APPENDIX E: PRELIMINARY HYDROLOGY REPORT

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Oct-2022
2022-318

11115 Hemlock Avenue

City of Fontana, CA

Preliminary Hydrology Report

Prepared For:

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APPENDICIES

1. INTRODUCTION

The purpose of this study is to demonstrate that the proposed project site can be designed to provide adequate flood protection without adversely impacting existing off-site drainage systems or adjacent properties. The scope of this analysis includes the pre-developed and post-developed runoff analysis.

2. EXISTING SITE DESCRIPTION

2.1. EXISTING SITE TOPOGRAPHY & HYDROLOGIC PATTERNS

The project site is located on Hemlock Avenue, approximately 750-ft north of Jurupa Avenue in the City of Fontana, County of San Bernardino. The site is currently bounded to the north by existing commercial developments, to the east by Beech Avenue, to the south by an industrial development, and to the west by Hemlock Avenue.

The total area, after dedication, of the project site is 37.40 acres. The site was once utilized as a mobile trailer storage yard. The site is currently vacant with two existing buildings remaining to be demolished. Ground surface cover throughout the majority of the site consists of decomposed granite with areas of asphalt concrete pavements surrounding the existing buildings. Most of the northern side of the site consists of Portland cement concrete. Landscape planters are present along the west and east property lines of the site.

The site consists of two (2) drainage areas in the existing condition: Drainage Area A (DA-A) and Drainage Area B (DA-B). The natural drainage pattern for DA-A in the existing condition is northeast to southwest. Stormwater sheet flow towards an existing gutter adjacent to the existing screen wall along the west property line. Openings underneath the screen wall are located at the west-central area and southwest corner of the site to allow stormwater to discharge onto Hemlock Avenue. Runoff ultimately is captured by the existing street catch basins, which is connected to an existing 39-inch public storm drain system in Hemlock Avenue.

The natural drainage pattern for DA-B in the existing condition is northwest to southeast. Stormwater sheet flow towards an existing gutter adjacent to the existing screen wall along the east property line. There is an opening underneath the screen wall located at southeast corner of the site to allow stormwater to discharge onto Beech Avenue. Runoff ultimately is captured by the existing street catch basins, which is connected to an existing 42-inch public storm drain system in Beech Avenue. See Figure 1 for the pre-development drainage map.

3. PROJECT SITE DESCRIPTION

3.1. PROJECT DESCRIPTION & HYDROLOGIC PATTERNS

The envisioned development is a proposed industrial facility with a proposed building of approximately 750,000 square feet. Proposed auto parking spaces are located south of the site, and trailer parking spaces are located west and east of the site. Docking areas are located west and east of the proposed building. Open landscape planter areas are proposed around the perimeter of the site.

The proposed development will alter the natural drainage pattern due to grading feasibility of the proposed development, however, the point of connection into the existing public storm system will be maintained. Surface runoff will be captured by a series of proposed on-site catch basins and into the proposed on-site storm drainage system. Stormwater from building roof areas will be captured by roof leaders and discharge onto the ground surface and into the proposed catch basins. The proposed on-site storm drain systems will convey the flows into two (2) proposed underground infiltration chambers. These chamber systems will be designed to meet the project's water

quality requirements and provide sufficient storage for the increase stormwater volume based on the proposed development of the site. In a large event, stormwater will bypass the chamber system and gravity flow into the existing public storm drain systems. The west half of the site will ultimately discharge into the existing 39-inch public storm drain system in Hemlock Avenue. The east half of the site will ultimately discharge into the existing 42-inch public storm drain system in Beech Avenue.

4. RESULTS & ANALYSIS

4.1. METHODOLOGY

The proposed drainage areas were analyzed using the San Bernardino (SB) County Hydrology Manual for the 100-year storm event. The main methods used for this project were the Rational Method and Synthetic Unit Hydrograph Method. Civil Design software was used to compute the data. Solving for the Rational Method returns the peak flow rate. Unit Hydrograph analysis will determine the total volume generated from a storm event.

According to the City of Fontana Soils Map, the site is entirely composed of type A soil (See Appendix D). The proposed land use was analyzed as commercial for both the pre- and post-development condition. According to the county's manual, Antecedent Moisture Condition (AMC) I is used for the 2-year storm event and AMC III was used for the 100-year storm event in order to give more confidence to mitigate any increase runoff, if needed.

For the rational method analysis, the runoff coefficient is determined by the land use for each condition. The rainfall intensities are based on the time of concentration for each drainage area and the intensity-duration curves provided in the county's manual. The flow lengths and terrain elevations were determined using existing topography for the pre-development condition and the conceptual grading plans for the post-development condition.

For the unit hydrograph analysis, the lag time was determined by using the time of concentration based on the rational method analysis. Rainfall depths were obtained from the National Oceanic and Atmospheric Administration (NOAA) Point Precipitation Frequency Estimates. The rainfall depth data are included in Appendix D. The rainfall used in the hydrology calculations are summarized on Table 4.1.

Table 4.1: Rainfall Depths

Storm Event & Duration	Rainfall Depth (inches)
2-Year, 1-Hour	0.518
2-Year, 6-Hour	1.36
2-Year, 24-Hour	2.46
100-Year, 1-Hour	1.33
100-Year, 6-Hour	3.11
100-Year, 24-Hour	5.69

4.2. HYDROLOGY RESULTS & ANALYSIS

The complete rational method analysis and results are included in Appendix B. The complete unit hydrograph analysis and results are included in Appendix C. The tables below provide a summary of the peak flow rate and runoff volume for the pre-developed and post-developed condition for the 2- and 100-year storm.

Table 4.2.1: Pre-Development Hydrology Summary Table				
Storm Event	Area (Acres)	Tc (min.)	Flow Rate (cfs) (Rational Method)	Volume (cf) (Unit Hydrograph)
Drainage Area A				
2-Year	29.19	13.63	11.44	--
100-Year			59.13	330,220
Drainage Area B				
2-Year	8.22	18.19	1.18	--
100-Year			14.91	57,534

Table 4.2.2: Post-Development Hydrology Summary Table				
Storm Event	Area (Acres)	Tc (min.)	Flow Rate (cfs) (Rational Method)	Volume (cf) (Unit Hydrograph)
Drainage Area A				
2-Year	24.47	10.84	30.61	--
100-Year			82.55	444,521
Drainage Area B				
2-Year	12.94	10.68	16.57	--
100-Year			44.07	240,687

Table 4.2.3: Result Analysis Summary Table	
Hydrology Results & Analysis Summary Table:	**Drainage Area A** Total Area **= 1,065,855 SF (24.47 Acres)** $Q_{100, PRE}$ = **59.13 CFS** $Q_{100, POST}$ = **82.55 CFS** ΔQ_{100} = **+ 23.42 CFS** ΔV_{100} = **114,301 CF** DCV = **93,857 CF** (See Water Quality Management Plan) DCV > ΔV_{100} | **114,301 CF = Site Design Storage Requirement** **Volume Provided = 114,337 CF** (Underground Infiltration Chamber System A) **Drainage Area B** Total Area **= 563,558 (12.94 Acres)** $Q_{100, PRE}$ = **14.81 CFS** $Q_{100, POST}$ = **44.07 CFS** ΔQ_{100} = **+ 29.26 CFS** ΔV_{100} = **182,804 CF** DCV = **52,687 CF** (See Water Quality Management Plan) DCV > ΔV_{100} | **182,804 CF = Site Design Storage Requirement** **Volume Provided = 183,014 CF** (Underground Infiltration Chamber System B)

Based on the 100-year rational method analysis, the post-development flow rate increased compare to the pre-development flow rate. Furthermore, the post-development runoff volume increased compare to the pre-development runoff volume. The increase in flow rate and runoff volume was a result from increase in impervious area.

To mitigate the increase storm runoff volume, two (2) underground infiltration chambers are proposed for the project. The minimum storage volume of each chamber was determined by the difference between the post-development and pre-development runoff volume for the 100-year storm event. These chamber systems will also be designed to meet water quality requirements. This strategy will reduce any potential impacts to the downstream off-site storm drain system and give more confidence to mitigate the increase in runoff. Furthermore, the proposed chamber system will mitigate the increase drainage area for Drainage Area B, which runoff ultimately discharge into the existing 42-inch public storm drain system in Beech Avenue.

5. CONCLUSION

The proposed development would not create or contribute runoff that would exceed the capacity of the existing downstream storm drain system. Furthermore, the underground infiltration systems will be designed to accommodate the 100-year storm event and would not exceed the flow rates and runoff volumes generated by the existing condition. Once construction is complete, there would not be any substantial increase in flood boundaries, levels or frequencies in any areas outside the development. The hydrologic analyses and calculations were designed in accordance with the San Bernardino County Hydrology Manual. The results from the analysis will be the basis for the grading and on-site storm-drain construction documents for the project.

Evaluation of the appropriateness of guidelines and the accuracy of County data was beyond the scope of this study. Usage of this report is limited to address the purpose and scope previously defined by the project owner. The contents of this report are professional opinion and as such, are not to be considered a guaranty or warranty.

6. REFERENCES

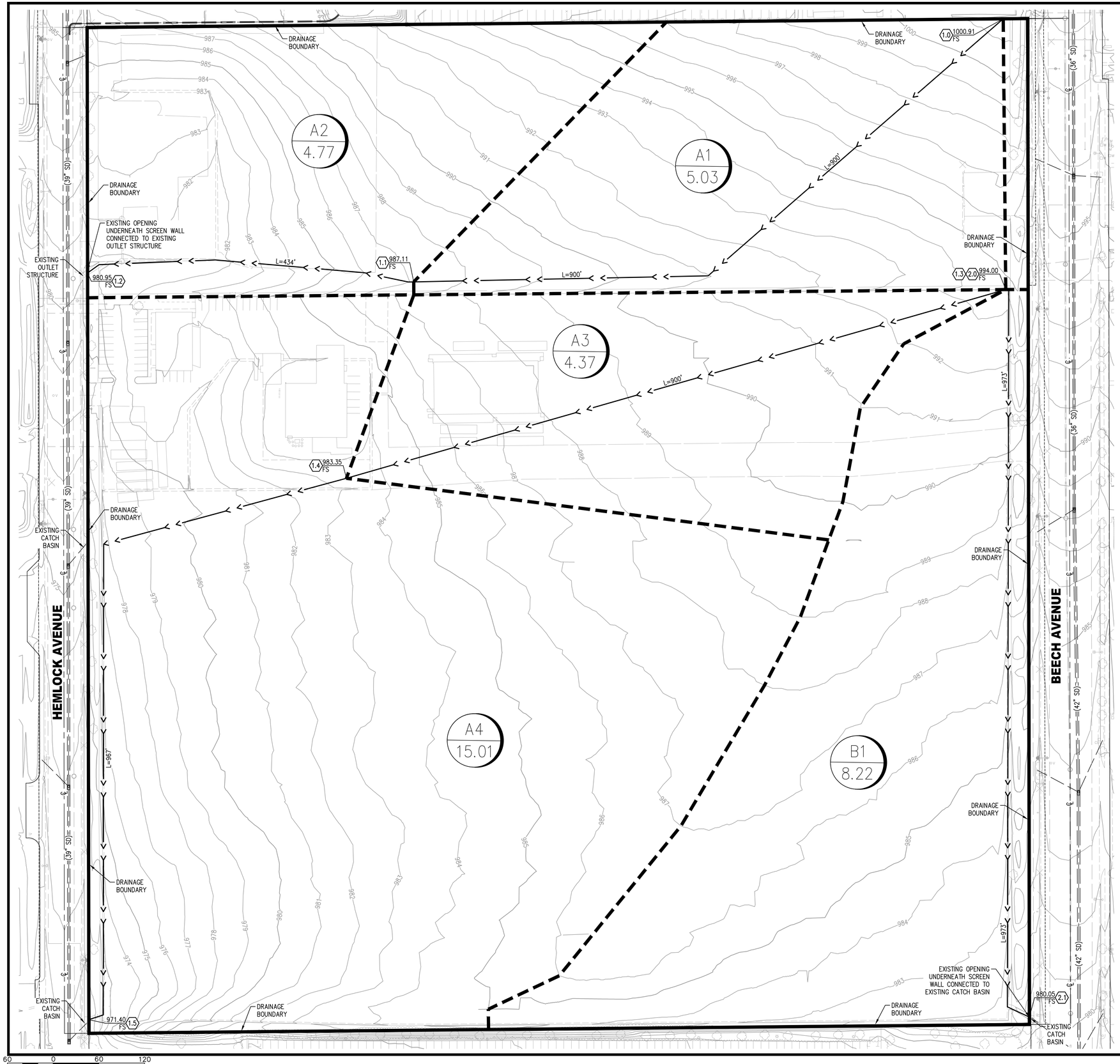
1. City of Fontana Water Quality Management Plan Handbook dated September 2016

2. National Oceanic and Atmospheric Administration (NOAA) Atlas 14 Point Precipitation Frequency Estimates

3. San Bernardino County Hydrology Manual dated August 1986

APPENDIX A

HYDROLOGY EXHIBITS



LEGEND

- PROJECT DRAINAGE BOUNDARY
- FLOW PATH
- SUB-DRAINAGE AREA ID
- X / X — SUB-DRAINAGE AREA IDENTIFIER
- SUB-DRAINAGE SURFACE AREA (ACRE)
- FLOW ARROW
- 1.0 — SURFACE FLOW NODE

ABBREVIATIONS

CF	CUBIC FEET
CL OR ℄	CENTERLINE
DA	DRAINAGE AREA
ES	EXISTING SURFACE ELEVATION
EX	EXISTING
HR	HOUR
IN	INCH/INCHES
INV	INVERT ELEVATION
L	LENGTH
R/W	RIGHT OF WAY
PL OR ℙ	PROPERTY LINE
PROP	PROPOSED
SD	STORM DRAIN
TYP	TYPICAL
ULT	ULTIMATE
V	VOLUME
W	WIDTH

PROJECT SITE SUMMARY

SITE AREA:	29.19 ACRE (AREA A) 8.22 ACRE (AREA B)	
SOIL GROUP:	A	(PER USDA WEB SOIL SURVEY)
IMPERVIOUS:	34%	(PRE-DEVELOPMENT)
ISOHYETALS:	0.518" 1.33"	(2-YEAR 1 HOUR) (100-YEAR 1 HOUR)
CN NUMBER:	32	(SOIL GROUP A)
FREQUENCY:	100 YEAR	(FOR STORM DRAIN DESIGN)
METHOD:	SAN BERNARDINO COUNTY HYDROLOGY MANUAL	

GENERAL NOTES

1. SEE PRELIMINARY HYDROLOGY REPORT, PREPARED BY WESTLAND GROUP, FOR THE COMPLETE PRE-DEVELOPMENT HYDROLOGY CALCULATIONS.
2. CALCULATIONS WERE BASED ON THE REQUIREMENTS ON THE SAN BERNARDINO HYDROLOGY MANUAL FOR 100 YEAR STORM.
3. ALL EXISTING ELEVATIONS AND INVERT ELEVATIONS ARE APPROXIMATE.
4. EXISTING TOPOGRAPHY INFORMATION AS SHOWN ON THIS DRAWING IS BASED ON THE TOPOGRAPHIC AERIAL SURVEY BY WESTLAND GROUP INC,. DATED AUGUST 10TH, 2022.

HYDROLOGY SUMMARY TABLE

AREA A

SUBAREAS ID	RUNOFF COEFFICIENT "C"	TIME OF CONC. "Tc" (MIN.)	RAINFALL INTENSITY "I" (INCH/HOUR)	DRAINAGE AREA (AC)	RUNOFF FLOW RATE "Q_{100}" (CFS)
A1	0.881	10.65	3.752	5.03	16.63
A2	0.879	12.51	3.407	4.77	12.73
A3	0.665	18.32	2.710	4.37	7.88
A4	0.651	20.20	2.556	15.01	24.37
TOTAL:	0.720	13.63	3.237	29.19	59.13

AREA B

SUBAREAS ID	RUNOFF COEFFICIENT "C"	TIME OF CONC. "Tc" (MIN.)	RAINFALL INTENSITY "I" (INCH/HOUR)	DRAINAGE AREA (AC)	RUNOFF FLOW RATE "Q_{100}" (CFS)
B1	0.666	18.19	2.722	8.22	14.91

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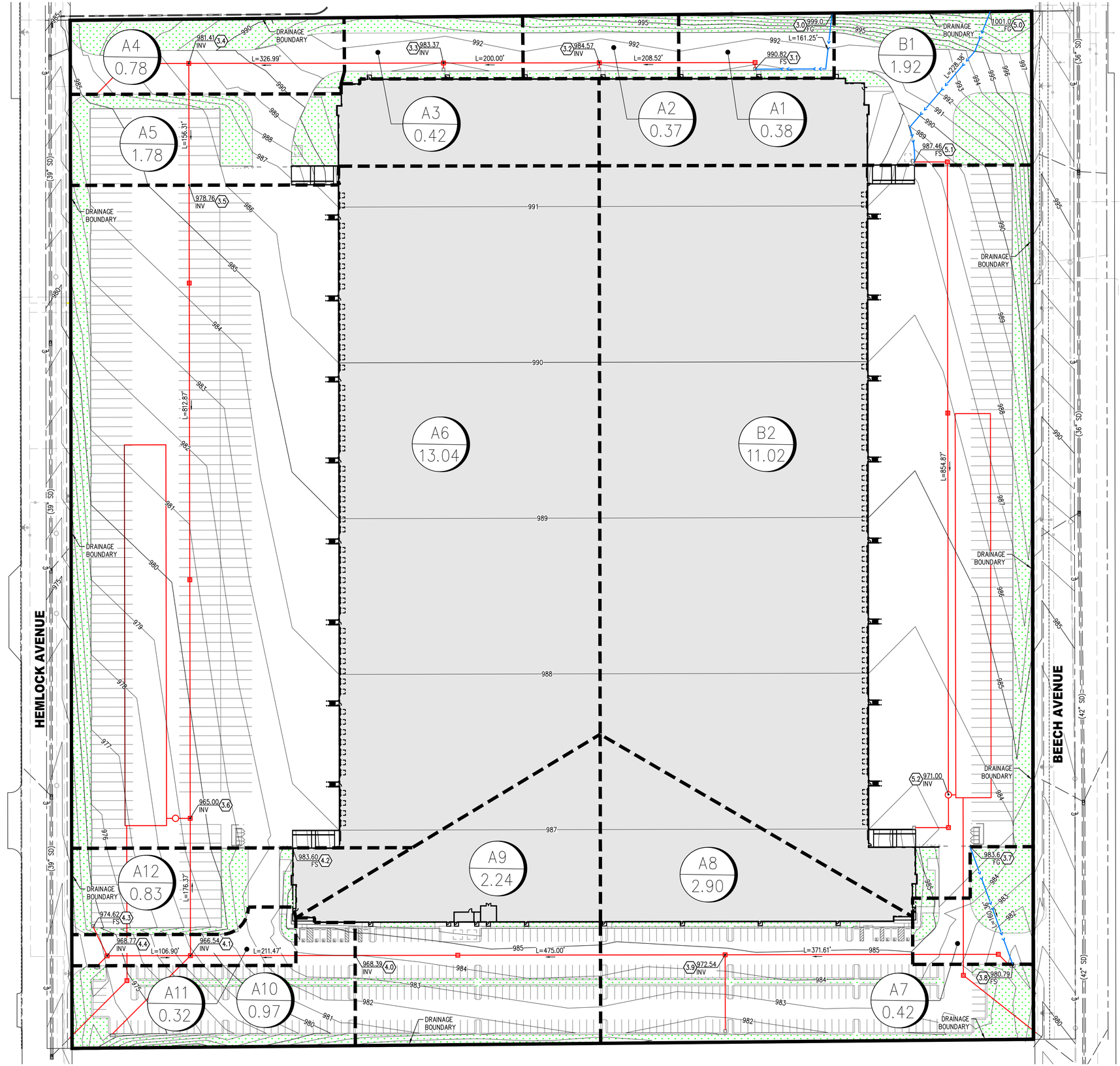
JOB NUMBER: 2022-318

CITY OF FONTANA, CALIFORNIA

11115 HEMLOCK AVENUE

SCALE: 1"=60'	**PRE - DEVELOPMENT DRAINAGE MAP**	FIGURE NO.: 1
DATE: 10/19/2022		
DRAWN BY: JL		



LEGEND

- PROJECT DRAINAGE BOUNDARY
- FLOW PATH
- STORM DRAIN
- SUB-DRAINAGE AREA ID
- X / X — SUB-DRAINAGE AREA IDENTIFIER
- SUB-DRAINAGE SURFACE AREA (ACRE)
- FLOW ARROW
- 3.0 — SURFACE FLOW NODE

ABBREVIATIONS

CF	CUBIC FEET
CL OR ℄	CENTERLINE
CMP	CORRUGATED METAL PIPE
DA	DRAINAGE AREA
EX	EXISTING
FS	FINISHED SURFACE ELEVATION
HR	HOUR
IN	INCH/INCHES
INV	INVERT ELEVATION
L	LENGTH
R/W	RIGHT OF WAY
PL OR ℙ	PROPERTY LINE
PROP	PROPOSED
SD	STORM DRAIN
TYP	TYPICAL
ULT	ULTIMATE
V	VOLUME
W	WIDTH

PROJECT SITE SUMMARY

SITE AREA:	24.46 ACRE (AREA A) 12.94 ACRE (AREA B)	
SOIL GROUP:	A	(PER USDA WEB SOIL SURVEY)
IMPERVIOUS:	89%	(POST-DEVELOPMENT)
ISOHYETALS:	0.518" 1.33"	(2-YEAR 1 HOUR) (100-YEAR 1 HOUR)
CN NUMBER:	32	(SOIL GROUP A)
FREQUENCY:	100 YEAR	(FOR STORM DRAIN DESIGN)
METHOD:	SAN BERNARDINO COUNTY HYDROLOGY MANUAL	

GENERAL NOTES

1. SEE PRELIMINARY HYDROLOGY REPORT, PREPARED BY WESTLAND GROUP, FOR THE COMPLETE POST-DEVELOPMENT HYDROLOGY CALCULATIONS.
2. CALCULATIONS WERE BASED ON THE REQUIREMENTS ON THE SAN BERNARDINO HYDROLOGY MANUAL FOR 100 YEAR STORM.
3. PROPOSED ON-SITE DRAINAGE SYSTEM LAYOUT IS PRELIMINARY.
4. ALL FINISH ELEVATIONS AND INVERT ELEVATIONS ARE APPROXIMATE.

HYDROLOGY SUMMARY TABLE

AREA A

SUBAREAS ID	RUNOFF COEFFICIENT "C"	TIME OF CONC. "Tc" (MIN.)	RAINFALL INTENSITY "I" (INCH/HOUR)	DRAINAGE AREA (AC)	RUNOFF FLOW RATE "Q_{100}" (CFS)
A1	0.851	5.17	5.787	0.38	1.87
A2	0.851	5.45	5.610	0.37	1.77
A3	0.850	5.78	5.416	0.42	1.94
A4	0.835	8.71	4.235	0.78	2.76
A5	0.873	7.42	4.661	1.78	7.24
A6	0.892	10.84	3.714	13.04	43.22
A7	0.825	6.89	4.872	0.42	1.69
A8	0.876	9.28	4.076	2.90	10.35
A9	0.884	10.14	3.864	2.24	7.65
A10	0.858	7.83	4.513	0.97	3.76
A11	0.866	6.98	4.837	0.32	3.48
A12	0.896	4.93	5.957	0.83	1.71
TOTAL:	0.880	10.84	3.714	24.46	82.55

AREA B

SUBAREAS ID	RUNOFF COEFFICIENT "C"	TIME OF CONC. "Tc" (MIN.)	RAINFALL INTENSITY "I" (INCH/HOUR)	DRAINAGE AREA (AC)	RUNOFF FLOW RATE "Q_{100}" (CFS)
B1	0.861	5.42	5.627	1.92	9.30
B2	0.891	10.68	3.746	11.02	36.77
TOTAL:	0.88	10.68	3.746	12.94	44.07

UNDERGROUND INFILTRATION CHAMBER SUMMARY

CHAMBER SYSTEM	RUNOFF VOLUME "V_{100}" (CF)	STORAGE VOLUME (CF)	MAXIMUM PONDING DEPTH (FT)
SYSTEM A	114,301	114,337	9.0
SYSTEM B	182,804	183,014	9.0

60 0 60 120
scale 1" = 60' feet

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11115 HEMLOCK AVENUE

SCALE: 1"=60'
DATE: 10/19/2022
DRAWN BY: JL

POST - DEVELOPMENT DRAINAGE MAP

FIGURE NO.: 2

APPENDIX B

RATIONAL METHOD ANALYSIS (2/100 YEAR STORM)

RATIONAL METHOD ANALYSIS

PRE-DEVELOPMENT CONDITIONS

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 10/18/22

JOB NO. 2022-318
11115 HEMLOCK AVENUE
2 YEAR, RATIONAL METHOD
PRE-CONDITION, AREA A

Program License Serial Number 6277

********* Hydrology Study Control Information **********

Rational hydrology study storm event year is 2.0
Computed rainfall intensity:
Storm year = 2.00 1 hour rainfall = 0.518 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 1

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Process from Point/Station 1.000 to Point/Station 1.100
**** INITIAL AREA EVALUATION ****

COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 32.00
Adjusted SCS curve number for AMC 1 = 16.60
Pervious ratio(Ap) = 0.1000 Max loss rate(Fm)= 0.100(In/Hr)
Initial subarea data:
Initial area flow distance = 900.000(Ft.)
Top (of initial area) elevation = 1000.910(Ft.)
Bottom (of initial area) elevation = 987.110(Ft.)
Difference in elevation = 13.800(Ft.)
Slope = 0.01533 s(%)= 1.53
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 10.652 min.
Rainfall intensity = 1.461(In/Hr) for a 2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.838
Subarea runoff = 6.163(CFS)
Total initial stream area = 5.030(Ac.)
Pervious area fraction = 0.100
Initial area Fm value = 0.100(In/Hr)

++

Process from Point/Station 1.100 to Point/Station 1.200
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 987.110(Ft.)

```
Downstream point elevation =   980.950(Ft.)
Channel length thru subarea  =   434.000(Ft.)
Channel base width      =   10.000(Ft.)
Slope or 'Z' of left channel bank = 100.000
Slope or 'Z' of right channel bank = 100.000
Estimated mean flow rate at midpoint of channel =      8.390(CFS)
Manning's 'N'    = 0.011
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =      8.390(CFS)
Depth of flow =   0.125(Ft.), Average velocity =   2.993(Ft/s)
Channel flow top width =   34.946(Ft.)
Flow Velocity =    2.99(Ft/s)
Travel time  =    2.42 min.
Time of concentration =   13.07 min.
Critical depth =      0.170(Ft.)
 Adding area flow to channel
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 1 = 16.60
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.100(In/Hr)
Rainfall intensity =      1.293(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.830
Subarea runoff =      4.356(CFS) for    4.770(Ac.)
Total runoff =     10.519(CFS)
Effective area this stream =        9.80(Ac.)
Total Study Area (Main Stream No. 1) =        9.80(Ac.)
Area averaged Fm value =    0.100(In/Hr)
Depth of flow =   0.139(Ft.), Average velocity =   3.177(Ft/s)
Critical depth =      0.189(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.200 to Point/Station        1.500
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =   966.350(Ft.)
Downstream point/station elevation =   959.400(Ft.)
Pipe length  =   623.08(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    10.519(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =    10.519(CFS)
Normal flow depth in pipe =   13.97(In.)
Flow top width inside pipe =   15.01(In.)
Critical Depth =   14.95(In.)
Pipe flow velocity =      7.14(Ft/s)
Travel time through pipe =    1.45 min.
Time of concentration (TC) =    14.52 min.


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Process from Point/Station        1.200 to Point/Station        1.500
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      9.800(Ac.)
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```
Runoff from this stream =     10.519(CFS)
Time of concentration =   14.52 min.
Rainfall intensity =     1.213(In/Hr)
Area averaged loss rate (Fm) =    0.1000(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.300 to Point/Station        1.400
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 1 = 16.60
Pervious ratio(Ap) = 0.9000     Max loss rate(Fm)=     0.900(In/Hr)
Initial subarea data:
Initial area flow distance =   900.000(Ft.)
Top (of initial area) elevation =   994.000(Ft.)
Bottom (of initial area) elevation =   983.350(Ft.)
Difference in elevation =    10.650(Ft.)
Slope =    0.01183  s(%)=       1.18
TC = k(0.496)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   18.321 min.
Rainfall intensity =      1.055(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.133
Subarea runoff =      0.612(CFS)
Total initial stream area =        4.370(Ac.)
Pervious area fraction = 0.900
Initial area Fm value =    0.900(In/Hr)


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Process from Point/Station        1.400 to Point/Station        1.500
**** IMPROVED CHANNEL TRAVEL TIME ****
________________________________________________________________________
Upstream point elevation =   983.350(Ft.)
Downstream point elevation =   971.400(Ft.)
Channel length thru subarea  =   967.000(Ft.)
Channel base width      =    1.500(Ft.)
Slope or 'Z' of left channel bank =   0.000
Slope or 'Z' of right channel bank =   2.667
Estimated mean flow rate at midpoint of channel =      0.644(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    0.500(Ft.)
Flow(q) thru subarea =      0.644(CFS)
Depth of flow =   0.144(Ft.), Average velocity =   2.654(Ft/s)
Channel flow top width =    1.883(Ft.)
Flow Velocity =    2.65(Ft/s)
Travel time  =    6.07 min.
Time of concentration =   24.39 min.
Critical depth =      0.170(Ft.)
 Adding area flow to channel
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 1 = 16.60
Pervious ratio(Ap) = 0.9000     Max loss rate(Fm)=     0.900(In/Hr)
Rainfall intensity =      0.889(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
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rational method)(Q=KCIA) is C = 0.090
Subarea runoff =      0.939(CFS) for   15.010(Ac.)
Total runoff =      1.550(CFS)
Effective area this stream =       19.38(Ac.)
Total Study Area (Main Stream No. 2) =       29.18(Ac.)
Area averaged Fm value =    0.900(In/Hr)
Depth of flow =   0.241(Ft.), Average velocity =   3.525(Ft/s)
Critical depth =      0.293(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.400 to Point/Station        1.500
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     19.380(Ac.)
Runoff from this stream =      1.550(CFS)
Time of concentration =   24.39 min.
Rainfall intensity =     0.889(In/Hr)
Area averaged loss rate (Fm) =    0.9000(In/Hr)
Area averaged Pervious ratio (Ap) = 0.9000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1     10.52     9.800     14.52    0.100      1.213
2      1.55    19.380     24.39    0.900      0.889
Qmax(1) =
           1.000 *    1.000 *    10.519) +
Fm Value exceeds Rainfall Intensity in one of the streams
Summing flow rates for conflunce solution
           1.000 *    0.595 *     1.550) + =      11.442
Qmax(2) =
           0.709 *    1.000 *    10.519) +
           1.000 *    1.000 *     1.550) + =       9.004

Total of 2 main streams to confluence:
Flow rates before confluence point:
      11.519       2.550
Maximum flow rates at confluence using above data:
       11.442        9.004
Area of streams before confluence:
        9.800       19.380
Effective area values after confluence:
       21.338       29.180


Results of confluence:
Total flow rate =     11.442(CFS)
Time of concentration =    14.523 min.
Effective stream area after confluence  =     21.338(Ac.)
Study area average Pervious fraction(Ap) =  0.631
Study area average soil loss rate(Fm) =    0.631(In/Hr)
Study area total =      29.18(Ac.)
End of computations, Total Study Area =           29.18 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
```

effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.631
Area averaged SCS curve number = 32.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 10/18/22

JOB NO. 2022-318
11115 HEMLOCK AVENUE
2 YEAR, RATIONAL METHOD
PRE-CONDITION, AREA B

Program License Serial Number 6277

********* Hydrology Study Control Information **********

Rational hydrology study storm event year is 2.0
Computed rainfall intensity:
Storm year = 2.00 1 hour rainfall = 0.518 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 1

++
Process from Point/Station 2.200 to Point/Station 2.300
**** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 32.00
Adjusted SCS curve number for AMC 1 = 16.60
Pervious ratio(Ap) = 0.9000 Max loss rate(Fm)= 0.900(In/Hr)
Initial subarea data:
Initial area flow distance = 973.000(Ft.)
Top (of initial area) elevation = 994.000(Ft.)
Bottom (of initial area) elevation = 980.050(Ft.)
Difference in elevation = 13.950(Ft.)
Slope = 0.01434 s(%)= 1.43
TC = k(0.496)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 18.189 min.
Rainfall intensity = 1.060(In/Hr) for a 2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.136
Subarea runoff = 1.184(CFS)
Total initial stream area = 8.220(Ac.)
Pervious area fraction = 0.900
Initial area Fm value = 0.900(In/Hr)
End of computations, Total Study Area = 8.22 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.900
Area averaged SCS curve number = 32.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 10/18/22

JOB NO. 2022-318
11115 HEMLOCK AVENUE
100 YEAR, RATIONAL METHOD
PRE-CONDITION, AREA A

Program License Serial Number 6277

********* Hydrology Study Control Information **********

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.330 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 3

++

Process from Point/Station 1.000 to Point/Station 1.100
**** INITIAL AREA EVALUATION ****

COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.1000 Max loss rate(Fm)= 0.079(In/Hr)
Initial subarea data:
Initial area flow distance = 900.000(Ft.)
Top (of initial area) elevation = 1000.910(Ft.)
Bottom (of initial area) elevation = 987.110(Ft.)
Difference in elevation = 13.800(Ft.)
Slope = 0.01533 s(%)= 1.53
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 10.652 min.
Rainfall intensity = 3.752(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.881
Subarea runoff = 16.630(CFS)
Total initial stream area = 5.030(Ac.)
Pervious area fraction = 0.100
Initial area Fm value = 0.079(In/Hr)

++

Process from Point/Station 1.100 to Point/Station 1.200
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 987.110(Ft.)

```
Downstream point elevation =   980.950(Ft.)
Channel length thru subarea  =   434.000(Ft.)
Channel base width      =   10.000(Ft.)
Slope or 'Z' of left channel bank = 100.000
Slope or 'Z' of right channel bank = 100.000
Estimated mean flow rate at midpoint of channel =     23.020(CFS)
Manning's 'N'    = 0.011
Maximum depth of channel  =    1.000(Ft.)
Flow(q) thru subarea =     23.020(CFS)
Depth of flow =   0.198(Ft.), Average velocity =   3.895(Ft/s)
Channel flow top width =   49.640(Ft.)
Flow Velocity =    3.89(Ft/s)
Travel time  =    1.86 min.
Time of concentration =   12.51 min.
Critical depth =      0.273(Ft.)
 Adding area flow to channel
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.079(In/Hr)
Rainfall intensity =      3.407(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.879
Subarea runoff =     12.729(CFS) for    4.770(Ac.)
Total runoff =     29.359(CFS)
Effective area this stream =        9.80(Ac.)
Total Study Area (Main Stream No. 1) =        9.80(Ac.)
Area averaged Fm value =    0.079(In/Hr)
Depth of flow =   0.221(Ft.), Average velocity =   4.146(Ft/s)
Critical depth =      0.305(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.200 to Point/Station        1.500
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =   966.350(Ft.)
Downstream point/station elevation =   959.400(Ft.)
Pipe length  =   623.08(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    29.359(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    29.359(CFS)
Normal flow depth in pipe =   19.97(In.)
Flow top width inside pipe =   23.70(In.)
Critical Depth =   22.55(In.)
Pipe flow velocity =      9.31(Ft/s)
Travel time through pipe =    1.12 min.
Time of concentration (TC) =    13.63 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.200 to Point/Station        1.500
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      9.800(Ac.)
```

```
Runoff from this stream =     29.359(CFS)
Time of concentration =   13.63 min.
Rainfall intensity =     3.237(In/Hr)
Area averaged loss rate (Fm) =    0.0785(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.300 to Point/Station        1.400
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.9000     Max loss rate(Fm)=     0.707(In/Hr)
Initial subarea data:
Initial area flow distance =   900.000(Ft.)
Top (of initial area) elevation =   994.000(Ft.)
Bottom (of initial area) elevation =   983.350(Ft.)
Difference in elevation =    10.650(Ft.)
Slope =    0.01183  s(%)=       1.18
TC = k(0.496)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   18.321 min.
Rainfall intensity =      2.710(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.665
Subarea runoff =      7.879(CFS)
Total initial stream area =        4.370(Ac.)
Pervious area fraction = 0.900
Initial area Fm value =    0.707(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.400 to Point/Station        1.500
**** IMPROVED CHANNEL TRAVEL TIME ****
________________________________________________________________________
Upstream point elevation =   983.350(Ft.)
Downstream point elevation =   971.400(Ft.)
Channel length thru subarea  =   967.000(Ft.)
Channel base width      =    1.500(Ft.)
Slope or 'Z' of left channel bank =   0.000
Slope or 'Z' of right channel bank =   2.667
Estimated mean flow rate at midpoint of channel =     20.111(CFS)
Manning's 'N'    = 0.015
Maximum depth of channel  =    0.500(Ft.)
Flow(q) thru subarea =     20.111(CFS)
Depth of flow =   0.946(Ft.), Average velocity =   8.564(Ft/s)
!!Warning: Water is above left or right bank elevations
Channel flow top width =    2.834(Ft.)
Flow Velocity =    8.56(Ft/s)
Travel time  =    1.88 min.
Time of concentration =   20.20 min.
Critical depth =      1.281(Ft.)
ERROR - Channel depth exceeds maximum allowable depth
 Adding area flow to channel
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.9000     Max loss rate(Fm)=     0.707(In/Hr)
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```
Rainfall intensity =      2.556(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.651
Subarea runoff =     24.371(CFS) for   15.010(Ac.)
Total runoff =     32.250(CFS)
Effective area this stream =       19.38(Ac.)
Total Study Area (Main Stream No. 2) =       29.18(Ac.)
Area averaged Fm value =    0.707(In/Hr)
Depth of flow =   1.218(Ft.), Average velocity =  10.345(Ft/s)
!!Warning: Water is above left or right bank elevations
ERROR - Channel depth exceeds maximum allowable depth
Critical depth =      1.719(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.400 to Point/Station        1.500
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     19.380(Ac.)
Runoff from this stream =     32.250(CFS)
Time of concentration =   20.20 min.
Rainfall intensity =     2.556(In/Hr)
Area averaged loss rate (Fm) =    0.7066(In/Hr)
Area averaged Pervious ratio (Ap) = 0.9000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1     29.36     9.800     13.63    0.079      3.237
2     32.25    19.380     20.20    0.707      2.556
Qmax(1) =
           1.000 *    1.000 *    29.359) +
           1.368 *    0.674 *    32.250) + =      59.125
Qmax(2) =
           0.784 *    1.000 *    29.359) +
           1.000 *    1.000 *    32.250) + =      55.276

Total of 2 main streams to confluence:
Flow rates before confluence point:
      30.359      33.250
Maximum flow rates at confluence using above data:
       59.125       55.276
Area of streams before confluence:
        9.800       19.380
Effective area values after confluence:
       22.871       29.180


Results of confluence:
Total flow rate =     59.125(CFS)
Time of concentration =    13.625 min.
Effective stream area after confluence  =     22.871(Ac.)
Study area average Pervious fraction(Ap) =  0.631
Study area average soil loss rate(Fm) =    0.496(In/Hr)
Study area total =      29.18(Ac.)
End of computations, Total Study Area =           29.18 (Ac.)
The following figures may
```

be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.631
Area averaged SCS curve number = 32.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 10/18/22

JOB NO. 2022-318
11115 HEMLOCK AVENUE
100 YEAR, RATIONAL METHOD
PRE-CONDITION, AREA B

Program License Serial Number 6277

********* Hydrology Study Control Information **********

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.330 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 3

++
Process from Point/Station 2.200 to Point/Station 2.300
**** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.9000 Max loss rate(Fm)= 0.707(In/Hr)
Initial subarea data:
Initial area flow distance = 973.000(Ft.)
Top (of initial area) elevation = 994.000(Ft.)
Bottom (of initial area) elevation = 980.050(Ft.)
Difference in elevation = 13.950(Ft.)
Slope = 0.01434 s(%)= 1.43
TC = k(0.496)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 18.189 min.
Rainfall intensity = 2.722(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.666
Subarea runoff = 14.908(CFS)
Total initial stream area = 8.220(Ac.)
Pervious area fraction = 0.900
Initial area Fm value = 0.707(In/Hr)
End of computations, Total Study Area = 8.22 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.900
Area averaged SCS curve number = 32.0

RATIONAL METHOD ANALYSIS

POST-DEVELOPMENT CONDITIONS

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 10/18/22

JOB NO. 2022-318
11115 HEMLOCK AVE
2 YEAR, RATIONAL METHOD
POST-CONDITION, AREA A1 TO A6

Program License Serial Number 6277

********* Hydrology Study Control Information **********

Rational hydrology study storm event year is 2.0
Computed rainfall intensity:
Storm year = 2.00 1 hour rainfall = 0.518 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 1

++

Process from Point/Station 3.000 to Point/Station 3.100
**** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 32.00
Adjusted SCS curve number for AMC 1 = 16.60
Pervious ratio(Ap) = 0.4000 Max loss rate(Fm)= 0.400(In/Hr)
Initial subarea data:
Initial area flow distance = 161.250(Ft.)
Top (of initial area) elevation = 999.000(Ft.)
Bottom (of initial area) elevation = 990.820(Ft.)
Difference in elevation = 8.180(Ft.)
Slope = 0.05073 s(%)= 5.07
TC = k(0.373)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 5.174 min.
Rainfall intensity = 2.254(In/Hr) for a 2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.740
Subarea runoff = 0.634(CFS)
Total initial stream area = 0.380(Ac.)
Pervious area fraction = 0.400
Initial area Fm value = 0.400(In/Hr)

++

Process from Point/Station 3.100 to Point/Station 3.200
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 985.820(Ft.)
Downstream point/station elevation = 984.570(Ft.)
Pipe length = 208.52(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 0.634(CFS)

```
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     0.634(CFS)
Normal flow depth in pipe =    4.48(In.)
Flow top width inside pipe =    9.00(In.)
Critical Depth =    4.34(In.)
Pipe flow velocity =      2.89(Ft/s)
Travel time through pipe =    1.20 min.
Time of concentration (TC) =     6.38 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.100 to Point/Station        3.200
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      0.380(Ac.)
Runoff from this stream =      0.634(CFS)
Time of concentration =    6.38 min.
Rainfall intensity =     1.988(In/Hr)
Area averaged loss rate (Fm) =    0.4000(In/Hr)
Area averaged Pervious ratio (Ap) = 0.4000
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.200 to Point/Station        3.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 1 = 16.60
Pervious ratio(Ap) = 0.3900     Max loss rate(Fm)=     0.390(In/Hr)
Initial subarea data:
Initial area flow distance =   163.100(Ft.)
Top (of initial area) elevation =   997.080(Ft.)
Bottom (of initial area) elevation =   990.760(Ft.)
Difference in elevation =     6.320(Ft.)
Slope =    0.03875  s(%)=       3.87
TC = k(0.371)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    5.449 min.
Rainfall intensity =      2.185(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.739
Subarea runoff =      0.598(CFS)
Total initial stream area =        0.370(Ac.)
Pervious area fraction = 0.390
Initial area Fm value =    0.390(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.200 to Point/Station        3.200
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.370(Ac.)
Runoff from this stream =      0.598(CFS)
Time of concentration =    5.45 min.
Rainfall intensity =     2.185(In/Hr)
Area averaged loss rate (Fm) =    0.3900(In/Hr)
```

```
Area averaged Pervious ratio (Ap) = 0.3900
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1      0.63     0.380      6.38    0.400      1.988
2      0.60     0.370      5.45    0.390      2.185
Qmax(1) =
           1.000 *    1.000 *     0.634) +
           0.891 *    1.000 *     0.598) + =       1.166
Qmax(2) =
           1.124 *    0.855 *     0.634) +
           1.000 *    1.000 *     0.598) + =       1.207

Total of 2 main streams to confluence:
Flow rates before confluence point:
       1.634       1.598
Maximum flow rates at confluence using above data:
        1.166        1.207
Area of streams before confluence:
        0.380        0.370
Effective area values after confluence:
        0.750        0.695


Results of confluence:
Total flow rate =      1.207(CFS)
Time of concentration =     5.449 min.
Effective stream area after confluence  =      0.695(Ac.)
Study area average Pervious fraction(Ap) =  0.395
Study area average soil loss rate(Fm) =    0.395(In/Hr)
Study area total =       0.75(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.200 to Point/Station        3.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =   984.570(Ft.)
Downstream point/station elevation =   983.370(Ft.)
Pipe length  =   200.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.207(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     1.207(CFS)
Normal flow depth in pipe =    6.95(In.)
Flow top width inside pipe =    7.55(In.)
Critical Depth =    6.07(In.)
Pipe flow velocity =      3.30(Ft/s)
Travel time through pipe =    1.01 min.
Time of concentration (TC) =     6.46 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.200 to Point/Station        3.300
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      0.695(Ac.)
```

```
Runoff from this stream =      1.207(CFS)
Time of concentration =    6.46 min.
Rainfall intensity =     1.973(In/Hr)
Area averaged loss rate (Fm) =    0.3951(In/Hr)
Area averaged Pervious ratio (Ap) = 0.3951
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.300 to Point/Station        3.300
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 1 = 16.60
Pervious ratio(Ap) = 0.3800     Max loss rate(Fm)=     0.380(In/Hr)
Initial subarea data:
Initial area flow distance =   161.380(Ft.)
Top (of initial area) elevation =   995.070(Ft.)
Bottom (of initial area) elevation =   990.650(Ft.)
Difference in elevation =     4.420(Ft.)
Slope =    0.02739  s(%)=       2.74
TC = k(0.368)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    5.777 min.
Rainfall intensity =      2.110(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.738
Subarea runoff =      0.654(CFS)
Total initial stream area =        0.420(Ac.)
Pervious area fraction = 0.380
Initial area Fm value =    0.380(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.300 to Point/Station        3.300
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.420(Ac.)
Runoff from this stream =      0.654(CFS)
Time of concentration =    5.78 min.
Rainfall intensity =     2.110(In/Hr)
Area averaged loss rate (Fm) =    0.3800(In/Hr)
Area averaged Pervious ratio (Ap) = 0.3800
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1      1.21     0.695      6.46    0.395      1.973
2      0.65     0.420      5.78    0.380      2.110
Qmax(1) =
           1.000 *    1.000 *     1.207) +
           0.921 *    1.000 *     0.654) + =       1.809
Qmax(2) =
           1.087 *    0.894 *     1.207) +
           1.000 *    1.000 *     0.654) + =       1.826

Total of 2 main streams to confluence:
```

```
Flow rates before confluence point:
       2.207       1.654
Maximum flow rates at confluence using above data:
        1.809        1.826
Area of streams before confluence:
        0.695        0.420
Effective area values after confluence:
        1.115        1.041


Results of confluence:
Total flow rate =      1.826(CFS)
Time of concentration =     5.777 min.
Effective stream area after confluence  =      1.041(Ac.)
Study area average Pervious fraction(Ap) =  0.389
Study area average soil loss rate(Fm) =    0.389(In/Hr)
Study area total =       1.11(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.300 to Point/Station        3.400
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =   983.370(Ft.)
Downstream point/station elevation =   981.410(Ft.)
Pipe length  =   326.99(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.826(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     1.826(CFS)
Normal flow depth in pipe =    7.13(In.)
Flow top width inside pipe =   11.78(In.)
Critical Depth =    6.91(In.)
Pipe flow velocity =      3.75(Ft/s)
Travel time through pipe =    1.45 min.
Time of concentration (TC) =     7.23 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.300 to Point/Station        3.400
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      1.041(Ac.)
Runoff from this stream =      1.826(CFS)
Time of concentration =    7.23 min.
Rainfall intensity =     1.844(In/Hr)
Area averaged loss rate (Fm) =    0.3894(In/Hr)
Area averaged Pervious ratio (Ap) = 0.3894
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.400 to Point/Station        3.400
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 1 = 16.60
Pervious ratio(Ap) = 0.3900     Max loss rate(Fm)=     0.390(In/Hr)
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```
Initial subarea data:
Initial area flow distance =   346.050(Ft.)
Top (of initial area) elevation =   991.360(Ft.)
Bottom (of initial area) elevation =   985.560(Ft.)
Difference in elevation =     5.800(Ft.)
Slope =    0.01676  s(%)=       1.68
TC = k(0.371)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.705 min.
Rainfall intensity =      1.649(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.687
Subarea runoff =      0.884(CFS)
Total initial stream area =        0.780(Ac.)
Pervious area fraction = 0.390
Initial area Fm value =    0.390(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.400 to Point/Station        3.400
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.780(Ac.)
Runoff from this stream =      0.884(CFS)
Time of concentration =    8.71 min.
Rainfall intensity =     1.649(In/Hr)
Area averaged loss rate (Fm) =    0.3900(In/Hr)
Area averaged Pervious ratio (Ap) = 0.3900
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1      1.83     1.041      7.23    0.389      1.844
2      0.88     0.780      8.71    0.390      1.649
Qmax(1) =
           1.000 *    1.000 *     1.826) +
           1.155 *    0.830 *     0.884) + =       2.674
Qmax(2) =
           0.866 *    1.000 *     1.826) +
           1.000 *    1.000 *     0.884) + =       2.466

Total of 2 main streams to confluence:
Flow rates before confluence point:
       2.826       1.884
Maximum flow rates at confluence using above data:
        2.674        2.466
Area of streams before confluence:
        1.041        0.780
Effective area values after confluence:
        1.689        1.821


Results of confluence:
Total flow rate =      2.674(CFS)
Time of concentration =     7.229 min.
Effective stream area after confluence  =      1.689(Ac.)
Study area average Pervious fraction(Ap) =  0.390
Study area average soil loss rate(Fm) =    0.390(In/Hr)
Study area total =       1.82(Ac.)
```

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Process from Point/Station        3.400 to Point/Station        3.500
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =   981.410(Ft.)
Downstream point/station elevation =   978.760(Ft.)
Pipe length  =   156.31(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.674(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     2.674(CFS)
Normal flow depth in pipe =    6.54(In.)
Flow top width inside pipe =   11.95(In.)
Critical Depth =    8.41(In.)
Pipe flow velocity =      6.12(Ft/s)
Travel time through pipe =    0.43 min.
Time of concentration (TC) =     7.65 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.400 to Point/Station        3.500
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      1.689(Ac.)
Runoff from this stream =      2.674(CFS)
Time of concentration =    7.65 min.
Rainfall intensity =     1.782(In/Hr)
Area averaged loss rate (Fm) =    0.3897(In/Hr)
Area averaged Pervious ratio (Ap) = 0.3897
Program is now starting with Main Stream No. 2


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Process from Point/Station        3.500 to Point/Station        3.500
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 1 = 16.60
Pervious ratio(Ap) = 0.1800     Max loss rate(Fm)=     0.180(In/Hr)
Initial subarea data:
Initial area flow distance =   370.380(Ft.)
Top (of initial area) elevation =   991.730(Ft.)
Bottom (of initial area) elevation =   984.280(Ft.)
Difference in elevation =     7.450(Ft.)
Slope =    0.02011  s(%)=       2.01
TC = k(0.319)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.420 min.
Rainfall intensity =      1.815(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.811
Subarea runoff =      2.620(CFS)
Total initial stream area =        1.780(Ac.)
Pervious area fraction = 0.180
Initial area Fm value =    0.180(In/Hr)


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Process from Point/Station        3.500 to Point/Station        3.500
**** CONFLUENCE OF MAIN STREAMS ****
--------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      1.780(Ac.)
Runoff from this stream =      2.620(CFS)
Time of concentration =    7.42 min.
Rainfall intensity =     1.815(In/Hr)
Area averaged loss rate (Fm) =    0.1800(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1800
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1      2.67     1.689      7.65    0.390      1.782
2      2.62     1.780      7.42    0.180      1.815
Qmax(1) =
           1.000 *    1.000 *     2.674) +
           0.979 *    1.000 *     2.620) + =       5.240
Qmax(2) =
           1.024 *    0.969 *     2.674) +
           1.000 *    1.000 *     2.620) + =       5.275

Total of 2 main streams to confluence:
Flow rates before confluence point:
       3.674       3.620
Maximum flow rates at confluence using above data:
        5.240        5.275
Area of streams before confluence:
        1.689        1.780
Effective area values after confluence:
        3.469        3.417


Results of confluence:
Total flow rate =      5.275(CFS)
Time of concentration =     7.420 min.
Effective stream area after confluence  =      3.417(Ac.)
Study area average Pervious fraction(Ap) =  0.282
Study area average soil loss rate(Fm) =    0.282(In/Hr)
Study area total =       3.47(Ac.)


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Process from Point/Station        3.500 to Point/Station        3.600
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
--------------------------------------------------------------------------------
Upstream point/station elevation =   978.760(Ft.)
Downstream point/station elevation =   965.000(Ft.)
Pipe length  =   812.87(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.275(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     5.275(CFS)
Normal flow depth in pipe =    8.61(In.)
Flow top width inside pipe =   14.83(In.)
Critical Depth =   11.17(In.)
Pipe flow velocity =      7.23(Ft/s)
Travel time through pipe =    1.87 min.
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Time of concentration (TC) =     9.29 min.


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Process from Point/Station        3.500 to Point/Station        3.600
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      3.417(Ac.)
Runoff from this stream =      5.275(CFS)
Time of concentration =    9.29 min.
Rainfall intensity =     1.586(In/Hr)
Area averaged loss rate (Fm) =    0.2821(In/Hr)
Area averaged Pervious ratio (Ap) = 0.2821
Program is now starting with Main Stream No. 2


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Process from Point/Station        3.600 to Point/Station        3.600
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 1 = 16.60
Pervious ratio(Ap) = 0.0400     Max loss rate(Fm)=     0.040(In/Hr)
Initial subarea data:
Initial area flow distance =   980.180(Ft.)
Top (of initial area) elevation =   987.140(Ft.)
Bottom (of initial area) elevation =   975.420(Ft.)
Difference in elevation =    11.720(Ft.)
Slope =    0.01196  s(%)=       1.20
TC = k(0.284)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.836 min.
Rainfall intensity =      1.446(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.875
Subarea runoff =     16.506(CFS)
Total initial stream area =       13.040(Ac.)
Pervious area fraction = 0.040
Initial area Fm value =    0.040(In/Hr)


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Process from Point/Station        3.600 to Point/Station        3.600
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     13.040(Ac.)
Runoff from this stream =     16.506(CFS)
Time of concentration =   10.84 min.
Rainfall intensity =     1.446(In/Hr)
Area averaged loss rate (Fm) =    0.0400(In/Hr)
Area averaged Pervious ratio (Ap) = 0.0400
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)
```

```
1      5.27     3.417      9.29    0.282      1.586
2     16.51    13.040     10.84    0.040      1.446
Qmax(1) =
           1.000 *    1.000 *     5.275) +
           1.099 *    0.858 *    16.506) + =      20.835
Qmax(2) =
           0.893 *    1.000 *     5.275) +
           1.000 *    1.000 *    16.506) + =      21.215

Total of 2 main streams to confluence:
Flow rates before confluence point:
       6.275      17.506
Maximum flow rates at confluence using above data:
       20.835       21.215
Area of streams before confluence:
        3.417       13.040
Effective area values after confluence:
       14.600       16.457


Results of confluence:
Total flow rate =     21.215(CFS)
Time of concentration =    10.836 min.
Effective stream area after confluence  =     16.457(Ac.)
Study area average Pervious fraction(Ap) =  0.090
Study area average soil loss rate(Fm) =    0.090(In/Hr)
Study area total =      16.46(Ac.)
End of computations, Total Study Area =           16.77 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.096
Area averaged SCS curve number =  32.0
```

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 10/18/22

JOB NO. 2022-318
11115 HEMLOCK AVE
2 YEAR, RATIONAL METHOD
POST-CONDITION, AREA A7 TO A10

Program License Serial Number 6277

********* Hydrology Study Control Information **********

Rational hydrology study storm event year is 2.0
Computed rainfall intensity:
Storm year = 2.00 1 hour rainfall = 0.518 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 1

++

Process from Point/Station 3.700 to Point/Station 3.800
**** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 32.00
Adjusted SCS curve number for AMC 1 = 16.60
Pervious ratio(Ap) = 0.5200 Max loss rate(Fm)= 0.520(In/Hr)
Initial subarea data:
Initial area flow distance = 160.360(Ft.)
Top (of initial area) elevation = 983.600(Ft.)
Bottom (of initial area) elevation = 980.790(Ft.)
Difference in elevation = 2.810(Ft.)
Slope = 0.01752 s(%)= 1.75
TC = k(0.403)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 6.892 min.
Rainfall intensity = 1.898(In/Hr) for a 2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.653
Subarea runoff = 0.521(CFS)
Total initial stream area = 0.420(Ac.)
Pervious area fraction = 0.520
Initial area Fm value = 0.520(In/Hr)

++

Process from Point/Station 3.800 to Point/Station 3.900
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 975.790(Ft.)
Downstream point/station elevation = 972.540(Ft.)
Pipe length = 371.61(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 0.521(CFS)

```
Nearest computed pipe diameter  =      6.00(In.)
Calculated individual pipe flow  =     0.521(CFS)
Normal flow depth in pipe =    4.88(In.)
Flow top width inside pipe =    4.68(In.)
Critical Depth =    4.42(In.)
Pipe flow velocity =      3.05(Ft/s)
Travel time through pipe =    2.03 min.
Time of concentration (TC) =     8.92 min.


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Process from Point/Station        3.800 to Point/Station        3.900
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      0.420(Ac.)
Runoff from this stream =      0.521(CFS)
Time of concentration =    8.92 min.
Rainfall intensity =     1.625(In/Hr)
Area averaged loss rate (Fm) =    0.5200(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5200
Program is now starting with Main Stream No. 2


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Process from Point/Station        3.900 to Point/Station        3.900
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 1 = 16.60
Pervious ratio(Ap) = 0.1400     Max loss rate(Fm)=     0.140(In/Hr)
Initial subarea data:
Initial area flow distance =   534.460(Ft.)
Top (of initial area) elevation =   987.610(Ft.)
Bottom (of initial area) elevation =   981.360(Ft.)
Difference in elevation =     6.250(Ft.)
Slope =    0.01169  s(%)=       1.17
TC = k(0.309)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.280 min.
Rainfall intensity =      1.587(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.821
Subarea runoff =      3.778(CFS)
Total initial stream area =        2.900(Ac.)
Pervious area fraction = 0.140
Initial area Fm value =    0.140(In/Hr)


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Process from Point/Station        3.900 to Point/Station        3.900
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      2.900(Ac.)
Runoff from this stream =      3.778(CFS)
Time of concentration =    9.28 min.
Rainfall intensity =     1.587(In/Hr)
Area averaged loss rate (Fm) =    0.1400(In/Hr)
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Area averaged Pervious ratio (Ap) = 0.1400
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1      0.52     0.420      8.92    0.520      1.625
2      3.78     2.900      9.28    0.140      1.587
Qmax(1) =
           1.000 *    1.000 *     0.521) +
           1.026 *    0.962 *     3.778) + =       4.248
Qmax(2) =
           0.966 *    1.000 *     0.521) +
           1.000 *    1.000 *     3.778) + =       4.281

Total of 2 main streams to confluence:
Flow rates before confluence point:
       1.521       4.778
Maximum flow rates at confluence using above data:
        4.248        4.281
Area of streams before confluence:
        0.420        2.900
Effective area values after confluence:
        3.209        3.320


Results of confluence:
Total flow rate =      4.281(CFS)
Time of concentration =     9.280 min.
Effective stream area after confluence  =      3.320(Ac.)
Study area average Pervious fraction(Ap) =  0.188
Study area average soil loss rate(Fm) =    0.188(In/Hr)
Study area total =       3.32(Ac.)


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Process from Point/Station        3.900 to Point/Station        4.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
____________________________________________________________________________
Upstream point/station elevation =   972.540(Ft.)
Downstream point/station elevation =   968.390(Ft.)
Pipe length  =   475.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.281(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     4.281(CFS)
Normal flow depth in pipe =    9.33(In.)
Flow top width inside pipe =   14.55(In.)
Critical Depth =   10.05(In.)
Pipe flow velocity =      5.34(Ft/s)
Travel time through pipe =    1.48 min.
Time of concentration (TC) =    10.76 min.


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Process from Point/Station        3.900 to Point/Station        4.000
**** CONFLUENCE OF MAIN STREAMS ****
____________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      3.320(Ac.)
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Runoff from this stream =      4.281(CFS)
Time of concentration =   10.76 min.
Rainfall intensity =     1.452(In/Hr)
Area averaged loss rate (Fm) =    0.1881(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1881
Program is now starting with Main Stream No. 2


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Process from Point/Station        4.000 to Point/Station        4.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 1 = 16.60
Pervious ratio(Ap) = 0.0900     Max loss rate(Fm)=     0.090(In/Hr)
Initial subarea data:
Initial area flow distance =   689.460(Ft.)
Top (of initial area) elevation =   987.610(Ft.)
Bottom (of initial area) elevation =   980.590(Ft.)
Difference in elevation =     7.020(Ft.)
Slope =    0.01018  s(%)=       1.02
TC = k(0.297)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.143 min.
Rainfall intensity =      1.505(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.846
Subarea runoff =      2.853(CFS)
Total initial stream area =        2.240(Ac.)
Pervious area fraction = 0.090
Initial area Fm value =    0.090(In/Hr)


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Process from Point/Station        4.000 to Point/Station        4.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      2.240(Ac.)
Runoff from this stream =      2.853(CFS)
Time of concentration =   10.14 min.
Rainfall intensity =     1.505(In/Hr)
Area averaged loss rate (Fm) =    0.0900(In/Hr)
Area averaged Pervious ratio (Ap) = 0.0900
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1      4.28     3.320     10.76    0.188      1.452
2      2.85     2.240     10.14    0.090      1.505
Qmax(1) =
           1.000 *    1.000 *     4.281) +
           0.963 *    1.000 *     2.853) + =       7.027
Qmax(2) =
           1.042 *    0.942 *     4.281) +
           1.000 *    1.000 *     2.853) + =       7.055

Total of 2 main streams to confluence:
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Flow rates before confluence point:
       5.281       3.853
Maximum flow rates at confluence using above data:
        7.027        7.055
Area of streams before confluence:
        3.320        2.240
Effective area values after confluence:
        5.560        5.368


Results of confluence:
Total flow rate =      7.055(CFS)
Time of concentration =    10.143 min.
Effective stream area after confluence  =      5.368(Ac.)
Study area average Pervious fraction(Ap) =  0.149
Study area average soil loss rate(Fm) =    0.149(In/Hr)
Study area total =       5.56(Ac.)


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Process from Point/Station        4.000 to Point/Station        4.100
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =   968.390(Ft.)
Downstream point/station elevation =   966.540(Ft.)
Pipe length  =   211.47(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     7.055(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     7.055(CFS)
Normal flow depth in pipe =   11.29(In.)
Flow top width inside pipe =   17.41(In.)
Critical Depth =   12.33(In.)
Pipe flow velocity =      6.05(Ft/s)
Travel time through pipe =    0.58 min.
Time of concentration (TC) =    10.73 min.


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Process from Point/Station        4.000 to Point/Station        4.100
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      5.368(Ac.)
Runoff from this stream =      7.055(CFS)
Time of concentration =   10.73 min.
Rainfall intensity =     1.455(In/Hr)
Area averaged loss rate (Fm) =    0.1486(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1486
Program is now starting with Main Stream No. 2


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Process from Point/Station        4.100 to Point/Station        4.100
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 1 = 16.60
Pervious ratio(Ap) = 0.2700     Max loss rate(Fm)=     0.270(In/Hr)
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Initial subarea data:
Initial area flow distance =   436.910(Ft.)
Top (of initial area) elevation =   986.380(Ft.)
Bottom (of initial area) elevation =   973.310(Ft.)
Difference in elevation =    13.070(Ft.)
Slope =    0.02991  s(%)=       2.99
TC = k(0.341)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.831 min.
Rainfall intensity =      1.758(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.762
Subarea runoff =      1.299(CFS)
Total initial stream area =        0.970(Ac.)
Pervious area fraction = 0.270
Initial area Fm value =    0.270(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        4.100 to Point/Station        4.100
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.970(Ac.)
Runoff from this stream =      1.299(CFS)
Time of concentration =    7.83 min.
Rainfall intensity =     1.758(In/Hr)
Area averaged loss rate (Fm) =    0.2700(In/Hr)
Area averaged Pervious ratio (Ap) = 0.2700
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1      7.05     5.368     10.73    0.149      1.455
2      1.30     0.970      7.83    0.270      1.758
Qmax(1) =
           1.000 *    1.000 *     7.055) +
           0.797 *    1.000 *     1.299) + =       8.089
Qmax(2) =
           1.231 *    0.730 *     7.055) +
           1.000 *    1.000 *     1.299) + =       7.641

Total of 2 main streams to confluence:
Flow rates before confluence point:
       8.055       2.299
Maximum flow rates at confluence using above data:
        8.089        7.641
Area of streams before confluence:
        5.368        0.970
Effective area values after confluence:
        6.338        4.890


Results of confluence:
Total flow rate =      8.089(CFS)
Time of concentration =    10.725 min.
Effective stream area after confluence  =      6.338(Ac.)
Study area average Pervious fraction(Ap) =  0.167
Study area average soil loss rate(Fm) =    0.167(In/Hr)
Study area total =       6.34(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        4.100 to Point/Station        4.100
**** CONFLUENCE OF MAIN STREAMS ****
____________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      6.338(Ac.)
Runoff from this stream =      8.089(CFS)
Time of concentration =   10.73 min.
Rainfall intensity =     1.455(In/Hr)
Area averaged loss rate (Fm) =    0.1671(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1671
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        4.100 to Point/Station        4.100
**** USER DEFINED FLOW INFORMATION AT A POINT ****
____________________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 1 = 16.60
Pervious ratio(Ap) = 0.2000     Max loss rate(Fm)=     0.200(In/Hr)
Rainfall intensity =      1.818(In/Hr) for a     2.0 year storm
User specified values are as follows:
TC =   7.40 min.  Rain intensity =       1.82(In/Hr)
Total area this stream =         1.15(Ac.)
Total Study Area (Main Stream No. 2) =        7.68(Ac.)
Total runoff =      1.76(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        4.100 to Point/Station        4.100
**** CONFLUENCE OF MAIN STREAMS ****
____________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      1.150(Ac.)
Runoff from this stream =      1.764(CFS)
Time of concentration =    7.40 min.
Rainfall intensity =     1.818(In/Hr)
Area averaged loss rate (Fm) =    0.2000(In/Hr)
Area averaged Pervious ratio (Ap) = 0.2000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1      8.09     6.338     10.73    0.167      1.455
2      1.76     1.150      7.40    0.200      1.818
Qmax(1) =
           1.000 *    1.000 *     8.089) +
           0.776 *    1.000 *     1.764) + =       9.458
Qmax(2) =
           1.282 *    0.690 *     8.089) +
           1.000 *    1.000 *     1.764) + =       8.918
```

```
Total of 2 main streams to confluence:
Flow rates before confluence point:
       9.089       2.764
Maximum flow rates at confluence using above data:
        9.458        8.918
Area of streams before confluence:
        6.338        1.150
Effective area values after confluence:
        7.488        5.523


Results of confluence:
Total flow rate =      9.458(CFS)
Time of concentration =    10.725 min.
Effective stream area after confluence  =      7.488(Ac.)
Study area average Pervious fraction(Ap) =  0.172
Study area average soil loss rate(Fm) =    0.172(In/Hr)
Study area total =       7.49(Ac.)
End of computations, Total Study Area =            7.68 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.172
Area averaged SCS curve number =  32.0
```

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 10/18/22

JOB NO. 2022-318
11115 HEMLOCK AVE
2 YEAR, RATIONAL METHOD
POST-CONDITION, AREA A11 TO A12

Program License Serial Number 6277

********* Hydrology Study Control Information **********

Rational hydrology study storm event year is 2.0
Computed rainfall intensity:
Storm year = 2.00 1 hour rainfall = 0.518 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 1

++

Process from Point/Station 4.200 to Point/Station 4.300
**** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 32.00
Adjusted SCS curve number for AMC 1 = 16.60
Pervious ratio(Ap) = 0.2300 Max loss rate(Fm)= 0.230(In/Hr)
Initial subarea data:
Initial area flow distance = 333.920(Ft.)
Top (of initial area) elevation = 983.600(Ft.)
Bottom (of initial area) elevation = 974.620(Ft.)
Difference in elevation = 8.980(Ft.)
Slope = 0.02689 s(%)= 2.69
TC = k(0.331)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 6.977 min.
Rainfall intensity = 1.884(In/Hr) for a 2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.790
Subarea runoff = 1.235(CFS)
Total initial stream area = 0.830(Ac.)
Pervious area fraction = 0.230
Initial area Fm value = 0.230(In/Hr)

++

Process from Point/Station 4.300 to Point/Station 4.400
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 969.620(Ft.)
Downstream point/station elevation = 968.770(Ft.)
Pipe length = 40.90(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 1.235(CFS)

```
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     1.235(CFS)
Normal flow depth in pipe =    4.59(In.)
Flow top width inside pipe =    9.00(In.)
Critical Depth =    6.14(In.)
Pipe flow velocity =      5.45(Ft/s)
Travel time through pipe =    0.13 min.
Time of concentration (TC) =     7.10 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        4.300 to Point/Station        4.400
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      0.830(Ac.)
Runoff from this stream =      1.235(CFS)
Time of concentration =    7.10 min.
Rainfall intensity =     1.864(In/Hr)
Area averaged loss rate (Fm) =    0.2300(In/Hr)
Area averaged Pervious ratio (Ap) = 0.2300
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        4.400 to Point/Station        4.400
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 1 = 16.60
Pervious ratio(Ap) = 0.0300     Max loss rate(Fm)=     0.030(In/Hr)
Initial subarea data:
Initial area flow distance =   276.950(Ft.)
Top (of initial area) elevation =   986.510(Ft.)
Bottom (of initial area) elevation =   973.530(Ft.)
Difference in elevation =    12.980(Ft.)
Slope =    0.04687  s(%)=       4.69
TC = k(0.282)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    4.930 min.
Rainfall intensity =      2.320(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.888
Subarea runoff =      0.660(CFS)
Total initial stream area =        0.320(Ac.)
Pervious area fraction = 0.030
Initial area Fm value =    0.030(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        4.400 to Point/Station        4.400
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.320(Ac.)
Runoff from this stream =      0.660(CFS)
Time of concentration =    4.93 min.
Rainfall intensity =     2.320(In/Hr)
Area averaged loss rate (Fm) =    0.0300(In/Hr)
```

```
Area averaged Pervious ratio (Ap) = 0.0300
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1      1.24     0.830      7.10    0.230      1.864
2      0.66     0.320      4.93    0.030      2.320
Qmax(1) =
           1.000 *    1.000 *     1.235) +
           0.801 *    1.000 *     0.660) + =       1.764
Qmax(2) =
           1.279 *    0.694 *     1.235) +
           1.000 *    1.000 *     0.660) + =       1.757

Total of 2 main streams to confluence:
Flow rates before confluence point:
       2.235       1.660
Maximum flow rates at confluence using above data:
        1.764        1.757
Area of streams before confluence:
        0.830        0.320
Effective area values after confluence:
        1.150        0.896


Results of confluence:
Total flow rate =      1.764(CFS)
Time of concentration =     7.102 min.
Effective stream area after confluence  =      1.150(Ac.)
Study area average Pervious fraction(Ap) =  0.174
Study area average soil loss rate(Fm) =    0.174(In/Hr)
Study area total =       1.15(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        4.400 to Point/Station        4.100
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =   968.770(Ft.)
Downstream point/station elevation =   966.540(Ft.)
Pipe length  =   106.90(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     1.764(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     1.764(CFS)
Normal flow depth in pipe =    5.75(In.)
Flow top width inside pipe =    8.64(In.)
Critical Depth =    7.31(In.)
Pipe flow velocity =      5.92(Ft/s)
Travel time through pipe =    0.30 min.
Time of concentration (TC) =     7.40 min.
End of computations, Total Study Area =            1.15 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.174
Area averaged SCS curve number =  32.0
```

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 10/18/22

JOB NO. 2022-318
11115 HEMLOCK AVE
2 YEAR, RATIONAL METHOD
POST-CONDITION, AREA A COMBINED

Program License Serial Number 6277

********* Hydrology Study Control Information **********

Rational hydrology study storm event year is 2.0
Computed rainfall intensity:
Storm year = 2.00 1 hour rainfall = 0.518 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 1

++

Process from Point/Station 3.000 to Point/Station 3.600
**** USER DEFINED FLOW INFORMATION AT A POINT ****

COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 32.00
Adjusted SCS curve number for AMC 1 = 16.60
Pervious ratio(Ap) = 0.1000 Max loss rate(Fm)= 0.100(In/Hr)
Rainfall intensity = 1.446(In/Hr) for a 2.0 year storm
User specified values are as follows:
TC = 10.84 min. Rain intensity = 1.45(In/Hr)
Total area this stream = 16.77(Ac.)
Total Study Area (Main Stream No. 1) = 16.77(Ac.)
Total runoff = 21.22(CFS)

++

Process from Point/Station 3.000 to Point/Station 3.600
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area = 16.770(Ac.)
Runoff from this stream = 21.215(CFS)
Time of concentration = 10.84 min.
Rainfall intensity = 1.446(In/Hr)
Area averaged loss rate (Fm) = 0.1000(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Program is now starting with Main Stream No. 2

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.700 to Point/Station        3.600
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 1 = 16.60
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.100(In/Hr)
Rainfall intensity =      1.455(In/Hr) for a     2.0 year storm
User specified values are as follows:
TC =  10.73 min.  Rain intensity =       1.46(In/Hr)
Total area this stream =         7.68(Ac.)
Total Study Area (Main Stream No. 2) =       24.45(Ac.)
Total runoff =      9.46(CFS)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.700 to Point/Station        3.600
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      7.680(Ac.)
Runoff from this stream =      9.458(CFS)
Time of concentration =   10.73 min.
Rainfall intensity =     1.455(In/Hr)
Area averaged loss rate (Fm) =    0.1000(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1     21.22    16.770     10.84    0.100      1.446
2      9.46     7.680     10.73    0.100      1.455
Qmax(1) =
           1.000 *    1.000 *    21.215) +
           0.993 *    1.000 *     9.458) + =      30.610
Qmax(2) =
           1.007 *    0.990 *    21.215) +
           1.000 *    1.000 *     9.458) + =      30.595

Total of 2 main streams to confluence:
Flow rates before confluence point:
      22.215      10.458
Maximum flow rates at confluence using above data:
       30.610       30.595
Area of streams before confluence:
       16.770        7.680
Effective area values after confluence:
       24.450       24.278


Results of confluence:
```

Total flow rate = 30.610(CFS)
Time of concentration = 10.836 min.
Effective stream area after confluence = 24.450(Ac.)
Study area average Pervious fraction(Ap) = 0.100
Study area average soil loss rate(Fm) = 0.100(In/Hr)
Study area total = 24.45(Ac.)
End of computations, Total Study Area = 24.45 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.100
Area averaged SCS curve number = 32.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 10/18/22

JOB NO. 2022-318
11115 HEMLOCK AVE
2 YEAR, RATIONAL METHOD
POST-CONDITION, AREA B

Program License Serial Number 6277

********* Hydrology Study Control Information **********

Rational hydrology study storm event year is 2.0
Computed rainfall intensity:
Storm year = 2.00 1 hour rainfall = 0.518 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 1

++

Process from Point/Station 5.000 to Point/Station 5.100
**** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 32.00
Adjusted SCS curve number for AMC 1 = 16.60
Pervious ratio(Ap) = 0.3100 Max loss rate(Fm)= 0.310(In/Hr)
Initial subarea data:
Initial area flow distance = 228.380(Ft.)
Top (of initial area) elevation = 1001.000(Ft.)
Bottom (of initial area) elevation = 987.460(Ft.)
Difference in elevation = 13.540(Ft.)
Slope = 0.05929 s(%)= 5.93
TC = k(0.351)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 5.421 min.
Rainfall intensity = 2.192(In/Hr) for a 2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.773
Subarea runoff = 3.251(CFS)
Total initial stream area = 1.920(Ac.)
Pervious area fraction = 0.310
Initial area Fm value = 0.310(In/Hr)

++

Process from Point/Station 5.100 to Point/Station 5.200
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 982.460(Ft.)
Downstream point/station elevation = 971.000(Ft.)
Pipe length = 854.87(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 3.251(CFS)

```
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     3.251(CFS)
Normal flow depth in pipe =    8.03(In.)
Flow top width inside pipe =   11.29(In.)
Critical Depth =    9.26(In.)
Pipe flow velocity =      5.82(Ft/s)
Travel time through pipe =    2.45 min.
Time of concentration (TC) =     7.87 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.100 to Point/Station        5.200
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      1.920(Ac.)
Runoff from this stream =      3.251(CFS)
Time of concentration =    7.87 min.
Rainfall intensity =     1.752(In/Hr)
Area averaged loss rate (Fm) =    0.3100(In/Hr)
Area averaged Pervious ratio (Ap) = 0.3100
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.200 to Point/Station        5.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 1 = 16.60
Pervious ratio(Ap) = 0.0500     Max loss rate(Fm)=     0.050(In/Hr)
Initial subarea data:
Initial area flow distance =   983.950(Ft.)
Top (of initial area) elevation =   996.020(Ft.)
Bottom (of initial area) elevation =   982.710(Ft.)
Difference in elevation =    13.310(Ft.)
Slope =    0.01353  s(%)=       1.35
TC = k(0.287)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.680 min.
Rainfall intensity =      1.459(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.869
Subarea runoff =     13.975(CFS)
Total initial stream area =       11.020(Ac.)
Pervious area fraction = 0.050
Initial area Fm value =    0.050(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.200 to Point/Station        5.200
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     11.020(Ac.)
Runoff from this stream =     13.975(CFS)
Time of concentration =   10.68 min.
Rainfall intensity =     1.459(In/Hr)
Area averaged loss rate (Fm) =    0.0500(In/Hr)
```

```
Area averaged Pervious ratio (Ap) = 0.0500
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1      3.25     1.920      7.87    0.310      1.752
2     13.98    11.020     10.68    0.050      1.459
Qmax(1) =
           1.000 *    1.000 *     3.251) +
           1.208 *    0.737 *    13.975) + =      15.693
Qmax(2) =
           0.797 *    1.000 *     3.251) +
           1.000 *    1.000 *    13.975) + =      16.565

Total of 2 main streams to confluence:
Flow rates before confluence point:
       4.251      14.975
Maximum flow rates at confluence using above data:
       15.693       16.565
Area of streams before confluence:
        1.920       11.020
Effective area values after confluence:
       10.041       12.940


Results of confluence:
Total flow rate =     16.565(CFS)
Time of concentration =    10.680 min.
Effective stream area after confluence  =     12.940(Ac.)
Study area average Pervious fraction(Ap) =  0.089
Study area average soil loss rate(Fm) =    0.089(In/Hr)
Study area total =      12.94(Ac.)
End of computations, Total Study Area =           12.94 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.089
Area averaged SCS curve number =  32.0
```

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 10/18/22

JOB NO. 2022-318
11115 HEMLOCK AVE
100 YEAR, RATIONAL METHOD
POST-CONDITION, AREA A1 TO A6

Program License Serial Number 6277

********* Hydrology Study Control Information **********

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.330 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 3

++

Process from Point/Station 3.000 to Point/Station 3.100
**** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.4000 Max loss rate(Fm)= 0.314(In/Hr)
Initial subarea data:
Initial area flow distance = 161.250(Ft.)
Top (of initial area) elevation = 999.000(Ft.)
Bottom (of initial area) elevation = 990.820(Ft.)
Difference in elevation = 8.180(Ft.)
Slope = 0.05073 s(%)= 5.07
TC = k(0.373)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 5.174 min.
Rainfall intensity = 5.787(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.851
Subarea runoff = 1.872(CFS)
Total initial stream area = 0.380(Ac.)
Pervious area fraction = 0.400
Initial area Fm value = 0.314(In/Hr)

++

Process from Point/Station 3.100 to Point/Station 3.200
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 985.820(Ft.)
Downstream point/station elevation = 984.570(Ft.)
Pipe length = 208.52(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 1.872(CFS)

```
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     1.872(CFS)
Normal flow depth in pipe =    7.24(In.)
Flow top width inside pipe =   11.74(In.)
Critical Depth =    6.99(In.)
Pipe flow velocity =      3.77(Ft/s)
Travel time through pipe =    0.92 min.
Time of concentration (TC) =     6.09 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.100 to Point/Station        3.200
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      0.380(Ac.)
Runoff from this stream =      1.872(CFS)
Time of concentration =    6.09 min.
Rainfall intensity =     5.245(In/Hr)
Area averaged loss rate (Fm) =    0.3141(In/Hr)
Area averaged Pervious ratio (Ap) = 0.4000
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.200 to Point/Station        3.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.3900     Max loss rate(Fm)=     0.306(In/Hr)
Initial subarea data:
Initial area flow distance =   163.100(Ft.)
Top (of initial area) elevation =   997.080(Ft.)
Bottom (of initial area) elevation =   990.760(Ft.)
Difference in elevation =     6.320(Ft.)
Slope =    0.03875  s(%)=       3.87
TC = k(0.371)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    5.449 min.
Rainfall intensity =      5.610(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.851
Subarea runoff =      1.766(CFS)
Total initial stream area =        0.370(Ac.)
Pervious area fraction = 0.390
Initial area Fm value =    0.306(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.200 to Point/Station        3.200
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.370(Ac.)
Runoff from this stream =      1.766(CFS)
Time of concentration =    5.45 min.
Rainfall intensity =     5.610(In/Hr)
Area averaged loss rate (Fm) =    0.3062(In/Hr)
```

```
Area averaged Pervious ratio (Ap) = 0.3900
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1      1.87     0.380      6.09    0.314      5.245
2      1.77     0.370      5.45    0.306      5.610
Qmax(1) =
           1.000 *    1.000 *     1.872) +
           0.931 *    1.000 *     1.766) + =       3.516
Qmax(2) =
           1.074 *    0.894 *     1.872) +
           1.000 *    1.000 *     1.766) + =       3.563

Total of 2 main streams to confluence:
Flow rates before confluence point:
       2.872       2.766
Maximum flow rates at confluence using above data:
        3.516        3.563
Area of streams before confluence:
        0.380        0.370
Effective area values after confluence:
        0.750        0.710


Results of confluence:
Total flow rate =      3.563(CFS)
Time of concentration =     5.449 min.
Effective stream area after confluence  =      0.710(Ac.)
Study area average Pervious fraction(Ap) =  0.395
Study area average soil loss rate(Fm) =    0.310(In/Hr)
Study area total =       0.75(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.200 to Point/Station        3.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =   984.570(Ft.)
Downstream point/station elevation =   983.370(Ft.)
Pipe length  =   200.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.563(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     3.563(CFS)
Normal flow depth in pipe =    9.35(In.)
Flow top width inside pipe =   14.54(In.)
Critical Depth =    9.15(In.)
Pipe flow velocity =      4.43(Ft/s)
Travel time through pipe =    0.75 min.
Time of concentration (TC) =     6.20 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.200 to Point/Station        3.300
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      0.710(Ac.)
```

```
Runoff from this stream =      3.563(CFS)
Time of concentration =    6.20 min.
Rainfall intensity =     5.191(In/Hr)
Area averaged loss rate (Fm) =    0.3102(In/Hr)
Area averaged Pervious ratio (Ap) = 0.3951
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.300 to Point/Station        3.300
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.3800     Max loss rate(Fm)=     0.298(In/Hr)
Initial subarea data:
Initial area flow distance =   161.380(Ft.)
Top (of initial area) elevation =   995.070(Ft.)
Bottom (of initial area) elevation =   990.650(Ft.)
Difference in elevation =     4.420(Ft.)
Slope =    0.02739  s(%)=       2.74
TC = k(0.368)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    5.777 min.
Rainfall intensity =      5.416(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.850
Subarea runoff =      1.935(CFS)
Total initial stream area =        0.420(Ac.)
Pervious area fraction = 0.380
Initial area Fm value =    0.298(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.300 to Point/Station        3.300
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.420(Ac.)
Runoff from this stream =      1.935(CFS)
Time of concentration =    5.78 min.
Rainfall intensity =     5.416(In/Hr)
Area averaged loss rate (Fm) =    0.2984(In/Hr)
Area averaged Pervious ratio (Ap) = 0.3800
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1      3.56     0.710      6.20    0.310      5.191
2      1.93     0.420      5.78    0.298      5.416
Qmax(1) =
           1.000 *    1.000 *     3.563) +
           0.956 *    1.000 *     1.935) + =       5.413
Qmax(2) =
           1.046 *    0.932 *     3.563) +
           1.000 *    1.000 *     1.935) + =       5.407

Total of 2 main streams to confluence:
```

```
Flow rates before confluence point:
       4.563       2.935
Maximum flow rates at confluence using above data:
        5.413        5.407
Area of streams before confluence:
        0.710        0.420
Effective area values after confluence:
        1.130        1.081


Results of confluence:
Total flow rate =      5.413(CFS)
Time of concentration =     6.202 min.
Effective stream area after confluence  =      1.130(Ac.)
Study area average Pervious fraction(Ap) =  0.389
Study area average soil loss rate(Fm) =    0.306(In/Hr)
Study area total =       1.13(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.300 to Point/Station        3.400
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =   983.370(Ft.)
Downstream point/station elevation =   981.410(Ft.)
Pipe length  =   326.99(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.413(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     5.413(CFS)
Normal flow depth in pipe =   10.73(In.)
Flow top width inside pipe =   17.66(In.)
Critical Depth =   10.76(In.)
Pipe flow velocity =      4.93(Ft/s)
Travel time through pipe =    1.11 min.
Time of concentration (TC) =     7.31 min.


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Process from Point/Station        3.300 to Point/Station        3.400
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      1.130(Ac.)
Runoff from this stream =      5.413(CFS)
Time of concentration =    7.31 min.
Rainfall intensity =     4.704(In/Hr)
Area averaged loss rate (Fm) =    0.3058(In/Hr)
Area averaged Pervious ratio (Ap) = 0.3895
Program is now starting with Main Stream No. 2


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Process from Point/Station        3.400 to Point/Station        3.400
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.3900     Max loss rate(Fm)=     0.306(In/Hr)
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Initial subarea data:
Initial area flow distance =   346.050(Ft.)
Top (of initial area) elevation =   991.360(Ft.)
Bottom (of initial area) elevation =   985.560(Ft.)
Difference in elevation =     5.800(Ft.)
Slope =    0.01676  s(%)=       1.68
TC = k(0.371)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.705 min.
Rainfall intensity =      4.235(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.835
Subarea runoff =      2.758(CFS)
Total initial stream area =        0.780(Ac.)
Pervious area fraction = 0.390
Initial area Fm value =    0.306(In/Hr)


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Process from Point/Station        3.400 to Point/Station        3.400
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.780(Ac.)
Runoff from this stream =      2.758(CFS)
Time of concentration =    8.71 min.
Rainfall intensity =     4.235(In/Hr)
Area averaged loss rate (Fm) =    0.3062(In/Hr)
Area averaged Pervious ratio (Ap) = 0.3900
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1      5.41     1.130      7.31    0.306      4.704
2      2.76     0.780      8.71    0.306      4.235
Qmax(1) =
           1.000 *    1.000 *     5.413) +
           1.119 *    0.840 *     2.758) + =       8.004
Qmax(2) =
           0.893 *    1.000 *     5.413) +
           1.000 *    1.000 *     2.758) + =       7.594

Total of 2 main streams to confluence:
Flow rates before confluence point:
       6.413       3.758
Maximum flow rates at confluence using above data:
        8.004        7.594
Area of streams before confluence:
        1.130        0.780
Effective area values after confluence:
        1.785        1.910


Results of confluence:
Total flow rate =      8.004(CFS)
Time of concentration =     7.308 min.
Effective stream area after confluence  =      1.785(Ac.)
Study area average Pervious fraction(Ap) =  0.390
Study area average soil loss rate(Fm) =    0.306(In/Hr)
Study area total =       1.91(Ac.)
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Process from Point/Station        3.400 to Point/Station        3.500
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =   981.410(Ft.)
Downstream point/station elevation =   978.760(Ft.)
Pipe length  =   156.31(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     8.004(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     8.004(CFS)
Normal flow depth in pipe =   11.70(In.)
Flow top width inside pipe =   12.43(In.)
Critical Depth =   13.37(In.)
Pipe flow velocity =      7.80(Ft/s)
Travel time through pipe =    0.33 min.
Time of concentration (TC) =     7.64 min.


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Process from Point/Station        3.400 to Point/Station        3.500
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      1.785(Ac.)
Runoff from this stream =      8.004(CFS)
Time of concentration =    7.64 min.
Rainfall intensity =     4.579(In/Hr)
Area averaged loss rate (Fm) =    0.3060(In/Hr)
Area averaged Pervious ratio (Ap) = 0.3897
Program is now starting with Main Stream No. 2


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Process from Point/Station        3.500 to Point/Station        3.500
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.1800     Max loss rate(Fm)=     0.141(In/Hr)
Initial subarea data:
Initial area flow distance =   370.380(Ft.)
Top (of initial area) elevation =   991.730(Ft.)
Bottom (of initial area) elevation =   984.280(Ft.)
Difference in elevation =     7.450(Ft.)
Slope =    0.02011  s(%)=       2.01
TC = k(0.319)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.420 min.
Rainfall intensity =      4.661(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.873
Subarea runoff =      7.241(CFS)
Total initial stream area =        1.780(Ac.)
Pervious area fraction = 0.180
Initial area Fm value =    0.141(In/Hr)


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Process from Point/Station        3.500 to Point/Station        3.500
**** CONFLUENCE OF MAIN STREAMS ****
--------------------------------------------------------------------------------
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      1.780(Ac.)
Runoff from this stream =      7.241(CFS)
Time of concentration =    7.42 min.
Rainfall intensity =     4.661(In/Hr)
Area averaged loss rate (Fm) =    0.1413(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1800
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1      8.00     1.785      7.64    0.306      4.579
2      7.24     1.780      7.42    0.141      4.661
Qmax(1) =
           1.000 *    1.000 *     8.004) +
           0.982 *    1.000 *     7.241) + =      15.114
Qmax(2) =
           1.019 *    0.971 *     8.004) +
           1.000 *    1.000 *     7.241) + =      15.161

Total of 2 main streams to confluence:
Flow rates before confluence point:
       9.004       8.241
Maximum flow rates at confluence using above data:
       15.114       15.161
Area of streams before confluence:
        1.785        1.780
Effective area values after confluence:
        3.565        3.513


Results of confluence:
Total flow rate =     15.161(CFS)
Time of concentration =     7.420 min.
Effective stream area after confluence  =      3.513(Ac.)
Study area average Pervious fraction(Ap) =  0.285
Study area average soil loss rate(Fm) =    0.224(In/Hr)
Study area total =       3.56(Ac.)


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Process from Point/Station        3.500 to Point/Station        3.600
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
--------------------------------------------------------------------------------
Upstream point/station elevation =   978.760(Ft.)
Downstream point/station elevation =   965.000(Ft.)
Pipe length  =   812.87(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    15.161(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    15.161(CFS)
Normal flow depth in pipe =   13.38(In.)
Flow top width inside pipe =   20.19(In.)
Critical Depth =   17.31(In.)
Pipe flow velocity =      9.37(Ft/s)
Travel time through pipe =    1.45 min.
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Time of concentration (TC) =     8.87 min.


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Process from Point/Station        3.500 to Point/Station        3.600
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      3.513(Ac.)
Runoff from this stream =     15.161(CFS)
Time of concentration =    8.87 min.
Rainfall intensity =     4.189(In/Hr)
Area averaged loss rate (Fm) =    0.2237(In/Hr)
Area averaged Pervious ratio (Ap) = 0.2850
Program is now starting with Main Stream No. 2


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Process from Point/Station        3.600 to Point/Station        3.600
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.0400     Max loss rate(Fm)=     0.031(In/Hr)
Initial subarea data:
Initial area flow distance =   980.180(Ft.)
Top (of initial area) elevation =   987.140(Ft.)
Bottom (of initial area) elevation =   975.420(Ft.)
Difference in elevation =    11.720(Ft.)
Slope =    0.01196  s(%)=       1.20
TC = k(0.284)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.836 min.
Rainfall intensity =      3.714(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.892
Subarea runoff =     43.217(CFS)
Total initial stream area =       13.040(Ac.)
Pervious area fraction = 0.040
Initial area Fm value =    0.031(In/Hr)


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Process from Point/Station        3.600 to Point/Station        3.600
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     13.040(Ac.)
Runoff from this stream =     43.217(CFS)
Time of concentration =   10.84 min.
Rainfall intensity =     3.714(In/Hr)
Area averaged loss rate (Fm) =    0.0314(In/Hr)
Area averaged Pervious ratio (Ap) = 0.0400
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)
```

```
1     15.16     3.513      8.87    0.224      4.189
2     43.22    13.040     10.84    0.031      3.714
Qmax(1) =
           1.000 *    1.000 *    15.161) +
           1.129 *    0.818 *    43.217) + =      55.083
Qmax(2) =
           0.880 *    1.000 *    15.161) +
           1.000 *    1.000 *    43.217) + =      56.561

Total of 2 main streams to confluence:
Flow rates before confluence point:
      16.161      44.217
Maximum flow rates at confluence using above data:
       55.083       56.561
Area of streams before confluence:
        3.513       13.040
Effective area values after confluence:
       14.182       16.553


Results of confluence:
Total flow rate =     56.561(CFS)
Time of concentration =    10.836 min.
Effective stream area after confluence  =     16.553(Ac.)
Study area average Pervious fraction(Ap) =  0.092
Study area average soil loss rate(Fm) =    0.072(In/Hr)
Study area total =      16.55(Ac.)
End of computations, Total Study Area =           16.77 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.096
Area averaged SCS curve number =  32.0
```

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 10/18/22

JOB NO. 2022-318
11115 HEMLOCK AVE
100 YEAR, RATIONAL METHOD
POST-CONDITION, AREA A7 TO A10

Program License Serial Number 6277

********* Hydrology Study Control Information **********

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.330 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 3

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Process from Point/Station 3.700 to Point/Station 3.800
**** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.5200 Max loss rate(Fm)= 0.408(In/Hr)
Initial subarea data:
Initial area flow distance = 160.360(Ft.)
Top (of initial area) elevation = 983.600(Ft.)
Bottom (of initial area) elevation = 980.790(Ft.)
Difference in elevation = 2.810(Ft.)
Slope = 0.01752 s(%)= 1.75
TC = k(0.403)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 6.892 min.
Rainfall intensity = 4.872(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.825
Subarea runoff = 1.687(CFS)
Total initial stream area = 0.420(Ac.)
Pervious area fraction = 0.520
Initial area Fm value = 0.408(In/Hr)

++

Process from Point/Station 3.800 to Point/Station 3.900
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 975.790(Ft.)
Downstream point/station elevation = 972.540(Ft.)
Pipe length = 371.61(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 1.687(CFS)

```
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     1.687(CFS)
Normal flow depth in pipe =    6.05(In.)
Flow top width inside pipe =   12.00(In.)
Critical Depth =    6.63(In.)
Pipe flow velocity =      4.26(Ft/s)
Travel time through pipe =    1.46 min.
Time of concentration (TC) =     8.35 min.


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Process from Point/Station        3.800 to Point/Station        3.900
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      0.420(Ac.)
Runoff from this stream =      1.687(CFS)
Time of concentration =    8.35 min.
Rainfall intensity =     4.343(In/Hr)
Area averaged loss rate (Fm) =    0.4083(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5200
Program is now starting with Main Stream No. 2


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Process from Point/Station        3.900 to Point/Station        3.900
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.1400     Max loss rate(Fm)=     0.110(In/Hr)
Initial subarea data:
Initial area flow distance =   534.460(Ft.)
Top (of initial area) elevation =   987.610(Ft.)
Bottom (of initial area) elevation =   981.360(Ft.)
Difference in elevation =     6.250(Ft.)
Slope =    0.01169  s(%)=       1.17
TC = k(0.309)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.280 min.
Rainfall intensity =      4.076(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.876
Subarea runoff =     10.351(CFS)
Total initial stream area =        2.900(Ac.)
Pervious area fraction = 0.140
Initial area Fm value =    0.110(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.900 to Point/Station        3.900
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      2.900(Ac.)
Runoff from this stream =     10.351(CFS)
Time of concentration =    9.28 min.
Rainfall intensity =     4.076(In/Hr)
Area averaged loss rate (Fm) =    0.1099(In/Hr)
```

```
Area averaged Pervious ratio (Ap) = 0.1400
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1      1.69     0.420      8.35    0.408      4.343
2     10.35     2.900      9.28    0.110      4.076
Qmax(1) =
           1.000 *    1.000 *     1.687) +
           1.067 *    0.899 *    10.351) + =      11.625
Qmax(2) =
           0.932 *    1.000 *     1.687) +
           1.000 *    1.000 *    10.351) + =      11.923

Total of 2 main streams to confluence:
Flow rates before confluence point:
       2.687      11.351
Maximum flow rates at confluence using above data:
       11.625       11.923
Area of streams before confluence:
        0.420        2.900
Effective area values after confluence:
        3.028        3.320


Results of confluence:
Total flow rate =     11.923(CFS)
Time of concentration =     9.280 min.
Effective stream area after confluence  =      3.320(Ac.)
Study area average Pervious fraction(Ap) =  0.188
Study area average soil loss rate(Fm) =    0.148(In/Hr)
Study area total =       3.32(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.900 to Point/Station        4.000
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
____________________________________________________________________________
Upstream point/station elevation =   972.540(Ft.)
Downstream point/station elevation =   968.390(Ft.)
Pipe length  =   475.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    11.923(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =    11.923(CFS)
Normal flow depth in pipe =   14.27(In.)
Flow top width inside pipe =   19.60(In.)
Critical Depth =   15.44(In.)
Pipe flow velocity =      6.85(Ft/s)
Travel time through pipe =    1.16 min.
Time of concentration (TC) =    10.44 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.900 to Point/Station        4.000
**** CONFLUENCE OF MAIN STREAMS ****
____________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      3.320(Ac.)
```

```
Runoff from this stream =     11.923(CFS)
Time of concentration =   10.44 min.
Rainfall intensity =     3.799(In/Hr)
Area averaged loss rate (Fm) =    0.1477(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1881
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        4.000 to Point/Station        4.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.0900     Max loss rate(Fm)=     0.071(In/Hr)
Initial subarea data:
Initial area flow distance =   689.460(Ft.)
Top (of initial area) elevation =   987.610(Ft.)
Bottom (of initial area) elevation =   980.590(Ft.)
Difference in elevation =     7.020(Ft.)
Slope =    0.01018  s(%)=       1.02
TC = k(0.297)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.143 min.
Rainfall intensity =      3.864(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.884
Subarea runoff =      7.648(CFS)
Total initial stream area =        2.240(Ac.)
Pervious area fraction = 0.090
Initial area Fm value =    0.071(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        4.000 to Point/Station        4.000
**** CONFLUENCE OF MAIN STREAMS ****
________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      2.240(Ac.)
Runoff from this stream =      7.648(CFS)
Time of concentration =   10.14 min.
Rainfall intensity =     3.864(In/Hr)
Area averaged loss rate (Fm) =    0.0707(In/Hr)
Area averaged Pervious ratio (Ap) = 0.0900
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1     11.92     3.320     10.44    0.148      3.799
2      7.65     2.240     10.14    0.071      3.864
Qmax(1) =
           1.000 *    1.000 *    11.923) +
           0.983 *    1.000 *     7.648) + =      19.439
Qmax(2) =
           1.018 *    0.972 *    11.923) +
           1.000 *    1.000 *     7.648) + =      19.444

Total of 2 main streams to confluence:
```

```
Flow rates before confluence point:
      12.923       8.648
Maximum flow rates at confluence using above data:
       19.439       19.444
Area of streams before confluence:
        3.320        2.240
Effective area values after confluence:
        5.560        5.467


Results of confluence:
Total flow rate =     19.444(CFS)
Time of concentration =    10.143 min.
Effective stream area after confluence  =      5.467(Ac.)
Study area average Pervious fraction(Ap) =  0.149
Study area average soil loss rate(Fm) =    0.117(In/Hr)
Study area total =       5.56(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        4.000 to Point/Station        4.100
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =   968.390(Ft.)
Downstream point/station elevation =   966.540(Ft.)
Pipe length  =   211.47(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    19.444(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    19.444(CFS)
Normal flow depth in pipe =   18.12(In.)
Flow top width inside pipe =   20.65(In.)
Critical Depth =   19.03(In.)
Pipe flow velocity =      7.64(Ft/s)
Travel time through pipe =    0.46 min.
Time of concentration (TC) =    10.60 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        4.000 to Point/Station        4.100
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      5.467(Ac.)
Runoff from this stream =     19.444(CFS)
Time of concentration =   10.60 min.
Rainfall intensity =     3.762(In/Hr)
Area averaged loss rate (Fm) =    0.1166(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1486
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        4.100 to Point/Station        4.100
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.2700     Max loss rate(Fm)=     0.212(In/Hr)
```

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Initial subarea data:
Initial area flow distance =   436.910(Ft.)
Top (of initial area) elevation =   986.380(Ft.)
Bottom (of initial area) elevation =   973.310(Ft.)
Difference in elevation =    13.070(Ft.)
Slope =    0.02991  s(%)=       2.99
TC = k(0.341)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.831 min.
Rainfall intensity =      4.513(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.858
Subarea runoff =      3.755(CFS)
Total initial stream area =        0.970(Ac.)
Pervious area fraction = 0.270
Initial area Fm value =    0.212(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        4.100 to Point/Station        4.100
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.970(Ac.)
Runoff from this stream =      3.755(CFS)
Time of concentration =    7.83 min.
Rainfall intensity =     4.513(In/Hr)
Area averaged loss rate (Fm) =    0.2120(In/Hr)
Area averaged Pervious ratio (Ap) = 0.2700
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1     19.44     5.467     10.60    0.117      3.762
2      3.75     0.970      7.83    0.212      4.513
Qmax(1) =
           1.000 *    1.000 *    19.444) +
           0.826 *    1.000 *     3.755) + =      22.543
Qmax(2) =
           1.206 *    0.739 *    19.444) +
           1.000 *    1.000 *     3.755) + =      21.070

Total of 2 main streams to confluence:
Flow rates before confluence point:
      20.444       4.755
Maximum flow rates at confluence using above data:
       22.543       21.070
Area of streams before confluence:
        5.467        0.970
Effective area values after confluence:
        6.437        5.007


Results of confluence:
Total flow rate =     22.543(CFS)
Time of concentration =    10.604 min.
Effective stream area after confluence  =      6.437(Ac.)
Study area average Pervious fraction(Ap) =  0.167
Study area average soil loss rate(Fm) =    0.131(In/Hr)
Study area total =       6.44(Ac.)
```

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Process from Point/Station        4.100 to Point/Station        4.100
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      6.437(Ac.)
Runoff from this stream =     22.543(CFS)
Time of concentration =   10.60 min.
Rainfall intensity =     3.762(In/Hr)
Area averaged loss rate (Fm) =    0.1310(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1669
Program is now starting with Main Stream No. 2


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Process from Point/Station        4.100 to Point/Station        4.100
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.2000     Max loss rate(Fm)=     0.157(In/Hr)
Rainfall intensity =      4.703(In/Hr) for a   100.0 year storm
User specified values are as follows:
TC =   7.31 min.  Rain intensity =       4.70(In/Hr)
Total area this stream =         1.15(Ac.)
Total Study Area (Main Stream No. 2) =        7.68(Ac.)
Total runoff =      4.85(CFS)


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Process from Point/Station        4.100 to Point/Station        4.100
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      1.150(Ac.)
Runoff from this stream =      4.853(CFS)
Time of concentration =    7.31 min.
Rainfall intensity =     4.703(In/Hr)
Area averaged loss rate (Fm) =    0.1570(In/Hr)
Area averaged Pervious ratio (Ap) = 0.2000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1     22.54     6.437     10.60    0.131      3.762
2      4.85     1.150      7.31    0.157      4.703
Qmax(1) =
           1.000 *    1.000 *    22.543) +
           0.793 *    1.000 *     4.853) + =      26.392
Qmax(2) =
           1.259 *    0.689 *    22.543) +
           1.000 *    1.000 *     4.853) + =      24.420
```

Total of 2 main streams to confluence:
Flow rates before confluence point:
      23.543   5.853
Maximum flow rates at confluence using above data:
       26.392   24.420
Area of streams before confluence:
        6.437   1.150
Effective area values after confluence:
        7.587   5.587

Results of confluence:
Total flow rate =   26.392(CFS)
Time of concentration =   10.604 min.
Effective stream area after confluence =   7.587(Ac.)
Study area average Pervious fraction(Ap) = 0.172
Study area average soil loss rate(Fm) =   0.135(In/Hr)
Study area total =   7.59(Ac.)
End of computations, Total Study Area =   7.68 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.172
Area averaged SCS curve number = 32.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 10/18/22

JOB NO. 2022-318
11115 HEMLOCK AVE
100 YEAR, RATIONAL METHOD
POST-CONDITION, AREA A11 TO A12

Program License Serial Number 6277

********* Hydrology Study Control Information **********

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.330 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 3

++

Process from Point/Station 4.200 to Point/Station 4.300
**** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.2300 Max loss rate(Fm)= 0.181(In/Hr)
Initial subarea data:
Initial area flow distance = 333.920(Ft.)
Top (of initial area) elevation = 983.600(Ft.)
Bottom (of initial area) elevation = 974.620(Ft.)
Difference in elevation = 8.980(Ft.)
Slope = 0.02689 s(%)= 2.69
TC = k(0.331)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 6.977 min.
Rainfall intensity = 4.837(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.866
Subarea runoff = 3.478(CFS)
Total initial stream area = 0.830(Ac.)
Pervious area fraction = 0.230
Initial area Fm value = 0.181(In/Hr)

++

Process from Point/Station 4.300 to Point/Station 4.400
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 969.620(Ft.)
Downstream point/station elevation = 968.770(Ft.)
Pipe length = 40.90(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 3.478(CFS)

```
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     3.478(CFS)
Normal flow depth in pipe =    7.24(In.)
Flow top width inside pipe =   11.74(In.)
Critical Depth =    9.56(In.)
Pipe flow velocity =      7.03(Ft/s)
Travel time through pipe =    0.10 min.
Time of concentration (TC) =     7.07 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        4.300 to Point/Station        4.400
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      0.830(Ac.)
Runoff from this stream =      3.478(CFS)
Time of concentration =    7.07 min.
Rainfall intensity =     4.797(In/Hr)
Area averaged loss rate (Fm) =    0.1806(In/Hr)
Area averaged Pervious ratio (Ap) = 0.2300
Program is now starting with Main Stream No. 2


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Process from Point/Station        4.400 to Point/Station        4.400
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.0300     Max loss rate(Fm)=     0.024(In/Hr)
Initial subarea data:
Initial area flow distance =   276.950(Ft.)
Top (of initial area) elevation =   986.510(Ft.)
Bottom (of initial area) elevation =   973.530(Ft.)
Difference in elevation =    12.980(Ft.)
Slope =    0.04687  s(%)=       4.69
TC = k(0.282)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    4.930 min.
Rainfall intensity =      5.957(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.896
Subarea runoff =      1.709(CFS)
Total initial stream area =        0.320(Ac.)
Pervious area fraction = 0.030
Initial area Fm value =    0.024(In/Hr)


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Process from Point/Station        4.400 to Point/Station        4.400
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      0.320(Ac.)
Runoff from this stream =      1.709(CFS)
Time of concentration =    4.93 min.
Rainfall intensity =     5.957(In/Hr)
Area averaged loss rate (Fm) =    0.0236(In/Hr)
```

```
Area averaged Pervious ratio (Ap) = 0.0300
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1      3.48     0.830      7.07    0.181      4.797
2      1.71     0.320      4.93    0.024      5.957
Qmax(1) =
           1.000 *    1.000 *     3.478) +
           0.804 *    1.000 *     1.709) + =       4.853
Qmax(2) =
           1.251 *    0.697 *     3.478) +
           1.000 *    1.000 *     1.709) + =       4.742

Total of 2 main streams to confluence:
Flow rates before confluence point:
       4.478       2.709
Maximum flow rates at confluence using above data:
        4.853        4.742
Area of streams before confluence:
        0.830        0.320
Effective area values after confluence:
        1.150        0.899


Results of confluence:
Total flow rate =      4.853(CFS)
Time of concentration =     7.074 min.
Effective stream area after confluence  =      1.150(Ac.)
Study area average Pervious fraction(Ap) =  0.174
Study area average soil loss rate(Fm) =    0.137(In/Hr)
Study area total =       1.15(Ac.)


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Process from Point/Station        4.400 to Point/Station        4.100
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =   968.770(Ft.)
Downstream point/station elevation =   966.540(Ft.)
Pipe length  =   106.90(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.853(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     4.853(CFS)
Normal flow depth in pipe =    9.28(In.)
Flow top width inside pipe =   10.05(In.)
Critical Depth =   10.90(In.)
Pipe flow velocity =      7.45(Ft/s)
Travel time through pipe =    0.24 min.
Time of concentration (TC) =     7.31 min.
End of computations, Total Study Area =            1.15 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.174
Area averaged SCS curve number =  32.0
```

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 10/18/22

JOB NO. 2022-318
11115 HEMLOCK AVE
100 YEAR, RATIONAL METHOD
POST-CONDITION, AREA A COMBINED

Program License Serial Number 6277

********* Hydrology Study Control Information **********

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.330 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 3

++

Process from Point/Station 3.000 to Point/Station 3.600
**** USER DEFINED FLOW INFORMATION AT A POINT ****

COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.1000 Max loss rate(Fm)= 0.079(In/Hr)
Rainfall intensity = 3.714(In/Hr) for a 100.0 year storm
User specified values are as follows:
TC = 10.84 min. Rain intensity = 3.71(In/Hr)
Total area this stream = 16.77(Ac.)
Total Study Area (Main Stream No. 1) = 16.77(Ac.)
Total runoff = 56.51(CFS)

++

Process from Point/Station 3.000 to Point/Station 3.600
**** CONFLUENCE OF MAIN STREAMS ****

The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area = 16.770(Ac.)
Runoff from this stream = 56.510(CFS)
Time of concentration = 10.84 min.
Rainfall intensity = 3.714(In/Hr)
Area averaged loss rate (Fm) = 0.0785(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Program is now starting with Main Stream No. 2

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.700 to Point/Station        3.600
**** USER DEFINED FLOW INFORMATION AT A POINT ****
______________________________________________________________________________
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.079(In/Hr)
Rainfall intensity =      3.762(In/Hr) for a   100.0 year storm
User specified values are as follows:
TC =  10.60 min.  Rain intensity =       3.76(In/Hr)
Total area this stream =         7.68(Ac.)
Total Study Area (Main Stream No. 2) =       24.45(Ac.)
Total runoff =     26.39(CFS)


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Process from Point/Station        3.700 to Point/Station        3.600
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      7.680(Ac.)
Runoff from this stream =     26.392(CFS)
Time of concentration =   10.60 min.
Rainfall intensity =     3.762(In/Hr)
Area averaged loss rate (Fm) =    0.0785(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1     56.51    16.770     10.84    0.079      3.714
2     26.39     7.680     10.60    0.079      3.762
Qmax(1) =
           1.000 *    1.000 *    56.510) +
           0.987 *    1.000 *    26.392) + =      82.554
Qmax(2) =
           1.013 *    0.979 *    56.510) +
           1.000 *    1.000 *    26.392) + =      82.431

Total of 2 main streams to confluence:
Flow rates before confluence point:
      57.510      27.392
Maximum flow rates at confluence using above data:
       82.554       82.431
Area of streams before confluence:
       16.770        7.680
Effective area values after confluence:
       24.450       24.091


Results of confluence:
```

Total flow rate = 82.554(CFS)
Time of concentration = 10.836 min.
Effective stream area after confluence = 24.450(Ac.)
Study area average Pervious fraction(Ap) = 0.100
Study area average soil loss rate(Fm) = 0.079(In/Hr)
Study area total = 24.45(Ac.)
End of computations, Total Study Area = 24.45 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.100
Area averaged SCS curve number = 32.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 10/18/22

JOB NO. 2022-318
11115 HEMLOCK AVE
100 YEAR, RATIONAL METHOD
POST-CONDITION, AREA B

Program License Serial Number 6277

********* Hydrology Study Control Information **********

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.330 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 3

++

Process from Point/Station 5.000 to Point/Station 5.100
**** INITIAL AREA EVALUATION ****

Soil classification AP and SCS values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2) = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.3100 Max loss rate(Fm)= 0.243(In/Hr)
Initial subarea data:
Initial area flow distance = 228.380(Ft.)
Top (of initial area) elevation = 1001.000(Ft.)
Bottom (of initial area) elevation = 987.460(Ft.)
Difference in elevation = 13.540(Ft.)
Slope = 0.05929 s(%)= 5.93
TC = k(0.351)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 5.421 min.
Rainfall intensity = 5.627(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.861
Subarea runoff = 9.303(CFS)
Total initial stream area = 1.920(Ac.)
Pervious area fraction = 0.310
Initial area Fm value = 0.243(In/Hr)

++

Process from Point/Station 5.100 to Point/Station 5.200
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****

Upstream point/station elevation = 982.460(Ft.)
Downstream point/station elevation = 971.000(Ft.)
Pipe length = 854.87(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 9.303(CFS)

```
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     9.303(CFS)
Normal flow depth in pipe =   11.79(In.)
Flow top width inside pipe =   17.11(In.)
Critical Depth =   14.15(In.)
Pipe flow velocity =      7.58(Ft/s)
Travel time through pipe =    1.88 min.
Time of concentration (TC) =     7.30 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.100 to Point/Station        5.200
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =      1.920(Ac.)
Runoff from this stream =      9.303(CFS)
Time of concentration =    7.30 min.
Rainfall intensity =     4.707(In/Hr)
Area averaged loss rate (Fm) =    0.2434(In/Hr)
Area averaged Pervious ratio (Ap) = 0.3100
Program is now starting with Main Stream No. 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.200 to Point/Station        5.200
**** INITIAL AREA EVALUATION ****
______________________________________________________________________________
Soil classification AP and SCS  values input by user
USER INPUT of soil data for subarea
SCS curve number for soil(AMC 2)  = 32.00
Adjusted SCS curve number for AMC 3 = 52.00
Pervious ratio(Ap) = 0.0500     Max loss rate(Fm)=     0.039(In/Hr)
Initial subarea data:
Initial area flow distance =   983.950(Ft.)
Top (of initial area) elevation =   996.020(Ft.)
Bottom (of initial area) elevation =   982.710(Ft.)
Difference in elevation =    13.310(Ft.)
Slope =    0.01353  s(%)=       1.35
TC = k(0.287)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.680 min.
Rainfall intensity =      3.746(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.891
Subarea runoff =     36.766(CFS)
Total initial stream area =       11.020(Ac.)
Pervious area fraction = 0.050
Initial area Fm value =    0.039(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.200 to Point/Station        5.200
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =     11.020(Ac.)
Runoff from this stream =     36.766(CFS)
Time of concentration =   10.68 min.
Rainfall intensity =     3.746(In/Hr)
Area averaged loss rate (Fm) =    0.0393(In/Hr)
```

```
Area averaged Pervious ratio (Ap) = 0.0500
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1      9.30     1.920      7.30    0.243      4.707
2     36.77    11.020     10.68    0.039      3.746
Qmax(1) =
           1.000 *    1.000 *     9.303) +
           1.259 *    0.684 *    36.766) + =      40.947
Qmax(2) =
           0.785 *    1.000 *     9.303) +
           1.000 *    1.000 *    36.766) + =      44.067

Total of 2 main streams to confluence:
Flow rates before confluence point:
      10.303      37.766
Maximum flow rates at confluence using above data:
       40.947       44.067
Area of streams before confluence:
        1.920       11.020
Effective area values after confluence:
        9.453       12.940


Results of confluence:
Total flow rate =     44.067(CFS)
Time of concentration =    10.680 min.
Effective stream area after confluence  =     12.940(Ac.)
Study area average Pervious fraction(Ap) =  0.089
Study area average soil loss rate(Fm) =    0.070(In/Hr)
Study area total =      12.94(Ac.)
End of computations, Total Study Area =           12.94 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.089
Area averaged SCS curve number =  32.0
```

APPENDIX C

UNIT HYDROGRAPH ANALYSIS (24 HOUR, 100-YEAR STORM)

UNIT HYDROGRAPH ANALYSIS (24 HOUR, 100-YEAR STORM)

PRE-DEVELOPMENT CONDITION

U n i t H y d r o g r a p h A n a l y s i s

Study date 10/18/22

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San Bernardino County Synthetic Unit Hydrology Method
Manual date - August 1986

Program License Serial Number 6277

JOB NO 2022-318
11115 HEMLOCK AVENUE
100-YEAR, UNIT HYDROGRAPH
PRE-CONDITION, AREA A

Storm Event Year = 100

Antecedent Moisture Condition = 3

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 100		
29.19	1	1.33
Rainfall data for year 100		
29.19	6	3.11
Rainfall data for year 100		
29.19	24	5.69

++

******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	SCS curve NO.(AMC 3)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
32.0	52.0	29.19	1.000	0.785	0.600	0.471

Area-averaged adjusted loss rate Fm (In/Hr) = 0.471

********* Area-Averaged low loss rate fraction, Yb **********

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC3)	S	Pervious Yield Fr
17.51	0.600	32.0	52.0	9.23	0.199
11.68	0.400	98.0	98.0	0.20	0.958

Area-averaged catchment yield fraction, Y = 0.502
Area-averaged low loss fraction, Yb = 0.498
User entry of time of concentration = 0.227 (hours)
++
Watershed area = 29.19(Ac.)
Catchment Lag time = 0.182 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 45.8722
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.471(In/Hr)
Average low loss rate fraction (Yb) = 0.498 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.492(In)
Computed peak 30-minute rainfall = 1.008(In)
Specified peak 1-hour rainfall = 1.330(In)
Computed peak 3-hour rainfall = 2.239(In)
Specified peak 6-hour rainfall = 3.110(In)
Specified peak 24-hour rainfall = 5.690(In)

Rainfall depth area reduction factors:
Using a total area of 29.19(Ac.) (Ref: fig. E-4)

5-minute factor = 0.999 Adjusted rainfall = 0.492(In)
30-minute factor = 0.999 Adjusted rainfall = 1.007(In)
1-hour factor = 0.999 Adjusted rainfall = 1.328(In)
3-hour factor = 1.000 Adjusted rainfall = 2.239(In)
6-hour factor = 1.000 Adjusted rainfall = 3.110(In)
24-hour factor = 1.000 Adjusted rainfall = 5.690(In)

U n i t H y d r o g r a p h

++

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
	(K = 353.02 (CFS))	
1	3.888	13.724
2	25.344	75.746
3	61.737	128.471
4	85.872	85.201
5	95.288	33.242
6	98.297	10.620
7	99.167	3.072
8	100.000	2.940

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.4916	0.4916
2	0.6486	0.1571
3	0.7628	0.1142
4	0.8559	0.0930
5	0.9358	0.0799
6	1.0066	0.0708

7	1.0706	0.0640
8	1.1293	0.0587
9	1.1838	0.0545
10	1.2348	0.0510
11	1.2827	0.0480
12	1.3282	0.0454
13	1.3797	0.0515
14	1.4291	0.0494
15	1.4767	0.0476
16	1.5227	0.0460
17	1.5672	0.0445
18	1.6104	0.0431
19	1.6523	0.0419
20	1.6931	0.0408
21	1.7328	0.0397
22	1.7715	0.0387
23	1.8093	0.0378
24	1.8463	0.0370
25	1.8824	0.0362
26	1.9179	0.0354
27	1.9526	0.0347
28	1.9866	0.0340
29	2.0200	0.0334
30	2.0528	0.0328
31	2.0850	0.0322
32	2.1167	0.0317
33	2.1479	0.0312
34	2.1786	0.0307
35	2.2088	0.0302
36	2.2386	0.0298
37	2.2679	0.0293
38	2.2967	0.0289
39	2.3252	0.0285
40	2.3533	0.0281
41	2.3810	0.0277
42	2.4083	0.0274
43	2.4354	0.0270
44	2.4621	0.0267
45	2.4884	0.0264
46	2.5145	0.0261
47	2.5403	0.0258
48	2.5658	0.0255
49	2.5910	0.0252
50	2.6159	0.0249
51	2.6406	0.0247
52	2.6650	0.0244
53	2.6892	0.0242
54	2.7132	0.0239
55	2.7369	0.0237
56	2.7604	0.0235
57	2.7836	0.0233
58	2.8067	0.0231
59	2.8295	0.0228
60	2.8522	0.0226
61	2.8746	0.0224
62	2.8968	0.0223
63	2.9189	0.0221
64	2.9408	0.0219
65	2.9625	0.0217
66	2.9840	0.0215
67	3.0054	0.0214

68	3.0266	0.0212
69	3.0476	0.0210
70	3.0685	0.0209
71	3.0892	0.0207
72	3.1097	0.0206
73	3.1285	0.0187
74	3.1471	0.0186
75	3.1655	0.0185
76	3.1839	0.0183
77	3.2020	0.0182
78	3.2201	0.0181
79	3.2380	0.0179
80	3.2558	0.0178
81	3.2735	0.0177
82	3.2911	0.0176
83	3.3085	0.0174
84	3.3258	0.0173
85	3.3430	0.0172
86	3.3601	0.0171
87	3.3770	0.0170
88	3.3939	0.0169
89	3.4107	0.0168
90	3.4273	0.0166
91	3.4439	0.0165
92	3.4603	0.0164
93	3.4766	0.0163
94	3.4929	0.0162
95	3.5090	0.0161
96	3.5251	0.0160
97	3.5410	0.0160
98	3.5569	0.0159
99	3.5727	0.0158
100	3.5883	0.0157
101	3.6039	0.0156
102	3.6195	0.0155
103	3.6349	0.0154
104	3.6502	0.0153
105	3.6655	0.0153
106	3.6806	0.0152
107	3.6957	0.0151
108	3.7107	0.0150
109	3.7257	0.0149
110	3.7405	0.0149
111	3.7553	0.0148
112	3.7700	0.0147
113	3.7847	0.0146
114	3.7992	0.0146
115	3.8137	0.0145
116	3.8281	0.0144
117	3.8425	0.0143
118	3.8567	0.0143
119	3.8710	0.0142
120	3.8851	0.0141
121	3.8992	0.0141
122	3.9132	0.0140
123	3.9271	0.0139
124	3.9410	0.0139
125	3.9548	0.0138
126	3.9686	0.0138
127	3.9823	0.0137
128	3.9959	0.0136

129	4.0095	0.0136
130	4.0230	0.0135
131	4.0365	0.0135
132	4.0499	0.0134
133	4.0632	0.0133
134	4.0765	0.0133
135	4.0897	0.0132
136	4.1029	0.0132
137	4.1160	0.0131
138	4.1291	0.0131
139	4.1421	0.0130
140	4.1551	0.0130
141	4.1680	0.0129
142	4.1808	0.0129
143	4.1936	0.0128
144	4.2064	0.0128
145	4.2191	0.0127
146	4.2317	0.0127
147	4.2443	0.0126
148	4.2569	0.0126
149	4.2694	0.0125
150	4.2819	0.0125
151	4.2943	0.0124
152	4.3067	0.0124
153	4.3190	0.0123
154	4.3313	0.0123
155	4.3435	0.0122
156	4.3557	0.0122
157	4.3678	0.0121
158	4.3799	0.0121
159	4.3920	0.0121
160	4.4040	0.0120
161	4.4160	0.0120
162	4.4279	0.0119
163	4.4398	0.0119
164	4.4517	0.0118
165	4.4635	0.0118
166	4.4752	0.0118
167	4.4870	0.0117
168	4.4987	0.0117
169	4.5103	0.0117
170	4.5219	0.0116
171	4.5335	0.0116
172	4.5450	0.0115
173	4.5565	0.0115
174	4.5680	0.0115
175	4.5794	0.0114
176	4.5908	0.0114
177	4.6021	0.0113
178	4.6135	0.0113
179	4.6247	0.0113
180	4.6360	0.0112
181	4.6472	0.0112
182	4.6584	0.0112
183	4.6695	0.0111
184	4.6806	0.0111
185	4.6917	0.0111
186	4.7027	0.0110
187	4.7137	0.0110
188	4.7247	0.0110
189	4.7356	0.0109

190	4.7465	0.0109
191	4.7574	0.0109
192	4.7682	0.0108
193	4.7790	0.0108
194	4.7898	0.0108
195	4.8005	0.0107
196	4.8113	0.0107
197	4.8219	0.0107
198	4.8326	0.0107
199	4.8432	0.0106
200	4.8538	0.0106
201	4.8644	0.0106
202	4.8749	0.0105
203	4.8854	0.0105
204	4.8959	0.0105
205	4.9063	0.0104
206	4.9167	0.0104
207	4.9271	0.0104
208	4.9375	0.0104
209	4.9478	0.0103
210	4.9581	0.0103
211	4.9684	0.0103
212	4.9786	0.0102
213	4.9889	0.0102
214	4.9991	0.0102
215	5.0092	0.0102
216	5.0194	0.0101
217	5.0295	0.0101
218	5.0396	0.0101
219	5.0496	0.0101
220	5.0597	0.0100
221	5.0697	0.0100
222	5.0797	0.0100
223	5.0896	0.0100
224	5.0995	0.0099
225	5.1095	0.0099
226	5.1193	0.0099
227	5.1292	0.0099
228	5.1390	0.0098
229	5.1488	0.0098
230	5.1586	0.0098
231	5.1684	0.0098
232	5.1781	0.0097
233	5.1878	0.0097
234	5.1975	0.0097
235	5.2072	0.0097
236	5.2169	0.0096
237	5.2265	0.0096
238	5.2361	0.0096
239	5.2456	0.0096
240	5.2552	0.0096
241	5.2647	0.0095
242	5.2742	0.0095
243	5.2837	0.0095
244	5.2932	0.0095
245	5.3026	0.0094
246	5.3121	0.0094
247	5.3215	0.0094
248	5.3308	0.0094
249	5.3402	0.0094
250	5.3495	0.0093

251	5.3588	0.0093
252	5.3681	0.0093
253	5.3774	0.0093
254	5.3867	0.0093
255	5.3959	0.0092
256	5.4051	0.0092
257	5.4143	0.0092
258	5.4235	0.0092
259	5.4326	0.0092
260	5.4418	0.0091
261	5.4509	0.0091
262	5.4600	0.0091
263	5.4690	0.0091
264	5.4781	0.0091
265	5.4871	0.0090
266	5.4961	0.0090
267	5.5051	0.0090
268	5.5141	0.0090
269	5.5231	0.0090
270	5.5320	0.0089
271	5.5409	0.0089
272	5.5498	0.0089
273	5.5587	0.0089
274	5.5676	0.0089
275	5.5764	0.0088
276	5.5852	0.0088
277	5.5940	0.0088
278	5.6028	0.0088
279	5.6116	0.0088
280	5.6204	0.0088
281	5.6291	0.0087
282	5.6378	0.0087
283	5.6465	0.0087
284	5.6552	0.0087
285	5.6639	0.0087
286	5.6725	0.0087
287	5.6812	0.0086
288	5.6898	0.0086

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0086	0.0043	0.0043
2	0.0086	0.0043	0.0043
3	0.0087	0.0043	0.0044
4	0.0087	0.0043	0.0044
5	0.0087	0.0043	0.0044
6	0.0087	0.0043	0.0044
7	0.0088	0.0044	0.0044
8	0.0088	0.0044	0.0044
9	0.0088	0.0044	0.0044
10	0.0088	0.0044	0.0044
11	0.0089	0.0044	0.0045
12	0.0089	0.0044	0.0045
13	0.0089	0.0044	0.0045
14	0.0090	0.0045	0.0045
15	0.0090	0.0045	0.0045
16	0.0090	0.0045	0.0045
17	0.0091	0.0045	0.0045
18	0.0091	0.0045	0.0046

19	0.0091	0.0045	0.0046
20	0.0091	0.0045	0.0046
21	0.0092	0.0046	0.0046
22	0.0092	0.0046	0.0046
23	0.0092	0.0046	0.0046
24	0.0093	0.0046	0.0046
25	0.0093	0.0046	0.0047
26	0.0093	0.0046	0.0047
27	0.0094	0.0047	0.0047
28	0.0094	0.0047	0.0047
29	0.0094	0.0047	0.0047
30	0.0094	0.0047	0.0047
31	0.0095	0.0047	0.0048
32	0.0095	0.0047	0.0048
33	0.0096	0.0048	0.0048
34	0.0096	0.0048	0.0048
35	0.0096	0.0048	0.0048
36	0.0096	0.0048	0.0048
37	0.0097	0.0048	0.0049
38	0.0097	0.0048	0.0049
39	0.0098	0.0049	0.0049
40	0.0098	0.0049	0.0049
41	0.0098	0.0049	0.0049
42	0.0099	0.0049	0.0050
43	0.0099	0.0049	0.0050
44	0.0099	0.0049	0.0050
45	0.0100	0.0050	0.0050
46	0.0100	0.0050	0.0050
47	0.0101	0.0050	0.0051
48	0.0101	0.0050	0.0051
49	0.0101	0.0050	0.0051
50	0.0102	0.0051	0.0051
51	0.0102	0.0051	0.0051
52	0.0102	0.0051	0.0051
53	0.0103	0.0051	0.0052
54	0.0103	0.0051	0.0052
55	0.0104	0.0052	0.0052
56	0.0104	0.0052	0.0052
57	0.0105	0.0052	0.0053
58	0.0105	0.0052	0.0053
59	0.0106	0.0053	0.0053
60	0.0106	0.0053	0.0053
61	0.0107	0.0053	0.0054
62	0.0107	0.0053	0.0054
63	0.0107	0.0053	0.0054
64	0.0108	0.0054	0.0054
65	0.0108	0.0054	0.0054
66	0.0109	0.0054	0.0055
67	0.0109	0.0054	0.0055
68	0.0110	0.0055	0.0055
69	0.0110	0.0055	0.0055
70	0.0111	0.0055	0.0056
71	0.0111	0.0055	0.0056
72	0.0112	0.0056	0.0056
73	0.0112	0.0056	0.0056
74	0.0113	0.0056	0.0057
75	0.0113	0.0056	0.0057
76	0.0114	0.0057	0.0057
77	0.0115	0.0057	0.0058
78	0.0115	0.0057	0.0058
79	0.0116	0.0058	0.0058

80	0.0116	0.0058	0.0058
81	0.0117	0.0058	0.0059
82	0.0117	0.0058	0.0059
83	0.0118	0.0059	0.0059
84	0.0118	0.0059	0.0060
85	0.0119	0.0059	0.0060
86	0.0120	0.0060	0.0060
87	0.0121	0.0060	0.0061
88	0.0121	0.0060	0.0061
89	0.0122	0.0061	0.0061
90	0.0122	0.0061	0.0061
91	0.0123	0.0061	0.0062
92	0.0124	0.0062	0.0062
93	0.0125	0.0062	0.0063
94	0.0125	0.0062	0.0063
95	0.0126	0.0063	0.0063
96	0.0127	0.0063	0.0064
97	0.0128	0.0063	0.0064
98	0.0128	0.0064	0.0064
99	0.0129	0.0064	0.0065
100	0.0130	0.0064	0.0065
101	0.0131	0.0065	0.0066
102	0.0131	0.0065	0.0066
103	0.0132	0.0066	0.0066
104	0.0133	0.0066	0.0067
105	0.0134	0.0067	0.0067
106	0.0135	0.0067	0.0068
107	0.0136	0.0068	0.0068
108	0.0136	0.0068	0.0069
109	0.0138	0.0068	0.0069
110	0.0138	0.0069	0.0069
111	0.0139	0.0069	0.0070
112	0.0140	0.0070	0.0070
113	0.0141	0.0070	0.0071
114	0.0142	0.0071	0.0071
115	0.0143	0.0071	0.0072
116	0.0144	0.0072	0.0072
117	0.0146	0.0072	0.0073
118	0.0146	0.0073	0.0074
119	0.0148	0.0074	0.0074
120	0.0149	0.0074	0.0075
121	0.0150	0.0075	0.0075
122	0.0151	0.0075	0.0076
123	0.0153	0.0076	0.0077
124	0.0153	0.0076	0.0077
125	0.0155	0.0077	0.0078
126	0.0156	0.0078	0.0078
127	0.0158	0.0078	0.0079
128	0.0159	0.0079	0.0080
129	0.0160	0.0080	0.0081
130	0.0161	0.0080	0.0081
131	0.0163	0.0081	0.0082
132	0.0164	0.0082	0.0083
133	0.0166	0.0083	0.0084
134	0.0168	0.0083	0.0084
135	0.0170	0.0084	0.0085
136	0.0171	0.0085	0.0086
137	0.0173	0.0086	0.0087
138	0.0174	0.0087	0.0088
139	0.0177	0.0088	0.0089
140	0.0178	0.0089	0.0089

141	0.0181	0.0090	0.0091
142	0.0182	0.0091	0.0091
143	0.0185	0.0092	0.0093
144	0.0186	0.0093	0.0093
145	0.0206	0.0102	0.0103
146	0.0207	0.0103	0.0104
147	0.0210	0.0105	0.0106
148	0.0212	0.0105	0.0106
149	0.0215	0.0107	0.0108
150	0.0217	0.0108	0.0109
151	0.0221	0.0110	0.0111
152	0.0223	0.0111	0.0112
153	0.0226	0.0113	0.0114
154	0.0228	0.0114	0.0115
155	0.0233	0.0116	0.0117
156	0.0235	0.0117	0.0118
157	0.0239	0.0119	0.0120
158	0.0242	0.0120	0.0121
159	0.0247	0.0123	0.0124
160	0.0249	0.0124	0.0125
161	0.0255	0.0127	0.0128
162	0.0258	0.0128	0.0130
163	0.0264	0.0131	0.0133
164	0.0267	0.0133	0.0134
165	0.0274	0.0136	0.0137
166	0.0277	0.0138	0.0139
167	0.0285	0.0142	0.0143
168	0.0289	0.0144	0.0145
169	0.0298	0.0148	0.0150
170	0.0302	0.0150	0.0152
171	0.0312	0.0155	0.0157
172	0.0317	0.0158	0.0159
173	0.0328	0.0163	0.0165
174	0.0334	0.0166	0.0168
175	0.0347	0.0173	0.0174
176	0.0354	0.0176	0.0178
177	0.0370	0.0184	0.0186
178	0.0378	0.0188	0.0190
179	0.0397	0.0198	0.0200
180	0.0408	0.0203	0.0205
181	0.0431	0.0215	0.0217
182	0.0445	0.0221	0.0224
183	0.0476	0.0237	0.0239
184	0.0494	0.0246	0.0248
185	0.0454	0.0226	0.0228
186	0.0480	0.0239	0.0241
187	0.0545	0.0271	0.0274
188	0.0587	0.0292	0.0295
189	0.0708	0.0352	0.0356
190	0.0799	0.0393	0.0406
191	0.1142	0.0393	0.0750
192	0.1571	0.0393	0.1178
193	0.4916	0.0393	0.4523
194	0.0930	0.0393	0.0538
195	0.0640	0.0319	0.0322
196	0.0510	0.0254	0.0256
197	0.0515	0.0256	0.0259
198	0.0460	0.0229	0.0231
199	0.0419	0.0209	0.0211
200	0.0387	0.0193	0.0195
201	0.0362	0.0180	0.0182

202	0.0340	0.0169	0.0171
203	0.0322	0.0160	0.0162
204	0.0307	0.0153	0.0154
205	0.0293	0.0146	0.0147
206	0.0281	0.0140	0.0141
207	0.0270	0.0134	0.0136
208	0.0261	0.0130	0.0131
209	0.0252	0.0125	0.0127
210	0.0244	0.0122	0.0123
211	0.0237	0.0118	0.0119
212	0.0231	0.0115	0.0116
213	0.0224	0.0112	0.0113
214	0.0219	0.0109	0.0110
215	0.0214	0.0106	0.0107
216	0.0209	0.0104	0.0105
217	0.0187	0.0093	0.0094
218	0.0183	0.0091	0.0092
219	0.0179	0.0089	0.0090
220	0.0176	0.0087	0.0088
221	0.0172	0.0086	0.0086
222	0.0169	0.0084	0.0085
223	0.0165	0.0082	0.0083
224	0.0162	0.0081	0.0082
225	0.0160	0.0079	0.0080
226	0.0157	0.0078	0.0079
227	0.0154	0.0077	0.0077
228	0.0152	0.0075	0.0076
229	0.0149	0.0074	0.0075
230	0.0147	0.0073	0.0074
231	0.0145	0.0072	0.0073
232	0.0143	0.0071	0.0072
233	0.0141	0.0070	0.0071
234	0.0139	0.0069	0.0070
235	0.0137	0.0068	0.0069
236	0.0135	0.0067	0.0068
237	0.0133	0.0066	0.0067
238	0.0132	0.0066	0.0066
239	0.0130	0.0065	0.0065
240	0.0129	0.0064	0.0065
241	0.0127	0.0063	0.0064
242	0.0126	0.0062	0.0063
243	0.0124	0.0062	0.0062
244	0.0123	0.0061	0.0062
245	0.0121	0.0060	0.0061
246	0.0120	0.0060	0.0060
247	0.0119	0.0059	0.0060
248	0.0118	0.0059	0.0059
249	0.0117	0.0058	0.0059
250	0.0115	0.0057	0.0058
251	0.0114	0.0057	0.0057
252	0.0113	0.0056	0.0057
253	0.0112	0.0056	0.0056
254	0.0111	0.0055	0.0056
255	0.0110	0.0055	0.0055
256	0.0109	0.0054	0.0055
257	0.0108	0.0054	0.0054
258	0.0107	0.0053	0.0054
259	0.0106	0.0053	0.0053
260	0.0105	0.0052	0.0053
261	0.0104	0.0052	0.0052
262	0.0104	0.0052	0.0052

263	0.0103	0.0051	0.0052
264	0.0102	0.0051	0.0051
265	0.0101	0.0050	0.0051
266	0.0100	0.0050	0.0050
267	0.0100	0.0050	0.0050
268	0.0099	0.0049	0.0050
269	0.0098	0.0049	0.0049
270	0.0097	0.0048	0.0049
271	0.0097	0.0048	0.0049
272	0.0096	0.0048	0.0048
273	0.0095	0.0047	0.0048
274	0.0095	0.0047	0.0048
275	0.0094	0.0047	0.0047
276	0.0093	0.0046	0.0047
277	0.0093	0.0046	0.0047
278	0.0092	0.0046	0.0046
279	0.0092	0.0046	0.0046
280	0.0091	0.0045	0.0046
281	0.0090	0.0045	0.0045
282	0.0090	0.0045	0.0045
283	0.0089	0.0044	0.0045
284	0.0089	0.0044	0.0045
285	0.0088	0.0044	0.0044
286	0.0088	0.0044	0.0044
287	0.0087	0.0043	0.0044
288	0.0087	0.0043	0.0043

Total soil rain loss = 2.56(In)
Total effective rainfall = 3.13(In)
Peak flow rate in flood hydrograph = 75.78(CFS)

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24 - 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 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	20.0	40.0	60.0	80.0
0+ 5	0.0004	0.06	Q	|	|	|	|
0+10	0.0031	0.39	Q	|	|	|	|
0+15	0.0096	0.94	Q	|	|	|	|
0+20	0.0186	1.32	Q	|	|	|	|
0+25	0.0287	1.46	Q	|	|	|	|
0+30	0.0392	1.51	Q	|	|	|	|
0+35	0.0497	1.53	Q	|	|	|	|
0+40	0.0604	1.55	Q	|	|	|	|
0+45	0.0711	1.55	Q	|	|	|	|
0+50	0.0818	1.56	Q	|	|	|	|
0+55	0.0926	1.56	Q	|	|	|	|
1+ 0	0.1034	1.57	Q	|	|	|	|
1+ 5	0.1142	1.57	Q	|	|	|	|
1+10	0.1251	1.58	Q	|	|	|	|
1+15	0.1360	1.58	Q	|	|	|	|
1+20	0.1469	1.59	Q	|	|	|	|
1+25	0.1579	1.59	Q	|	|	|	|
1+30	0.1689	1.60	Q	|	|	|	|
1+35	0.1800	1.60	Q	|	|	|	|
1+40	0.1910	1.61	QV	|	|	|	|

1+45	0.2021	1.61	QV	|	|	|	|
1+50	0.2133	1.62	QV	|	|	|	|
1+55	0.2245	1.62	QV	|	|	|	|
2+ 0	0.2357	1.63	QV	|	|	|	|
2+ 5	0.2470	1.63	QV	|	|	|	|
2+10	0.2583	1.64	QV	|	|	|	|
2+15	0.2696	1.65	QV	|	|	|	|
2+20	0.2810	1.65	QV	|	|	|	|
2+25	0.2924	1.66	QV	|	|	|	|
2+30	0.3038	1.66	QV	|	|	|	|
2+35	0.3153	1.67	QV	|	|	|	|
2+40	0.3269	1.67	QV	|	|	|	|
2+45	0.3384	1.68	QV	|	|	|	|
2+50	0.3500	1.69	QV	|	|	|	|
2+55	0.3617	1.69	QV	|	|	|	|
3+ 0	0.3734	1.70	QV	|	|	|	|
3+ 5	0.3851	1.70	Q V	|	|	|	|
3+10	0.3969	1.71	Q V	|	|	|	|
3+15	0.4087	1.72	Q V	|	|	|	|
3+20	0.4206	1.72	Q V	|	|	|	|
3+25	0.4325	1.73	Q V	|	|	|	|
3+30	0.4444	1.73	Q V	|	|	|	|
3+35	0.4564	1.74	Q V	|	|	|	|
3+40	0.4685	1.75	Q V	|	|	|	|
3+45	0.4805	1.75	Q V	|	|	|	|
3+50	0.4927	1.76	Q V	|	|	|	|
3+55	0.5048	1.77	Q V	|	|	|	|
4+ 0	0.5171	1.77	Q V	|	|	|	|
4+ 5	0.5293	1.78	Q V	|	|	|	|
4+10	0.5417	1.79	Q V	|	|	|	|
4+15	0.5540	1.80	Q V	|	|	|	|
4+20	0.5664	1.80	Q V	|	|	|	|
4+25	0.5789	1.81	Q V	|	|	|	|
4+30	0.5914	1.82	Q V	|	|	|	|
4+35	0.6040	1.82	Q V	|	|	|	|
4+40	0.6166	1.83	Q V	|	|	|	|
4+45	0.6292	1.84	Q V	|	|	|	|
4+50	0.6420	1.85	Q V	|	|	|	|
4+55	0.6547	1.85	Q V	|	|	|	|
5+ 0	0.6676	1.86	Q V	|	|	|	|
5+ 5	0.6804	1.87	Q V	|	|	|	|
5+10	0.6934	1.88	Q V	|	|	|	|
5+15	0.7063	1.89	Q V	|	|	|	|
5+20	0.7194	1.89	Q V	|	|	|	|
5+25	0.7325	1.90	Q V	|	|	|	|
5+30	0.7456	1.91	Q V	|	|	|	|
5+35	0.7589	1.92	Q V	|	|	|	|
5+40	0.7721	1.93	Q V	|	|	|	|
5+45	0.7855	1.94	Q V	|	|	|	|
5+50	0.7989	1.94	Q V	|	|	|	|
5+55	0.8123	1.95	Q V	|	|	|	|
6+ 0	0.8258	1.96	Q V	|	|	|	|
6+ 5	0.8394	1.97	Q V	|	|	|	|
6+10	0.8530	1.98	Q V	|	|	|	|
6+15	0.8667	1.99	Q V	|	|	|	|
6+20	0.8805	2.00	Q V	|	|	|	|
6+25	0.8943	2.01	|Q V	|	|	|	|
6+30	0.9082	2.02	|Q V	|	|	|	|
6+35	0.9222	2.03	|Q V	|	|	|	|
6+40	0.9362	2.04	|Q V	|	|	|	|
6+45	0.9503	2.05	|Q V	|	|	|	|

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 6+50       0.9645      2.06  |Q   V    |         |         |         |
 6+55       0.9788      2.07  |Q   V    |         |         |         |
 7+ 0       0.9931      2.08  |Q   V    |         |         |         |
 7+ 5       1.0075      2.09  |Q   V    |         |         |         |
 7+10       1.0219      2.10  |Q   V    |         |         |         |
 7+15       1.0365      2.11  |Q   V    |         |         |         |
 7+20       1.0511      2.12  |Q   V    |         |         |         |
 7+25       1.0658      2.13  |Q   V    |         |         |         |
 7+30       1.0806      2.15  |Q   V    |         |         |         |
 7+35       1.0954      2.16  |Q   V    |         |         |         |
 7+40       1.1104      2.17  |Q   V    |         |         |         |
 7+45       1.1254      2.18  |Q   V    |         |         |         |
 7+50       1.1405      2.19  |Q   V    |         |         |         |
 7+55       1.1557      2.21  |Q    V   |         |         |         |
 8+ 0       1.1709      2.22  |Q    V   |         |         |         |
 8+ 5       1.1863      2.23  |Q    V   |         |         |         |
 8+10       1.2017      2.24  |Q    V   |         |         |         |
 8+15       1.2173      2.26  |Q    V   |         |         |         |
 8+20       1.2329      2.27  |Q    V   |         |         |         |
 8+25       1.2486      2.28  |Q    V   |         |         |         |
 8+30       1.2645      2.30  |Q    V   |         |         |         |
 8+35       1.2804      2.31  |Q    V   |         |         |         |
 8+40       1.2964      2.33  |Q    V   |         |         |         |
 8+45       1.3125      2.34  |Q    V   |         |         |         |
 8+50       1.3287      2.35  |Q    V   |         |         |         |
 8+55       1.3450      2.37  |Q     V  |         |         |         |
 9+ 0       1.3615      2.38  |Q     V  |         |         |         |
 9+ 5       1.3780      2.40  |Q     V  |         |         |         |
 9+10       1.3946      2.42  |Q     V  |         |         |         |
 9+15       1.4114      2.43  |Q     V  |         |         |         |
 9+20       1.4283      2.45  |Q     V  |         |         |         |
 9+25       1.4452      2.47  |Q     V  |         |         |         |
 9+30       1.4623      2.48  |Q     V  |         |         |         |
 9+35       1.4796      2.50  |Q     V  |         |         |         |
 9+40       1.4969      2.52  |Q     V  |         |         |         |
 9+45       1.5144      2.54  |Q     V  |         |         |         |
 9+50       1.5320      2.55  |Q      V |         |         |         |
 9+55       1.5497      2.57  |Q      V |         |         |         |
10+ 0       1.5676      2.59  |Q      V |         |         |         |
10+ 5       1.5856      2.61  |Q      V |         |         |         |
10+10       1.6037      2.63  |Q      V |         |         |         |
10+15       1.6220      2.65  |Q      V |         |         |         |
10+20       1.6404      2.67  |Q      V |         |         |         |
10+25       1.6589      2.70  |Q      V |         |         |         |
10+30       1.6777      2.72  |Q      V |         |         |         |
10+35       1.6965      2.74  |Q      V |         |         |         |
10+40       1.7156      2.76  |Q       V|         |         |         |
10+45       1.7348      2.79  |Q       V|         |         |         |
10+50       1.7541      2.81  |Q       V|         |         |         |
10+55       1.7736      2.84  |Q       V|         |         |         |
11+ 0       1.7933      2.86  |Q       V|         |         |         |
11+ 5       1.8132      2.89  |Q       V|         |         |         |
11+10       1.8333      2.91  |Q       V|         |         |         |
11+15       1.8535      2.94  |Q       V|         |         |         |
11+20       1.8740      2.97  |Q       V|         |         |         |
11+25       1.8946      3.00  |Q       V|         |         |         |
11+30       1.9155      3.03  |Q        V         |         |         |
11+35       1.9365      3.06  |Q        V         |         |         |
11+40       1.9578      3.09  |Q        V         |         |         |
11+45       1.9793      3.12  |Q        V         |         |         |
11+50       2.0010      3.15  |Q        V         |         |         |
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11+55	2.0229	3.19	Q	V			
12+ 0	2.0451	3.22	Q	V			
12+ 5	2.0676	3.27	Q	V			
12+10	2.0909	3.37	Q	V			
12+15	2.1151	3.52	Q	V			
12+20	2.1401	3.63	Q	V			
12+25	2.1655	3.70	Q	V			
12+30	2.1913	3.75	Q	V			
12+35	2.2175	3.80	Q	V			
12+40	2.2439	3.84	Q	V			
12+45	2.2707	3.89	Q	V			
12+50	2.2979	3.94	Q	V			
12+55	2.3254	3.99	Q	V			
13+ 0	2.3532	4.05	Q	V			
13+ 5	2.3815	4.10	Q	V			
13+10	2.4101	4.16	Q	V			
13+15	2.4392	4.22	Q	V			
13+20	2.4687	4.28	Q	V			
13+25	2.4986	4.35	Q	V			
13+30	2.5291	4.42	Q	V			
13+35	2.5600	4.49	Q	V			
13+40	2.5914	4.56	Q	V			
13+45	2.6234	4.64	Q	V			
13+50	2.6559	4.73	Q	V			
13+55	2.6891	4.81	Q	V			
14+ 0	2.7229	4.91	Q	V			
14+ 5	2.7574	5.01	Q	V			
14+10	2.7926	5.11	Q	V			
14+15	2.8286	5.23	Q	V			
14+20	2.8654	5.35	Q	V			
14+25	2.9031	5.47	Q	V			
14+30	2.9417	5.61	Q	V			
14+35	2.9814	5.76	Q	V			
14+40	3.0221	5.91	Q	V			
14+45	3.0640	6.08	Q	V			
14+50	3.1071	6.27	Q	V			
14+55	3.1517	6.47	Q	V			
15+ 0	3.1978	6.69	Q	V			
15+ 5	3.2456	6.94	Q	V			
15+10	3.2953	7.22	Q	V			
15+15	3.3471	7.53	Q	V			
15+20	3.4014	7.88	Q	V			
15+25	3.4581	8.23	Q	V			
15+30	3.5158	8.39	Q	V			
15+35	3.5737	8.41	Q	V			
15+40	3.6339	8.73	Q	V			
15+45	3.6990	9.46	Q	V			
15+50	3.7718	10.57	Q	V			
15+55	3.8579	12.50	Q	V			
16+ 0	3.9747	16.96	Q	V			
16+ 5	4.1804	29.87	Q	V			
16+10	4.5828	58.42	Q	V			
16+15	5.1047	75.78	Q	V			
16+20	5.4709	53.18	Q	V			
16+25	5.6613	27.64	Q	V			
16+30	5.7679	15.48	Q	V			
16+35	5.8431	10.92	Q	V			
16+40	5.9101	9.72	Q	V			
16+45	5.9637	7.79	Q	V			
16+50	6.0127	7.12	Q	V			
16+55	6.0582	6.61	Q	V			

17+ 0	6.1010	6.20	| Q	|	|	| V |
17+ 5	6.1412	5.85	| Q	|	|	| V |
17+10	6.1795	5.55	| Q	|	|	| V |
17+15	6.2159	5.29	| Q	|	|	| V |
17+20	6.2508	5.06	| Q	|	|	| V |
17+25	6.2843	4.87	| Q	|	|	| V |
17+30	6.3166	4.69	| Q	|	|	| V |
17+35	6.3478	4.53	| Q	|	|	| V |
17+40	6.3780	4.38	| Q	|	|	| V |
17+45	6.4073	4.25	| Q	|	|	| V |
17+50	6.4357	4.13	| Q	|	|	| V |
17+55	6.4634	4.02	| Q	|	|	| V |
18+ 0	6.4904	3.92	|Q	|	|	| V |
18+ 5	6.5166	3.81	|Q	|	|	| V |
18+10	6.5418	3.66	|Q	|	|	| V |
18+15	6.5657	3.47	|Q	|	|	| V |
18+20	6.5885	3.32	|Q	|	|	| V |
18+25	6.6107	3.22	|Q	|	|	| V |
18+30	6.6323	3.14	|Q	|	|	| V |
18+35	6.6535	3.07	|Q	|	|	| V |
18+40	6.6742	3.01	|Q	|	|	| V |
18+45	6.6946	2.95	|Q	|	|	| V |
18+50	6.7145	2.90	|Q	|	|	| V |
18+55	6.7341	2.85	|Q	|	|	| V |
19+ 0	6.7534	2.80	|Q	|	|	| V |
19+ 5	6.7723	2.75	|Q	|	|	| V |
19+10	6.7910	2.71	|Q	|	|	| V |
19+15	6.8093	2.66	|Q	|	|	| V |
19+20	6.8274	2.62	|Q	|	|	| V |
19+25	6.8452	2.58	|Q	|	|	| V |
19+30	6.8627	2.54	|Q	|	|	| V |
19+35	6.8800	2.51	|Q	|	|	| V |
19+40	6.8970	2.47	|Q	|	|	| V |
19+45	6.9138	2.44	|Q	|	|	| V |
19+50	6.9304	2.41	|Q	|	|	| V |
19+55	6.9468	2.38	|Q	|	|	| V |
20+ 0	6.9629	2.35	|Q	|	|	| V |
20+ 5	6.9789	2.32	|Q	|	|	| V |
20+10	6.9946	2.29	|Q	|	|	| V |
20+15	7.0102	2.26	|Q	|	|	| V |
20+20	7.0256	2.24	|Q	|	|	| V |
20+25	7.0408	2.21	|Q	|	|	| V |
20+30	7.0559	2.19	|Q	|	|	| V |
20+35	7.0708	2.16	|Q	|	|	| V |
20+40	7.0855	2.14	|Q	|	|	| V |
20+45	7.1001	2.12	|Q	|	|	| V |
20+50	7.1145	2.09	|Q	|	|	| V |
20+55	7.1288	2.07	|Q	|	|	| V |
21+ 0	7.1429	2.05	|Q	|	|	| V |
21+ 5	7.1569	2.03	|Q	|	|	| V |
21+10	7.1708	2.01	|Q	|	|	| V |
21+15	7.1845	1.99	Q	|	|	| V |
21+20	7.1981	1.98	Q	|	|	| V |
21+25	7.2116	1.96	Q	|	|	| V |
21+30	7.2250	1.94	Q	|	|	| V |
21+35	7.2382	1.92	Q	|	|	| V |
21+40	7.2513	1.91	Q	|	|	| V |
21+45	7.2643	1.89	Q	|	|	| V |
21+50	7.2772	1.87	Q	|	|	| V |
21+55	7.2900	1.86	Q	|	|	| V |
22+ 0	7.3027	1.84	Q	|	|	| V |

22+ 5	7.3153	1.83	Q	|	|	|	V |
22+10	7.3278	1.81	Q	|	|	|	V |
22+15	7.3402	1.80	Q	|	|	|	V |
22+20	7.3525	1.78	Q	|	|	|	V |
22+25	7.3647	1.77	Q	|	|	|	V |
22+30	7.3768	1.76	Q	|	|	|	V |
22+35	7.3888	1.74	Q	|	|	|	V |
22+40	7.4007	1.73	Q	|	|	|	V |
22+45	7.4125	1.72	Q	|	|	|	V |
22+50	7.4243	1.71	Q	|	|	|	V|
22+55	7.4360	1.69	Q	|	|	|	V|
23+ 0	7.4475	1.68	Q	|	|	|	V|
23+ 5	7.4591	1.67	Q	|	|	|	V|
23+10	7.4705	1.66	Q	|	|	|	V|
23+15	7.4818	1.65	Q	|	|	|	V|
23+20	7.4931	1.64	Q	|	|	|	V|
23+25	7.5043	1.63	Q	|	|	|	V|
23+30	7.5154	1.62	Q	|	|	|	V|
23+35	7.5265	1.61	Q	|	|	|	V|
23+40	7.5375	1.60	Q	|	|	|	V|
23+45	7.5484	1.59	Q	|	|	|	V|
23+50	7.5593	1.58	Q	|	|	|	V|
23+55	7.5700	1.57	Q	|	|	|	V|
24+ 0	7.5808	1.56	Q	|	|	|	V|

U n i t H y d r o g r a p h A n a l y s i s

Study date 10/18/22

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San Bernardino County Synthetic Unit Hydrology Method
Manual date - August 1986

Program License Serial Number 6277

JOB NO 2022-318
11115 HEMLOCK AVENUE
100-YEAR, UNIT HYDROGRAPH
PRE-CONDITION, AREA B

Storm Event Year = 100

Antecedent Moisture Condition = 3

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 100		
8.22	1	1.33
Rainfall data for year 100		
8.22	6	3.11
Rainfall data for year 100		
8.22	24	5.69

++

******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	SCS curve NO.(AMC 3)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
32.0	52.0	8.22	1.000	0.785	0.900	0.707

Area-averaged adjusted loss rate Fm (In/Hr) = 0.707

********* Area-Averaged low loss rate fraction, Yb **********

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC3)	S	Pervious Yield Fr
7.40	0.900	32.0	52.0	9.23	0.199
0.82	0.100	98.0	98.0	0.20	0.958

Area-averaged catchment yield fraction, Y = 0.275
Area-averaged low loss fraction, Yb = 0.725
User entry of time of concentration = 0.303 (hours)
++
Watershed area = 8.22(Ac.)
Catchment Lag time = 0.243 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 34.3614
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.707(In/Hr)
Average low loss rate fraction (Yb) = 0.725 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.492(In)
Computed peak 30-minute rainfall = 1.008(In)
Specified peak 1-hour rainfall = 1.330(In)
Computed peak 3-hour rainfall = 2.239(In)
Specified peak 6-hour rainfall = 3.110(In)
Specified peak 24-hour rainfall = 5.690(In)

Rainfall depth area reduction factors:
Using a total area of 8.22(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.492(In)
30-minute factor = 1.000 Adjusted rainfall = 1.008(In)
1-hour factor = 1.000 Adjusted rainfall = 1.329(In)
3-hour factor = 1.000 Adjusted rainfall = 2.239(In)
6-hour factor = 1.000 Adjusted rainfall = 3.110(In)
24-hour factor = 1.000 Adjusted rainfall = 5.690(In)

U n i t H y d r o g r a p h
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Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
	(K = 99.41 (CFS))	
1	2.380	2.366
2	14.565	12.114
3	37.668	22.967
4	66.447	28.609
5	84.161	17.610
6	92.859	8.646
7	97.015	4.132
8	98.439	1.416
9	99.057	0.615
10	99.673	0.612
11	100.000	0.325

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.4921	0.4921
2	0.6493	0.1572
3	0.7636	0.1143

4	0.8567	0.0931
5	0.9367	0.0800
6	1.0076	0.0709
7	1.0716	0.0641
8	1.1304	0.0588
9	1.1850	0.0545
10	1.2360	0.0510
11	1.2840	0.0480
12	1.3295	0.0455
13	1.3809	0.0515
14	1.4304	0.0494
15	1.4779	0.0476
16	1.5239	0.0459
17	1.5684	0.0445
18	1.6115	0.0431
19	1.6533	0.0419
20	1.6941	0.0407
21	1.7337	0.0397
22	1.7724	0.0387
23	1.8102	0.0378
24	1.8471	0.0369
25	1.8832	0.0361
26	1.9186	0.0354
27	1.9532	0.0347
28	1.9872	0.0340
29	2.0206	0.0334
30	2.0534	0.0328
31	2.0855	0.0322
32	2.1172	0.0316
33	2.1483	0.0311
34	2.1790	0.0306
35	2.2091	0.0302
36	2.2389	0.0297
37	2.2681	0.0293
38	2.2970	0.0289
39	2.3255	0.0285
40	2.3535	0.0281
41	2.3812	0.0277
42	2.4086	0.0274
43	2.4356	0.0270
44	2.4623	0.0267
45	2.4887	0.0264
46	2.5148	0.0261
47	2.5405	0.0258
48	2.5660	0.0255
49	2.5912	0.0252
50	2.6162	0.0249
51	2.6409	0.0247
52	2.6653	0.0244
53	2.6895	0.0242
54	2.7134	0.0239
55	2.7371	0.0237
56	2.7606	0.0235
57	2.7839	0.0233
58	2.8069	0.0230
59	2.8297	0.0228
60	2.8524	0.0226
61	2.8748	0.0224
62	2.8971	0.0222
63	2.9191	0.0221
64	2.9410	0.0219

65	2.9627	0.0217
66	2.9842	0.0215
67	3.0056	0.0214
68	3.0268	0.0212
69	3.0478	0.0210
70	3.0687	0.0209
71	3.0894	0.0207
72	3.1099	0.0206
73	3.1287	0.0187
74	3.1473	0.0186
75	3.1657	0.0185
76	3.1841	0.0183
77	3.2023	0.0182
78	3.2203	0.0181
79	3.2382	0.0179
80	3.2560	0.0178
81	3.2737	0.0177
82	3.2913	0.0176
83	3.3087	0.0174
84	3.3260	0.0173
85	3.3432	0.0172
86	3.3603	0.0171
87	3.3773	0.0170
88	3.3941	0.0169
89	3.4109	0.0168
90	3.4275	0.0166
91	3.4441	0.0165
92	3.4605	0.0164
93	3.4768	0.0163
94	3.4931	0.0162
95	3.5092	0.0161
96	3.5253	0.0160
97	3.5412	0.0160
98	3.5571	0.0159
99	3.5729	0.0158
100	3.5886	0.0157
101	3.6041	0.0156
102	3.6197	0.0155
103	3.6351	0.0154
104	3.6504	0.0153
105	3.6657	0.0153
106	3.6808	0.0152
107	3.6959	0.0151
108	3.7109	0.0150
109	3.7259	0.0149
110	3.7407	0.0149
111	3.7555	0.0148
112	3.7702	0.0147
113	3.7849	0.0146
114	3.7994	0.0146
115	3.8139	0.0145
116	3.8283	0.0144
117	3.8427	0.0143
118	3.8569	0.0143
119	3.8712	0.0142
120	3.8853	0.0141
121	3.8994	0.0141
122	3.9134	0.0140
123	3.9273	0.0139
124	3.9412	0.0139
125	3.9550	0.0138

126	3.9688	0.0138
127	3.9825	0.0137
128	3.9961	0.0136
129	4.0097	0.0136
130	4.0232	0.0135
131	4.0367	0.0135
132	4.0501	0.0134
133	4.0634	0.0133
134	4.0767	0.0133
135	4.0899	0.0132
136	4.1031	0.0132
137	4.1162	0.0131
138	4.1293	0.0131
139	4.1423	0.0130
140	4.1552	0.0130
141	4.1682	0.0129
142	4.1810	0.0129
143	4.1938	0.0128
144	4.2066	0.0128
145	4.2193	0.0127
146	4.2319	0.0127
147	4.2445	0.0126
148	4.2571	0.0126
149	4.2696	0.0125
150	4.2821	0.0125
151	4.2945	0.0124
152	4.3069	0.0124
153	4.3192	0.0123
154	4.3315	0.0123
155	4.3437	0.0122
156	4.3559	0.0122
157	4.3680	0.0121
158	4.3801	0.0121
159	4.3922	0.0121
160	4.4042	0.0120
161	4.4162	0.0120
162	4.4281	0.0119
163	4.4400	0.0119
164	4.4519	0.0118
165	4.4637	0.0118
166	4.4754	0.0118
167	4.4872	0.0117
168	4.4989	0.0117
169	4.5105	0.0116
170	4.5221	0.0116
171	4.5337	0.0116
172	4.5452	0.0115
173	4.5567	0.0115
174	4.5682	0.0115
175	4.5796	0.0114
176	4.5910	0.0114
177	4.6023	0.0113
178	4.6136	0.0113
179	4.6249	0.0113
180	4.6362	0.0112
181	4.6474	0.0112
182	4.6585	0.0112
183	4.6697	0.0111
184	4.6808	0.0111
185	4.6918	0.0111
186	4.7029	0.0110

187	4.7139	0.0110
188	4.7249	0.0110
189	4.7358	0.0109
190	4.7467	0.0109
191	4.7576	0.0109
192	4.7684	0.0108
193	4.7792	0.0108
194	4.7900	0.0108
195	4.8007	0.0107
196	4.8114	0.0107
197	4.8221	0.0107
198	4.8328	0.0107
199	4.8434	0.0106
200	4.8540	0.0106
201	4.8645	0.0106
202	4.8751	0.0105
203	4.8856	0.0105
204	4.8961	0.0105
205	4.9065	0.0104
206	4.9169	0.0104
207	4.9273	0.0104
208	4.9377	0.0104
209	4.9480	0.0103
210	4.9583	0.0103
211	4.9686	0.0103
212	4.9788	0.0102
213	4.9890	0.0102
214	4.9992	0.0102
215	5.0094	0.0102
216	5.0195	0.0101
217	5.0296	0.0101
218	5.0397	0.0101
219	5.0498	0.0101
220	5.0598	0.0100
221	5.0698	0.0100
222	5.0798	0.0100
223	5.0898	0.0100
224	5.0997	0.0099
225	5.1096	0.0099
226	5.1195	0.0099
227	5.1294	0.0099
228	5.1392	0.0098
229	5.1490	0.0098
230	5.1588	0.0098
231	5.1686	0.0098
232	5.1783	0.0097
233	5.1880	0.0097
234	5.1977	0.0097
235	5.2074	0.0097
236	5.2170	0.0096
237	5.2266	0.0096
238	5.2362	0.0096
239	5.2458	0.0096
240	5.2554	0.0096
241	5.2649	0.0095
242	5.2744	0.0095
243	5.2839	0.0095
244	5.2934	0.0095
245	5.3028	0.0094
246	5.3122	0.0094
247	5.3216	0.0094

248	5.3310	0.0094
249	5.3404	0.0094
250	5.3497	0.0093
251	5.3590	0.0093
252	5.3683	0.0093
253	5.3776	0.0093
254	5.3868	0.0093
255	5.3961	0.0092
256	5.4053	0.0092
257	5.4145	0.0092
258	5.4236	0.0092
259	5.4328	0.0092
260	5.4419	0.0091
261	5.4510	0.0091
262	5.4601	0.0091
263	5.4692	0.0091
264	5.4782	0.0091
265	5.4873	0.0090
266	5.4963	0.0090
267	5.5053	0.0090
268	5.5143	0.0090
269	5.5232	0.0090
270	5.5321	0.0089
271	5.5411	0.0089
272	5.5500	0.0089
273	5.5589	0.0089
274	5.5677	0.0089
275	5.5766	0.0088
276	5.5854	0.0088
277	5.5942	0.0088
278	5.6030	0.0088
279	5.6118	0.0088
280	5.6205	0.0088
281	5.6293	0.0087
282	5.6380	0.0087
283	5.6467	0.0087
284	5.6554	0.0087
285	5.6640	0.0087
286	5.6727	0.0087
287	5.6813	0.0086
288	5.6899	0.0086

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0086	0.0063	0.0024
2	0.0086	0.0063	0.0024
3	0.0087	0.0063	0.0024
4	0.0087	0.0063	0.0024
5	0.0087	0.0063	0.0024
6	0.0087	0.0063	0.0024
7	0.0088	0.0064	0.0024
8	0.0088	0.0064	0.0024
9	0.0088	0.0064	0.0024
10	0.0088	0.0064	0.0024
11	0.0089	0.0064	0.0024
12	0.0089	0.0065	0.0024
13	0.0089	0.0065	0.0025
14	0.0090	0.0065	0.0025
15	0.0090	0.0065	0.0025

16	0.0090	0.0065	0.0025
17	0.0091	0.0066	0.0025
18	0.0091	0.0066	0.0025
19	0.0091	0.0066	0.0025
20	0.0091	0.0066	0.0025
21	0.0092	0.0067	0.0025
22	0.0092	0.0067	0.0025
23	0.0092	0.0067	0.0025
24	0.0093	0.0067	0.0025
25	0.0093	0.0067	0.0026
26	0.0093	0.0068	0.0026
27	0.0094	0.0068	0.0026
28	0.0094	0.0068	0.0026
29	0.0094	0.0068	0.0026
30	0.0094	0.0069	0.0026
31	0.0095	0.0069	0.0026
32	0.0095	0.0069	0.0026
33	0.0096	0.0069	0.0026
34	0.0096	0.0069	0.0026
35	0.0096	0.0070	0.0026
36	0.0096	0.0070	0.0026
37	0.0097	0.0070	0.0027
38	0.0097	0.0070	0.0027
39	0.0098	0.0071	0.0027
40	0.0098	0.0071	0.0027
41	0.0098	0.0071	0.0027
42	0.0099	0.0072	0.0027
43	0.0099	0.0072	0.0027
44	0.0099	0.0072	0.0027
45	0.0100	0.0072	0.0027
46	0.0100	0.0073	0.0027
47	0.0101	0.0073	0.0028
48	0.0101	0.0073	0.0028
49	0.0101	0.0074	0.0028
50	0.0102	0.0074	0.0028
51	0.0102	0.0074	0.0028
52	0.0102	0.0074	0.0028
53	0.0103	0.0075	0.0028
54	0.0103	0.0075	0.0028
55	0.0104	0.0075	0.0029
56	0.0104	0.0076	0.0029
57	0.0105	0.0076	0.0029
58	0.0105	0.0076	0.0029
59	0.0106	0.0077	0.0029
60	0.0106	0.0077	0.0029
61	0.0107	0.0077	0.0029
62	0.0107	0.0077	0.0029
63	0.0107	0.0078	0.0029
64	0.0108	0.0078	0.0030
65	0.0108	0.0079	0.0030
66	0.0109	0.0079	0.0030
67	0.0109	0.0079	0.0030
68	0.0110	0.0080	0.0030
69	0.0110	0.0080	0.0030
70	0.0111	0.0080	0.0030
71	0.0111	0.0081	0.0031
72	0.0112	0.0081	0.0031
73	0.0112	0.0082	0.0031
74	0.0113	0.0082	0.0031
75	0.0113	0.0082	0.0031
76	0.0114	0.0083	0.0031

77	0.0115	0.0083	0.0031
78	0.0115	0.0083	0.0032
79	0.0116	0.0084	0.0032
80	0.0116	0.0084	0.0032
81	0.0117	0.0085	0.0032
82	0.0117	0.0085	0.0032
83	0.0118	0.0086	0.0032
84	0.0118	0.0086	0.0033
85	0.0119	0.0087	0.0033
86	0.0120	0.0087	0.0033
87	0.0121	0.0087	0.0033
88	0.0121	0.0088	0.0033
89	0.0122	0.0088	0.0033
90	0.0122	0.0089	0.0034
91	0.0123	0.0089	0.0034
92	0.0124	0.0090	0.0034
93	0.0125	0.0090	0.0034
94	0.0125	0.0091	0.0034
95	0.0126	0.0091	0.0035
96	0.0127	0.0092	0.0035
97	0.0128	0.0093	0.0035
98	0.0128	0.0093	0.0035
99	0.0129	0.0094	0.0035
100	0.0130	0.0094	0.0036
101	0.0131	0.0095	0.0036
102	0.0131	0.0095	0.0036
103	0.0132	0.0096	0.0036
104	0.0133	0.0096	0.0036
105	0.0134	0.0097	0.0037
106	0.0135	0.0098	0.0037
107	0.0136	0.0098	0.0037
108	0.0136	0.0099	0.0037
109	0.0138	0.0100	0.0038
110	0.0138	0.0100	0.0038
111	0.0139	0.0101	0.0038
112	0.0140	0.0102	0.0038
113	0.0141	0.0103	0.0039
114	0.0142	0.0103	0.0039
115	0.0143	0.0104	0.0039
116	0.0144	0.0105	0.0040
117	0.0146	0.0106	0.0040
118	0.0146	0.0106	0.0040
119	0.0148	0.0107	0.0041
120	0.0149	0.0108	0.0041
121	0.0150	0.0109	0.0041
122	0.0151	0.0109	0.0041
123	0.0153	0.0111	0.0042
124	0.0153	0.0111	0.0042
125	0.0155	0.0112	0.0043
126	0.0156	0.0113	0.0043
127	0.0158	0.0114	0.0043
128	0.0159	0.0115	0.0044
129	0.0160	0.0116	0.0044
130	0.0161	0.0117	0.0044
131	0.0163	0.0119	0.0045
132	0.0164	0.0119	0.0045
133	0.0166	0.0121	0.0046
134	0.0168	0.0122	0.0046
135	0.0170	0.0123	0.0047
136	0.0171	0.0124	0.0047
137	0.0173	0.0126	0.0048

138	0.0174	0.0126	0.0048
139	0.0177	0.0128	0.0049
140	0.0178	0.0129	0.0049
141	0.0181	0.0131	0.0050
142	0.0182	0.0132	0.0050
143	0.0185	0.0134	0.0051
144	0.0186	0.0135	0.0051
145	0.0206	0.0149	0.0056
146	0.0207	0.0150	0.0057
147	0.0210	0.0153	0.0058
148	0.0212	0.0154	0.0058
149	0.0215	0.0156	0.0059
150	0.0217	0.0157	0.0060
151	0.0221	0.0160	0.0061
152	0.0222	0.0161	0.0061
153	0.0226	0.0164	0.0062
154	0.0228	0.0166	0.0063
155	0.0233	0.0169	0.0064
156	0.0235	0.0170	0.0064
157	0.0239	0.0174	0.0066
158	0.0242	0.0175	0.0066
159	0.0247	0.0179	0.0068
160	0.0249	0.0181	0.0068
161	0.0255	0.0185	0.0070
162	0.0258	0.0187	0.0071
163	0.0264	0.0191	0.0072
164	0.0267	0.0194	0.0073
165	0.0274	0.0198	0.0075
166	0.0277	0.0201	0.0076
167	0.0285	0.0206	0.0078
168	0.0289	0.0209	0.0079
169	0.0297	0.0216	0.0082
170	0.0302	0.0219	0.0083
171	0.0311	0.0226	0.0085
172	0.0316	0.0230	0.0087
173	0.0328	0.0238	0.0090
174	0.0334	0.0242	0.0092
175	0.0347	0.0251	0.0095
176	0.0354	0.0257	0.0097
177	0.0369	0.0268	0.0101
178	0.0378	0.0274	0.0104
179	0.0397	0.0288	0.0109
180	0.0407	0.0295	0.0112
181	0.0431	0.0313	0.0118
182	0.0445	0.0323	0.0122
183	0.0476	0.0345	0.0131
184	0.0494	0.0358	0.0136
185	0.0455	0.0330	0.0125
186	0.0480	0.0348	0.0132
187	0.0545	0.0396	0.0150
188	0.0588	0.0427	0.0161
189	0.0709	0.0514	0.0195
190	0.0800	0.0580	0.0220
191	0.1143	0.0589	0.0554
192	0.1572	0.0589	0.0983
193	0.4921	0.0589	0.4332
194	0.0931	0.0589	0.0342
195	0.0641	0.0465	0.0176
196	0.0510	0.0370	0.0140
197	0.0515	0.0373	0.0141
198	0.0459	0.0333	0.0126

199	0.0419	0.0304	0.0115
200	0.0387	0.0281	0.0106
201	0.0361	0.0262	0.0099
202	0.0340	0.0247	0.0093
203	0.0322	0.0234	0.0088
204	0.0306	0.0222	0.0084
205	0.0293	0.0212	0.0080
206	0.0281	0.0204	0.0077
207	0.0270	0.0196	0.0074
208	0.0261	0.0189	0.0072
209	0.0252	0.0183	0.0069
210	0.0244	0.0177	0.0067
211	0.0237	0.0172	0.0065
212	0.0230	0.0167	0.0063
213	0.0224	0.0163	0.0062
214	0.0219	0.0159	0.0060
215	0.0214	0.0155	0.0059
216	0.0209	0.0151	0.0057
217	0.0187	0.0136	0.0051
218	0.0183	0.0133	0.0050
219	0.0179	0.0130	0.0049
220	0.0176	0.0127	0.0048
221	0.0172	0.0125	0.0047
222	0.0169	0.0122	0.0046
223	0.0165	0.0120	0.0045
224	0.0162	0.0118	0.0045
225	0.0160	0.0116	0.0044
226	0.0157	0.0114	0.0043
227	0.0154	0.0112	0.0042
228	0.0152	0.0110	0.0042
229	0.0149	0.0108	0.0041
230	0.0147	0.0107	0.0040
231	0.0145	0.0105	0.0040
232	0.0143	0.0104	0.0039
233	0.0141	0.0102	0.0039
234	0.0139	0.0101	0.0038
235	0.0137	0.0099	0.0038
236	0.0135	0.0098	0.0037
237	0.0133	0.0097	0.0037
238	0.0132	0.0096	0.0036
239	0.0130	0.0094	0.0036
240	0.0129	0.0093	0.0035
241	0.0127	0.0092	0.0035
242	0.0126	0.0091	0.0034
243	0.0124	0.0090	0.0034
244	0.0123	0.0089	0.0034
245	0.0121	0.0088	0.0033
246	0.0120	0.0087	0.0033
247	0.0119	0.0086	0.0033
248	0.0118	0.0085	0.0032
249	0.0116	0.0085	0.0032
250	0.0115	0.0084	0.0032
251	0.0114	0.0083	0.0031
252	0.0113	0.0082	0.0031
253	0.0112	0.0081	0.0031
254	0.0111	0.0081	0.0030
255	0.0110	0.0080	0.0030
256	0.0109	0.0079	0.0030
257	0.0108	0.0078	0.0030
258	0.0107	0.0078	0.0029
259	0.0106	0.0077	0.0029

260	0.0105	0.0076	0.0029
261	0.0104	0.0076	0.0029
262	0.0104	0.0075	0.0028
263	0.0103	0.0075	0.0028
264	0.0102	0.0074	0.0028
265	0.0101	0.0073	0.0028
266	0.0100	0.0073	0.0028
267	0.0100	0.0072	0.0027
268	0.0099	0.0072	0.0027
269	0.0098	0.0071	0.0027
270	0.0097	0.0071	0.0027
271	0.0097	0.0070	0.0027
272	0.0096	0.0070	0.0026
273	0.0095	0.0069	0.0026
274	0.0095	0.0069	0.0026
275	0.0094	0.0068	0.0026
276	0.0093	0.0068	0.0026
277	0.0093	0.0067	0.0025
278	0.0092	0.0067	0.0025
279	0.0092	0.0066	0.0025
280	0.0091	0.0066	0.0025
281	0.0090	0.0066	0.0025
282	0.0090	0.0065	0.0025
283	0.0089	0.0065	0.0024
284	0.0089	0.0064	0.0024
285	0.0088	0.0064	0.0024
286	0.0088	0.0064	0.0024
287	0.0087	0.0063	0.0024
288	0.0087	0.0063	0.0024

Total soil rain loss = 3.74(In)
Total effective rainfall = 1.95(In)
Peak flow rate in flood hydrograph = 15.78(CFS)

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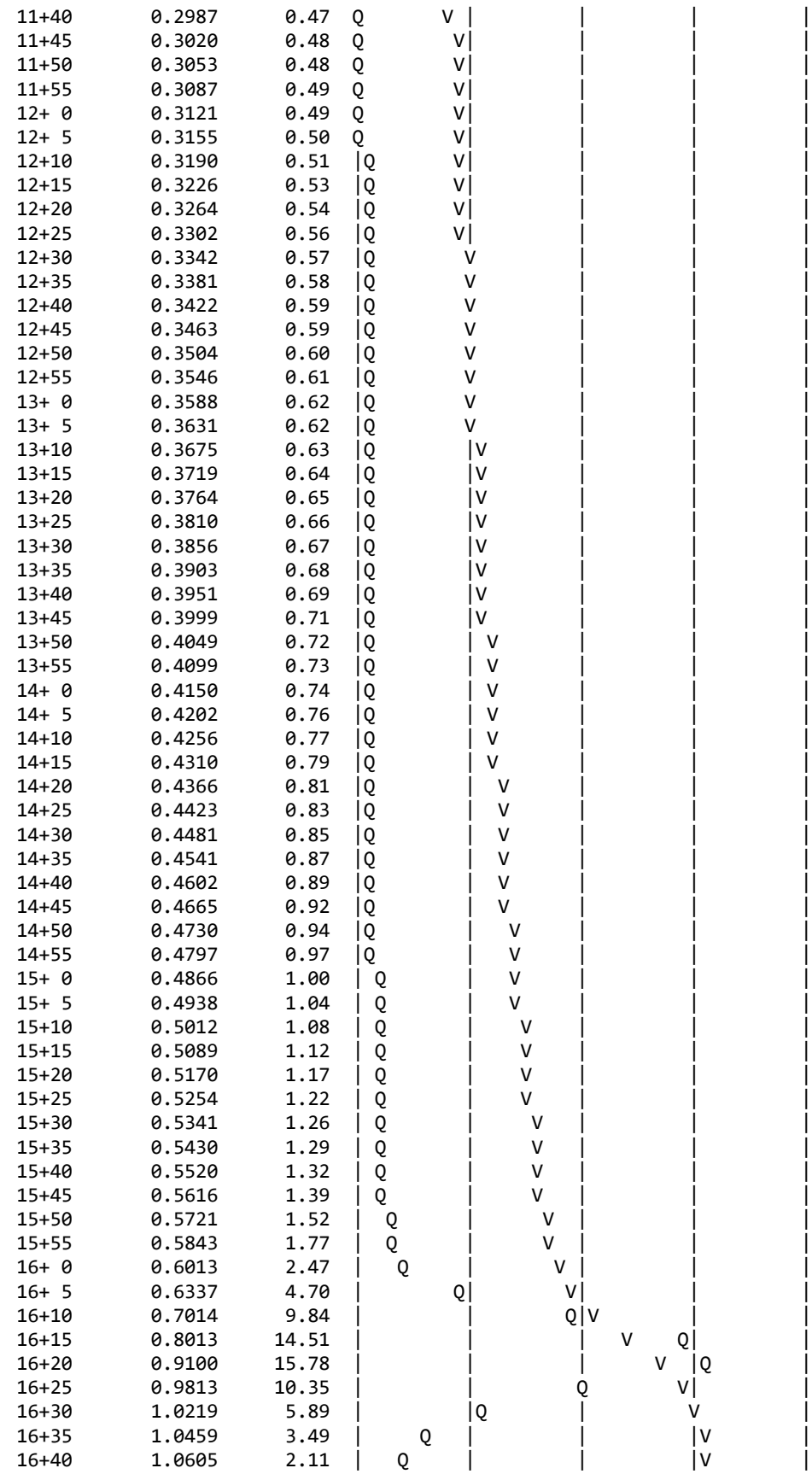
24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	5.0	10.0	15.0	20.0
0+ 5	0.0000	0.01	Q	|	|	|	|
0+10	0.0003	0.03	Q	|	|	|	|
0+15	0.0009	0.09	Q	|	|	|	|
0+20	0.0020	0.16	Q	|	|	|	|
0+25	0.0033	0.20	Q	|	|	|	|
0+30	0.0048	0.22	Q	|	|	|	|
0+35	0.0064	0.23	Q	|	|	|	|
0+40	0.0080	0.23	Q	|	|	|	|
0+45	0.0097	0.24	Q	|	|	|	|
0+50	0.0113	0.24	Q	|	|	|	|
0+55	0.0130	0.24	Q	|	|	|	|
1+ 0	0.0146	0.24	Q	|	|	|	|
1+ 5	0.0163	0.24	Q	|	|	|	|
1+10	0.0180	0.24	Q	|	|	|	|
1+15	0.0196	0.24	Q	|	|	|	|
1+20	0.0213	0.24	Q	|	|	|	|
1+25	0.0230	0.24	Q	|	|	|	|

1+30	0.0247	0.25	Q	|	|	|	|
1+35	0.0264	0.25	Q	|	|	|	|
1+40	0.0281	0.25	Q	|	|	|	|
1+45	0.0298	0.25	Q	|	|	|	|
1+50	0.0315	0.25	Q	|	|	|	|
1+55	0.0332	0.25	Q	|	|	|	|
2+ 0	0.0349	0.25	QV	|	|	|	|
2+ 5	0.0367	0.25	QV	|	|	|	|
2+10	0.0384	0.25	QV	|	|	|	|
2+15	0.0401	0.25	QV	|	|	|	|
2+20	0.0419	0.25	QV	|	|	|	|
2+25	0.0436	0.25	QV	|	|	|	|
2+30	0.0454	0.26	QV	|	|	|	|
2+35	0.0472	0.26	QV	|	|	|	|
2+40	0.0489	0.26	QV	|	|	|	|
2+45	0.0507	0.26	QV	|	|	|	|
2+50	0.0525	0.26	QV	|	|	|	|
2+55	0.0543	0.26	QV	|	|	|	|
3+ 0	0.0561	0.26	QV	|	|	|	|
3+ 5	0.0579	0.26	QV	|	|	|	|
3+10	0.0597	0.26	QV	|	|	|	|
3+15	0.0615	0.26	QV	|	|	|	|
3+20	0.0633	0.26	QV	|	|	|	|
3+25	0.0651	0.27	QV	|	|	|	|
3+30	0.0670	0.27	Q V	|	|	|	|
3+35	0.0688	0.27	Q V	|	|	|	|
3+40	0.0707	0.27	Q V	|	|	|	|
3+45	0.0725	0.27	Q V	|	|	|	|
3+50	0.0744	0.27	Q V	|	|	|	|
3+55	0.0762	0.27	Q V	|	|	|	|
4+ 0	0.0781	0.27	Q V	|	|	|	|
4+ 5	0.0800	0.27	Q V	|	|	|	|
4+10	0.0819	0.27	Q V	|	|	|	|
4+15	0.0838	0.28	Q V	|	|	|	|
4+20	0.0857	0.28	Q V	|	|	|	|
4+25	0.0876	0.28	Q V	|	|	|	|
4+30	0.0895	0.28	Q V	|	|	|	|
4+35	0.0914	0.28	Q V	|	|	|	|
4+40	0.0934	0.28	Q V	|	|	|	|
4+45	0.0953	0.28	Q V	|	|	|	|
4+50	0.0973	0.28	Q V	|	|	|	|
4+55	0.0992	0.28	Q V	|	|	|	|
5+ 0	0.1012	0.29	Q V	|	|	|	|
5+ 5	0.1032	0.29	Q V	|	|	|	|
5+10	0.1052	0.29	Q V	|	|	|	|
5+15	0.1072	0.29	Q V	|	|	|	|
5+20	0.1092	0.29	Q V	|	|	|	|
5+25	0.1112	0.29	Q V	|	|	|	|
5+30	0.1132	0.29	Q V	|	|	|	|
5+35	0.1152	0.29	Q V	|	|	|	|
5+40	0.1172	0.30	Q V	|	|	|	|
5+45	0.1193	0.30	Q V	|	|	|	|
5+50	0.1213	0.30	Q V	|	|	|	|
5+55	0.1234	0.30	Q V	|	|	|	|
6+ 0	0.1255	0.30	Q V	|	|	|	|
6+ 5	0.1276	0.30	Q V	|	|	|	|
6+10	0.1296	0.30	Q V	|	|	|	|
6+15	0.1317	0.31	Q V	|	|	|	|
6+20	0.1339	0.31	Q V	|	|	|	|
6+25	0.1360	0.31	Q V	|	|	|	|
6+30	0.1381	0.31	Q V	|	|	|	|

6+35	0.1403	0.31	Q	V				
6+40	0.1424	0.31	Q	V				
6+45	0.1446	0.31	Q	V				
6+50	0.1467	0.32	Q	V				
6+55	0.1489	0.32	Q	V				
7+ 0	0.1511	0.32	Q	V				
7+ 5	0.1533	0.32	Q	V				
7+10	0.1555	0.32	Q	V				
7+15	0.1578	0.32	Q	V				
7+20	0.1600	0.33	Q	V				
7+25	0.1623	0.33	Q	V				
7+30	0.1645	0.33	Q	V				
7+35	0.1668	0.33	Q	V				
7+40	0.1691	0.33	Q	V				
7+45	0.1714	0.33	Q	V				
7+50	0.1737	0.34	Q	V				
7+55	0.1760	0.34	Q	V				
8+ 0	0.1784	0.34	Q	V				
8+ 5	0.1807	0.34	Q	V				
8+10	0.1831	0.34	Q	V				
8+15	0.1855	0.35	Q	V				
8+20	0.1879	0.35	Q	V				
8+25	0.1903	0.35	Q	V				
8+30	0.1927	0.35	Q	V				
8+35	0.1951	0.35	Q	V				
8+40	0.1976	0.36	Q	V				
8+45	0.2001	0.36	Q	V				
8+50	0.2025	0.36	Q	V				
8+55	0.2050	0.36	Q	V				
9+ 0	0.2076	0.37	Q	V				
9+ 5	0.2101	0.37	Q	V				
9+10	0.2126	0.37	Q	V				
9+15	0.2152	0.37	Q	V				
9+20	0.2178	0.37	Q	V				
9+25	0.2204	0.38	Q	V				
9+30	0.2230	0.38	Q	V				
9+35	0.2256	0.38	Q	V				
9+40	0.2283	0.39	Q	V				
9+45	0.2310	0.39	Q	V				
9+50	0.2337	0.39	Q	V				
9+55	0.2364	0.39	Q	V				
10+ 0	0.2391	0.40	Q	V				
10+ 5	0.2419	0.40	Q	V				
10+10	0.2446	0.40	Q	V				
10+15	0.2474	0.41	Q	V				
10+20	0.2502	0.41	Q	V				
10+25	0.2531	0.41	Q	V				
10+30	0.2559	0.42	Q	V				
10+35	0.2588	0.42	Q	V				
10+40	0.2617	0.42	Q	V				
10+45	0.2647	0.43	Q	V				
10+50	0.2676	0.43	Q	V				
10+55	0.2706	0.43	Q	V				
11+ 0	0.2736	0.44	Q	V				
11+ 5	0.2767	0.44	Q	V				
11+10	0.2797	0.45	Q	V				
11+15	0.2828	0.45	Q	V				
11+20	0.2859	0.45	Q	V				
11+25	0.2891	0.46	Q	V				
11+30	0.2923	0.46	Q	V				
11+35	0.2955	0.47	Q	V				



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16+45       1.0716      1.61  |  Q      |         |         | V       |
16+50       1.0816      1.46  | Q       |         |         | V       |
16+55       1.0901      1.23  | Q       |         |         | V       |
17+ 0       1.0971      1.01  | Q       |         |         | V       |
17+ 5       1.1036      0.95  |Q        |         |         |  V      |
17+10       1.1097      0.89  |Q        |         |         |  V      |
17+15       1.1156      0.85  |Q        |         |         |  V      |
17+20       1.1211      0.81  |Q        |         |         |  V      |
17+25       1.1265      0.77  |Q        |         |         |  V      |
17+30       1.1316      0.74  |Q        |         |         |  V      |
17+35       1.1365      0.72  |Q        |         |         |   V     |
17+40       1.1413      0.69  |Q        |         |         |   V     |
17+45       1.1459      0.67  |Q        |         |         |   V     |
17+50       1.1504      0.65  |Q        |         |         |   V     |
17+55       1.1548      0.63  |Q        |         |         |   V     |
18+ 0       1.1590      0.62  |Q        |         |         |   V     |
18+ 5       1.1631      0.60  |Q        |         |         |   V     |
18+10       1.1671      0.58  |Q        |         |         |    V    |
18+15       1.1709      0.55  |Q        |         |         |    V    |
18+20       1.1746      0.53  |Q        |         |         |    V    |
18+25       1.1781      0.51  |Q        |         |         |    V    |
18+30       1.1815      0.49  Q        |         |         |    V    |
18+35       1.1848      0.48  Q        |         |         |    V    |
18+40       1.1881      0.47  Q        |         |         |    V    |
18+45       1.1912      0.46  Q        |         |         |    V    |
18+50       1.1944      0.45  Q        |         |         |    V    |
18+55       1.1974      0.44  Q        |         |         |    V    |
19+ 0       1.2004      0.44  Q        |         |         |    V    |
19+ 5       1.2034      0.43  Q        |         |         |     V   |
19+10       1.2063      0.42  Q        |         |         |     V   |
19+15       1.2092      0.42  Q        |         |         |     V   |
19+20       1.2120      0.41  Q        |         |         |     V   |
19+25       1.2147      0.40  Q        |         |         |     V   |
19+30       1.2175      0.40  Q        |         |         |     V   |
19+35       1.2202      0.39  Q        |         |         |     V   |
19+40       1.2228      0.38  Q        |         |         |     V   |
19+45       1.2254      0.38  Q        |         |         |     V   |
19+50       1.2280      0.37  Q        |         |         |     V   |
19+55       1.2305      0.37  Q        |         |         |     V   |
20+ 0       1.2331      0.36  Q        |         |         |     V   |
20+ 5       1.2355      0.36  Q        |         |         |      V  |
20+10       1.2380      0.36  Q        |         |         |      V  |
20+15       1.2404      0.35  Q        |         |         |      V  |
20+20       1.2428      0.35  Q        |         |         |      V  |
20+25       1.2452      0.34  Q        |         |         |      V  |
20+30       1.2475      0.34  Q        |         |         |      V  |
20+35       1.2498      0.34  Q        |         |         |      V  |
20+40       1.2521      0.33  Q        |         |         |      V  |
20+45       1.2544      0.33  Q        |         |         |      V  |
20+50       1.2566      0.32  Q        |         |         |      V  |
20+55       1.2588      0.32  Q        |         |         |      V  |
21+ 0       1.2610      0.32  Q        |         |         |      V  |
21+ 5       1.2632      0.32  Q        |         |         |      V  |
21+10       1.2653      0.31  Q        |         |         |      V  |
21+15       1.2674      0.31  Q        |         |         |       V |
21+20       1.2696      0.31  Q        |         |         |       V |
21+25       1.2716      0.30  Q        |         |         |       V |
21+30       1.2737      0.30  Q        |         |         |       V |
21+35       1.2758      0.30  Q        |         |         |       V |
21+40       1.2778      0.30  Q        |         |         |       V |
21+45       1.2798      0.29  Q        |         |         |       V |
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21+50	1.2818	0.29	Q	|	|	|	V |
21+55	1.2838	0.29	Q	|	|	|	V |
22+ 0	1.2858	0.29	Q	|	|	|	V |
22+ 5	1.2877	0.28	Q	|	|	|	V |
22+10	1.2896	0.28	Q	|	|	|	V |
22+15	1.2916	0.28	Q	|	|	|	V |
22+20	1.2935	0.28	Q	|	|	|	V |
22+25	1.2954	0.27	Q	|	|	|	V |
22+30	1.2972	0.27	Q	|	|	|	V |
22+35	1.2991	0.27	Q	|	|	|	V |
22+40	1.3009	0.27	Q	|	|	|	V|
22+45	1.3028	0.27	Q	|	|	|	V|
22+50	1.3046	0.26	Q	|	|	|	V|
22+55	1.3064	0.26	Q	|	|	|	V|
23+ 0	1.3082	0.26	Q	|	|	|	V|
23+ 5	1.3100	0.26	Q	|	|	|	V|
23+10	1.3117	0.26	Q	|	|	|	V|
23+15	1.3135	0.25	Q	|	|	|	V|
23+20	1.3152	0.25	Q	|	|	|	V|
23+25	1.3170	0.25	Q	|	|	|	V|
23+30	1.3187	0.25	Q	|	|	|	V|
23+35	1.3204	0.25	Q	|	|	|	V|
23+40	1.3221	0.25	Q	|	|	|	V|
23+45	1.3238	0.25	Q	|	|	|	V|
23+50	1.3255	0.24	Q	|	|	|	V|
23+55	1.3271	0.24	Q	|	|	|	V|
24+ 0	1.3288	0.24	Q	|	|	|	V|

UNIT HYDROGRAPH ANALYSIS (24 HOUR, 100-YEAR STORM)

POST-DEVELOPMENT CONDITION

U n i t H y d r o g r a p h A n a l y s i s

Study date 10/18/22

++

San Bernardino County Synthetic Unit Hydrology Method
Manual date - August 1986

Program License Serial Number 6277

JOB NO 2022-318
11115 HEMLOCK AVENUE
100-YEAR, UNIT HYDROGRAPH
POST-CONDITION, AREA A

Storm Event Year = 100

Antecedent Moisture Condition = 3

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 100		
24.47	1	1.33
Rainfall data for year 100		
24.47	6	3.11
Rainfall data for year 100		
24.47	24	5.69

++

******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	SCS curve NO.(AMC 3)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
32.0	52.0	24.47	1.000	0.785	0.120	0.094

Area-averaged adjusted loss rate Fm (In/Hr) = 0.094

********* Area-Averaged low loss rate fraction, Yb **********

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC3)	S	Pervious Yield Fr
2.94	0.120	32.0	52.0	9.23	0.199
21.53	0.880	98.0	98.0	0.20	0.958

Area-averaged catchment yield fraction, Y = 0.867
Area-averaged low loss fraction, Yb = 0.133
User entry of time of concentration = 0.181 (hours)
++
Watershed area = 24.47(Ac.)
Catchment Lag time = 0.144 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 57.6781
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.094(In/Hr)
Average low loss rate fraction (Yb) = 0.133 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.492(In)
Computed peak 30-minute rainfall = 1.008(In)
Specified peak 1-hour rainfall = 1.330(In)
Computed peak 3-hour rainfall = 2.239(In)
Specified peak 6-hour rainfall = 3.110(In)
Specified peak 24-hour rainfall = 5.690(In)

Rainfall depth area reduction factors:
Using a total area of 24.47(Ac.) (Ref: fig. E-4)

5-minute factor = 0.999 Adjusted rainfall = 0.492(In)
30-minute factor = 0.999 Adjusted rainfall = 1.007(In)
1-hour factor = 0.999 Adjusted rainfall = 1.328(In)
3-hour factor = 1.000 Adjusted rainfall = 2.239(In)
6-hour factor = 1.000 Adjusted rainfall = 3.110(In)
24-hour factor = 1.000 Adjusted rainfall = 5.690(In)

U n i t H y d r o g r a p h

++

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
	(K = 295.93 (CFS))	
1	6.038	17.867
2	38.773	96.875
3	79.357	120.101
4	94.547	44.953
5	98.446	11.539
6	99.506	3.138
7	100.000	1.462

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.4917	0.4917
2	0.6488	0.1571
3	0.7630	0.1142
4	0.8561	0.0931
5	0.9360	0.0799
6	1.0068	0.0708
7	1.0708	0.0640

8	1.1296	0.0588
9	1.1841	0.0545
10	1.2350	0.0510
11	1.2830	0.0480
12	1.3285	0.0454
13	1.3800	0.0515
14	1.4294	0.0494
15	1.4770	0.0476
16	1.5230	0.0460
17	1.5675	0.0445
18	1.6106	0.0431
19	1.6525	0.0419
20	1.6933	0.0408
21	1.7330	0.0397
22	1.7717	0.0387
23	1.8095	0.0378
24	1.8465	0.0370
25	1.8826	0.0362
26	1.9180	0.0354
27	1.9527	0.0347
28	1.9867	0.0340
29	2.0201	0.0334
30	2.0529	0.0328
31	2.0851	0.0322
32	2.1168	0.0317
33	2.1480	0.0312
34	2.1787	0.0307
35	2.2089	0.0302
36	2.2386	0.0298
37	2.2679	0.0293
38	2.2968	0.0289
39	2.3252	0.0285
40	2.3533	0.0281
41	2.3810	0.0277
42	2.4084	0.0274
43	2.4354	0.0270
44	2.4621	0.0267
45	2.4885	0.0264
46	2.5146	0.0261
47	2.5403	0.0258
48	2.5658	0.0255
49	2.5910	0.0252
50	2.6160	0.0249
51	2.6407	0.0247
52	2.6651	0.0244
53	2.6893	0.0242
54	2.7132	0.0239
55	2.7369	0.0237
56	2.7604	0.0235
57	2.7837	0.0233
58	2.8067	0.0231
59	2.8296	0.0228
60	2.8522	0.0226
61	2.8746	0.0224
62	2.8969	0.0223
63	2.9190	0.0221
64	2.9408	0.0219
65	2.9625	0.0217
66	2.9841	0.0215
67	3.0054	0.0214
68	3.0266	0.0212

69	3.0476	0.0210
70	3.0685	0.0209
71	3.0892	0.0207
72	3.1098	0.0206
73	3.1285	0.0187
74	3.1471	0.0186
75	3.1656	0.0185
76	3.1839	0.0183
77	3.2021	0.0182
78	3.2202	0.0181
79	3.2381	0.0179
80	3.2559	0.0178
81	3.2735	0.0177
82	3.2911	0.0176
83	3.3085	0.0174
84	3.3258	0.0173
85	3.3430	0.0172
86	3.3601	0.0171
87	3.3771	0.0170
88	3.3940	0.0169
89	3.4107	0.0168
90	3.4274	0.0166
91	3.4439	0.0165
92	3.4603	0.0164
93	3.4767	0.0163
94	3.4929	0.0162
95	3.5091	0.0161
96	3.5251	0.0160
97	3.5411	0.0160
98	3.5569	0.0159
99	3.5727	0.0158
100	3.5884	0.0157
101	3.6040	0.0156
102	3.6195	0.0155
103	3.6349	0.0154
104	3.6503	0.0153
105	3.6655	0.0153
106	3.6807	0.0152
107	3.6958	0.0151
108	3.7108	0.0150
109	3.7257	0.0149
110	3.7406	0.0149
111	3.7554	0.0148
112	3.7701	0.0147
113	3.7847	0.0146
114	3.7993	0.0146
115	3.8137	0.0145
116	3.8282	0.0144
117	3.8425	0.0143
118	3.8568	0.0143
119	3.8710	0.0142
120	3.8851	0.0141
121	3.8992	0.0141
122	3.9132	0.0140
123	3.9272	0.0139
124	3.9411	0.0139
125	3.9549	0.0138
126	3.9686	0.0138
127	3.9823	0.0137
128	3.9960	0.0136
129	4.0095	0.0136

130	4.0231	0.0135
131	4.0365	0.0135
132	4.0499	0.0134
133	4.0633	0.0133
134	4.0765	0.0133
135	4.0898	0.0132
136	4.1029	0.0132
137	4.1161	0.0131
138	4.1291	0.0131
139	4.1421	0.0130
140	4.1551	0.0130
141	4.1680	0.0129
142	4.1809	0.0129
143	4.1937	0.0128
144	4.2064	0.0128
145	4.2191	0.0127
146	4.2318	0.0127
147	4.2444	0.0126
148	4.2570	0.0126
149	4.2695	0.0125
150	4.2819	0.0125
151	4.2943	0.0124
152	4.3067	0.0124
153	4.3190	0.0123
154	4.3313	0.0123
155	4.3436	0.0122
156	4.3557	0.0122
157	4.3679	0.0121
158	4.3800	0.0121
159	4.3920	0.0121
160	4.4041	0.0120
161	4.4160	0.0120
162	4.4280	0.0119
163	4.4399	0.0119
164	4.4517	0.0118
165	4.4635	0.0118
166	4.4753	0.0118
167	4.4870	0.0117
168	4.4987	0.0117
169	4.5104	0.0117
170	4.5220	0.0116
171	4.5335	0.0116
172	4.5451	0.0115
173	4.5566	0.0115
174	4.5680	0.0115
175	4.5795	0.0114
176	4.5908	0.0114
177	4.6022	0.0113
178	4.6135	0.0113
179	4.6248	0.0113
180	4.6360	0.0112
181	4.6472	0.0112
182	4.6584	0.0112
183	4.6695	0.0111
184	4.6806	0.0111
185	4.6917	0.0111
186	4.7027	0.0110
187	4.7137	0.0110
188	4.7247	0.0110
189	4.7356	0.0109
190	4.7466	0.0109

191	4.7574	0.0109
192	4.7683	0.0108
193	4.7791	0.0108
194	4.7898	0.0108
195	4.8006	0.0107
196	4.8113	0.0107
197	4.8220	0.0107
198	4.8326	0.0107
199	4.8433	0.0106
200	4.8538	0.0106
201	4.8644	0.0106
202	4.8749	0.0105
203	4.8854	0.0105
204	4.8959	0.0105
205	4.9064	0.0104
206	4.9168	0.0104
207	4.9272	0.0104
208	4.9375	0.0104
209	4.9479	0.0103
210	4.9582	0.0103
211	4.9684	0.0103
212	4.9787	0.0102
213	4.9889	0.0102
214	4.9991	0.0102
215	5.0093	0.0102
216	5.0194	0.0101
217	5.0295	0.0101
218	5.0396	0.0101
219	5.0497	0.0101
220	5.0597	0.0100
221	5.0697	0.0100
222	5.0797	0.0100
223	5.0897	0.0100
224	5.0996	0.0099
225	5.1095	0.0099
226	5.1194	0.0099
227	5.1292	0.0099
228	5.1391	0.0098
229	5.1489	0.0098
230	5.1587	0.0098
231	5.1684	0.0098
232	5.1782	0.0097
233	5.1879	0.0097
234	5.1976	0.0097
235	5.2072	0.0097
236	5.2169	0.0096
237	5.2265	0.0096
238	5.2361	0.0096
239	5.2457	0.0096
240	5.2552	0.0096
241	5.2648	0.0095
242	5.2743	0.0095
243	5.2838	0.0095
244	5.2932	0.0095
245	5.3027	0.0094
246	5.3121	0.0094
247	5.3215	0.0094
248	5.3309	0.0094
249	5.3402	0.0094
250	5.3496	0.0093
251	5.3589	0.0093

252	5.3682	0.0093
253	5.3774	0.0093
254	5.3867	0.0093
255	5.3959	0.0092
256	5.4051	0.0092
257	5.4143	0.0092
258	5.4235	0.0092
259	5.4327	0.0092
260	5.4418	0.0091
261	5.4509	0.0091
262	5.4600	0.0091
263	5.4691	0.0091
264	5.4781	0.0091
265	5.4871	0.0090
266	5.4962	0.0090
267	5.5052	0.0090
268	5.5141	0.0090
269	5.5231	0.0090
270	5.5320	0.0089
271	5.5409	0.0089
272	5.5498	0.0089
273	5.5587	0.0089
274	5.5676	0.0089
275	5.5764	0.0088
276	5.5853	0.0088
277	5.5941	0.0088
278	5.6029	0.0088
279	5.6116	0.0088
280	5.6204	0.0088
281	5.6291	0.0087
282	5.6379	0.0087
283	5.6466	0.0087
284	5.6553	0.0087
285	5.6639	0.0087
286	5.6726	0.0087
287	5.6812	0.0086
288	5.6898	0.0086

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0086	0.0011	0.0075
2	0.0086	0.0011	0.0075
3	0.0087	0.0012	0.0075
4	0.0087	0.0012	0.0075
5	0.0087	0.0012	0.0076
6	0.0087	0.0012	0.0076
7	0.0088	0.0012	0.0076
8	0.0088	0.0012	0.0076
9	0.0088	0.0012	0.0077
10	0.0088	0.0012	0.0077
11	0.0089	0.0012	0.0077
12	0.0089	0.0012	0.0077
13	0.0089	0.0012	0.0077
14	0.0090	0.0012	0.0078
15	0.0090	0.0012	0.0078
16	0.0090	0.0012	0.0078
17	0.0091	0.0012	0.0078
18	0.0091	0.0012	0.0079
19	0.0091	0.0012	0.0079

20	0.0091	0.0012	0.0079
21	0.0092	0.0012	0.0080
22	0.0092	0.0012	0.0080
23	0.0092	0.0012	0.0080
24	0.0093	0.0012	0.0080
25	0.0093	0.0012	0.0081
26	0.0093	0.0012	0.0081
27	0.0094	0.0012	0.0081
28	0.0094	0.0012	0.0081
29	0.0094	0.0013	0.0082
30	0.0094	0.0013	0.0082
31	0.0095	0.0013	0.0082
32	0.0095	0.0013	0.0082
33	0.0096	0.0013	0.0083
34	0.0096	0.0013	0.0083
35	0.0096	0.0013	0.0083
36	0.0096	0.0013	0.0084
37	0.0097	0.0013	0.0084
38	0.0097	0.0013	0.0084
39	0.0098	0.0013	0.0085
40	0.0098	0.0013	0.0085
41	0.0098	0.0013	0.0085
42	0.0099	0.0013	0.0085
43	0.0099	0.0013	0.0086
44	0.0099	0.0013	0.0086
45	0.0100	0.0013	0.0087
46	0.0100	0.0013	0.0087
47	0.0101	0.0013	0.0087
48	0.0101	0.0013	0.0087
49	0.0101	0.0013	0.0088
50	0.0102	0.0014	0.0088
51	0.0102	0.0014	0.0089
52	0.0102	0.0014	0.0089
53	0.0103	0.0014	0.0089
54	0.0103	0.0014	0.0090
55	0.0104	0.0014	0.0090
56	0.0104	0.0014	0.0090
57	0.0105	0.0014	0.0091
58	0.0105	0.0014	0.0091
59	0.0106	0.0014	0.0092
60	0.0106	0.0014	0.0092
61	0.0107	0.0014	0.0092
62	0.0107	0.0014	0.0093
63	0.0107	0.0014	0.0093
64	0.0108	0.0014	0.0093
65	0.0108	0.0014	0.0094
66	0.0109	0.0014	0.0094
67	0.0109	0.0015	0.0095
68	0.0110	0.0015	0.0095
69	0.0110	0.0015	0.0096
70	0.0111	0.0015	0.0096
71	0.0111	0.0015	0.0097
72	0.0112	0.0015	0.0097
73	0.0112	0.0015	0.0097
74	0.0113	0.0015	0.0098
75	0.0113	0.0015	0.0098
76	0.0114	0.0015	0.0099
77	0.0115	0.0015	0.0099
78	0.0115	0.0015	0.0100
79	0.0116	0.0015	0.0100
80	0.0116	0.0015	0.0101

81	0.0117	0.0016	0.0101
82	0.0117	0.0016	0.0102
83	0.0118	0.0016	0.0102
84	0.0118	0.0016	0.0103
85	0.0119	0.0016	0.0103
86	0.0120	0.0016	0.0104
87	0.0121	0.0016	0.0105
88	0.0121	0.0016	0.0105
89	0.0122	0.0016	0.0106
90	0.0122	0.0016	0.0106
91	0.0123	0.0016	0.0107
92	0.0124	0.0016	0.0107
93	0.0125	0.0017	0.0108
94	0.0125	0.0017	0.0108
95	0.0126	0.0017	0.0109
96	0.0127	0.0017	0.0110
97	0.0128	0.0017	0.0111
98	0.0128	0.0017	0.0111
99	0.0129	0.0017	0.0112
100	0.0130	0.0017	0.0112
101	0.0131	0.0017	0.0113
102	0.0131	0.0017	0.0114
103	0.0132	0.0018	0.0115
104	0.0133	0.0018	0.0115
105	0.0134	0.0018	0.0116
106	0.0135	0.0018	0.0117
107	0.0136	0.0018	0.0118
108	0.0136	0.0018	0.0118
109	0.0138	0.0018	0.0119
110	0.0138	0.0018	0.0120
111	0.0139	0.0019	0.0121
112	0.0140	0.0019	0.0121
113	0.0141	0.0019	0.0123
114	0.0142	0.0019	0.0123
115	0.0143	0.0019	0.0124
116	0.0144	0.0019	0.0125
117	0.0146	0.0019	0.0126
118	0.0146	0.0019	0.0127
119	0.0148	0.0020	0.0128
120	0.0149	0.0020	0.0129
121	0.0150	0.0020	0.0130
122	0.0151	0.0020	0.0131
123	0.0153	0.0020	0.0132
124	0.0153	0.0020	0.0133
125	0.0155	0.0021	0.0134
126	0.0156	0.0021	0.0135
127	0.0158	0.0021	0.0137
128	0.0159	0.0021	0.0138
129	0.0160	0.0021	0.0139
130	0.0161	0.0021	0.0140
131	0.0163	0.0022	0.0142
132	0.0164	0.0022	0.0143
133	0.0166	0.0022	0.0144
134	0.0168	0.0022	0.0145
135	0.0170	0.0023	0.0147
136	0.0171	0.0023	0.0148
137	0.0173	0.0023	0.0150
138	0.0174	0.0023	0.0151
139	0.0177	0.0023	0.0153
140	0.0178	0.0024	0.0154
141	0.0181	0.0024	0.0157

142	0.0182	0.0024	0.0158
143	0.0185	0.0025	0.0160
144	0.0186	0.0025	0.0161
145	0.0206	0.0027	0.0178
146	0.0207	0.0028	0.0180
147	0.0210	0.0028	0.0182
148	0.0212	0.0028	0.0184
149	0.0215	0.0029	0.0187
150	0.0217	0.0029	0.0188
151	0.0221	0.0029	0.0191
152	0.0223	0.0030	0.0193
153	0.0226	0.0030	0.0196
154	0.0228	0.0030	0.0198
155	0.0233	0.0031	0.0202
156	0.0235	0.0031	0.0204
157	0.0239	0.0032	0.0208
158	0.0242	0.0032	0.0210
159	0.0247	0.0033	0.0214
160	0.0249	0.0033	0.0216
161	0.0255	0.0034	0.0221
162	0.0258	0.0034	0.0223
163	0.0264	0.0035	0.0229
164	0.0267	0.0035	0.0231
165	0.0274	0.0036	0.0237
166	0.0277	0.0037	0.0240
167	0.0285	0.0038	0.0247
168	0.0289	0.0038	0.0250
169	0.0298	0.0040	0.0258
170	0.0302	0.0040	0.0262
171	0.0312	0.0041	0.0270
172	0.0317	0.0042	0.0275
173	0.0328	0.0044	0.0284
174	0.0334	0.0044	0.0290
175	0.0347	0.0046	0.0301
176	0.0354	0.0047	0.0307
177	0.0370	0.0049	0.0320
178	0.0378	0.0050	0.0328
179	0.0397	0.0053	0.0344
180	0.0408	0.0054	0.0353
181	0.0431	0.0057	0.0374
182	0.0445	0.0059	0.0386
183	0.0476	0.0063	0.0413
184	0.0494	0.0066	0.0429
185	0.0454	0.0060	0.0394
186	0.0480	0.0064	0.0416
187	0.0545	0.0072	0.0472
188	0.0588	0.0078	0.0509
189	0.0708	0.0079	0.0630
190	0.0799	0.0079	0.0721
191	0.1142	0.0079	0.1064
192	0.1571	0.0079	0.1492
193	0.4917	0.0079	0.4838
194	0.0931	0.0079	0.0852
195	0.0640	0.0079	0.0562
196	0.0510	0.0068	0.0442
197	0.0515	0.0068	0.0446
198	0.0460	0.0061	0.0399
199	0.0419	0.0056	0.0363
200	0.0387	0.0051	0.0336
201	0.0362	0.0048	0.0313
202	0.0340	0.0045	0.0295

203	0.0322	0.0043	0.0279
204	0.0307	0.0041	0.0266
205	0.0293	0.0039	0.0254
206	0.0281	0.0037	0.0243
207	0.0270	0.0036	0.0234
208	0.0261	0.0035	0.0226
209	0.0252	0.0034	0.0219
210	0.0244	0.0032	0.0212
211	0.0237	0.0032	0.0206
212	0.0231	0.0031	0.0200
213	0.0224	0.0030	0.0195
214	0.0219	0.0029	0.0190
215	0.0214	0.0028	0.0185
216	0.0209	0.0028	0.0181
217	0.0187	0.0025	0.0163
218	0.0183	0.0024	0.0159
219	0.0179	0.0024	0.0155
220	0.0176	0.0023	0.0152
221	0.0172	0.0023	0.0149
222	0.0169	0.0022	0.0146
223	0.0165	0.0022	0.0143
224	0.0162	0.0022	0.0141
225	0.0160	0.0021	0.0138
226	0.0157	0.0021	0.0136
227	0.0154	0.0021	0.0134
228	0.0152	0.0020	0.0132
229	0.0149	0.0020	0.0129
230	0.0147	0.0020	0.0128
231	0.0145	0.0019	0.0126
232	0.0143	0.0019	0.0124
233	0.0141	0.0019	0.0122
234	0.0139	0.0018	0.0120
235	0.0137	0.0018	0.0119
236	0.0135	0.0018	0.0117
237	0.0133	0.0018	0.0116
238	0.0132	0.0018	0.0114
239	0.0130	0.0017	0.0113
240	0.0129	0.0017	0.0111
241	0.0127	0.0017	0.0110
242	0.0126	0.0017	0.0109
243	0.0124	0.0017	0.0108
244	0.0123	0.0016	0.0106
245	0.0121	0.0016	0.0105
246	0.0120	0.0016	0.0104
247	0.0119	0.0016	0.0103
248	0.0118	0.0016	0.0102
249	0.0117	0.0015	0.0101
250	0.0115	0.0015	0.0100
251	0.0114	0.0015	0.0099
252	0.0113	0.0015	0.0098
253	0.0112	0.0015	0.0097
254	0.0111	0.0015	0.0096
255	0.0110	0.0015	0.0095
256	0.0109	0.0014	0.0095
257	0.0108	0.0014	0.0094
258	0.0107	0.0014	0.0093
259	0.0106	0.0014	0.0092
260	0.0105	0.0014	0.0091
261	0.0104	0.0014	0.0091
262	0.0104	0.0014	0.0090
263	0.0103	0.0014	0.0089

264	0.0102	0.0014	0.0088
265	0.0101	0.0013	0.0088
266	0.0100	0.0013	0.0087
267	0.0100	0.0013	0.0086
268	0.0099	0.0013	0.0086
269	0.0098	0.0013	0.0085
270	0.0097	0.0013	0.0084
271	0.0097	0.0013	0.0084
272	0.0096	0.0013	0.0083
273	0.0095	0.0013	0.0083
274	0.0095	0.0013	0.0082
275	0.0094	0.0012	0.0082
276	0.0093	0.0012	0.0081
277	0.0093	0.0012	0.0080
278	0.0092	0.0012	0.0080
279	0.0092	0.0012	0.0079
280	0.0091	0.0012	0.0079
281	0.0090	0.0012	0.0078
282	0.0090	0.0012	0.0078
283	0.0089	0.0012	0.0077
284	0.0089	0.0012	0.0077
285	0.0088	0.0012	0.0076
286	0.0088	0.0012	0.0076
287	0.0087	0.0012	0.0075
288	0.0087	0.0012	0.0075

Total soil rain loss = 0.67(In)
Total effective rainfall = 5.02(In)
Peak flow rate in flood hydrograph = 75.62(CFS)

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24 - 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 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	20.0	40.0	60.0	80.0
0+ 5	0.0009	0.13	Q				
0+10	0.0068	0.86	Q				
0+15	0.0189	1.76	Q				
0+20	0.0334	2.10	VQ				
0+25	0.0485	2.19	VQ				
0+30	0.0638	2.22	VQ				
0+35	0.0792	2.24	VQ				
0+40	0.0946	2.24	VQ				
0+45	0.1101	2.25	VQ				
0+50	0.1257	2.26	VQ				
0+55	0.1413	2.27	VQ				
1+ 0	0.1569	2.27	VQ				
1+ 5	0.1726	2.28	VQ				
1+10	0.1884	2.29	VQ				
1+15	0.2042	2.29	VQ				
1+20	0.2200	2.30	VQ				
1+25	0.2359	2.31	VQ				
1+30	0.2519	2.32	VQ				
1+35	0.2679	2.32	|Q				
1+40	0.2839	2.33	|Q				
1+45	0.3000	2.34	|Q				

1+50	0.3162	2.35	Q				
1+55	0.3324	2.35	Q				
2+ 0	0.3486	2.36	Q				
2+ 5	0.3649	2.37	Q				
2+10	0.3813	2.38	Q				
2+15	0.3977	2.38	Q				
2+20	0.4142	2.39	Q				
2+25	0.4307	2.40	Q				
2+30	0.4473	2.41	Q				
2+35	0.4640	2.42	Q				
2+40	0.4807	2.43	Q				
2+45	0.4975	2.43	Q				
2+50	0.5143	2.44	QV				
2+55	0.5312	2.45	QV				
3+ 0	0.5481	2.46	QV				
3+ 5	0.5651	2.47	QV				
3+10	0.5822	2.48	QV				
3+15	0.5993	2.49	QV				
3+20	0.6165	2.50	QV				
3+25	0.6337	2.51	QV				
3+30	0.6511	2.51	QV				
3+35	0.6684	2.52	QV				
3+40	0.6859	2.53	QV				
3+45	0.7034	2.54	QV				
3+50	0.7210	2.55	QV				
3+55	0.7386	2.56	QV				
4+ 0	0.7563	2.57	QV				
4+ 5	0.7741	2.58	Q V				
4+10	0.7920	2.59	Q V				
4+15	0.8099	2.60	Q V				
4+20	0.8279	2.61	Q V				
4+25	0.8459	2.62	Q V				
4+30	0.8641	2.63	Q V				
4+35	0.8823	2.64	Q V				
4+40	0.9006	2.65	Q V				
4+45	0.9189	2.67	Q V				
4+50	0.9373	2.68	Q V				
4+55	0.9559	2.69	Q V				
5+ 0	0.9744	2.70	Q V				
5+ 5	0.9931	2.71	Q V				
5+10	1.0118	2.72	Q V				
5+15	1.0307	2.73	Q V				
5+20	1.0496	2.74	Q V				
5+25	1.0686	2.76	Q V				
5+30	1.0876	2.77	Q V				
5+35	1.1068	2.78	Q V				
5+40	1.1260	2.79	Q V				
5+45	1.1453	2.81	Q V				
5+50	1.1648	2.82	Q V				
5+55	1.1843	2.83	Q V				
6+ 0	1.2039	2.84	Q V				
6+ 5	1.2235	2.86	Q V				
6+10	1.2433	2.87	Q V				
6+15	1.2632	2.88	Q V				
6+20	1.2831	2.90	Q V				
6+25	1.3032	2.91	Q V				
6+30	1.3233	2.93	Q V				
6+35	1.3436	2.94	Q V				
6+40	1.3639	2.95	Q V				
6+45	1.3844	2.97	Q V				
6+50	1.4050	2.98	Q V				

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 6+55       1.4256      3.00  |Q   V    |         |         |         |
 7+ 0       1.4464      3.01  |Q   V    |         |         |         |
 7+ 5       1.4672      3.03  |Q   V    |         |         |         |
 7+10       1.4882      3.05  |Q   V    |         |         |         |
 7+15       1.5093      3.06  |Q   V    |         |         |         |
 7+20       1.5305      3.08  |Q   V    |         |         |         |
 7+25       1.5518      3.09  |Q    V   |         |         |         |
 7+30       1.5732      3.11  |Q    V   |         |         |         |
 7+35       1.5948      3.13  |Q    V   |         |         |         |
 7+40       1.6164      3.15  |Q    V   |         |         |         |
 7+45       1.6382      3.16  |Q    V   |         |         |         |
 7+50       1.6601      3.18  |Q    V   |         |         |         |
 7+55       1.6822      3.20  |Q    V   |         |         |         |
 8+ 0       1.7043      3.22  |Q    V   |         |         |         |
 8+ 5       1.7266      3.24  |Q    V   |         |         |         |
 8+10       1.7490      3.25  |Q    V   |         |         |         |
 8+15       1.7715      3.27  |Q    V   |         |         |         |
 8+20       1.7942      3.29  |Q     V  |         |         |         |
 8+25       1.8170      3.31  |Q     V  |         |         |         |
 8+30       1.8400      3.33  |Q     V  |         |         |         |
 8+35       1.8631      3.35  |Q     V  |         |         |         |
 8+40       1.8863      3.37  |Q     V  |         |         |         |
 8+45       1.9097      3.39  |Q     V  |         |         |         |
 8+50       1.9332      3.42  |Q     V  |         |         |         |
 8+55       1.9569      3.44  |Q     V  |         |         |         |
 9+ 0       1.9807      3.46  |Q     V  |         |         |         |
 9+ 5       2.0047      3.48  |Q     V  |         |         |         |
 9+10       2.0289      3.51  |Q     V  |         |         |         |
 9+15       2.0532      3.53  |Q      V |         |         |         |
 9+20       2.0777      3.55  |Q      V |         |         |         |
 9+25       2.1023      3.58  |Q      V |         |         |         |
 9+30       2.1271      3.60  |Q      V |         |         |         |
 9+35       2.1521      3.63  |Q      V |         |         |         |
 9+40       2.1773      3.66  |Q      V |         |         |         |
 9+45       2.2026      3.68  |Q      V |         |         |         |
 9+50       2.2282      3.71  |Q      V |         |         |         |
 9+55       2.2539      3.74  |Q      V |         |         |         |
10+ 0       2.2798      3.76  |Q      V |         |         |         |
10+ 5       2.3060      3.79  |Q       V|         |         |         |
10+10       2.3323      3.82  |Q       V|         |         |         |
10+15       2.3588      3.85  |Q       V|         |         |         |
10+20       2.3856      3.88  |Q       V|         |         |         |
10+25       2.4125      3.91  |Q       V|         |         |         |
10+30       2.4397      3.95  |Q       V|         |         |         |
10+35       2.4671      3.98  |Q       V|         |         |         |
10+40       2.4948      4.01  | Q      V|         |         |         |
10+45       2.5226      4.05  | Q      V|         |         |         |
10+50       2.5507      4.08  | Q      V|         |         |         |
10+55       2.5791      4.12  | Q       V         |         |         |
11+ 0       2.6077      4.16  | Q       V         |         |         |
11+ 5       2.6366      4.19  | Q       V         |         |         |
11+10       2.6658      4.23  | Q       V         |         |         |
11+15       2.6952      4.27  | Q       V         |         |         |
11+20       2.7249      4.31  | Q       V         |         |         |
11+25       2.7549      4.36  | Q       V         |         |         |
11+30       2.7852      4.40  | Q       V         |         |         |
11+35       2.8158      4.44  | Q       |V        |         |         |
11+40       2.8467      4.49  | Q       |V        |         |         |
11+45       2.8779      4.54  | Q       |V        |         |         |
11+50       2.9095      4.58  | Q       |V        |         |         |
11+55       2.9414      4.63  | Q       |V        |         |         |
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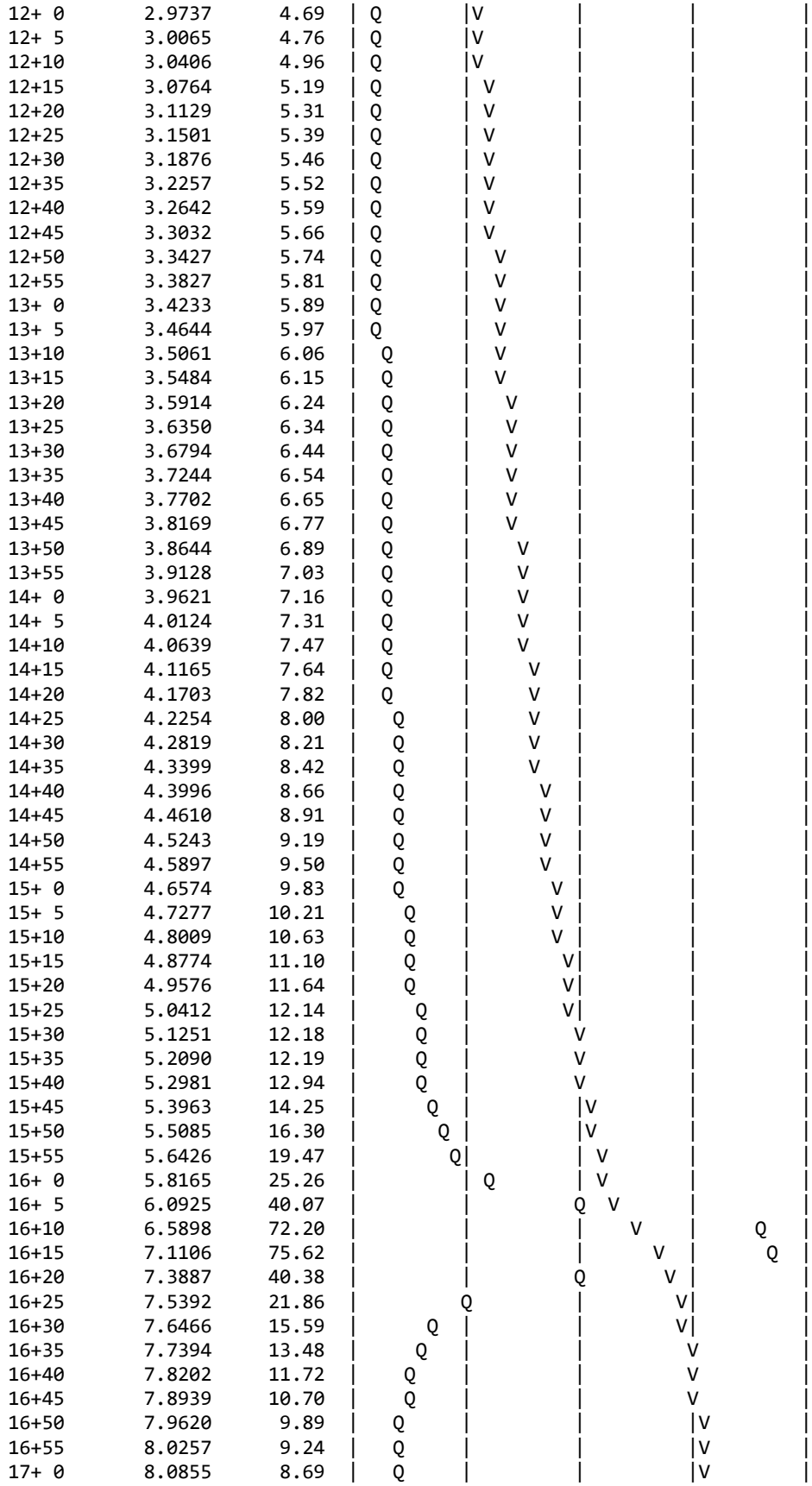

17+ 5	8.1422	8.23	| Q |	|	|	|V |
17+10	8.1962	7.83	| Q |	|	|	| V |
17+15	8.2477	7.48	| Q |	|	|	| V |
17+20	8.2971	7.18	| Q |	|	|	| V |
17+25	8.3447	6.91	| Q |	|	|	| V |
17+30	8.3906	6.66	| Q |	|	|	| V |
17+35	8.4350	6.44	| Q |	|	|	| V |
17+40	8.4780	6.24	| Q |	|	|	| V |
17+45	8.5197	6.06	| Q |	|	|	| V |
17+50	8.5603	5.89	| Q |	|	|	| V |
17+55	8.5999	5.74	| Q |	|	|	| V |
18+ 0	8.6384	5.60	| Q |	|	|	| V |
18+ 5	8.6759	5.44	| Q |	|	|	| V |
18+10	8.7115	5.17	| Q |	|	|	| V |
18+15	8.7451	4.88	| Q |	|	|	| V |
18+20	8.7776	4.71	| Q |	|	|	| V |
18+25	8.8092	4.59	| Q |	|	|	| V |
18+30	8.8401	4.49	| Q |	|	|	| V |
18+35	8.8704	4.40	| Q |	|	|	| V |
18+40	8.9002	4.31	| Q |	|	|	| V |
18+45	8.9293	4.23	| Q |	|	|	| V |
18+50	8.9580	4.16	| Q |	|	|	| V |
18+55	8.9861	4.08	| Q |	|	|	| V |
19+ 0	9.0137	4.01	| Q |	|	|	| V |
19+ 5	9.0409	3.95	|Q |	|	|	| V |
19+10	9.0677	3.88	|Q |	|	|	| V |
19+15	9.0940	3.82	|Q |	|	|	| V |
19+20	9.1199	3.77	|Q |	|	|	| V |
19+25	9.1455	3.71	|Q |	|	|	| V |
19+30	9.1707	3.66	|Q |	|	|	| V |
19+35	9.1955	3.60	|Q |	|	|	| V |
19+40	9.2200	3.55	|Q |	|	|	| V |
19+45	9.2441	3.51	|Q |	|	|	| V |
19+50	9.2680	3.46	|Q |	|	|	| V |
19+55	9.2915	3.42	|Q |	|	|	| V |
20+ 0	9.3147	3.37	|Q |	|	|	| V |
20+ 5	9.3377	3.33	|Q |	|	|	| V |
20+10	9.3604	3.29	|Q |	|	|	| V |
20+15	9.3828	3.25	|Q |	|	|	| V |
20+20	9.4049	3.22	|Q |	|	|	| V |
20+25	9.4268	3.18	|Q |	|	|	| V |
20+30	9.4485	3.15	|Q |	|	|	| V |
20+35	9.4699	3.11	|Q |	|	|	| V |
20+40	9.4911	3.08	|Q |	|	|	| V |
20+45	9.5121	3.05	|Q |	|	|	| V |
20+50	9.5329	3.02	|Q |	|	|	| V |
20+55	9.5534	2.98	|Q |	|	|	| V |
21+ 0	9.5738	2.96	|Q |	|	|	| V |
21+ 5	9.5939	2.93	|Q |	|	|	| V |
21+10	9.6139	2.90	|Q |	|	|	| V |
21+15	9.6337	2.87	|Q |	|	|	| V |
21+20	9.6533	2.84	|Q |	|	|	| V |
21+25	9.6727	2.82	|Q |	|	|	| V |
21+30	9.6919	2.79	|Q |	|	|	| V |
21+35	9.7110	2.77	|Q |	|	|	| V |
21+40	9.7299	2.75	|Q |	|	|	| V |
21+45	9.7486	2.72	|Q |	|	|	| V |
21+50	9.7672	2.70	|Q |	|	|	| V |
21+55	9.7857	2.68	|Q |	|	|	| V |
22+ 0	9.8040	2.65	|Q |	|	|	| V |
22+ 5	9.8221	2.63	|Q |	|	|	| V |

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  22+10       9.8401      2.61  |Q        |         |         |       V |
  22+15       9.8579      2.59  |Q        |         |         |       V |
  22+20       9.8756      2.57  |Q        |         |         |       V |
  22+25       9.8932      2.55  |Q        |         |         |       V |
  22+30       9.9107      2.53  |Q        |         |         |       V |
  22+35       9.9280      2.51  |Q        |         |         |       V |
  22+40       9.9452      2.50  |Q        |         |         |       V |
  22+45       9.9622      2.48  |Q        |         |         |       V |
  22+50       9.9792      2.46  |Q        |         |         |        V|
  22+55       9.9960      2.44  |Q        |         |         |        V|
  23+ 0      10.0127      2.43  |Q        |         |         |        V|
  23+ 5      10.0293      2.41  |Q        |         |         |        V|
  23+10      10.0458      2.39  |Q        |         |         |        V|
  23+15      10.0622      2.38  |Q        |         |         |        V|
  23+20      10.0784      2.36  |Q        |         |         |        V|
  23+25      10.0946      2.35  |Q        |         |         |        V|
  23+30      10.1106      2.33  |Q        |         |         |        V|
  23+35      10.1266      2.32  |Q        |         |         |        V|
  23+40      10.1424      2.30  |Q        |         |         |        V|
  23+45      10.1582      2.29  |Q        |         |         |        V|
  23+50      10.1738      2.27  |Q        |         |         |        V|
  23+55      10.1894      2.26  |Q        |         |         |        V|
  24+ 0      10.2048      2.24  |Q        |         |         |        V|
-------------------------------------------------------------------------
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U n i t H y d r o g r a p h A n a l y s i s

Study date 10/18/22

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San Bernardino County Synthetic Unit Hydrology Method
Manual date - August 1986

Program License Serial Number 6277

JOB NO 2022-318
11115 HEMLOCK AVENUE
100-YEAR, UNIT HYDROGRAPH
POST-CONDITION, AREA B

Storm Event Year = 100

Antecedent Moisture Condition = 3

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 100		
12.94	1	1.33
Rainfall data for year 100		
12.94	6	3.11
Rainfall data for year 100		
12.94	24	5.69

++

******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	SCS curve NO.(AMC 3)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
32.0	52.0	12.94	1.000	0.785	0.090	0.071

Area-averaged adjusted loss rate Fm (In/Hr) = 0.071

********* Area-Averaged low loss rate fraction, Yb **********

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC3)	S	Pervious Yield Fr
1.16	0.090	32.0	52.0	9.23	0.199
11.78	0.910	98.0	98.0	0.20	0.958

Area-averaged catchment yield fraction, Y = 0.890
Area-averaged low loss fraction, Yb = 0.110
User entry of time of concentration = 0.178 (hours)
++
Watershed area = 12.94(Ac.)
Catchment Lag time = 0.142 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 58.5206
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.071(In/Hr)
Average low loss rate fraction (Yb) = 0.110 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.492(In)
Computed peak 30-minute rainfall = 1.008(In)
Specified peak 1-hour rainfall = 1.330(In)
Computed peak 3-hour rainfall = 2.239(In)
Specified peak 6-hour rainfall = 3.110(In)
Specified peak 24-hour rainfall = 5.690(In)

Rainfall depth area reduction factors:
Using a total area of 12.94(Ac.) (Ref: fig. E-4)

5-minute factor = 0.999 Adjusted rainfall = 0.492(In)
30-minute factor = 0.999 Adjusted rainfall = 1.007(In)
1-hour factor = 0.999 Adjusted rainfall = 1.329(In)
3-hour factor = 1.000 Adjusted rainfall = 2.239(In)
6-hour factor = 1.000 Adjusted rainfall = 3.110(In)
24-hour factor = 1.000 Adjusted rainfall = 5.690(In)

U n i t H y d r o g r a p h
++

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
	(K = 156.49 (CFS))	
1	6.210	9.719
2	39.813	52.586
3	80.245	63.274
4	94.922	22.968
5	98.531	5.648
6	100.000	2.298

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.4919	0.4919
2	0.6491	0.1572
3	0.7634	0.1143
4	0.8565	0.0931
5	0.9365	0.0800
6	1.0073	0.0708
7	1.0714	0.0641
8	1.1302	0.0588

9	1.1847	0.0545
10	1.2357	0.0510
11	1.2837	0.0480
12	1.3292	0.0455
13	1.3807	0.0515
14	1.4301	0.0494
15	1.4777	0.0476
16	1.5236	0.0460
17	1.5681	0.0445
18	1.6112	0.0431
19	1.6531	0.0419
20	1.6938	0.0407
21	1.7335	0.0397
22	1.7722	0.0387
23	1.8100	0.0378
24	1.8469	0.0369
25	1.8830	0.0361
26	1.9184	0.0354
27	1.9531	0.0347
28	1.9871	0.0340
29	2.0205	0.0334
30	2.0532	0.0328
31	2.0854	0.0322
32	2.1171	0.0317
33	2.1482	0.0311
34	2.1789	0.0307
35	2.2091	0.0302
36	2.2388	0.0297
37	2.2681	0.0293
38	2.2969	0.0289
39	2.3254	0.0285
40	2.3535	0.0281
41	2.3812	0.0277
42	2.4085	0.0274
43	2.4356	0.0270
44	2.4623	0.0267
45	2.4886	0.0264
46	2.5147	0.0261
47	2.5405	0.0258
48	2.5660	0.0255
49	2.5912	0.0252
50	2.6161	0.0249
51	2.6408	0.0247
52	2.6652	0.0244
53	2.6894	0.0242
54	2.7133	0.0239
55	2.7371	0.0237
56	2.7605	0.0235
57	2.7838	0.0233
58	2.8069	0.0231
59	2.8297	0.0228
60	2.8523	0.0226
61	2.8748	0.0224
62	2.8970	0.0222
63	2.9191	0.0221
64	2.9410	0.0219
65	2.9627	0.0217
66	2.9842	0.0215
67	3.0055	0.0214
68	3.0267	0.0212
69	3.0477	0.0210

70	3.0686	0.0209
71	3.0893	0.0207
72	3.1099	0.0206
73	3.1286	0.0187
74	3.1472	0.0186
75	3.1657	0.0185
76	3.1840	0.0183
77	3.2022	0.0182
78	3.2203	0.0181
79	3.2382	0.0179
80	3.2560	0.0178
81	3.2737	0.0177
82	3.2912	0.0176
83	3.3086	0.0174
84	3.3260	0.0173
85	3.3432	0.0172
86	3.3602	0.0171
87	3.3772	0.0170
88	3.3941	0.0169
89	3.4108	0.0168
90	3.4275	0.0166
91	3.4440	0.0165
92	3.4605	0.0164
93	3.4768	0.0163
94	3.4930	0.0162
95	3.5092	0.0161
96	3.5252	0.0160
97	3.5412	0.0160
98	3.5571	0.0159
99	3.5728	0.0158
100	3.5885	0.0157
101	3.6041	0.0156
102	3.6196	0.0155
103	3.6350	0.0154
104	3.6504	0.0153
105	3.6656	0.0153
106	3.6808	0.0152
107	3.6959	0.0151
108	3.7109	0.0150
109	3.7258	0.0149
110	3.7407	0.0149
111	3.7555	0.0148
112	3.7702	0.0147
113	3.7848	0.0146
114	3.7994	0.0146
115	3.8139	0.0145
116	3.8283	0.0144
117	3.8426	0.0143
118	3.8569	0.0143
119	3.8711	0.0142
120	3.8852	0.0141
121	3.8993	0.0141
122	3.9133	0.0140
123	3.9273	0.0139
124	3.9412	0.0139
125	3.9550	0.0138
126	3.9687	0.0138
127	3.9824	0.0137
128	3.9961	0.0136
129	4.0096	0.0136
130	4.0232	0.0135

131	4.0366	0.0135
132	4.0500	0.0134
133	4.0634	0.0133
134	4.0766	0.0133
135	4.0899	0.0132
136	4.1030	0.0132
137	4.1162	0.0131
138	4.1292	0.0131
139	4.1422	0.0130
140	4.1552	0.0130
141	4.1681	0.0129
142	4.1810	0.0129
143	4.1938	0.0128
144	4.2065	0.0128
145	4.2192	0.0127
146	4.2319	0.0127
147	4.2445	0.0126
148	4.2571	0.0126
149	4.2696	0.0125
150	4.2820	0.0125
151	4.2944	0.0124
152	4.3068	0.0124
153	4.3191	0.0123
154	4.3314	0.0123
155	4.3437	0.0122
156	4.3558	0.0122
157	4.3680	0.0121
158	4.3801	0.0121
159	4.3922	0.0121
160	4.4042	0.0120
161	4.4161	0.0120
162	4.4281	0.0119
163	4.4400	0.0119
164	4.4518	0.0118
165	4.4636	0.0118
166	4.4754	0.0118
167	4.4871	0.0117
168	4.4988	0.0117
169	4.5105	0.0116
170	4.5221	0.0116
171	4.5336	0.0116
172	4.5452	0.0115
173	4.5567	0.0115
174	4.5681	0.0115
175	4.5796	0.0114
176	4.5909	0.0114
177	4.6023	0.0113
178	4.6136	0.0113
179	4.6249	0.0113
180	4.6361	0.0112
181	4.6473	0.0112
182	4.6585	0.0112
183	4.6696	0.0111
184	4.6807	0.0111
185	4.6918	0.0111
186	4.7028	0.0110
187	4.7138	0.0110
188	4.7248	0.0110
189	4.7357	0.0109
190	4.7467	0.0109
191	4.7575	0.0109

192	4.7684	0.0108
193	4.7792	0.0108
194	4.7899	0.0108
195	4.8007	0.0107
196	4.8114	0.0107
197	4.8221	0.0107
198	4.8327	0.0107
199	4.8434	0.0106
200	4.8539	0.0106
201	4.8645	0.0106
202	4.8750	0.0105
203	4.8855	0.0105
204	4.8960	0.0105
205	4.9065	0.0104
206	4.9169	0.0104
207	4.9273	0.0104
208	4.9376	0.0104
209	4.9479	0.0103
210	4.9583	0.0103
211	4.9685	0.0103
212	4.9788	0.0102
213	4.9890	0.0102
214	4.9992	0.0102
215	5.0094	0.0102
216	5.0195	0.0101
217	5.0296	0.0101
218	5.0397	0.0101
219	5.0498	0.0101
220	5.0598	0.0100
221	5.0698	0.0100
222	5.0798	0.0100
223	5.0897	0.0100
224	5.0997	0.0099
225	5.1096	0.0099
226	5.1195	0.0099
227	5.1293	0.0099
228	5.1392	0.0098
229	5.1490	0.0098
230	5.1588	0.0098
231	5.1685	0.0098
232	5.1783	0.0097
233	5.1880	0.0097
234	5.1977	0.0097
235	5.2073	0.0097
236	5.2170	0.0096
237	5.2266	0.0096
238	5.2362	0.0096
239	5.2458	0.0096
240	5.2553	0.0096
241	5.2649	0.0095
242	5.2744	0.0095
243	5.2839	0.0095
244	5.2933	0.0095
245	5.3028	0.0094
246	5.3122	0.0094
247	5.3216	0.0094
248	5.3310	0.0094
249	5.3403	0.0094
250	5.3497	0.0093
251	5.3590	0.0093
252	5.3683	0.0093

253	5.3775	0.0093
254	5.3868	0.0093
255	5.3960	0.0092
256	5.4052	0.0092
257	5.4144	0.0092
258	5.4236	0.0092
259	5.4327	0.0092
260	5.4419	0.0091
261	5.4510	0.0091
262	5.4601	0.0091
263	5.4691	0.0091
264	5.4782	0.0091
265	5.4872	0.0090
266	5.4962	0.0090
267	5.5052	0.0090
268	5.5142	0.0090
269	5.5232	0.0090
270	5.5321	0.0089
271	5.5410	0.0089
272	5.5499	0.0089
273	5.5588	0.0089
274	5.5677	0.0089
275	5.5765	0.0088
276	5.5854	0.0088
277	5.5942	0.0088
278	5.6030	0.0088
279	5.6117	0.0088
280	5.6205	0.0088
281	5.6292	0.0087
282	5.6379	0.0087
283	5.6466	0.0087
284	5.6553	0.0087
285	5.6640	0.0087
286	5.6727	0.0087
287	5.6813	0.0086
288	5.6899	0.0086

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0086	0.0009	0.0077
2	0.0086	0.0010	0.0077
3	0.0087	0.0010	0.0077
4	0.0087	0.0010	0.0077
5	0.0087	0.0010	0.0078
6	0.0087	0.0010	0.0078
7	0.0088	0.0010	0.0078
8	0.0088	0.0010	0.0078
9	0.0088	0.0010	0.0079
10	0.0088	0.0010	0.0079
11	0.0089	0.0010	0.0079
12	0.0089	0.0010	0.0079
13	0.0089	0.0010	0.0080
14	0.0090	0.0010	0.0080
15	0.0090	0.0010	0.0080
16	0.0090	0.0010	0.0080
17	0.0091	0.0010	0.0081
18	0.0091	0.0010	0.0081
19	0.0091	0.0010	0.0081
20	0.0091	0.0010	0.0081

21	0.0092	0.0010	0.0082
22	0.0092	0.0010	0.0082
23	0.0092	0.0010	0.0082
24	0.0093	0.0010	0.0082
25	0.0093	0.0010	0.0083
26	0.0093	0.0010	0.0083
27	0.0094	0.0010	0.0083
28	0.0094	0.0010	0.0083
29	0.0094	0.0010	0.0084
30	0.0094	0.0010	0.0084
31	0.0095	0.0010	0.0084
32	0.0095	0.0010	0.0085
33	0.0096	0.0011	0.0085
34	0.0096	0.0011	0.0085
35	0.0096	0.0011	0.0086
36	0.0096	0.0011	0.0086
37	0.0097	0.0011	0.0086
38	0.0097	0.0011	0.0086
39	0.0098	0.0011	0.0087
40	0.0098	0.0011	0.0087
41	0.0098	0.0011	0.0088
42	0.0099	0.0011	0.0088
43	0.0099	0.0011	0.0088
44	0.0099	0.0011	0.0088
45	0.0100	0.0011	0.0089
46	0.0100	0.0011	0.0089
47	0.0101	0.0011	0.0090
48	0.0101	0.0011	0.0090
49	0.0101	0.0011	0.0090
50	0.0102	0.0011	0.0090
51	0.0102	0.0011	0.0091
52	0.0102	0.0011	0.0091
53	0.0103	0.0011	0.0092
54	0.0103	0.0011	0.0092
55	0.0104	0.0011	0.0092
56	0.0104	0.0011	0.0093
57	0.0105	0.0012	0.0093
58	0.0105	0.0012	0.0093
59	0.0106	0.0012	0.0094
60	0.0106	0.0012	0.0094
61	0.0107	0.0012	0.0095
62	0.0107	0.0012	0.0095
63	0.0107	0.0012	0.0096
64	0.0108	0.0012	0.0096
65	0.0108	0.0012	0.0096
66	0.0109	0.0012	0.0097
67	0.0109	0.0012	0.0097
68	0.0110	0.0012	0.0098
69	0.0110	0.0012	0.0098
70	0.0111	0.0012	0.0098
71	0.0111	0.0012	0.0099
72	0.0112	0.0012	0.0099
73	0.0112	0.0012	0.0100
74	0.0113	0.0012	0.0100
75	0.0113	0.0013	0.0101
76	0.0114	0.0013	0.0101
77	0.0115	0.0013	0.0102
78	0.0115	0.0013	0.0102
79	0.0116	0.0013	0.0103
80	0.0116	0.0013	0.0103
81	0.0117	0.0013	0.0104

82	0.0117	0.0013	0.0104
83	0.0118	0.0013	0.0105
84	0.0118	0.0013	0.0105
85	0.0119	0.0013	0.0106
86	0.0120	0.0013	0.0107
87	0.0121	0.0013	0.0107
88	0.0121	0.0013	0.0108
89	0.0122	0.0013	0.0108
90	0.0122	0.0013	0.0109
91	0.0123	0.0014	0.0110
92	0.0124	0.0014	0.0110
93	0.0125	0.0014	0.0111
94	0.0125	0.0014	0.0111
95	0.0126	0.0014	0.0112
96	0.0127	0.0014	0.0113
97	0.0128	0.0014	0.0113
98	0.0128	0.0014	0.0114
99	0.0129	0.0014	0.0115
100	0.0130	0.0014	0.0115
101	0.0131	0.0014	0.0116
102	0.0131	0.0014	0.0117
103	0.0132	0.0015	0.0118
104	0.0133	0.0015	0.0118
105	0.0134	0.0015	0.0119
106	0.0135	0.0015	0.0120
107	0.0136	0.0015	0.0121
108	0.0136	0.0015	0.0121
109	0.0138	0.0015	0.0122
110	0.0138	0.0015	0.0123
111	0.0139	0.0015	0.0124
112	0.0140	0.0015	0.0125
113	0.0141	0.0016	0.0126
114	0.0142	0.0016	0.0126
115	0.0143	0.0016	0.0128
116	0.0144	0.0016	0.0128
117	0.0146	0.0016	0.0130
118	0.0146	0.0016	0.0130
119	0.0148	0.0016	0.0132
120	0.0149	0.0016	0.0132
121	0.0150	0.0017	0.0134
122	0.0151	0.0017	0.0134
123	0.0153	0.0017	0.0136
124	0.0153	0.0017	0.0136
125	0.0155	0.0017	0.0138
126	0.0156	0.0017	0.0139
127	0.0158	0.0017	0.0140
128	0.0159	0.0017	0.0141
129	0.0160	0.0018	0.0143
130	0.0161	0.0018	0.0144
131	0.0163	0.0018	0.0145
132	0.0164	0.0018	0.0146
133	0.0166	0.0018	0.0148
134	0.0168	0.0018	0.0149
135	0.0170	0.0019	0.0151
136	0.0171	0.0019	0.0152
137	0.0173	0.0019	0.0154
138	0.0174	0.0019	0.0155
139	0.0177	0.0019	0.0157
140	0.0178	0.0020	0.0158
141	0.0181	0.0020	0.0161
142	0.0182	0.0020	0.0162

143	0.0185	0.0020	0.0164
144	0.0186	0.0020	0.0166
145	0.0206	0.0023	0.0183
146	0.0207	0.0023	0.0184
147	0.0210	0.0023	0.0187
148	0.0212	0.0023	0.0189
149	0.0215	0.0024	0.0192
150	0.0217	0.0024	0.0193
151	0.0221	0.0024	0.0196
152	0.0222	0.0025	0.0198
153	0.0226	0.0025	0.0201
154	0.0228	0.0025	0.0203
155	0.0233	0.0026	0.0207
156	0.0235	0.0026	0.0209
157	0.0239	0.0026	0.0213
158	0.0242	0.0027	0.0215
159	0.0247	0.0027	0.0220
160	0.0249	0.0027	0.0222
161	0.0255	0.0028	0.0227
162	0.0258	0.0028	0.0229
163	0.0264	0.0029	0.0235
164	0.0267	0.0029	0.0238
165	0.0274	0.0030	0.0243
166	0.0277	0.0031	0.0247
167	0.0285	0.0031	0.0253
168	0.0289	0.0032	0.0257
169	0.0297	0.0033	0.0265
170	0.0302	0.0033	0.0269
171	0.0311	0.0034	0.0277
172	0.0317	0.0035	0.0282
173	0.0328	0.0036	0.0292
174	0.0334	0.0037	0.0297
175	0.0347	0.0038	0.0309
176	0.0354	0.0039	0.0315
177	0.0369	0.0041	0.0329
178	0.0378	0.0042	0.0336
179	0.0397	0.0044	0.0353
180	0.0407	0.0045	0.0362
181	0.0431	0.0047	0.0384
182	0.0445	0.0049	0.0396
183	0.0476	0.0052	0.0424
184	0.0494	0.0054	0.0440
185	0.0455	0.0050	0.0405
186	0.0480	0.0053	0.0427
187	0.0545	0.0059	0.0486
188	0.0588	0.0059	0.0529
189	0.0708	0.0059	0.0650
190	0.0800	0.0059	0.0741
191	0.1143	0.0059	0.1084
192	0.1572	0.0059	0.1513
193	0.4919	0.0059	0.4861
194	0.0931	0.0059	0.0872
195	0.0641	0.0059	0.0582
196	0.0510	0.0056	0.0454
197	0.0515	0.0057	0.0458
198	0.0460	0.0051	0.0409
199	0.0419	0.0046	0.0373
200	0.0387	0.0043	0.0344
201	0.0361	0.0040	0.0321
202	0.0340	0.0037	0.0303
203	0.0322	0.0035	0.0287

204	0.0307	0.0034	0.0273
205	0.0293	0.0032	0.0260
206	0.0281	0.0031	0.0250
207	0.0270	0.0030	0.0240
208	0.0261	0.0029	0.0232
209	0.0252	0.0028	0.0224
210	0.0244	0.0027	0.0217
211	0.0237	0.0026	0.0211
212	0.0231	0.0025	0.0205
213	0.0224	0.0025	0.0200
214	0.0219	0.0024	0.0195
215	0.0214	0.0024	0.0190
216	0.0209	0.0023	0.0186
217	0.0187	0.0021	0.0167
218	0.0183	0.0020	0.0163
219	0.0179	0.0020	0.0160
220	0.0176	0.0019	0.0156
221	0.0172	0.0019	0.0153
222	0.0169	0.0019	0.0150
223	0.0165	0.0018	0.0147
224	0.0162	0.0018	0.0145
225	0.0160	0.0018	0.0142
226	0.0157	0.0017	0.0140
227	0.0154	0.0017	0.0137
228	0.0152	0.0017	0.0135
229	0.0149	0.0016	0.0133
230	0.0147	0.0016	0.0131
231	0.0145	0.0016	0.0129
232	0.0143	0.0016	0.0127
233	0.0141	0.0016	0.0125
234	0.0139	0.0015	0.0124
235	0.0137	0.0015	0.0122
236	0.0135	0.0015	0.0120
237	0.0133	0.0015	0.0119
238	0.0132	0.0015	0.0117
239	0.0130	0.0014	0.0116
240	0.0129	0.0014	0.0114
241	0.0127	0.0014	0.0113
242	0.0126	0.0014	0.0112
243	0.0124	0.0014	0.0110
244	0.0123	0.0014	0.0109
245	0.0121	0.0013	0.0108
246	0.0120	0.0013	0.0107
247	0.0119	0.0013	0.0106
248	0.0118	0.0013	0.0105
249	0.0116	0.0013	0.0104
250	0.0115	0.0013	0.0103
251	0.0114	0.0013	0.0102
252	0.0113	0.0012	0.0101
253	0.0112	0.0012	0.0100
254	0.0111	0.0012	0.0099
255	0.0110	0.0012	0.0098
256	0.0109	0.0012	0.0097
257	0.0108	0.0012	0.0096
258	0.0107	0.0012	0.0095
259	0.0106	0.0012	0.0095
260	0.0105	0.0012	0.0094
261	0.0104	0.0012	0.0093
262	0.0104	0.0011	0.0092
263	0.0103	0.0011	0.0091
264	0.0102	0.0011	0.0091

265	0.0101	0.0011	0.0090
266	0.0100	0.0011	0.0089
267	0.0100	0.0011	0.0089
268	0.0099	0.0011	0.0088
269	0.0098	0.0011	0.0087
270	0.0097	0.0011	0.0087
271	0.0097	0.0011	0.0086
272	0.0096	0.0011	0.0085
273	0.0095	0.0010	0.0085
274	0.0095	0.0010	0.0084
275	0.0094	0.0010	0.0084
276	0.0093	0.0010	0.0083
277	0.0093	0.0010	0.0083
278	0.0092	0.0010	0.0082
279	0.0092	0.0010	0.0081
280	0.0091	0.0010	0.0081
281	0.0090	0.0010	0.0080
282	0.0090	0.0010	0.0080
283	0.0089	0.0010	0.0079
284	0.0089	0.0010	0.0079
285	0.0088	0.0010	0.0078
286	0.0088	0.0010	0.0078
287	0.0087	0.0010	0.0077
288	0.0087	0.0010	0.0077

Total soil rain loss = 0.55(In)
Total effective rainfall = 5.14(In)
Peak flow rate in flood hydrograph = 40.16(CFS)

++

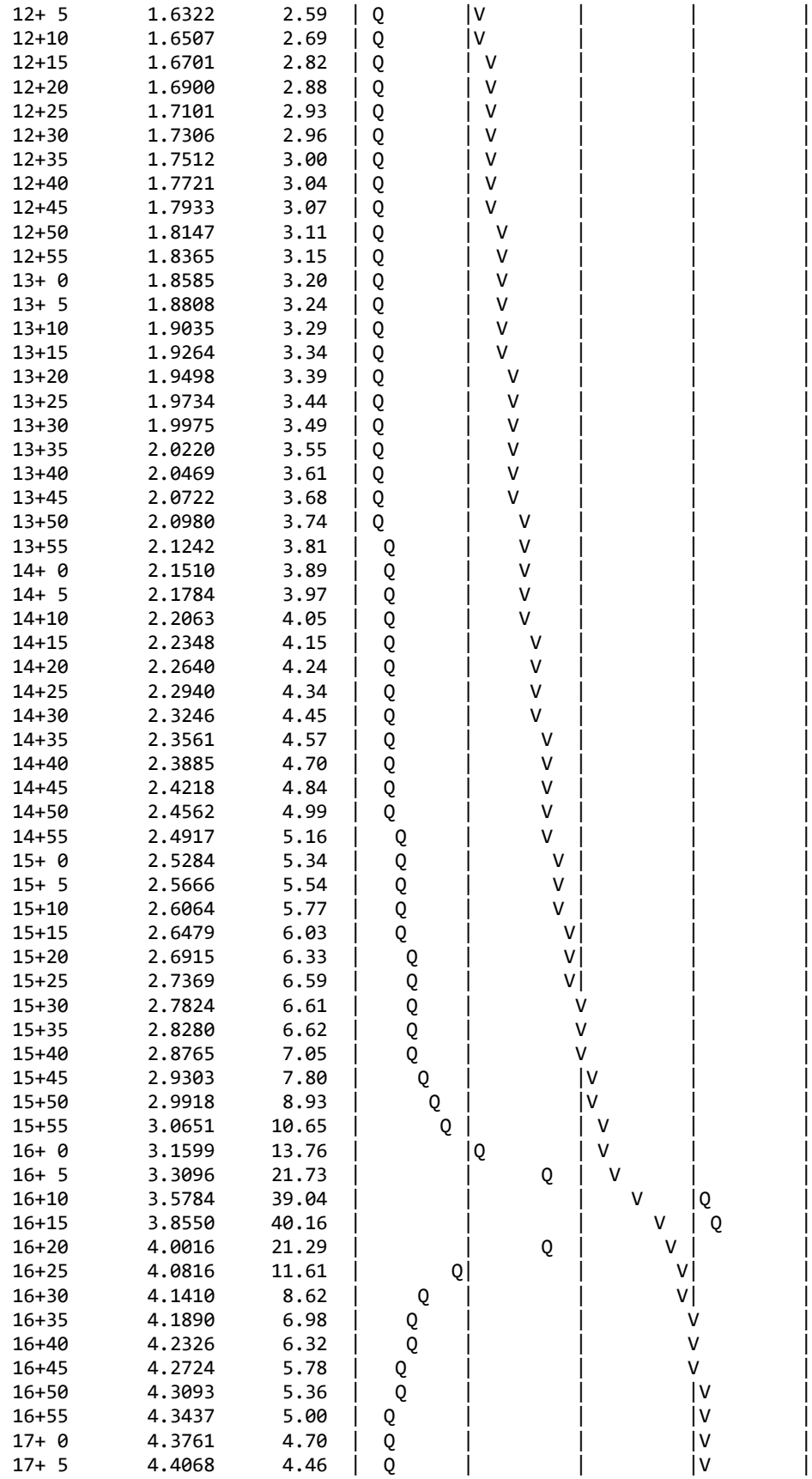
24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	12.5	25.0	37.5	50.0
0+ 5	0.0005	0.07	Q	|	|	|	|
0+10	0.0038	0.48	Q	|	|	|	|
0+15	0.0104	0.96	Q	|	|	|	|
0+20	0.0183	1.14	Q	|	|	|	|
0+25	0.0265	1.19	Q	|	|	|	|
0+30	0.0349	1.21	Q	|	|	|	|
0+35	0.0432	1.21	Q	|	|	|	|
0+40	0.0516	1.22	Q	|	|	|	|
0+45	0.0600	1.22	Q	|	|	|	|
0+50	0.0685	1.23	Q	|	|	|	|
0+55	0.0769	1.23	Q	|	|	|	|
1+ 0	0.0854	1.23	Q	|	|	|	|
1+ 5	0.0939	1.24	Q	|	|	|	|
1+10	0.1025	1.24	Q	|	|	|	|
1+15	0.1111	1.24	Q	|	|	|	|
1+20	0.1197	1.25	Q	|	|	|	|
1+25	0.1283	1.25	VQ	|	|	|	|
1+30	0.1369	1.26	VQ	|	|	|	|
1+35	0.1456	1.26	|Q	|	|	|	|
1+40	0.1543	1.26	|Q	|	|	|	|
1+45	0.1631	1.27	|Q	|	|	|	|
1+50	0.1718	1.27	|Q	|	|	|	|

1+55	0.1806	1.28	Q				
2+ 0	0.1895	1.28	Q				
2+ 5	0.1983	1.29	Q				
2+10	0.2072	1.29	Q				
2+15	0.2161	1.29	Q				
2+20	0.2251	1.30	Q				
2+25	0.2340	1.30	Q				
2+30	0.2430	1.31	Q				
2+35	0.2521	1.31	Q				
2+40	0.2611	1.32	Q				
2+45	0.2702	1.32	Q				
2+50	0.2794	1.33	QV				
2+55	0.2885	1.33	QV				
3+ 0	0.2977	1.34	QV				
3+ 5	0.3070	1.34	QV				
3+10	0.3162	1.34	QV				
3+15	0.3255	1.35	QV				
3+20	0.3349	1.35	QV				
3+25	0.3442	1.36	QV				
3+30	0.3536	1.36	QV				
3+35	0.3630	1.37	QV				
3+40	0.3725	1.37	QV				
3+45	0.3820	1.38	QV				
3+50	0.3916	1.39	QV				
3+55	0.4011	1.39	QV				
4+ 0	0.4108	1.40	QV				
4+ 5	0.4204	1.40	Q V				
4+10	0.4301	1.41	Q V				
4+15	0.4398	1.41	Q V				
4+20	0.4496	1.42	Q V				
4+25	0.4594	1.42	Q V				
4+30	0.4692	1.43	Q V				
4+35	0.4791	1.43	Q V				
4+40	0.4890	1.44	Q V				
4+45	0.4990	1.45	Q V				
4+50	0.5090	1.45	Q V				
4+55	0.5190	1.46	Q V				
5+ 0	0.5291	1.46	Q V				
5+ 5	0.5393	1.47	Q V				
5+10	0.5494	1.48	Q V				
5+15	0.5597	1.48	Q V				
5+20	0.5699	1.49	Q V				
5+25	0.5802	1.50	Q V				
5+30	0.5906	1.50	Q V				
5+35	0.6010	1.51	Q V				
5+40	0.6114	1.52	Q V				
5+45	0.6219	1.52	Q V				
5+50	0.6324	1.53	Q V				
5+55	0.6430	1.54	Q V				
6+ 0	0.6537	1.54	Q V				
6+ 5	0.6643	1.55	Q V				
6+10	0.6751	1.56	Q V				
6+15	0.6859	1.57	Q V				
6+20	0.6967	1.57	Q V				
6+25	0.7076	1.58	Q V				
6+30	0.7185	1.59	Q V				
6+35	0.7295	1.60	Q V				
6+40	0.7406	1.60	Q V				
6+45	0.7517	1.61	Q V				
6+50	0.7628	1.62	Q V				
6+55	0.7740	1.63	Q V				

7+ 0	0.7853	1.64	|Q V |	|	|	|
7+ 5	0.7966	1.64	|Q V |	|	|	|
7+10	0.8080	1.65	|Q V |	|	|	|
7+15	0.8195	1.66	|Q V |	|	|	|
7+20	0.8310	1.67	|Q V |	|	|	|
7+25	0.8425	1.68	|Q V |	|	|	|
7+30	0.8542	1.69	|Q V |	|	|	|
7+35	0.8658	1.70	|Q V |	|	|	|
7+40	0.8776	1.71	|Q V |	|	|	|
7+45	0.8894	1.72	|Q V |	|	|	|
7+50	0.9013	1.73	|Q V |	|	|	|
7+55	0.9133	1.74	|Q V |	|	|	|
8+ 0	0.9253	1.75	|Q V |	|	|	|
8+ 5	0.9374	1.76	|Q V |	|	|	|
8+10	0.9496	1.77	|Q V |	|	|	|
8+15	0.9618	1.78	|Q V |	|	|	|
8+20	0.9741	1.79	|Q V |	|	|	|
8+25	0.9865	1.80	|Q V |	|	|	|
8+30	0.9989	1.81	|Q V |	|	|	|
8+35	1.0115	1.82	|Q V |	|	|	|
8+40	1.0241	1.83	|Q V |	|	|	|
8+45	1.0368	1.84	|Q V |	|	|	|
8+50	1.0495	1.85	|Q V |	|	|	|
8+55	1.0624	1.87	|Q V |	|	|	|
9+ 0	1.0753	1.88	|Q V |	|	|	|
9+ 5	1.0884	1.89	|Q V |	|	|	|
9+10	1.1015	1.90	|Q V |	|	|	|
9+15	1.1147	1.92	|Q V |	|	|	|
9+20	1.1280	1.93	|Q V |	|	|	|
9+25	1.1413	1.94	|Q V |	|	|	|
9+30	1.1548	1.96	|Q V |	|	|	|
9+35	1.1684	1.97	|Q V |	|	|	|
9+40	1.1820	1.98	|Q V |	|	|	|
9+45	1.1958	2.00	|Q V |	|	|	|
9+50	1.2097	2.01	|Q V |	|	|	|
9+55	1.2236	2.03	|Q V |	|	|	|
10+ 0	1.2377	2.04	|Q V |	|	|	|
10+ 5	1.2519	2.06	|Q V|	|	|	|
10+10	1.2662	2.07	|Q V|	|	|	|
10+15	1.2806	2.09	|Q V|	|	|	|
10+20	1.2951	2.11	|Q V|	|	|	|
10+25	1.3097	2.12	|Q V|	|	|	|
10+30	1.3245	2.14	|Q V|	|	|	|
10+35	1.3394	2.16	|Q V|	|	|	|
10+40	1.3544	2.18	|Q V|	|	|	|
10+45	1.3695	2.20	|Q V|	|	|	|
10+50	1.3848	2.22	|Q V|	|	|	|
10+55	1.4002	2.24	|Q V |	|	|	|
11+ 0	1.4157	2.26	|Q V |	|	|	|
11+ 5	1.4314	2.28	|Q V |	|	|	|
11+10	1.4472	2.30	|Q V |	|	|	|
11+15	1.4632	2.32	|Q V |	|	|	|
11+20	1.4793	2.34	|Q V |	|	|	|
11+25	1.4956	2.36	|Q V |	|	|	|
11+30	1.5120	2.39	|Q V |	|	|	|
11+35	1.5286	2.41	|Q |V |	|	|	|
11+40	1.5454	2.44	|Q |V |	|	|	|
11+45	1.5624	2.46	|Q |V |	|	|	|
11+50	1.5795	2.49	|Q |V |	|	|	|
11+55	1.5968	2.52	| Q |V |	|	|	|
12+ 0	1.6144	2.54	| Q |V |	|	|	|



17+10	4.4360	4.24	Q			V
17+15	4.4639	4.05	Q			V
17+20	4.4907	3.89	Q			V
17+25	4.5165	3.74	Q			V
17+30	4.5414	3.61	Q			V
17+35	4.5654	3.49	Q			V
17+40	4.5888	3.39	Q			V
17+45	4.6114	3.29	Q			V
17+50	4.6334	3.20	Q			V
17+55	4.6548	3.11	Q			V
18+ 0	4.6757	3.03	Q			V
18+ 5	4.6960	2.95	Q			V
18+10	4.7153	2.80	Q			V
18+15	4.7336	2.65	Q			V
18+20	4.7512	2.55	Q			V
18+25	4.7683	2.49	Q			V
18+30	4.7851	2.44	Q			V
18+35	4.8015	2.39	Q			V
18+40	4.8176	2.34	Q			V
18+45	4.8335	2.30	Q			V
18+50	4.8490	2.25	Q			V
18+55	4.8642	2.22	Q			V
19+ 0	4.8792	2.18	Q			V
19+ 5	4.8940	2.14	Q			V
19+10	4.9085	2.11	Q			V
19+15	4.9228	2.07	Q			V
19+20	4.9369	2.04	Q			V
19+25	4.9507	2.01	Q			V
19+30	4.9644	1.98	Q			V
19+35	4.9778	1.96	Q			V
19+40	4.9911	1.93	Q			V
19+45	5.0042	1.90	Q			V
19+50	5.0171	1.88	Q			V
19+55	5.0299	1.85	Q			V
20+ 0	5.0425	1.83	Q			V
20+ 5	5.0550	1.81	Q			V
20+10	5.0673	1.79	Q			V
20+15	5.0794	1.77	Q			V
20+20	5.0915	1.75	Q			V
20+25	5.1033	1.73	Q			V
20+30	5.1151	1.71	Q			V
20+35	5.1267	1.69	Q			V
20+40	5.1382	1.67	Q			V
20+45	5.1496	1.65	Q			V
20+50	5.1609	1.64	Q			V
20+55	5.1720	1.62	Q			V
21+ 0	5.1831	1.60	Q			V
21+ 5	5.1940	1.59	Q			V
21+10	5.2048	1.57	Q			V
21+15	5.2156	1.56	Q			V
21+20	5.2262	1.54	Q			V
21+25	5.2367	1.53	Q			V
21+30	5.2472	1.52	Q			V
21+35	5.2575	1.50	Q			V
21+40	5.2678	1.49	Q			V
21+45	5.2779	1.48	Q			V
21+50	5.2880	1.46	Q			V
21+55	5.2980	1.45	Q			V
22+ 0	5.3079	1.44	Q			V
22+ 5	5.3178	1.43	Q			V
22+10	5.3275	1.42	Q			V

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 22+15       5.3372      1.41  |Q        |         |         |       V |
 22+20       5.3468      1.40  |Q        |         |         |       V |
 22+25       5.3564      1.38  |Q        |         |         |       V |
 22+30       5.3658      1.37  |Q        |         |         |       V |
 22+35       5.3752      1.36  |Q        |         |         |       V |
 22+40       5.3846      1.35  |Q        |         |         |       V |
 22+45       5.3938      1.34  |Q        |         |         |       V |
 22+50       5.4030      1.33  |Q        |         |         |        V|
 22+55       5.4121      1.33  |Q        |         |         |        V|
 23+ 0       5.4212      1.32  |Q        |         |         |        V|
 23+ 5       5.4302      1.31  |Q        |         |         |        V|
 23+10       5.4392      1.30  |Q        |         |         |        V|
 23+15       5.4480      1.29  |Q        |         |         |        V|
 23+20       5.4569      1.28  |Q        |         |         |        V|
 23+25       5.4656      1.27  |Q        |         |         |        V|
 23+30       5.4743      1.26  |Q        |         |         |        V|
 23+35       5.4830      1.26  |Q        |         |         |        V|
 23+40       5.4916      1.25  Q         |         |         |        V|
 23+45       5.5001      1.24  Q         |         |         |        V|
 23+50       5.5086      1.23  Q         |         |         |        V|
 23+55       5.5171      1.23  Q         |         |         |        V|
 24+ 0       5.5254      1.22  Q         |         |         |        V|
-------------------------------------------------------------------------
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APPENDIX D

SUPPORTING DOCUMENTS

SOILS MAP

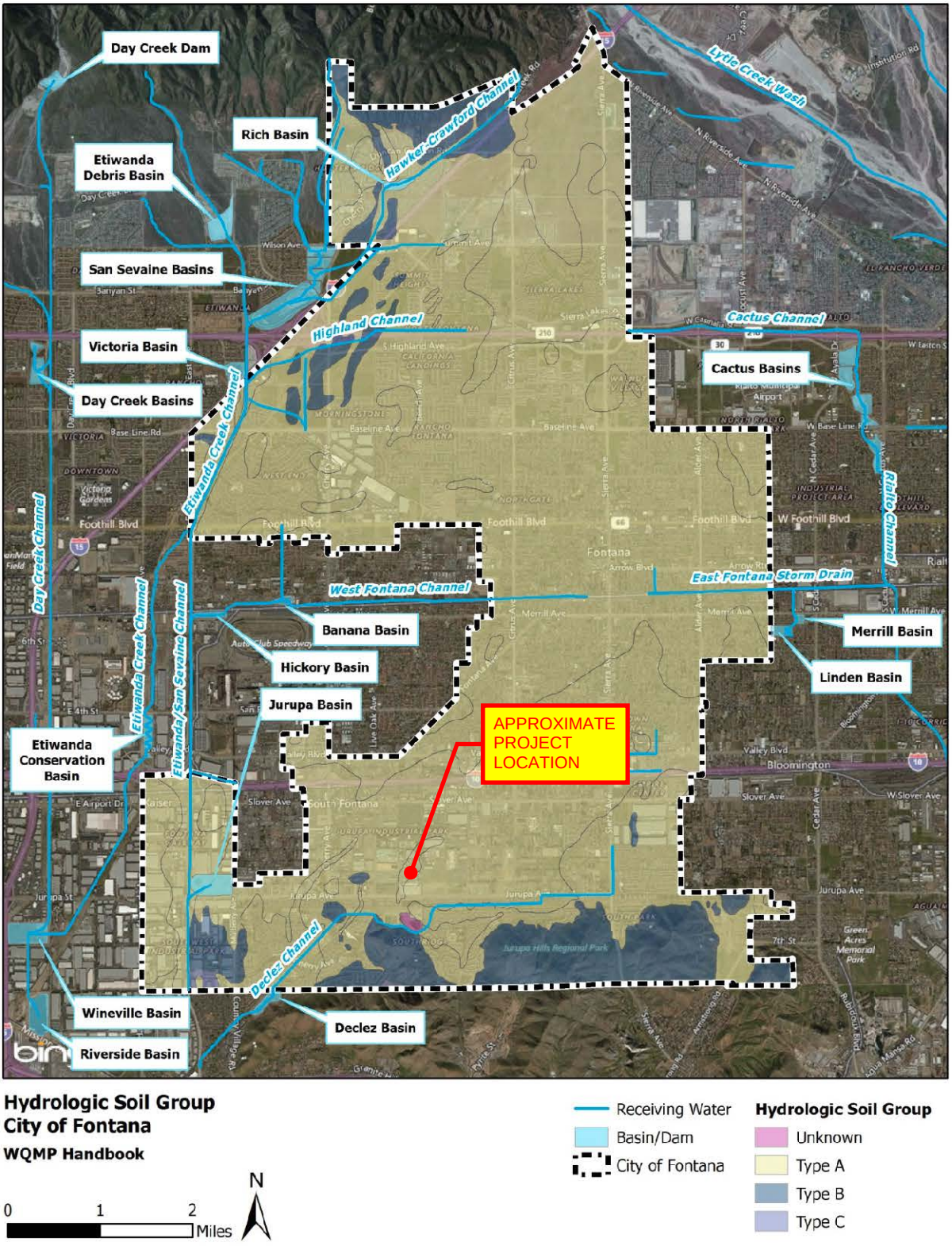

Figure 2-1 Hydrologic Soil Group

NOAA ATLAS 14 DATA

NOAA Atlas 14, Volume 6, Version 2
Location name: Fontana, California, USA*
Latitude: 34.0522°, Longitude: -117.4735°
Elevation: 987.62 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.103** (0.086-0.125)	**0.136** (0.113-0.165)	**0.179** (0.149-0.218)	**0.216** (0.177-0.264)	**0.266** (0.212-0.338)	**0.306** (0.238-0.398)	**0.348** (0.264-0.464)	**0.393** (0.289-0.538)	**0.455** (0.321-0.651)	**0.505** (0.344-0.749)
10-min	**0.148** (0.124-0.180)	**0.195** (0.162-0.236)	**0.257** (0.213-0.313)	**0.309** (0.254-0.379)	**0.382** (0.303-0.485)	**0.439** (0.342-0.570)	**0.499** (0.379-0.664)	**0.563** (0.415-0.771)	**0.652** (0.460-0.933)	**0.724** (0.493-1.07)
15-min	**0.179** (0.149-0.217)	**0.235** (0.196-0.286)	**0.311** (0.258-0.378)	**0.374** (0.308-0.458)	**0.461** (0.367-0.586)	**0.531** (0.413-0.689)	**0.603** (0.458-0.803)	**0.680** (0.501-0.933)	**0.789** (0.557-1.13)	**0.876** (0.596-1.30)
30-min	**0.269** (0.224-0.326)	**0.353** (0.294-0.429)	**0.466** (0.387-0.567)	**0.561** (0.462-0.688)	**0.692** (0.551-0.879)	**0.797** (0.620-1.03)	**0.906** (0.687-1.21)	**1.02** (0.753-1.40)	**1.18** (0.835-1.69)	**1.31** (0.895-1.95)
60-min	**0.395** (0.329-0.478)	**0.518** (0.432-0.629)	**0.684** (0.568-0.832)	**0.823** (0.677-1.01)	**1.02** (0.808-1.29)	**1.17** (0.909-1.52)	**1.33** (1.01-1.77)	**1.50** (1.10-2.05)	**1.74** (1.23-2.48)	**1.93** (1.31-2.86)
2-hr	**0.587** (0.490-0.712)	**0.762** (0.635-0.925)	**0.991** (0.823-1.21)	**1.18** (0.970-1.45)	**1.44** (1.14-1.82)	**1.63** (1.27-2.12)	**1.84** (1.39-2.44)	**2.05** (1.51-2.81)	**2.34** (1.65-3.35)	**2.57** (1.75-3.81)
3-hr	**0.745** (0.621-0.902)	**0.962** (0.801-1.17)	**1.24** (1.03-1.51)	**1.47** (1.21-1.81)	**1.78** (1.42-2.26)	**2.02** (1.57-2.62)	**2.26** (1.71-3.01)	**2.51** (1.85-3.44)	**2.84** (2.01-4.07)	**3.10** (2.11-4.60)
6-hr	**1.06** (0.881-1.28)	**1.36** (1.14-1.65)	**1.76** (1.46-2.14)	**2.07** (1.70-2.54)	**2.49** (1.98-3.16)	**2.80** (2.18-3.63)	**3.11** (2.36-4.14)	**3.43** (2.53-4.70)	**3.85** (2.72-5.51)	**4.18** (2.84-6.19)
12-hr	**1.39** (1.16-1.69)	**1.81** (1.51-2.20)	**2.34** (1.94-2.85)	**2.76** (2.27-3.38)	**3.30** (2.63-4.20)	**3.71** (2.88-4.81)	**4.11** (3.11-5.47)	**4.50** (3.32-6.17)	**5.02** (3.54-7.19)	**5.41** (3.69-8.02)
24-hr	**1.86** (1.65-2.15)	**2.46** (2.18-2.84)	**3.22** (2.84-3.72)	**3.81** (3.33-4.44)	**4.57** (3.87-5.51)	**5.14** (4.26-6.32)	**5.69** (4.61-7.17)	**6.24** (4.91-8.07)	**6.95** (5.26-9.37)	**7.47** (5.47-10.4)
2-day	**2.25** (1.99-2.59)	**3.04** (2.69-3.51)	**4.04** (3.56-4.68)	**4.84** (4.23-5.64)	**5.88** (4.98-7.09)	**6.66** (5.52-8.19)	**7.43** (6.01-9.35)	**8.20** (6.46-10.6)	**9.21** (6.97-12.4)	**9.96** (7.29-13.9)
3-day	**2.43** (2.15-2.80)	**3.34** (2.96-3.86)	**4.51** (3.98-5.22)	**5.45** (4.76-6.35)	**6.69** (5.67-8.06)	**7.63** (6.33-9.38)	**8.56** (6.94-10.8)	**9.51** (7.49-12.3)	**10.8** (8.15-14.5)	**11.7** (8.58-16.4)
4-day	**2.63** (2.33-3.03)	**3.65** (3.23-4.21)	**4.97** (4.38-5.75)	**6.04** (5.28-7.04)	**7.46** (6.32-8.99)	**8.55** (7.09-10.5)	**9.63** (7.80-12.1)	**10.7** (8.47-13.9)	**12.2** (9.25-16.5)	**13.4** (9.78-18.6)
7-day	**3.01** (2.67-3.47)	**4.25** (3.76-4.90)	**5.87** (5.17-6.79)	**7.19** (6.29-8.38)	**8.98** (7.60-10.8)	**10.4** (8.59-12.7)	**11.7** (9.52-14.8)	**13.2** (10.4-17.1)	**15.1** (11.4-20.4)	**16.6** (12.2-23.2)
10-day	**3.26** (2.88-3.75)	**4.63** (4.09-5.34)	**6.45** (5.69-7.46)	**7.94** (6.95-9.26)	**9.99** (8.46-12.0)	**11.6** (9.60-14.2)	**13.2** (10.7-16.6)	**14.9** (11.7-19.3)	**17.2** (13.0-23.2)	**19.0** (13.9-26.5)
20-day	**3.86** (3.42-4.45)	**5.56** (4.92-6.42)	**7.86** (6.93-9.10)	**9.79** (8.56-11.4)	**12.5** (10.6-15.0)	**14.6** (12.1-18.0)	**16.8** (13.6-21.2)	**19.2** (15.1-24.8)	**22.4** (17.0-30.2)	**25.0** (18.3-34.9)
30-day	**4.56** (4.03-5.25)	**6.57** (5.80-7.58)	**9.32** (8.21-10.8)	**11.6** (10.2-13.6)	**14.9** (12.7-18.0)	**17.6** (14.6-21.6)	**20.4** (16.5-25.7)	**23.3** (18.4-30.2)	**27.5** (20.8-37.1)	**30.9** (22.6-43.1)
45-day	**5.39** (4.78-6.22)	**7.70** (6.81-8.89)	**10.9** (9.62-12.6)	**13.7** (11.9-15.9)	**17.6** (14.9-21.2)	**20.8** (17.3-25.6)	**24.2** (19.6-30.5)	**27.9** (22.0-36.1)	**33.2** (25.1-44.7)	**37.5** (27.4-52.3)
60-day	**6.34** (5.62-7.31)	**8.93** (7.90-10.3)	**12.6** (11.1-14.5)	**15.7** (13.7-18.3)	**20.3** (17.1-24.4)	**24.0** (19.9-29.5)	**28.0** (22.7-35.3)	**32.4** (25.5-41.9)	**38.6** (29.2-52.1)	**43.8** (32.1-61.1)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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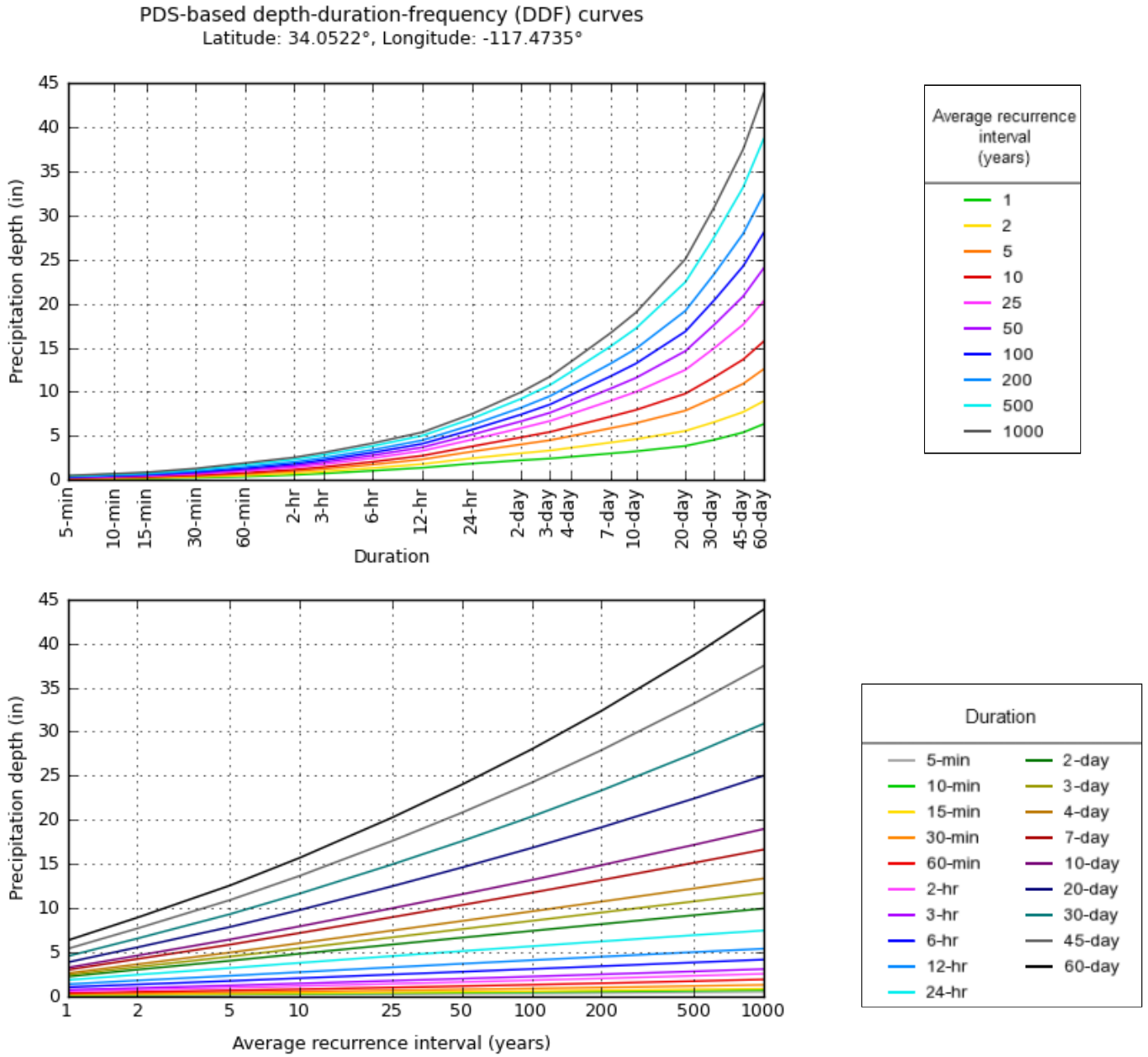
PF graphical



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Maps & aerials

Small scale terrain

APPENDIX E

INFILTRATION REPORT

June 8, 2016

ProLogis
2817 East Cedar Street, Suite 200
Ontario, California 91761

Attention: Mr. Scott Mulkay

Project No.: **15G177-2**

Subject: **Results of Infiltration Testing**
Proposed Commercial/Industrial Building
11115 Hemlock Avenue
Fontana, California

Reference: Geotechnical Investigation, Proposed Commercial/Industrial Building, 11115 Hemlock Avenue, Fontana, California, prepared for ProLogis by Southern California Geotechnical, Inc. (SCG), SCG Project No. 15G177-1, dated September 4, 2015.

Gentlemen:

In accordance with your request, we have conducted infiltration testing at the subject site. We are pleased to present this report summarizing the results of the infiltration testing and our design recommendations.

Scope of Services

The scope of services performed for this project was in general accordance with our Proposal No. 15P322-2, dated September 16, 2015. The scope of services included surface reconnaissance, subsurface exploration, field testing, and engineering analysis to determine the infiltration rates of the onsite soils. The infiltration testing was performed in general accordance with the Technical Guidance Document for Water Quality Management Plans prepared for the County of San Bernardino Areawide Stormwater Program dated June 7, 2013. The San Bernardino County standards defer to guidelines published by Riverside County Department of Environmental Health (RCDEH).

Site and Project Description

The subject site is located on the east side of Hemlock Avenue, approximately 750 feet north of the intersection of Hemlock Avenue and Jurupa Avenue, at the street address of 11115 Hemlock Avenue in Fontana, California. The site is bounded to the north by an existing commercial/industrial development, to the east by Beech Avenue, to the south by an existing commercial/industrial building, and to the west by Hemlock Avenue. The general location of the site is illustrated on the Site Location Map, included as Plate 1 of this report.

The site consists of a rectangular shaped parcel, 37.21± acres in size. The site is currently utilized as a mobile trailer storage yard, occupied by Modular Space Corporation. Two buildings are present in the west-central area of the site. These buildings are single-story structures,

which are assumed to be supported on shallow foundations with concrete slab-on-grade floors. Ground surface cover throughout the majority of the site consists of open graded gravel with areas of asphaltic concrete pavements surrounding the buildings and near the northwest corner of the site. The easternmost of the two buildings is immediately surrounded by Portland cement concrete. Landscape planters are present along the northern side of the westernmost building, and along the east and west property lines.

Detailed topographic information was not available at the time of this report. Based on visual observations, site grades appear to dip downwards toward the southwest at an estimated gradient of approximately 1 to 2± percent.

Proposed Development

A preliminary site plan, prepared by RGA, was provided to our office. Based on this plan, the site will be developed with one (1) commercial/industrial building. The proposed building will be located in the central portion of the site and will possess a footprint area of 775,200± ft^2. The building will be constructed in a cross-deck configuration with dock high doors on the east and west sides. We expect that the building will be surrounded by asphaltic concrete pavements in the parking and drive areas and Portland cement concrete pavements in the truck court and loading dock areas. It is assumed that several landscape planters and concrete flatwork will be included throughout the site.

We understand the site will utilize an on-site storm water disposal system to dispose of storm water. Based on the infiltration test location plan provided to our office by the project civil engineer, the storm water disposal system will consist of two (2) below grade chamber systems and two (2) infiltration basins. One below grade chamber system will be located in the southeast area of the subject site and the other chamber system will be located in the southwest area of the site. One infiltration basin will be located in the southeast corner of the site and the other basin will be located in the southwest corner. The bottom of the proposed below grade chamber systems will be 8 to 12± feet below the existing site grades and the bottom of the infiltration basins will be 6 to 10± feet below the existing grades.

Previous Studies

Southern California Geotechnical, Inc. (SCG) previously performed a geotechnical investigation at the subject site, which is referenced above. As a part of this study, a total of ten (10) borings were advanced to depths of 5 to 30± feet below the existing site grades. Boring No. B-1 was drilled through existing asphaltic concrete pavements. The pavement section at Boring No. B-1 consisted of 6½± inches of asphaltic concrete with no discernable underlying layer of aggregate base. The remaining borings were drilled in areas paved with crushed miscellaneous base (CMB). At Boring Nos. B-2 through B-10, the ground surface cover consisted of a 3 to 4-inch thick CMB layer. Artificial fill soils were encountered beneath the pavements at Boring No. B-1, and beneath the CMB layer at Boring Nos. B-2 and B-8. The artificial fill soils extend to depths of 2½± feet below the existing site grades and generally consisted of medium dense to dense fine sands with varying amounts of fine to coarse gravel, medium to coarse sands, and silt. Native alluvium was encountered beneath pavements and/or the artificial fill soils at all of the boring locations, extending to at least the maximum depth explored of 30± feet below the existing site grades. The alluvium generally consisted of medium dense to very dense fine sands, silty fine

sands, fine to coarse sands and fine sandy silts with varying amounts of silt, fine to coarse gravel and cobbles. Boring No. B-7 also encountered a layer of very dense gravelly fine to coarse sands between depths of 17 and 25± feet. Groundwater was not encountered at any of the borings.

Subsurface Exploration

Scope of Exploration

The subsurface exploration conducted for this project consisted of a total of six (6) infiltration test borings. The borings were advanced to depths of 8 to 12± feet below existing site grades. The borings were advanced using a truck-mounted drilling rig, equipped with 8-inch diameter hollow stem augers and were logged during drilling by a member of our staff. The approximate locations of the infiltration test borings (identified as I-1 through I-6) are indicated on the Infiltration Test Location Plan, enclosed as Plate 2 of this report.

Upon the completion of each infiltration boring, the bottom of the test holes were covered with 2± inches of clean ¾-inch gravel. A sufficient length of 3-inch-diameter perforated PVC casing was then placed into each test hole so that the PVC casing extended from the bottom of the test hole to the ground surface. Clean ¾-inch gravel was then installed in the annulus surrounding the PVC casing.

Geotechnical Conditions

Ground surface cover at all six (6) of the infiltration boring locations consisted of 1 to 3± inches of open graded gravel. Native alluvium was encountered beneath the open graded gravel layer at all of the infiltration boring locations, extending to at least the maximum explored depth of 12± feet below existing grades. The alluvial soils generally consist of loose to dense fine to medium sands, silty fine to medium sands, and gravelly fine to coarse sands with varying amounts of coarse sand, fine to coarse gravel, silt, and cobble content. The Boring Logs, which illustrate the conditions encountered at the boring locations, are included with this report.

Infiltration Testing

We understand that the results of the testing will be used to prepare a preliminary design for the proposed storm water infiltration system that will be used to dispose of storm water at the subject site. As previously stated, the infiltration testing was performed in general accordance with Technical Guidance Document for Water Quality Management Plans, prepared for the County of San Bernardino Areawide Stormwater Program, dated June 7, 2013.

Pre-soaking

In accordance with the infiltration county standards for sandy soils, the infiltration test borings were pre-soaked 2 hours prior to infiltration testing or until all of the water had percolated through each test hole. The pre-soaking process consisted of filling each test boring by inverting a full 5 gallon bottle of clear water supported over the hole so that the water flow into the hole holds constant at a level at least 5 times the hole's radius above the gravel at the bottom of the hole. Pre-soaking was completed after all of the water had percolated through the test hole.

Infiltration Testing

Following the pre-soaking process of the infiltration test borings, SCG performed the infiltration testing. Each test hole was filled with water to a depth of at least 5 times the hole's radius above the gravel at the bottom of the test hole prior to each test interval. In accordance with the San Bernardino County guidelines, since "sandy soils" were encountered at the bottom of all the infiltration test borings (where 6 inches of water infiltrated into the surrounding soils for two consecutive 25-minute readings), readings were taken at an interval of 10 minutes for a total of 1 hour at the test location. After each reading, water was added to the boring so that the depth of the water was at least 5 times the radius of the hole. The water level readings are presented on the spreadsheets enclosed with this report. The infiltration rates for each of the timed intervals are also tabulated on the spreadsheets.

The infiltration rates for the tests are tabulated in inches per hour. In accordance with typically accepted practice, it is recommended that the most conservative reading from the latter part of the infiltration test be used for design. The rate is summarized below:

Infiltration Test No.	Soil Description	Infiltration Rate (inches/hour)
I-1	Fine to medium Sand, little Silt, trace coarse Sand, little fine Gravel	2.1
I-2	Silty fine to medium Sand, trace coarse Sand, trace fine Gravel	3.6
I-3	Silty fine Sand, trace to little medium to coarse Sand, trace fine Gravel	3.6
I-4	Gravelly fine to coarse Sand, trace Silt	6.4
I-5	Silty fine to medium Sand, little coarse Sand, trace fine Gravel	1.2
I-6	Fine to medium Sand, little coarse Sand, little Silt, little fine Gravel	2.8

Laboratory Testing

Grain Size Analysis

The grain size distribution of selected soils taken from the base of each infiltration test boring has been determined using a range of wire mesh screens. The analysis was performed in general accordance with ASTM D-422 and/or ASTM D-1140. The weight of the portion of the sample retained on each screen is recorded and the percentage finer or coarser of the total weight is calculated. The results of the analysis are presented at the end of this report.

Design Recommendations

A total of six (6) infiltration tests were performed at the subject site. As noted above, the infiltration rates range from 1.2 to 6.4 inches per hour. The primary factors affecting the infiltration rates are the silt content and the varying relative densities of the encountered soils, which vary at different depths and locations at the subject site.

Based on the infiltration test results, we recommend an average infiltration rate of 2 inches per hour be used in the design of the proposed below grade chamber system and proposed infiltration basins.

We recommend that a representative from the geotechnical engineer be on-site during the construction of the proposed infiltration chambers and basins to identify the soil classification at the base of each infiltration system. It should be confirmed that the soils at the base of the proposed infiltration system correspond with those presented in this report to ensure that the performance of each system will be consistent with the rates reported herein.

The design of the proposed infiltration system should be performed by the project civil engineer, in accordance with the city of Fontana and/or San Bernardino County guidelines. **It is recommended that the project civil engineer apply an appropriate factor of safety.** It is recommended that the system be constructed so as to facilitate removal of silt and clay, or other deleterious materials from any water that may enter the systems. The presence of such materials would decrease the effective infiltration rates. **The infiltration rates recommended above are based on the assumption that only clean water will be introduced to the subsurface profile. Any fines, debris, or organic materials could significantly impact the infiltration rate.** It should be noted that the recommended infiltration rates are based on infiltration testing at six (6) discrete locations and that the overall infiltration rate of the infiltration system could vary considerably.

Infiltration versus Permeability

Infiltration rates are based on unsaturated flow. As water is introduced into soils by infiltration, the soils become saturated and the wetting front advances from the unsaturated zone to the saturated zone. Once the soils become saturated, infiltration rates become zero, and water can only move through soils by hydraulic conductivity at a rate determined by pressure head and soil permeability. The infiltration rates presented herein was determined in accordance with the San Bernardino County guidelines, and is considered valid for the time and place of the actual test. Changes in soil moisture content will affect the infiltration rate. Infiltration rates should be expected to decrease until the soils become saturated. Soil permeability values will then govern groundwater movement. Permeability values may be on the order of 10 to 20 times less than infiltration rates. The system designer should incorporate adequate factors of safety and allow for overflow design into appropriate traditional storm drain systems, which would transport storm water off-site.

Location of Infiltration System

The use of on-site storm water infiltration systems carries a risk of creating adverse geotechnical conditions. Increasing the moisture content of the soil can cause the soil to lose internal shear strength and increase its compressibility, resulting in a change in the designed engineering properties. Overlying structures and pavements in the infiltration area could potentially be damaged due to saturation of subgrade soils. If possible, the proposed infiltration system for this site should be located at least 25 feet away from any structures, including retaining walls. Even with this provision of locating the infiltration system at least 25 feet from the buildings, it is possible that infiltrating water into the subsurface soils could have an adverse effect on the proposed or existing structures. It should also be noted that utility trenches which happen to

collect storm water can also serve as conduits to transmit storm water toward the structure, depending on the slope of the utility trench. Therefore, consideration should also be given to the proposed locations of underground utilities which may pass near the proposed infiltration system.

General Comments

This report has been prepared as an instrument of service for use by the client in order to aid in the evaluation of this property and to assist the architects and engineers in the design and preparation of the project plans and specifications. This report may be provided to the contractor(s) and other design consultants to disclose information relative to the project. However, this report is not intended to be utilized as a specification in and of itself, without appropriate interpretation by the project architect, structural engineer, and/or civil engineer. The design of the proposed storm water infiltration systems are the responsibility of the civil engineer. The role of the geotechnical engineer is limited to determination of infiltration rate only. By using the design infiltration rate contained herein, the civil engineer agrees to indemnify, defend, and hold harmless the geotechnical engineer for all aspects of the design and performance of the proposed storm water infiltration system. The reproduction and distribution of this report must be authorized by the client and Southern California Geotechnical, Inc. Furthermore, any reliance on this report by an unauthorized third party is at such party's sole risk, and we accept no responsibility for damage or loss which may occur.

The analysis of this site was based on a subsurface profile interpolated from limited discrete soil samples. While the materials encountered in the project area are considered to be representative of the total area, some variations should be expected between boring locations and testing depths. If the conditions encountered during construction vary significantly from those detailed herein, we should be contacted immediately to determine if the conditions alter the recommendations contained herein.

This report has been based on assumed or provided characteristics of the proposed development. It is recommended that the owner, client, architect, structural engineer, and civil engineer carefully review these assumptions to ensure that they are consistent with the characteristics of the proposed development. If discrepancies exist, they should be brought to our attention to verify that they do not affect the conclusions and recommendations contained herein. We also recommend that the project plans and specifications be submitted to our office for review to verify that our recommendations have been correctly interpreted.

The analysis, conclusions, and recommendations contained within this report have been promulgated in accordance with generally accepted professional geotechnical engineering practice. No other warranty is implied or expressed.

Closure

We sincerely appreciate the opportunity to be of service on this project. We look forward to providing additional consulting services during the course of the project. If we may be of further assistance in any manner, please contact our office.

Respectfully Submitted,

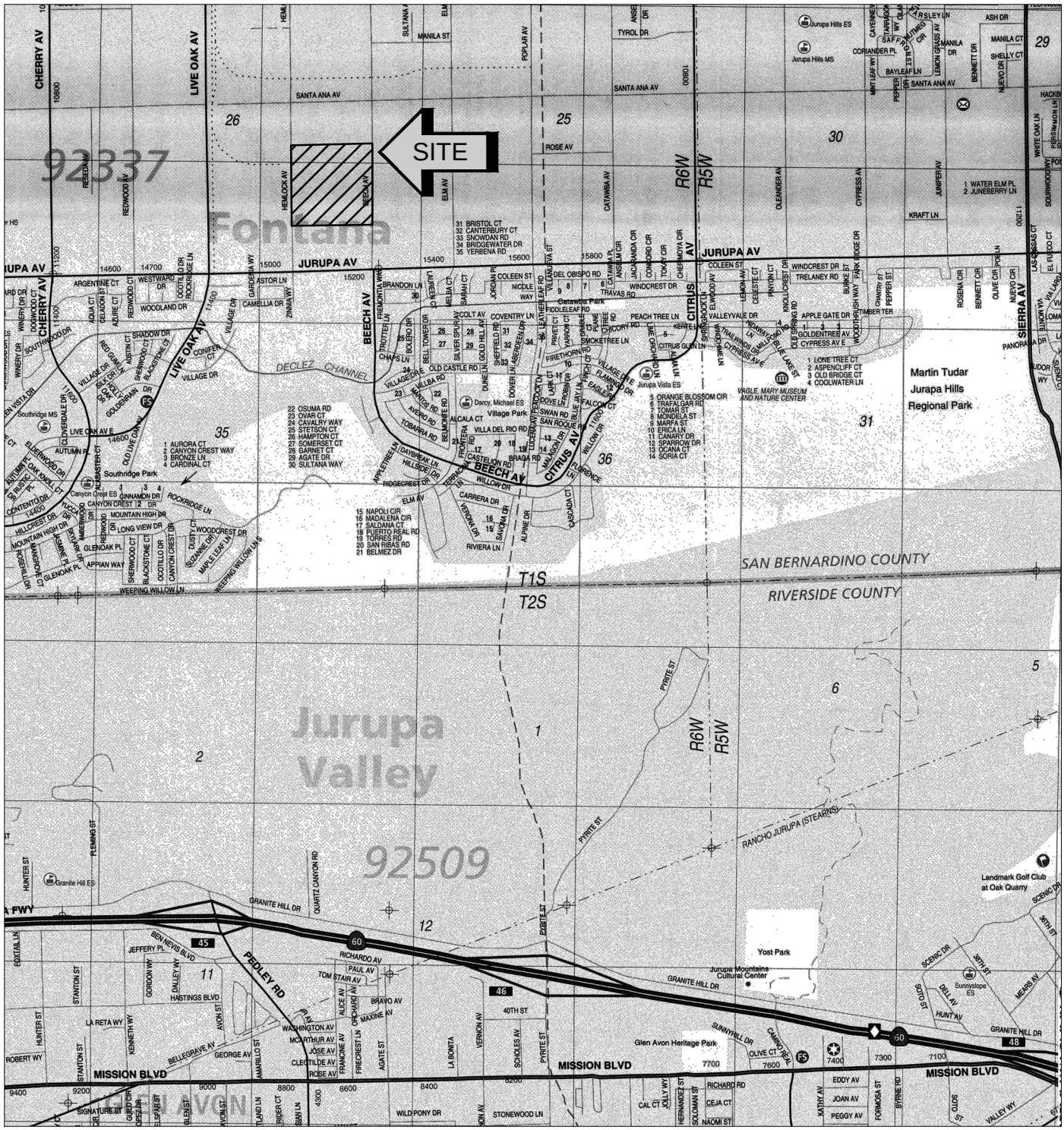
SOUTHERN CALIFORNIA GEOTECHNICAL, INC.

Scott McCann
Staff Scientist

John A. Seminara, GE 2294
Principal Engineer

Distribution: (1) Addressee

Enclosures: Plate 1 - Site Location Map
Plate 2 - Infiltration Test Location Plan
Boring Log Legend and Logs (8 pages)
Infiltration Test Results Spreadsheet (6 pages)
Grain Size Distribution Graph (6 pages)



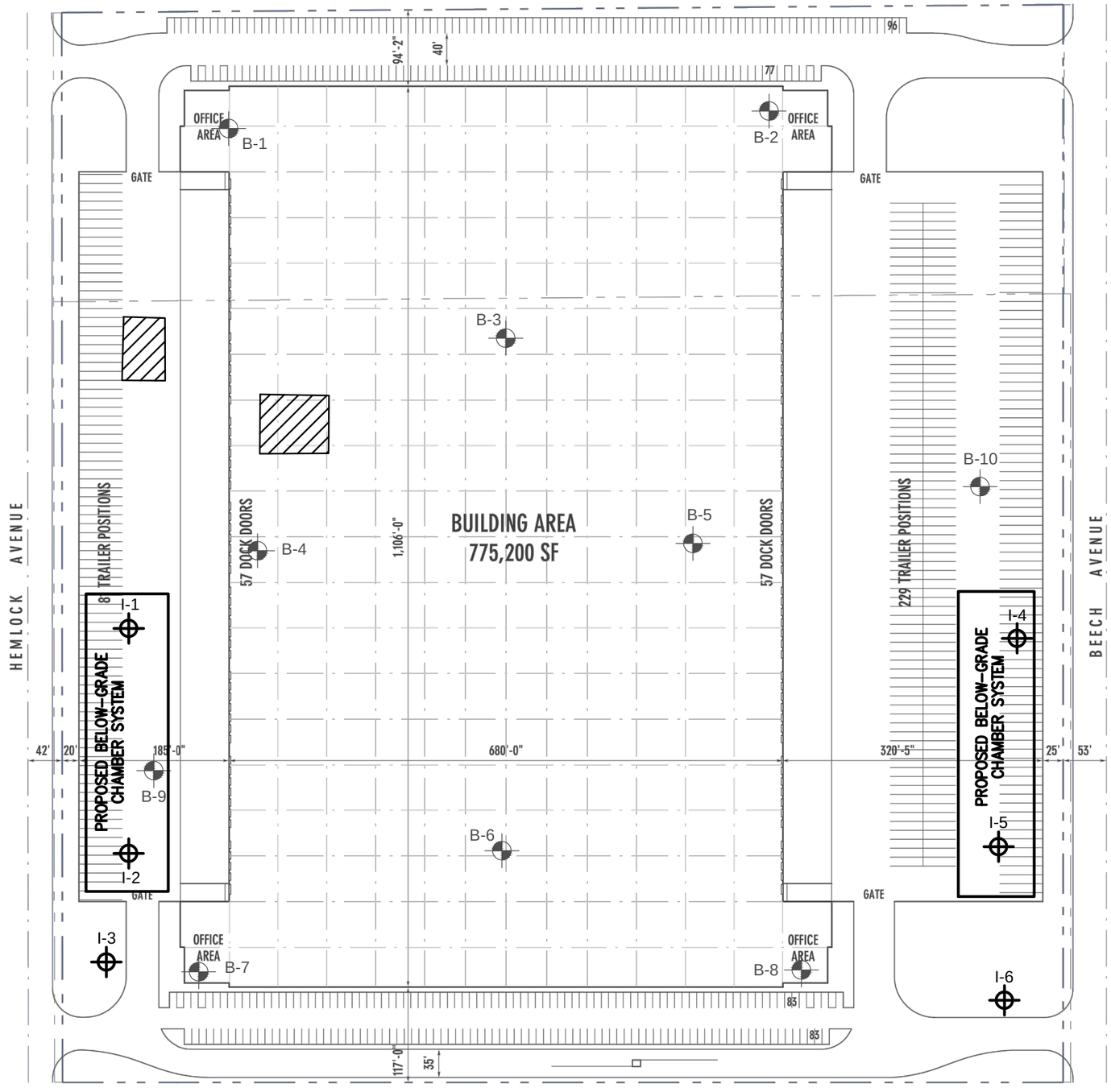
SOURCE: SAN BERNARDINO COUNTY
THOMAS GUIDE, 2013

SITE LOCATION MAP

PROPOSED COMMERCIAL/INDUSTRIAL BUILDING

FONTANA, CALIFORNIA

SCALE: 1" = 2400'	
DRAWN: JLH CHKD: JAS	
SCG PROJECT 15G177-2	
PLATE 1	



NORTH

SoCalGeo

GEOTECHNICAL LEGEND

- APPROXIMATE INFILTRATION TEST LOCATION
- APPROXIMATE BORING LOCATION FROM PREVIOUS STUDY (SCG PROJECT NO. 15G177-1)
- EXISTING BUILDING TO BE DEMOLISHED

NOTE: BASE MAP PREPARED BY RGA

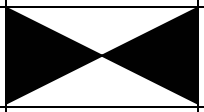
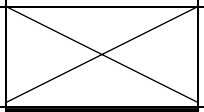
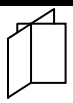
INFILTRATION TEST LOCATION PLAN

PROPOSED COMMERCIAL/INDUSTRIAL BUILDING

FONTANA, CALIFORNIA

SCALE: 1" = 150'	SOUTHERN CALIFORNIA GEOTECHNICAL
DRAWN: SAM CHKD: JAS	
SCG PROJECT 15G177-2	
PLATE 2	

BORING LOG LEGEND

SAMPLE TYPE	GRAPHICAL SYMBOL	SAMPLE DESCRIPTION
AUGER		SAMPLE COLLECTED FROM AUGER CUTTINGS, NO FIELD MEASUREMENT OF SOIL STRENGTH. (DISTURBED)
CORE		ROCK CORE SAMPLE: TYPICALLY TAKEN WITH A DIAMOND-TIPPED CORE BARREL. TYPICALLY USED ONLY IN HIGHLY CONSOLIDATED BEDROCK.
GRAB		SOIL SAMPLE TAKEN WITH NO SPECIALIZED EQUIPMENT, SUCH AS FROM A STOCKPILE OR THE GROUND SURFACE. (DISTURBED)
CS		CALIFORNIA SAMPLER: 2-1/2 INCH I.D. SPLIT BARREL SAMPLER, LINED WITH 1-INCH HIGH BRASS RINGS. DRIVEN WITH SPT HAMMER. (RELATIVELY UNDISTURBED)
NSR		NO RECOVERY: THE SAMPLING ATTEMPT DID NOT RESULT IN RECOVERY OF ANY SIGNIFICANT SOIL OR ROCK MATERIAL.
SPT		STANDARD PENETRATION TEST: SAMPLER IS A 1.4 INCH INSIDE DIAMETER SPLIT BARREL, DRIVEN 18 INCHES WITH THE SPT HAMMER. (DISTURBED)
SH		SHELBY TUBE: TAKEN WITH A THIN WALL SAMPLE TUBE, PUSHED INTO THE SOIL AND THEN EXTRACTED. (UNDISTURBED)
VANE		VANE SHEAR TEST: SOIL STRENGTH OBTAINED USING A 4 BLADED SHEAR DEVICE. TYPICALLY USED IN SOFT CLAYS-NO SAMPLE RECOVERED.

COLUMN DESCRIPTIONS

DEPTH: Distance in feet below the ground surface.

SAMPLE: Sample Type as depicted above.

BLOW COUNT: Number of blows required to advance the sampler 12 inches using a 140 lb hammer with a 30-inch drop. 50/3" indicates penetration refusal (>50 blows) at 3 inches. WH indicates that the weight of the hammer was sufficient to push the sampler 6 inches or more.

POCKET PEN.: Approximate shear strength of a cohesive soil sample as measured by pocket penetrometer.

GRAPHIC LOG: Graphic Soil Symbol as depicted on the following page.

DRY DENSITY: Dry density of an undisturbed or relatively undisturbed sample in lbs/ft^3.

MOISTURE CONTENT: Moisture content of a soil sample, expressed as a percentage of the dry weight.

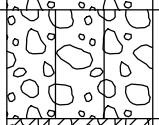
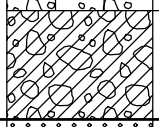
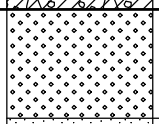
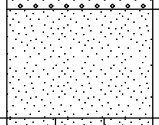
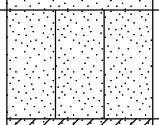
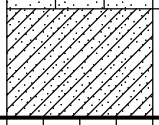
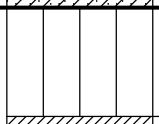
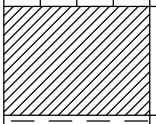
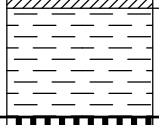
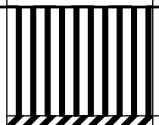
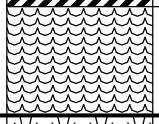
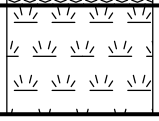
LIQUID LIMIT: The moisture content above which a soil behaves as a liquid.

PLASTIC LIMIT: The moisture content above which a soil behaves as a plastic.

PASSING #200 SIEVE: The percentage of the sample finer than the #200 standard sieve.

UNCONFINED SHEAR: The shear strength of a cohesive soil sample, as measured in the unconfined state.

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. I-1

JOB NO.: 15G177-2
PROJECT: C/I Development
LOCATION: Fontana, California

DRILLING DATE: 5/20/16
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jason Hiskey

WATER DEPTH:
CAVE DEPTH:
READING TAKEN:

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	UNCONFINED SHEAR (TSF)	COMMENTS
					3± inches Open-graded Gravel							
		21			ALLUVIUM: Light Gray fine Sand, trace Silt, trace medium Sand, trace fine Gravel, medium dense-dry to damp		2					
		10			Light Gray Brown fine Sand, little Silt, trace medium to coarse Sand, loose to medium dense-damp to moist		7					
5												
		31			Light Gray Brown Silty fine Sand, trace coarse Sand, dense-damp		6					
					Light Gray fine to medium Sand, trace to little Silt, little coarse Sand, dense-dry to damp		2					
		34					3					
10												
		43			Light Gray fine to medium Sand, trace coarse Sand, little fine Gravel, little Silt, dense-dry to damp		2					
					Boring Terminated at 12'							

TBL 15G177-2.GPJ SOCALGEO.GDT 6/8/16

TEST BORING LOG **PLATE I-1**

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. I-2

JOB NO.: 15G177-2
PROJECT: C/I Development
LOCATION: Fontana, California

DRILLING DATE: 5/20/16
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jason Hiskey

WATER DEPTH:
CAVE DEPTH:
READING TAKEN:

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	UNCONFINED SHEAR (TSF)	COMMENTS
					2½± inches Open-graded Gravel							
		33			ALLUVIUM: Light Gray fine to medium Sand, little Silt, little coarse Sand, occasional Cobbles, dense-dry to damp		2					
		44			Light Gray Silty fine to medium Sand, little coarse Sand, some fine to coarse Gravel, occasional Cobbles, dense-dry to damp		2					
5												
		18			Light Gray Brown fine Sand, trace coarse Sand, little Silt, medium dense-damp		5					
		27			Light Brown Silty fine to medium Sand, trace coarse Sand, trace fine Gravel, medium dense-damp		3					
10												
					Boring Terminated at 10'							

TBL 15G177-2.GPJ SOCALGEO.GDT 6/8/16

TEST BORING LOG **PLATE I-2**

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. I-3

JOB NO.: 15G177-2
PROJECT: C/I Development
LOCATION: Fontana, California

DRILLING DATE: 5/20/16
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jason Hiskey

WATER DEPTH:
CAVE DEPTH:
READING TAKEN:

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	UNCONFINED SHEAR (TSF)	COMMENTS
					3± inches Open-graded Gravel							
		19			Gray to Gray Brown fine to medium Sand, trace Silt, little coarse Sand, medium dense-dry to damp		2					
		12			@ 3½ feet, trace fine Gravel		2					
5												
		16			ALLUVIUM: Light Brown Silty fine Sand, trace to little medium to coarse Sand, trace fine Gravel, medium dense-damp		5					
					Boring Terminated at 8'							

TBL 15G177-2.GPJ SOCALGEO.GDT 6/8/16

TEST BORING LOG **PLATE I-3**

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. I-4

JOB NO.: 15G177-2 | DRILLING DATE: 5/20/16 | WATER DEPTH:
PROJECT: C/I Development | DRILLING METHOD: Hollow Stem Auger | CAVE DEPTH:
LOCATION: Fontana, California | LOGGED BY: Jason Hiskey | READING TAKEN:

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	UNCONFINED SHEAR (TSF)	COMMENTS
					1± inch Open-graded Gravel							
		24			ALLUVIUM: Light Gray Brown fine to medium Sand, little Silt, some coarse Sand, little fine to coarse Gravel, medium dense-dry to damp		2					
		23			Light Brown fine to coarse Sand, trace Silt, some fine to coarse Gravel, medium dense-dry to damp		2					
5												
		22			Light Gray Brown fine to medium Sand, trace Silt, little coarse Sand, little fine to corase Gravel, medium dense-dry to damp		2					
		13			Gray Brown Silty fine Sand, trace medium Sand, medium dense-moist		10					
10												
		31			Gray Brown Silty fine to medium Sand, little coarse Sand, trace fine Gravel, dense-damp to moist		7					
					Light Gray Gravelly fine to coarse Sand, trace Silt, occasional Cobbles, dense-dry to damp		2					
					Boring Terminated at 12'							

TBL 15G177-2.GPJ SOCALGEO.GDT 6/8/16

TEST BORING LOG **PLATE I-4**

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. I-5

JOB NO.: 15G177-2
PROJECT: C/I Development
LOCATION: Fontana, California

DRILLING DATE: 5/20/16
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: Jason Hiskey

WATER DEPTH:
CAVE DEPTH:
READING TAKEN:

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	UNCONFINED SHEAR (TSF)	COMMENTS
					2½± inches Open-graded Gravel							
		9			ALLUVIUM: Brown Silty fine Sand, little medium Sand, loose-damp to moist		6					
		13			Brown Silty fine to medium Sand, little coarse Sand, trace fine Gravel, medium dense-damp to moist		7					
5		15			Brown fine Sand, trace coarse Sand, little medium Sand, little Silt, medium dense-damp to moist		7					
		49			Brown Silty fine to medium Sand, little coarse Sand, trace fine Gravel, occasional Cobbles, dense-damp to moist		6					
10					Boring Terminated at 10'							

TBL 15G177-2.GPJ SOCALGEO.GDT 6/8/16

TEST BORING LOG **PLATE I-5**

SOUTHERN CALIFORNIA GEOTECHNICAL
A California Corporation

BORING NO. I-6

JOB NO.: 15G177-2 | DRILLING DATE: 5/20/16 | WATER DEPTH:
PROJECT: C/I Development | DRILLING METHOD: Hollow Stem Auger | CAVE DEPTH:
LOCATION: Fontana, California | LOGGED BY: Jason Hiskey | READING TAKEN:

FIELD RESULTS						LABORATORY RESULTS						
DEPTH (FEET)	SAMPLE	BLOW COUNT	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION SURFACE ELEVATION: MSL	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT	PASSING #200 SIEVE (%)	UNCONFINED SHEAR (TSF)	COMMENTS
					3± inches Open-graded Gravel							
		13			ALLUVIUM: Brown Silty fine Sand, trace fine Gravel, little medium to coarse Sand, medium dense-damp to moist		6					
		8			Gray Brown Silty fine Sand, trace medium Sand, loose-moist		9					
5												
		21			Light Gray fine to medium Sand, little coarse Sand, little Silt, little fine Gravel, medium dense-dry to damp		2					
					Boring Terminated at 8'							

TBL 15G177-2.GPJ SOCALGEO.GDT 6/8/16

TEST BORING LOG **PLATE I-6**

INFILTRATION CALCULATIONS

Project Name	Proposed C/I Building
Project Location	Fontana, CA
Project Number	15G177-2
Engineer	SM

Test Hole Radius	4	(in)
Test Depth	9.4	(ft)

Infiltration Test Hole: I-1

Interval Number		Time	Time Interval (min)	Water Depth (ft)	Change in Water Level (ft)	Average Head Height (ft)	Infiltration Rate Q (in/hr)	
P1	Initial	12:40 PM	16.0	7.42	0.53	1.72	2.11	Pre-Sat
	Final	12:56 PM		7.95				
P2	Initial	12:57 PM	16.0	7.26	0.56	1.86	2.07	
	Final	1:13 PM		7.82				
1	Initial	1:25 PM	10.0	7.30	0.37	1.92	2.13	Infiltration Testing
	Final	1:35 PM		7.67				
2	Initial	1:36 PM	10.0	7.28	0.36	1.94	2.05	
	Final	1:46 PM		7.64				
3	Initial	1:47 PM	10.0	7.35	0.36	1.87	2.12	
	Final	1:57 PM		7.71				
4	Initial	1:58 PM	10.0	7.39	0.36	1.83	2.16	
	Final	2:08 PM		7.75				
5	Initial	2:09 PM	10.0	7.29	0.37	1.93	2.12	
	Final	2:19 PM		7.66				
6	Initial	2:20 PM	10.0	7.33	0.36	1.89	2.10	
	Final	2:30 PM		7.69				

Per County Standards, Infiltration Rate calculated as follows:

$$Q = \frac{\Delta H(60r)}{\Delta t(r + 2H_{avg})}$$

Where: Q = Infiltration Rate (in inches per hour)
ΔH = Change in Height (Water Level) over the time interval
r = Test Hole (Borehole) Radius
Δt = Time Interval H above GS= 2
H_{avg} = Average Head Height over the time interval

INFILTRATION CALCULATIONS

Project Name	Proposed C/I Building
Project Location	Fontana, CA
Project Number	15G177-2
Engineer	SM

Test Hole Radius	4	(in)
Test Depth	7.8	(ft)

Infiltration Test Hole: I-2

Interval Number		Time	Time Interval (min)	Water Depth (ft)	Change in Water Level (ft)	Average Head Height (ft)	Infiltration Rate Q (in/hr)	
P1	Initial	12:45 PM	14.0	5.52	1.16	1.73	5.24	Pre-Sat
	Final	12:59 PM		6.68				
P2	Initial	1:00 PM	14.0	5.69	0.92	1.68	4.27	
	Final	1:14 PM		6.61				
1	Initial	1:29 PM	10.0	5.48	0.54	2.08	2.88	Infiltration Testing
	Final	1:39 PM		6.02				
2	Initial	1:40 PM	10.0	5.69	0.60	1.84	3.59	
	Final	1:50 PM		6.29				
3	Initial	1:51 PM	10.0	5.66	0.57	1.89	3.31	
	Final	2:01 PM		6.23				
4	Initial	2:02 PM	10.0	5.71	0.56	1.84	3.35	
	Final	2:12 PM		6.27				
5	Initial	2:13 PM	10.0	5.75	0.56	1.80	3.42	
	Final	2:23 PM		6.31				
6	Initial	2:24 PM	10.0	5.83	0.56	1.72	3.56	
	Final	2:34 PM		6.39				

Per County Standards, Infiltration Rate calculated as follows:

$$Q = \frac{\Delta H(60r)}{\Delta t(r + 2H_{avg})}$$

Where: Q = Infiltration Rate (in inches per hour)
ΔH = Change in Height (Water Level) over the time interval
r = Test Hole (Borehole) Radius
Δt = Time Interval H above GS= 0.67
H_{avg} = Average Head Height over the time interval

INFILTRATION CALCULATIONS

Project Name	Proposed C/I Building
Project Location	Fontana, CA
Project Number	15G177-2
Engineer	SM

Test Hole Radius	4	(in)
Test Depth	6.9	(ft)

Infiltration Test Hole	I-3

Interval Number		Time	Time Interval (min)	Water Depth (ft)	Change in Water Level (ft)	Average Head Height (ft)	Infiltration Rate Q (in/hr)	
P1	Initial	12:50 PM	13.0	4.74	0.76	1.75	3.66	Pre-Sat
	Final	1:03 PM		5.50				
P2	Initial	1:04 PM	13.0	5.11	0.83	1.35	5.07	
	Final	1:17 PM		5.94				
1	Initial	1:32 PM	10.0	4.70	0.63	1.86	3.74	Infiltration Testing
	Final	1:42 PM		5.33				
2	Initial	1:43 PM	10.0	4.64	0.64	1.91	3.70	
	Final	1:53 PM		5.28				
3	Initial	1:54 PM	10.0	4.75	0.60	1.82	3.62	
	Final	2:04 PM		5.35				
4	Initial	2:05 PM	10.0	4.83	0.59	1.75	3.70	
	Final	2:15 PM		5.42				
5	Initial	2:16 PM	10.0	4.85	0.57	1.74	3.60	
	Final	2:26 PM		5.42				
6	Initial	2:27 PM	10.0	4.81	0.58	1.77	3.59	
	Final	2:37 PM		5.39				

Per County Standards, Infiltration Rate calculated as follows:

$$Q = \frac{\Delta H(60r)}{\Delta t(r + 2H_{avg})}$$

Where: Q = Infiltration Rate (in inches per hour)
ΔH = Change in Height (Water Level) over the time interval
r = Test Hole (Borehole) Radius
Δt = Time Interval H above GS= 0.83
H_{avg} = Average Head Height over the time interval

INFILTRATION CALCULATIONS

Project Name	Proposed C/I Building
Project Location	Fontana, CA
Project Number	15G177-2
Engineer	SM

Test Hole Radius	4	(in)
Test Depth	9.8	(ft)

Infiltration Test Hole	I-4

Interval Number		Time	Time Interval (min)	Water Depth (ft)	Change in Water Level (ft)	Average Head Height (ft)	Infiltration Rate Q (in/hr)	
P1	Initial	8:15 AM	7.0	7.70	0.76	1.72	6.91	Pre-Sat
	Final	8:22 AM		8.46				
P2	Initial	8:23 AM	7.0	7.70	0.72	1.74	6.47	
	Final	8:30 AM		8.42				
1	Initial	8:31 AM	10.0	7.74	1.13	1.50	8.16	Infiltration Testing
	Final	8:41 AM		8.87				
2	Initial	8:42 AM	10.0	7.76	1.12	1.48	8.16	
	Final	8:52 AM		8.88				
3	Initial	8:53 AM	10.0	7.70	1.05	1.58	7.23	
	Final	9:03 AM		8.75				
4	Initial	9:04 AM	10.0	7.69	1.02	1.60	6.93	
	Final	9:14 AM		8.71				
5	Initial	9:15 AM	10.0	7.70	1.02	1.59	6.97	
	Final	9:25 AM		8.72				
6	Initial	9:26 AM	10.0	7.65	0.98	1.66	6.44	
	Final	9:36 AM		8.63				

Per County Standards, Infiltration Rate calculated as follows:

$$Q = \frac{\Delta H(60r)}{\Delta t(r + 2H_{avg})}$$

Where: Q = Infiltration Rate (in inches per hour)
ΔH = Change in Height (Water Level) over the time interval
r = Test Hole (Borehole) Radius
Δt = Time Interval H above GS= 0
H_{avg} = Average Head Height over the time interval

INFILTRATION CALCULATIONS

Project Name	Proposed C/I Building
Project Location	Fontana, CA
Project Number	15G177-2
Engineer	SM

Test Hole Radius	4	(in)
Test Depth	8.0	(ft)

Infiltration Test Hole	I-5

Interval Number		Time	Time Interval (min)	Water Depth (ft)	Change in Water Level (ft)	Average Head Height (ft)	Infiltration Rate Q (in/hr)	
P1	Initial	10:40 AM	18.0	5.48	0.52	2.29	1.41	Pre-Sat
	Final	10:58 AM		6.00				
P2	Initial	10:59 AM	25.0	5.97	0.50	1.81	1.21	
	Final	11:24 AM		6.47				
1	Initial	11:25 AM	10.0	5.98	2.22	0.94	24.07	Infiltration Testing
	Final	11:35 AM		8.20				
2	Initial	11:36 AM	10.0	5.97	0.22	1.95	1.25	
	Final	11:46 AM		6.19				
3	Initial	11:47 AM	10.0	5.97	0.22	1.95	1.25	
	Final	11:57 AM		6.19				
4	Initial	11:58 AM	10.0	5.94	0.23	1.98	1.29	
	Final	12:08 PM		6.17				
5	Initial	12:09 PM	10.0	6.01	0.21	1.92	1.21	
	Final	12:19 PM		6.22				
6	Initial	12:20 PM	10.0	6.02	0.21	1.91	1.22	
	Final	12:30 PM		6.23				

Per County Standards, Infiltration Rate calculated as follows:

$$Q = \frac{\Delta H(60r)}{\Delta t(r + 2H_{avg})}$$

Where: Q = Infiltration Rate (in inches per hour)
ΔH = Change in Height (Water Level) over the time interval
r = Test Hole (Borehole) Radius
Δt = Time Interval H above GS= 0.67
H_{avg} = Average Head Height over the time interval

INFILTRATION CALCULATIONS

Project Name	Proposed C/I Building
Project Location	Fontana, CA
Project Number	15G177-2
Engineer	SM

Test Hole Radius	4	(in)
Test Depth	6.7	(ft)

Infiltration Test Hole	I-6

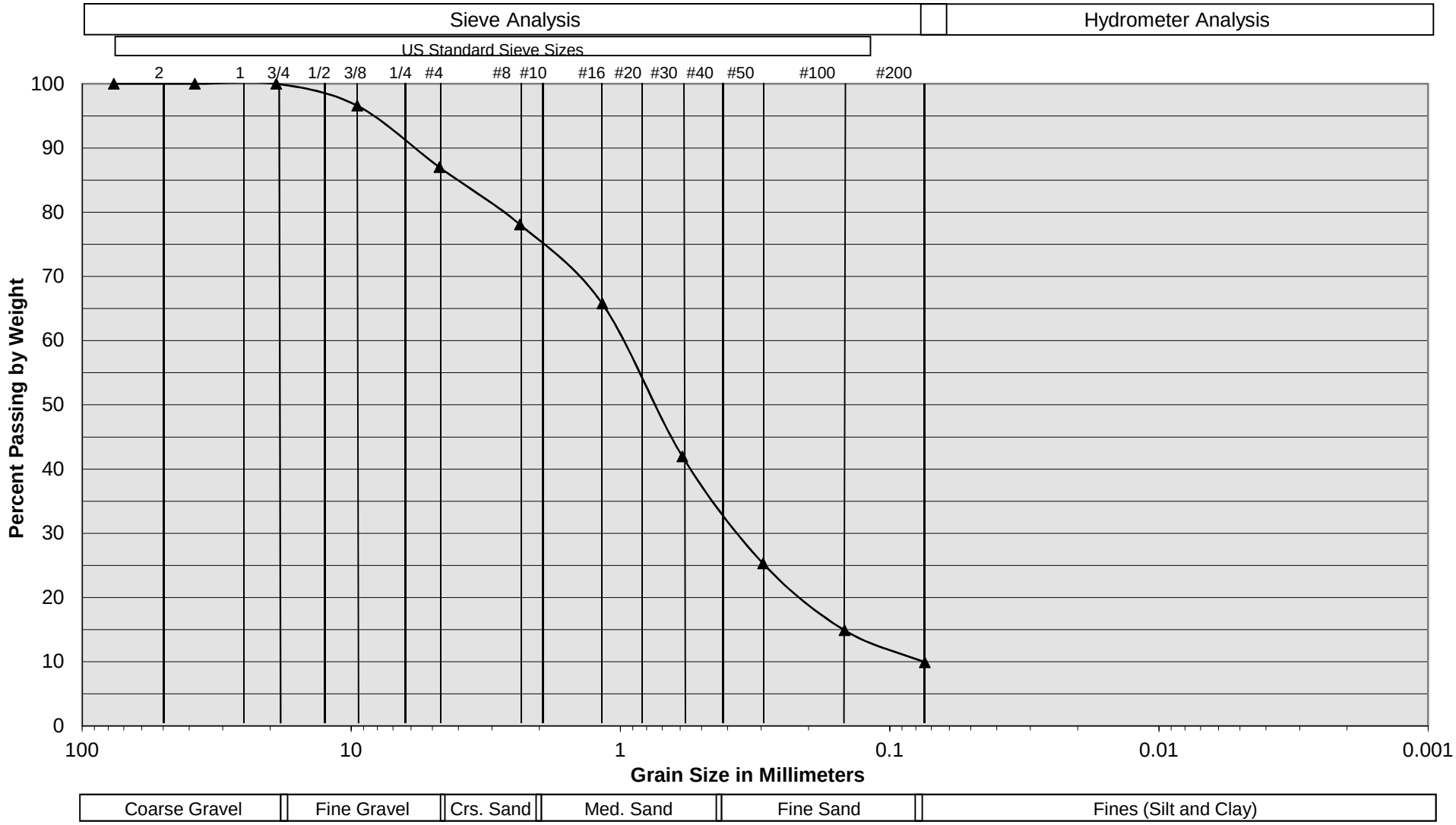
Interval Number		Time	Time Interval (min)	Water Depth (ft)	Change in Water Level (ft)	Average Head Height (ft)	Infiltration Rate Q (in/hr)	
P1	Initial	10:50 AM	14.0	4.20	0.73	2.11	2.75	Pre-Sat
	Final	11:04 AM		4.93				
P2	Initial	11:05 AM	14.0	4.50	0.69	1.83	2.97	
	Final	11:19 AM		5.19				
1	Initial	11:30 AM	10.0	4.67	0.49	1.76	3.06	Infiltration Testing
	Final	11:40 AM		5.16				
2	Initial	11:41 AM	10.0	4.49	0.51	1.93	2.93	
	Final	11:51 AM		5.00				
3	Initial	11:52 AM	10.0	4.63	0.47	1.81	2.86	
	Final	12:02 PM		5.10				
4	Initial	12:03 PM	10.0	4.61	0.46	1.83	2.76	
	Final	12:13 PM		5.07				
5	Initial	12:14 PM	10.0	4.66	0.45	1.79	2.77	
	Final	12:24 PM		5.11				
6	Initial	12:25 PM	10.0	4.67	0.45	1.78	2.78	
	Final	12:35 PM		5.12				

Per County Standards, Infiltration Rate calculated as follows:

$$Q = \frac{\Delta H(60r)}{\Delta t(r + 2H_{avg})}$$

Where: Q = Infiltration Rate (in inches per hour)
ΔH = Change in Height (Water Level) over the time interval
r = Test Hole (Borehole) Radius
Δt = Time Interval H above GS= 1.33
H_{avg} = Average Head Height over the time interval

Grain Size Distribution



Sample Description	I-1 @ 9.5 feet
Soil Classification	Light Gray Brown fine to medium Sand, little Silt, trace coarse Sand, little fine Gravel

Proposed Commercial/Industrial Building
Fontana, California
Project No. 15G177-2
PLATE C-1

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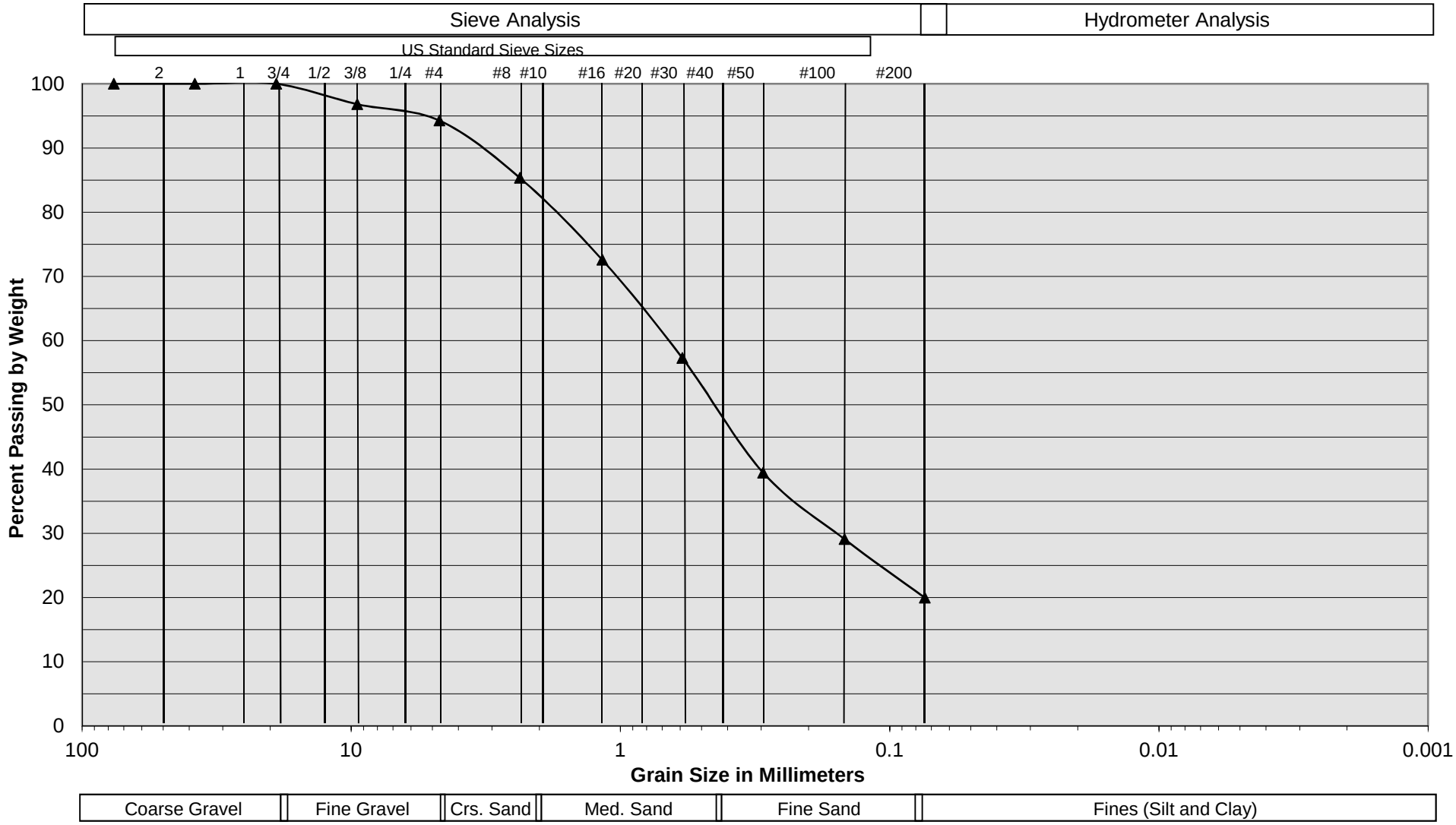
Grain Size Distribution



Sample Description	I-2 @ 7 feet
Soil Classification	Light Brown Silty fine to medium Sand, trace coarse Sand, trace fine Gravel

Proposed Commercial/Industrial Building
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PLATE C-2

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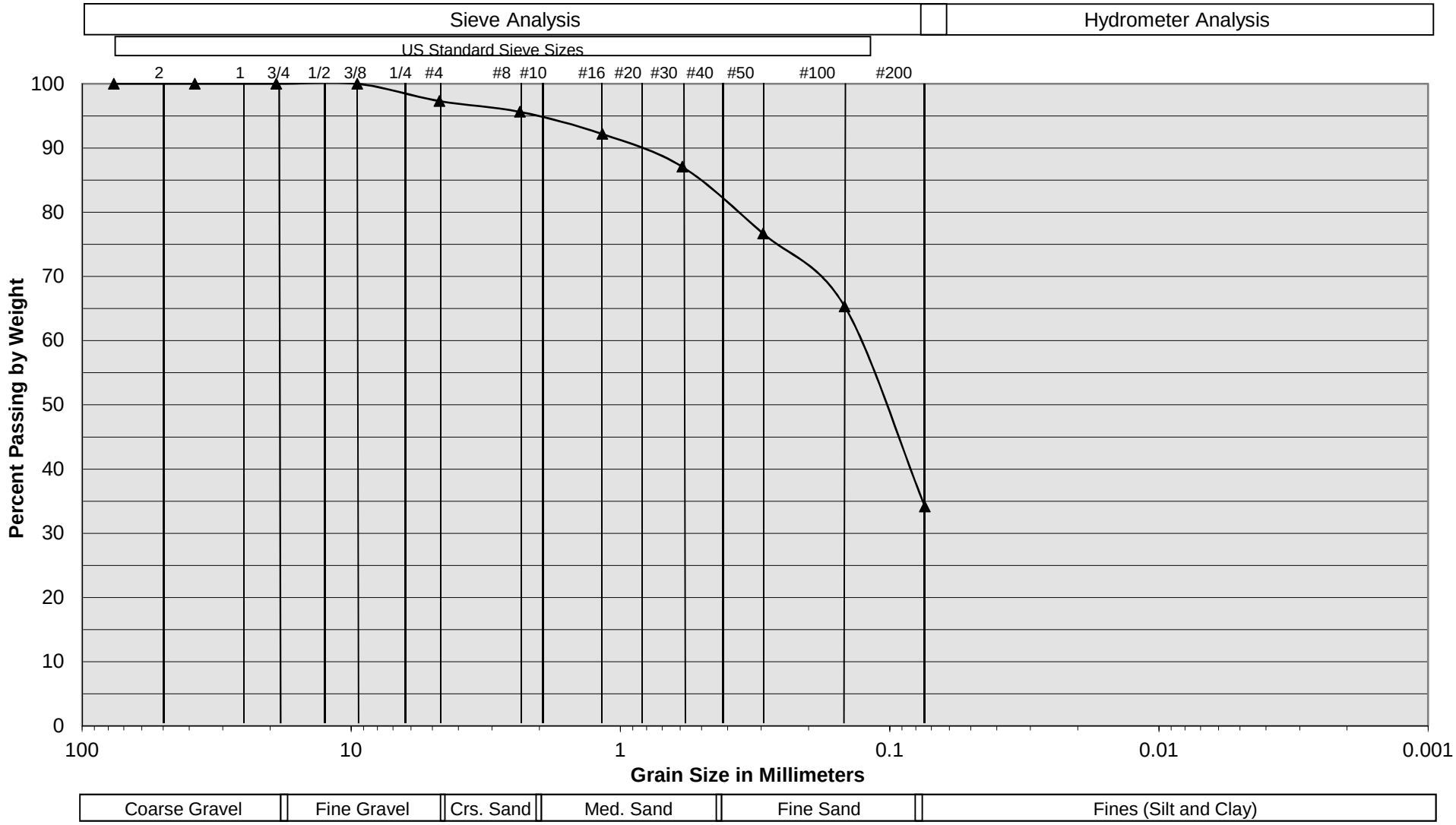
Grain Size Distribution



Sample Description	I-3 @ 9.5 feet
Soil Classification	Light Brown Silty fine Sand, trace to little medium to coarse Sand, trace fine Gravel

Proposed Commercial/Industrial Building
Fontana, California
Project No. 15G177-2
PLATE C-3

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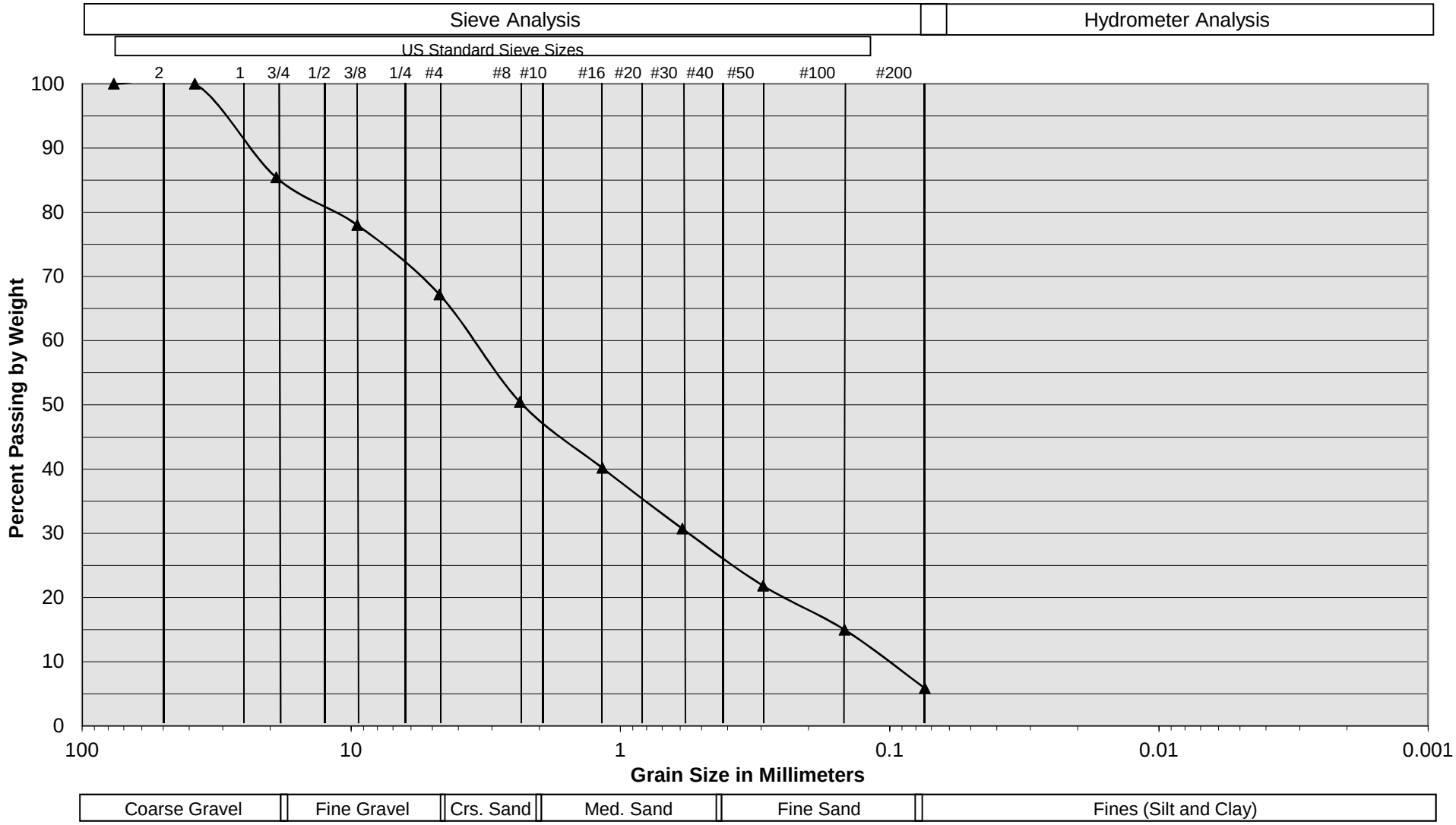
Grain Size Distribution



Sample Description	I-4 @ 10 feet
Soil Classification	Light Gray Gravelly fine to coarse Sand, trace Silt

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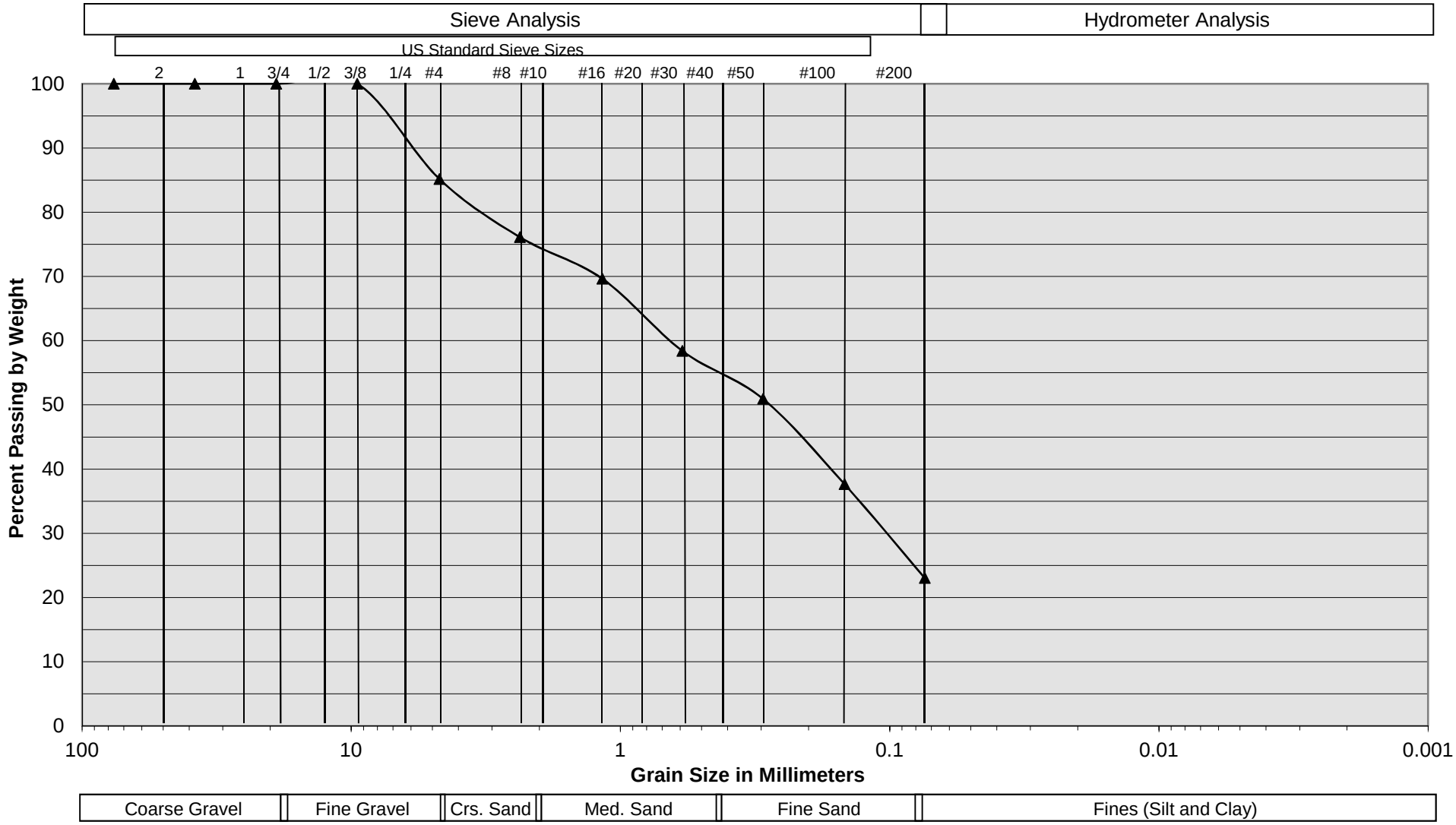

Sample Description	I-5 @ 8 feet
Soil Classification	Brown Silty fine to medium Sand, little coarse Sand, trace fine Gravel

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PLATE C-5

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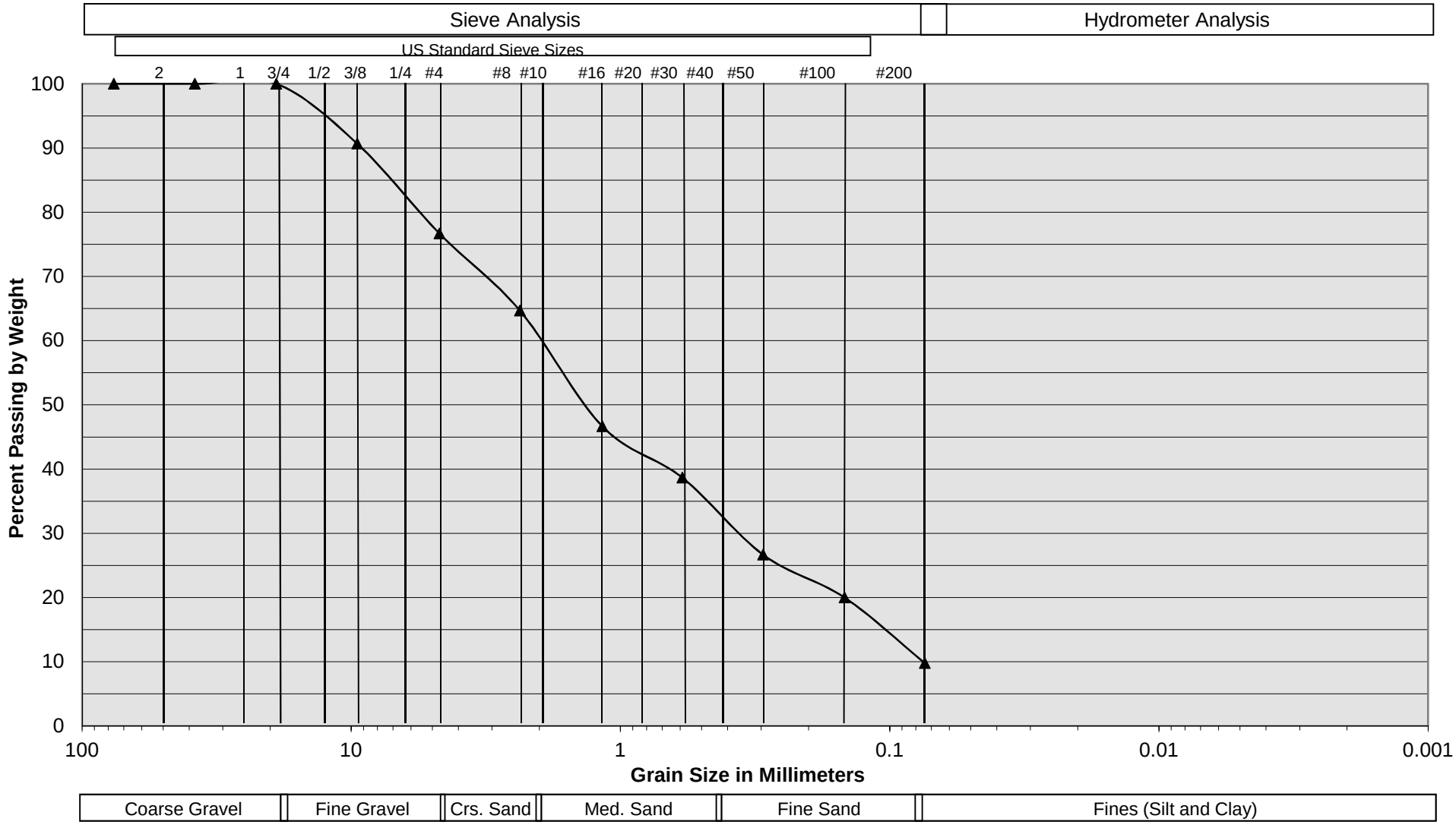

Sample Description	I-6 @ 6.5 feet
Soil Classification	Light Gray fine to medium Sand, little coarse Sand, little Silt, little fine Gravel

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Project No. 15G177-2
PLATE C-6

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