

**PRELIMINARY HYDROLOGY  
CALCULATIONS**

FOR

**CENTER STREET INDUSTRIAL DEVELOPMENT  
CENTER STREET AT PLACENTIA LANE  
COLTON, CALIFORNIA**

PREPARED FOR

**HILLWOOD INVESTMENTS  
901 VIA PIEMONTE, SUITE 175  
ONTARIO, CALIFORNIA 91764  
PH. (909) 382-0033  
FAX (909) 382-0073**

AUGUST 4, 2017

JOB NO. 3573

PREPARED BY

**THIENES ENGINEERING  
14349 FIRESTONE BOULEVARD  
LA MIRADA, CALIFORNIA 90638  
(714) 521-4811**

**PRELIMINARY HYDROLOGY  
CALCULATIONS**

**FOR**

**CENTER STREET  
INDUSTRIAL DEVELOPMENT**

PREPARED UNDER THE  
SUPERVISION OF:

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

## INTRODUCTION

### A: PROJECT LOCATION

The project site is located on the northerly side of Center Street east of the intersection of Placentia Lane in the City of Colton. Please see next page for vicinity map.

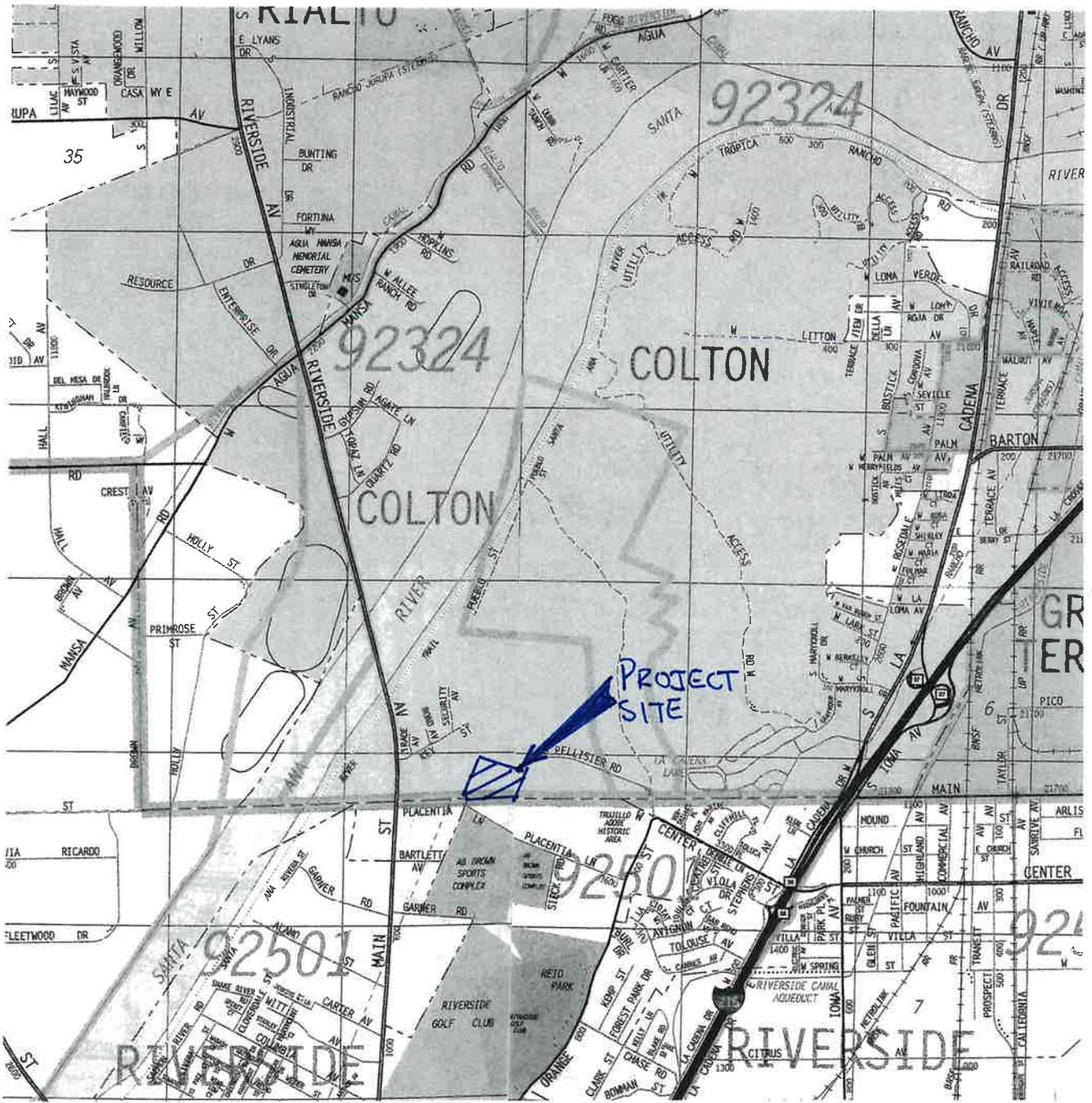
### B: STUDY PURPOSE

The purpose of this study is to determine the pre- and post-condition 100-year peak flow rate from the site that discharges to Center Street.

### C: PROJECT STAFF:

Thienes Engineering staff involved in this study include:

Reinhard Stenzel  
Brian Weil



VICINITY MAP

## DISCUSSION

The project site encompasses approximately 13.1 acres. Proposed improvements consist of one warehouse type building with approximately 237,030 square feet. Truck yard areas are located on the easterly and westerly side of the proposed building. Vehicle parking is located on the southerly sides of the building. Areas adjacent to the street and the southwesterly corner of the site will be landscaped along with smaller areas around the building.

### Existing Condition

The project site is currently a vacant dirt lot cover with native grasses and brush. The project site generally drains to the southeasterly corner of the site. Here, runoff sheet flows to Center Street. There is a low point in Center Street at the easterly property line of the project site. A gutter conveys runoff across the street at this location. Flow traverses through adjacent properties ultimately to Springbrook Channel located south of the site. The 100-year peak flow rate under existing condition is approximately 19.7 cfs.

### Proposed Condition

Runoff from the westerly half of the building and the westerly truck yard (nodes 100-111) will drain to grate inlets in the truck yard area. A storm drain conveys this flow around the building to the open space at the southeast corner of the site. Flow from the southerly parking area (nodes 120-123) is also intercepted in this storm drain system.

Runoff from the easterly half of the building and the truck yard area (nodes 130-133) will drain to grate inlets at the truck yard area. A storm drain system will convey runoff to the open space at the southeast corner of the site. The total 100-year peak flow rate at this location is approximately 33.8 cfs (undetained).

Landscaped areas adjacent to the street and a small portion of the proposed driveways (nodes 200-201) will surface drain to the street. The 100-year peak flow rate for this area is approximately 2.4 cfs

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

### Detention

The proposed 100-year peak flow rate is higher than the existing condition peak flow rate. Detention will be utilized in the truck yard areas to reduce the 100-year peak flow rates to less than that under existing conditions. Small area unit hydrographs were established for each drainage area tributary to the east and west truck yards. Discharge from each truck

yard are based on the orifice equation for a particular pipe size with the depth of ponding representing the amount of head at the grate inlet.

The following table summarizes the peak flow discharge and required volumes at each truck yard:

Truck Yard	Discharge (cfs)	Required Volume (acre-feet)	Maximum Depth (feet)
East	3.0	0.201	0.66
West	5.2	0.221	0.79

Flow from the southerly parking areas (3.5 cfs at node 122 and 0.8 cfs at node 123) will be able to discharge undetained. With onsite detention, the 100-year peak flow rate discharged from the site is approximately 12.5 cfs (3.5 cfs + 0.8 cfs + 3.0 cfs + 5.2 cfs).

Adding the discharge directly to the street (at node 201) the total 100-year peak flow rate discharged from the project site is approximately 14.9 cfs. This is approximately 76% of the existing condition 100-year peak flow rate.

See Appendix "C" for detention calculations.

#### Methodology

San Bernardino County Rational Method program (by AES Software) was used for the hydrology calculations. Small area unit hydrographs were created using AES Software's Small Area Unit Hydrograph Program. The soil type is "A" per the San Bernardino County Hydrology Manual. See in Appendix "A" for reference material from the Hydrology Manual.

APPENDIX

DESCRIPTION

A

REFERENCE MATERIALS

B

HYDROLOGY CALCULATIONS

C

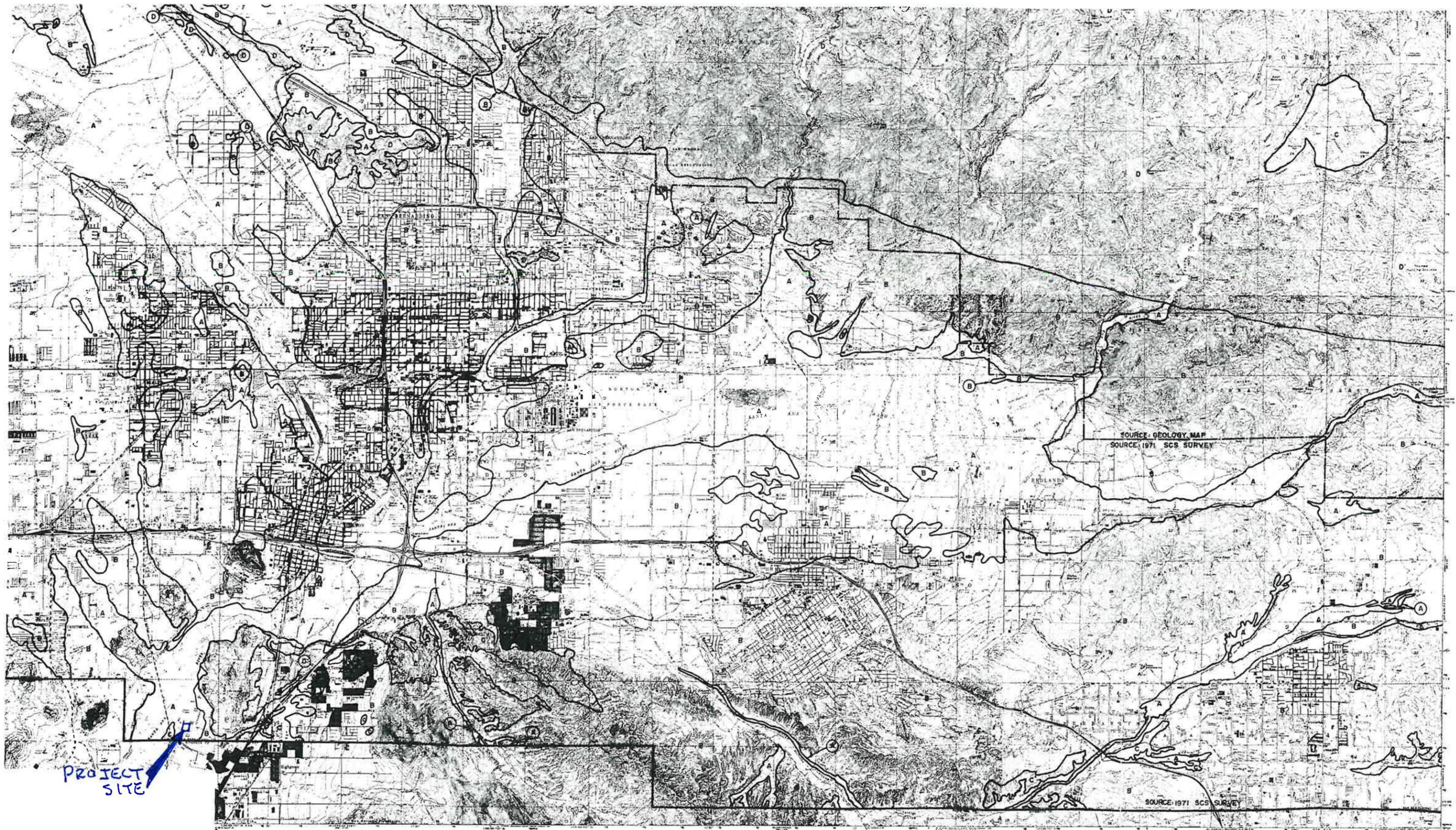
DETENTION CALCULATIONS

D

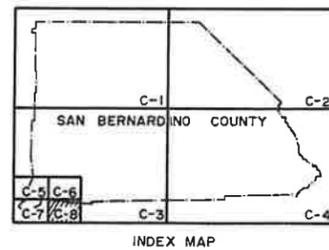
HYDROLOGY MAP

# **APPENDIX A**

## **REFERENCE MATERIALS**



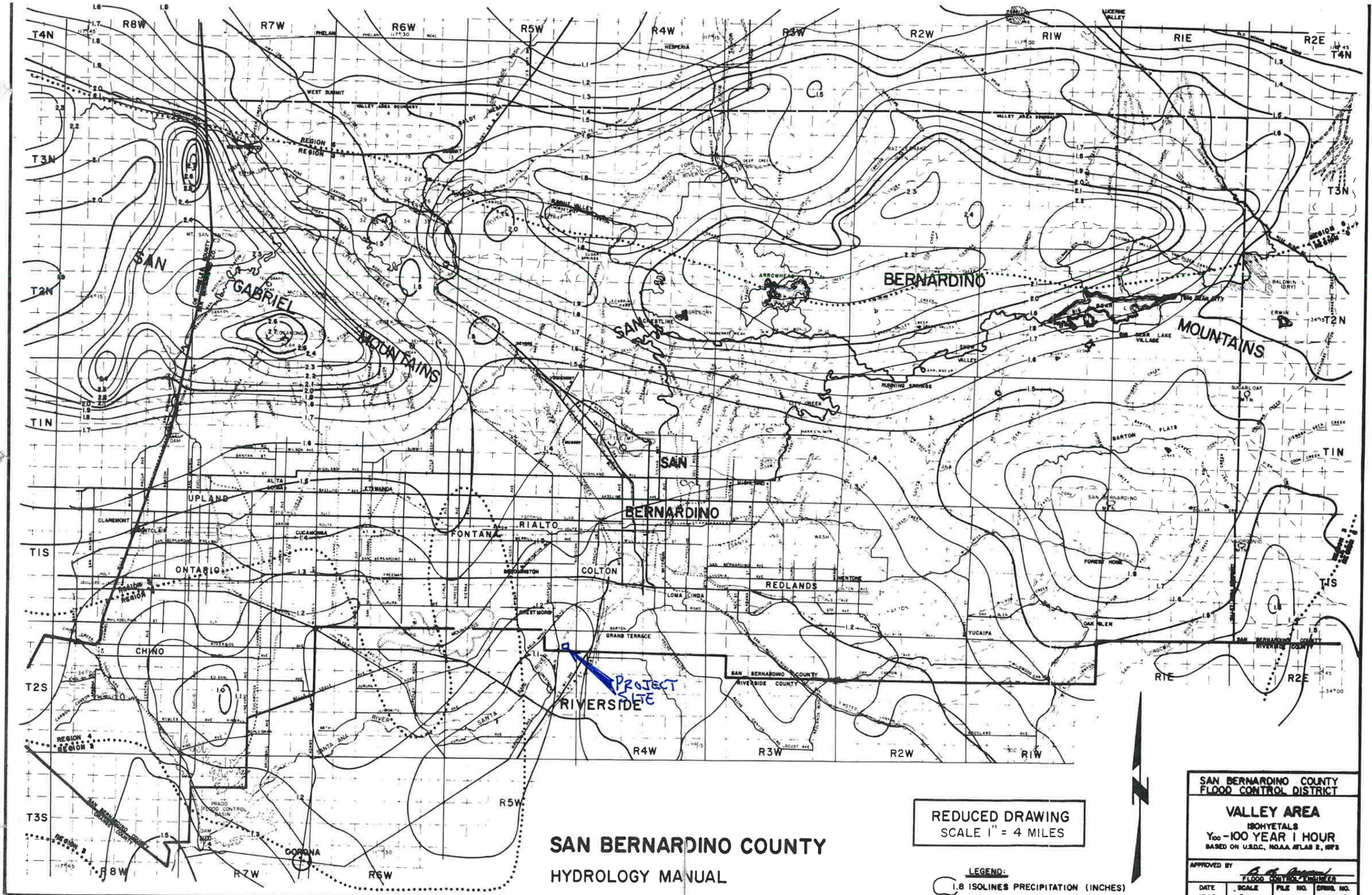
**SAN BERNARDINO COUNTY**  
HYDROLOGY MANUAL



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

SCALE 1:48,000  
**SCALE REDUCED BY 1/2**

**HYDROLOGIC SOILS GROUP MAP**  
FOR  
**SOUTHWEST-D AREA**



**SAN BERNARDINO COUNTY  
HYDROLOGY MANUAL**

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

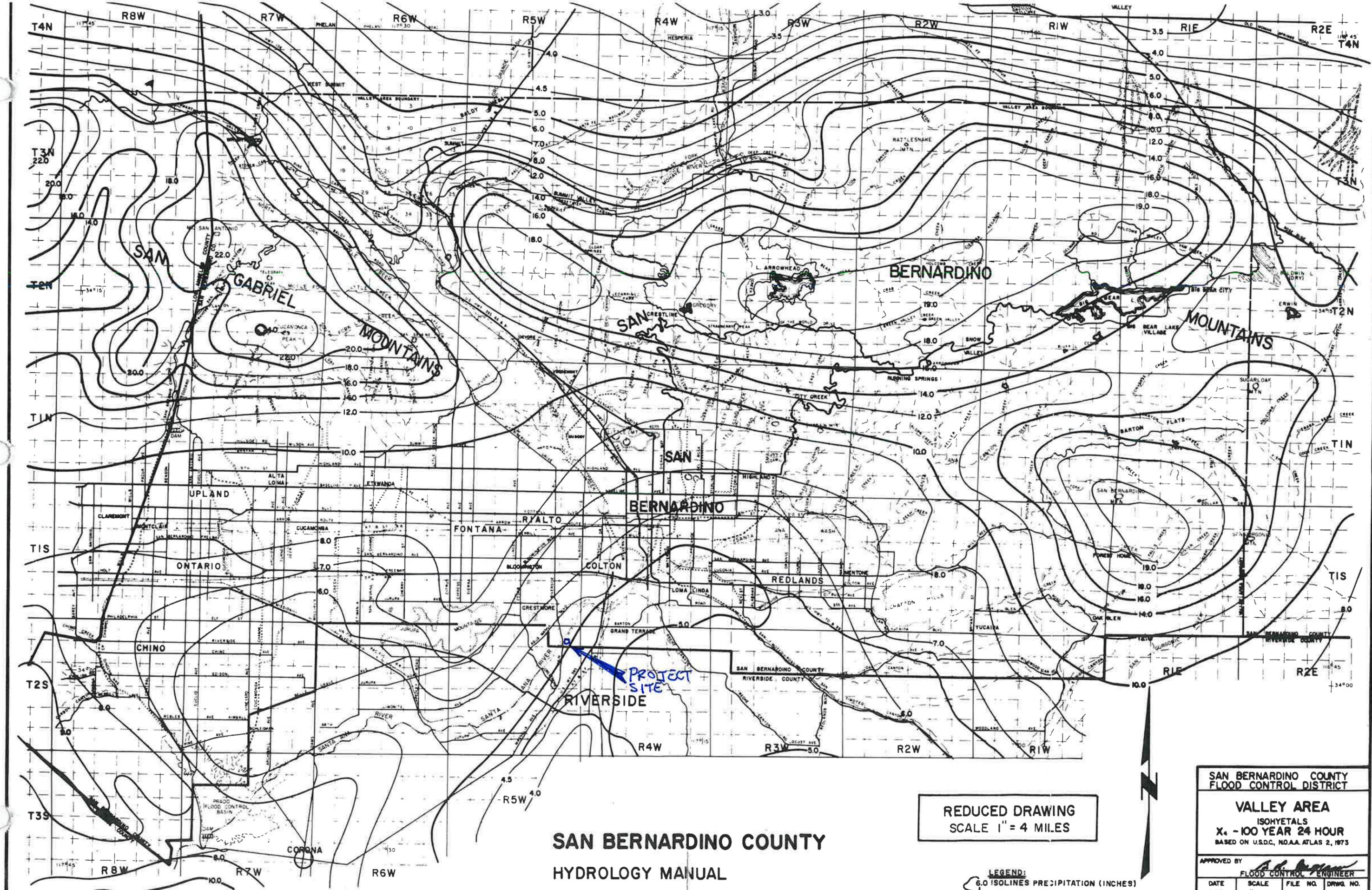
**LEGEND:**  
1.8 ISOLINES PRECIPITATION (INCHES)

**SAN BERNARDINO COUNTY  
FLOOD CONTROL DISTRICT**

**VALLEY AREA**  
ISOHYETALS  
Y<sub>100</sub>-100 YEAR 1 HOUR  
BASED ON U.S.D.C. NOAA ATLAS 2, 1975

APPROVED BY *[Signature]*  
FLOOD CONTROL ENGINEER

DATE	SCALE	FILE NO.	DRAW. NO.
1982	1"=4M.	WB-1	4 of 12



**SAN BERNARDINO COUNTY  
HYDROLOGY MANUAL**

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

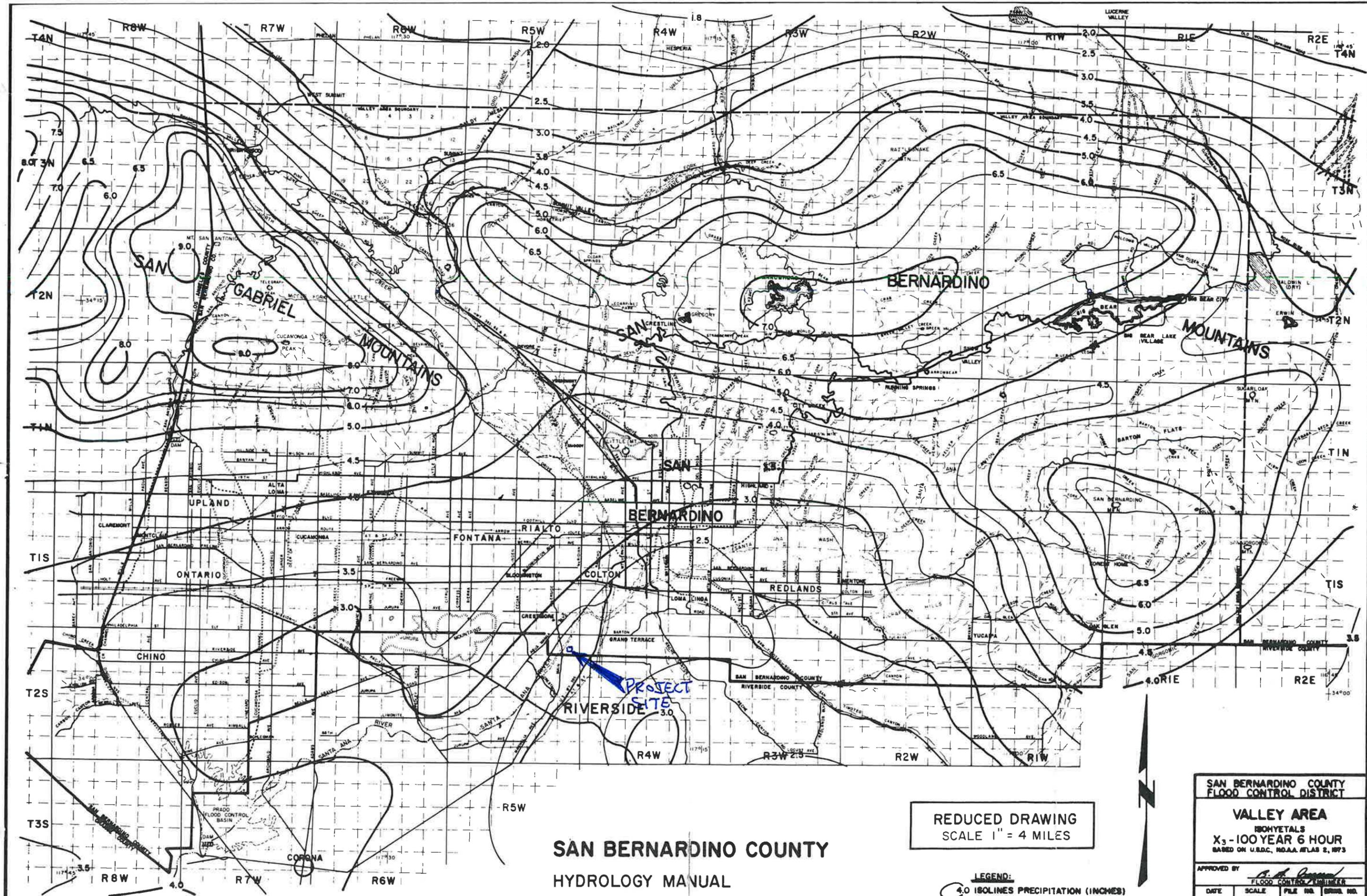
**LEGEND:**  
6.0 ISOLINES PRECIPITATION (INCHES)

**SAN BERNARDINO COUNTY  
FLOOD CONTROL DISTRICT**

**VALLEY AREA**  
ISOHYETALS  
X<sub>4</sub> - 100 YEAR 24 HOUR  
BASED ON U.S.D.C. NO. AA ATLAS 2, 1973

APPROVED BY *[Signature]*  
FLOOD CONTROL ENGINEER

DATE 1982	SCALE 1" = 2 MI.	FILE NO. WRD-1	DRWG. NO. 6 of 12
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**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  
X<sub>3</sub>-100 YEAR 6 HOUR  
BASED ON U.S.D.C. NOAA ATLAS 2, 1973

APPROVED BY *[Signature]*  
FLOOD CONTROL ENGINEER

DATE	SCALE	FILE NO.	SHEET NO.
1982	1"=2M.	WD-1	8 of 12

# **APPENDIX B**

## **HYDROLOGY CALCULATIONS**

## EXISTING CONDITION



## PROPOSED CONDITION

Analysis prepared by:

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

\*\*\*\*\* DESCRIPTION OF STUDY \*\*\*\*\*  
\* CENTER STREET INDUSTRIAL CENTER \*  
\* 100-YEAR HYDROLOGY \*  
\*\*\*\*\*

FILE NAME: C:\XDRIVE\3573\3573A.DAT  
TIME/DATE OF STUDY: 16:40 08/03/2017

=====

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) = 1.1500

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

\*\*\*\*\*

FLOW PROCESS FROM NODE 100.00 TO NODE 101.00 IS CODE = 21

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

=====

INITIAL SUBAREA FLOW-LENGTH (FEET) = 410.00  
ELEVATION DATA: UPSTREAM (FEET) = 839.38 DOWNSTREAM (FEET) = 834.56

Tc = K \* [(LENGTH\*\* 3.00) / (ELEVATION CHANGE)] \*\* 0.20  
SUBAREA ANALYSIS USED MINIMUM Tc (MIN.) = 8.202  
\* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 3.795  
SUBAREA Tc AND LOSS RATE DATA (AMC III):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	A	2.60	0.80	0.10	52	8.20

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp (INCH/HR) = 0.80  
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.10  
SUBAREA RUNOFF (CFS) = 8.69  
TOTAL AREA (ACRES) = 2.60 PEAK FLOW RATE (CFS) = 8.69

\*\*\*\*\*

FLOW PROCESS FROM NODE 101.00 TO NODE 111.00 IS CODE = 31

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

=====

ELEVATION DATA: UPSTREAM (FEET) = 830.56 DOWNSTREAM (FEET) = 830.08  
FLOW LENGTH (FEET) = 160.00 MANNING'S N = 0.012  
DEPTH OF FLOW IN 21.0 INCH PIPE IS 16.3 INCHES  
PIPE-FLOW VELOCITY (FEET/SEC.) = 4.34  
ESTIMATED PIPE DIAMETER (INCH) = 21.00 NUMBER OF PIPES = 1  
PIPE-FLOW (CFS) = 8.69  
PIPE TRAVEL TIME (MIN.) = 0.62 Tc (MIN.) = 8.82  
LONGEST FLOWPATH FROM NODE 100.00 TO NODE 111.00 = 570.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 111.00 TO NODE 111.00 IS CODE = 1

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

=====

TOTAL NUMBER OF STREAMS = 2  
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:  
TIME OF CONCENTRATION (MIN.) = 8.82  
RAINFALL INTENSITY (INCH/HR) = 3.63  
AREA-AVERAGED Fm (INCH/HR) = 0.08  
AREA-AVERAGED Fp (INCH/HR) = 0.80  
AREA-AVERAGED Ap = 0.10  
EFFECTIVE STREAM AREA (ACRES) = 2.60  
TOTAL STREAM AREA (ACRES) = 2.60  
PEAK FLOW RATE (CFS) AT CONFLUENCE = 8.69

\*\*\*\*\*

FLOW PROCESS FROM NODE 110.00 TO NODE 111.00 IS CODE = 21

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

=====

INITIAL SUBAREA FLOW-LENGTH (FEET) = 634.00  
ELEVATION DATA: UPSTREAM (FEET) = 839.31 DOWNSTREAM (FEET) = 834.56

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 10.685  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.238  
 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 3.60 0.80 0.10 52 10.69  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.80  
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.10  
 SUBAREA RUNOFF(CFS) = 10.23  
 TOTAL AREA(ACRES) = 3.60 PEAK FLOW RATE(CFS) = 10.23

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 111.00 TO NODE 111.00 IS CODE = 1

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

=====

TOTAL NUMBER OF STREAMS = 2  
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:  
 TIME OF CONCENTRATION(MIN.) = 10.69  
 RAINFALL INTENSITY(INCH/HR) = 3.24  
 AREA-AVERAGED Fm(INCH/HR) = 0.08  
 AREA-AVERAGED Fp(INCH/HR) = 0.80  
 AREA-AVERAGED Ap = 0.10  
 EFFECTIVE STREAM AREA(ACRES) = 3.60  
 TOTAL STREAM AREA(ACRES) = 3.60  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 10.23

\*\* CONFLUENCE DATA \*\*

STRFAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	8.69	8.82	3.634	0.80( 0.08)	0.10	2.6	100.00
2	10.23	10.69	3.238	0.80( 0.08)	0.10	3.6	110.00

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

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

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	18.20	8.82	3.634	0.80( 0.08)	0.10	5.6	100.00
2	17.96	10.69	3.238	0.80( 0.08)	0.10	6.2	110.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
 PEAK FLOW RATE(CFS) = 18.20 Tc(MIN.) = 8.82  
 EFFECTIVE AREA(ACRES) = 5.57 AREA-AVERAGED Fm(INCH/HR) = 0.08  
 AREA-AVERAGED Fp(INCH/HR) = 0.80 AREA-AVERAGED Ap = 0.10  
 TOTAL AREA(ACRES) = 6.20  
 LONGEST FLOWPATH FROM NODE 110.00 TO NODE 111.00 = 634.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 111.00 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) = 830.08 DOWNSTREAM(FEET) = 828.35  
 FLOW LENGTH(FEET) = 577.00 MANNING'S N = 0.012  
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 19.7 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.32  
 ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 18.20  
 PIPE TRAVEL TIME(MIN.) = 1.81 Tc(MIN.) = 10.62  
 LONGEST FLOWPATH FROM NODE 110.00 TO NODE 122.00 = 1211.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 122.00 TO NODE 122.00 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.) = 10.62  
 RAINFALL INTENSITY(INCH/HR) = 3.25  
 AREA-AVERAGED Fm(INCH/HR) = 0.08  
 AREA-AVERAGED Fp(INCH/HR) = 0.80  
 AREA-AVERAGED Ap = 0.10  
 EFFECTIVE STREAM AREA(ACRES) = 5.57  
 TOTAL STREAM AREA(ACRES) = 6.20  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 18.20

\*\*\*\*\*  
 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) = 258.00  
 ELEVATION DATA: UPSTREAM(FEET) = 838.17 DOWNSTREAM(FEET) = 835.74

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20  
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.124  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 4.130  
 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 0.95 0.80 0.10 52 7.12  
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.80

SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.10  
 SUBAREA RUNOFF(CFS) = 3.46  
 TOTAL AREA(ACRES) = 0.95 PEAK FLOW RATE(CFS) = 3.46

\*\*\*\*\*  
 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) = 831.74 DOWNSTREAM(FEET) = 828.35  
 FLOW LENGTH(FEET) = 12.00 MANNING'S N = 0.012  
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000  
 DEPTH OF FLOW IN 12.0 INCH PIPE IS 3.4 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 19.08  
 ESTIMATED PIPE DIAMETER(INCH) = 12.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 3.46  
 PIPE TRAVEL TIME(MIN.) = 0.01 Tc(MIN.) = 7.13  
 LONGEST FLOWPATH FROM NODE 120.00 TO NODE 122.00 = 270.00 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.) = 7.13  
 RAINFALL INTENSITY(INCH/HR) = 4.13  
 AREA-AVERAGED Fm(INCH/HR) = 0.08  
 AREA-AVERAGED Fp(INCH/HR) = 0.80  
 AREA-AVERAGED Ap = 0.10  
 EFFECTIVE STREAM AREA(ACRES) = 0.95  
 TOTAL STREAM AREA(ACRES) = 0.95  
 PEAK FLOW RATE(CFS) AT CONFLUENCE = 3.46

\*\* CONFLUENCE DATA \*\*

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	18.20	10.62	3.250	0.80(0.08)	0.10	5.6	100.00
1	17.96	12.50	2.948	0.80(0.08)	0.10	6.2	110.00
2	3.46	7.13	4.126	0.80(0.08)	0.10	0.9	120.00

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

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

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	20.91	10.62	3.250	0.80(0.08)	0.10	6.5	100.00
2	20.42	12.50	2.948	0.80(0.08)	0.10	7.1	110.00
3	19.06	7.13	4.126	0.80(0.08)	0.10	4.7	120.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:  
 PEAK FLOW RATE(CFS) = 20.91 Tc(MIN.) = 10.62  
 EFFECTIVE AREA(ACRES) = 6.52 AREA-AVERAGED Fm(INCH/HR) = 0.08  
 AREA-AVERAGED Fp(INCH/HR) = 0.80 AREA-AVERAGED Ap = 0.10  
 TOTAL AREA(ACRES) = 7.15  
 LONGEST FLOWPATH FROM NODE 110.00 TO NODE 122.00 = 1211.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 122.00 TO NODE 123.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM(FEET) = 828.35 DOWNSTREAM(FEET) = 827.23  
 FLOW LENGTH(FEET) = 372.00 MANNING'S N = 0.012  
 DEPTH OF FLOW IN 30.0 INCH PIPE IS 21.8 INCHES  
 PIPE-FLOW VELOCITY(FEET/SEC.) = 5.46  
 ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1  
 PIPE-FLOW(CFS) = 20.91  
 PIPE TRAVEL TIME(MIN.) = 1.14 Tc(MIN.) = 11.76  
 LONGEST FLOWPATH FROM NODE 110.00 TO NODE 123.00 = 1583.00 FEET.

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 122.00 TO NODE 123.00 IS CODE = 81

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

MAINLINE Tc(MIN) = 11.76  
 \* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.058  
 SUBAREA LOSS RATE DATA(AMC III):  
 DEVELOPMENT TYPE/ LAND USE SCS SOIL GROUP AREA (ACRES) Fp (INCH/HR) Ap (DECIMAL) SCS CN  
 COMMERCIAL A 0.30 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) = 0.30 SUBAREA RUNOFF(CFS) = 0.80  
 EFFECTIVE AREA(ACRES) = 6.82 AREA-AVERAGED Fm(INCH/HR) = 0.08  
 AREA-AVERAGED Fp(INCH/HR) = 0.80 AREA-AVERAGED Ap = 0.10  
 TOTAL AREA(ACRES) = 7.45 PEAK FLOW RATE(CFS) = 20.91  
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*  
 FLOW PROCESS FROM NODE 123.00 TO NODE 124.00 IS CODE = 31

>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<

>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<

ELEVATION DATA: UPSTREAM(FEET) = 827.23 DOWNSTREAM(FEET) = 827.00
FLOW LENGTH(FEET) = 80.00 MANNING'S N = 0.012
DEPTH OF FLOW IN 30.0 INCH PIPE IS 22.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 5.35
ESTIMATED PIPE DIAMETER(INCH) = 30.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 20.91
PIPE TRAVEL TIME(MIN.) = 0.25 Tc(MIN.) = 12.01
LONGEST FLOWPATH FROM NODE 110.00 TO NODE 124.00 = 1663.00 FEET.

\*\*\*\*\*
FLOW PROCESS FROM NODE 124.00 TO NODE 124.00 IS CODE = 81

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

MAINLINE Tc(MIN) = 12.01
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.019
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 0.20 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) = 0.20 SUBAREA RUNOFF(CFS) = 0.48
EFFECTIVE AREA(ACRES) = 7.02 AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.70 AREA-AVERAGED Ap = 0.13
TOTAL AREA(ACRES) = 7.65 PEAK FLOW RATE(CFS) = 20.91
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

\*\*\*\*\*
FLOW PROCESS FROM NODE 124.00 TO NODE 124.00 IS CODE = 1

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

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 12.01
RAINFALL INTENSITY(INCH/HR) = 3.02
AREA-AVERAGED Fm(INCH/HR) = 0.09
AREA-AVERAGED Fp(INCH/HR) = 0.70
AREA-AVERAGED Ap = 0.13
EFFECTIVE STREAM AREA(ACRES) = 7.02
TOTAL STREAM AREA(ACRES) = 7.65
PEAK FLOW RATE(CFS) AT CONFLUENCE = 20.91

\*\*\*\*\*
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) = 388.00
ELEVATION DATA: UPSTREAM(FEET) = 839.38 DOWNSTREAM(FEET) = 834.68

Tc = K\*[(LENGTH\*\* 3.00)/(ELEVATION CHANGE)]\*\*0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.975
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.860
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 1.65 0.80 0.10 52 7.98
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.80
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.10
SUBAREA RUNOFF(CFS) = 5.61
TOTAL AREA(ACRES) = 1.65 PEAK FLOW RATE(CFS) = 5.61

\*\*\*\*\*
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) = 830.68 DOWNSTREAM(FEET) = 830.34
FLOW LENGTH(FEET) = 114.00 MANNING'S N = 0.012
DEPTH OF FLOW IN 18.0 INCH PIPE IS 13.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 3.89
ESTIMATED PIPE DIAMETER(INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 5.61
PIPE TRAVEL TIME(MIN.) = 0.49 Tc(MIN.) = 8.46
LONGEST FLOWPATH FROM NODE 130.00 TO NODE 132.00 = 502.00 FEET.

\*\*\*\*\*
FLOW PROCESS FROM NODE 131.00 TO NODE 132.00 IS CODE = 81

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

MAINLINE Tc(MIN) = 8.46
\* 100 YEAR RAINFALL INTENSITY(INCH/HR) = 3.724
SUBAREA LOSS RATE DATA(AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 0.95 0.80 0.10 52
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.80
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.10
SUBAREA AREA(ACRES) = 0.95 SUBAREA RUNOFF(CFS) = 3.12
EFFECTIVE AREA(ACRES) = 2.60 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.80 AREA-AVERAGED Ap = 0.10

TOTAL AREA (ACRES) = 2.60 PEAK FLOW RATE (CFS) = 8.53

\*\*\*\*\*

FLOW PROCESS FROM NODE 132.00 TO NODE 133.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM (FEET) = 830.34 DOWNSTREAM (FEET) = 829.00
FLOW LENGTH (FEET) = 114.00 MANNING'S N = 0.012
DEPTH OF FLOW IN 18.0 INCH PIPE IS 11.2 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 7.38
ESTIMATED PIPE DIAMETER (INCH) = 18.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 8.53
PIPE TRAVEL TIME (MIN.) = 0.26 Tc (MIN.) = 8.72
LONGEST FLOWPATH FROM NODE 130.00 TO NODE 133.00 = 616.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 132.00 TO NODE 133.00 IS CODE = 81

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

MAINLINE Tc (MIN) = 8.72
\* 100 YEAR RAINFALL INTENSITY (INCH/HR) = 3.658
SUBAREA LOSS RATE DATA (AMC III):
DEVELOPMENT TYPE/ SCS SOIL AREA Fp Ap SCS
LAND USE GROUP (ACRES) (INCH/HR) (DECIMAL) CN
COMMERCIAL A 1.90 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) = 1.90 SUBAREA RUNOFF (CFS) = 6.12
EFFECTIVE AREA (ACRES) = 4.50 AREA-AVERAGED Fm (INCH/HR) = 0.08
AREA-AVERAGED Fp (INCH/HR) = 0.80 AREA-AVERAGED Ap = 0.10
TOTAL AREA (ACRES) = 4.50 PEAK FLOW RATE (CFS) = 14.49

\*\*\*\*\*

FLOW PROCESS FROM NODE 133.00 TO NODE 134.00 IS CODE = 31

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

ELEVATION DATA: UPSTREAM (FEET) = 829.00 DOWNSTREAM (FEET) = 827.00
FLOW LENGTH (FEET) = 143.00 MANNING'S N = 0.012
DEPTH OF FLOW IN 21.0 INCH PIPE IS 13.3 INCHES
PIPE-FLOW VELOCITY (FEET/SEC.) = 8.99
ESTIMATED PIPE DIAMETER (INCH) = 21.00 NUMBER OF PIPES = 1
PIPE-FLOW (CFS) = 14.49
PIPE TRAVEL TIME (MIN.) = 0.27 Tc (MIN.) = 8.99
LONGEST FLOWPATH FROM NODE 130.00 TO NODE 134.00 = 759.00 FEET.

\*\*\*\*\*

FLOW PROCESS FROM NODE 134.00 TO NODE 134.00 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.) = 8.99
RAINFALL INTENSITY (INCH/HR) = 3.59
AREA-AVERAGED Fm (INCH/HR) = 0.08
AREA-AVERAGED Fp (INCH/HR) = 0.80
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA (ACRES) = 4.50
TOTAL STREAM AREA (ACRES) = 4.50
PEAK FLOW RATE (CFS) AT CONFLUENCE = 14.49

\*\* CONFLUENCE DATA \*\*

Table with 8 columns: STREAM NUMBER, Q (CFS), Tc (MIN.), Intensity (INCH/HR), Fp (Fm) (INCH/HR), Ap, Ae (ACRES), HEADWATER NODE. Contains 4 rows of data.

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

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

Table with 8 columns: STREAM NUMBER, Q (CFS), Tc (MIN.), Intensity (INCH/HR), Fp (Fm) (INCH/HR), Ap, Ae (ACRES), HEADWATER NODE. Contains 4 rows of data.

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE (CFS) = 33.80 Tc (MIN.) = 8.99
EFFECTIVE AREA (ACRES) = 9.93 AREA-AVERAGED Fm (INCH/HR) = 0.09
AREA-AVERAGED Fp (INCH/HR) = 0.72 AREA-AVERAGED Ap = 0.12
TOTAL AREA (ACRES) = 12.15
LONGEST FLOWPATH FROM NODE 110.00 TO NODE 134.00 = 1663.00 FEET.

END OF STUDY SUMMARY:
TOTAL AREA (ACRES) = 12.15 TC (MIN.) = 8.99
EFFECTIVE AREA (ACRES) = 9.93 AREA-AVERAGED Fm (INCH/HR) = 0.09
AREA-AVERAGED Fp (INCH/HR) = 0.72 AREA-AVERAGED Ap = 0.12
PEAK FLOW RATE (CFS) = 33.80

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

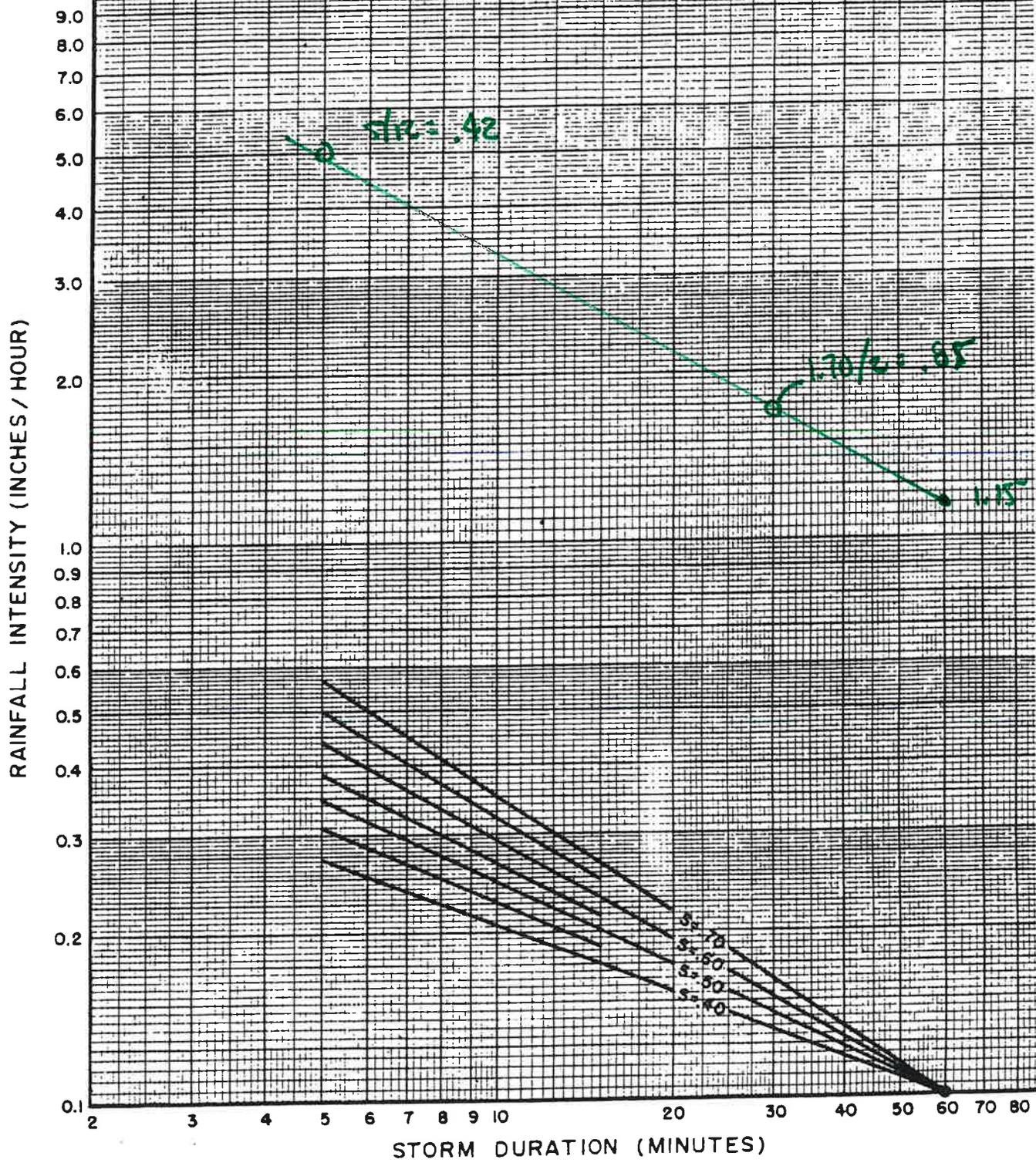
STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	33.27	8.54	3.705	0.72( 0.09)	0.12	9.5	120.00
2	33.80	8.99	3.593	0.72( 0.09)	0.12	9.9	130.00
3	33.04	12.01	3.019	0.73( 0.08)	0.12	11.5	100.00
4	31.50	13.88	2.767	0.73( 0.08)	0.11	12.1	110.00

=====  
 END OF RATIONAL METHOD ANALYSIS  
 =====



## **APPENDIX C**

### **DETENTION CALCULATIONS**



DESIGN STORM FREQUENCY = \_\_\_\_\_ YEARS  
 ONE HOUR POINT RAINFALL = \_\_\_\_\_ INCHES  
 LOG-LOG SLOPE = \_\_\_\_\_  
 PROJECT LOCATION = \_\_\_\_\_

**SAN BERNARDINO COUNTY**  
 HYDROLOGY MANUAL

**INTENSITY - DURATION  
 CURVES  
 CALCULATION SHEET**

POINT RAINFALL - INCHES

50.0  
40.0  
30.0  
20.0  
10.0  
5.0  
4.0  
3.0  
2.0  
1.0  
0.5  
0.4  
0.3  
0.2  
0.1

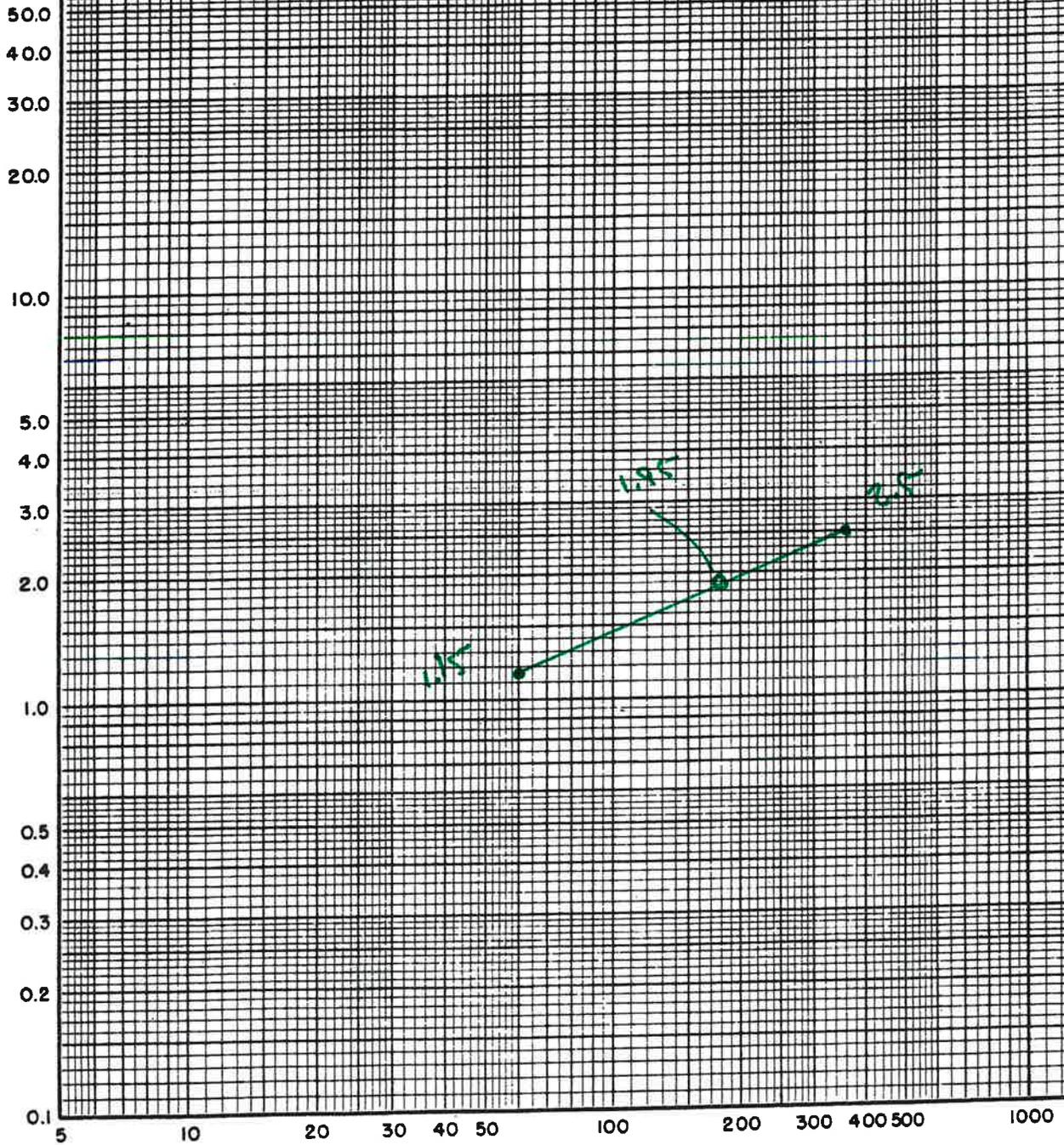
STORM DURATION - MINUTES

PROJECT LOCATION \_\_\_\_\_

NOTES \_\_\_\_\_  
\_\_\_\_\_

**SAN BERNARDINO COUNTY**  
HYDROLOGY MANUAL

AREA - AVERAGED  
MASS RAINFALL  
PLOTING SHEET



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

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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

\*\*\* 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	4.50	10.00	52. ( 32.)	0.742	0.873

TOTAL AREA (Acres) = 4.50

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

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

1

### EASTERLY TRUCK YARD

Elevation	Depth (feet)	Area (sq. ft.)	Volume (c.f.)	$\Sigma$ Volume (c.f.)	$\Sigma$ Volume (ac-ft)	Q Discharge (cfs)
834.68	0.00	0	88	88	0.00	1.30
834.80	0.12	1,470	1,215	1,303	0.03	2.20
835.00	0.32	10,680	3,449	4,753	0.11	2.70
835.20	0.52	23,813	5,572	10,325	0.24	3.20
835.40	0.72	31,912	7,023	17,348	0.40	3.70
835.60	0.92	38,318	8,264	25,612	0.59	4.00
835.80	1.12	44,326				

\*\*\*\*\*  
 SMALL AREA UNIT HYDROGRAPH MODEL  
 \*\*\*\*\*

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Analysis prepared by:

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

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90  
 TOTAL CATCHMENT AREA (ACRES) = 4.50  
 SOIL-LOSS RATE, Fm, (INCH/HR) = 0.074  
 LOW LOSS FRACTION = 0.127  
 TIME OF CONCENTRATION (MTN.) = 8.70  
 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) = 0.42  
 30-MINUTE POINT RAINFALL VALUE (INCHES) = 0.85  
 1-HOUR POINT RAINFALL VALUE (INCHES) = 1.15  
 3-HOUR POINT RAINFALL VALUE (INCHES) = 1.95  
 6-HOUR POINT RAINFALL VALUE (INCHES) = 2.50  
 24-HOUR POINT RAINFALL VALUE (INCHES) = 5.00

-----  
 TOTAL CATCHMENT RUNOFF VOLUME (ACRE-FEET) = 1.49  
 TOTAL CATCHMENT SOIL-LOSS VOLUME (ACRE-FEET) = 0.38

\*\*\*\*\*

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	5.0	10.0	15.0	20.0
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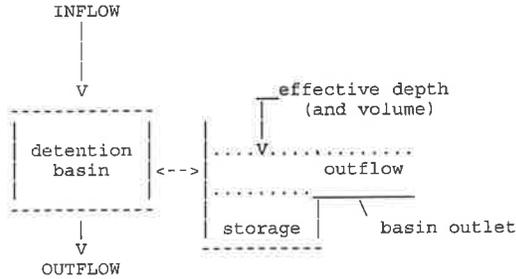
0.05	0.0000	0.00	Q	.	.	.	.
0.20	0.0022	0.37	Q	.	.	.	.
0.34	0.0066	0.37	Q	.	.	.	.
0.49	0.0111	0.37	Q	.	.	.	.
0.63	0.0156	0.37	Q	.	.	.	.
0.78	0.0201	0.38	Q	.	.	.	.
0.92	0.0246	0.38	Q	.	.	.	.
1.07	0.0291	0.38	Q	.	.	.	.
1.21	0.0337	0.38	Q	.	.	.	.
1.36	0.0383	0.38	Q	.	.	.	.
1.50	0.0429	0.38	Q	.	.	.	.
1.65	0.0475	0.39	Q	.	.	.	.
1.79	0.0522	0.39	Q	.	.	.	.
1.94	0.0568	0.39	Q	.	.	.	.
2.08	0.0615	0.39	Q	.	.	.	.
2.23	0.0663	0.40	Q	.	.	.	.
2.37	0.0710	0.40	Q	.	.	.	.
2.52	0.0758	0.40	Q	.	.	.	.
2.66	0.0806	0.40	Q	.	.	.	.
2.81	0.0854	0.40	Q	.	.	.	.
2.95	0.0903	0.41	Q	.	.	.	.
3.10	0.0951	0.41	Q	.	.	.	.
3.24	0.1000	0.41	Q	.	.	.	.
3.39	0.1050	0.41	Q	.	.	.	.
3.53	0.1099	0.41	Q	.	.	.	.
3.68	0.1149	0.42	Q	.	.	.	.
3.82	0.1199	0.42	Q	.	.	.	.
3.97	0.1250	0.42	Q	.	.	.	.
4.11	0.1301	0.42	Q	.	.	.	.
4.26	0.1352	0.43	Q	.	.	.	.
4.40	0.1403	0.43	Q	.	.	.	.
4.55	0.1455	0.43	Q	.	.	.	.
4.69	0.1507	0.44	Q	.	.	.	.
4.84	0.1559	0.44	Q	.	.	.	.
4.98	0.1612	0.44	Q	.	.	.	.
5.13	0.1665	0.44	Q	.	.	.	.
5.27	0.1719	0.45	Q	.	.	.	.
5.42	0.1772	0.45	Q	.	.	.	.
5.56	0.1826	0.45	Q	.	.	.	.
5.71	0.1881	0.46	Q	.	.	.	.
5.85	0.1936	0.46	Q	.	.	.	.
6.00	0.1991	0.46	Q	.	.	.	.
6.14	0.2047	0.47	Q	.	.	.	.
6.29	0.2103	0.47	Q	.	.	.	.
6.43	0.2159	0.47	Q	.	.	.	.
6.57	0.2216	0.48	Q	.	.	.	.
6.72	0.2274	0.48	Q	.	.	.	.
6.87	0.2331	0.48	Q	.	.	.	.
7.01	0.2390	0.49	Q	.	.	.	.
7.16	0.2448	0.49	Q	.	.	.	.
7.30	0.2508	0.50	Q	.	.	.	.
7.45	0.2567	0.50	.Q	.	.	.	.
7.59	0.2628	0.50	.Q	.	.	.	.
7.74	0.2688	0.51	.Q	.	.	.	.
7.88	0.2749	0.51	.Q	.	.	.	.
8.02	0.2811	0.52	.Q	.	.	.	.
8.17	0.2874	0.52	.Q	.	.	.	.
8.32	0.2936	0.53	.Q	.	.	.	.

8.46	0.3000	0.53	.Q	.	.	.	.
8.60	0.3064	0.54	.Q	.	.	.	.
8.75	0.3129	0.54	.Q	.	.	.	.
8.90	0.3194	0.55	.Q	.	.	.	.
9.04	0.3260	0.55	.Q	.	.	.	.
9.19	0.3327	0.56	.Q	.	.	.	.
9.33	0.3394	0.56	.Q	.	.	.	.
9.48	0.3462	0.57	.Q	.	.	.	.
9.62	0.3531	0.58	.Q	.	.	.	.
9.77	0.3601	0.59	.Q	.	.	.	.
9.91	0.3671	0.59	.Q	.	.	.	.
10.05	0.3742	0.60	.Q	.	.	.	.
10.20	0.3815	0.60	.Q	.	.	.	.
10.35	0.3888	0.61	.Q	.	.	.	.
10.49	0.3962	0.62	.Q	.	.	.	.
10.64	0.4036	0.63	.Q	.	.	.	.
10.78	0.4112	0.64	.Q	.	.	.	.
10.93	0.4189	0.65	.Q	.	.	.	.
11.07	0.4267	0.65	.Q	.	.	.	.
11.22	0.4346	0.67	.Q	.	.	.	.
11.36	0.4427	0.67	.Q	.	.	.	.
11.51	0.4508	0.69	.Q	.	.	.	.
11.65	0.4591	0.69	.Q	.	.	.	.
11.80	0.4675	0.71	.Q	.	.	.	.
11.94	0.4761	0.72	.Q	.	.	.	.
12.09	0.4843	0.66	.Q	.	.	.	.
12.23	0.4915	0.54	.Q	.	.	.	.
12.38	0.4980	0.55	.Q	.	.	.	.
12.52	0.5047	0.56	.Q	.	.	.	.
12.66	0.5115	0.58	.Q	.	.	.	.
12.81	0.5186	0.59	.Q	.	.	.	.
12.95	0.5258	0.62	.Q	.	.	.	.
13.10	0.5333	0.63	.Q	.	.	.	.
13.24	0.5410	0.66	.Q	.	.	.	.
13.39	0.5489	0.67	.Q	.	.	.	.
13.53	0.5572	0.70	.Q	.	.	.	.
13.68	0.5657	0.72	.Q	.	.	.	.
13.82	0.5746	0.76	.Q	.	.	.	.
13.97	0.5838	0.78	.Q	.	.	.	.
14.12	0.5946	1.02	. Q	.	.	.	.
14.26	0.6076	1.14	. Q	.	.	.	.
14.40	0.6216	1.21	. Q	.	.	.	.
14.55	0.6363	1.24	. Q	.	.	.	.
14.70	0.6517	1.33	. Q	.	.	.	.
14.84	0.6679	1.38	. Q	.	.	.	.
14.98	0.6851	1.50	. Q	.	.	.	.
15.13	0.7035	1.57	. Q	.	.	.	.
15.27	0.7235	1.75	. Q	.	.	.	.
15.42	0.7452	1.87	. Q	.	.	.	.
15.57	0.7685	2.02	. Q	.	.	.	.
15.71	0.7943	2.29	. Q	.	.	.	.
15.85	0.8261	3.01	. Q	.	.	.	.
16.00	0.8698	4.27	. Q	.	.	.	.
16.15	0.9822	14.50	. Q	.	.	.	.
16.29	1.0844	2.55	. Q	.	.	.	.
16.43	1.1108	1.85	. Q	.	.	.	.
16.58	1.1319	1.66	. Q	.	.	.	.
16.73	1.1504	1.44	. Q	.	.	.	.
16.87	1.1667	1.28	. Q	.	.	.	.
17.02	1.1814	1.17	. Q	.	.	.	.
17.16	1.1932	0.80	. Q	.	.	.	.
17.31	1.2025	0.74	. Q	.	.	.	.
17.45	1.2110	0.69	. Q	.	.	.	.
17.59	1.2190	0.64	. Q	.	.	.	.
17.74	1.2264	0.60	. Q	.	.	.	.
17.89	1.2335	0.57	. Q	.	.	.	.
18.03	1.2402	0.54	. Q	.	.	.	.
18.17	1.2478	0.73	. Q	.	.	.	.
18.32	1.2563	0.70	. Q	.	.	.	.
18.47	1.2646	0.68	. Q	.	.	.	.
18.61	1.2727	0.66	. Q	.	.	.	.
18.76	1.2805	0.64	. Q	.	.	.	.
18.90	1.2881	0.62	. Q	.	.	.	.
19.05	1.2955	0.61	. Q	.	.	.	.
19.19	1.3027	0.59	. Q	.	.	.	.
19.33	1.3097	0.58	. Q	.	.	.	.
19.48	1.3166	0.57	. Q	.	.	.	.
19.63	1.3233	0.56	. Q	.	.	.	.
19.77	1.3299	0.55	. Q	.	.	.	.
19.92	1.3364	0.53	. Q	.	.	.	.
20.06	1.3428	0.52	. Q	.	.	.	.
20.20	1.3490	0.52	. Q	.	.	.	.
20.35	1.3551	0.51	. Q	.	.	.	.
20.49	1.3611	0.50	. Q	.	.	.	.
20.64	1.3671	0.49	. Q	.	.	.	.
20.78	1.3729	0.48	. Q	.	.	.	.
20.93	1.3786	0.48	. Q	.	.	.	.
21.08	1.3843	0.47	. Q	.	.	.	.
21.22	1.3898	0.46	. Q	.	.	.	.
21.36	1.3953	0.45	. Q	.	.	.	.
21.51	1.4007	0.45	. Q	.	.	.	.
21.66	1.4061	0.44	. Q	.	.	.	.
21.80	1.4114	0.44	. Q	.	.	.	.
21.94	1.4166	0.43	. Q	.	.	.	.
22.09	1.4217	0.43	. Q	.	.	.	.
22.23	1.4268	0.42	. Q	.	.	.	.
22.38	1.4318	0.42	. Q	.	.	.	.
22.52	1.4369	0.41	. Q	.	.	.	.
22.67	1.4417	0.41	. Q	.	.	.	.

22.82	1.4465	0.40	Q	.	.	.	.
22.96	1.4513	0.40	Q	.	.	.	.
23.11	1.4561	0.39	Q	.	.	.	.
23.25	1.4608	0.39	Q	.	.	.	.
23.39	1.4654	0.39	Q	.	.	.	.
23.54	1.4700	0.38	Q	.	.	.	.
23.68	1.4746	0.38	Q	.	.	.	.
23.83	1.4791	0.38	Q	.	.	.	.
23.98	1.4836	0.37	Q	.	.	.	.
24.12	1.4880	0.37	Q	.	.	.	.
24.26	1.4902	0.00	Q	.	.	.	.

FLOW-THROUGH DETENTION BASIN MODEL

SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:  
 CONSTANT HYDROGRAPH TIME UNIT (MINUTES) = 8.700  
 DEAD STORAGE (AF) = 0.00  
 SPECIFIED DEAD STORAGE (AF) FILLED = 0.00  
 ASSUMED INITIAL DEPTH (FEET) IN STORAGE BASIN = 0.00



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**	0.120	0.010	1.300*	
* 0.320	0.030	2.200**	0.520	0.110	2.700*	
* 0.720	0.240	3.200**	0.920	0.400	3.700*	
* 1.120	0.590	4.000**				

BASIN STORAGE, OUTFLOW AND DEPTH ROUTING VALUES:

INTERVAL NUMBER	DEPTH (FEET)	{S-O*DT/2} (ACRE-FEET)	{S+O*DT/2} (ACRE-FEET)
1	0.00	0.00000	0.00000
2	0.12	0.00221	0.01779
3	0.32	0.01682	0.04318
4	0.52	0.09382	0.12618
5	0.72	0.22083	0.25917
6	0.92	0.37783	0.42217
7	1.12	0.56603	0.61397

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 (HRS)	DEAD-STORAGE FILLED (AF)	INFLOW (CFS)	EFFECTIVE DEPTH (FT)	OUTFLOW (CFS)	EFFECTIVE VOLUME (AF)
0.050	0.000	0.00	0.00	0.00	0.000
0.195	0.000	0.37	0.03	0.16	0.002
0.340	0.000	0.37	0.03	0.34	0.003
0.485	0.000	0.37	0.03	0.37	0.003
0.630	0.000	0.37	0.03	0.37	0.003
0.775	0.000	0.38	0.03	0.37	0.003
0.920	0.000	0.38	0.03	0.38	0.003
1.065	0.000	0.38	0.04	0.38	0.003
1.210	0.000	0.38	0.04	0.38	0.003
1.355	0.000	0.38	0.04	0.38	0.003
1.500	0.000	0.38	0.04	0.38	0.003
1.645	0.000	0.39	0.04	0.39	0.003
1.790	0.000	0.39	0.04	0.39	0.003
1.935	0.000	0.39	0.04	0.39	0.003
2.080	0.000	0.39	0.04	0.39	0.003
2.225	0.000	0.40	0.04	0.39	0.003
2.370	0.000	0.40	0.04	0.40	0.003
2.515	0.000	0.40	0.04	0.40	0.003
2.660	0.000	0.40	0.04	0.40	0.003
2.805	0.000	0.40	0.04	0.40	0.003
2.950	0.000	0.41	0.04	0.40	0.003
3.095	0.000	0.41	0.04	0.41	0.003
3.240	0.000	0.41	0.04	0.41	0.003
3.385	0.000	0.41	0.04	0.41	0.003
3.530	0.000	0.41	0.04	0.41	0.003
3.675	0.000	0.42	0.04	0.42	0.003
3.820	0.000	0.42	0.04	0.42	0.003
3.965	0.000	0.42	0.04	0.42	0.003
4.110	0.000	0.42	0.04	0.42	0.003

4.255	0.000	0.43	0.04	0.43	0.003
4.400	0.000	0.43	0.04	0.43	0.003
4.545	0.000	0.43	0.04	0.43	0.003
4.690	0.000	0.44	0.04	0.43	0.003
4.835	0.000	0.44	0.04	0.44	0.003
4.980	0.000	0.44	0.04	0.44	0.003
5.125	0.000	0.44	0.04	0.44	0.003
5.270	0.000	0.45	0.04	0.45	0.003
5.415	0.000	0.45	0.04	0.45	0.003
5.560	0.000	0.45	0.04	0.45	0.003
5.705	0.000	0.46	0.04	0.45	0.004
5.850	0.000	0.46	0.04	0.46	0.004
5.995	0.000	0.46	0.04	0.46	0.004
6.140	0.000	0.47	0.04	0.46	0.004
6.285	0.000	0.47	0.04	0.47	0.004
6.430	0.000	0.47	0.04	0.47	0.004
6.575	0.000	0.48	0.04	0.47	0.004
6.720	0.000	0.48	0.04	0.48	0.004
6.865	0.000	0.48	0.04	0.48	0.004
7.010	0.000	0.49	0.04	0.49	0.004
7.155	0.000	0.49	0.05	0.49	0.004
7.300	0.000	0.50	0.05	0.49	0.004
7.445	0.000	0.50	0.05	0.50	0.004
7.590	0.000	0.50	0.05	0.50	0.004
7.735	0.000	0.51	0.05	0.51	0.004
7.880	0.000	0.51	0.05	0.51	0.004
8.025	0.000	0.52	0.05	0.51	0.004
8.170	0.000	0.52	0.05	0.52	0.004
8.315	0.000	0.53	0.05	0.52	0.004
8.460	0.000	0.53	0.05	0.53	0.004
8.605	0.000	0.54	0.05	0.53	0.004
8.750	0.000	0.54	0.05	0.54	0.004
8.895	0.000	0.55	0.05	0.54	0.004
9.040	0.000	0.55	0.05	0.55	0.004
9.185	0.000	0.56	0.05	0.56	0.004
9.330	0.000	0.56	0.05	0.56	0.004
9.475	0.000	0.57	0.05	0.57	0.004
9.620	0.000	0.58	0.05	0.57	0.004
9.765	0.000	0.59	0.05	0.58	0.004
9.910	0.000	0.59	0.05	0.59	0.005
10.055	0.000	0.60	0.06	0.59	0.005
10.200	0.000	0.60	0.06	0.60	0.005
10.345	0.000	0.61	0.06	0.61	0.005
10.490	0.000	0.62	0.06	0.62	0.005
10.635	0.000	0.63	0.06	0.62	0.005
10.780	0.000	0.64	0.06	0.63	0.005
10.925	0.000	0.65	0.06	0.64	0.005
11.070	0.000	0.65	0.06	0.65	0.005
11.215	0.000	0.67	0.06	0.66	0.005
11.360	0.000	0.67	0.06	0.67	0.005
11.505	0.000	0.69	0.06	0.68	0.005
11.650	0.000	0.69	0.06	0.69	0.005
11.795	0.000	0.71	0.07	0.70	0.005
11.940	0.000	0.72	0.07	0.71	0.006
12.085	0.000	0.66	0.06	0.69	0.005
12.230	0.000	0.54	0.05	0.61	0.004
12.375	0.000	0.55	0.05	0.55	0.004
12.520	0.000	0.56	0.05	0.56	0.004
12.665	0.000	0.58	0.05	0.57	0.004
12.810	0.000	0.59	0.05	0.59	0.005
12.955	0.000	0.62	0.06	0.60	0.005
13.100	0.000	0.63	0.06	0.62	0.005
13.245	0.000	0.66	0.06	0.64	0.005
13.390	0.000	0.67	0.06	0.66	0.005
13.535	0.000	0.70	0.06	0.68	0.005
13.680	0.000	0.72	0.07	0.71	0.006
13.825	0.000	0.76	0.07	0.74	0.006
13.970	0.000	0.78	0.07	0.77	0.006
14.115	0.000	1.02	0.09	0.88	0.008
14.260	0.000	1.14	0.10	1.06	0.009
14.405	0.000	1.21	0.11	1.16	0.009
14.550	0.000	1.24	0.11	1.22	0.010
14.695	0.000	1.33	0.12	1.27	0.010
14.840	0.000	1.38	0.13	1.32	0.011
14.985	0.000	1.50	0.14	1.37	0.012
15.130	0.000	1.57	0.16	1.44	0.014
15.275	0.000	1.75	0.19	1.54	0.017
15.420	0.000	1.87	0.21	1.65	0.019
15.565	0.000	2.02	0.24	1.78	0.022
15.710	0.000	2.29	0.28	1.94	0.026
15.855	0.000	3.01	0.34	2.14	0.037
16.000	0.000	4.27	0.40	2.32	0.060
16.145	0.000	14.50	0.66	2.72	0.201
16.290	0.000	2.55	0.65	3.04	0.196
16.435	0.000	1.85	0.63	3.00	0.182
16.580	0.000	1.66	0.61	2.95	0.166
16.725	0.000	1.44	0.58	2.88	0.149
16.870	0.000	1.28	0.55	2.81	0.131
17.015	0.000	1.17	0.52	2.74	0.112
17.160	0.000	0.80	0.47	2.64	0.090
17.305	0.000	0.74	0.42	2.51	0.069
17.450	0.000	0.69	0.37	2.38	0.048
17.595	0.000	0.64	0.31	2.24	0.029
17.740	0.000	0.60	0.16	1.83	0.014
17.885	0.000	0.57	0.08	1.20	0.007
18.030	0.000	0.54	0.05	0.75	0.005
18.175	0.000	0.73	0.07	0.65	0.005
18.320	0.000	0.70	0.06	0.71	0.005
18.465	0.000	0.68	0.06	0.69	0.005

18.610	0.000	0.66	0.06	0.67	0.005
18.755	0.000	0.64	0.06	0.65	0.005
18.900	0.000	0.62	0.06	0.64	0.005
19.045	0.000	0.61	0.06	0.62	0.005
19.190	0.000	0.59	0.06	0.60	0.005
19.335	0.000	0.58	0.05	0.59	0.004
19.480	0.000	0.57	0.05	0.58	0.004
19.625	0.000	0.56	0.05	0.56	0.004
19.770	0.000	0.55	0.05	0.55	0.004
19.915	0.000	0.53	0.05	0.54	0.004
20.060	0.000	0.52	0.05	0.53	0.004
20.205	0.000	0.52	0.05	0.52	0.004
20.350	0.000	0.51	0.05	0.51	0.004
20.495	0.000	0.50	0.05	0.50	0.004
20.640	0.000	0.49	0.05	0.50	0.004
20.785	0.000	0.48	0.04	0.49	0.004
20.930	0.000	0.48	0.04	0.48	0.004
21.075	0.000	0.47	0.04	0.47	0.004
21.220	0.000	0.46	0.04	0.47	0.004
21.365	0.000	0.45	0.04	0.46	0.004
21.510	0.000	0.45	0.04	0.45	0.003
21.655	0.000	0.44	0.04	0.45	0.003
21.800	0.000	0.44	0.04	0.44	0.003
21.945	0.000	0.43	0.04	0.44	0.003
22.090	0.000	0.43	0.04	0.43	0.003
22.235	0.000	0.42	0.04	0.42	0.003
22.380	0.000	0.42	0.04	0.42	0.003
22.525	0.000	0.41	0.04	0.41	0.003
22.670	0.000	0.41	0.04	0.41	0.003
22.815	0.000	0.40	0.04	0.41	0.003
22.960	0.000	0.40	0.04	0.40	0.003
23.105	0.000	0.39	0.04	0.40	0.003
23.250	0.000	0.39	0.04	0.39	0.003
23.395	0.000	0.39	0.04	0.39	0.003
23.540	0.000	0.38	0.04	0.38	0.003
23.685	0.000	0.38	0.04	0.38	0.003
23.830	0.000	0.38	0.03	0.38	0.003
23.975	0.000	0.37	0.03	0.37	0.003
24.120	0.000	0.37	0.03	0.37	0.003
24.265	0.000	0.00	0.00	0.21	0.000

1

WESTERLY TRUCK YARD

Elevation	Depth (feet)	Area (sq. ft.)	Volume (c.f.)	$\Sigma$ Volume (c.f.)	$\Sigma$ Volume (ac-ft)	Q Discharge (cfs)
834.56	0.00	0	402	402	0.01	2.90
834.80	0.24	3,350	1,573	1,975	0.05	3.90
835.00	0.44	12,376	3,589	5,564	0.13	4.70
835.20	0.64	23,516	5,405	10,969	0.25	5.40
835.40	0.84	30,534	6,663	17,632	0.40	6.00
835.60	1.04	36,096	7,784	25,416	0.58	6.60
835.80	1.24	41,749	8,842	34,258	0.79	7.10
836.00	1.44	46,670				

SMALL AREA UNIT HYDROGRAPH MODEL

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 Ver. 8.0 Release Date: 01/01/99 License ID 1435

Analysis prepared by:

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RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90  
 TOTAL CATCHMENT AREA(ACRES) = 6.20  
 SOIL-LOSS RATE, Fm, (INCH/HR) = 0.074  
 LOW LOSS FRACTION = 0.127  
 TIME OF CONCENTRATION(MIN.) = 8.80  
 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) = 0.42  
 30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.85  
 1-HOUR POINT RAINFALL VALUE(INCHES) = 1.15  
 3-HOUR POINT RAINFALL VALUE(INCHES) = 1.95  
 6-HOUR POINT RAINFALL VALUE(INCHES) = 2.50  
 24 HOUR POINT RAINFALL VALUE(INCHES) = 5.00

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 TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 2.03  
 TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 0.55

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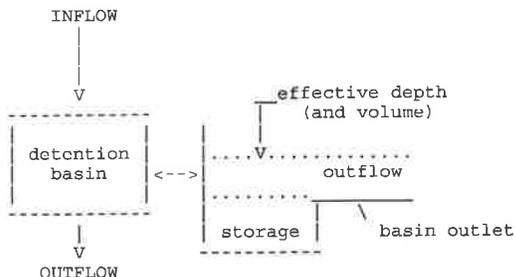
TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	5.0	10.0	15.0	20.0
0.01	0.0000	0.00	Q				
0.16	0.0031	0.51	.Q				
0.31	0.0093	0.51	.Q				
0.45	0.0155	0.51	.Q				
0.60	0.0217	0.52	.Q				
0.75	0.0279	0.52	.Q				
0.89	0.0342	0.52	.Q				
1.04	0.0406	0.52	.Q				
1.19	0.0469	0.53	.Q				
1.33	0.0533	0.53	.Q				
1.48	0.0597	0.53	.Q				
1.63	0.0661	0.53	.Q				
1.77	0.0726	0.54	.Q				
1.92	0.0791	0.54	.Q				
2.07	0.0857	0.54	.Q				
2.21	0.0923	0.54	.Q				
2.36	0.0989	0.55	.Q				
2.51	0.1055	0.55	.Q				
2.65	0.1122	0.55	.Q				
2.80	0.1189	0.56	.Q				
2.95	0.1257	0.56	.Q				
3.09	0.1325	0.56	.Q				
3.24	0.1393	0.57	.Q				
3.39	0.1462	0.57	.Q				
3.53	0.1531	0.57	.Q				
3.68	0.1601	0.57	.Q				
3.83	0.1671	0.58	.Q				
3.97	0.1741	0.58	.Q				
4.12	0.1812	0.59	.Q				
4.27	0.1883	0.59	.Q				
4.41	0.1955	0.59	.Q				
4.56	0.2027	0.60	.Q				
4.71	0.2099	0.60	.Q				
4.85	0.2172	0.60	.Q				
5.00	0.2246	0.61	.Q				
5.15	0.2320	0.61	.Q				
5.29	0.2395	0.62	.Q				
5.44	0.2470	0.62	.Q				
5.59	0.2545	0.63	.Q				
5.73	0.2621	0.63	.Q				
5.88	0.2698	0.63	.Q				
6.03	0.2775	0.64	.Q				
6.17	0.2853	0.64	.Q				
6.32	0.2931	0.65	.Q				
6.47	0.3010	0.65	.Q				
6.61	0.3089	0.66	.Q				
6.76	0.3169	0.66	.Q				
6.91	0.3250	0.67	.Q				
7.05	0.3331	0.67	.Q				
7.20	0.3414	0.68	.Q				
7.35	0.3496	0.69	.Q				
7.49	0.3580	0.69	.Q				
7.64	0.3664	0.70	.Q				
7.79	0.3749	0.70	.Q				
7.93	0.3834	0.71	.Q				
8.08	0.3921	0.71	.Q				
8.23	0.4008	0.72	.Q				
8.37	0.4096	0.73	.Q				



23.04	1.9849	0.55	.Q	*	*	*	*
23.19	1.9915	0.54	.Q	*	*	*	*
23.33	1.9980	0.53	.Q	*	*	*	*
23.48	2.0044	0.53	.Q	*	*	*	*
23.63	2.0108	0.52	.Q	*	*	*	*
23.77	2.0171	0.52	.Q	*	*	*	*
23.92	2.0234	0.51	.Q	*	*	*	*
24.07	2.0296	0.51	.Q	*	*	*	*
24.21	2.0327	0.00	Q	*	*	*	*

FLOW-THROUGH DETENTION BASIN MODEL

SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:  
 CONSTANT HYDROGRAPH TIME UNIT (MINUTES) = 8.800  
 DEAD STORAGE (AF) = 0.00  
 SPECIFIED DEAD STORAGE (AF) FILLED = 0.00  
 ASSUMED INITIAL DEPTH (FEET) IN STORAGE BASIN = 0.00



DEPTH-VS.-STORAGE AND DEPTH-VS.-DISCHARGE INFORMATION:

TOTAL NUMBER OF BASIN DEPTH INFORMATION ENTRIES = 8

*BASIN-DEPTH (FEET)	STORAGE (ACRE-FEET)	OUTFLOW (CFS)	**BASIN-DEPTH (FEET)	STORAGE (ACRE-FEET)	OUTFLOW (CFS)	*
* 0.000	0.000	0.000**	0.240	0.010	2.900*	*
* 0.440	0.050	3.900**	0.640	0.130	4.700*	*
* 0.840	0.250	5.400**	1.040	0.400	6.000*	*
* 1.240	0.580	6.600**	1.440	0.790	7.100*	*

BASIN STORAGE, OUTFLOW AND DEPTH ROUTING VALUES:

INTERVAL NUMBER	DEPTH (FEET)	{S-O*DT/2} (ACRE-FEET)	{S+O*DT/2} (ACRE-FEET)
1	0.00	0.00000	0.00000
2	0.24	-0.00758	0.02758
3	0.44	0.02636	0.07364
4	0.64	0.10152	0.15848
5	0.84	0.21727	0.28273
6	1.04	0.36364	0.43636
7	1.24	0.54000	0.62000
8	1.44	0.74697	0.83303

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.

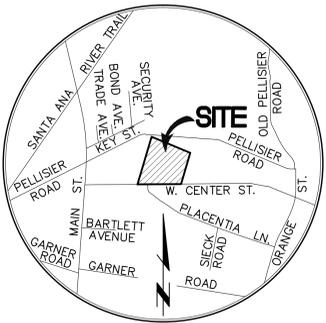
TIME (HRS)	DEAD-STORAGE FILLED (AF)	INFLOW (CFS)	EFFECTIVE DEPTH (FT)	OUTFLOW (CFS)	EFFECTIVE VOLUME (AF)
0.013	0.000	0.00	0.00	0.00	0.000
0.160	0.000	0.51	0.05	0.32	0.002
0.307	0.000	0.51	0.05	0.65	0.002
0.453	0.000	0.51	0.05	0.65	0.002
0.600	0.000	0.52	0.05	0.66	0.002
0.747	0.000	0.52	0.05	0.66	0.002
0.893	0.000	0.52	0.05	0.66	0.002
1.040	0.000	0.52	0.06	0.66	0.002
1.187	0.000	0.53	0.06	0.67	0.002
1.333	0.000	0.53	0.06	0.67	0.002
1.480	0.000	0.53	0.06	0.67	0.002
1.627	0.000	0.53	0.06	0.68	0.002
1.773	0.000	0.54	0.06	0.68	0.002
1.920	0.000	0.54	0.06	0.68	0.002
2.067	0.000	0.54	0.06	0.69	0.002
2.213	0.000	0.54	0.06	0.69	0.002
2.360	0.000	0.55	0.06	0.70	0.002
2.507	0.000	0.55	0.06	0.70	0.002
2.653	0.000	0.55	0.06	0.70	0.002
2.800	0.000	0.56	0.06	0.71	0.002
2.947	0.000	0.56	0.06	0.71	0.002
3.093	0.000	0.56	0.06	0.71	0.002
3.240	0.000	0.57	0.06	0.72	0.002
3.387	0.000	0.57	0.06	0.72	0.002
3.533	0.000	0.57	0.06	0.73	0.003
3.680	0.000	0.57	0.06	0.73	0.003
3.827	0.000	0.58	0.06	0.74	0.003
3.973	0.000	0.58	0.06	0.74	0.003
4.120	0.000	0.59	0.06	0.74	0.003
4.267	0.000	0.59	0.06	0.75	0.003

4.413	0.000	0.59	0.06	0.75	0.003
4.560	0.000	0.60	0.06	0.76	0.003
4.707	0.000	0.60	0.06	0.76	0.003
4.853	0.000	0.60	0.06	0.77	0.003
5.000	0.000	0.61	0.06	0.77	0.003
5.147	0.000	0.61	0.06	0.78	0.003
5.293	0.000	0.62	0.07	0.78	0.003
5.440	0.000	0.62	0.07	0.79	0.003
5.587	0.000	0.63	0.07	0.79	0.003
5.733	0.000	0.63	0.07	0.80	0.003
5.880	0.000	0.63	0.07	0.81	0.003
6.027	0.000	0.64	0.07	0.81	0.003
6.173	0.000	0.64	0.07	0.82	0.003
6.320	0.000	0.65	0.07	0.82	0.003
6.467	0.000	0.65	0.07	0.83	0.003
6.613	0.000	0.66	0.07	0.84	0.003
6.760	0.000	0.66	0.07	0.84	0.003
6.907	0.000	0.67	0.07	0.85	0.003
7.053	0.000	0.67	0.07	0.86	0.003
7.200	0.000	0.68	0.07	0.86	0.003
7.347	0.000	0.69	0.07	0.87	0.003
7.493	0.000	0.69	0.07	0.88	0.003
7.640	0.000	0.70	0.07	0.88	0.003
7.787	0.000	0.70	0.07	0.89	0.003
7.933	0.000	0.71	0.07	0.90	0.003
8.080	0.000	0.71	0.08	0.91	0.003
8.227	0.000	0.72	0.08	0.92	0.003
8.373	0.000	0.73	0.08	0.93	0.003
8.520	0.000	0.74	0.08	0.93	0.003
8.667	0.000	0.74	0.08	0.94	0.003
8.813	0.000	0.75	0.08	0.95	0.003
8.960	0.000	0.76	0.08	0.96	0.003
9.107	0.000	0.77	0.08	0.97	0.003
9.253	0.000	0.77	0.08	0.98	0.003
9.400	0.000	0.78	0.08	0.99	0.003
9.547	0.000	0.79	0.08	1.00	0.003
9.693	0.000	0.80	0.08	1.01	0.004
9.840	0.000	0.81	0.09	1.03	0.004
9.987	0.000	0.82	0.09	1.04	0.004
10.133	0.000	0.83	0.09	1.05	0.004
10.280	0.000	0.84	0.09	1.06	0.004
10.427	0.000	0.85	0.09	1.08	0.004
10.573	0.000	0.86	0.09	1.09	0.004
10.720	0.000	0.87	0.09	1.11	0.004
10.867	0.000	0.89	0.09	1.12	0.004
11.013	0.000	0.90	0.09	1.14	0.004
11.160	0.000	0.91	0.10	1.15	0.004
11.307	0.000	0.92	0.10	1.17	0.004
11.453	0.000	0.94	0.10	1.19	0.004
11.600	0.000	0.95	0.10	1.21	0.004
11.747	0.000	0.97	0.10	1.23	0.004
11.893	0.000	0.98	0.10	1.25	0.004
12.040	0.000	1.01	0.11	1.27	0.004
12.187	0.000	0.76	0.08	1.13	0.003
12.333	0.000	0.76	0.08	0.97	0.003
12.480	0.000	0.77	0.08	0.97	0.003
12.627	0.000	0.80	0.08	1.00	0.004
12.773	0.000	0.81	0.09	1.03	0.004
12.920	0.000	0.84	0.09	1.05	0.004
13.067	0.000	0.86	0.09	1.09	0.004
13.213	0.000	0.90	0.09	1.12	0.004
13.360	0.000	0.92	0.10	1.16	0.004
13.507	0.000	0.96	0.10	1.20	0.004
13.653	0.000	0.99	0.10	1.24	0.004
13.800	0.000	1.04	0.11	1.29	0.005
13.947	0.000	1.07	0.11	1.34	0.005
14.093	0.000	1.31	0.14	1.52	0.006
14.240	0.000	1.56	0.16	1.83	0.007
14.387	0.000	1.65	0.17	2.05	0.007
14.533	0.000	1.70	0.18	2.14	0.007
14.680	0.000	1.82	0.19	2.24	0.008
14.827	0.000	1.89	0.20	2.36	0.008
14.973	0.000	2.05	0.22	2.51	0.009
15.120	0.000	2.15	0.23	2.68	0.009
15.267	0.000	2.40	0.25	2.84	0.011
15.413	0.000	2.56	0.26	2.95	0.013
15.560	0.000	2.76	0.27	3.00	0.015
15.707	0.000	3.13	0.29	3.08	0.019
15.853	0.000	4.12	0.34	3.26	0.029
16.000	0.000	5.85	0.45	3.67	0.056
16.147	0.000	18.20	0.79	4.59	0.221
16.293	0.000	3.51	0.76	5.17	0.201
16.440	0.000	2.56	0.71	5.02	0.171
16.587	0.000	2.27	0.66	4.85	0.139
16.733	0.000	1.97	0.58	4.61	0.107
16.880	0.000	1.76	0.51	4.32	0.076
17.027	0.000	1.60	0.43	4.00	0.047
17.173	0.000	1.10	0.28	3.47	0.019
17.320	0.000	1.01	0.11	2.20	0.004
17.467	0.000	0.94	0.10	1.24	0.004
17.613	0.000	0.88	0.09	1.16	0.004
17.760	0.000	0.83	0.09	1.09	0.004
17.907	0.000	0.78	0.08	1.03	0.003
18.053	0.000	0.74	0.08	0.97	0.003
18.200	0.000	1.00	0.11	1.11	0.004
18.347	0.000	0.96	0.10	1.25	0.004
18.493	0.000	0.93	0.10	1.21	0.004
18.640	0.000	0.90	0.10	1.17	0.004
18.787	0.000	0.88	0.09	1.14	0.004

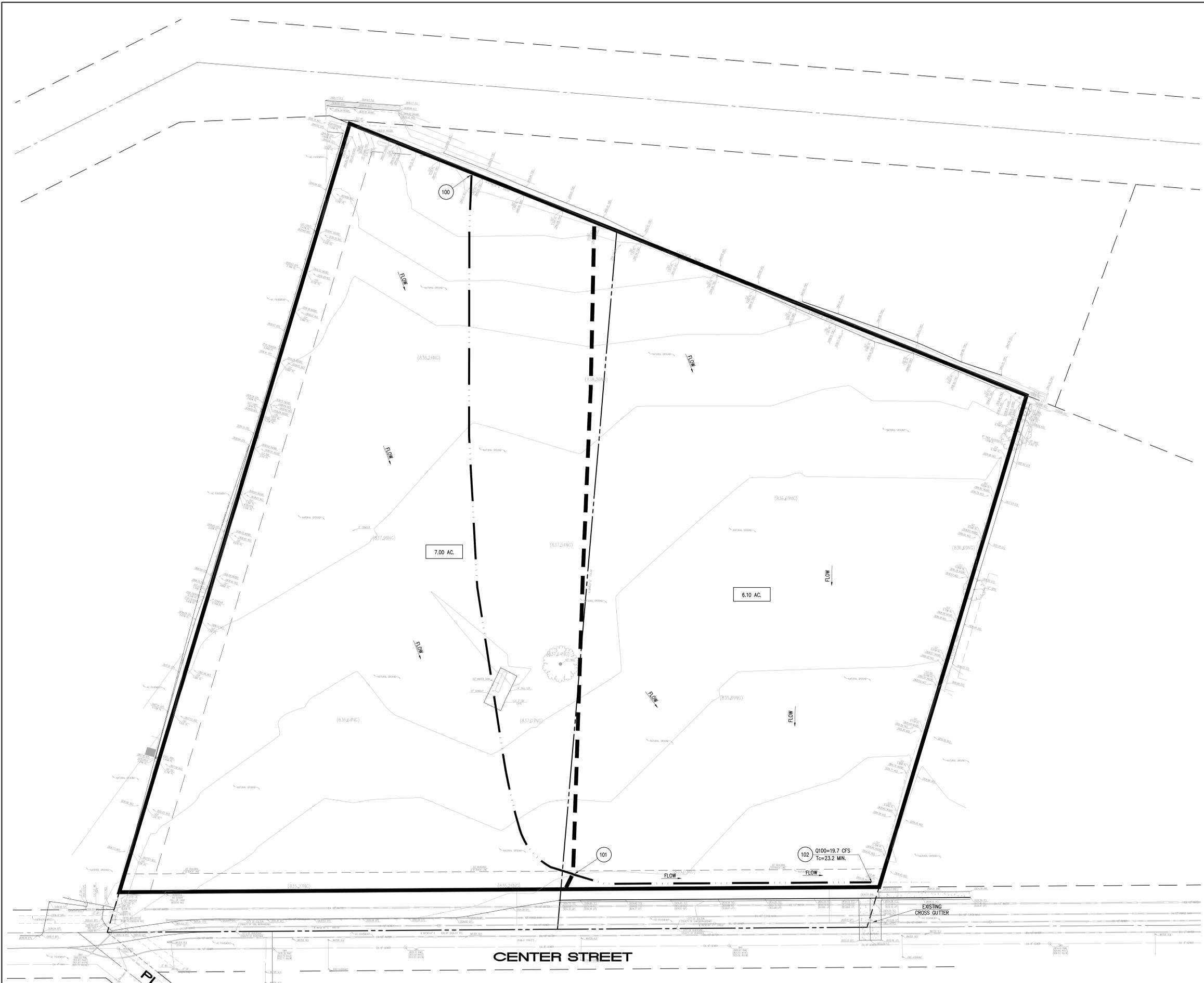
18.933	0.000	0.86	0.09	1.11	0.004
19.080	0.000	0.83	0.09	1.08	0.004
19.227	0.000	0.81	0.09	1.05	0.004
19.373	0.000	0.80	0.08	1.03	0.003
19.520	0.000	0.78	0.08	1.00	0.003
19.667	0.000	0.76	0.08	0.98	0.003
19.813	0.000	0.75	0.08	0.96	0.003
19.960	0.000	0.73	0.08	0.94	0.003
20.107	0.000	0.72	0.08	0.93	0.003
20.253	0.000	0.71	0.07	0.91	0.003
20.400	0.000	0.69	0.07	0.89	0.003
20.547	0.000	0.68	0.07	0.88	0.003
20.693	0.000	0.67	0.07	0.86	0.003
20.840	0.000	0.66	0.07	0.85	0.003
20.987	0.000	0.65	0.07	0.84	0.003
21.133	0.000	0.64	0.07	0.82	0.003
21.280	0.000	0.63	0.07	0.81	0.003
21.427	0.000	0.62	0.07	0.80	0.003
21.573	0.000	0.61	0.06	0.79	0.003
21.720	0.000	0.61	0.06	0.78	0.003
21.867	0.000	0.60	0.06	0.77	0.003
22.013	0.000	0.59	0.06	0.76	0.003
22.160	0.000	0.58	0.06	0.75	0.003
22.307	0.000	0.58	0.06	0.74	0.003
22.453	0.000	0.57	0.06	0.73	0.003
22.600	0.000	0.56	0.06	0.72	0.002
22.747	0.000	0.56	0.06	0.71	0.002
22.893	0.000	0.55	0.06	0.71	0.002
23.040	0.000	0.55	0.06	0.70	0.002
23.187	0.000	0.54	0.06	0.69	0.002
23.333	0.000	0.53	0.06	0.68	0.002
23.480	0.000	0.53	0.06	0.68	0.002
23.627	0.000	0.52	0.06	0.67	0.002
23.773	0.000	0.52	0.05	0.66	0.002
23.920	0.000	0.51	0.05	0.66	0.002
24.067	0.000	0.51	0.05	0.65	0.002
24.213	0.000	0.00	0.00	0.32	0.000

# **APPENDIX D**

# **HYDROLOGY MAP**

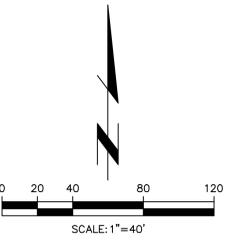


VICINITY MAP  
N.T.S.



**LEGEND**

- PROJECT BOUNDARY
- SUBAREA BOUNDARY
- FLOW LINE
- SUBAREA AREA
- NODE NUMBER
- FLOW ARROW



Last Update: 8/4/17  
G:\3500-3599\3573\3573jdr-es.dwg

**CITY OF COLTON**  
PUBLIC WORKS DEPARTMENT

**EXISTING CONDITION  
HYDROLOGY MAP**

**CENTER STREET  
INDUSTRIAL DEVELOPMENT**

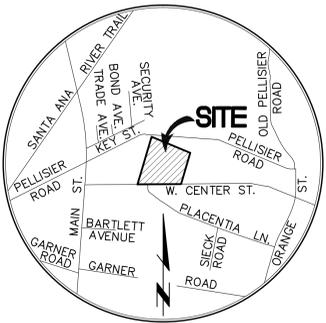
Designed by _____	Approved by _____	Date _____
Checked by _____	Public Works Director _____	R.C.E. XXXXX
Designed by _____		
Date _____		
Checked by _____		
Date _____		

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

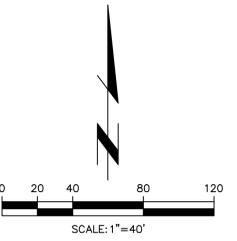
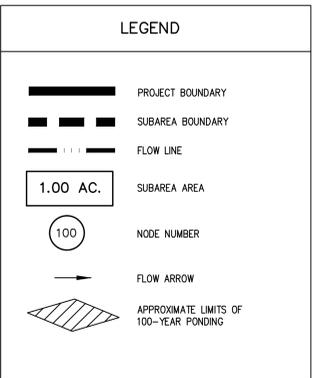
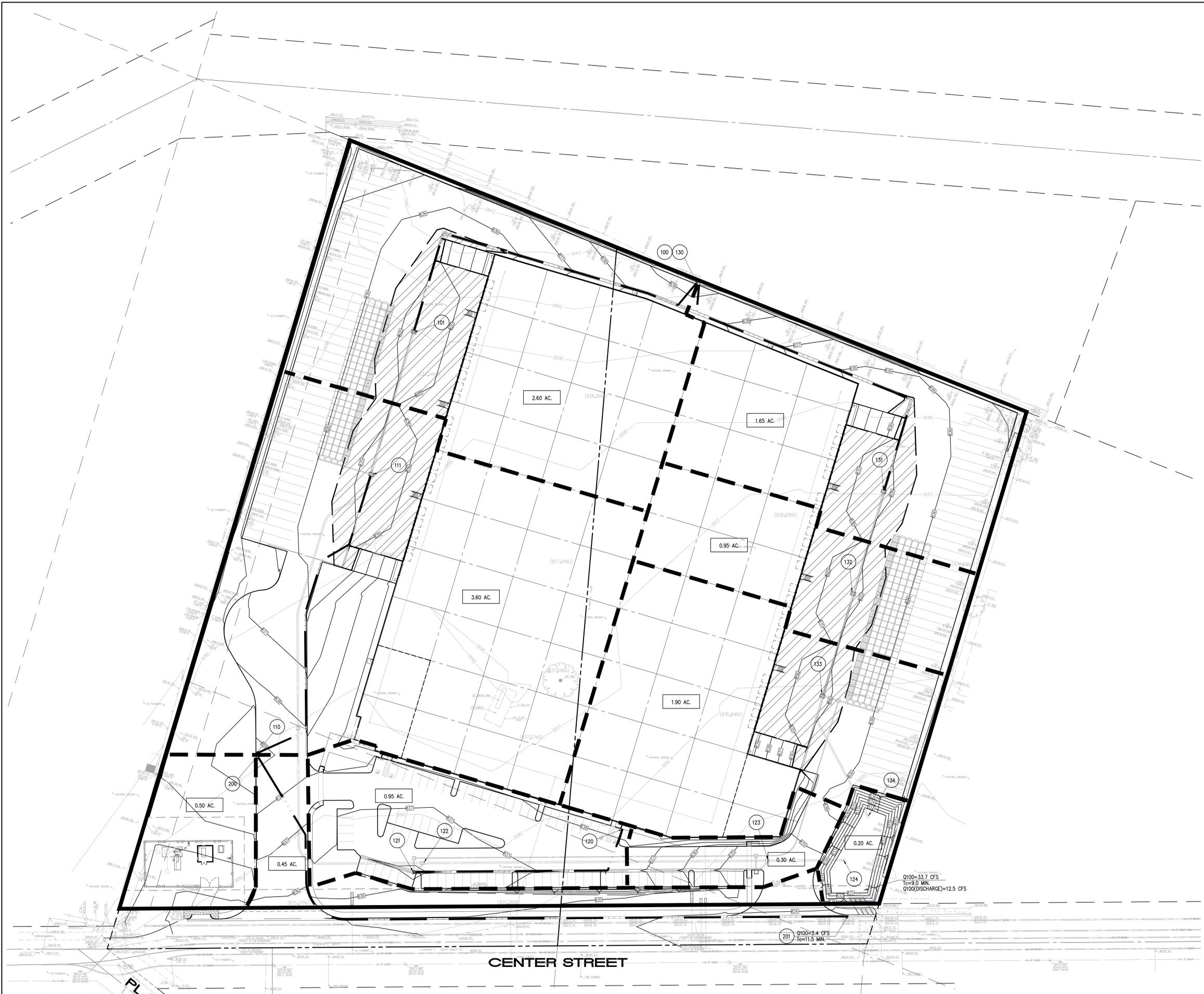
**PREPARED FOR:**  
Hillwood Investments  
901 Via Piemonte, Suite 175  
Ontario, CA 91764  
PHONE: (909)382-0033  
FAX: (909)382-0073



3573 / 1 OF 1 SHEET



VICINITY MAP  
N.T.S.



Q100=33.7 CFS  
Tc=9.0 MIN.  
Q100(DISCHARGE)=12.5 CFS

Q100=2.4 CFS  
Tc=11.5 MIN.

Last Update: 8/4/17  
G:\3500-3599\3573\3573.dwg

**CITY OF COLTON**  
PUBLIC WORKS DEPARTMENT

**PROPOSED CONDITION  
HYDROLOGY MAP**

**CENTER STREET  
INDUSTRIAL DEVELOPMENT**

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

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

**PREPARED FOR:**  
Hillwood Investments  
901 Via Piemonte, Suite 175  
Ontario, CA 91764  
PHONE: (909)382-0033  
FAX: (909)382-0073

