PRELIMINARY HYDROLOGY CALCULATIONS

FOR

ORANGE SHOW ASSEMBLAGE
ORANGE SHOW ROAD WEST OF VALLEY VIEW
CITY OF SAN BERNARDINO, CALIFORNIA

PREPARED FOR

WESTERN REALCO
500 NEWPORT CENTER DRIVE #630
NEWPORT BEACH, CA 92660

AUGUST 25, 2015

JOB NO. 3348

PREPARED BY

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

PRELIMINARY HYDROLOGY CALCULATIONS

FOR

ORANGE SHOW ASSEMBLAGE

PREPARED BY BRIAN WEIL
UNDER THE SUPERVISION OF

REINHARD STENZEL, PE DATE:
R.C.E. 56155
EXP. 12/31/16

INTRODUCTION

A: PROJECT LOCATION

The project site is located on the north side of Orange Show Road between Valley View and Waterman Avenue in the City of San Bernardino. Norman Road is to the north of the project site. Please see following page for vicinity map.

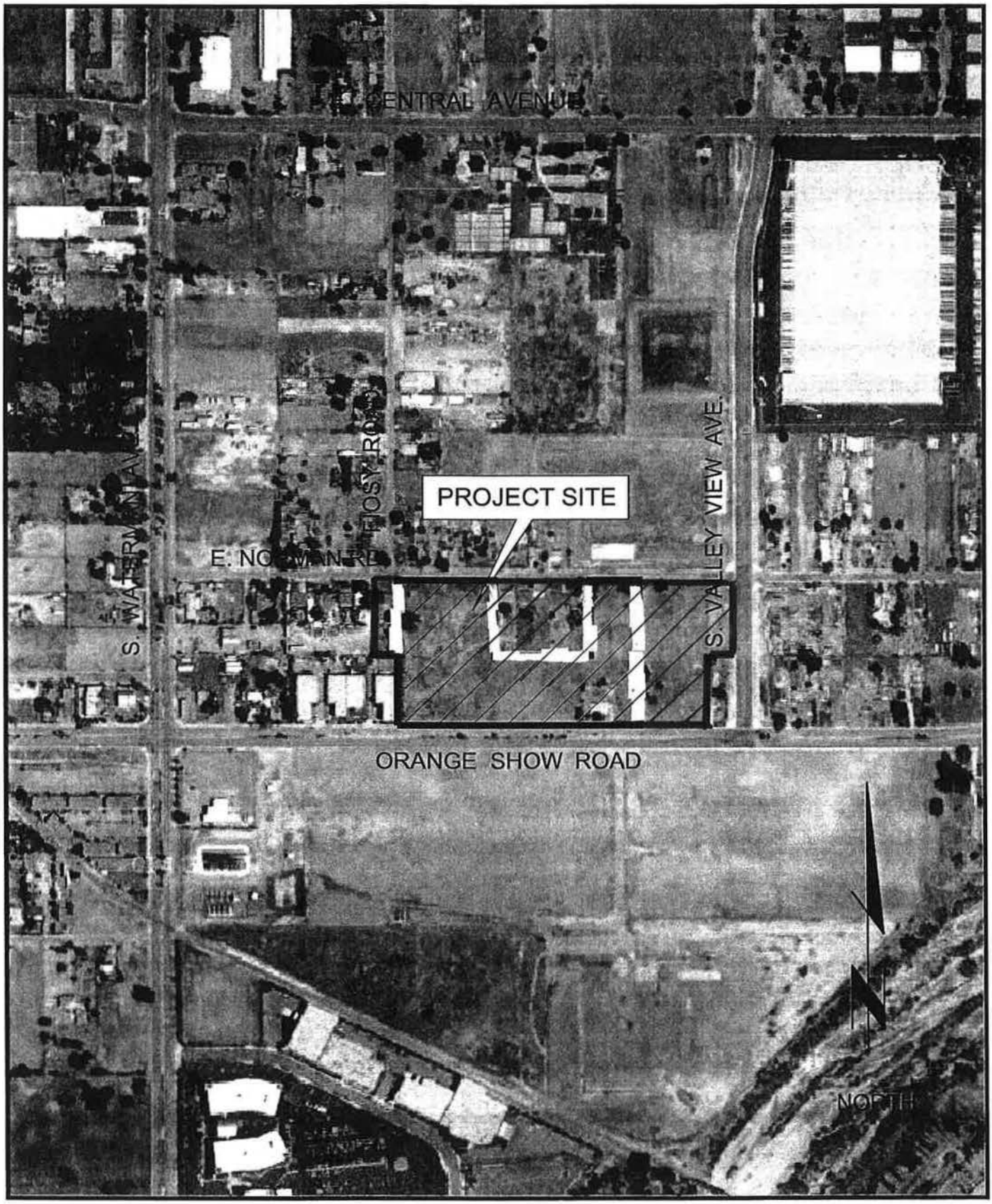
B: STUDY PURPOSE

The purpose of this study is to determine the 100-year existing and proposed condition hydrology for the project site.

C: PROJECT STAFF:

Thienes Engineering staff involved in this study include:

Reinhard Stenzel
Brian Weil



VICINITY MAP

SCALE: ~ 1"=500'

FIGURE 1

DISCUSSION

Project Description

The project site encompasses approximately 14.20 acres. Proposed improvements to the site consist of the construction of one warehouse type building with 318,000 square feet. The truck yard will be located on the southerly side of the proposed building. Vehicle parking will be located on the easterly and westerly sides of the project site. There will be landscaped areas adjacent to the streets.

Existing Conditions

The site is currently a vacant dirt lot covered in native grasses and weeds with the exception of a few large lot residential homes. Runoff from the project site generally drains in a southwesterly direction, ultimately discharging to Orange Show Road. Runoff from the easterly 3/4 of the project site (nodes 100-103 on existing condition hydrology map) drains to Orange Show Road. The 100-year peak flow rate for this area is approximately 17.0 cfs.

The westerly portion of the project site (nodes 110-111) also drains to Orange Show Road at a different location. Here, the 100-year peak flow rate is approximately 8.1 cfs. Total existing condition 100-year peak flow rate from the project site tributary to Orange Show Road is approximately 25.1 cfs (direct sum of individual drainage areas).

A small portion of the project site adjacent to Norman Road (nodes 200-201) drains directly to Norman Road. The 100-year peak flow rate at this area is approximately 1.8 cfs.

See Appendix "B" for existing condition hydrology calculations.

Proposed Conditions

Proposed conditions generally maintain existing drainage patterns. Runoff from building, the easterly parking area and truck dock (nodes 100-105 on proposed condition hydrology map) drain to catch basin in the truck yard area. A storm drain system connects these catch basins and conveys runoff to the southwesterly corner of the project site. Here, runoff "burps out" of the storm drain system in a small water quality basin (at node 106). Runoff then drains to Orange Show Road via a parkway culvert. The 100-year undetained peak flow rate at this location is approximately 37.4 cfs.

Runoff from a small portion of the driveways and the landscaping adjacent to Orange Show Road (nodes 110-111) surface drains to the street. The 100-year peak flow rate for this area is approximately 1.3 cfs.

Finally, runoff from the northwesterly parking area and the landscaping adjacent to Norman Road will surface drain to the street. The 100-year peak flow rate for this area is approximately 4.4 cfs.

Please see Appendix "B" for proposed condition hydrology calculations and Appendix "D" for hydrology maps.

Detention

Currently, there are not existing storm drain systems in Orange Show Road. To ensure there is no adverse effect on downstream areas, runoff from the proposed development will limit runoff to less than existing conditions for the 100-year event.

Detention is proposed in the truck yard area. Here, almost all runoff from the site is tributary to the grates in the truck yard. The storm drain system from the truck yard to the outlet at the southwesterly corner of the site will be sized to only allow a portion of the 100-year peak flow rate from the truck yard area to discharge from the site. An 18" storm drain was used to limit runoff from the truck yard. Discharge rates are based on the hydraulic capacity of the 18" storm drain using available head and the length of the pipe.

A small area unit hydrograph was established for the area tributary to the truck yard. Detention analysis shows that approximately 10.3 cfs can discharge from the truck yard area. The remaining flow is temporarily stored at a depth of about 0.75'. Runoff from a portion of the parking lot at the southwesterly corner of the site (about 1.2 cfs) and landscaping adjacent to the street (1.3 cfs) discharges to the street undetained. The total 100-year peak flow rate tributary to Orange Show Road is approximately 12.8 cfs. This is considerably less than existing condition 100-year runoff to Orange Show Road of 25.1 cfs.

Please see Appendix "C" for hydrograph and detention analysis,

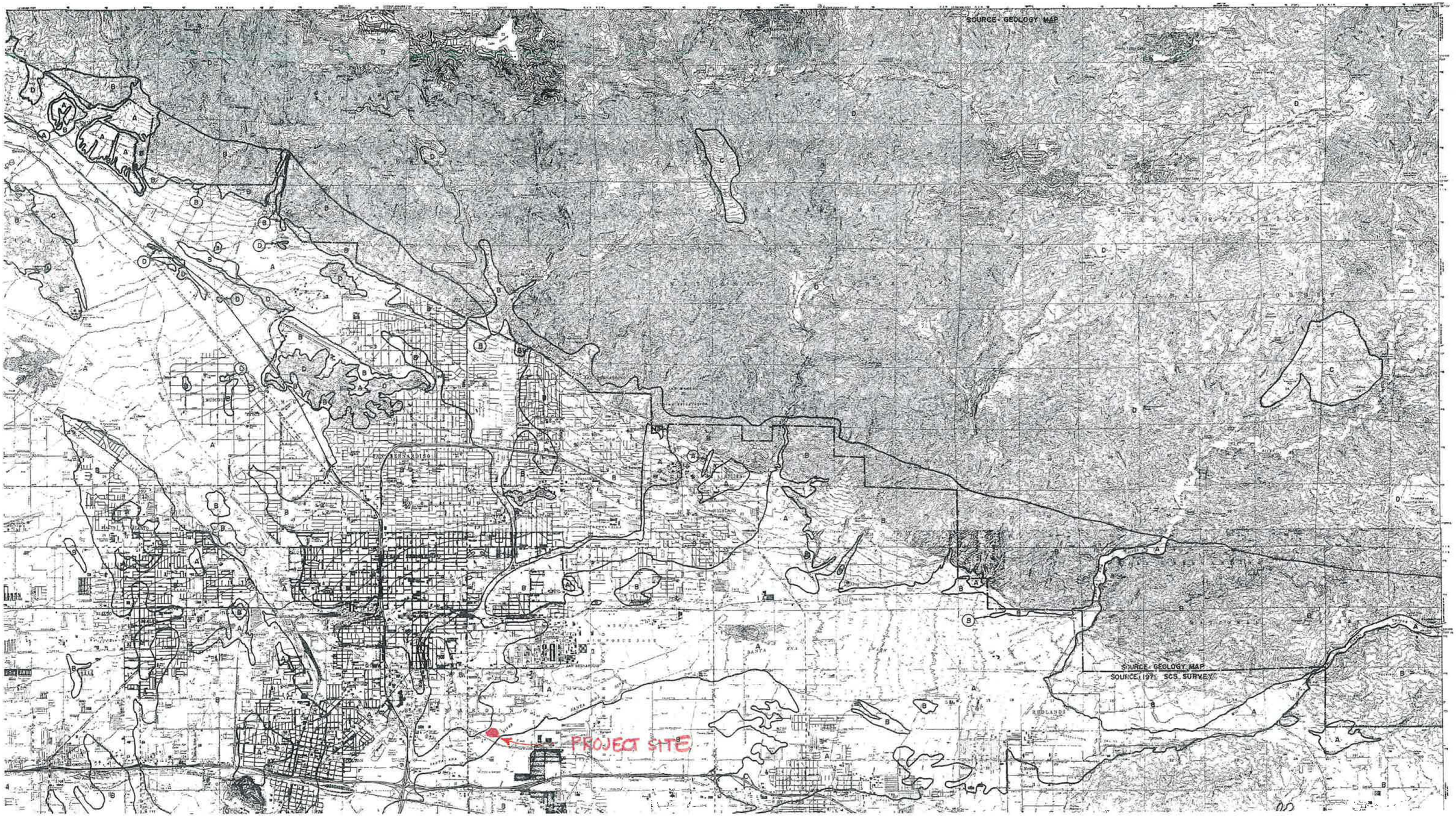
Methodology

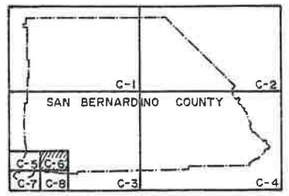
San Bernardino County Rational Method program (AES Software) was used for the hydrology calculations. AES Small Area Unity Hydrograph program was used for the hydrograph and basin analysis. The site is composed of soil type "A" per the San Bernardino County Hydrology Manual.

APPENDIX	DESCRIPTION
A	REFERENCE MATERIALS
B	HYDROLOGY CALCULATIONS
C	DETENTION ANALYSIS
D	HYDROLOGY MAP

APPENDIX A

REFERENCE MATERIALS





INDEX MAP

LEGEND

SOIL GROUP BOUNDARY

A SOIL GROUP DESIGNATION

BOUNDARY OF INDICATED SOURCE

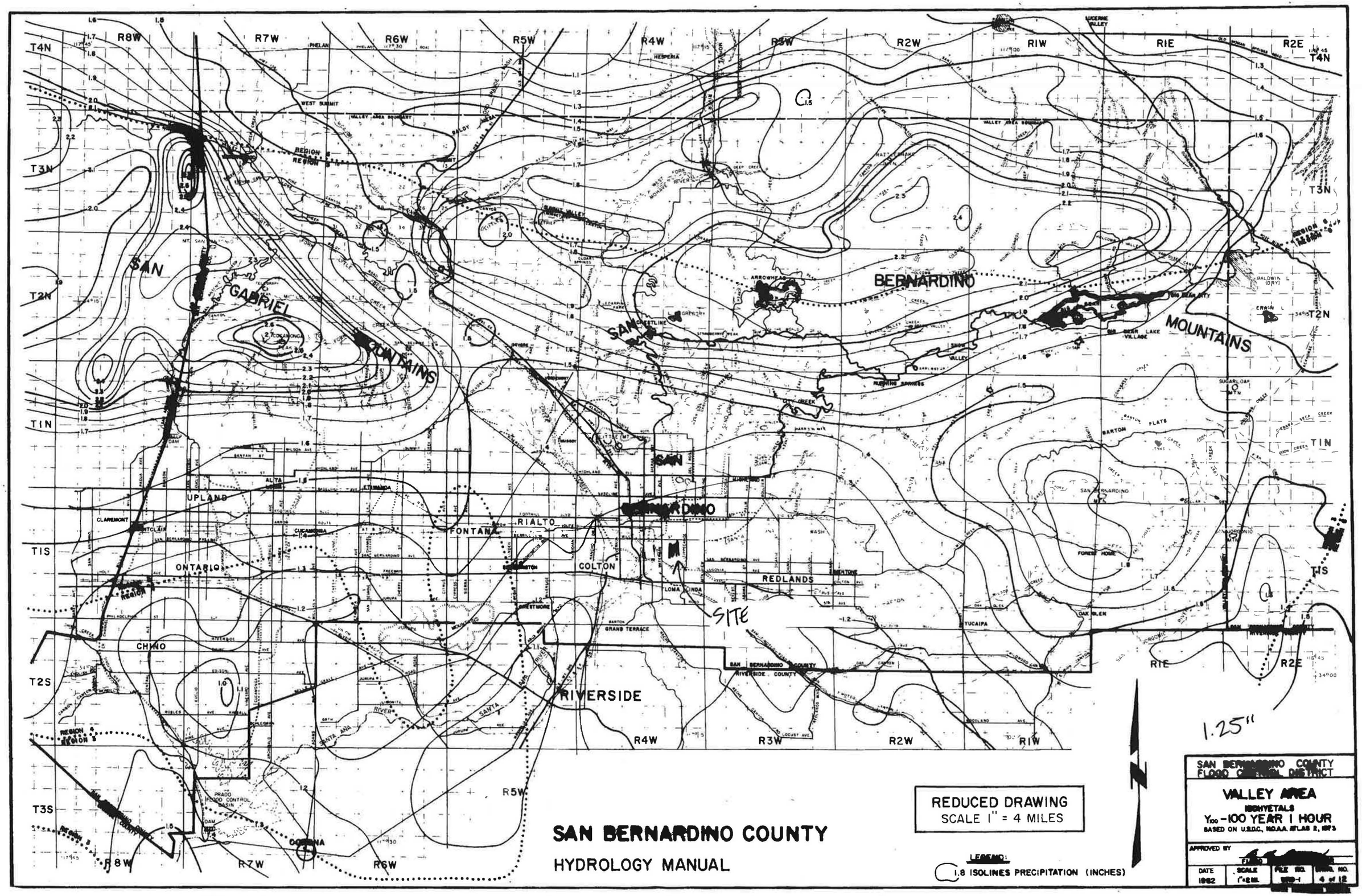
SCALE 1:48,000

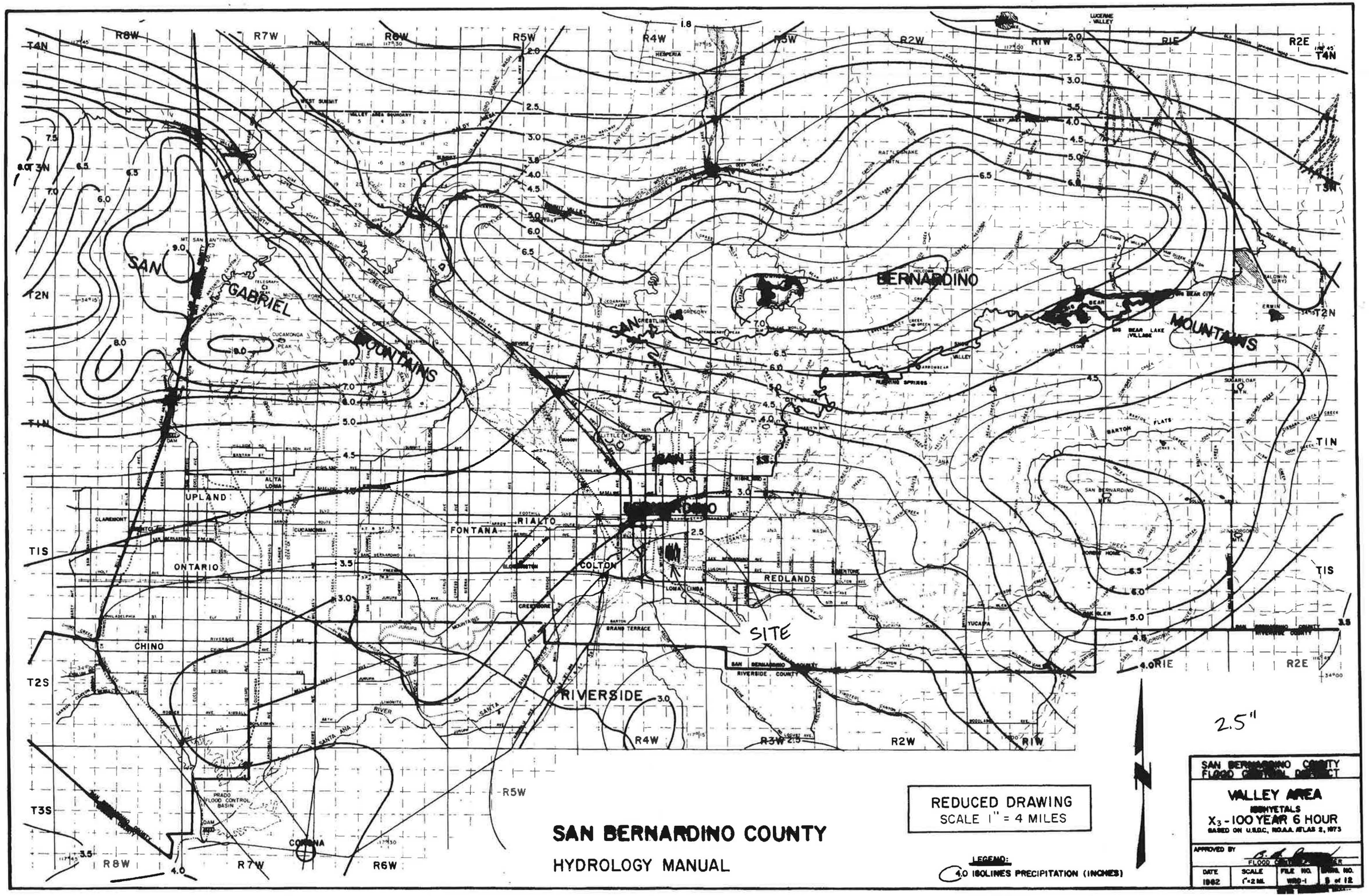
SCALE REDUCED BY 1/2

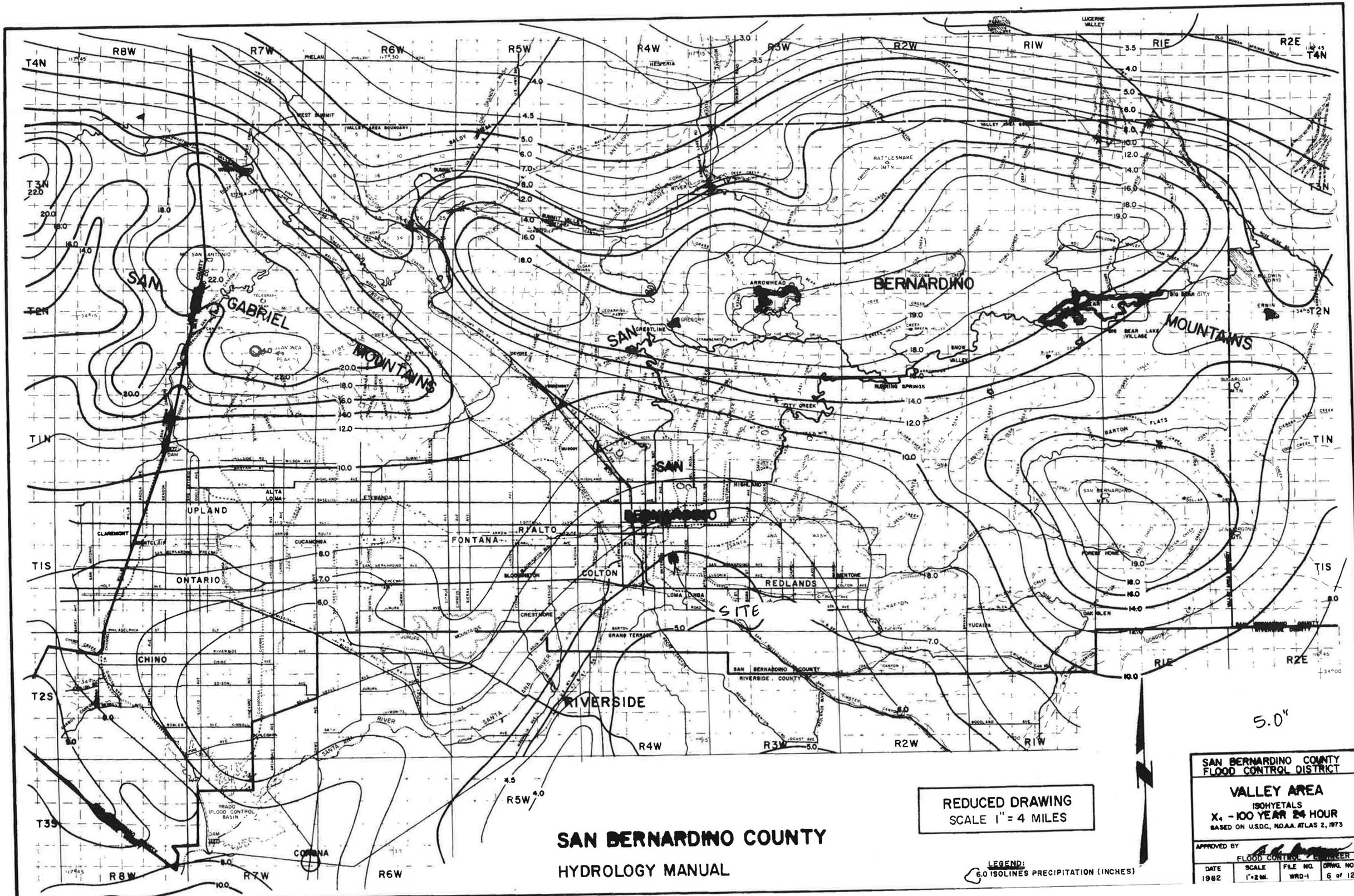
SAN BERNARDINO COUNTY

HYDROLOGY MANUAL

HYDROLOGIC SOILS GROUP MAP FOR SOUTHWEST-B AREA


SAN BERNARDINO COUNTY
HYDROLOGY MANUAL
REDUCED DRAWING
SCALE 1" = 4 MILES
LEGEND:
1.8 ISOLINES PRECIPITATION (INCHES)
SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT
VALLEY AREA
ISOHYETALS
Y100 -100 YEAR 1 HOUR
BASED ON U.S.D.C., N.O.A.A. ATLAS 2, 1973
APPROVED BY
DATE 1982
SCALE 1"=2 MI.
FILE NO. WRD-1
DWG. NO. 4 of 12
SAN GABRIEL MOUNTAINS
SAN BERNARDINO MOUNTAINS
SAN BERNARDINO
RIVERSIDE
UPLAND
ONTARIO
CHINO
FONTANA
RIALTO
COLTON
REDLANDS
CORONA
SITE
1.25"
R8W
R7W
R6W
R5W
R4W
R3W
R2W
R1W
R1E
R2E
T4N
T3N
T2N
T1N
T1S
T2S
T3S


SAN BERNARDINO COUNTY
HYDROLOGY MANUAL
REDUCED DRAWING
SCALE 1" = 4 MILES
LEGEND:
4.0 ISOLINES PRECIPITATION (INCHES)
SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT
VALLEY AREA
ISOHYETALS
X3 - 100 YEAR 6 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
DWG. NO. 5 of 12
SAN GABRIEL MOUNTAINS
SAN BERNARDINO MOUNTAINS
SITE
2.5"
SAN BERNARDINO
UPLAND
ONTARIO
CHINO
FONTANA
RIALTO
COLTON
REDLANDS
RIVERSIDE
CORONA
CRESTLINE
BIG BEAR LAKE VILLAGE
BARTON FLATS
SAN BERNARDINO COUNTY
RIVERSIDE COUNTY
PRADO FLOOD CONTROL BASIN
T4N
T3N
T2N
T1N
T1S
T2S
T3S
R8W
R7W
R6W
R5W
R4W
R3W
R2W
R1W
R1E
R2E


SAN BERNARDINO COUNTY
HYDROLOGY MANUAL
REDUCED DRAWING
SCALE 1" = 4 MILES
LEGEND:
6.0 ISOLINES PRECIPITATION (INCHES)
SAN BERNARDINO COUNTY
FLOOD CONTROL DISTRICT
VALLEY AREA
ISOHYETALS
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
SITE
5.0"
UPLAND
ONTARIO
CHINO
FONTANA
RIALTO
COLTON
REDLANDS
CORONA
CRESTLINE
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

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 **************************
* ORANGE SHOW ASSEMBLAGE                                                   *
* EXISTING CONDTION                                                        *
* NODES 100-103                                                            *
 ****************************************************************************

  FILE NAME: C:\XDRIVE\3348\EXA.DAT
  TIME/DATE OF STUDY: 18:15 08/24/2015
============================================================================
  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) = 1.2500

  *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) =   535.00
  ELEVATION DATA: UPSTREAM(FEET) =   1026.50  DOWNSTREAM(FEET) =   1021.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   16.184
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.744
  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 POOR COVER
  "OPEN BRUSH"                 A       2.30      0.36      1.00    81   16.18
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.36
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.00
  SUBAREA RUNOFF(CFS) =       4.93
  TOTAL AREA(ACRES) =       2.30   PEAK FLOW RATE(CFS) =       4.93

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1021.00  DOWNSTREAM(FEET) =   1019.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   235.00   CHANNEL SLOPE =  0.0085
  CHANNEL FLOW THRU SUBAREA(CFS) =       4.93
  FLOW VELOCITY(FEET/SEC) =   1.94 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.02   Tc(MIN.) =  18.20
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =   770.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  18.20
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.557
```

```
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL POOR COVER
  "OPEN BRUSH"                 A        2.10       0.36       1.00    81
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.36
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.00
  SUBAREA AREA(ACRES) =     2.10      SUBAREA RUNOFF(CFS) =     4.15
  EFFECTIVE AREA(ACRES) =      4.40   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.36  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      4.40       PEAK FLOW RATE(CFS) =       8.69

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1019.00  DOWNSTREAM(FEET) =   1017.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   220.00   CHANNEL SLOPE =  0.0091
  CHANNEL FLOW THRU SUBAREA(CFS) =       8.69
  FLOW VELOCITY(FEET/SEC) =   2.30 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.59   Tc(MIN.) =  19.80
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =   990.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  19.80
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.431
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "2 DWELLINGS/ACRE"           A        0.40       0.80       0.70    52
  NATURAL POOR COVER
  "OPEN BRUSH"                 A        4.35       0.36       1.00    81
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.39
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.97
  SUBAREA AREA(ACRES) =     4.75      SUBAREA RUNOFF(CFS) =     8.78
  EFFECTIVE AREA(ACRES) =      9.15   AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.38  AREA-AVERAGED Ap =  0.99
  TOTAL AREA(ACRES) =      9.15       PEAK FLOW RATE(CFS) =      16.97
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =      9.15  TC(MIN.) =     19.80
  EFFECTIVE AREA(ACRES) =       9.15  AREA-AVERAGED Fm(INCH/HR)=  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.38  AREA-AVERAGED Ap =  0.99
  PEAK FLOW RATE(CFS)    =     16.97
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

 ************************** DESCRIPTION OF STUDY **************************
* ORANGE SHOW ASSEMBLAGE                                                   *
* EXISTING CONDITION                                                       *
* NODES 110-111                                                            *
 ***************************************************************************

  FILE NAME: C:\XDRIVE\3348\EXB.DAT
  TIME/DATE OF STUDY: 18:16 08/24/2015
============================================================================
  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) = 1.2500

  *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) =   610.00
  ELEVATION DATA: UPSTREAM(FEET) =   1020.00  DOWNSTREAM(FEET) =   1015.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   18.227
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.555
  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 POOR COVER
  "OPEN BRUSH"                 A       4.10      0.36      1.00    81   18.23
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.36
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.00
  SUBAREA RUNOFF(CFS) =      8.09
  TOTAL AREA(ACRES) =      4.10   PEAK FLOW RATE(CFS) =      8.09
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =      4.10  TC(MIN.) =     18.23
  EFFECTIVE AREA(ACRES) =      4.10  AREA-AVERAGED Fm(INCH/HR)=  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.36  AREA-AVERAGED Ap =  1.00
  PEAK FLOW RATE(CFS)    =      8.09
============================================================================
============================================================================
  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 **************************
* ORANGE SHOW ROAD                                                         *
* EXISTING CONDITION                                                       *
* NODES 200-201                                                            *
 ****************************************************************************

  FILE NAME: C:\XDRIVE\3348\EXC.DAT
  TIME/DATE OF STUDY: 18:18 08/24/2015
============================================================================
  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) = 1.2500

  *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) =   900.00
  ELEVATION DATA: UPSTREAM(FEET) =   1024.00  DOWNSTREAM(FEET) =   1017.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   17.681
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.602
  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
  "2 DWELLINGS/ACRE"          A        0.45      0.80      0.70    52   17.68
  NATURAL POOR COVER
  "OPEN BRUSH"                A        0.50      0.36      1.00    81   21.19
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.53
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.86
  SUBAREA RUNOFF(CFS) =       1.84
  TOTAL AREA(ACRES) =       0.95   PEAK FLOW RATE(CFS) =       1.84
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =       0.95  TC(MIN.) =      17.68
  EFFECTIVE AREA(ACRES) =       0.95  AREA-AVERAGED Fm(INCH/HR)=  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.53  AREA-AVERAGED Ap =  0.86
  PEAK FLOW RATE(CFS)    =       1.84
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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 **************************
* ORANGE SHOW                                                              *
* PROPOSED CONDITION HYDROLOGY                                             *
* NODES 100-106                                                            *
 ****************************************************************************

  FILE NAME: C:\XDRIVE\3348\HYDA.DAT
  TIME/DATE OF STUDY: 09:44 08/25/2015
============================================================================
  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) = 1.2500

  *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) =   570.00
  ELEVATION DATA: UPSTREAM(FEET) =   1026.19  DOWNSTREAM(FEET) =   1019.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.361
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.811
  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       2.50      0.80       0.10    52    9.36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
  SUBAREA RUNOFF(CFS) =      8.40
  TOTAL AREA(ACRES) =      2.50   PEAK FLOW RATE(CFS) =      8.40

****************************************************************************
  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) =  1015.50  DOWNSTREAM(FEET) =  1013.30
  FLOW LENGTH(FEET) =   182.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.44
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      8.40
  PIPE TRAVEL TIME(MIN.) =   0.41    Tc(MIN.) =   9.77
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =   752.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =   9.77
```

```
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.715
SUBAREA LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                  A       2.75      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) =     2.75      SUBAREA RUNOFF(CFS) =     9.00
EFFECTIVE AREA(ACRES) =      5.25   AREA-AVERAGED Fm(INCH/HR) =  0.08
AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.10
TOTAL AREA(ACRES) =      5.25       PEAK FLOW RATE(CFS) =      17.17

****************************************************************************
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) =  1013.30  DOWNSTREAM(FEET) =  1012.55
FLOW LENGTH(FEET) =   152.00   MANNING'S N =  0.012
DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   6.34
ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      17.17
PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =  10.17
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =   904.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN) =  10.17
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.626
SUBAREA LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                  A       1.70      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) =     1.70      SUBAREA RUNOFF(CFS) =     5.43
EFFECTIVE AREA(ACRES) =      6.95   AREA-AVERAGED Fm(INCH/HR) =  0.08
AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.10
TOTAL AREA(ACRES) =      6.95       PEAK FLOW RATE(CFS) =      22.18

****************************************************************************
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) =  1012.55  DOWNSTREAM(FEET) =  1011.80
FLOW LENGTH(FEET) =   152.00   MANNING'S N =  0.012
DEPTH OF FLOW IN  27.0 INCH PIPE IS  21.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   6.58
ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      22.18
PIPE TRAVEL TIME(MIN.) =   0.38    Tc(MIN.) =  10.55
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =  1056.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    103.00 TO NODE    104.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN) =  10.55
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.546
SUBAREA LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
COMMERCIAL                  A       1.75      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) =     1.75      SUBAREA RUNOFF(CFS) =     5.46
EFFECTIVE AREA(ACRES) =      8.70   AREA-AVERAGED Fm(INCH/HR) =  0.08
AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.10
TOTAL AREA(ACRES) =      8.70       PEAK FLOW RATE(CFS) =      27.14

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

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1011.80  DOWNSTREAM(FEET) =  1011.05
  FLOW LENGTH(FEET) =   152.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  22.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.01
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     27.14
  PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =  10.92
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    105.00 =  1208.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    105.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  10.92
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.475
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  A        2.65      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) =    2.65      SUBAREA RUNOFF(CFS) =    8.10
  EFFECTIVE AREA(ACRES) =    11.35   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =    11.35       PEAK FLOW RATE(CFS) =      34.69

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    105.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  10.92
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.475
  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) =    2.75
  EFFECTIVE AREA(ACRES) =    12.25   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =    12.25       PEAK FLOW RATE(CFS) =      37.44

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    106.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1011.05  DOWNSTREAM(FEET) =  1009.55
  FLOW LENGTH(FEET) =   318.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  26.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.36
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     37.44
  PIPE TRAVEL TIME(MIN.) =   0.72    Tc(MIN.) =  11.64
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    106.00 =  1526.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    106.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN) =  11.64
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.345
  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) =    1.32
  EFFECTIVE AREA(ACRES) =    12.70   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.10
```

```
  TOTAL AREA(ACRES) =     12.70        PEAK FLOW RATE(CFS) =       37.44
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)       =      12.70  TC(MIN.) =      11.64
  EFFECTIVE AREA(ACRES) =      12.70  AREA-AVERAGED Fm(INCH/HR)=  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.10
  PEAK FLOW RATE(CFS)     =      37.44
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

1

```
****************************************************************************
            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 **************************
* ORANGE SHOW ROAD                                                         *
* PROPOSED CONDITION                                                       *
* RUNOFF TO ORANGE SHOW ROAD (NODES 110-111)                               *
 ***************************************************************************

  FILE NAME: C:\XDRIVE\3348\HYDC.DAT
  TIME/DATE OF STUDY: 09:45 08/25/2015
============================================================================
  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) = 1.2500

  *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) =   375.00
  ELEVATION DATA: UPSTREAM(FEET) =   1018.77  DOWNSTREAM(FEET) =   1015.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.166
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.136
  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        0.35      0.80       0.10    52    8.17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
  SUBAREA RUNOFF(CFS) =       1.28
  TOTAL AREA(ACRES) =       0.35   PEAK FLOW RATE(CFS) =       1.28
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =       0.35  TC(MIN.) =       8.17
  EFFECTIVE AREA(ACRES) =       0.35  AREA-AVERAGED Fm(INCH/HR)=  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.10
  PEAK FLOW RATE(CFS)    =       1.28
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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

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

 ************************** DESCRIPTION OF STUDY **************************
* ORANGE SHOW ROAD                                                         *
* PROPOSED CONDITION                                                       *
* NODES 200-201                                                            *
 ****************************************************************************

  FILE NAME: C:\XDRIVE\3348\HYDB.DAT
  TIME/DATE OF STUDY: 15:47 08/24/2015
============================================================================
  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) = 1.2500

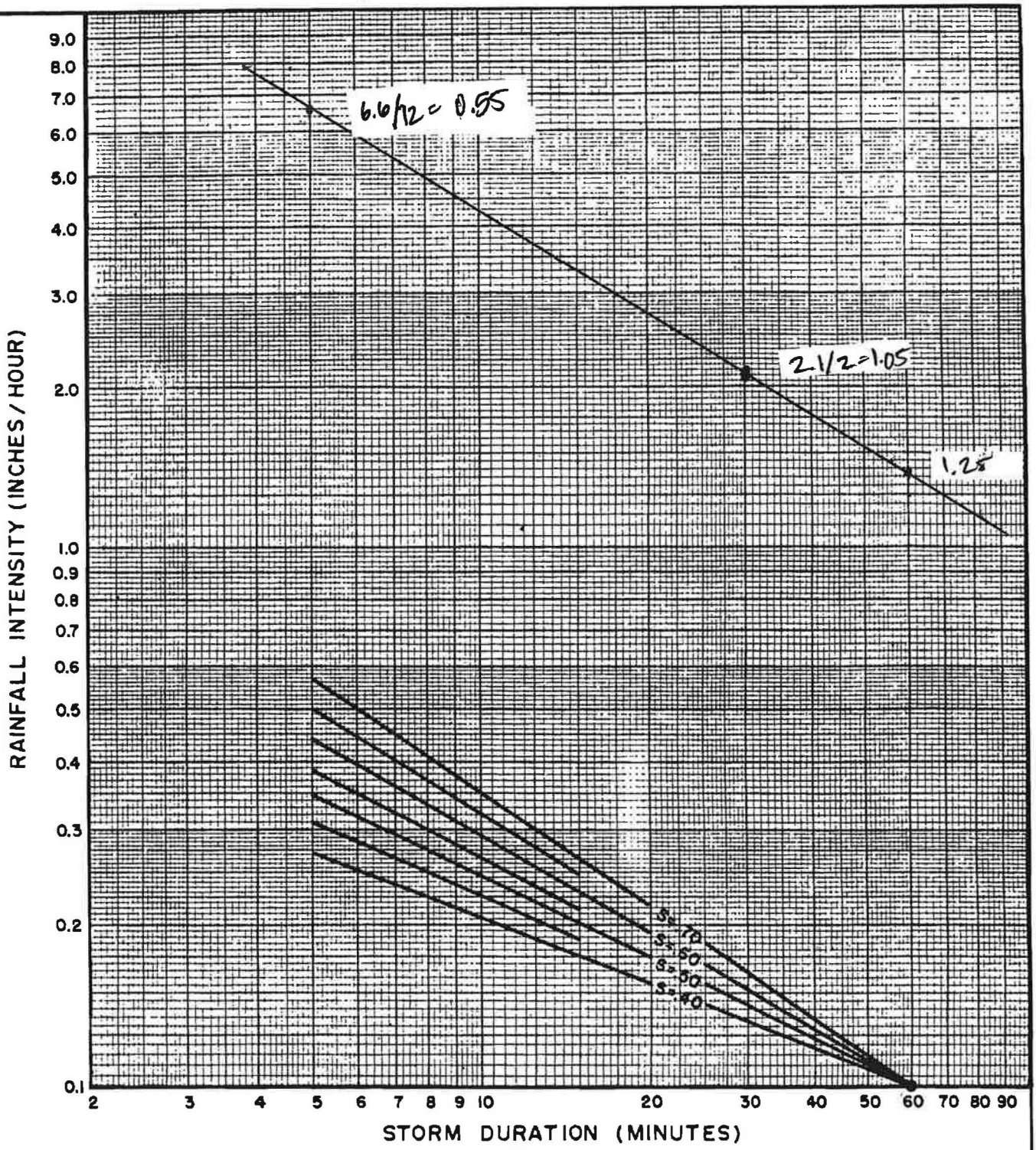
  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*


****************************************************************************
  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) =   335.00
  ELEVATION DATA: UPSTREAM(FEET) =   1020.06  DOWNSTREAM(FEET) =   1016.13

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.569
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.329
  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        1.15      0.80       0.10    52    7.57
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.80
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.10
  SUBAREA RUNOFF(CFS) =      4.40
  TOTAL AREA(ACRES) =      1.15   PEAK FLOW RATE(CFS) =      4.40
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =      1.15  TC(MIN.) =      7.57
  EFFECTIVE AREA(ACRES) =      1.15  AREA-AVERAGED Fm(INCH/HR)=  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.80  AREA-AVERAGED Ap =  0.10
  PEAK FLOW RATE(CFS)    =      4.40
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

APPENDIX C

DETENTION ANALYSIS



DESIGN STORM FREQUENCY = 100 YEARS

ONE HOUR POINT RAINFALL = 1.25 INCHES

LOG-LOG SLOPE = 0.6

PROJECT LOCATION = Orange Show & Waterman

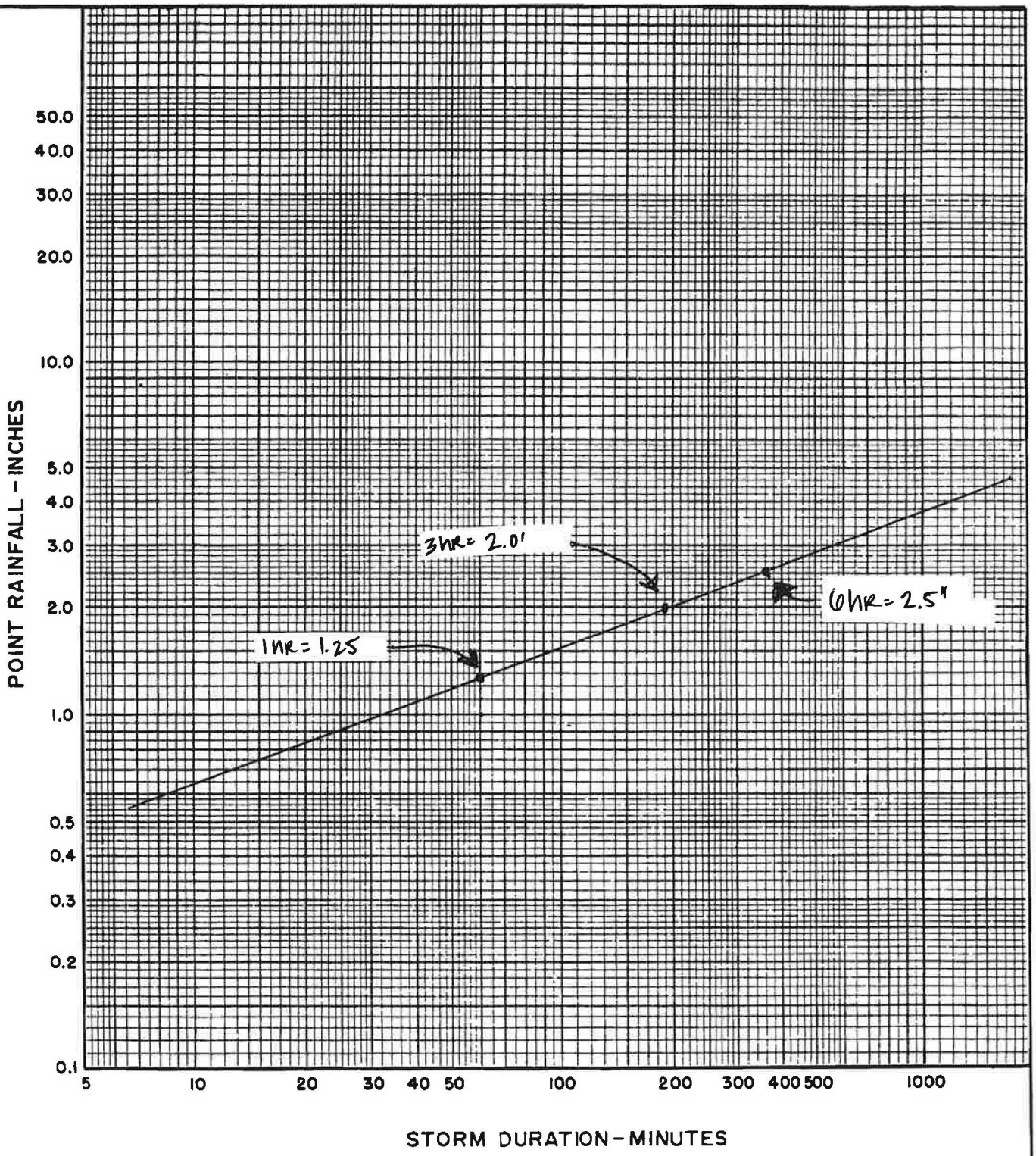
SAN BERNARDINO COUNTY

HYDROLOGY MANUAL

INTENSITY - DURATION CURVES CALCULATION SHEET

FIGURE D-3

7



PROJECT LOCATION Orange Show - Waterman

NOTES TEI Job # 3348 * PRELIM *

SAN BERNARDINO COUNTY

HYDROLOGY MANUAL

AREA - AVERAGED MASS RAINFALL PLOTTING SHEET

FIGURE E-8

****

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

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Analysis prepared by:

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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 = 5.00 (inches)

SOIL-COVER TYPE	AREA (Acres)	PERCENT OF PERVIOUS AREA	SCS CURVE NUMBER	LOSS RATE Fp(in./hr.)	YIELD
1	12.20	10.00	52.(32.)	0.742	0.873

TOTAL AREA (Acres) = 12.20

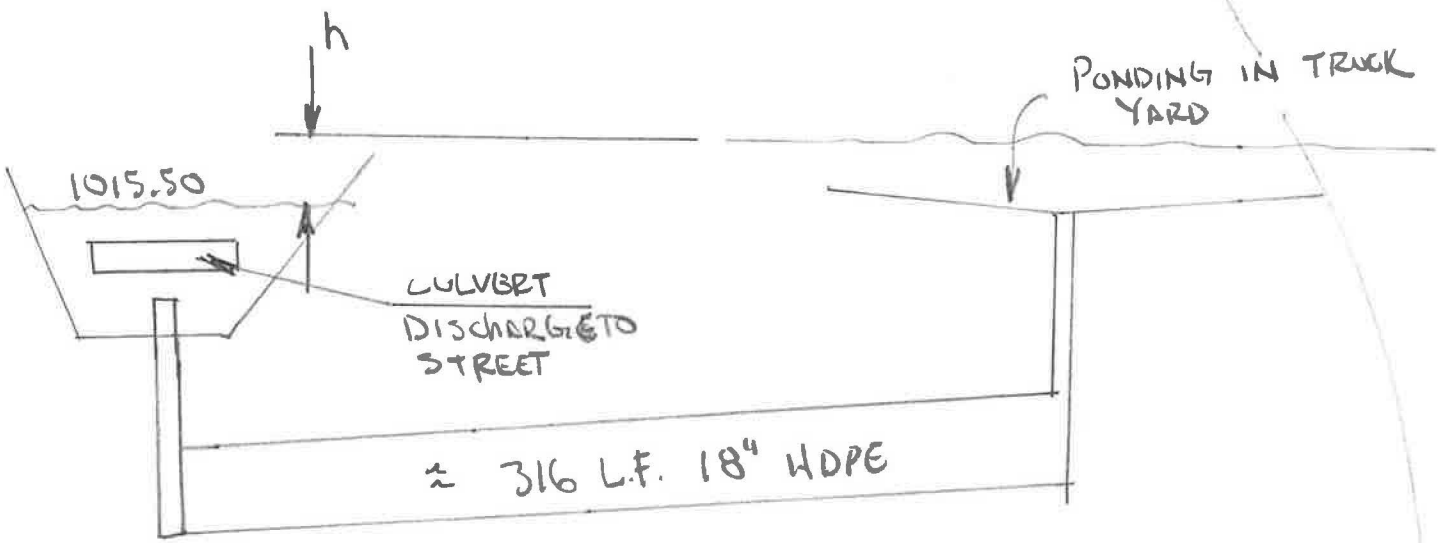
AREA-AVERAGED LOSS RATE, $\overline{Fm}$ (in./hr.) = 0.074

AREA-AVERAGED LOW LOSS FRACTION, $\overline{Y}$ = 0.127

1

SOUTHERLY TRUCK YARD

Elevation	Depth (feet)	Area (sq. ft.)	Volume (c.f.)	Σ Volume (c.f.)	Σ Volume (ac-ft)	Qdischarge (cfs)
1017.36	0.00	0				
			1272	1272	0.03	9.3
1017.60	0.24	10600				
			4595	5867	0.13	9.7
1017.80	0.44	35350				
			9768	15635	0.36	10.1
1018.00	0.64	62325				
			14143	29777	0.68	10.5
1018.20	0.84	79100				
			17270	47047	1.08	10.9
1018.40	1.04	93600				
			20240	67287	1.54	11.3
1018.60	1.24	108800				



LET h = TOTAL FRICTION LOSS THRU S.D.

$h = \left(\frac{Q}{K}\right)^2 \times L$ K = 114 FOR 18" HDPE

L = LENGTH = 316

SO $Q = \sqrt{\frac{h}{L}} \times K$

ELEV	h	Q
1017.6	2.1	$\sqrt{\frac{2.1}{316}} \times 114 = 9.3$
1017.8	2.3	9.7
⋮		
1018.6	3.1	11.3

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

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                         Analysis prepared by:

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   RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
   TOTAL CATCHMENT AREA(ACRES) =   12.25
   SOIL-LOSS RATE, Fm,(INCH/HR) =  0.074
   LOW LOSS FRACTION = 0.127
   TIME OF CONCENTRATION(MIN.) = 10.90
   RATIONAL METHOD PEAK FLOW RATE (DEFINED BY USER)
   IS USED FOR SMALL AREA PEAK Q
   USER SPECIFIED RAINFALL VALUES ARE USED
   RETURN FREQUENCY(YEARS) = 100
      5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.55
     30-MINUTE POINT RAINFALL VALUE(INCHES) =  1.05
      1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.25
      3-HOUR   POINT RAINFALL VALUE(INCHES) =  2.00
      6-HOUR   POINT RAINFALL VALUE(INCHES) =  2.50
     24-HOUR   POINT RAINFALL VALUE(INCHES) =  5.00

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

   TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     4.01
   TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     1.10

*****************************************************************************
  TIME      VOLUME       Q    0.        10.0      20.0      30.0      40.0
 (HOURS)     (AF)      (CFS)
-----------------------------------------------------------------------------
  0.01      0.0000     -0.82  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
  0.20      0.0014      1.00  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
  0.38      0.0165      1.01  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
  0.56      0.0317      1.02  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
  0.74      0.0470      1.02  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
  0.92      0.0624      1.03  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
  1.10      0.0779      1.03  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
  1.29      0.0935      1.04  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
  1.47      0.1091      1.05  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
  1.65      0.1249      1.05  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
  1.83      0.1407      1.06  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
  2.01      0.1567      1.07  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
  2.19      0.1728      1.07  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
  2.38      0.1889      1.08  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
  2.56      0.2052      1.09  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
  2.74      0.2216      1.10  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
  2.92      0.2381      1.10  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
  3.10      0.2547      1.11  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
  3.28      0.2714      1.12  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
  3.47      0.2883      1.13  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
  3.65      0.3052      1.13  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
  3.83      0.3223      1.14  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
  4.01      0.3396      1.15  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
  4.19      0.3569      1.16  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
  4.37      0.3744      1.17  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
  4.56      0.3920      1.18  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
  4.74      0.4097      1.19  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
  4.92      0.4276      1.20  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
  5.10      0.4457      1.20  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
  5.28      0.4639      1.22  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
  5.46      0.4822      1.22  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
  5.64      0.5007      1.24  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
  5.83      0.5194      1.25  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
  6.01      0.5382      1.26  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
  6.19      0.5572      1.27  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
  6.37      0.5763      1.28  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
  6.55      0.5957      1.29  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
  6.74      0.6152      1.31  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
  6.92      0.6349      1.32  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
```

7.10	0.6548	1.34	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
7.28	0.6749	1.34	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
7.46	0.6953	1.36	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
7.64	0.7158	1.37	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
7.83	0.7366	1.39	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
8.01	0.7575	1.40	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
8.19	0.7788	1.42	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
8.37	0.8002	1.43	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
8.55	0.8219	1.46	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
8.73	0.8439	1.47	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
8.91	0.8662	1.49	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
9.10	0.8887	1.51	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
9.28	0.9115	1.53	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
9.46	0.9346	1.55	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
9.64	0.9581	1.58	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
9.82	0.9818	1.59	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
10.01	1.0059	1.62	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
10.19	1.0304	1.64	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
10.37	1.0553	1.67	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
10.55	1.0805	1.69	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
10.73	1.1061	1.73	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
10.91	1.1322	1.75	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
11.10	1.1588	1.79	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
11.28	1.1858	1.81	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
11.46	1.2133	1.86	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
11.64	1.2414	1.88	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
11.82	1.2700	1.93	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
12.00	1.2993	1.96	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
12.19	1.3238	1.31	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
12.37	1.3436	1.33	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
12.55	1.3641	1.39	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
12.73	1.3853	1.43	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
12.91	1.4072	1.50	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
13.09	1.4300	1.54	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
13.27	1.4538	1.63	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
13.46	1.4786	1.67	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
13.64	1.5046	1.78	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
13.82	1.5318	1.85	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
14.00	1.5606	1.99	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
14.18	1.5936	2.42	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
14.37	1.6340	2.96	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
14.55	1.6793	3.08	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
14.73	1.7278	3.38	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
14.91	1.7799	3.56	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
15.09	1.8367	4.02	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
15.27	1.8993	4.32	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
15.45	1.9622	4.07	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
15.64	2.0192	3.53	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
15.82	2.1022	7.52	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
16.00	2.2468	11.75	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
16.18	2.6278	39.00	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
16.36	2.9526	4.27	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
16.55	3.0198	4.68	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
16.73	3.0832	3.77	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
16.91	3.1357	3.22	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
17.09	3.1812	2.85	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
17.27	3.2170	1.91	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
17.45	3.2443	1.73	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
17.64	3.2691	1.58	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
17.82	3.2920	1.46	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
18.00	3.3132	1.36	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
18.18	3.3382	1.97	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
18.36	3.3673	1.91	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
18.54	3.3954	1.83	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
18.73	3.4224	1.77	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
18.91	3.4485	1.71	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
19.09	3.4738	1.65	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
19.27	3.4982	1.61	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
19.45	3.5220	1.56	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
19.63	3.5451	1.52	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
19.82	3.5677	1.48	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
20.00	3.5897	1.45	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
20.18	3.6111	1.41	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
20.36	3.6321	1.38	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
20.54	3.6526	1.35	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
20.72	3.6728	1.33	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
20.91	3.6925	1.30	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
21.09	3.7118	1.28	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
21.27	3.7308	1.25	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.
21.45	3.7495	1.23	.QQQQQQQQQ.QQQQQQQQQ.	Q	Q Q.QQQQQQQQQ.

```
21.63      3.7678      1.21  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
21.81      3.7859      1.19  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
21.99      3.8036      1.17  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
22.18      3.8211      1.16  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
22.36      3.8383      1.14  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
22.54      3.8553      1.12  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
22.72      3.8720      1.11  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
22.90      3.8885      1.09  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
23.08      3.9048      1.08  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
23.27      3.9208      1.06  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
23.45      3.9367      1.05  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
23.63      3.9524      1.04  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
23.81      3.9678      1.02  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
23.99      3.9831      1.01  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
24.17      3.9983      1.00  .QQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
24.36      4.0058      0.00  QQQQQQQQQQ.QQQQQQQQQ. Q   Q  Q.QQQQQQQQQ.
-----------------------------------------------------------------------------


=============================================================================
    FLOW-THROUGH DETENTION BASIN MODEL

    SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:
    CONSTANT HYDROGRAPH TIME UNIT(MINUTES) =   10.900
    DEAD STORAGE(AF) =        0.00
    SPECIFIED DEAD STORAGE(AF) FILLED =        0.00
    ASSUMED INITIAL DEPTH(FEET) IN STORAGE BASIN =    0.00


                 INFLOW
                   |
                   |
                   |
                   V                 __effective depth
             -------------           |   (and volume)
             |           |     |     |
             | detention |     |....V.............
             |   basin   |<-->|          outflow
             |           |     |.........________
             -------------     |         |   \
                   |           | storage |     basin outlet
                   V           -----------
                OUTFLOW


    DEPTH-VS.-STORAGE AND DEPTH-VS.-DISCHARGE INFORMATION:
    TOTAL NUMBER OF BASIN DEPTH INFORMATION ENTRIES =   7
    *BASIN-DEPTH  STORAGE    OUTFLOW  **BASIN-DEPTH  STORAGE    OUTFLOW  *
    *   (FEET)  (ACRE-FEET)   (CFS)   **   (FEET)  (ACRE-FEET)   (CFS)   *
    *      0.000      0.000      0.000**      0.240      0.030      9.300*
    *      0.440      0.130      9.700**      0.640      0.360     10.100*
    *      0.840      0.680     10.500**      1.040      1.080     10.900*
    *      1.240      1.540     11.300**
-----------------------------------------------------------------------------
    BASIN STORAGE, OUTFLOW AND DEPTH ROUTING VALUES:
     INTERVAL   DEPTH   {S-O*DT/2}   {S+O*DT/2}
      NUMBER   (FEET)   (ACRE-FEET)  (ACRE-FEET)
         1      0.00      0.00000      0.00000
         2      0.24     -0.03981      0.09981
         3      0.44      0.05718      0.20282
         4      0.64      0.28418      0.43582
         5      0.84      0.60118      0.75882
         6      1.04      0.99817      1.16183
         7      1.24      1.45517      1.62483
    WHERE S=STORAGE(AF);O=OUTFLOW(AF/MIN.);DT=UNIT INTERVAL(MIN.)
-----------------------------------------------------------------------------
    DETENTION BASIN ROUTING RESULTS:
    NOTE: COMPUTED BASIN DEPTH, OUTFLOW, AND STORAGE QUANTITIES
          OCCUR AT THE GIVEN TIME. BASIN INFLOW VALUES REPRESENT THE
          AVERAGE INFLOW DURING THE RECENT HYDROGRAPH UNIT INTERVAL.

      TIME  DEAD-STORAGE  INFLOW  EFFECTIVE  OUTFLOW  EFFECTIVE
     (HRS)   FILLED(AF)    (CFS)  DEPTH(FT)   (CFS)   VOLUME(AF)
-----------------------------------------------------------------------------
      0.013        0.000    -0.82     -0.03    -0.57     -0.004
      0.195        0.000     1.00      0.05     0.36      0.006
      0.377        0.000     1.01      0.04     1.64      0.005
      0.558        0.000     1.02      0.04     1.42      0.005
      0.740        0.000     1.02      0.04     1.42      0.005
```

0.922	0.000	1.03	0.04	1.43	0.005
1.103	0.000	1.03	0.04	1.44	0.005
1.285	0.000	1.04	0.04	1.45	0.005
1.467	0.000	1.05	0.04	1.46	0.005
1.648	0.000	1.05	0.04	1.47	0.005
1.830	0.000	1.06	0.04	1.48	0.005
2.012	0.000	1.07	0.04	1.49	0.005
2.193	0.000	1.07	0.04	1.50	0.005
2.375	0.000	1.08	0.04	1.51	0.005
2.557	0.000	1.09	0.04	1.52	0.005
2.738	0.000	1.10	0.04	1.53	0.005
2.920	0.000	1.10	0.04	1.54	0.005
3.102	0.000	1.11	0.04	1.55	0.005
3.283	0.000	1.12	0.04	1.56	0.005
3.465	0.000	1.13	0.04	1.57	0.005
3.647	0.000	1.13	0.04	1.58	0.005
3.828	0.000	1.14	0.04	1.59	0.005
4.010	0.000	1.15	0.04	1.60	0.005
4.192	0.000	1.16	0.04	1.62	0.005
4.373	0.000	1.17	0.04	1.63	0.005
4.555	0.000	1.18	0.04	1.64	0.005
4.737	0.000	1.19	0.04	1.65	0.005
4.918	0.000	1.20	0.04	1.67	0.005
5.100	0.000	1.20	0.04	1.68	0.005
5.282	0.000	1.22	0.04	1.69	0.005
5.463	0.000	1.22	0.04	1.71	0.006
5.645	0.000	1.24	0.04	1.72	0.006
5.827	0.000	1.25	0.04	1.74	0.006
6.008	0.000	1.26	0.05	1.75	0.006
6.190	0.000	1.27	0.05	1.77	0.006
6.372	0.000	1.28	0.05	1.79	0.006
6.553	0.000	1.29	0.05	1.80	0.006
6.735	0.000	1.31	0.05	1.82	0.006
6.917	0.000	1.32	0.05	1.84	0.006
7.098	0.000	1.34	0.05	1.86	0.006
7.280	0.000	1.34	0.05	1.87	0.006
7.462	0.000	1.36	0.05	1.89	0.006
7.643	0.000	1.37	0.05	1.91	0.006
7.825	0.000	1.39	0.05	1.93	0.006
8.007	0.000	1.40	0.05	1.95	0.006
8.188	0.000	1.42	0.05	1.98	0.006
8.370	0.000	1.43	0.05	2.00	0.006
8.552	0.000	1.46	0.05	2.02	0.007
8.733	0.000	1.47	0.05	2.05	0.007
8.915	0.000	1.49	0.05	2.07	0.007
9.097	0.000	1.51	0.05	2.10	0.007
9.278	0.000	1.53	0.06	2.13	0.007
9.460	0.000	1.55	0.06	2.15	0.007
9.642	0.000	1.58	0.06	2.18	0.007
9.823	0.000	1.59	0.06	2.21	0.007
10.005	0.000	1.62	0.06	2.25	0.007
10.187	0.000	1.64	0.06	2.28	0.007
10.368	0.000	1.67	0.06	2.32	0.008
10.550	0.000	1.69	0.06	2.35	0.008
10.732	0.000	1.73	0.06	2.39	0.008
10.913	0.000	1.75	0.06	2.43	0.008
11.095	0.000	1.79	0.06	2.47	0.008
11.277	0.000	1.81	0.07	2.52	0.008
11.458	0.000	1.86	0.07	2.57	0.008
11.640	0.000	1.88	0.07	2.62	0.008
11.822	0.000	1.93	0.07	2.67	0.009
12.003	0.000	1.96	0.07	2.73	0.009
12.185	0.000	1.31	0.05	2.29	0.006
12.367	0.000	1.33	0.05	1.85	0.006
12.548	0.000	1.39	0.05	1.91	0.006
12.730	0.000	1.43	0.05	1.97	0.006
12.912	0.000	1.50	0.05	2.05	0.007
13.093	0.000	1.54	0.06	2.12	0.007
13.275	0.000	1.63	0.06	2.21	0.007
13.457	0.000	1.67	0.06	2.31	0.008
13.638	0.000	1.78	0.06	2.42	0.008
13.820	0.000	1.85	0.07	2.54	0.008
14.002	0.000	1.99	0.07	2.68	0.009
14.183	0.000	2.42	0.09	3.08	0.011
14.365	0.000	2.96	0.11	3.76	0.013
14.547	0.000	3.08	0.11	4.22	0.014
14.728	0.000	3.38	0.12	4.52	0.015
14.910	0.000	3.56	0.13	4.85	0.016
15.092	0.000	4.02	0.14	5.30	0.018
15.273	0.000	4.32	0.16	5.83	0.019

15.455	0.000	4.07	0.15	5.86	0.018
15.637	0.000	3.53	0.13	5.31	0.016
15.818	0.000	7.52	0.27	7.14	0.043
16.000	0.000	11.75	0.39	9.47	0.104
16.182	0.000	39.00	0.75	9.96	0.540
16.363	0.000	4.27	0.70	10.27	0.450
16.545	0.000	4.68	0.65	10.16	0.368
16.727	0.000	3.77	0.57	10.03	0.274
16.908	0.000	3.22	0.48	9.86	0.174
17.090	0.000	2.85	0.33	9.62	0.073
17.272	0.000	1.91	0.07	6.14	0.009
17.453	0.000	1.73	0.06	2.61	0.008
17.635	0.000	1.58	0.06	2.31	0.007
17.817	0.000	1.46	0.05	2.13	0.007
17.998	0.000	1.36	0.05	1.98	0.006
18.180	0.000	1.97	0.07	2.33	0.009
18.362	0.000	1.91	0.07	2.71	0.009
18.543	0.000	1.83	0.07	2.62	0.008
18.725	0.000	1.77	0.06	2.52	0.008
18.907	0.000	1.71	0.06	2.43	0.008
19.088	0.000	1.65	0.06	2.35	0.007
19.270	0.000	1.61	0.06	2.28	0.007
19.452	0.000	1.56	0.06	2.21	0.007
19.633	0.000	1.52	0.05	2.15	0.007
19.815	0.000	1.48	0.05	2.10	0.007
19.997	0.000	1.45	0.05	2.05	0.007
20.178	0.000	1.41	0.05	2.00	0.006
20.360	0.000	1.38	0.05	1.96	0.006
20.542	0.000	1.35	0.05	1.91	0.006
20.723	0.000	1.33	0.05	1.87	0.006
20.905	0.000	1.30	0.05	1.84	0.006
21.087	0.000	1.28	0.05	1.80	0.006
21.268	0.000	1.25	0.05	1.77	0.006
21.450	0.000	1.23	0.04	1.74	0.006
21.632	0.000	1.21	0.04	1.71	0.005
21.813	0.000	1.19	0.04	1.68	0.005
21.995	0.000	1.17	0.04	1.65	0.005
22.177	0.000	1.16	0.04	1.63	0.005
22.358	0.000	1.14	0.04	1.60	0.005
22.540	0.000	1.12	0.04	1.58	0.005
22.722	0.000	1.11	0.04	1.56	0.005
22.903	0.000	1.09	0.04	1.54	0.005
23.085	0.000	1.08	0.04	1.52	0.005
23.267	0.000	1.06	0.04	1.50	0.005
23.448	0.000	1.05	0.04	1.48	0.005
23.630	0.000	1.04	0.04	1.46	0.005
23.812	0.000	1.02	0.04	1.44	0.005
23.993	0.000	1.01	0.04	1.42	0.005
24.175	0.000	1.00	0.04	1.41	0.005
24.357	0.000	0.00	0.00	0.70	0.000

APPENDIX D

HYDROLOGY MAP