES) =     2.70   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =     2.70       PEAK FLOW RATE(CFS) =       8.85

****************************************************************************
  FLOW PROCESS FROM NODE    212.00 TO NODE    213.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   983.48  DOWNSTREAM(FEET) =   982.37
  FLOW LENGTH(FEET) =   361.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.39
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      8.85
  PIPE TRAVEL TIME(MIN.) =   1.37    Tc(MIN.) =  12.04
  LONGEST FLOWPATH FROM NODE    210.00 TO NODE    213.00 =  1014.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    213.00 TO NODE    213.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================
```

```
  ** MAIN STREAM CONFLUENCE DATA **
   STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
   NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
      1      8.85  12.04    3.461  0.80( 0.08) 0.10     2.7     210.00
  LONGEST FLOWPATH FROM NODE    210.00 TO NODE    213.00 =  1014.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
   NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
      1     12.80  12.04    3.461  0.80( 0.08) 0.10     4.1     200.00
  LONGEST FLOWPATH FROM NODE      0.00 TO NODE    213.00 =     0.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
   NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
      1     21.64  12.04    3.461  0.80( 0.08) 0.10     6.8     210.00
      2     21.64  12.04    3.461  0.80( 0.08) 0.10     6.8     200.00
    TOTAL AREA(ACRES) =      6.80

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       21.64  Tc(MIN.) =   12.036
  EFFECTIVE AREA(ACRES) =      6.80  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =      6.80
  LONGEST FLOWPATH FROM NODE    210.00 TO NODE    213.00 =  1014.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    213.00 TO NODE    213.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    213.00 TO NODE    214.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   982.37  DOWNSTREAM(FEET) =   979.69
  FLOW LENGTH(FEET) =    43.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.33
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     21.64
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =  12.08
  LONGEST FLOWPATH FROM NODE    210.00 TO NODE    214.00 =  1057.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      6.80  TC(MIN.) =     12.08
  EFFECTIVE AREA(ACRES) =      6.80  AREA-AVERAGED Fm(INCH/HR)=  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.10
  PEAK FLOW RATE(CFS)   =     21.64

  ** PEAK FLOW RATE TABLE **
```

```
   STREAM     Q     Tc   Intensity   Fp(Fm)     Ap   Ae     HEADWATER
   NUMBER   (CFS) (MIN.) (INCH/HR) (INCH/HR)       (ACRES)    NODE
      1     21.64  12.08    3.454  0.80( 0.08) 0.10     6.8     200.00
      2     21.64  12.08    3.454  0.80( 0.08) 0.10     6.8     210.00
==============================================================================
==============================================================================
  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 #3950 SLOVER AVE INDUSTRIAL BLDG                                  *
* PROPOSED CONDITION 100-YEAR                                           *
* NODES 230-232   230P.DAT                                              *
 ************************************************************************

  FILE NAME: C:\XDRIVE\3950\230P.DAT
  TIME/DATE OF STUDY: 14:08 06/09/2021
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

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

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.3200

  *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) =   478.00
  ELEVATION DATA: UPSTREAM(FEET) =    995.22  DOWNSTREAM(FEET) =    991.93

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.707
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.937
  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        0.40      0.80      0.10    52    9.71
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
  SUBAREA RUNOFF(CFS) =      1.39
  TOTAL AREA(ACRES) =      0.40   PEAK FLOW RATE(CFS) =      1.39

****************************************************************************
  FLOW PROCESS FROM NODE    231.00 TO NODE    232.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    991.93  DOWNSTREAM(FEET) =    988.80
  CHANNEL LENGTH THRU SUBAREA(FEET) =   377.00   CHANNEL SLOPE =  0.0083
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      1.39
  FLOW VELOCITY(FEET/SEC) =   1.72   FLOW DEPTH(FEET) =   0.31
  TRAVEL TIME(MIN.) =   3.65   Tc(MIN.) =  13.35
  LONGEST FLOWPATH FROM NODE    230.00 TO NODE    232.00 =   855.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    231.00 TO NODE    232.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  13.35
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.252
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.45      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) =    0.45      SUBAREA RUNOFF(CFS) =    1.28
  EFFECTIVE AREA(ACRES) =     0.85   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =     0.85       PEAK FLOW RATE(CFS) =       2.43
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      0.85  TC(MIN.) =     13.35
  EFFECTIVE AREA(ACRES) =      0.85  AREA-AVERAGED Fm(INCH/HR)=  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.10
  PEAK FLOW RATE(CFS)   =      2.43
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
____________________________________________________________________________
****************************************************************************
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                           Analysis prepared by:

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

 ************************* DESCRIPTION OF STUDY *************************
* JOB #3950 SLOVER AVE INDUSTRIAL BLDG                                  *
* PROPOSED CONDITION 100-YEAR                                           *
* NODES 300-301   300P.DAT                                              *
 ************************************************************************

  FILE NAME: C:\XDRIVE\3950\300P.DAT
  TIME/DATE OF STUDY: 14:11 06/09/2021
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

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

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.3200

  *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) =   422.00
  ELEVATION DATA: UPSTREAM(FEET) =    988.92  DOWNSTREAM(FEET) =    987.29

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.366
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.785
  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        0.20      0.80      0.10    52   10.37
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
  SUBAREA RUNOFF(CFS) =      0.67
  TOTAL AREA(ACRES) =      0.20   PEAK FLOW RATE(CFS) =      0.67
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      0.20  TC(MIN.) =     10.37
  EFFECTIVE AREA(ACRES) =      0.20  AREA-AVERAGED Fm(INCH/HR)=  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.10
  PEAK FLOW RATE(CFS)   =      0.67
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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```
____________________________________________________________________________
****************************************************************************
             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 #3950 SLOVER AVE INDUSTRIAL BLDG                                  *
* PROPOSED CONDITION 100-YEAR                                           *
* NODES 320-321   320P.DAT                                              *
 ************************************************************************

  FILE NAME: C:\XDRIVE\3950\320P.DAT
  TIME/DATE OF STUDY: 14:39 06/09/2021
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

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

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.3200

  *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) =   292.00
  ELEVATION DATA: UPSTREAM(FEET) =    986.12  DOWNSTREAM(FEET) =    985.16

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.239
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.056
  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        0.10      0.80      0.10    52    9.24
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
  SUBAREA RUNOFF(CFS) =      0.36
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.36
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      0.10  TC(MIN.) =      9.24
  EFFECTIVE AREA(ACRES) =      0.10  AREA-AVERAGED Fm(INCH/HR)=  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.10
  PEAK FLOW RATE(CFS)   =      0.36
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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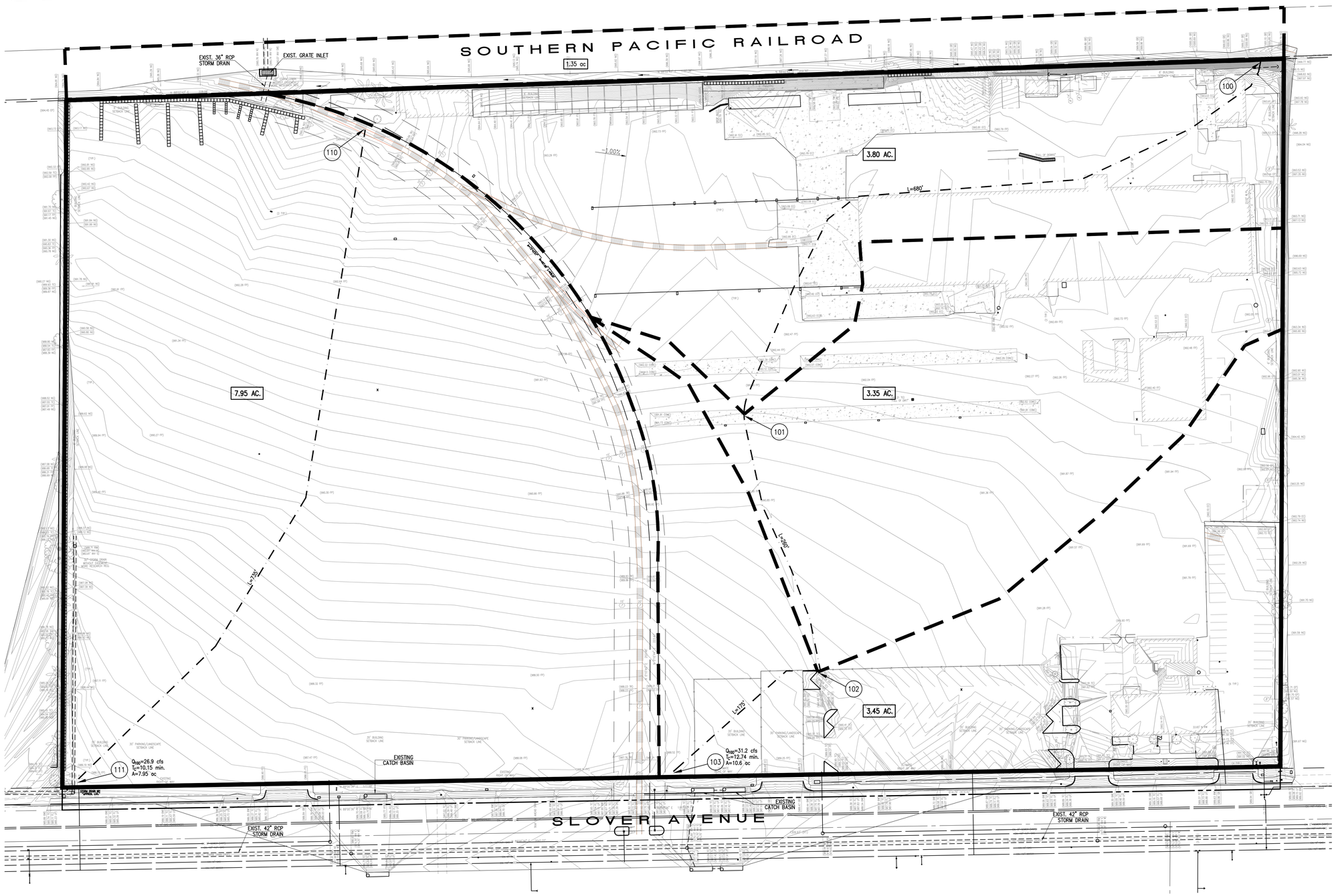
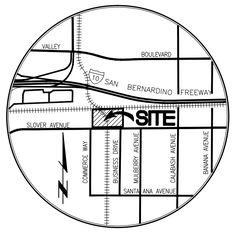
APPENDIX C

HYDROLOGY MAP





VICINITY MAP
N.T.S.

LEGEND

▬▬	PROJECT BOUNDARY
▬ ▬	SUBAREA BOUNDARY
▬ · ▬	FLOW PATH
1.00 AC.	SUBAREA AREA
(101)	NODE NUMBER
T_C	TIME OF CONCENTRATION
Q_{100}	FLOW RATE (CUBIC FEET PER SECOND) NUMBER DESIGNATE YEAR OF FREQUENCY

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

Last Update:3/11/21
G:\3900-3999\3950\3950HYD-EX.dwg

PREPARED FOR:

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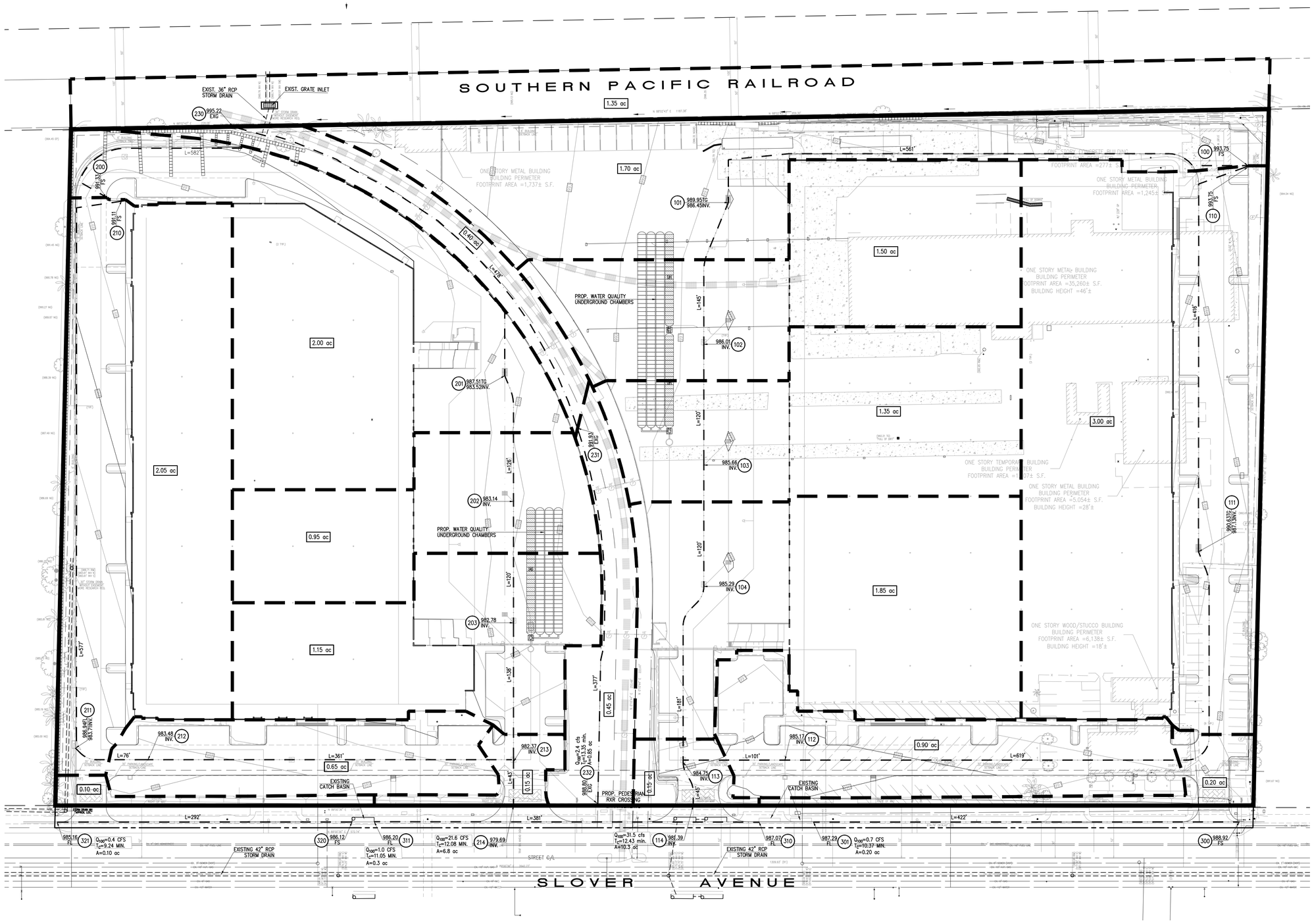
Designed by
Date
Checked by
Date
Designed by
Date
Checked by
Date

Approved by Date
Public Works Director R.C.E.
Sheet 1 of X Sheets

CITY OF FONTANA
PUBLIC WORKS DEPARTMENT

EXISTING HYDROLOGY MAP
SLOVER AVENUE INDUSTRIAL BUILDINGS
13592 SLOVER AVENUE
FONTANA, CA

3950/ 1 OF 1 SHEET



LEGEND

▬▬▬	PROJECT BOUNDARY
▬ ▬ ▬	SUBAREA BOUNDARY
·—·—·	FLOW PATH
1.00 AC.	SUBAREA AREA
(101)	NODE NUMBER
T_C	TIME OF CONCENTRATION
Q_{100}	FLOW RATE (CUBIC FEET PER SECOND) NUMBER DESIGNATE YEAR OF FREQUENCY

0 20 40 80 120

SCALE:1"=40'

Last Update:3/11/21
O:\3900-3999\3950\3950HYD.dwg

CITY OF FONTANA
PUBLIC WORKS DEPARTMENT

PRELIMINARY HYDROLOGY MAP

SLOVER AVENUE INDUSTRIAL BUILDINGS

13592 SLOVER AVENUE
FONTANA, CA

PREPARED FOR:

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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.

Sheet 1 of X Sheets

3950/ 1 OF 1 SHEET