PRELIMINARY
HYDROLOGY CALCULATIONS

FOR

ALERE SLOVER AND CACTUS
SAN BERNARDINO, CALIFORNIA

PREPARED FOR

ALERE PROPERTY GROUP, LLC
100 BAYVIEW CR., STE 310
NEWPORT BEACH, CA 92660
PHONE: (949) 509-5000
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PRELIMINARY APPROVED
By Osvaldo Roque at 3:54 pm, Oct 29, 2018
Additional comments can be addressed in the final submittal

SEPTEMBER 1, 2017
REVISED JUNE 11, 2018

JOB NO. 3569

PREPARED BY

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

PRELIMINARY
HYDROLOGY CALCULATIONS

FOR

ALERE SLOVER AND CACTUS

PREPARED BY KRISTIE FERRONATO
UNDER THE SUPERVISION OF

REINHARD STENZEL DATE:
R.C.E. 56155
EXP. 12/31/18

Required for final.

INTRODUCTION

A: PROJECT LOCATION

The project site is located at the southwest corner of Slover Avenue and Cactus Avenue in the County of San Bernardino. Please see following page for vicinity map.

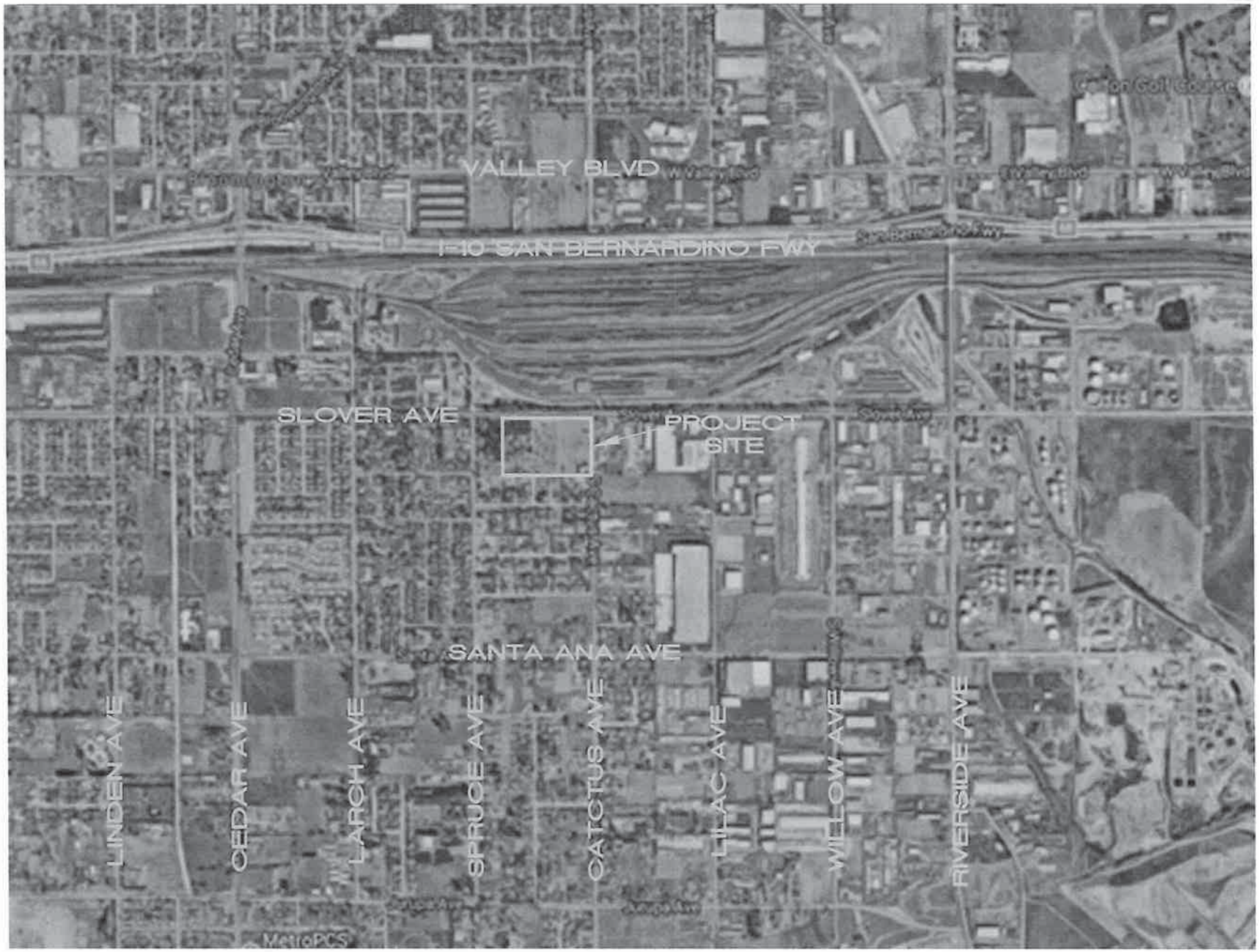
B: STUDY PURPOSE

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

C: PROJECT STAFF:

Thienes Engineering staff involved in this study include:

Reinhard Stenzel
Kristie Ferronato
Matthew Cruz



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LA MIRADA, CALIFORNIA 90638
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VICINITY MAP

FOR

ALERE SLOVER AND CACTUS

N

NOT TO SCALE

DISCUSSION

Project Description

The project site encompasses approximately 13.30 acres. Improvements to the site include one commercial type building with approximately 257,915 square feet. There will be a truck yard located on the northerly side of the building. Vehicle parking lots are located on the easterly and westerly sides of the site with a drive aisle on the southerly side of the building. There will be landscaping adjacent to the street and throughout the project site.

Existing Conditions

The project site is generally a vacant lot with moderate grass and weeds. However there are a few single family homes on the project site. Runoff from the majority of the site generally drains southeasterly towards Cactus. The 100-year existing condition peak flow rate for this portion is approximately 22.7 cfs. The western portion of the site drains westerly toward existing properties to the west. The 100-year existing condition peak flow rate for this portion is approximately 4.4 cfs.

See Appendix "B" for existing condition hydrology calculations.

Proposed Conditions

Runoff the building and truck yard (nodes 100-132 on proposed hydrology map) drains to a series of catch basins in the truck yard. A storm drain will convey the runoff southerly in the eastern drive aisle, while low flows from these areas will bleed off to underground chambers for water quality purposes. The runoff from the eastern vehicle parking area (nodes 140-141) will be collect in a catch basin in the southerly portion of the vehicle parking area (node 141). The runoff will confluence with the runoff from the truck yard (at node 142). The runoff from the westerly and southern drive aisle (nodes 150-152) will be collect in curb opening catch basin (node 152). The runoff will confluence with the main line storm drain (node 153). Since there are no public storm drains in the project area, the runoff from the project site will be discharged via parkway culverts to Cactus Avenue.

The total 100-year peak flow rate for the proposed condition is approximately 49.6 cfs (undetained). See Appendix "B" for proposed condition hydrology calculations.

Detention Calculations

There are no existing storm drains in the vicinity of the project site. Discharge from the site will be limited to less than existing conditions to assure that there are not any adverse effects to downstream properties. In order to limit runoff from the site, some detention will be required. The truck yard north of the building will be utilized for peak flow

detention. This will allow the drive aisle to the west and south and the vehicle parking to the east to discharge undetained.

Calculations show that approximately 12.9 cfs can discharge from the truck yard area with a ponding depth of approximately 0.65 feet. The volume stored at this elevation is approximately 0.41acre-feet. With the temporary onsite detention, the 100-year proposed condition from the project site is approximately 19.0 cfs (12.9 cfs at node 132 + 2.4 cfs at node 141 + 3.7 cfs at node 152). This is less than the existing condition 100-year peak flow rate.

See Appendix "C" for detention calculations.

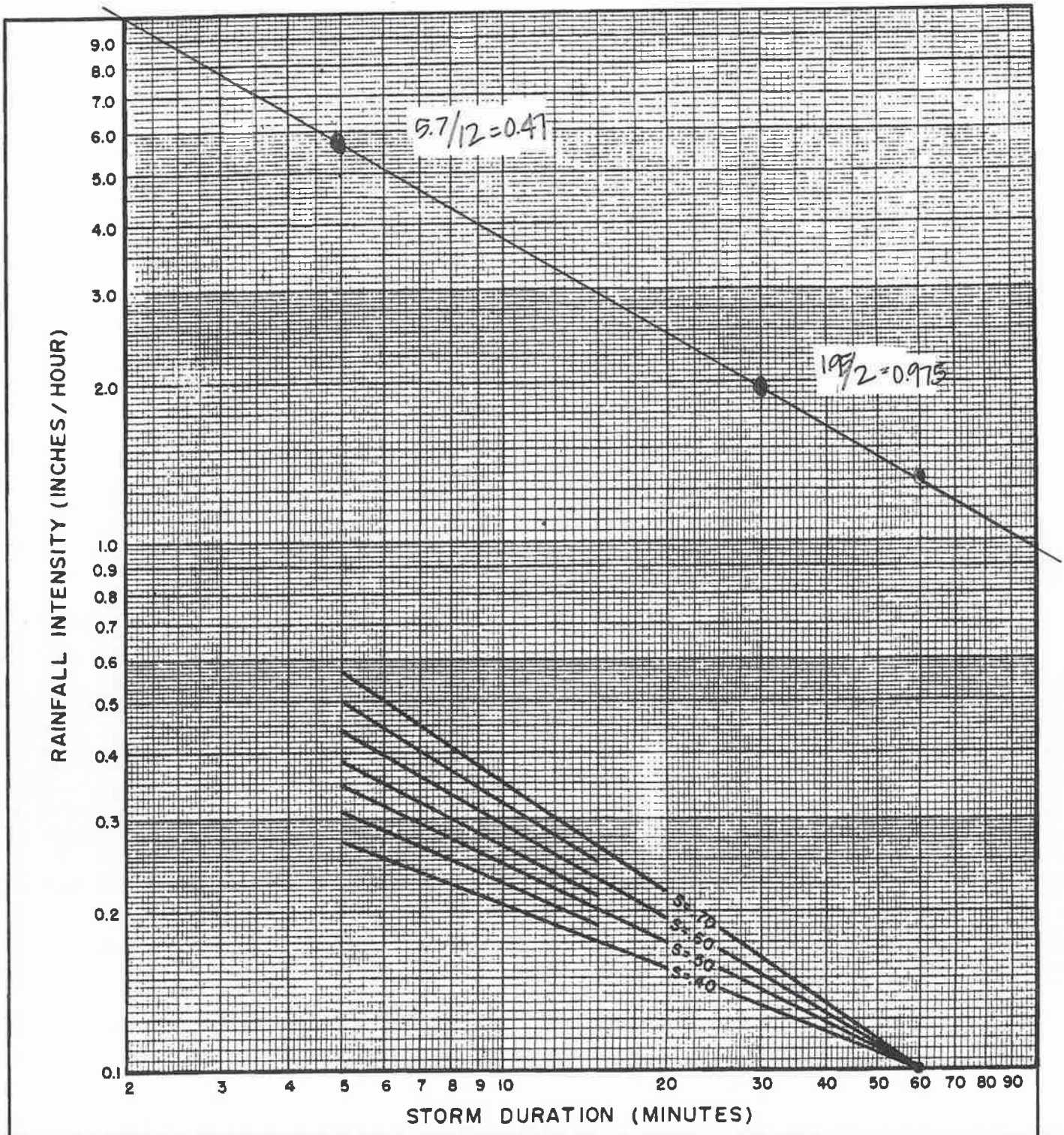
Methodology

The San Bernardino County Rational Method program (AES Software) was used for hydrology calculations. The site is composed of soil type "A" per the San Bernardino County Hydrology Manual. AES Software's FLOOD program was used for the hydrograph and detention analysis. See Appendix "A" for pertinent reference materials.

APPENDIX	DESCRIPTION
A	REFERENCE MATERIALS
B	HYDROLOGY CALCULATIONS
C	DETENTION CALCULATIONS
D	CATCH BASIN CALCULATIONS
E	HYDROLOGY MAPS

APPENDIX A

REFERENCE MATERIALS



DESIGN STORM FREQUENCY = 100 YEARS

ONE HOUR POINT RAINFALL = 1.3 INCHES

LOG-LOG SLOPE = 0.62

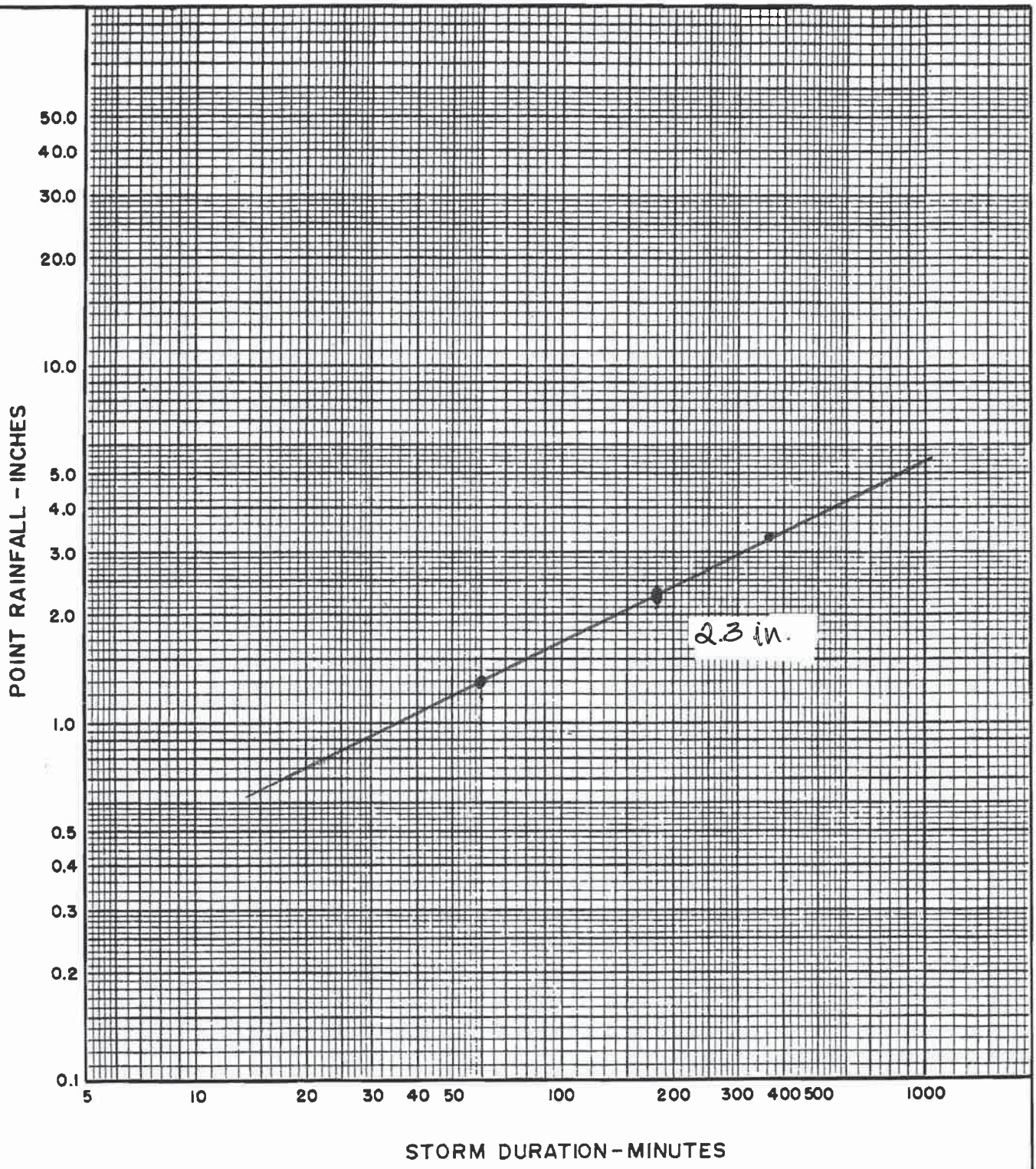
PROJECT LOCATION = Slover & Cactus

SAN BERNARDINO COUNTY

HYDROLOGY MANUAL

INTENSITY – DURATION CURVES CALCULATION SHEET

FIGURE D-3



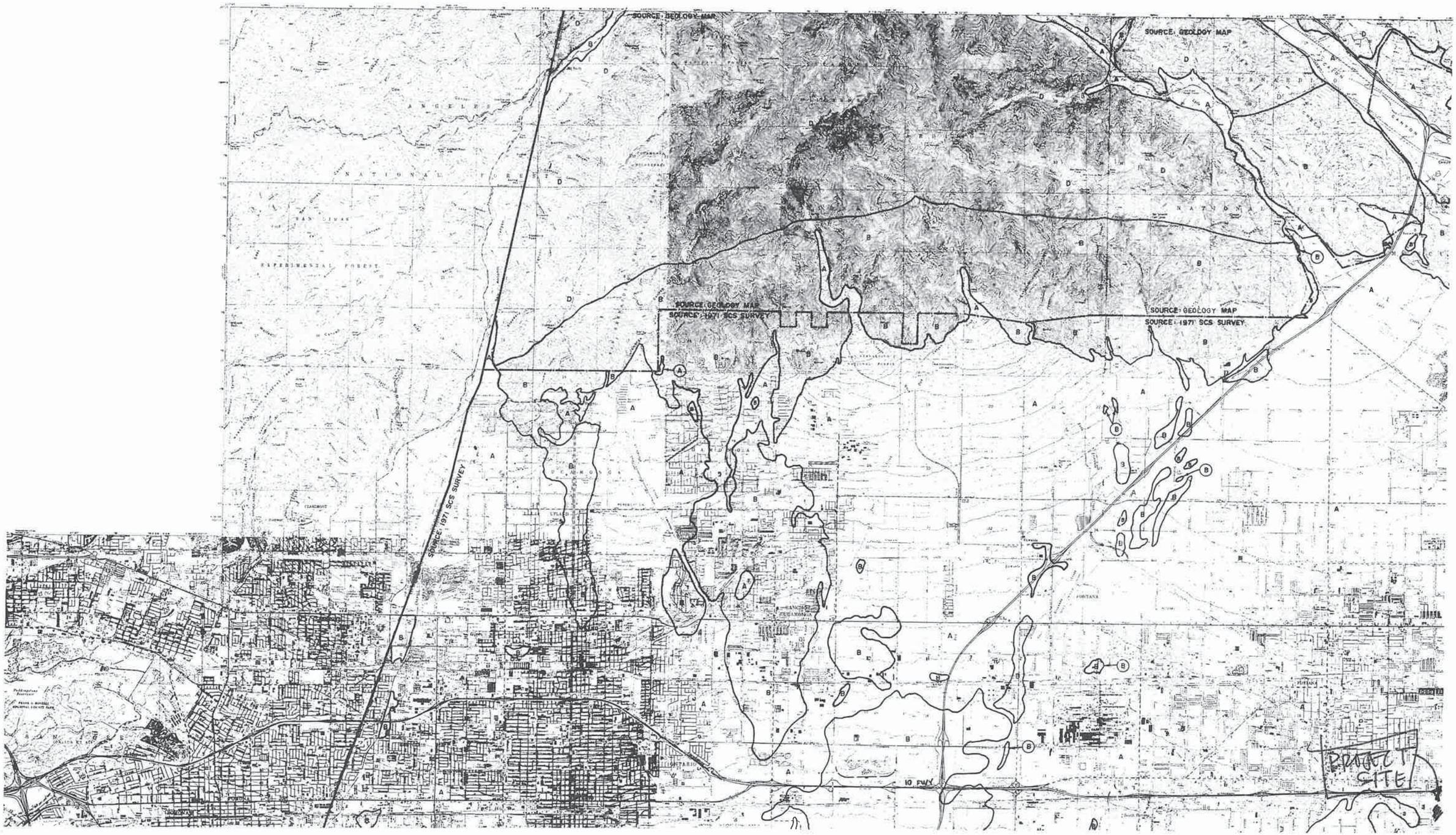
PROJECT LOCATION Slover & Cactus

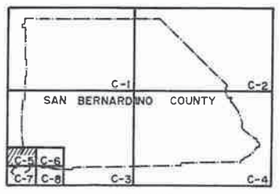
NOTES TEI Job No 3569

SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

AREA - AVERAGED
MASS RAINFALL
PLOTTING SHEET

FIGURE E-8





INDEX MAP

LEGEND

SOIL GROUP BOUNDARY

A SOIL GROUP DESIGNATION

BOUNDARY OF INDICATED SOURCE

SCALE 1:48,000

SCALE REDUCED BY 1/2

SOILTYPE A

SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

HYDROLOGIC SOILS GROUP MAP FOR SOUTHWEST-A AREA

FIGURE C-13

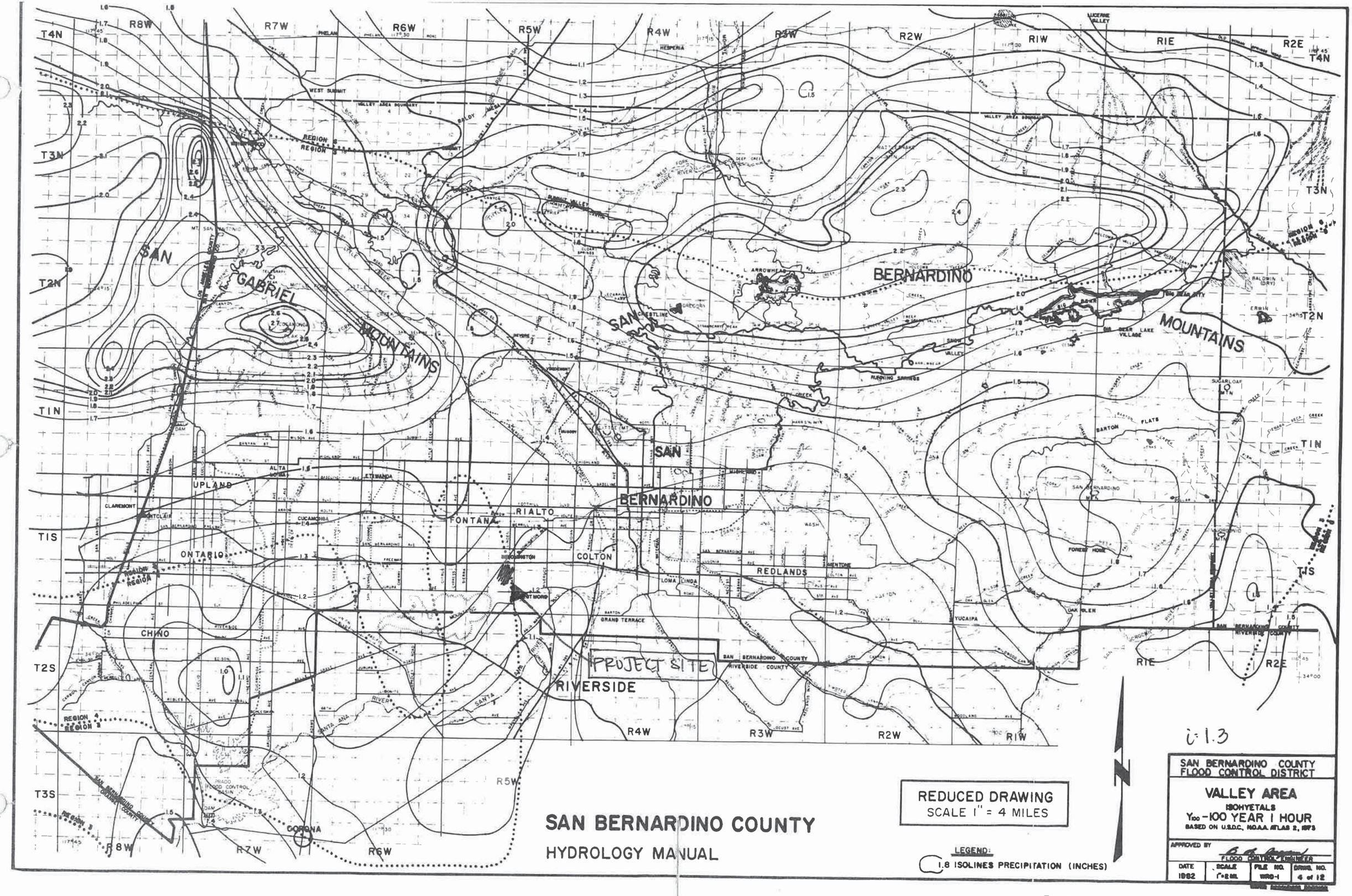
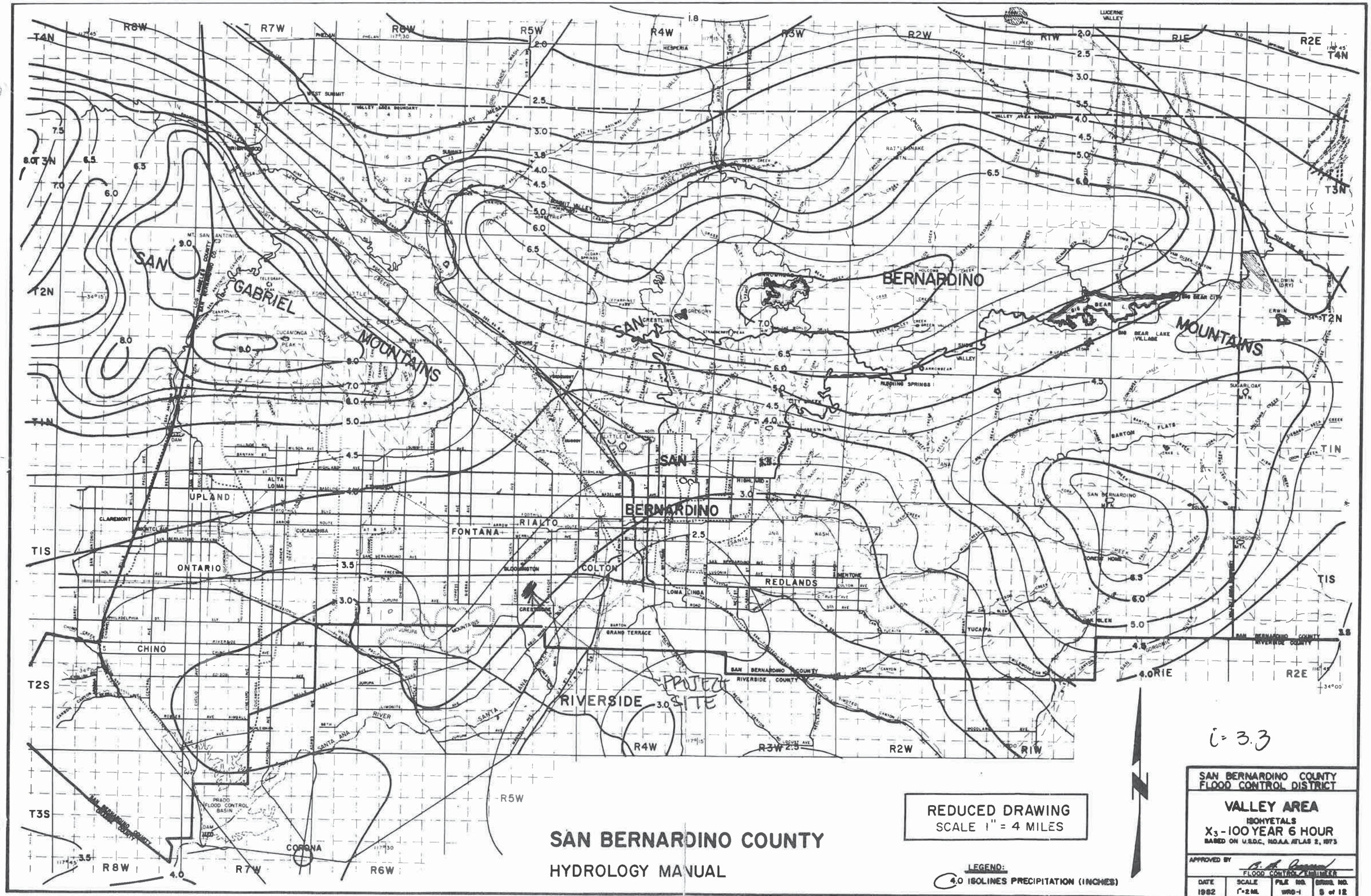

SAN BERNARDINO COUNTY
HYDROLOGY MANUAL
REDUCED DRAWING
SCALE 1" = 4 MILES
LEGEND:
1.8 ISOLINES PRECIPITATION (INCHES)
SAN BERNARDINO COUNTY
FLOOD CONTROL DISTRICT
VALLEY AREA
ISOHYETALS
Y100 -100 YEAR 1 HOUR
BASED ON U.S.D.C., N.O.A.A. ATLAS 2, 1973
APPROVED BY
FLOOD CONTROL ENGINEER
DATE 1982
SCALE 1"=2 MI.
FILE NO. WRD-1
DRWG. NO. 4 of 12
PROJECT SITE
SAN GABRIEL MOUNTAINS
SAN BERNARDINO MOUNTAINS
SAN BERNARDINO
RIVERSIDE
UPLAND
ONTARIO
CHINO
FONTANA
RIALTO
COLTON
REDLANDS
CORONA
SAN BERNARDINO COUNTY
RIVERSIDE COUNTY
T4N
T3N
T2N
T1N
T1S
T2S
T3S
R8W
R7W
R6W
R5W
R4W
R3W
R2W
R1W
R1E
R2E
i=1.3

FIGURE B-4



REDUCED DRAWING
SCALE 1" = 4 MILES

LEGEND:
4.0 ISOLINES PRECIPITATION (INCHES)

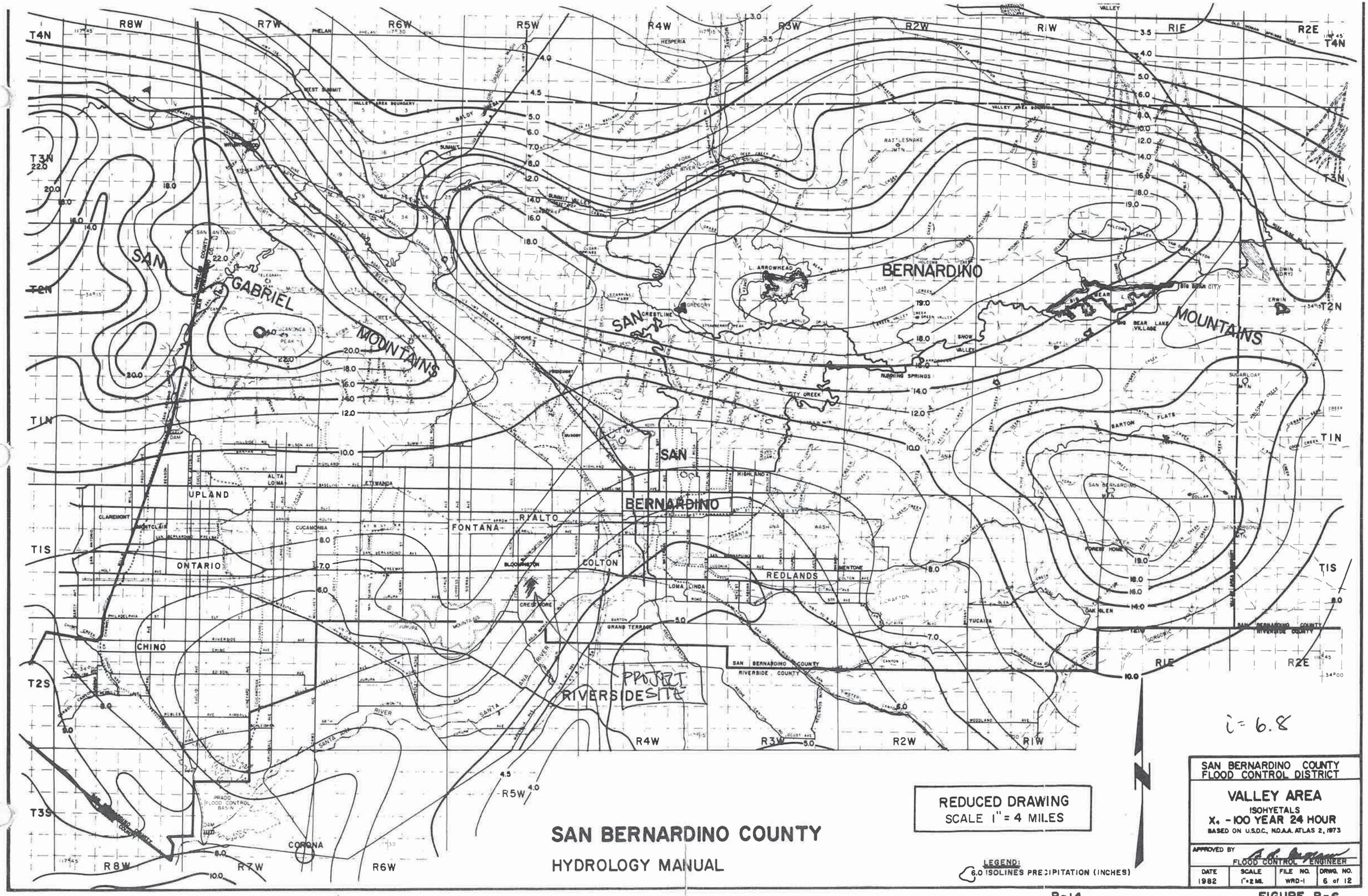
SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

SAN BERNARDINO COUNTY
FLOOD CONTROL DISTRICT

VALLEY AREA
ISOHYETALS
X_3 - 100 YEAR 6 HOUR
BASED ON U.S.D.C., N.O.A.A. ATLAS 2, 1973

APPROVED BY			
FLOOD CONTROL ENGINEER			
DATE	SCALE	FILE NO.	SHEET NO.
1982	1"=2 MI.	WRS-1	5 of 12

FIGURE B-5



REDUCED DRAWING
SCALE 1" = 4 MILES

LEGEND:
6.0 ISOLINES PRECIPITATION (INCHES)

i = 6.8

SAN BERNARDINO COUNTY
FLOOD CONTROL DISTRICT

VALLEY AREA
ISOHYETALS
X_t - 100 YEAR 24 HOUR
BASED ON U.S.D.C., N.O.A.A. ATLAS 2, 1973

APPROVED BY
FLOOD CONTROL ENGINEER

DATE	SCALE	FILE NO.	DRWG. NO.
1982	1"=2 MI.	WRD-1	6 of 12

SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

FIGURE B-6

APPENDIX B

HYDROLOGY CALCULATIONS

```
**************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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         Ver. 23.0  Release Date: 07/01/2016  License ID 1435

                      Analysis prepared by:



 ************************** DESCRIPTION OF STUDY **************************
* TEI JOB NO 3569                                                        *
* EXISTING CONDITION                                                     *
* 100 YEAR STORM EVENT                                                   *
 **************************************************************************

  FILE NAME: W:\3569\EX100.DAT
  TIME/DATE OF STUDY: 13:20 06/11/2018
==========================================================================
  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) = 1.3000

  *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 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *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) =   1045.00  DOWNSTREAM(FEET) =   1038.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   15.080
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.977
  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        1.70      0.35      1.000    81   18.08
  RESIDENTIAL
  "2 DWELLINGS/ACRE"          A        1.05      0.74      0.700    52   15.08
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.47
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.885
  SUBAREA RUNOFF(CFS) =      6.34
  TOTAL AREA(ACRES) =      2.75   PEAK FLOW RATE(CFS) =      6.34

**************************************************************************
  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) =   1038.50  DOWNSTREAM(FEET) =   1034.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   365.00   CHANNEL SLOPE =  0.0110
  CHANNEL FLOW THRU SUBAREA(CFS) =      6.34
  FLOW VELOCITY(FEET/SEC) =   2.34 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.60   Tc(MIN.) =   17.68
  LONGEST FLOWPATH FROM NODE     100.00 TO NODE     102.00 =    1045.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE     102.00 TO NODE     102.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  MAINLINE Tc(MIN.) =   17.68
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.706
  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        3.70      0.35     1.000    81
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.35
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA AREA(ACRES) =     3.70      SUBAREA RUNOFF(CFS) =     7.83
EFFECTIVE AREA(ACRES) =      6.45   AREA-AVERAGED Fm(INCH/HR) =  0.38
AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.95
TOTAL AREA(ACRES) =        6.4       PEAK FLOW RATE(CFS) =      13.50

****************************************************************************
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) =   1034.50  DOWNSTREAM(FEET) =   1032.10
CHANNEL LENGTH THRU SUBAREA(FEET) =   185.00   CHANNEL SLOPE =  0.0130
CHANNEL FLOW THRU SUBAREA(CFS) =      13.50
FLOW VELOCITY(FEET/SEC) =   3.08 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
TRAVEL TIME(MIN.) =   1.00   Tc(MIN.) =   18.69
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =    1230.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     103.00 TO NODE     103.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   18.69
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.618
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        4.75      0.35     1.000    81
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.35
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA AREA(ACRES) =     4.75      SUBAREA RUNOFF(CFS) =     9.68
EFFECTIVE AREA(ACRES) =     11.20   AREA-AVERAGED Fm(INCH/HR) =  0.37
AREA-AVERAGED Fp(INCH/HR) =  0.38  AREA-AVERAGED Ap =  0.97
TOTAL AREA(ACRES) =       11.2       PEAK FLOW RATE(CFS) =      22.67
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =       11.2  TC(MIN.) =     18.69
EFFECTIVE AREA(ACRES) =     11.20  AREA-AVERAGED Fm(INCH/HR)=  0.37
AREA-AVERAGED Fp(INCH/HR) =  0.38  AREA-AVERAGED Ap = 0.972
PEAK FLOW RATE(CFS)   =      22.67
============================================================================
============================================================================
END OF RATIONAL METHOD ANALYSIS
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****************************************************************************
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                         Analysis prepared by:



 ************************** DESCRIPTION OF STUDY **************************
* TEI JOB NO 3569                                                          *
* EXISTING CONDITION (NODE 200-201)                                        *
* 100 YEAR STORM EVENT                                                     *
 ****************************************************************************

  FILE NAME: W:\3569\EX200.DAT
  TIME/DATE OF STUDY: 16:23 06/11/2018
============================================================================
  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) = 1.3000

  *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 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
  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) =   590.00
  ELEVATION DATA: UPSTREAM(FEET) =   1045.70  DOWNSTREAM(FEET) =   1038.90

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   16.450
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.826
  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        2.10      0.35     1.000    81   16.45
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.35
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =       4.67
  TOTAL AREA(ACRES) =       2.10   PEAK FLOW RATE(CFS) =       4.67
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =        2.1  TC(MIN.) =      16.45
  EFFECTIVE AREA(ACRES) =       2.10  AREA-AVERAGED Fm(INCH/HR)=  0.35
  AREA-AVERAGED Fp(INCH/HR) =  0.35  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =       4.67
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

♀

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                        Analysis prepared by:



 ************************* DESCRIPTION OF STUDY *************************
* TEI JOB NO 3569                                                      *
* PROPOSED CONDITION                                                   *
* 100 YEAR STORM EVENT                                                 *
 ************************************************************************

  FILE NAME: W:\3569\100.DAT
  TIME/DATE OF STUDY: 09:31 06/15/2018
==============================================================================
  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) = 1.3000

  *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 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *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) =   335.00
  ELEVATION DATA: UPSTREAM(FEET) =   1041.07  DOWNSTREAM(FEET) =   1037.05

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.535
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.514
  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    7.53
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =     15.19
  TOTAL AREA(ACRES) =      3.80   PEAK FLOW RATE(CFS) =     15.19

******************************************************************************
  FLOW PROCESS FROM NODE    101.00 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) =  1034.10  DOWNSTREAM(FEET) =  1033.30
  FLOW LENGTH(FEET) =   150.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.26
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      15.19
  PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =    7.93
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    112.00 =     485.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    112.00 IS CODE =   1
------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.93
  RAINFALL INTENSITY(INCH/HR) =   4.38
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.10
```

```
  EFFECTIVE STREAM AREA(ACRES) =       3.80
  TOTAL STREAM AREA(ACRES) =       3.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      15.19

****************************************************************************
  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) =   225.00
  ELEVATION DATA: UPSTREAM(FEET) =   1041.23  DOWNSTREAM(FEET) =   1037.05

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.888
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.234
  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        1.60      0.74      0.100     52    5.89
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      7.43
  TOTAL AREA(ACRES) =      1.60   PEAK FLOW RATE(CFS) =      7.43

****************************************************************************
  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) =  1035.00  DOWNSTREAM(FEET) =  1033.30
  FLOW LENGTH(FEET) =    20.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.00
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.43
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    5.91
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    112.00 =     245.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    112.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.91
  RAINFALL INTENSITY(INCH/HR) =   5.22
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       1.60
  TOTAL STREAM AREA(ACRES) =       1.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       7.43

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       15.19    7.93    4.377  0.74( 0.07) 0.10       3.8     100.00
      2        7.43    5.91    5.223  0.74( 0.07) 0.10       1.6     110.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       20.97    5.91    5.223  0.74( 0.07) 0.10       4.4     110.00
      2       21.40    7.93    4.377  0.74( 0.07) 0.10       5.4     100.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      21.40    Tc(MIN.) =     7.93
  EFFECTIVE AREA(ACRES) =       5.40   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       5.4
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    112.00 =     485.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    122.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1033.30  DOWNSTREAM(FEET) =  1032.60
  FLOW LENGTH(FEET) =    35.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.14
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      21.40
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    7.99
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    122.00 =     520.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    122.00 TO NODE    122.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```


Assumed INV elevations not labeled on plan.

Plan indicates 135'

```
==============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.99
  RAINFALL INTENSITY(INCH/HR) =   4.36
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       5.40
  TOTAL STREAM AREA(ACRES) =       5.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      21.40

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    121.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   225.00
  ELEVATION DATA: UPSTREAM(FEET) =   1041.23  DOWNSTREAM(FEET) =   1037.05

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.888
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.234
  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      0.74      0.100    52    5.89
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      9.52
  TOTAL AREA(ACRES) =      2.05   PEAK FLOW RATE(CFS) =      9.52

****************************************************************************
  FLOW PROCESS FROM NODE    121.00 TO NODE    122.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1035.00  DOWNSTREAM(FEET) =  1032.60
  FLOW LENGTH(FEET) =    20.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.12
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.52
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    5.91
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    122.00 =     245.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    122.00 TO NODE    122.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.91
  RAINFALL INTENSITY(INCH/HR) =   5.22
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       2.05
  TOTAL STREAM AREA(ACRES) =       2.05
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       9.52

  ** CONFLUENCE DATA **
   STREAM       Q      Tc    Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
      1       20.97    5.96    5.195  0.74( 0.07) 0.10        4.4     110.00
      1       21.40    7.99    4.359  0.74( 0.07) 0.10        5.4     100.00
      2        9.52    5.91    5.225  0.74( 0.07) 0.10        2.0     120.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc    Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
      1       30.41    5.91    5.225  0.74( 0.07) 0.10        6.4     120.00
      2       30.43    5.96    5.195  0.74( 0.07) 0.10        6.5     110.00
      3       29.32    7.99    4.359  0.74( 0.07) 0.10        7.4     100.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      30.43    Tc(MIN.) =     5.96
  EFFECTIVE AREA(ACRES) =       6.48   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        7.4
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    122.00 =     520.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    122.00 TO NODE    132.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1032.60  DOWNSTREAM(FEET) =  1032.00
  FLOW LENGTH(FEET) =   135.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.7 INCHES
```

```
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.99
 ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      30.43
 PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =    6.28
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    132.00 =     655.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    132.00 TO NODE    132.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    6.28
 RAINFALL INTENSITY(INCH/HR) =   5.03
 AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.74
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       6.48
 TOTAL STREAM AREA(ACRES) =       7.45
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      30.43

****************************************************************************
 FLOW PROCESS FROM NODE    130.00 TO NODE    131.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   225.00
 ELEVATION DATA: UPSTREAM(FEET) =   1041.23  DOWNSTREAM(FEET) =   1037.05

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.888
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.234
 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        3.20      0.74      0.100     52    5.89
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =     14.86
 TOTAL AREA(ACRES) =      3.20   PEAK FLOW RATE(CFS) =     14.86

****************************************************************************
 FLOW PROCESS FROM NODE    131.00 TO NODE    132.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1035.00  DOWNSTREAM(FEET) =  1032.00
 FLOW LENGTH(FEET) =    20.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  15.0 INCH PIPE IS   8.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  22.16
 ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      14.86
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    5.90
 LONGEST FLOWPATH FROM NODE    130.00 TO NODE    132.00 =     245.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    132.00 TO NODE    132.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    5.90
 RAINFALL INTENSITY(INCH/HR) =   5.23
 AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.74
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       3.20
 TOTAL STREAM AREA(ACRES) =       3.20
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      14.86

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       30.41    6.23    5.061  0.74( 0.07) 0.10       6.4     120.00
     1       30.43    6.28    5.034  0.74( 0.07) 0.10       6.5     110.00
     1       29.32    8.31    4.257  0.74( 0.07) 0.10       7.4     100.00
     2       14.86    5.90    5.226  0.74( 0.07) 0.10       3.2     130.00

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       44.64    5.90    5.226  0.74( 0.07) 0.10       9.3     130.00
     2       44.79    6.23    5.061  0.74( 0.07) 0.10       9.6     120.00
     3       44.74    6.28    5.034  0.74( 0.07) 0.10       9.7     110.00
     4       41.38    8.31    4.257  0.74( 0.07) 0.10      10.6     100.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      44.79    Tc(MIN.) =     6.23
 EFFECTIVE AREA(ACRES) =       9.64   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
```

```
 TOTAL AREA(ACRES) =       10.6
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    132.00 =     655.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    132.00 TO NODE    142.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1032.00  DOWNSTREAM(FEET) =  1029.90
 FLOW LENGTH(FEET) =   530.00  MANNING'S N =  0.012
 DEPTH OF FLOW IN  39.0 INCH PIPE IS  26.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.38
 ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       44.79
 PIPE TRAVEL TIME(MIN.) =   1.20    Tc(MIN.) =    7.43
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    142.00 =    1185.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    142.00 TO NODE    142.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    7.43
 RAINFALL INTENSITY(INCH/HR) =   4.55
 AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.74
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       9.64
 TOTAL STREAM AREA(ACRES) =      10.65
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      44.79

****************************************************************************
 FLOW PROCESS FROM NODE    140.00 TO NODE    141.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
 ELEVATION DATA: UPSTREAM(FEET) =   1038.92  DOWNSTREAM(FEET) =   1032.56

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.434
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.963
 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        0.55      0.74      0.100     52    6.43
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      2.42
 TOTAL AREA(ACRES) =      0.55   PEAK FLOW RATE(CFS) =      2.42

****************************************************************************
 FLOW PROCESS FROM NODE    141.00 TO NODE    142.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1035.00  DOWNSTREAM(FEET) =  1029.90
 FLOW LENGTH(FEET) =     5.00   MANNING'S N =  0.012
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   2.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  27.12
 ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       2.42
 PIPE TRAVEL TIME(MIN.) =   0.00    Tc(MIN.) =    6.44
 LONGEST FLOWPATH FROM NODE    140.00 TO NODE    142.00 =     305.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    142.00 TO NODE    142.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    6.44
 RAINFALL INTENSITY(INCH/HR) =   4.96
 AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.74
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.55
 TOTAL STREAM AREA(ACRES) =       0.55
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.42

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       44.64    7.10    4.678  0.74( 0.07) 0.10       9.3     130.00
     1       44.79    7.43    4.554  0.74( 0.07) 0.10       9.6     120.00
     1       44.74    7.48    4.533  0.74( 0.07) 0.10       9.7     110.00
     1       41.38    9.55    3.916  0.74( 0.07) 0.10      10.6     100.00
     2        2.42    6.44    4.962  0.74( 0.07) 0.10       0.6     140.00

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
```

Seems wrong. Specify INV elevation on plan.

```
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
     1       45.38    6.44    4.962  0.74( 0.07) 0.10       9.0     140.00
     2       46.92    7.10    4.678  0.74( 0.07) 0.10       9.9     130.00
     3       47.01    7.43    4.554  0.74( 0.07) 0.10      10.2     120.00
     4       46.94    7.48    4.533  0.74( 0.07) 0.10      10.2     110.00
     5       43.28    9.55    3.916  0.74( 0.07) 0.10      11.2     100.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      47.01    Tc(MIN.) =     7.43
 EFFECTIVE AREA(ACRES) =      10.19   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =       11.2
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    142.00 =    1185.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    142.00 TO NODE    153.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1029.90  DOWNSTREAM(FEET) =  1029.30
 FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.012
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  20.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  14.47
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      47.01
 PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    7.45
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    153.00 =    1210.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    153.00 TO NODE    153.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    7.45
 RAINFALL INTENSITY(INCH/HR) =   4.54
 AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.74
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =      10.19
 TOTAL STREAM AREA(ACRES) =      11.20
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      47.01

****************************************************************************
 FLOW PROCESS FROM NODE    150.00 TO NODE    151.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   650.00
 ELEVATION DATA: UPSTREAM(FEET) =   1041.07  DOWNSTREAM(FEET) =   1036.90

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.133
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.572
 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        0.75      0.74      0.100    52   11.13
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      2.36
 TOTAL AREA(ACRES) =      0.75   PEAK FLOW RATE(CFS) =      2.36

****************************************************************************
 FLOW PROCESS FROM NODE    151.00 TO NODE    152.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  1036.80  DOWNSTREAM ELEVATION(FEET) =  1031.60
 STREET LENGTH(FEET) =   610.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.012
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0149

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.18
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.35
   HALFSTREET FLOOD WIDTH(FEET) =   15.02
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.02
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.70
 STREET FLOW TRAVEL TIME(MIN.) =   5.03   Tc(MIN.) =   16.16
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.856
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

Does not match plan.

```
  COMMERCIAL                  A        0.65      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.65      SUBAREA RUNOFF(CFS) =    1.63
  EFFECTIVE AREA(ACRES) =      1.40    AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.4         PEAK FLOW RATE(CFS) =       3.50

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  15.72
  FLOW VELOCITY(FEET/SEC.) =  2.06   DEPTH*VELOCITY(FT*FT/SEC.) =   0.73
  LONGEST FLOWPATH FROM NODE    150.00 TO NODE    152.00 =    1260.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    152.00 TO NODE    153.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1029.60  DOWNSTREAM(FEET) =  1029.30
  FLOW LENGTH(FEET) =   150.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.04
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.50
  PIPE TRAVEL TIME(MIN.) =   0.82    Tc(MIN.) =   16.98
  LONGEST FLOWPATH FROM NODE    150.00 TO NODE    153.00 =    1410.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    153.00 TO NODE    153.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   16.98
  RAINFALL INTENSITY(INCH/HR) =   2.77
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       1.40
  TOTAL STREAM AREA(ACRES) =       1.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.50

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       45.38    6.47    4.948  0.74( 0.07) 0.10       9.0     140.00
      1       46.92    7.13    4.666  0.74( 0.07) 0.10       9.9     130.00
      1       47.01    7.45    4.543  0.74( 0.07) 0.10      10.2     120.00
      1       46.94    7.51    4.523  0.74( 0.07) 0.10      10.2     110.00
      1       43.28    9.58    3.909  0.74( 0.07) 0.10      11.2     100.00
      2        3.50   16.98    2.772  0.74( 0.07) 0.10       1.4     150.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       47.79    6.47    4.948  0.74( 0.07) 0.10       9.5     140.00
      2       49.42    7.13    4.666  0.74( 0.07) 0.10      10.4     130.00
      3       49.56    7.45    4.543  0.74( 0.07) 0.10      10.8     120.00
      4       49.50    7.51    4.523  0.74( 0.07) 0.10      10.8     110.00
      5       46.09    9.58    3.909  0.74( 0.07) 0.10      12.0     100.00
      6       33.96   16.98    2.772  0.74( 0.07) 0.10      12.6     150.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      49.56    Tc(MIN.) =     7.45
  EFFECTIVE AREA(ACRES) =      10.80   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =      12.6
  LONGEST FLOWPATH FROM NODE    150.00 TO NODE    153.00 =    1410.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    153.00 TO NODE    154.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1029.30  DOWNSTREAM(FEET) =  1029.29
  FLOW LENGTH(FEET) =     8.00   MANNING'S N =  0.012
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  36.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.85
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      49.56
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    7.48
  LONGEST FLOWPATH FROM NODE    150.00 TO NODE    154.00 =    1418.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    154.00 TO NODE    154.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.48
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.533
  SUBAREA LOSS RATE DATA(AMC III):
```

```
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  A        0.35      0.74      0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.35     SUBAREA RUNOFF(CFS) =     1.40
  EFFECTIVE AREA(ACRES) =    11.15   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       12.9      PEAK FLOW RATE(CFS) =      49.56
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       12.9  TC(MIN.) =      7.48
  EFFECTIVE AREA(ACRES) =     11.15  AREA-AVERAGED Fm(INCH/HR)=  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap = 0.100
  PEAK FLOW RATE(CFS)   =      49.56

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       47.79    6.49    4.936  0.74( 0.07) 0.10       9.9     140.00
      2       49.42    7.16    4.656  0.74( 0.07) 0.10      10.8     130.00
      3       49.56    7.48    4.533  0.74( 0.07) 0.10      11.2     120.00
      4       49.50    7.54    4.513  0.74( 0.07) 0.10      11.2     110.00
      5       46.09    9.61    3.902  0.74( 0.07) 0.10      12.3     100.00
      6       33.96   17.01    2.769  0.74( 0.07) 0.10      12.9     150.00
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

♀

APPENDIX C

DETENTION CALCULATIONS

3569 TRUCK YARD STORAGE

Elevation	Depth (feet)	Area (sq. ft.)	Volume (c.f.)	Σ Volume (c.f.)	Σ Volume (ac-ft)	Q Discharge * (cfs)
1037.20	0.00	2,688				
			1,877	1,877	0.043	11.6
1037.40	0.20	16,077				
			5,199	7,075	0.162	12.2
1037.60	0.40	35,913				
			8,460	15,535	0.357	12.8
1037.80	0.60	48,686				
			10,421	25,956	0.596	13.3
1038.00	0.80	55,522				

* ORIFICE EQUATION USED FOR DISCHARGE Q's.
18" PIPE WITH 1.5 FT. COVER AND PONDING IN TRUCK YARD

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

          F L O O D   R O U T I N G   A N A L Y S I S
       USING COUNTY HYDROLOGY MANUAL OF SAN BERNARDINO(1986)
       (c) Copyright 1989-2016 Advanced Engineering Software (aes)
           Ver. 23.0  Release Date: 07/01/2016  License ID 1435

                      Analysis prepared by:



 ************************* DESCRIPTION OF STUDY *************************
* TEI JOB NO 3569                                                       *
* PROPOSED CONDITION                                                    *
* 100 YEAR STORM EVENT                                                  *
 ************************************************************************

  FILE NAME: W:\3569\BASIN.DAT
  TIME/DATE OF STUDY: 15:46 06/11/2018

**************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    132.00 IS CODE =   1
--------------------------------------------------------------------------
  >>>>>SUBAREA RUNOFF (UNIT-HYDROGRAPH ANALYSIS)<<<<<
==========================================================================

      (UNIT-HYDROGRAPH ADDED TO STREAM #1)

         WATERSHED AREA =      10.650 ACRES
         BASEFLOW =  44.790 CFS/SQUARE-MILE
         *USER ENTERED "LAG" TIME =    0.100 HOURS
          CAUTION: LAG TIME IS LESS THAN 0.50 HOURS.
          THE 5-MINUTE PERIOD UH MODEL (USED IN THIS COMPUTER PROGRAM)
          MAY BE TOO LARGE FOR PEAK FLOW ESTIMATES.
         VALLEY(DEVELOPED) S-GRAPH SELECTED
         MAXIMUM WATERSHED LOSS RATE(INCH/HOUR) =  0.042
         LOW LOSS FRACTION = 0.066
         *HYDROGRAPH MODEL #1 SPECIFIED*

         SPECIFIED PEAK  5-MINUTES RAINFALL(INCH)=  0.47
         SPECIFIED PEAK 30-MINUTES RAINFALL(INCH)=  0.97
         SPECIFIED PEAK  1-HOUR RAINFALL(INCH) =  1.30
         SPECIFIED PEAK  3-HOUR RAINFALL(INCH) =  2.30
         SPECIFIED PEAK  6-HOUR RAINFALL(INCH) =  3.30
         SPECIFIED PEAK 24-HOUR RAINFALL(INCH) =  6.80

         PRECIPITATION DEPTH-AREA REDUCTION FACTORS:
           5-MINUTE FACTOR = 1.000
          30-MINUTE FACTOR = 1.000
           1-HOUR FACTOR = 1.000
           3-HOUR FACTOR = 1.000
           6-HOUR FACTOR = 1.000
          24-HOUR FACTOR = 1.000

         UNIT HYDROGRAPH TIME UNIT =    5.000 MINUTES
         UNIT INTERVAL PERCENTAGE OF LAG-TIME =  83.333


==========================================================================
                    UNIT HYDROGRAPH DETERMINATION
--------------------------------------------------------------------------
     INTERVAL          "S" GRAPH          UNIT HYDROGRAPH
      NUMBER          MEAN VALUES          ORDINATES(CFS)
--------------------------------------------------------------------------
          1              12.091               15.573
          2              66.357               69.894
          3              94.973               36.857
          4              99.026                5.220
          5              99.610                0.753
          6              99.903                0.376
          7             100.000                0.125


--------------------------------------------------------------------------
     TOTAL SOIL-LOSS VOLUME(ACRE-FEET) =        0.3587
     TOTAL STORM RUNOFF VOLUME(ACRE-FEET) =     7.1824
--------------------------------------------------------------------------
+
==========================================================================

                    2 4 - H O U R   S T O R M
                  R U N O F F   H Y D R O G R A P H

==========================================================================
              HYDROGRAPH IN FIVE-MINUTE UNIT INTERVALS(CFS)
         (Note: Time indicated is at END of Each Unit Intervals)
--------------------------------------------------------------------------
 TIME(HRS) VOLUME(AF)   Q(CFS) 0.       12.5       25.0       37.5       50.0
--------------------------------------------------------------------------
   0.083      0.0064      0.92  Q        .          .          .          .
   0.167      0.0183      1.73  VQ       .          .          .          .
```

0.250	0.0331	2.16	VQ	.	.	.	.
0.333	0.0484	2.22	VQ	.	.	.	.
0.417	0.0638	2.23	VQ	.	.	.	.
0.500	0.0792	2.24	VQ	.	.	.	.
0.583	0.0947	2.24	VQ	.	.	.	.
0.667	0.1102	2.25	VQ	.	.	.	.
0.750	0.1257	2.25	VQ	.	.	.	.
0.833	0.1412	2.26	VQ	.	.	.	.
0.917	0.1568	2.26	VQ	.	.	.	.
1.000	0.1724	2.26	VQ	.	.	.	.
1.083	0.1880	2.27	.Q	.	.	.	.
1.167	0.2037	2.27	.Q	.	.	.	.
1.250	0.2193	2.28	.Q	.	.	.	.
1.333	0.2350	2.28	.Q	.	.	.	.
1.417	0.2508	2.28	.Q	.	.	.	.
1.500	0.2665	2.29	.Q	.	.	.	.
1.583	0.2823	2.29	.Q	.	.	.	.
1.667	0.2982	2.30	.Q	.	.	.	.
1.750	0.3140	2.30	.Q	.	.	.	.
1.833	0.3299	2.31	.Q	.	.	.	.
1.917	0.3458	2.31	.Q	.	.	.	.
2.000	0.3618	2.32	.QV	.	.	.	.
2.083	0.3777	2.32	.QV	.	.	.	.
2.167	0.3937	2.32	.QV	.	.	.	.
2.250	0.4098	2.33	.QV	.	.	.	.
2.333	0.4258	2.33	.QV	.	.	.	.
2.417	0.4419	2.34	.QV	.	.	.	.
2.500	0.4581	2.34	.QV	.	.	.	.
2.583	0.4742	2.35	.QV	.	.	.	.
2.667	0.4904	2.35	.QV	.	.	.	.
2.750	0.5067	2.36	.QV	.	.	.	.
2.833	0.5229	2.36	.QV	.	.	.	.
2.917	0.5392	2.37	.Q V	.	.	.	.
3.000	0.5555	2.37	.Q V	.	.	.	.
3.083	0.5719	2.38	.Q V	.	.	.	.
3.167	0.5883	2.38	.Q V	.	.	.	.
3.250	0.6047	2.39	.Q V	.	.	.	.
3.333	0.6212	2.39	.Q V	.	.	.	.
3.417	0.6377	2.40	.Q V	.	.	.	.
3.500	0.6542	2.40	.Q V	.	.	.	.
3.583	0.6708	2.41	.Q V	.	.	.	.
3.667	0.6874	2.41	.Q V	.	.	.	.
3.750	0.7041	2.42	.Q V	.	.	.	.
3.833	0.7208	2.42	.Q V	.	.	.	.
3.917	0.7375	2.43	.Q V	.	.	.	.
4.000	0.7542	2.43	.Q V	.	.	.	.
4.083	0.7710	2.44	.Q V	.	.	.	.
4.167	0.7879	2.44	.Q V	.	.	.	.
4.250	0.8047	2.45	.Q V	.	.	.	.
4.333	0.8217	2.46	.Q V	.	.	.	.
4.417	0.8386	2.46	.Q V	.	.	.	.
4.500	0.8556	2.47	.Q V	.	.	.	.
4.583	0.8726	2.47	.Q V	.	.	.	.
4.667	0.8897	2.48	.Q V	.	.	.	.
4.750	0.9068	2.49	.Q V	.	.	.	.
4.833	0.9240	2.49	.Q V	.	.	.	.
4.917	0.9412	2.50	.Q V	.	.	.	.
5.000	0.9585	2.50	. Q V	.	.	.	.
5.083	0.9757	2.51	. Q V	.	.	.	.
5.167	0.9931	2.52	. Q V	.	.	.	.
5.250	1.0105	2.52	. Q V	.	.	.	.
5.333	1.0279	2.53	. Q V	.	.	.	.
5.417	1.0453	2.54	. Q V	.	.	.	.
5.500	1.0629	2.54	. Q V	.	.	.	.
5.583	1.0804	2.55	. Q V	.	.	.	.
5.667	1.0980	2.56	. Q V	.	.	.	.
5.750	1.1157	2.56	. Q V	.	.	.	.
5.833	1.1334	2.57	. Q V	.	.	.	.
5.917	1.1511	2.58	. Q V	.	.	.	.
6.000	1.1689	2.59	. Q V	.	.	.	.
6.083	1.1868	2.59	. Q V	.	.	.	.
6.167	1.2047	2.60	. Q V	.	.	.	.
6.250	1.2227	2.61	. Q V	.	.	.	.
6.333	1.2407	2.61	. Q V	.	.	.	.
6.417	1.2587	2.62	. Q V	.	.	.	.
6.500	1.2768	2.63	. Q V	.	.	.	.
6.583	1.2950	2.64	. Q V	.	.	.	.
6.667	1.3132	2.65	. Q V	.	.	.	.
6.750	1.3315	2.65	. Q V	.	.	.	.
6.833	1.3498	2.66	. Q V	.	.	.	.
6.917	1.3682	2.67	. Q V	.	.	.	.
7.000	1.3866	2.68	. Q V	.	.	.	.
7.083	1.4052	2.69	. Q V	.	.	.	.
7.167	1.4237	2.70	. Q V	.	.	.	.
7.250	1.4423	2.70	. Q V	.	.	.	.
7.333	1.4610	2.71	. Q V	.	.	.	.
7.417	1.4798	2.72	. Q V	.	.	.	.
7.500	1.4986	2.73	. Q V	.	.	.	.
7.583	1.5174	2.74	. Q V	.	.	.	.
7.667	1.5364	2.75	. Q V	.	.	.	.
7.750	1.5554	2.76	. Q V	.	.	.	.
7.833	1.5744	2.77	. Q V	.	.	.	.
7.917	1.5936	2.78	. Q V	.	.	.	.
8.000	1.6128	2.79	. Q V	.	.	.	.
8.083	1.6320	2.80	. Q V.	.	.	.	.
8.167	1.6514	2.81	. Q V.	.	.	.	.
8.250	1.6708	2.82	. Q V.	.	.	.	.
8.333	1.6903	2.83	. Q V.	.	.	.	.

8.417	1.7098	2.84	. Q V. . . .
8.500	1.7295	2.85	. Q V. . . .
8.583	1.7492	2.86	. Q V. . . .
8.667	1.7689	2.87	. Q V. . . .
8.750	1.7888	2.88	. Q V. . . .
8.833	1.8088	2.90	. Q V . . .
8.917	1.8288	2.91	. Q V . . .
9.000	1.8489	2.92	. Q V . . .
9.083	1.8691	2.93	. Q V . . .
9.167	1.8894	2.94	. Q V . . .
9.250	1.9097	2.96	. Q V . . .
9.333	1.9302	2.97	. Q V . . .
9.417	1.9507	2.98	. Q V . . .
9.500	1.9713	3.00	. Q V . . .
9.583	1.9921	3.01	. Q .V . . .
9.667	2.0129	3.02	. Q .V . . .
9.750	2.0338	3.04	. Q .V . . .
9.833	2.0548	3.05	. Q .V . . .
9.917	2.0759	3.07	. Q .V . . .
10.000	2.0972	3.08	. Q .V . . .
10.083	2.1185	3.10	. Q .V . . .
10.167	2.1399	3.11	. Q .V . . .
10.250	2.1615	3.13	. Q . V . . .
10.333	2.1831	3.14	. Q . V . . .
10.417	2.2049	3.16	. Q . V . . .
10.500	2.2268	3.18	. Q . V . . .
10.583	2.2488	3.19	. Q . V . . .
10.667	2.2709	3.21	. Q . V . . .
10.750	2.2931	3.23	. Q . V . . .
10.833	2.3155	3.25	. Q . V . . .
10.917	2.3380	3.27	. Q . V . . .
11.000	2.3607	3.29	. Q . V . . .
11.083	2.3834	3.31	. Q . V . . .
11.167	2.4064	3.33	. Q . V . . .
11.250	2.4294	3.35	. Q . V . . .
11.333	2.4526	3.37	. Q . V . . .
11.417	2.4760	3.39	. Q . V . . .
11.500	2.4995	3.41	. Q . V . . .
11.583	2.5232	3.44	. Q . V . . .
11.667	2.5470	3.46	. Q . V . . .
11.750	2.5710	3.48	. Q . V . . .
11.833	2.5952	3.51	. Q . V . . .
11.917	2.6195	3.54	. Q . V . . .
12.000	2.6441	3.56	. Q . V . . .
12.083	2.6688	3.59	. Q . V . . .
12.167	2.6937	3.62	. Q . V . . .
12.250	2.7188	3.64	. Q . V . . .
12.333	2.7441	3.67	. Q . V . . .
12.417	2.7696	3.70	. Q . V . . .
12.500	2.7953	3.74	. Q . V . . .
12.583	2.8213	3.77	. Q . V . . .
12.667	2.8475	3.80	. Q . V . . .
12.750	2.8739	3.84	. Q . V . . .
12.833	2.9006	3.88	. Q . V . . .
12.917	2.9276	3.91	. Q . V . . .
13.000	2.9548	3.95	. Q . V . . .
13.083	2.9823	3.99	. Q . V . . .
13.167	3.0101	4.04	. Q . V . . .
13.250	3.0382	4.08	. Q . V . . .
13.333	3.0666	4.13	. Q . V . . .
13.417	3.0954	4.18	. Q . V . . .
13.500	3.1245	4.23	. Q . V . . .
13.583	3.1540	4.28	. Q . V . . .
13.667	3.1839	4.34	. Q . V . . .
13.750	3.2141	4.39	. Q . V . . .
13.833	3.2449	4.46	. Q . V . . .
13.917	3.2760	4.52	. Q . V . . .
14.000	3.3076	4.59	. Q . V . . .
14.083	3.3397	4.66	. Q . V . . .
14.167	3.3723	4.74	. Q . V . . .
14.250	3.4055	4.81	. Q . V . . .
14.333	3.4393	4.90	. Q . V. . . .
14.417	3.4736	4.99	. Q . V. . . .
14.500	3.5088	5.10	. Q . V. . . .
14.583	3.5446	5.20	. Q . V. . . .
14.667	3.5812	5.32	. Q . V. . . .
14.750	3.6187	5.44	. Q . V . . .
14.833	3.6572	5.59	. Q . V . . .
14.917	3.6967	5.73	. Q . V . . .
15.000	3.7374	5.91	. Q . V . . .
15.083	3.7793	6.09	. Q . .V . . .
15.167	3.8228	6.31	. Q . .V . . .
15.250	3.8677	6.53	. Q . .V . . .
15.333	3.9147	6.82	. Q . .V . . .
15.417	3.9626	6.96	. Q . . V . . .
15.500	4.0085	6.66	. Q . . V . . .
15.583	4.0548	6.72	. Q . . V . . .
15.667	4.1049	7.28	. Q . . V . . .
15.750	4.1596	7.95	. Q . . V . . .
15.833	4.2209	8.89	. Q . . V . . .
15.917	4.2923	10.37	. Q . . V . . .
16.000	4.3866	13.70	. Q . . V . . .
16.083	4.5437	22.81	. . Q . V . . .
16.167	4.8248	40.81	. . . V . Q .
16.250	5.0028	25.85	. . Q V . . .
16.333	5.0828	11.62	. Q. . . V . . .
16.417	5.1387	8.12	. Q . . . V . . .
16.500	5.1902	7.47	. Q . . . V . . .

16.583	5.2381	6.96	. Q	. V. .
16.667	5.2822	6.40	. Q	. V. .
16.750	5.3234	5.98	. Q	. V. .
16.833	5.3623	5.65	. Q	. V. .
16.917	5.3993	5.37	. Q	. V .
17.000	5.4347	5.14	. Q	. V .
17.083	5.4687	4.94	. Q	. V .
17.167	5.5016	4.77	. Q	. V .
17.250	5.5334	4.62	. Q	. V .
17.333	5.5643	4.48	. Q	. V .
17.417	5.5943	4.36	. Q	. .V .
17.500	5.6235	4.25	. Q	. .V .
17.583	5.6521	4.15	. Q	. .V .
17.667	5.6800	4.05	. Q	. .V .
17.750	5.7073	3.97	. Q	. .V .
17.833	5.7341	3.89	. Q	. .V .
17.917	5.7604	3.82	. Q	. . V .
18.000	5.7862	3.75	. Q	. . V .
18.083	5.8116	3.69	. Q	. . V .
18.167	5.8366	3.63	. Q	. . V .
18.250	5.8612	3.57	. Q	. . V .
18.333	5.8854	3.52	. Q	. . V .
18.417	5.9093	3.47	. Q	. . V .
18.500	5.9329	3.42	. Q	. . V .
18.583	5.9562	3.38	. Q	. . V .
18.667	5.9791	3.34	. Q	. . V .
18.750	6.0018	3.29	. Q	. . V .
18.833	6.0242	3.26	. Q	. . V .
18.917	6.0464	3.22	. Q	. . V .
19.000	6.0683	3.18	. Q	. . V .
19.083	6.0900	3.15	. Q	. . V .
19.167	6.1115	3.12	. Q	. . V .
19.250	6.1328	3.09	. Q	. . V .
19.333	6.1538	3.06	. Q	. . V .
19.417	6.1747	3.03	. Q	. . V .
19.500	6.1953	3.00	. Q	. . V .
19.583	6.2158	2.97	. Q	. . V .
19.667	6.2361	2.95	. Q	. . V .
19.750	6.2563	2.92	. Q	. . V .
19.833	6.2762	2.90	. Q	. . V .
19.917	6.2961	2.88	. Q	. . V .
20.000	6.3157	2.85	. Q	. . V .
20.083	6.3352	2.83	. Q	. . V .
20.167	6.3546	2.81	. Q	. . V .
20.250	6.3738	2.79	. Q	. . V .
20.333	6.3929	2.77	. Q	. . V .
20.417	6.4119	2.75	. Q	. . V .
20.500	6.4307	2.73	. Q	. . V .
20.583	6.4494	2.72	. Q	. . V .
20.667	6.4680	2.70	. Q	. . V .
20.750	6.4864	2.68	. Q	. . V .
20.833	6.5048	2.66	. Q	. . V .
20.917	6.5230	2.65	. Q	. . V .
21.000	6.5412	2.63	. Q	. . V .
21.083	6.5592	2.62	. Q	. . V .
21.167	6.5771	2.60	. Q	. . V .
21.250	6.5949	2.59	. Q	. . V .
21.333	6.6126	2.57	. Q	. . V .
21.417	6.6303	2.56	. Q	. . V .
21.500	6.6478	2.55	. Q	. . V .
21.583	6.6652	2.53	. Q	. . V .
21.667	6.6826	2.52	. Q	. . V .
21.750	6.6998	2.51	. Q	. . V .
21.833	6.7170	2.49	.Q	. . V .
21.917	6.7341	2.48	.Q	. . V .
22.000	6.7511	2.47	.Q	. . V .
22.083	6.7680	2.46	.Q	. . V .
22.167	6.7849	2.45	.Q	. . V .
22.250	6.8017	2.44	.Q	. . V .
22.333	6.8184	2.42	.Q	. . V .
22.417	6.8350	2.41	.Q	. . V .
22.500	6.8515	2.40	.Q	. . V .
22.583	6.8680	2.39	.Q	. . V .
22.667	6.8844	2.38	.Q	. . V .
22.750	6.9008	2.37	.Q	. . V .
22.833	6.9170	2.36	.Q	. . V .
22.917	6.9332	2.35	.Q	. . V .
23.000	6.9494	2.34	.Q	. . V .
23.083	6.9655	2.33	.Q	. . V .
23.167	6.9815	2.33	.Q	. . V .
23.250	6.9974	2.32	.Q	. . V .
23.333	7.0133	2.31	.Q	. . V.
23.417	7.0292	2.30	.Q	. . V.
23.500	7.0449	2.29	.Q	. . V.
23.583	7.0607	2.28	.Q	. . V.
23.667	7.0763	2.27	.Q	. . V.
23.750	7.0919	2.27	.Q	. . V.
23.833	7.1075	2.26	.Q	. . V.
23.917	7.1230	2.25	.Q	. . V.
24.000	7.1384	2.24	.Q	. . V.
24.083	7.1526	2.06	.Q	. . V.
24.167	7.1612	1.25	Q	. . V.
24.250	7.1668	0.82	Q	. . V.
24.333	7.1720	0.76	Q	. . V.
24.417	7.1772	0.75	Q	. . V.
24.500	7.1824	0.75	Q	. . V

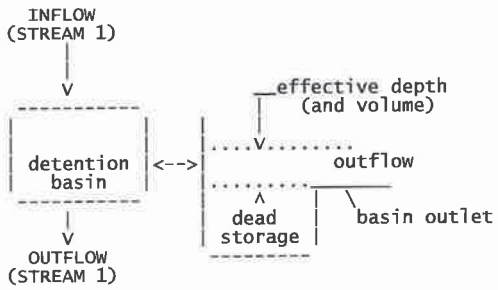
TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:

(Note: 100% of Peak Flow Rate estimate assumed to have an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1470.0
10%	260.0
20%	35.0
30%	20.0
40%	15.0
50%	15.0
60%	10.0
70%	5.0
80%	5.0
90%	5.0

****
FLOW PROCESS FROM NODE 132.00 TO NODE 132.00 IS CODE = 3.1

>>>>>FLOW-THROUGH DETENTION BASIN ROUTING MODEL APPLIED TO STREAM #1<<<<<



ROUTE RUNOFF HYDROGRAPH FROM STREAM NUMBER 1
THROUGH A FLOW-THROUGH DETENTION BASIN
SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:
DEAD STORAGE(AF) = 0.000
SPECIFIED DEAD STORAGE(AF) FILLED = 0.000
SPECIFIED EFFECTIVE VOLUME(AF) FILLED ABOVE OUTLET = 0.000
DETENTION BASIN CONSTANT LOSS RATE(CFS) = 0.00

BASIN DEPTH VERSUS OUTFLOW AND STORAGE INFORMATION:

INTERVAL NUMBER	DEPTH (FT)	OUTFLOW (CFS)	STORAGE (AF)
1	0.00	0.00	0.000
2	0.20	11.60	0.043
3	0.40	12.20	0.162
4	0.60	12.80	0.357
5	0.80	13.30	0.596

MODIFIED-PULS BASIN ROUTING MODEL RESULTS(5-MINUTE COMPUTATION INTERVALS):
(Note: Computed EFFECTIVE DEPTH and VOLUME are estimated at the clock time; MEAN OUTFLOW is the average value during the unit interval.)

CLOCK TIME (HRS)	DEAD-STORAGE FILLED(AF)	INFLOW (CFS)	LOSS (CFS)	EFFECTIVE DEPTH(FT)	MEAN OUTFLOW (CFS)	EFFECTIVE VOLUME(AF)
12.083	0.000	3.59	0.00	0.06	3.6	0.013
12.167	0.000	3.62	0.00	0.06	3.6	0.013
12.250	0.000	3.64	0.00	0.06	3.6	0.013
12.333	0.000	3.67	0.00	0.06	3.7	0.014
12.417	0.000	3.70	0.00	0.06	3.7	0.014
12.500	0.000	3.74	0.00	0.06	3.7	0.014
12.583	0.000	3.77	0.00	0.06	3.8	0.014
12.667	0.000	3.80	0.00	0.07	3.8	0.014
12.750	0.000	3.84	0.00	0.07	3.8	0.014
12.833	0.000	3.88	0.00	0.07	3.9	0.014
12.917	0.000	3.91	0.00	0.07	3.9	0.014
13.000	0.000	3.95	0.00	0.07	3.9	0.015
13.083	0.000	3.99	0.00	0.07	4.0	0.015
13.167	0.000	4.04	0.00	0.07	4.0	0.015
13.250	0.000	4.08	0.00	0.07	4.1	0.015
13.333	0.000	4.13	0.00	0.07	4.1	0.015
13.417	0.000	4.18	0.00	0.07	4.2	0.015
13.500	0.000	4.23	0.00	0.07	4.2	0.016
13.583	0.000	4.28	0.00	0.07	4.3	0.016
13.667	0.000	4.34	0.00	0.07	4.3	0.016
13.750	0.000	4.39	0.00	0.08	4.4	0.016
13.833	0.000	4.46	0.00	0.08	4.4	0.017
13.917	0.000	4.52	0.00	0.08	4.5	0.017
14.000	0.000	4.59	0.00	0.08	4.6	0.017
14.083	0.000	4.66	0.00	0.08	4.6	0.017
14.167	0.000	4.74	0.00	0.08	4.7	0.018
14.250	0.000	4.81	0.00	0.08	4.8	0.018

14.333	0.000	4.90	0.00	0.08	4.9	0.018
14.417	0.000	4.99	0.00	0.09	4.9	0.018
14.500	0.000	5.10	0.00	0.09	5.0	0.019
14.583	0.000	5.20	0.00	0.09	5.1	0.019
14.667	0.000	5.32	0.00	0.09	5.3	0.020
14.750	0.000	5.44	0.00	0.09	5.4	0.020
14.833	0.000	5.59	0.00	0.10	5.5	0.021
14.917	0.000	5.73	0.00	0.10	5.7	0.021
15.000	0.000	5.91	0.00	0.10	5.8	0.022
15.083	0.000	6.09	0.00	0.10	6.0	0.023
15.167	0.000	6.31	0.00	0.11	6.2	0.023
15.250	0.000	6.53	0.00	0.11	6.4	0.024
15.333	0.000	6.82	0.00	0.12	6.7	0.025
15.417	0.000	6.96	0.00	0.12	6.9	0.026
15.500	0.000	6.66	0.00	0.12	6.8	0.025
15.583	0.000	6.72	0.00	0.12	6.7	0.025
15.667	0.000	7.28	0.00	0.13	7.0	0.027
15.750	0.000	7.95	0.00	0.14	7.6	0.029
15.833	0.000	8.89	0.00	0.15	8.4	0.033
15.917	0.000	10.37	0.00	0.18	9.6	0.038
16.000	0.000	13.70	0.00	0.22	11.0	0.057
16.083	0.000	22.81	0.00	0.35	11.9	0.132
16.167	0.000	40.81	0.00	0.57	12.4	0.328
16.250	0.000	25.85	0.00	0.65	12.8	0.418
16.333	0.000	11.62	0.00	0.64	12.9	0.409
16.417	0.000	8.12	0.00	0.62	12.9	0.376
16.500	0.000	7.47	0.00	0.58	12.8	0.339
16.583	0.000	6.96	0.00	0.54	12.7	0.300
16.667	0.000	6.40	0.00	0.50	12.6	0.258
16.750	0.000	5.98	0.00	0.45	12.4	0.213
16.833	0.000	5.65	0.00	0.41	12.3	0.167
16.917	0.000	5.37	0.00	0.33	12.1	0.121
17.000	0.000	5.14	0.00	0.25	11.9	0.075
17.083	0.000	4.94	0.00	0.16	10.7	0.035
17.167	0.000	4.77	0.00	0.09	7.2	0.018
17.250	0.000	4.62	0.00	0.08	4.8	0.017
17.333	0.000	4.48	0.00	0.08	4.6	0.017
17.417	0.000	4.36	0.00	0.08	4.4	0.016
17.500	0.000	4.25	0.00	0.07	4.3	0.016
17.583	0.000	4.15	0.00	0.07	4.2	0.015
17.667	0.000	4.05	0.00	0.07	4.1	0.015
17.750	0.000	3.97	0.00	0.07	4.0	0.015
17.833	0.000	3.89	0.00	0.07	3.9	0.014
17.917	0.000	3.82	0.00	0.07	3.9	0.014
18.000	0.000	3.75	0.00	0.06	3.8	0.014
18.083	0.000	3.69	0.00	0.06	3.7	0.014
18.167	0.000	3.63	0.00	0.06	3.7	0.013
18.250	0.000	3.57	0.00	0.06	3.6	0.013
18.333	0.000	3.52	0.00	0.06	3.5	0.013
18.417	0.000	3.47	0.00	0.06	3.5	0.013
18.500	0.000	3.42	0.00	0.06	3.4	0.013
18.583	0.000	3.38	0.00	0.06	3.4	0.013
18.667	0.000	3.34	0.00	0.06	3.4	0.012
18.750	0.000	3.29	0.00	0.06	3.3	0.012
18.833	0.000	3.26	0.00	0.06	3.3	0.012
18.917	0.000	3.22	0.00	0.06	3.2	0.012
19.000	0.000	3.18	0.00	0.05	3.2	0.012
19.083	0.000	3.15	0.00	0.05	3.2	0.012
19.167	0.000	3.12	0.00	0.05	3.1	0.012
19.250	0.000	3.09	0.00	0.05	3.1	0.011
19.333	0.000	3.06	0.00	0.05	3.1	0.011
19.417	0.000	3.03	0.00	0.05	3.0	0.011
19.500	0.000	3.00	0.00	0.05	3.0	0.011
19.583	0.000	2.97	0.00	0.05	3.0	0.011
19.667	0.000	2.95	0.00	0.05	3.0	0.011
19.750	0.000	2.92	0.00	0.05	2.9	0.011
19.833	0.000	2.90	0.00	0.05	2.9	0.011
19.917	0.000	2.88	0.00	0.05	2.9	0.011

PROCESS SUMMARY OF STORAGE:
INFLOW VOLUME = 7.182 AF
BASIN STORAGE = 0.000 AF (WITH 0.000 AF INITIALLY FILLED)
OUTFLOW VOLUME = 7.182 AF
LOSS VOLUME = 0.000 AF

END OF FLOODSCx ROUTING ANALYSIS

♀

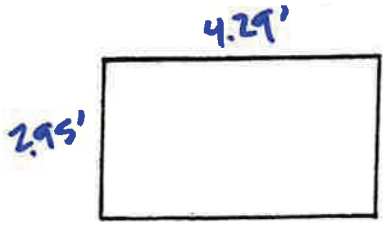
APPENDIX D

CATCH BASIN CALCULATIONS

GRATE INLET CALCULATION SHEET

Grate at (H1)

Use A.P.W.A. Standard Plan No. 305-2



$Q/P = 3.0(H)^{3/2}$

P = Perimeter = 14.48'

H = Maximum depth of ponding at grate = 0.5 '

$Qmax = 3.0(P)(H)^{3/2} = 3.0(14.48)(0.5)^{3/2} =$ 15.4 cfs

Assume 50% clogging implies 7.7 cfs

Q_{100} at (141) = 2.4 cfs < 7.7 cfs

1 grate O.K.

CURB OPENING BASIN CALCULATION SHEET

Basin Located At (152)

h = height of catch basin opening 0.5 '

H = Maximum depth of ponding at catch basin .67 '

H/h = .67 '/ 0.5 ' = 1.34 '

Use Table "L" to yield 1.5 cfs/l.f.

Q 100 at (152) = 3.5 cfs

(Q100)/(Table "L" result) = 3.5 / 1.5 = 2.3 = minimum length of opening required to intercept Q.

Length of Catch Basin Recommended = 7.0 '

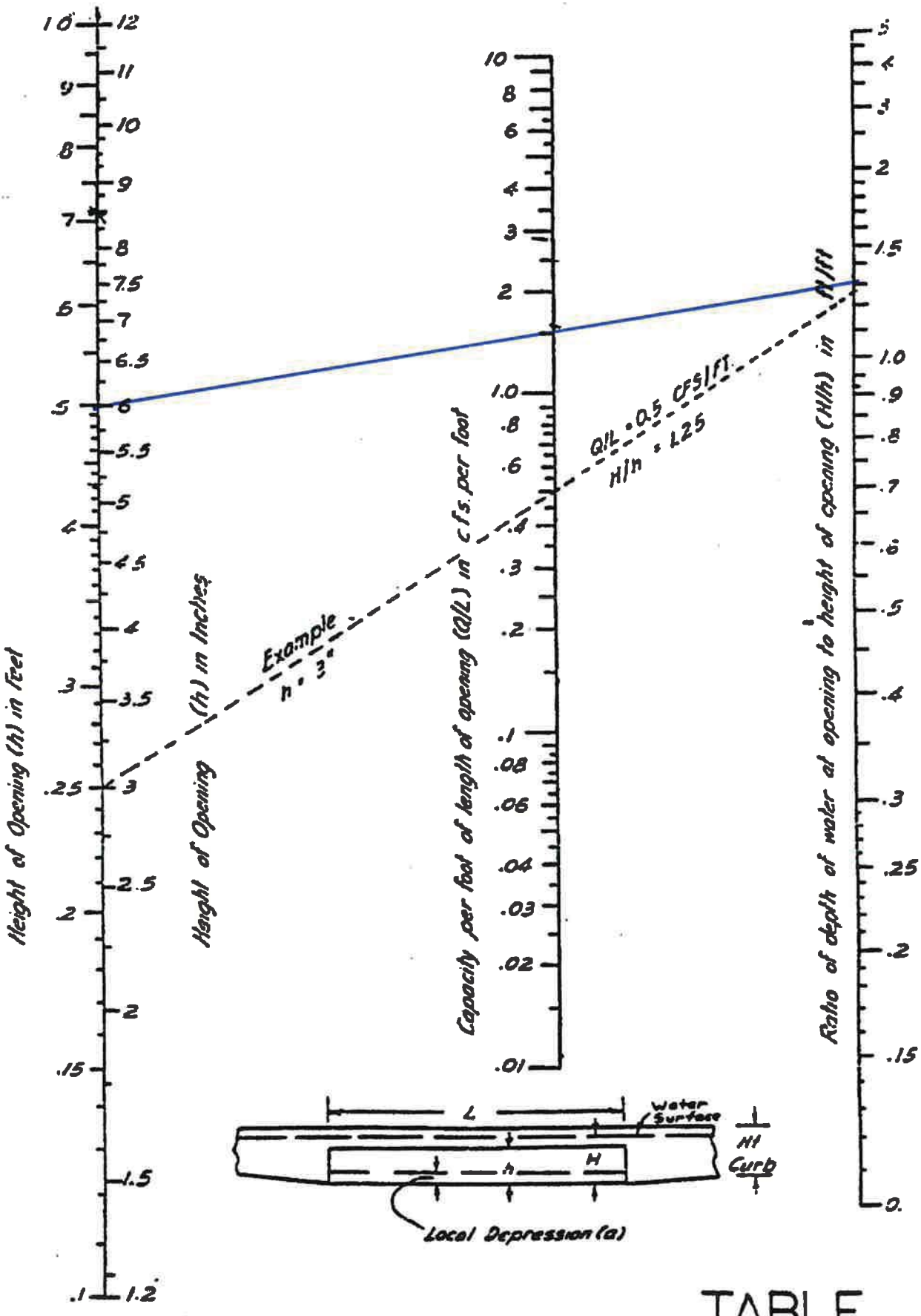


TABLE L

Bureau of Public Roads — Nomograph for capacity of curb

```
*****************************************************************************
              HYDRAULIC ELEMENTS - I  PROGRAM PACKAGE
       (C) Copyright 1982-99 Advanced Engineering Software (aes)
           Ver. 8.0  Release Date: 01/01/99  License ID 1435

                          Analysis prepared by:

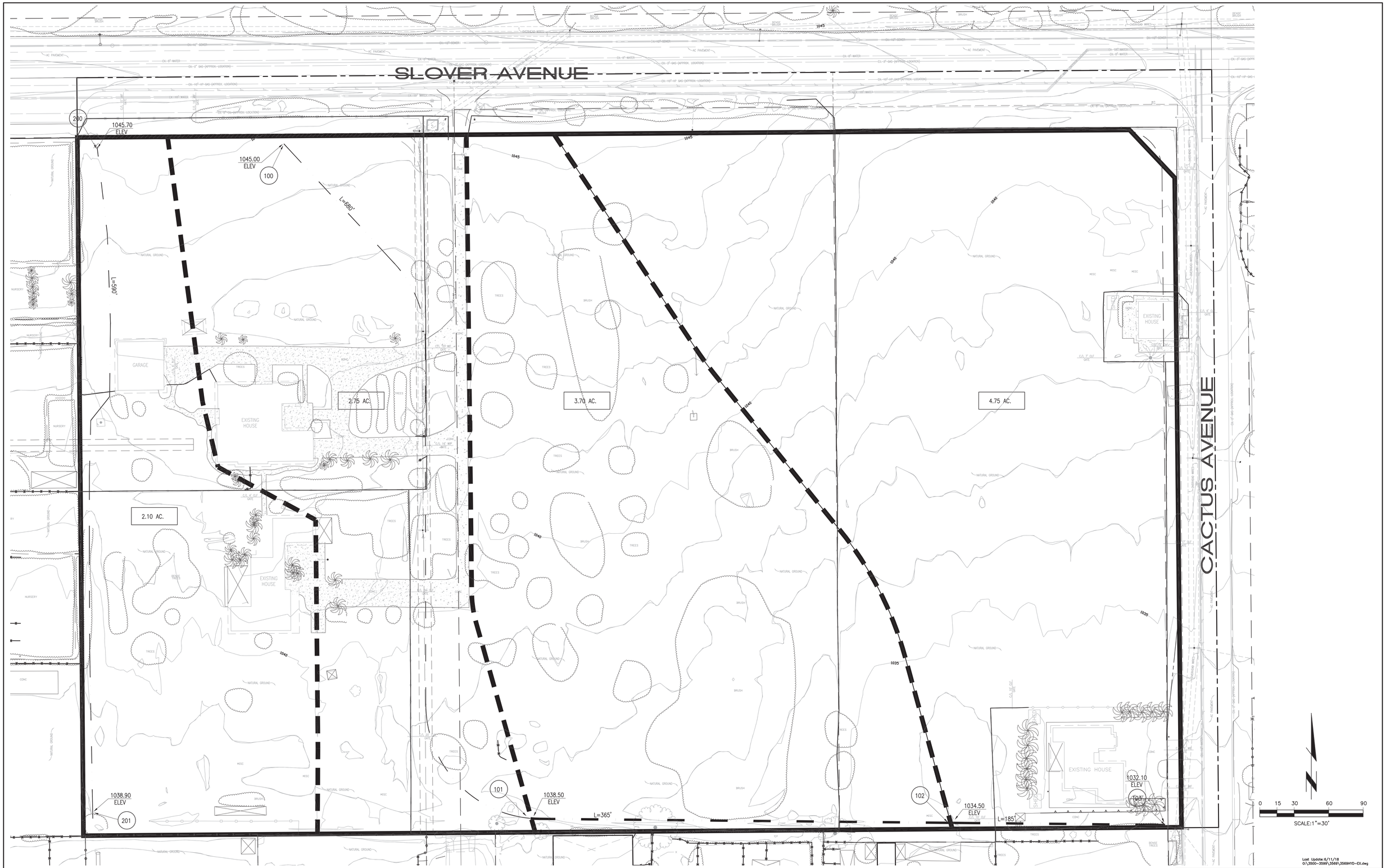
                            THIENES ENGINEERING
                          16800 VALLEY VIEW AVENUE
                            LA MIRADA CA 90638
                       PH: (714) 521-4811 FAX: (714) 521-4173

----------------------------------------------------------------------------
  TIME/DATE OF STUDY: 15:28   7/21/2017
============================================================================


 ************************* DESCRIPTION OF STUDY *************************
* TEI JOB NO 3569                                                         *
* PARKWAY CUVLERT                                                         *
* OUT TO CACTUS                                                           *
 *************************************************************************

*****************************************************************************
>>>>CHANNEL INPUT INFORMATION<<<<
----------------------------------------------------------------------------
    NORMAL DEPTH(FEET) =   0.33
    CHANNEL Z1(HORIZONTAL/VERTICAL) =     0.00
            Z2(HORIZONTAL/VERTICAL) =     0.00
    CONSTANT CHANNEL SLOPE(FEET/FEET) = 0.020000
    UNIFORM FLOW(CFS) =       18.00
    MANNINGS FRICTION FACTOR = 0.0140
============================================================================
    NORMAL-DEPTH FLOW INFORMATION:
----------------------------------------------------------------------------
    >>>>> BASEWIDTH(FEET) =     8.02
    FLOW TOP-WIDTH(FEET) =          8.02
    FLOW AREA(SQUARE FEET) =            2.65
    HYDRAULIC DEPTH(FEET) =     0.33
    FLOW AVERAGE VELOCITY(FEET/SEC.) =      6.80
    UNIFORM FROUDE NUMBER =    2.086
    PRESSURE + MOMENTUM(POUNDS) =           264.48
    AVERAGED VELOCITY HEAD(FEET) =      0.718
    SPECIFIC ENERGY(FEET) =      1.048
============================================================================
    CRITICAL-DEPTH FLOW INFORMATION:
----------------------------------------------------------------------------
    CRITICAL FLOW TOP-WIDTH(FEET) =          8.02
    CRITICAL FLOW AREA(SQUARE FEET) =            4.31
    CRITICAL FLOW HYDRAULIC DEPTH(FEET) =     0.54
    CRITICAL FLOW AVERAGE VELOCITY(FEET/SEC.) =     4.17
    CRITICAL DEPTH(FEET) =     0.54
    CRITICAL FLOW PRESSURE + MOMENTUM(POUNDS) =          217.94
    AVERAGED CRITICAL FLOW VELOCITY HEAD(FEET) =      0.271
    CRITICAL FLOW SPECIFIC ENERGY(FEET) =      0.808
============================================================================

1
```



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LEGEND

	PROJECT BOUNDARY
	SUBAREA BOUNDARY
	FLOWLINE
X.XX Ac.	SUBAREA AREA
XX	NODE NUMBER

COUNTY OF SAN BERNARDINO

PUBLIC WORKS DEPARTMENT

EXISTING HYDROLOGY MAP

ALERE SLOVER AND CACTUS

SAN BERNARDINO, CA.

3569/1 OF 1 SHEET

PREPARED FOR:

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

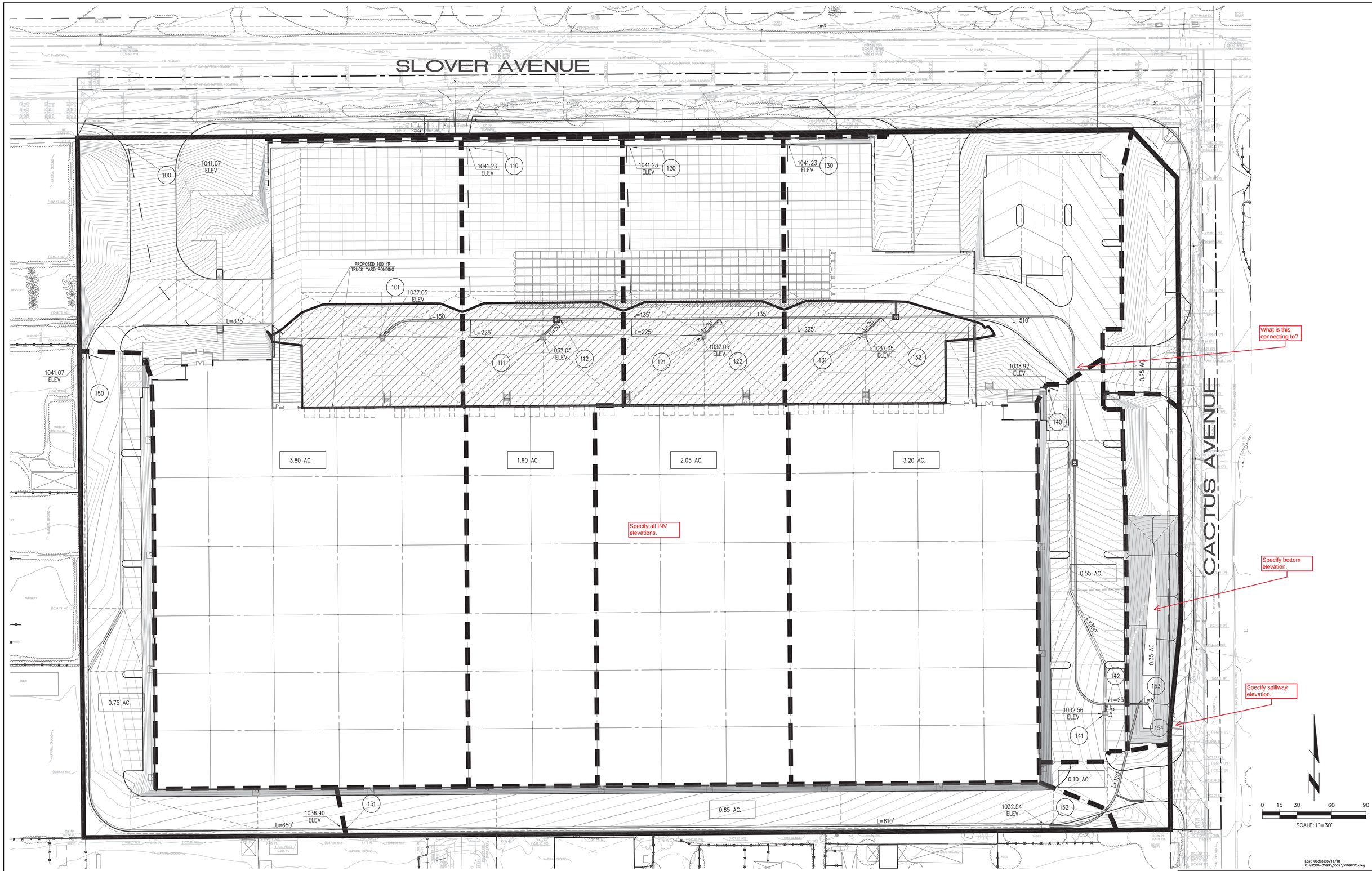
Thienes Engineering, Inc.
CIVIL ENGINEERING • LAND SURVEYING
14349 FIRESTONE BOULEVARD
LA MIRADA, CALIFORNIA 90638
PH.(714)521-4811 FAX(714)521-4173

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

Approved by _____ Date _____

Public Works Director _____ R.C.E. XXXXX

Sheet 1 of 1 Sheets



LEGEND

- PROJECT BOUNDARY
- SUBAREA BOUNDARY
- FLOWLINE
- X.XX Ac. — SUBAREA AREA
- XX — NODE NUMBER
- 100 YEAR PONDING LIMITS

Last Update: 6/11/18
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COUNTY OF SAN BERNARDINO
PUBLIC WORKS DEPARTMENT

PROPOSED HYDROLOGY MAP
ALERE SLOVER AND CACTUS
SAN BERNARDINO, CA.

PREPARED FOR:
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Sheet 1 of 1 Sheets

3569/1 OF 1 SHEET