Appendix G-1
Preliminary Drainage Reports

Building 1 Preliminary Drainage Report

February, 2022
2020-326

I-15 Industrial Park Building 1
Parcel Map No. 20315
City of Hesperia, CA

Preliminary Drainage Report

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1. Purpose and Scope

The I-15 Industrial Park Building 1 is located within the County of San Bernardino in the City of Hesperia and is intended to be developed into an industrial/commercial complex. The proposed development measures approximately 66.38 acres and is bounded by Poplar Street to the South, Main Street to the North, Cataba Road to the East, and Mesa Linda Street to the West. The project intends to only develop Parcel 1 of Parcel Map 20315, which measures to be approximately 61.21 acres, and Parcel 2 will remain undeveloped.

The purpose of this study is to evaluate the Post-development hydrological conditions of the site including the storm drain system and Best Management Practices (BMPs) to ensure that they provide flood protection from the 100-year storm event without harming downstream conditions offsite.

2. Project Description

2.1 Project Description

The project site is located Southwest of the intersection between Interstate Highway 15 and Main Street. The entire site measures approximately 66.38 acres and is intended to be developed into an industrial/commercial complex. However, since only Parcel 1 will be disturbed, the hydrologic analysis will be limited to only Parcel 1 which measures to be approximately 61.21 acres.

The project site is currently vacant, undeveloped land with poor coverage. The soils have a hydrologic soil group classification of "A", and the site topography shows that stormwater runoff sheet flows to the northeast where it will naturally evaporate and infiltrate into the soil. See the exhibit for the Pre-Development conditions in Appendix A for more information.

The proposed site for Phase I is considered an industrial development and intends to develop approximately 61.21 acres into one industrial building, parking areas, loading areas, drive aisles, and landscape areas. Stormwater runoff will be collected by nearby catch basins and conveyed to the proposed above ground and underground basins via a storm drain system. Prior to entering the above ground basin, runoff will first be pretreated via filter inserts placed on the catch basins. Further downstream within the storm drain system, the runoff will be further pretreated via a baffle box. After pretreatment, runoff is released into the above ground basin where it will collect and infiltrate into the soil. In the northwest portion of the site, runoff will first be released into an underground CMP infiltration system and above ground basin. The basins are sized and designed to prevent flooding from a 100-year storm while also accommodating the required retention volume for water quality purposes. For this project, the basins are designed to capture the entire volume generated from a 100-year storm even meaning that no runoff will be discharged off site. For more information, please refer to the exhibit for the post-development conditions in Appendix A.

2.2 Soil Conditions

At this point in time, an infiltration study has not yet been performed. Therefore, the infiltration rate is currently assumed to be 7.8 in/hr. This is the infiltration rate that was measured for the Hesperia Commerce Center I project. Applying a safety factor of 2 results in a design infiltration rate of 3.9 in/hr and shows that the entire basin will be able to drawdown within 24 hours after the storm event. Since infiltration rates have not yet been measured, the volume for the first 3 hours of the storm as the basin is filling has not been taken into account in the size of the above ground basins. The infiltration rate will be measured and updated accordingly during final engineering.

3. Methodology

3.1 Background

The methodology described in the San Bernardino County Hydrology Manual is used to compute hydrologic data from the project site. The main methods used for this project were the Rational Method, Unit Hydrograph Method, and Basin Analysis, and the Civil Design software was used to compute the data. Solving for the Rational Method returns the peak flowrate of the site along with the time of concentration. The time of concentration is then used to solve for the Unit Hydrograph of the site which returns the total volume generated from a storm event. The inflow hydrograph returned from the Unit Hydrograph Method is then used along with the storage-outflow-elevation relationship of the basin to perform basin routing analysis which returns the storage, outflow, and elevation of the basin at each timestep within the storm event.

In addition, since the site does not meet any of the hydromodification exemption criteria provided in the Mojave Watershed Technical Guidance Documentation, the project must demonstrate that the post-development runoff volume, time of concentration, and peak flow velocity for the 10-year storm does not exceed that of the pre-development condition by more than five percent to comply with hydromodification requirements. This report will refer to the volume retention and allowable runoff required for compliance as the hydromodification volume retention requirement and the hydromodification allowable peak flow respectively.

3.2 Design Methodology

To assist in determining the adequate size of the onsite storage BMPs, the required retention volume was computed. This is taken to be the greater of the Design Capture Volume (DCV), the hydromodification volume retention requirement, and the difference in stormwater runoff volume for the 100-year storm between the post-development and pre-development conditions. Refer to the WQMP for more information regarding the DCV and the hydromodification requirements.

Once the required retention volume is retained onsite, the project site is allowed to release stormwater runoff offsite. However, for water quality and flood control purposes, the project is required to attenuate flows before discharging offsite. This will result in additional storage volume in the BMPs as runoff will continue to build up due to the inflow being higher than the outflow. The allowable flow rate out of the BMP is the hydromodification allowable peak flow for a 10-year storm, and the pre-development peak flow for a 100-year storm. When calculating the allowable peak flow rate for a 100-year storm, the 25-year pre-development rainfall data and

AMC II was used in order to give more confidence that the basin does not adversely impact downstream conditions. For this project, the site is proposed to retain the entire volume from a 100-year storm meaning that no runoff will be released.

For this preliminary drainage study, the storm drain pipes and inlets have not been analyzed, but they will be sized to be able to accommodate the design storm of a 100-year storm event during final engineering.

3.3 Calculations Performed

Below is a summary of the calculations that were performed for hydrological analysis. Refer to Appendix H for pertinent information used in the calculations such as the precipitation data and the hydrologic soil group.

1. *Rational Method*
    a. *10-year storm event for pre-development and post-development conditions*
        i. *Used to determine hydromodification requirements*
    b. *25-year storm event for pre-development conditions*
        i. *Used to determine allowable flow rate for 100-year storm*
    c. *100-year storm event for pre-development and post-development conditions*
        i. *Used to determine volume differences*

2. *Unit Hydrograph*
    a. *10-year storm event for pre-development and post-development conditions*
        i. *Used to determine hydromodification requirements*
        ii. *Used to generate inflow hydrograph for post-development conditions*

    b. *100-year storm event for pre-development and post-development conditions*
        i. *Used to determine volume differences*
        ii. *Used to generate inflow hydrograph for post-development conditions*

3. *Basin Analysis*
    a. *10-year storm event for post-development conditions*
        i. *Used to determine peak flows out of the basin for a 10-year storm*

    b. *100-year storm event for post-development conditions*
        i. *Used to determine peak flows out of the basin for a 100-year storm*
        ii. *Used to determine max water surface elevation for a 100-year storm*

4. *Storm Drain Pipe Sizing*
    a. *To be performed during final engineering*

5. *Inlet Sizing*
    a. *To be performed during final engineering*

4. Results and Analysis

Table 4.1 below shows the different volume required to be retained onsite. The calculations show that the BMPs will need to retain the entire hydromodification retention volume of 378,172 CF.

Table 4.1: Required Onsite Retention Volume

Onsite Retention Volume Requirement			
Area ID	DCV (CF)	Hydromodification Retention Volume (CF)	ΔV_{100} (CF)
Total	165,452	378,172	177,760

Tables 4.2a and 4.2b show a summary of the flow rate and volumes calculated using the Rational Method and the Unit Hydrograph for the pre-development and post-development conditions respectively. In addition, Table 4.2c shows a summary of the HCOC calculations. The results show that once the two basins retain the entire required retention volume, they will be allowed to release a total maximum of 54.40 cfs for a 10-year storm and 70.26 cfs for a 100-year storm. For this project, the site proposes to retain all runoff for the 100-year storm without discharging any runoff offsite.

Table 4.2a: Pre-Development Peak Flows and Volumes (Refer to Pre-Development Exhibit)

Pre-Development Conditions					
Area ID	Q_{10}, cfs	V_{10}, cf	Q_{25}, cfs	Q_{100}, cfs	V_{100}, cf
A	26.53	197,418	41.18	76.79	725,370
B	16.70	70,197	23.78	39.24	258,420
C	3.83	14,309	5.30	8.46	52,568
Total	**47.06**	**281,925**	**70.26**	**124.49**	**1,036,358**

Table 4.2b: Post-Development Peak Flows and Volumes (Refer to Post-Development Exhibit)

Post-Development Conditions (Without BMPs)				
Area ID	Q_{10}, cfs	V_{10}, cf	Q_{100}, cfs	V_{100}, cf
A	75.46	389,744	130.03	681,862
B	71.42	305,094	121.51	532,255
Total	**146.89**	**694,839**	**251.54**	**1,214,117**

Table 4.2c: HCOC Calculations

HCOC Calculations Summary			
	10-Year Time of Concentration (Min)	10-Year Peak Runoff (Cfs)	10-Year, 24-Hour Runoff Volume (CF)
Pre-Development Condition	30.35	47.06	281,925
Post-Development Condition	13.27	146.89	694,839
HCOC Requirement *0.95*(Post-Development) – Pre-Development*	15.56 *(Additional time to provide)*	92.49 *(Amount of runoff to reduce)*	378,172 *(Amount of runoff to retain)*
Summary (10-Year Storm)	**28.83** *(Minimum Tc for Post-Conditions)*	**54.40** *(Maximum outflow for Post-Conditions)*	**378,172** *(Minimum amount of runoff to retain)*

The above ground basins are designed to have a combined retention volume of 325,585 CF. The retention volume is estimated at 1' below the top of the above ground basin to account for freeboard. Both basins are connected to an underground CMP for additional storage. The CMP in DA A has a volume of approximately 481,775 CF and the CMP in DA B has a volume of approximately 408,016. Therefore, the entire site provides a total retention volume of approximately 1,215,376 CF, which is enough for full retention.

The above ground basins are designed to have runoff pond up to 1' below the top of the basins without releasing offsite. In addition, each above ground basin will have 4' of engineered soil with a porosity of 35% resulting in a total retention volume of 200,786 CF and 124,798 CF for Basins 1 and 2 respectively. Including the underground CMP, the total volume retained onsite becomes 682,561 CF and 532,814 CF for Basins 1 and 2 respectively.

For a 100-year storm event, the maximum ponding will be around 1' below the top of the basin for both storms. Table 4.3 below provides a summary of the results, and for more information, refer to the stage storage worksheet and basin summary tables provided in Appendix F.

Table 4.3a: Basin Analysis (DA A)

Basin Analysis (DA A)				
10-Year Volume (CF)	100-Year Volume (CF)	Total Retention Provided (CF)	100-Year Peak Runoff (Cfs)	Max Water Surface Elevation (Ft)
389,744	681,862	682,561	0.00	1' Below the Top of the Above Ground Basin

Table 4.3b: Basin Analysis (DA B)

BASIN ANALYSIS (DA B)				
10-Year Volume (CF)	100-Year Volume (CF)	Total Retention Provided (CF)	100-Year Peak Runoff (Cfs)	Max Water Surface Elevation (Ft)
305,094	532,255	532,814	0.00	1' Below the Top of the Above Ground Basin

Table 4.3c: Basin Analysis (Entire Site)

BASIN ANALYSIS (DA B)				
10-Year Volume (CF)	100-Year Volume (CF)	Total Retention Provided (CF)	100-Year Peak Runoff (Cfs)	Max Water Surface Elevation (Ft)
694,839	1,214,117	1,215,376	0.00	1' Below the Top of the Above Ground Basin

The calculations show that the proposed underground CMP is sized large enough to accommodate the required retention volume for water quality purposes while also mitigating enough flows to prevent adverse impacts downstream of the project site. Since the basins are designed to retain and infiltrate the entire volume from the 100-year storm, there will be no runoff leaving the site for up to a 100-year storm. Refer to Appendix B-F for calculations regarding the Rational Method, Unit Hydrograph, and Basin Analysis.

The below table summarizes the calculations pertinent to the design.

PROJECT DESIGN CRITERIA	
Hydrology Results & Analysis Summary Table:	ΔV_{100} = **177,760 ft³**= V_{POST} - V_{PRE} = 1,214,117 – 1,036,358 DCV = **165,452 ft³** ΔV_{10} (Hydromodification) = **378,172 ft³**= 0.95*V_{POST} - V_{PRE} = 0.95*694,839 – 281,925 ΔV_{10} > DCV > ΔV_{100}, ΔV_{10} = site design storage requirement V_{100} = **1,214,117 ft³** Total $V_{RETAINED}$ = **1,215,376 ft³** Peak Q_{100} (Post w/ BMPs) = **0.00 cfs (Entire Site)** $V_{Provided}$ > V_{100} = Full Retention Onsite

5. Conclusion

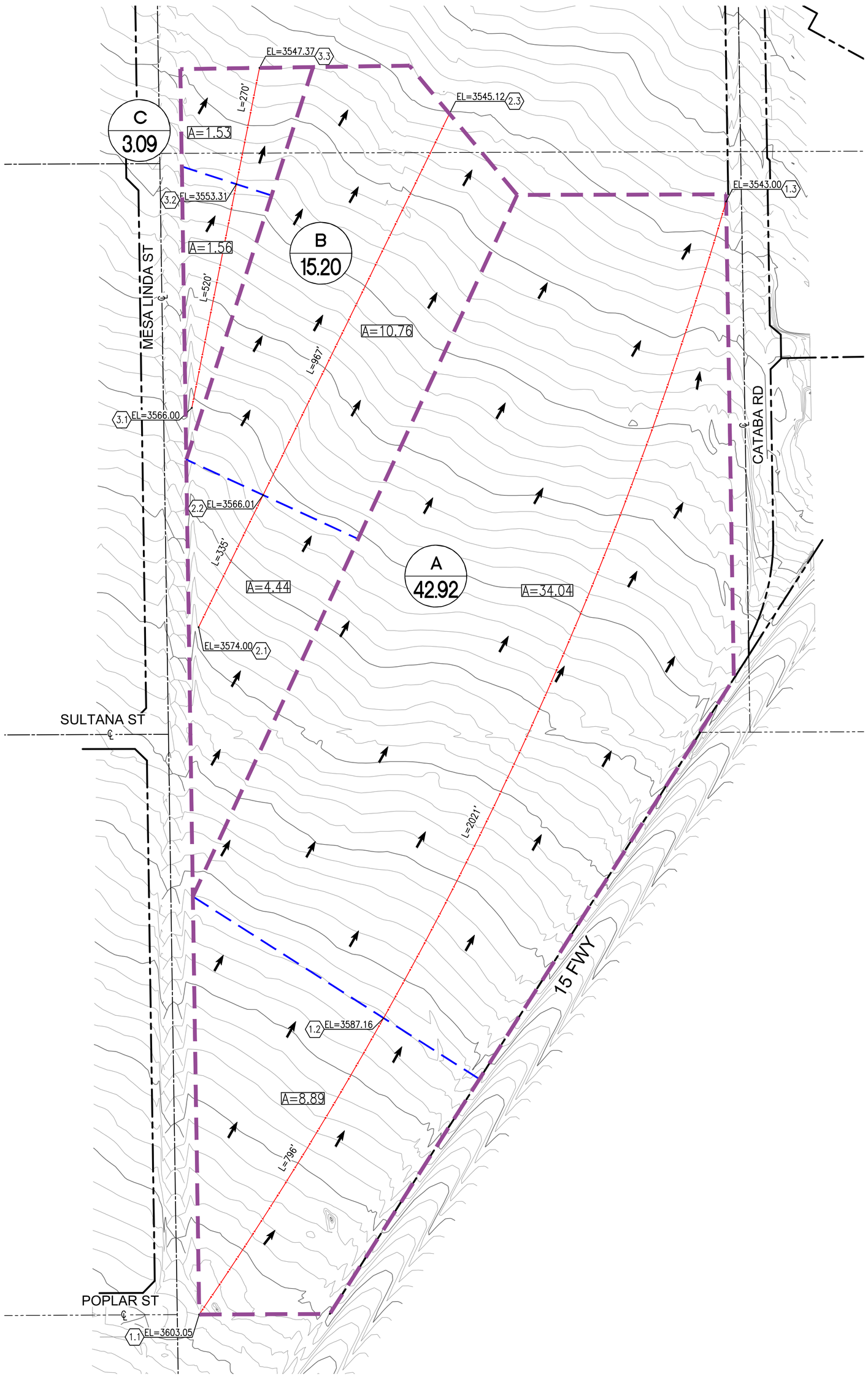
The results show that the proposed development will provide enough on-site retention volume and flow attenuation to prevent adverse impacts downstream of the project site. As shown in the post-development exhibit, the proposed BMPs for stormwater management are two above ground retention basins and one underground CMP system. The proposed basins will retain and infiltrate the entire volume generated from a 100-year storm event, and no stormwater runoff will be released offsite. The results demonstrate that the proposed underground CMP system will comply with the flood protection and WQMP requirements of the City of Hesperia and County of San Bernardino. The results demonstrate that the proposed above ground retention basins for this project will comply with the flood protection and WQMP requirements of the City of Hesperia and County of San Bernardino.

Appendix A – Hydrology Exhibits

- Pre-Development Exhibit
- Post-Development Exhibit

CITY OF HESPERIA
HYDROLOGY EXHIBIT
FOR
I-15 INDUSTRIAL PARK BUILDING 1

VICINITY MAP
NOT TO SCALE



HYDROLOGY INFORMATION

SITE AREA:	61.21 ACRE	
SOIL GROUP:	A	(NRCS WEB SOIL SURVEY)
IMPERVIOUS:	0%	
ISOHYETALS:	1.31"	(100-YEAR 1 HOUR)
	0.785"	(10-YEAR 1 HOUR)
CN NUMBER:	67	(SOIL GROUP A)
FREQUENCY:	100 YEAR	
	10 YEAR	

METHOD: SAN BERNARDINO COUNTY HYDROLOGY MANUAL

LEGEND:

- SUB DRAINAGE AREA BOUNDARY
- DRAINAGE AREA BOUNDARY
- FLOW PATH
- PROPOSED FLOW DIRECTION ARROW
- X / XXX — DRAINAGE AREA DESIGNATION / AREA (AC)

HYDROLOGY SUMMARY

DRAINAGE AREA No.	TRIBUTARY AREA (AC)	IMPERVIOUS RATIO	10-YEAR VOLUME (CF)	100-YEAR VOLUME (CF)	25-YEAR PEAK FLOW (CFS)
A	42.92	0.00	197,418	725,370	41.18
B	15.20	0.00	70,197	258,420	23.78
C	3.09	0.00	14,309	52,568	5.30
TOTAL	61.21	0.00	281,924	1,036,358	70.26

150' 0' 75' 150'
SCALE: 1" = 150'

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JOB NO: 2020-326

I-15 INDUSTRIAL PARK BUILDING 1
PRE-DEVELOPED HYDROLOGY EXHIBIT
CITY OF HESPERIA

DATE: MAR 2021
SHEET 1 OF 1

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Plotted by: markm
03/10/2021

CITY OF HESPERIA
HYDROLOGY EXHIBIT
FOR
I-15 INDUSTRIAL PARK BUILDING 1

VICINITY MAP
NOT TO SCALE

HYDROLOGY INFORMATION

SITE AREA:	61.21 ACRE	
SOIL GROUP:	A	(NRCS WEB SOIL SURVEY)
IMPERVIOUS:	0%	
ISOHYETALS:	1.31"	(100–YEAR 1 HOUR)
	0.785"	(10–YEAR 1 HOUR)
CN NUMBER:	67	(SOIL GROUP A)
FREQUENCY:	100 YEAR	
	10 YEAR	

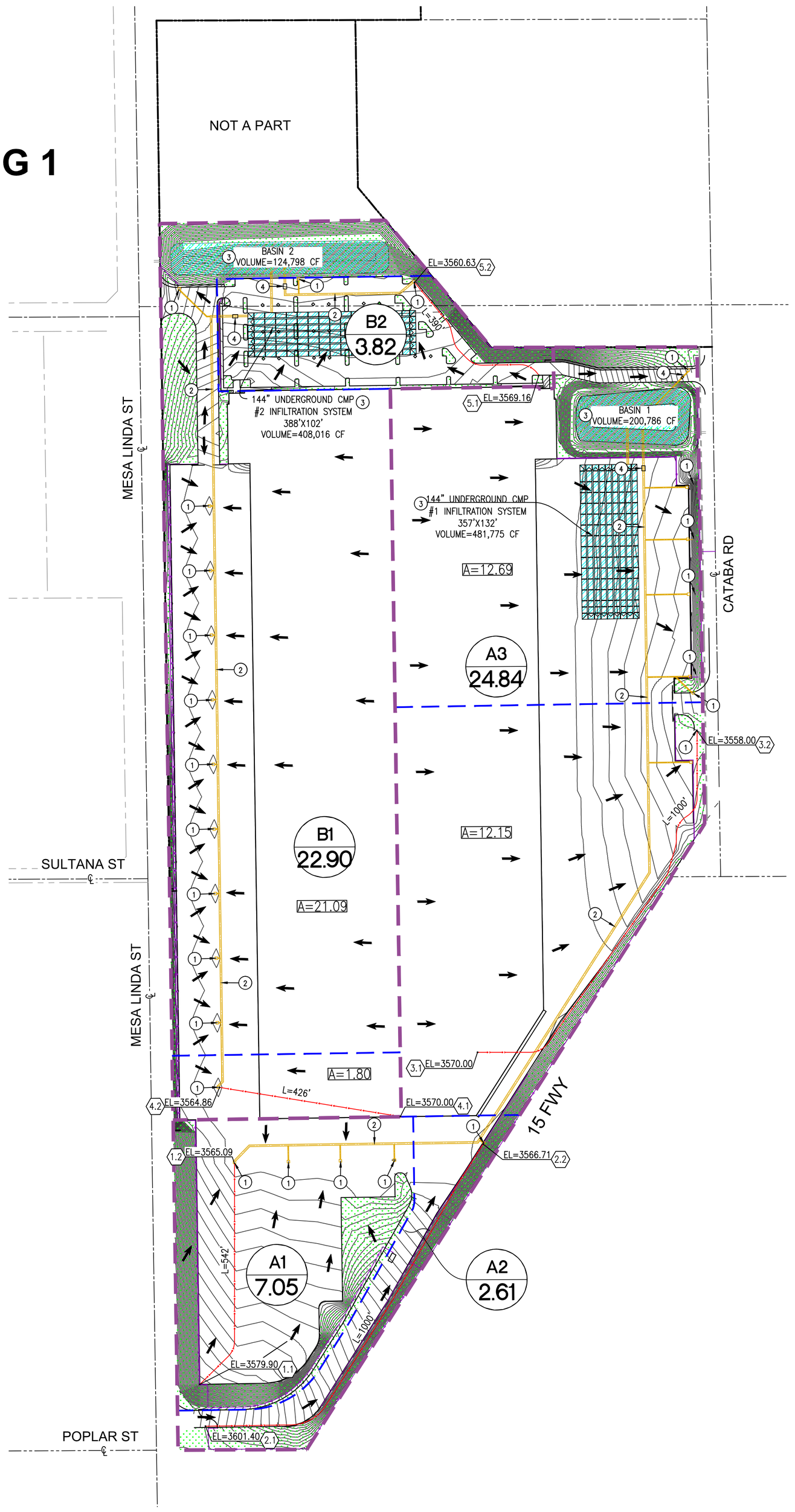
METHOD: SAN BERNARDINO COUNTY HYDROLOGY MANUAL

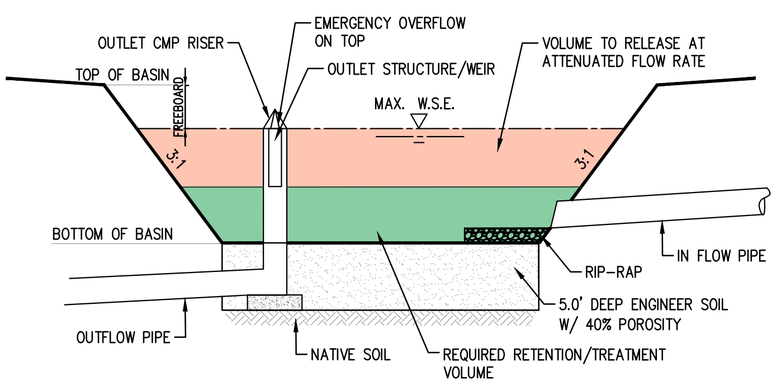
LEGEND:

- DETENTION BASIN
- SUB DRAINAGE AREA BOUNDARY
- DRAINAGE AREA BOUNDARY
- FLOW PATH
- STORM DRAIN
- PROPOSED FLOW DIRECTION ARROW
- X / X.XX — DRAINAGE AREA DESIGNATION / AREA (AC)

DRAINAGE NOTES:

1. PROPOSED CATCH BASIN WITH FILTER INSERT
2. PROPOSED STORM DRAIN PIPE PRIVATE MAINTAINED
3. PROPOSED BMP – ABOVE GROUND/UNDERGROUND DETENTION BASIN
4. PROPOSED BMP – BAFFLE BOX

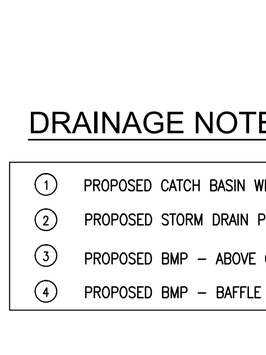




INFILTRATION/DETENTION BASIN DETAIL
N.T.S

HYDROLOGY SUMMARY

DRAINAGE AREA No.	TRIBUTARY AREA (AC)	IMPERVIOUS RATIO	RUNOFF COEFFICIENT	DCV (CF)	HYDROMODIFICATION VOLUME TO RETAIN (CF)	100-YEAR VOLUME (CF)	TOTAL RETENTION VOLUME (CF)
A	34.50	0.85	0.66	–	378,172	681,862	200,786 (BASIN 1) 481,775 (UNDERGROUND CMP #1)
B	26.71	0.86	0.68	–		532,255	124,798 (BASIN 2) 408,016 (UNDERGROUND CMP #2)
TOTAL	61.21	0.86	0.67	165,452		1,214,117	1,215,376



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JOB NO: 2020–326

I-15 INDUSTRIAL PARK BUILDING 1
HYDROLOGY EXHIBIT
PARCEL 1 – PARCEL MAP NO. 20315
CITY OF HESPERIA

DATE: MAR 2022
SHEET 1 OF 1

P:\YEAR_2020\2020-326 HESPERIA COMMERCE CENTER V - COVINGTON GROUP, INC. - MARK S. MEANOR\CAD\06 ENGINEERING\LD\VERSIONS\HYDROLOGY\1_EXHIBITS\2020-326_POST HYDROLOGY.DWG (03-10-22 8:08:30PM)

03/10/2022

Appendix B – Rational Method (Pre-Development)

- 10-Year Storm Event
- 25-Year Storm Event
- 100-Year Storm Event

Appendix B – Rational Method (Pre-Development)

- 10-Year Storm Event

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: 12/03/20

2020-326 HCC V
PRE-DEVELOPMENT CONDITIONS
RATIONAL METHOD - 10 YEAR STORM
DA A

Program License Serial Number 6277

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.785 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 1.100 to Point/Station 1.200
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
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) = 67.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.578(In/Hr)
Initial subarea data:
Initial area flow distance = 795.710(Ft.)
Top (of initial area) elevation = 3603.050(Ft.)
Bottom (of initial area) elevation = 3587.160(Ft.)
Difference in elevation = 15.890(Ft.)
Slope = 0.01997 s(%)= 2.00
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 16.611 min.
Rainfall intensity = 1.929(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.630
Subarea runoff = 10.806(CFS)

```
Total initial stream area =        8.890(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.578(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.200 to Point/Station        1.300
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.213(Ft.), Average velocity =   2.473(Ft/s)
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              0.30
        2             50.00              0.00
        3            100.00              0.30
Manning's 'N' friction factor =   0.020
------------------------------------------------------------------
Sub-Channel flow  =     18.696(CFS)
  '     '        flow top width =     70.994(Ft.)
  '     '    velocity=    2.473(Ft/s)
  '     '        area =      7.560(Sq.Ft)
  '     '        Froude number =     1.335

Upstream point elevation =  3587.160(Ft.)
Downstream point elevation =  3542.420(Ft.)
Flow length =  2038.410(Ft.)
Travel time  =   13.74 min.
Time of concentration =   30.35 min.
Depth of flow =   0.213(Ft.)
Average velocity =   2.473(Ft/s)
Total irregular channel flow =    18.696(CFS)
Irregular channel normal depth above invert elev. =   0.213(Ft.)
Average velocity of channel(s) =   2.473(Ft/s)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
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)  = 67.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.578(In/Hr)
Rainfall intensity =      1.265(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.489
Subarea runoff =     15.724(CFS) for   34.040(Ac.)
Total runoff =     26.530(CFS)
Effective area this stream =       42.93(Ac.)
```

Total Study Area (Main Stream No. 1) = 42.93(Ac.)
Area averaged Fm value = 0.578(In/Hr)
Depth of flow = 0.243(Ft.), Average velocity = 2.699(Ft/s)
End of computations, Total Study Area = 42.93 (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) = 1.000
Area averaged SCS curve number = 67.0

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: 11/29/20

2020-326 HCC V
PRE-DEVELOPMENT CONDITIONS
RATIONAL METHOD - 10 YEAR STORM
DA B

Program License Serial Number 6277

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.785 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 2.100 to Point/Station 2.200
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
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) = 67.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.578(In/Hr)
Initial subarea data:
Initial area flow distance = 334.940(Ft.)
Top (of initial area) elevation = 3574.000(Ft.)
Bottom (of initial area) elevation = 3566.010(Ft.)
Difference in elevation = 7.990(Ft.)
Slope = 0.02386 s(%)= 2.39
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 11.340 min.
Rainfall intensity = 2.520(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.693
Subarea runoff = 7.757(CFS)

```
Total initial stream area =        4.440(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.578(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.200 to Point/Station        2.300
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.193(Ft.), Average velocity =   2.299(Ft/s)
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              0.35
        2             50.00              0.00
        3            100.00              0.35
Manning's 'N' friction factor =   0.020
------------------------------------------------------------------
Sub-Channel flow  =     12.258(CFS)
  '     '        flow top width =     55.196(Ft.)
  '     '    velocity=    2.299(Ft/s)
  '     '        area =      5.332(Sq.Ft)
  '     '        Froude number =     1.304

Upstream point elevation =  3566.010(Ft.)
Downstream point elevation =  3545.120(Ft.)
Flow length =   966.880(Ft.)
Travel time  =    7.01 min.
Time of concentration =   18.35 min.
Depth of flow =   0.193(Ft.)
Average velocity =   2.299(Ft/s)
Total irregular channel flow =    12.258(CFS)
Irregular channel normal depth above invert elev. =   0.193(Ft.)
Average velocity of channel(s) =   2.299(Ft/s)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
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)  = 67.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.578(In/Hr)
Rainfall intensity =      1.799(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.611
Subarea runoff =      8.942(CFS) for   10.760(Ac.)
Total runoff =     16.699(CFS)
Effective area this stream =       15.20(Ac.)
```

Total Study Area (Main Stream No. 1) = 15.20(Ac.)
Area averaged Fm value = 0.578(In/Hr)
Depth of flow = 0.217(Ft.), Average velocity = 2.484(Ft/s)
End of computations, Total Study Area = 15.20 (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) = 1.000
Area averaged SCS curve number = 67.0

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: 11/29/20

2020-326 HCC V
PRE-DEVELOPMENT CONDITIONS
RATIONAL METHOD - 10 YEAR STORM
DA C

Program License Serial Number 6277

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.785 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 3.100 to Point/Station 3.200
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
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) = 67.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.578(In/Hr)
Initial subarea data:
Initial area flow distance = 519.560(Ft.)
Top (of initial area) elevation = 3566.000(Ft.)
Bottom (of initial area) elevation = 3553.310(Ft.)
Difference in elevation = 12.690(Ft.)
Slope = 0.02442 s(%)= 2.44
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 13.454 min.
Rainfall intensity = 2.236(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.667
Subarea runoff = 2.327(CFS)

```
Total initial stream area =        1.560(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.578(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.200 to Point/Station        3.300
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.109(Ft.), Average velocity =   1.580(Ft/s)
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              0.30
        2             50.00              0.00
        3            100.00              0.30
Manning's 'N' friction factor =   0.020
------------------------------------------------------------------
Sub-Channel flow  =      3.103(CFS)
  '     '        flow top width =     36.184(Ft.)
  '     '    velocity=    1.580(Ft/s)
  '     '        area =      1.964(Sq.Ft)
  '     '        Froude number =     1.195

Upstream point elevation =  3553.310(Ft.)
Downstream point elevation =  3547.370(Ft.)
Flow length =   269.850(Ft.)
Travel time  =    2.85 min.
Time of concentration =   16.30 min.
Depth of flow =   0.109(Ft.)
Average velocity =   1.580(Ft/s)
Total irregular channel flow =     3.103(CFS)
Irregular channel normal depth above invert elev. =   0.109(Ft.)
Average velocity of channel(s) =   1.580(Ft/s)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
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)  = 67.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.578(In/Hr)
Rainfall intensity =      1.955(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.634
Subarea runoff =      1.501(CFS) for    1.530(Ac.)
Total runoff =      3.827(CFS)
Effective area this stream =        3.09(Ac.)
```

Total Study Area (Main Stream No. 1) = 3.09(Ac.)
Area averaged Fm value = 0.578(In/Hr)
Depth of flow = 0.117(Ft.), Average velocity = 1.665(Ft/s)
End of computations, Total Study Area = 3.09 (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) = 1.000
Area averaged SCS curve number = 67.0

Appendix B – Rational Method (Pre-Development)

- 25-Year Storm Event

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: 12/03/20

2020-326 HCC V
PRE-DEVELOPMENT CONDITIONS
RATIONAL METHOD - 25 YEAR STORM
DA A

Program License Serial Number 6277

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

Rational hydrology study storm event year is 25.0
Computed rainfall intensity:
Storm year = 25.00 1 hour rainfall = 0.989 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 1.100 to Point/Station 1.200
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
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) = 67.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.578(In/Hr)
Initial subarea data:
Initial area flow distance = 795.710(Ft.)
Top (of initial area) elevation = 3603.050(Ft.)
Bottom (of initial area) elevation = 3587.160(Ft.)
Difference in elevation = 15.890(Ft.)
Slope = 0.01997 s(%)= 2.00
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 16.611 min.
Rainfall intensity = 2.430(In/Hr) for a 25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.686
Subarea runoff = 14.816(CFS)

```
Total initial stream area =        8.890(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.578(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.200 to Point/Station        1.300
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.248(Ft.), Average velocity =   2.736(Ft/s)
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              0.30
        2             50.00              0.00
        3            100.00              0.30
Manning's 'N' friction factor =   0.020
------------------------------------------------------------------
Sub-Channel flow  =     28.029(CFS)
  '     '        flow top width =     82.635(Ft.)
  '     '    velocity=    2.736(Ft/s)
  '     '        area =     10.243(Sq.Ft)
  '     '        Froude number =     1.370

Upstream point elevation =  3587.160(Ft.)
Downstream point elevation =  3542.420(Ft.)
Flow length =  2038.410(Ft.)
Travel time  =   12.42 min.
Time of concentration =   29.03 min.
Depth of flow =   0.248(Ft.)
Average velocity =   2.736(Ft/s)
Total irregular channel flow =    28.029(CFS)
Irregular channel normal depth above invert elev. =   0.248(Ft.)
Average velocity of channel(s) =   2.736(Ft/s)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
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)  = 67.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.578(In/Hr)
Rainfall intensity =      1.644(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.583
Subarea runoff =     26.365(CFS) for   34.040(Ac.)
Total runoff =     41.182(CFS)
Effective area this stream =       42.93(Ac.)
```

Total Study Area (Main Stream No. 1) = 42.93(Ac.)
Area averaged Fm value = 0.578(In/Hr)
Depth of flow = 0.286(Ft.), Average velocity = 3.013(Ft/s)
End of computations, Total Study Area = 42.93 (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) = 1.000
Area averaged SCS curve number = 67.0

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: 11/29/20

2020-326 HCC V
PRE-DEVELOPMENT CONDITIONS
RATIONAL METHOD - 25 YEAR STORM
DA B

Program License Serial Number 6277

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

Rational hydrology study storm event year is 25.0
Computed rainfall intensity:
Storm year = 25.00 1 hour rainfall = 0.989 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 2.100 to Point/Station 2.200
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
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) = 67.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.578(In/Hr)
Initial subarea data:
Initial area flow distance = 334.940(Ft.)
Top (of initial area) elevation = 3574.000(Ft.)
Bottom (of initial area) elevation = 3566.010(Ft.)
Difference in elevation = 7.990(Ft.)
Slope = 0.02386 s(%)= 2.39
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 11.340 min.
Rainfall intensity = 3.174(In/Hr) for a 25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.736
Subarea runoff = 10.374(CFS)

```
Total initial stream area =        4.440(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.578(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.200 to Point/Station        2.300
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.219(Ft.), Average velocity =   2.499(Ft/s)
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              0.35
        2             50.00              0.00
        3            100.00              0.35
Manning's 'N' friction factor =   0.020
------------------------------------------------------------------
Sub-Channel flow  =     17.108(CFS)
  '     '        flow top width =     62.547(Ft.)
  '     '    velocity=    2.499(Ft/s)
  '     '        area =      6.846(Sq.Ft)
  '     '        Froude number =     1.331

Upstream point elevation =  3566.010(Ft.)
Downstream point elevation =  3545.120(Ft.)
Flow length =   966.880(Ft.)
Travel time  =    6.45 min.
Time of concentration =   17.79 min.
Depth of flow =   0.219(Ft.)
Average velocity =   2.499(Ft/s)
Total irregular channel flow =    17.108(CFS)
Irregular channel normal depth above invert elev. =   0.219(Ft.)
Average velocity of channel(s) =   2.499(Ft/s)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
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)  = 67.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.578(In/Hr)
Rainfall intensity =      2.316(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.675
Subarea runoff =     13.402(CFS) for   10.760(Ac.)
Total runoff =     23.776(CFS)
Effective area this stream =       15.20(Ac.)
```

Total Study Area (Main Stream No. 1) = 15.20(Ac.)
Area averaged Fm value = 0.578(In/Hr)
Depth of flow = 0.248(Ft.), Average velocity = 2.713(Ft/s)
End of computations, Total Study Area = 15.20 (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) = 1.000
Area averaged SCS curve number = 67.0

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: 11/29/20

2020-326 HCC V
PRE-DEVELOPMENT CONDITIONS
RATIONAL METHOD - 25 YEAR STORM
DA C

Program License Serial Number 6277

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

Rational hydrology study storm event year is 25.0
Computed rainfall intensity:
Storm year = 25.00 1 hour rainfall = 0.989 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 3.100 to Point/Station 3.200
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
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) = 67.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.578(In/Hr)
Initial subarea data:
Initial area flow distance = 519.560(Ft.)
Top (of initial area) elevation = 3566.000(Ft.)
Bottom (of initial area) elevation = 3553.310(Ft.)
Difference in elevation = 12.690(Ft.)
Slope = 0.02442 s(%)= 2.44
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 13.454 min.
Rainfall intensity = 2.816(In/Hr) for a 25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.715
Subarea runoff = 3.142(CFS)

```
Total initial stream area =        1.560(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.578(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.200 to Point/Station        3.300
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.122(Ft.), Average velocity =   1.710(Ft/s)
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              0.30
        2             50.00              0.00
        3            100.00              0.30
Manning's 'N' friction factor =   0.020
------------------------------------------------------------------
Sub-Channel flow  =      4.254(CFS)
  '     '        flow top width =     40.726(Ft.)
  '     '    velocity=    1.710(Ft/s)
  '     '        area =      2.488(Sq.Ft)
  '     '        Froude number =     1.219

Upstream point elevation =  3553.310(Ft.)
Downstream point elevation =  3547.370(Ft.)
Flow length =   269.850(Ft.)
Travel time  =    2.63 min.
Time of concentration =   16.08 min.
Depth of flow =   0.122(Ft.)
Average velocity =   1.710(Ft/s)
Total irregular channel flow =     4.254(CFS)
Irregular channel normal depth above invert elev. =   0.122(Ft.)
Average velocity of channel(s) =   1.710(Ft/s)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
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)  = 67.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.578(In/Hr)
Rainfall intensity =      2.486(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.691
Subarea runoff =      2.162(CFS) for    1.530(Ac.)
Total runoff =      5.304(CFS)
Effective area this stream =        3.09(Ac.)
```

Total Study Area (Main Stream No. 1) = 3.09(Ac.)
Area averaged Fm value = 0.578(In/Hr)
Depth of flow = 0.133(Ft.), Average velocity = 1.807(Ft/s)
End of computations, Total Study Area = 3.09 (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) = 1.000
Area averaged SCS curve number = 67.0

Appendix B – Rational Method (Pre-Development)

- 100-Year Storm Event

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: 12/03/20

2020-326 HCC V
PRE-DEVELOPMENT CONDITIONS
RATIONAL METHOD - 100 YEAR STORM
DA 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 = 1.310 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 3

++
Process from Point/Station 1.100 to Point/Station 1.200
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
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) = 67.00
Adjusted SCS curve number for AMC 3 = 84.60
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.290(In/Hr)
Initial subarea data:
Initial area flow distance = 795.710(Ft.)
Top (of initial area) elevation = 3603.050(Ft.)
Bottom (of initial area) elevation = 3587.160(Ft.)
Difference in elevation = 15.890(Ft.)
Slope = 0.01997 s(%)= 2.00
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 16.611 min.
Rainfall intensity = 3.219(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.819

```
Subarea runoff =     23.434(CFS)
Total initial stream area =        8.890(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.290(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.200 to Point/Station        1.300
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.307(Ft.), Average velocity =   3.200(Ft/s)
!!Warning: Water is above left or right bank elevations
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              0.30
        2             50.00              0.00
        3            100.00              0.30
Manning's 'N' friction factor =   0.020
------------------------------------------------------------------
Sub-Channel flow  =     50.152(CFS)
  '     '        flow top width =    100.000(Ft.)
  '     '    velocity=    3.200(Ft/s)
  '     '        area =     15.673(Sq.Ft)
  '     '        Froude number =     1.424

Upstream point elevation =  3587.160(Ft.)
Downstream point elevation =  3542.420(Ft.)
Flow length =  2038.410(Ft.)
Travel time  =   10.62 min.
Time of concentration =   27.23 min.
Depth of flow =   0.307(Ft.)
Average velocity =   3.200(Ft/s)
Total irregular channel flow =    50.152(CFS)
Irregular channel normal depth above invert elev. =   0.307(Ft.)
Average velocity of channel(s) =   3.200(Ft/s)
!!Warning: Water is above left or right bank elevations
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
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)  = 67.00
Adjusted SCS curve number for AMC 3 = 84.60
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.290(In/Hr)
Rainfall intensity =      2.278(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
```

rational method)(Q=KCIA) is C = 0.785
Subarea runoff = 53.359(CFS) for 34.040(Ac.)
Total runoff = 76.793(CFS)
Effective area this stream = 42.93(Ac.)
Total Study Area (Main Stream No. 1) = 42.93(Ac.)
Area averaged Fm value = 0.290(In/Hr)
Depth of flow = 0.352(Ft.), Average velocity = 3.794(Ft/s)
!!Warning: Water is above left or right bank elevations
End of computations, Total Study Area = 42.93 (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) = 1.000
Area averaged SCS curve number = 67.0

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: 11/29/20

2020-326 HCC V
PRE-DEVELOPMENT CONDITIONS
RATIONAL METHOD - 100 YEAR STORM
DA 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 = 1.310 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 3

++

Process from Point/Station 2.100 to Point/Station 2.200
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
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) = 67.00
Adjusted SCS curve number for AMC 3 = 84.60
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.290(In/Hr)
Initial subarea data:
Initial area flow distance = 334.940(Ft.)
Top (of initial area) elevation = 3574.000(Ft.)
Bottom (of initial area) elevation = 3566.010(Ft.)
Difference in elevation = 7.990(Ft.)
Slope = 0.02386 s(%)= 2.39
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 11.340 min.
Rainfall intensity = 4.205(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.838

```
Subarea runoff =     15.643(CFS)
Total initial stream area =        4.440(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.290(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.200 to Point/Station        2.300
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.261(Ft.), Average velocity =   2.813(Ft/s)
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              0.35
        2             50.00              0.00
        3            100.00              0.35
Manning's 'N' friction factor =   0.020
------------------------------------------------------------------
Sub-Channel flow  =     27.478(CFS)
  '     '        flow top width =     74.709(Ft.)
  '     '    velocity=    2.813(Ft/s)
  '     '        area =      9.767(Sq.Ft)
  '     '        Froude number =     1.371

Upstream point elevation =  3566.010(Ft.)
Downstream point elevation =  3545.120(Ft.)
Flow length =   966.880(Ft.)
Travel time  =    5.73 min.
Time of concentration =   17.07 min.
Depth of flow =   0.261(Ft.)
Average velocity =   2.813(Ft/s)
Total irregular channel flow =    27.478(CFS)
Irregular channel normal depth above invert elev. =   0.261(Ft.)
Average velocity of channel(s) =   2.813(Ft/s)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
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)  = 67.00
Adjusted SCS curve number for AMC 3 = 84.60
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.290(In/Hr)
Rainfall intensity =      3.158(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.817
Subarea runoff =     23.594(CFS) for   10.760(Ac.)
```

Total runoff = 39.237(CFS)
Effective area this stream = 15.20(Ac.)
Total Study Area (Main Stream No. 1) = 15.20(Ac.)
Area averaged Fm value = 0.290(In/Hr)
Depth of flow = 0.299(Ft.), Average velocity = 3.075(Ft/s)
End of computations, Total Study Area = 15.20 (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) = 1.000
Area averaged SCS curve number = 67.0

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: 11/29/20

2020-326 HCC V
PRE-DEVELOPMENT CONDITIONS
RATIONAL METHOD - 100 YEAR STORM
DA C

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 = 1.310 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 3

++

Process from Point/Station 3.100 to Point/Station 3.200
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
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) = 67.00
Adjusted SCS curve number for AMC 3 = 84.60
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.290(In/Hr)
Initial subarea data:
Initial area flow distance = 519.560(Ft.)
Top (of initial area) elevation = 3566.000(Ft.)
Bottom (of initial area) elevation = 3553.310(Ft.)
Difference in elevation = 12.690(Ft.)
Slope = 0.02442 s(%)= 2.44
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 13.454 min.
Rainfall intensity = 3.731(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.830

```
Subarea runoff =      4.831(CFS)
Total initial stream area =        1.560(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.290(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.200 to Point/Station        3.300
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.145(Ft.), Average velocity =   1.914(Ft/s)
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              0.30
        2             50.00              0.00
        3            100.00              0.30
Manning's 'N' friction factor =   0.020
------------------------------------------------------------------
Sub-Channel flow  =      6.683(CFS)
  '     '        flow top width =     48.244(Ft.)
  '     '    velocity=    1.914(Ft/s)
  '     '        area =      3.491(Sq.Ft)
  '     '        Froude number =     1.254

Upstream point elevation =  3553.310(Ft.)
Downstream point elevation =  3547.370(Ft.)
Flow length =   269.850(Ft.)
Travel time  =    2.35 min.
Time of concentration =   15.80 min.
Depth of flow =   0.145(Ft.)
Average velocity =   1.914(Ft/s)
Total irregular channel flow =     6.683(CFS)
Irregular channel normal depth above invert elev. =   0.145(Ft.)
Average velocity of channel(s) =   1.914(Ft/s)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
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)  = 67.00
Adjusted SCS curve number for AMC 3 = 84.60
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.290(In/Hr)
Rainfall intensity =      3.333(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.822
Subarea runoff =      3.632(CFS) for    1.530(Ac.)
```

Total runoff = 8.463(CFS)
Effective area this stream = 3.09(Ac.)
Total Study Area (Main Stream No. 1) = 3.09(Ac.)
Area averaged Fm value = 0.290(In/Hr)
Depth of flow = 0.158(Ft.), Average velocity = 2.031(Ft/s)
End of computations, Total Study Area = 3.09 (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) = 1.000
Area averaged SCS curve number = 67.0

Appendix C – Rational Method (Post-Development)

- 10-Year Storm Event
- 100-Year Storm Event

Appendix C – Rational Method (Post-Development)

- 10-Year Storm Event

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: 12/06/20

2020-326 HCC V
POST-DEVELOPMENT CONDITIONS
RATIONAL METHOD - 10 YEAR STORM
DA A

Program License Serial Number 6277

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.785 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 1.100 to Point/Station 1.200
**** 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
Pervious ratio(Ap) = 0.2700 Max loss rate(Fm)= 0.264(In/Hr)
Initial subarea data:
Initial area flow distance = 541.690(Ft.)
Top (of initial area) elevation = 3579.900(Ft.)
Bottom (of initial area) elevation = 3565.090(Ft.)
Difference in elevation = 14.810(Ft.)
Slope = 0.02734 s(%)= 2.73
TC = k(0.341)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 8.690 min.
Rainfall intensity = 3.036(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.822
Subarea runoff = 17.587(CFS)
Total initial stream area = 7.050(Ac.)
Pervious area fraction = 0.270
Initial area Fm value = 0.264(In/Hr)

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.200 to Point/Station        2.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  3561.090(Ft.)
Downstream point/station elevation =  3558.170(Ft.)
Pipe length  =   584.04(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    17.587(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    17.587(CFS)
Normal flow depth in pipe =   18.33(In.)
Flow top width inside pipe =   25.21(In.)
Critical Depth =   17.57(In.)
Pipe flow velocity =      6.12(Ft/s)
Travel time through pipe =    1.59 min.
Time of concentration (TC) =    10.28 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.300 to Point/Station        2.300
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      7.050(Ac.)
Runoff from this stream =     17.587(CFS)
Time of concentration =   10.28 min.
Rainfall intensity =     2.699(In/Hr)
Area averaged loss rate (Fm) =    0.2640(In/Hr)
Area averaged Pervious ratio (Ap) = 0.2700


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.100 to Point/Station        2.200
**** 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
Pervious ratio(Ap) = 0.3100     Max loss rate(Fm)=     0.303(In/Hr)
Initial subarea data:
Initial area flow distance =  1000.000(Ft.)
Top (of initial area) elevation =  3600.940(Ft.)
Bottom (of initial area) elevation =  3563.660(Ft.)
Difference in elevation =    37.280(Ft.)
Slope =    0.03728  s(%)=       3.73
TC = k(0.351)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.739 min.
Rainfall intensity =      2.618(In/Hr) for a    10.0 year storm
```

```
Effective runoff coefficient used for area (Q=KCIA) is C = 0.796
Subarea runoff =      5.437(CFS)
Total initial stream area =        2.610(Ac.)
Pervious area fraction = 0.310
Initial area Fm value =    0.303(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.200 to Point/Station        2.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  3558.220(Ft.)
Downstream point/station elevation =  3558.170(Ft.)
Pipe length  =    10.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.437(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     5.437(CFS)
Normal flow depth in pipe =   11.44(In.)
Flow top width inside pipe =   17.33(In.)
Critical Depth =   10.79(In.)
Pipe flow velocity =      4.59(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =    10.77 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.300 to Point/Station        2.300
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      2.610(Ac.)
Runoff from this stream =      5.437(CFS)
Time of concentration =   10.77 min.
Rainfall intensity =     2.611(In/Hr)
Area averaged loss rate (Fm) =    0.3031(In/Hr)
Area averaged Pervious ratio (Ap) = 0.3100
Summary of stream data:

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


1     17.59     7.050     10.28    0.264      2.699
2      5.44     2.610     10.77    0.303      2.611
Qmax(1) =
           1.000 *    1.000 *    17.587) +
           1.038 *    0.954 *     5.437) + =      22.971
Qmax(2) =
           0.964 *    1.000 *    17.587) +
           1.000 *    1.000 *     5.437) + =      22.392
```

```
Total of 2 streams to confluence:
Flow rates before confluence point:
      17.587       5.437
Maximum flow rates at confluence using above data:
       22.971       22.392
Area of streams before confluence:
        7.050        2.610
Effective area values after confluence:
        9.540        9.660
Results of confluence:
Total flow rate =     22.971(CFS)
Time of concentration =    10.279 min.
Effective stream area after confluence =      9.540(Ac.)
Study area average Pervious fraction(Ap) =  0.281
Study area average soil loss rate(Fm) =    0.275(In/Hr)
Study area total (this main stream) =       9.66(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.300 to Point/Station        3.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  3558.170(Ft.)
Downstream point/station elevation =  3552.860(Ft.)
Pipe length  =  1062.43(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    22.971(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    22.971(CFS)
Normal flow depth in pipe =   20.16(In.)
Flow top width inside pipe =   28.17(In.)
Critical Depth =   19.57(In.)
Pipe flow velocity =      6.55(Ft/s)
Travel time through pipe =    2.70 min.
Time of concentration (TC) =    12.98 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.300 to Point/Station        3.300
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      9.540(Ac.)
Runoff from this stream =     22.971(CFS)
Time of concentration =   12.98 min.
Rainfall intensity =     2.292(In/Hr)
Area averaged loss rate (Fm) =    0.2746(In/Hr)
Area averaged Pervious ratio (Ap) = 0.2808
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.100 to Point/Station        3.200
**** 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
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.098(In/Hr)
Initial subarea data:
Initial area flow distance =  1000.000(Ft.)
Top (of initial area) elevation =  3570.000(Ft.)
Bottom (of initial area) elevation =  3558.220(Ft.)
Difference in elevation =    11.780(Ft.)
Slope =    0.01178  s(%)=       1.18
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.712 min.
Rainfall intensity =      2.463(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.864
Subarea runoff =     25.867(CFS)
Total initial stream area =       12.150(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.098(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.200 to Point/Station        3.200
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
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
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.098(In/Hr)
Time of concentration =    11.71 min.
Rainfall intensity =      2.463(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.864
Subarea runoff =     27.017(CFS) for   12.690(Ac.)
Total runoff =     52.884(CFS)
Effective area this stream =       24.84(Ac.)
Total Study Area (Main Stream No. 1) =       34.50(Ac.)
Area averaged Fm value =    0.098(In/Hr)


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```

```
Process from Point/Station        3.200 to Point/Station        3.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  3553.420(Ft.)
Downstream point/station elevation =  3552.860(Ft.)
Pipe length  =   111.97(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    52.884(CFS)
Nearest computed pipe diameter  =     39.00(In.)
Calculated individual pipe flow  =    52.884(CFS)
Normal flow depth in pipe =   29.06(In.)
Flow top width inside pipe =   33.99(In.)
Critical Depth =   27.88(In.)
Pipe flow velocity =      7.97(Ft/s)
Travel time through pipe =    0.23 min.
Time of concentration (TC) =    11.95 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.300 to Point/Station        3.300
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     24.840(Ac.)
Runoff from this stream =     52.884(CFS)
Time of concentration =   11.95 min.
Rainfall intensity =     2.429(In/Hr)
Area averaged loss rate (Fm) =    0.0978(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     22.97     9.540     12.98    0.275      2.292
2     52.88    24.840     11.95    0.098      2.429
Qmax(1) =
           1.000 *    1.000 *    22.971) +
           0.941 *    1.000 *    52.884) + =      72.741
Qmax(2) =
           1.068 *    0.920 *    22.971) +
           1.000 *    1.000 *    52.884) + =      75.462

Total of 2 streams to confluence:
Flow rates before confluence point:
      22.971      52.884
Maximum flow rates at confluence using above data:
       72.741       75.462
Area of streams before confluence:
        9.540       24.840
```

```
Effective area values after confluence:
       34.380       33.619
Results of confluence:
Total flow rate =     75.462(CFS)
Time of concentration =    11.946 min.
Effective stream area after confluence =     33.619(Ac.)
Study area average Pervious fraction(Ap) =  0.150
Study area average soil loss rate(Fm) =    0.147(In/Hr)
Study area total (this main stream) =      34.38(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.300 to Point/Station        3.400
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  3552.860(Ft.)
Downstream point/station elevation =  3549.380(Ft.)
Pipe length  =   695.90(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    75.462(CFS)
Nearest computed pipe diameter  =     45.00(In.)
Calculated individual pipe flow  =    75.462(CFS)
Normal flow depth in pipe =   32.81(In.)
Flow top width inside pipe =   40.00(In.)
Critical Depth =   32.10(In.)
Pipe flow velocity =      8.74(Ft/s)
Travel time through pipe =    1.33 min.
Time of concentration (TC) =    13.27 min.
End of computations, Total Study Area =           34.50 (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) = 0.151
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: 12/06/20

2020-326 HCC V
POST-DEVELOPMENT CONDITIONS
RATIONAL METHOD - 10 YEAR STORM
DA B

Program License Serial Number 6277

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.785 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 4.100 to Point/Station 4.200
**** 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
Pervious ratio(Ap) = 0.1000 Max loss rate(Fm)= 0.098(In/Hr)
Initial subarea data:
Initial area flow distance = 425.600(Ft.)
Top (of initial area) elevation = 3570.000(Ft.)
Bottom (of initial area) elevation = 3564.860(Ft.)
Difference in elevation = 5.140(Ft.)
Slope = 0.01208 s(%)= 1.21
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 8.281 min.
Rainfall intensity = 3.140(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.872
Subarea runoff = 4.928(CFS)

```
Total initial stream area =        1.800(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.098(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        4.200 to Point/Station        4.200
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
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
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.098(In/Hr)
Time of concentration =     8.28 min.
Rainfall intensity =      3.140(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.872
Subarea runoff =     57.743(CFS) for   21.090(Ac.)
Total runoff =     62.671(CFS)
Effective area this stream =       22.89(Ac.)
Total Study Area (Main Stream No. 1) =       22.89(Ac.)
Area averaged Fm value =    0.098(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        4.200 to Point/Station        5.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  3560.860(Ft.)
Downstream point/station elevation =  3551.510(Ft.)
Pipe length  =  1869.51(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    62.671(CFS)
Nearest computed pipe diameter  =     42.00(In.)
Calculated individual pipe flow  =    62.671(CFS)
Normal flow depth in pipe =   30.61(In.)
Flow top width inside pipe =   37.34(In.)
Critical Depth =   29.76(In.)
Pipe flow velocity =      8.35(Ft/s)
Travel time through pipe =    3.73 min.
Time of concentration (TC) =    12.01 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.300 to Point/Station        5.300
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
```

```
Stream flow area =     22.890(Ac.)
Runoff from this stream =     62.671(CFS)
Time of concentration =   12.01 min.
Rainfall intensity =     2.420(In/Hr)
Area averaged loss rate (Fm) =    0.0978(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.100 to Point/Station        5.200
**** 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
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.098(In/Hr)
Initial subarea data:
Initial area flow distance =   390.280(Ft.)
Top (of initial area) elevation =  3569.160(Ft.)
Bottom (of initial area) elevation =  3560.630(Ft.)
Difference in elevation =     8.530(Ft.)
Slope =    0.02186  s(%)=       2.19
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.104 min.
Rainfall intensity =      3.496(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.875
Subarea runoff =     11.682(CFS)
Total initial stream area =        3.820(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.098(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.200 to Point/Station        5.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  3553.130(Ft.)
Downstream point/station elevation =  3551.510(Ft.)
Pipe length  =   323.11(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    11.682(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    11.682(CFS)
Normal flow depth in pipe =   15.21(In.)
Flow top width inside pipe =   23.12(In.)
Critical Depth =   14.72(In.)
Pipe flow velocity =      5.56(Ft/s)
Travel time through pipe =    0.97 min.
```

```
Time of concentration (TC) =     8.07 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.300 to Point/Station        5.300
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      3.820(Ac.)
Runoff from this stream =     11.682(CFS)
Time of concentration =    8.07 min.
Rainfall intensity =     3.197(In/Hr)
Area averaged loss rate (Fm) =    0.0978(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     62.67    22.890     12.01    0.098      2.420
2     11.68     3.820      8.07    0.098      3.197
Qmax(1) =
           1.000 *    1.000 *    62.671) +
           0.749 *    1.000 *    11.682) + =      71.424
Qmax(2) =
           1.335 *    0.672 *    62.671) +
           1.000 *    1.000 *    11.682) + =      67.873

Total of 2 streams to confluence:
Flow rates before confluence point:
      62.671      11.682
Maximum flow rates at confluence using above data:
       71.424       67.873
Area of streams before confluence:
       22.890        3.820
Effective area values after confluence:
       26.710       19.199
Results of confluence:
Total flow rate =     71.424(CFS)
Time of concentration =    12.014 min.
Effective stream area after confluence =     26.710(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.098(In/Hr)
Study area total (this main stream) =      26.71(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.300 to Point/Station        5.400
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
```

Upstream point/station elevation = 3551.510(Ft.)
Downstream point/station elevation = 3550.990(Ft.)
Pipe length = 105.12(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 71.424(CFS)
Nearest computed pipe diameter = 45.00(In.)
Calculated individual pipe flow = 71.424(CFS)
Normal flow depth in pipe = 31.59(In.)
Flow top width inside pipe = 41.16(In.)
Critical Depth = 31.25(In.)
Pipe flow velocity = 8.63(Ft/s)
Travel time through pipe = 0.20 min.
Time of concentration (TC) = 12.22 min.
End of computations, Total Study Area = 26.71 (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

Appendix C – Rational Method (Post-Development)

- 100-Year Storm Event

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: 12/06/20

2020-326 HCC V
POST-DEVELOPMENT CONDITIONS
RATIONAL METHOD - 100 YEAR STORM
DA 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 = 1.310 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 3

++

Process from Point/Station 1.100 to Point/Station 1.200
**** 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) = 0.2700 Max loss rate(Fm)= 0.212(In/Hr)
Initial subarea data:
Initial area flow distance = 541.690(Ft.)
Top (of initial area) elevation = 3579.900(Ft.)
Bottom (of initial area) elevation = 3565.090(Ft.)
Difference in elevation = 14.810(Ft.)
Slope = 0.02734 s(%)= 2.73
TC = k(0.341)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 8.690 min.
Rainfall intensity = 5.066(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.862
Subarea runoff = 30.800(CFS)
Total initial stream area = 7.050(Ac.)
Pervious area fraction = 0.270

```
Initial area Fm value =    0.212(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.200 to Point/Station        2.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  3561.090(Ft.)
Downstream point/station elevation =  3558.170(Ft.)
Pipe length  =   584.04(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    30.800(CFS)
Nearest computed pipe diameter  =     33.00(In.)
Calculated individual pipe flow  =    30.800(CFS)
Normal flow depth in pipe =   22.83(In.)
Flow top width inside pipe =   30.48(In.)
Critical Depth =   22.15(In.)
Pipe flow velocity =      7.03(Ft/s)
Travel time through pipe =    1.38 min.
Time of concentration (TC) =    10.07 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.300 to Point/Station        2.300
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      7.050(Ac.)
Runoff from this stream =     30.800(CFS)
Time of concentration =   10.07 min.
Rainfall intensity =     4.568(In/Hr)
Area averaged loss rate (Fm) =    0.2120(In/Hr)
Area averaged Pervious ratio (Ap) = 0.2700


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.100 to Point/Station        2.200
**** 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) = 0.3100     Max loss rate(Fm)=     0.243(In/Hr)
Initial subarea data:
Initial area flow distance =  1000.000(Ft.)
Top (of initial area) elevation =  3600.940(Ft.)
Bottom (of initial area) elevation =  3563.660(Ft.)
Difference in elevation =    37.280(Ft.)
Slope =    0.03728  s(%)=       3.73
TC = k(0.351)*[(length^3)/(elevation change)]^0.2
```

```
Initial area time of concentration =   10.739 min.
Rainfall intensity =      4.368(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.850
Subarea runoff =      9.689(CFS)
Total initial stream area =        2.610(Ac.)
Pervious area fraction = 0.310
Initial area Fm value =    0.243(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.200 to Point/Station        2.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  3558.220(Ft.)
Downstream point/station elevation =  3558.170(Ft.)
Pipe length  =    10.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     9.689(CFS)
Nearest computed pipe diameter  =     21.00(In.)
Calculated individual pipe flow  =     9.689(CFS)
Normal flow depth in pipe =   15.07(In.)
Flow top width inside pipe =   18.91(In.)
Critical Depth =   13.90(In.)
Pipe flow velocity =      5.24(Ft/s)
Travel time through pipe =    0.03 min.
Time of concentration (TC) =    10.77 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.300 to Point/Station        2.300
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      2.610(Ac.)
Runoff from this stream =      9.689(CFS)
Time of concentration =   10.77 min.
Rainfall intensity =     4.359(In/Hr)
Area averaged loss rate (Fm) =    0.2434(In/Hr)
Area averaged Pervious ratio (Ap) = 0.3100
Summary of stream data:

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


1     30.80     7.050     10.07    0.212      4.568
2      9.69     2.610     10.77    0.243      4.359
Qmax(1) =
           1.000 *    1.000 *    30.800) +
           1.051 *    0.935 *     9.689) + =      40.322
Qmax(2) =
```

```
           0.952 *    1.000 *    30.800) +
           1.000 *    1.000 *     9.689) + =      39.013

Total of 2 streams to confluence:
Flow rates before confluence point:
      30.800       9.689
Maximum flow rates at confluence using above data:
       40.322       39.013
Area of streams before confluence:
        7.050        2.610
Effective area values after confluence:
        9.491        9.660
Results of confluence:
Total flow rate =     40.322(CFS)
Time of concentration =    10.074 min.
Effective stream area after confluence =      9.491(Ac.)
Study area average Pervious fraction(Ap) =  0.281
Study area average soil loss rate(Fm) =    0.220(In/Hr)
Study area total (this main stream) =       9.66(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.300 to Point/Station        3.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  3558.170(Ft.)
Downstream point/station elevation =  3552.860(Ft.)
Pipe length  =  1062.43(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    40.322(CFS)
Nearest computed pipe diameter  =     36.00(In.)
Calculated individual pipe flow  =    40.322(CFS)
Normal flow depth in pipe =   25.62(In.)
Flow top width inside pipe =   32.62(In.)
Critical Depth =   24.81(In.)
Pipe flow velocity =      7.50(Ft/s)
Travel time through pipe =    2.36 min.
Time of concentration (TC) =    12.44 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.300 to Point/Station        3.300
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      9.491(Ac.)
Runoff from this stream =     40.322(CFS)
Time of concentration =   12.44 min.
Rainfall intensity =     3.942(In/Hr)
Area averaged loss rate (Fm) =    0.2205(In/Hr)
Area averaged Pervious ratio (Ap) = 0.2808
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.100 to Point/Station        3.200
**** 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 =  1000.000(Ft.)
Top (of initial area) elevation =  3570.000(Ft.)
Bottom (of initial area) elevation =  3558.220(Ft.)
Difference in elevation =    11.780(Ft.)
Slope =    0.01178  s(%)=       1.18
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.712 min.
Rainfall intensity =      4.111(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.883
Subarea runoff =     44.093(CFS)
Total initial stream area =       12.150(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.079(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.200 to Point/Station        3.200
**** SUBAREA FLOW ADDITION ****
------------------------------------------------------------------------
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)
Time of concentration =    11.71 min.
Rainfall intensity =      4.111(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.883
Subarea runoff =     46.053(CFS) for   12.690(Ac.)
Total runoff =     90.146(CFS)
Effective area this stream =       24.84(Ac.)
Total Study Area (Main Stream No. 1) =       34.50(Ac.)
```

```
Area averaged Fm value =    0.079(In/Hr)


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Process from Point/Station        3.200 to Point/Station        3.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  3553.420(Ft.)
Downstream point/station elevation =  3552.860(Ft.)
Pipe length  =   111.97(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    90.146(CFS)
Nearest computed pipe diameter  =     48.00(In.)
Calculated individual pipe flow  =    90.146(CFS)
Normal flow depth in pipe =   35.16(In.)
Flow top width inside pipe =   42.50(In.)
Critical Depth =   34.54(In.)
Pipe flow velocity =      9.13(Ft/s)
Travel time through pipe =    0.20 min.
Time of concentration (TC) =    11.92 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.300 to Point/Station        3.300
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     24.840(Ac.)
Runoff from this stream =     90.146(CFS)
Time of concentration =   11.92 min.
Rainfall intensity =     4.061(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     40.32     9.491     12.44    0.220      3.942
2     90.15    24.840     11.92    0.079      4.061
Qmax(1) =
           1.000 *    1.000 *    40.322) +
           0.970 *    1.000 *    90.146) + =     127.763
Qmax(2) =
           1.032 *    0.958 *    40.322) +
           1.000 *    1.000 *    90.146) + =     130.025

Total of 2 streams to confluence:
Flow rates before confluence point:
      40.322      90.146
```

```
Maximum flow rates at confluence using above data:
      127.763      130.025
Area of streams before confluence:
        9.491       24.840
Effective area values after confluence:
       34.331       33.935
Results of confluence:
Total flow rate =    130.025(CFS)
Time of concentration =    11.917 min.
Effective stream area after confluence =     33.935(Ac.)
Study area average Pervious fraction(Ap) =  0.150
Study area average soil loss rate(Fm) =    0.118(In/Hr)
Study area total (this main stream) =      34.33(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.300 to Point/Station        3.400
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  3552.860(Ft.)
Downstream point/station elevation =  3549.380(Ft.)
Pipe length  =   695.90(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =   130.025(CFS)
Nearest computed pipe diameter  =     54.00(In.)
Calculated individual pipe flow  =   130.025(CFS)
Normal flow depth in pipe =   41.44(In.)
Flow top width inside pipe =   45.63(In.)
Critical Depth =   40.29(In.)
Pipe flow velocity =      9.94(Ft/s)
Travel time through pipe =    1.17 min.
Time of concentration (TC) =    13.08 min.
End of computations, Total Study Area =           34.50 (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) = 0.151
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: 12/06/20

2020-326 HCC V
POST-DEVELOPMENT CONDITIONS
RATIONAL METHOD - 100 YEAR STORM
DA 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 = 1.310 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 3

++

Process from Point/Station 4.100 to Point/Station 4.200
**** 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 = 425.600(Ft.)
Top (of initial area) elevation = 3570.000(Ft.)
Bottom (of initial area) elevation = 3564.860(Ft.)
Difference in elevation = 5.140(Ft.)
Slope = 0.01208 s(%)= 1.21
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 8.281 min.
Rainfall intensity = 5.240(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.887

```
Subarea runoff =      8.361(CFS)
Total initial stream area =        1.800(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.079(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        4.200 to Point/Station        4.200
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
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)
Time of concentration =     8.28 min.
Rainfall intensity =      5.240(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.887
Subarea runoff =     97.968(CFS) for   21.090(Ac.)
Total runoff =    106.329(CFS)
Effective area this stream =       22.89(Ac.)
Total Study Area (Main Stream No. 1) =       22.89(Ac.)
Area averaged Fm value =    0.079(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        4.200 to Point/Station        5.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  3560.860(Ft.)
Downstream point/station elevation =  3551.510(Ft.)
Pipe length  =  1869.51(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =   106.329(CFS)
Nearest computed pipe diameter  =     51.00(In.)
Calculated individual pipe flow  =   106.329(CFS)
Normal flow depth in pipe =   37.50(In.)
Flow top width inside pipe =   45.00(In.)
Critical Depth =   36.94(In.)
Pipe flow velocity =      9.51(Ft/s)
Travel time through pipe =    3.28 min.
Time of concentration (TC) =    11.56 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.300 to Point/Station        5.300
**** CONFLUENCE OF MINOR STREAMS ****
```

```
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     22.890(Ac.)
Runoff from this stream =    106.329(CFS)
Time of concentration =   11.56 min.
Rainfall intensity =     4.150(In/Hr)
Area averaged loss rate (Fm) =    0.0785(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.100 to Point/Station        5.200
**** 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 =   390.280(Ft.)
Top (of initial area) elevation =  3569.160(Ft.)
Bottom (of initial area) elevation =  3560.630(Ft.)
Difference in elevation =     8.530(Ft.)
Slope =    0.02186  s(%)=       2.19
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.104 min.
Rainfall intensity =      5.833(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.888
Subarea runoff =     19.785(CFS)
Total initial stream area =        3.820(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.079(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.200 to Point/Station        5.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  3553.130(Ft.)
Downstream point/station elevation =  3551.510(Ft.)
Pipe length  =   323.11(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    19.785(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    19.785(CFS)
Normal flow depth in pipe =   20.06(In.)
Flow top width inside pipe =   23.60(In.)
```

```
Critical Depth =   18.67(In.)
Pipe flow velocity =      6.24(Ft/s)
Travel time through pipe =    0.86 min.
Time of concentration (TC) =     7.97 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.300 to Point/Station        5.300
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      3.820(Ac.)
Runoff from this stream =     19.785(CFS)
Time of concentration =    7.97 min.
Rainfall intensity =     5.384(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    106.33    22.890     11.56    0.079      4.150
2     19.79     3.820      7.97    0.079      5.384
Qmax(1) =
           1.000 *    1.000 *   106.329) +
           0.767 *    1.000 *    19.785) + =     121.511
Qmax(2) =
           1.303 *    0.689 *   106.329) +
           1.000 *    1.000 *    19.785) + =     115.307

Total of 2 streams to confluence:
Flow rates before confluence point:
     106.329      19.785
Maximum flow rates at confluence using above data:
      121.511      115.307
Area of streams before confluence:
       22.890        3.820
Effective area values after confluence:
       26.710       19.600
Results of confluence:
Total flow rate =    121.511(CFS)
Time of concentration =    11.556 min.
Effective stream area after confluence =     26.710(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.079(In/Hr)
Study area total (this main stream) =      26.71(Ac.)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.300 to Point/Station        5.400
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  3551.510(Ft.)
Downstream point/station elevation =  3550.990(Ft.)
Pipe length  =   105.12(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =   121.511(CFS)
Nearest computed pipe diameter  =     54.00(In.)
Calculated individual pipe flow  =   121.511(CFS)
Normal flow depth in pipe =   39.28(In.)
Flow top width inside pipe =   48.09(In.)
Critical Depth =   38.94(In.)
Pipe flow velocity =      9.81(Ft/s)
Travel time through pipe =    0.18 min.
Time of concentration (TC) =    11.73 min.
End of computations, Total Study Area =           26.71 (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
```

Appendix D – Unit Hydrograph (Pre-Development)

- 10-Year Storm Event
- 100-Year Storm Event

Appendix D – Unit Hydrograph (Pre-Development)

- 10-Year Storm Event

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

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Study date 12/03/20

++

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

Program License Serial Number 6277

2020-326 HCC V
PRE-DEVELOPMENT CONDITIONS
UNIT HYDROGRAPH - 10 YEAR STORM
DA A

Storm Event Year = 10

Antecedent Moisture Condition = 2

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 10		
42.92	1	0.79
Rainfall data for year 2		
42.92	6	1.12
Rainfall data for year 2		
42.92	24	2.11
Rainfall data for year 100		

```
            42.92            1            1.31
------------------------------------------------------------------------
Rainfall data for year 100
            42.92            6            3.05
------------------------------------------------------------------------
Rainfall data for year 100
            42.92           24            6.31
------------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

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


SCS curve  SCS curve     Area     Area     Fp(Fig C6)    Ap      Fm
No.(AMCII) NO.(AMC 2)    (Ac.)    Fraction     (In/Hr)  (dec.)   (In/Hr)
 67.0      67.0         42.92      1.000     0.578    1.000    0.578

Area-averaged adjusted loss rate Fm (In/Hr) =  0.578

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

Area       Area          SCS CN    SCS CN      S     Pervious
 (Ac.)      Fract         (AMC2)    (AMC2)           Yield Fr
    42.92   1.000         67.0      67.0       4.93     0.273

Area-averaged catchment yield fraction, Y =  0.273
Area-averaged low loss fraction, Yb =  0.727
User entry of time of concentration  =   0.506 (hours)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watershed area =      42.92(Ac.)
Catchment Lag time =   0.405 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 20.5863
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.578(In/Hr)
Average low loss rate fraction (Yb) = 0.727 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall =  0.372(In)
Computed peak 30-minute rainfall =  0.638(In)
Specified peak 1-hour rainfall =  0.785(In)
Computed peak 3-hour rainfall =  1.356(In)
Specified peak 6-hour rainfall =  1.914(In)
Specified peak 24-hour rainfall =  3.838(In)


Rainfall depth area reduction factors:
Using a total area of      42.92(Ac.) (Ref: fig. E-4)

5-minute factor = 0.998     Adjusted rainfall =  0.372(In)
30-minute factor = 0.998    Adjusted rainfall =  0.636(In)
```

1-hour factor = 0.998 Adjusted rainfall = 0.783(In)
3-hour factor = 1.000 Adjusted rainfall = 1.355(In)
6-hour factor = 1.000 Adjusted rainfall = 1.914(In)
24-hour factor = 1.000 Adjusted rainfall = 3.838(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 = 519.06 (CFS))	
1	1.033	5.361
2	4.725	19.163
3	12.013	37.833
4	28.066	83.324
5	45.124	88.541
6	56.476	58.923
7	63.994	39.026
8	69.530	28.736
9	73.935	22.863
10	77.525	18.632
11	80.431	15.087
12	82.868	12.649
13	85.001	11.071
14	86.912	9.920
15	88.543	8.463
16	89.843	6.752
17	91.022	6.116
18	92.092	5.558
19	93.055	4.998
20	93.930	4.538
21	94.649	3.732
22	95.347	3.625
23	95.943	3.094
24	96.478	2.778
25	96.972	2.562
26	97.349	1.959
27	97.713	1.889
28	97.961	1.288
29	98.167	1.069
30	98.388	1.147
31	98.635	1.280
32	98.882	1.282
33	99.129	1.282
34	99.376	1.282
35	99.564	0.977
36	99.693	0.668
37	99.821	0.668

38	100.000	0.334

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.3717	0.3717
2	0.4577	0.0859
3	0.5169	0.0592
4	0.5635	0.0466
5	0.6025	0.0390
6	0.6363	0.0339
7	0.6665	0.0301
8	0.6937	0.0272
9	0.7186	0.0249
10	0.7417	0.0231
11	0.7632	0.0215
12	0.7834	0.0202
13	0.8153	0.0319
14	0.8461	0.0307
15	0.8757	0.0296
16	0.9044	0.0287
17	0.9321	0.0278
18	0.9591	0.0270
19	0.9853	0.0262
20	1.0109	0.0255
21	1.0358	0.0249
22	1.0601	0.0243
23	1.0839	0.0238
24	1.1072	0.0233
25	1.1300	0.0228
26	1.1523	0.0223
27	1.1742	0.0219
28	1.1957	0.0215
29	1.2168	0.0211
30	1.2376	0.0208
31	1.2580	0.0204
32	1.2781	0.0201
33	1.2979	0.0198
34	1.3174	0.0195
35	1.3366	0.0192
36	1.3555	0.0189
37	1.3741	0.0186
38	1.3924	0.0184
39	1.4106	0.0181
40	1.4284	0.0179
41	1.4461	0.0177
42	1.4635	0.0174
43	1.4808	0.0172
44	1.4978	0.0170
45	1.5147	0.0168
46	1.5313	0.0167

47	1.5478	0.0165
48	1.5641	0.0163
49	1.5802	0.0161
50	1.5962	0.0160
51	1.6120	0.0158
52	1.6277	0.0157
53	1.6432	0.0155
54	1.6585	0.0154
55	1.6737	0.0152
56	1.6888	0.0151
57	1.7037	0.0149
58	1.7185	0.0148
59	1.7332	0.0147
60	1.7478	0.0146
61	1.7622	0.0144
62	1.7765	0.0143
63	1.7907	0.0142
64	1.8048	0.0141
65	1.8188	0.0140
66	1.8327	0.0139
67	1.8464	0.0138
68	1.8601	0.0137
69	1.8737	0.0136
70	1.8871	0.0135
71	1.9005	0.0134
72	1.9138	0.0133
73	1.9271	0.0133
74	1.9403	0.0132
75	1.9534	0.0131
76	1.9664	0.0130
77	1.9794	0.0129
78	1.9922	0.0129
79	2.0050	0.0128
80	2.0177	0.0127
81	2.0303	0.0126
82	2.0429	0.0125
83	2.0553	0.0125
84	2.0677	0.0124
85	2.0800	0.0123
86	2.0923	0.0122
87	2.1045	0.0122
88	2.1166	0.0121
89	2.1286	0.0120
90	2.1406	0.0120
91	2.1525	0.0119
92	2.1643	0.0118
93	2.1761	0.0118
94	2.1878	0.0117
95	2.1994	0.0117
96	2.2110	0.0116

97	2.2226	0.0115
98	2.2340	0.0115
99	2.2455	0.0114
100	2.2568	0.0114
101	2.2681	0.0113
102	2.2794	0.0112
103	2.2905	0.0112
104	2.3017	0.0111
105	2.3128	0.0111
106	2.3238	0.0110
107	2.3348	0.0110
108	2.3457	0.0109
109	2.3566	0.0109
110	2.3674	0.0108
111	2.3782	0.0108
112	2.3889	0.0107
113	2.3996	0.0107
114	2.4102	0.0106
115	2.4208	0.0106
116	2.4314	0.0105
117	2.4418	0.0105
118	2.4523	0.0105
119	2.4627	0.0104
120	2.4731	0.0104
121	2.4834	0.0103
122	2.4937	0.0103
123	2.5039	0.0102
124	2.5141	0.0102
125	2.5243	0.0102
126	2.5344	0.0101
127	2.5445	0.0101
128	2.5545	0.0100
129	2.5645	0.0100
130	2.5745	0.0100
131	2.5844	0.0099
132	2.5943	0.0099
133	2.6041	0.0098
134	2.6139	0.0098
135	2.6237	0.0098
136	2.6334	0.0097
137	2.6431	0.0097
138	2.6528	0.0097
139	2.6624	0.0096
140	2.6720	0.0096
141	2.6816	0.0096
142	2.6911	0.0095
143	2.7006	0.0095
144	2.7101	0.0095
145	2.7195	0.0094
146	2.7289	0.0094

147	2.7383	0.0094
148	2.7476	0.0093
149	2.7569	0.0093
150	2.7662	0.0093
151	2.7754	0.0092
152	2.7846	0.0092
153	2.7938	0.0092
154	2.8029	0.0092
155	2.8121	0.0091
156	2.8212	0.0091
157	2.8302	0.0091
158	2.8393	0.0090
159	2.8483	0.0090
160	2.8572	0.0090
161	2.8662	0.0089
162	2.8751	0.0089
163	2.8840	0.0089
164	2.8929	0.0089
165	2.9017	0.0088
166	2.9105	0.0088
167	2.9193	0.0088
168	2.9281	0.0088
169	2.9368	0.0087
170	2.9455	0.0087
171	2.9542	0.0087
172	2.9629	0.0087
173	2.9715	0.0086
174	2.9801	0.0086
175	2.9887	0.0086
176	2.9972	0.0086
177	3.0058	0.0085
178	3.0143	0.0085
179	3.0228	0.0085
180	3.0312	0.0085
181	3.0397	0.0084
182	3.0481	0.0084
183	3.0565	0.0084
184	3.0649	0.0084
185	3.0732	0.0083
186	3.0815	0.0083
187	3.0898	0.0083
188	3.0981	0.0083
189	3.1064	0.0083
190	3.1146	0.0082
191	3.1228	0.0082
192	3.1310	0.0082
193	3.1392	0.0082
194	3.1474	0.0082
195	3.1555	0.0081
196	3.1636	0.0081

197	3.1717	0.0081
198	3.1798	0.0081
199	3.1878	0.0081
200	3.1959	0.0080
201	3.2039	0.0080
202	3.2119	0.0080
203	3.2198	0.0080
204	3.2278	0.0080
205	3.2357	0.0079
206	3.2436	0.0079
207	3.2515	0.0079
208	3.2594	0.0079
209	3.2672	0.0079
210	3.2751	0.0078
211	3.2829	0.0078
212	3.2907	0.0078
213	3.2985	0.0078
214	3.3062	0.0078
215	3.3140	0.0077
216	3.3217	0.0077
217	3.3294	0.0077
218	3.3371	0.0077
219	3.3448	0.0077
220	3.3525	0.0077
221	3.3601	0.0076
222	3.3677	0.0076
223	3.3753	0.0076
224	3.3829	0.0076
225	3.3905	0.0076
226	3.3980	0.0076
227	3.4056	0.0075
228	3.4131	0.0075
229	3.4206	0.0075
230	3.4281	0.0075
231	3.4356	0.0075
232	3.4430	0.0075
233	3.4505	0.0074
234	3.4579	0.0074
235	3.4653	0.0074
236	3.4727	0.0074
237	3.4801	0.0074
238	3.4874	0.0074
239	3.4948	0.0073
240	3.5021	0.0073
241	3.5094	0.0073
242	3.5167	0.0073
243	3.5240	0.0073
244	3.5313	0.0073
245	3.5385	0.0073
246	3.5458	0.0072

247	3.5530	0.0072
248	3.5602	0.0072
249	3.5674	0.0072
250	3.5746	0.0072
251	3.5818	0.0072
252	3.5889	0.0072
253	3.5961	0.0071
254	3.6032	0.0071
255	3.6103	0.0071
256	3.6174	0.0071
257	3.6245	0.0071
258	3.6316	0.0071
259	3.6386	0.0071
260	3.6457	0.0070
261	3.6527	0.0070
262	3.6597	0.0070
263	3.6667	0.0070
264	3.6737	0.0070
265	3.6807	0.0070
266	3.6877	0.0070
267	3.6946	0.0070
268	3.7015	0.0069
269	3.7085	0.0069
270	3.7154	0.0069
271	3.7223	0.0069
272	3.7292	0.0069
273	3.7360	0.0069
274	3.7429	0.0069
275	3.7498	0.0069
276	3.7566	0.0068
277	3.7634	0.0068
278	3.7702	0.0068
279	3.7770	0.0068
280	3.7838	0.0068
281	3.7906	0.0068
282	3.7974	0.0068
283	3.8041	0.0068
284	3.8109	0.0067
285	3.8176	0.0067
286	3.8243	0.0067
287	3.8310	0.0067
288	3.8377	0.0067

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0067	0.0049	0.0018
2	0.0067	0.0049	0.0018
3	0.0067	0.0049	0.0018

4	0.0067	0.0049	0.0018
5	0.0068	0.0049	0.0018
6	0.0068	0.0049	0.0018
7	0.0068	0.0049	0.0019
8	0.0068	0.0050	0.0019
9	0.0068	0.0050	0.0019
10	0.0069	0.0050	0.0019
11	0.0069	0.0050	0.0019
12	0.0069	0.0050	0.0019
13	0.0069	0.0050	0.0019
14	0.0069	0.0050	0.0019
15	0.0070	0.0051	0.0019
16	0.0070	0.0051	0.0019
17	0.0070	0.0051	0.0019
18	0.0070	0.0051	0.0019
19	0.0070	0.0051	0.0019
20	0.0070	0.0051	0.0019
21	0.0071	0.0051	0.0019
22	0.0071	0.0052	0.0019
23	0.0071	0.0052	0.0019
24	0.0071	0.0052	0.0019
25	0.0072	0.0052	0.0020
26	0.0072	0.0052	0.0020
27	0.0072	0.0052	0.0020
28	0.0072	0.0052	0.0020
29	0.0072	0.0053	0.0020
30	0.0073	0.0053	0.0020
31	0.0073	0.0053	0.0020
32	0.0073	0.0053	0.0020
33	0.0073	0.0053	0.0020
34	0.0073	0.0053	0.0020
35	0.0074	0.0054	0.0020
36	0.0074	0.0054	0.0020
37	0.0074	0.0054	0.0020
38	0.0074	0.0054	0.0020
39	0.0075	0.0054	0.0020
40	0.0075	0.0054	0.0020
41	0.0075	0.0055	0.0021
42	0.0075	0.0055	0.0021
43	0.0076	0.0055	0.0021
44	0.0076	0.0055	0.0021
45	0.0076	0.0055	0.0021
46	0.0076	0.0056	0.0021
47	0.0077	0.0056	0.0021
48	0.0077	0.0056	0.0021
49	0.0077	0.0056	0.0021
50	0.0077	0.0056	0.0021
51	0.0078	0.0057	0.0021
52	0.0078	0.0057	0.0021
53	0.0078	0.0057	0.0021

54	0.0079	0.0057	0.0021
55	0.0079	0.0057	0.0022
56	0.0079	0.0058	0.0022
57	0.0080	0.0058	0.0022
58	0.0080	0.0058	0.0022
59	0.0080	0.0058	0.0022
60	0.0080	0.0058	0.0022
61	0.0081	0.0059	0.0022
62	0.0081	0.0059	0.0022
63	0.0081	0.0059	0.0022
64	0.0082	0.0059	0.0022
65	0.0082	0.0060	0.0022
66	0.0082	0.0060	0.0022
67	0.0083	0.0060	0.0023
68	0.0083	0.0060	0.0023
69	0.0083	0.0061	0.0023
70	0.0083	0.0061	0.0023
71	0.0084	0.0061	0.0023
72	0.0084	0.0061	0.0023
73	0.0085	0.0062	0.0023
74	0.0085	0.0062	0.0023
75	0.0085	0.0062	0.0023
76	0.0086	0.0062	0.0023
77	0.0086	0.0063	0.0023
78	0.0086	0.0063	0.0024
79	0.0087	0.0063	0.0024
80	0.0087	0.0063	0.0024
81	0.0088	0.0064	0.0024
82	0.0088	0.0064	0.0024
83	0.0088	0.0064	0.0024
84	0.0089	0.0064	0.0024
85	0.0089	0.0065	0.0024
86	0.0089	0.0065	0.0024
87	0.0090	0.0066	0.0025
88	0.0090	0.0066	0.0025
89	0.0091	0.0066	0.0025
90	0.0091	0.0066	0.0025
91	0.0092	0.0067	0.0025
92	0.0092	0.0067	0.0025
93	0.0093	0.0067	0.0025
94	0.0093	0.0068	0.0025
95	0.0094	0.0068	0.0026
96	0.0094	0.0068	0.0026
97	0.0095	0.0069	0.0026
98	0.0095	0.0069	0.0026
99	0.0096	0.0070	0.0026
100	0.0096	0.0070	0.0026
101	0.0097	0.0070	0.0026
102	0.0097	0.0071	0.0026
103	0.0098	0.0071	0.0027

104	0.0098	0.0071	0.0027
105	0.0099	0.0072	0.0027
106	0.0099	0.0072	0.0027
107	0.0100	0.0073	0.0027
108	0.0100	0.0073	0.0027
109	0.0101	0.0074	0.0028
110	0.0102	0.0074	0.0028
111	0.0102	0.0074	0.0028
112	0.0103	0.0075	0.0028
113	0.0104	0.0075	0.0028
114	0.0104	0.0076	0.0028
115	0.0105	0.0076	0.0029
116	0.0105	0.0077	0.0029
117	0.0106	0.0077	0.0029
118	0.0107	0.0078	0.0029
119	0.0108	0.0078	0.0029
120	0.0108	0.0079	0.0030
121	0.0109	0.0079	0.0030
122	0.0110	0.0080	0.0030
123	0.0111	0.0081	0.0030
124	0.0111	0.0081	0.0030
125	0.0112	0.0082	0.0031
126	0.0113	0.0082	0.0031
127	0.0114	0.0083	0.0031
128	0.0115	0.0083	0.0031
129	0.0116	0.0084	0.0032
130	0.0117	0.0085	0.0032
131	0.0118	0.0086	0.0032
132	0.0118	0.0086	0.0032
133	0.0120	0.0087	0.0033
134	0.0120	0.0088	0.0033
135	0.0122	0.0089	0.0033
136	0.0122	0.0089	0.0033
137	0.0124	0.0090	0.0034
138	0.0125	0.0091	0.0034
139	0.0126	0.0092	0.0034
140	0.0127	0.0092	0.0035
141	0.0129	0.0094	0.0035
142	0.0129	0.0094	0.0035
143	0.0131	0.0095	0.0036
144	0.0132	0.0096	0.0036
145	0.0133	0.0097	0.0036
146	0.0134	0.0097	0.0036
147	0.0136	0.0099	0.0037
148	0.0137	0.0099	0.0037
149	0.0139	0.0101	0.0038
150	0.0140	0.0102	0.0038
151	0.0142	0.0103	0.0039
152	0.0143	0.0104	0.0039
153	0.0146	0.0106	0.0040

154	0.0147	0.0107	0.0040
155	0.0149	0.0109	0.0041
156	0.0151	0.0110	0.0041
157	0.0154	0.0112	0.0042
158	0.0155	0.0113	0.0042
159	0.0158	0.0115	0.0043
160	0.0160	0.0116	0.0044
161	0.0163	0.0119	0.0044
162	0.0165	0.0120	0.0045
163	0.0168	0.0123	0.0046
164	0.0170	0.0124	0.0046
165	0.0174	0.0127	0.0048
166	0.0177	0.0128	0.0048
167	0.0181	0.0132	0.0049
168	0.0184	0.0134	0.0050
169	0.0189	0.0138	0.0052
170	0.0192	0.0140	0.0052
171	0.0198	0.0144	0.0054
172	0.0201	0.0146	0.0055
173	0.0208	0.0151	0.0057
174	0.0211	0.0154	0.0058
175	0.0219	0.0159	0.0060
176	0.0223	0.0162	0.0061
177	0.0233	0.0169	0.0063
178	0.0238	0.0173	0.0065
179	0.0249	0.0181	0.0068
180	0.0255	0.0186	0.0070
181	0.0270	0.0196	0.0074
182	0.0278	0.0202	0.0076
183	0.0296	0.0216	0.0081
184	0.0307	0.0223	0.0084
185	0.0202	0.0147	0.0055
186	0.0215	0.0156	0.0059
187	0.0249	0.0181	0.0068
188	0.0272	0.0198	0.0074
189	0.0339	0.0246	0.0092
190	0.0390	0.0284	0.0106
191	0.0592	0.0431	0.0161
192	0.0859	0.0482	0.0377
193	0.3717	0.0482	0.3235
194	0.0466	0.0339	0.0127
195	0.0301	0.0219	0.0082
196	0.0231	0.0168	0.0063
197	0.0319	0.0232	0.0087
198	0.0287	0.0208	0.0078
199	0.0262	0.0191	0.0072
200	0.0243	0.0177	0.0066
201	0.0228	0.0166	0.0062
202	0.0215	0.0156	0.0059
203	0.0204	0.0149	0.0056

204	0.0195	0.0142	0.0053
205	0.0186	0.0135	0.0051
206	0.0179	0.0130	0.0049
207	0.0172	0.0125	0.0047
208	0.0167	0.0121	0.0045
209	0.0161	0.0117	0.0044
210	0.0157	0.0114	0.0043
211	0.0152	0.0111	0.0041
212	0.0148	0.0108	0.0040
213	0.0144	0.0105	0.0039
214	0.0141	0.0102	0.0038
215	0.0138	0.0100	0.0038
216	0.0135	0.0098	0.0037
217	0.0133	0.0097	0.0036
218	0.0130	0.0095	0.0036
219	0.0128	0.0093	0.0035
220	0.0125	0.0091	0.0034
221	0.0123	0.0090	0.0034
222	0.0121	0.0088	0.0033
223	0.0119	0.0087	0.0032
224	0.0117	0.0085	0.0032
225	0.0115	0.0084	0.0031
226	0.0114	0.0083	0.0031
227	0.0112	0.0081	0.0031
228	0.0110	0.0080	0.0030
229	0.0109	0.0079	0.0030
230	0.0107	0.0078	0.0029
231	0.0106	0.0077	0.0029
232	0.0105	0.0076	0.0028
233	0.0103	0.0075	0.0028
234	0.0102	0.0074	0.0028
235	0.0101	0.0073	0.0027
236	0.0100	0.0072	0.0027
237	0.0098	0.0072	0.0027
238	0.0097	0.0071	0.0027
239	0.0096	0.0070	0.0026
240	0.0095	0.0069	0.0026
241	0.0094	0.0069	0.0026
242	0.0093	0.0068	0.0025
243	0.0092	0.0067	0.0025
244	0.0092	0.0067	0.0025
245	0.0091	0.0066	0.0025
246	0.0090	0.0065	0.0024
247	0.0089	0.0065	0.0024
248	0.0088	0.0064	0.0024
249	0.0087	0.0064	0.0024
250	0.0087	0.0063	0.0024
251	0.0086	0.0062	0.0023
252	0.0085	0.0062	0.0023
253	0.0084	0.0061	0.0023

254	0.0084	0.0061	0.0023
255	0.0083	0.0060	0.0023
256	0.0082	0.0060	0.0022
257	0.0082	0.0059	0.0022
258	0.0081	0.0059	0.0022
259	0.0081	0.0059	0.0022
260	0.0080	0.0058	0.0022
261	0.0079	0.0058	0.0022
262	0.0079	0.0057	0.0021
263	0.0078	0.0057	0.0021
264	0.0078	0.0056	0.0021
265	0.0077	0.0056	0.0021
266	0.0077	0.0056	0.0021
267	0.0076	0.0055	0.0021
268	0.0076	0.0055	0.0021
269	0.0075	0.0055	0.0020
270	0.0075	0.0054	0.0020
271	0.0074	0.0054	0.0020
272	0.0074	0.0054	0.0020
273	0.0073	0.0053	0.0020
274	0.0073	0.0053	0.0020
275	0.0072	0.0053	0.0020
276	0.0072	0.0052	0.0020
277	0.0071	0.0052	0.0019
278	0.0071	0.0052	0.0019
279	0.0071	0.0051	0.0019
280	0.0070	0.0051	0.0019
281	0.0070	0.0051	0.0019
282	0.0069	0.0050	0.0019
283	0.0069	0.0050	0.0019
284	0.0069	0.0050	0.0019
285	0.0068	0.0050	0.0019
286	0.0068	0.0049	0.0019
287	0.0068	0.0049	0.0018
288	0.0067	0.0049	0.0018

Total soil rain loss = 2.55(In)
Total effective rainfall = 1.28(In)
Peak flow rate in flood hydrograph = 34.45(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 10.0 20.0 30.0 40.0

0+ 5	0.0001	0.01	Q				
0+10	0.0004	0.04	Q				
0+15	0.0012	0.11	Q				
0+20	0.0030	0.27	Q				
0+25	0.0059	0.43	Q				
0+30	0.0096	0.54	Q				
0+35	0.0138	0.61	Q				
0+40	0.0184	0.66	Q				
0+45	0.0233	0.71	Q				
0+50	0.0284	0.74	Q				
0+55	0.0337	0.77	Q				
1+ 0	0.0392	0.80	Q				
1+ 5	0.0449	0.82	Q				
1+10	0.0506	0.84	Q				
1+15	0.0566	0.86	Q				
1+20	0.0626	0.87	Q				
1+25	0.0687	0.89	Q				
1+30	0.0749	0.90	Q				
1+35	0.0811	0.91	Q				
1+40	0.0875	0.92	Q				
1+45	0.0939	0.93	Q				
1+50	0.1004	0.94	Q				
1+55	0.1069	0.95	Q				
2+ 0	0.1135	0.96	Q				
2+ 5	0.1201	0.96	QV				
2+10	0.1268	0.97	QV				
2+15	0.1335	0.98	QV				
2+20	0.1403	0.98	QV				
2+25	0.1471	0.99	QV				
2+30	0.1539	0.99	QV				
2+35	0.1607	1.00	QV				
2+40	0.1676	1.00	|Q				
2+45	0.1746	1.01	|Q				
2+50	0.1815	1.01	|Q				
2+55	0.1885	1.02	|Q				
3+ 0	0.1956	1.02	|Q				
3+ 5	0.2026	1.03	|Q				
3+10	0.2097	1.03	|Q				
3+15	0.2168	1.03	|Q				
3+20	0.2240	1.04	|Q				
3+25	0.2311	1.04	|QV				
3+30	0.2383	1.04	|QV				
3+35	0.2455	1.05	|QV				
3+40	0.2527	1.05	|QV				
3+45	0.2600	1.05	|QV				
3+50	0.2673	1.06	|QV				
3+55	0.2746	1.06	|QV				
4+ 0	0.2819	1.06	|QV				
4+ 5	0.2892	1.07	|QV				
4+10	0.2966	1.07	|QV				

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4+15       0.3040      1.07  |QV       |         |         |         |
4+20       0.3114      1.08  |QV       |         |         |         |
4+25       0.3188      1.08  |QV       |         |         |         |
4+30       0.3263      1.08  |QV       |         |         |         |
4+35       0.3338      1.09  |QV       |         |         |         |
4+40       0.3413      1.09  |QV       |         |         |         |
4+45       0.3489      1.10  |Q V      |         |         |         |
4+50       0.3564      1.10  |Q V      |         |         |         |
4+55       0.3640      1.10  |Q V      |         |         |         |
5+ 0       0.3717      1.11  |Q V      |         |         |         |
5+ 5       0.3793      1.11  |Q V      |         |         |         |
5+10       0.3870      1.12  |Q V      |         |         |         |
5+15       0.3947      1.12  |Q V      |         |         |         |
5+20       0.4024      1.12  |Q V      |         |         |         |
5+25       0.4102      1.13  |Q V      |         |         |         |
5+30       0.4180      1.13  |Q V      |         |         |         |
5+35       0.4258      1.14  |Q V      |         |         |         |
5+40       0.4337      1.14  |Q V      |         |         |         |
5+45       0.4416      1.14  |Q V      |         |         |         |
5+50       0.4495      1.15  |Q V      |         |         |         |
5+55       0.4574      1.15  |Q V      |         |         |         |
6+ 0       0.4654      1.16  |Q  V     |         |         |         |
6+ 5       0.4734      1.16  |Q  V     |         |         |         |
6+10       0.4814      1.17  |Q  V     |         |         |         |
6+15       0.4895      1.17  |Q  V     |         |         |         |
6+20       0.4976      1.18  |Q  V     |         |         |         |
6+25       0.5057      1.18  |Q  V     |         |         |         |
6+30       0.5139      1.19  |Q  V     |         |         |         |
6+35       0.5221      1.19  |Q  V     |         |         |         |
6+40       0.5303      1.20  |Q  V     |         |         |         |
6+45       0.5386      1.20  |Q  V     |         |         |         |
6+50       0.5469      1.21  |Q  V     |         |         |         |
6+55       0.5553      1.21  |Q  V     |         |         |         |
7+ 0       0.5636      1.22  |Q  V     |         |         |         |
7+ 5       0.5720      1.22  |Q  V     |         |         |         |
7+10       0.5805      1.23  |Q   V    |         |         |         |
7+15       0.5890      1.23  |Q   V    |         |         |         |
7+20       0.5975      1.24  |Q   V    |         |         |         |
7+25       0.6061      1.24  |Q   V    |         |         |         |
7+30       0.6147      1.25  |Q   V    |         |         |         |
7+35       0.6233      1.25  |Q   V    |         |         |         |
7+40       0.6320      1.26  |Q   V    |         |         |         |
7+45       0.6407      1.27  |Q   V    |         |         |         |
7+50       0.6495      1.27  |Q   V    |         |         |         |
7+55       0.6583      1.28  |Q   V    |         |         |         |
8+ 0       0.6671      1.28  |Q   V    |         |         |         |
8+ 5       0.6760      1.29  |Q   V    |         |         |         |
8+10       0.6850      1.30  |Q   V    |         |         |         |
8+15       0.6939      1.30  |Q    V   |         |         |         |
8+20       0.7030      1.31  |Q    V   |         |         |         |
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8+25	0.7120	1.32	Q V				
8+30	0.7211	1.32	Q V				
8+35	0.7303	1.33	Q V				
8+40	0.7395	1.34	Q V				
8+45	0.7488	1.34	Q V				
8+50	0.7581	1.35	Q V				
8+55	0.7674	1.36	Q V				
9+ 0	0.7768	1.37	Q V				
9+ 5	0.7863	1.37	Q V				
9+10	0.7958	1.38	Q V				
9+15	0.8054	1.39	Q V				
9+20	0.8150	1.40	Q V				
9+25	0.8247	1.40	Q V				
9+30	0.8344	1.41	Q V				
9+35	0.8442	1.42	Q V				
9+40	0.8540	1.43	Q V				
9+45	0.8639	1.44	Q V				
9+50	0.8739	1.45	Q V				
9+55	0.8839	1.46	Q V				
10+ 0	0.8940	1.47	Q V				
10+ 5	0.9042	1.47	Q V				
10+10	0.9144	1.48	Q V				
10+15	0.9247	1.49	Q V				
10+20	0.9350	1.50	Q V				
10+25	0.9455	1.51	Q V				
10+30	0.9560	1.52	Q V				
10+35	0.9665	1.53	Q V				
10+40	0.9772	1.54	Q V				
10+45	0.9879	1.56	Q V				
10+50	0.9987	1.57	Q V				
10+55	1.0095	1.58	Q V				
11+ 0	1.0205	1.59	Q V				
11+ 5	1.0315	1.60	Q V				
11+10	1.0426	1.61	Q V				
11+15	1.0538	1.63	Q V				
11+20	1.0651	1.64	Q V				
11+25	1.0765	1.65	Q V				
11+30	1.0880	1.67	Q V				
11+35	1.0995	1.68	Q V				
11+40	1.1112	1.69	Q V				
11+45	1.1230	1.71	Q V				
11+50	1.1348	1.72	Q V				
11+55	1.1468	1.74	Q V				
12+ 0	1.1589	1.75	Q V				
12+ 5	1.1711	1.77	Q V				
12+10	1.1833	1.79	Q V				
12+15	1.1958	1.80	Q V				
12+20	1.2083	1.82	Q V				
12+25	1.2209	1.83	Q V				
12+30	1.2336	1.85	Q V				

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12+35       1.2464      1.87  |Q        V         |         |          |
12+40       1.2594      1.88  |Q        V         |         |          |
12+45       1.2725      1.90  |Q        |V        |         |          |
12+50       1.2858      1.92  |Q        |V        |         |          |
12+55       1.2992      1.95  |Q        |V        |         |          |
13+ 0       1.3128      1.97  |Q        |V        |         |          |
13+ 5       1.3265      1.99  |Q        |V        |         |          |
13+10       1.3403      2.02  | Q       |V        |         |          |
13+15       1.3544      2.04  | Q       |V        |         |          |
13+20       1.3686      2.07  | Q       |V        |         |          |
13+25       1.3830      2.09  | Q       | V       |         |          |
13+30       1.3976      2.12  | Q       | V       |         |          |
13+35       1.4125      2.15  | Q       | V       |         |          |
13+40       1.4275      2.18  | Q       | V       |         |          |
13+45       1.4427      2.21  | Q       | V       |         |          |
13+50       1.4582      2.25  | Q       | V       |         |          |
13+55       1.4739      2.28  | Q       | V       |         |          |
14+ 0       1.4899      2.32  | Q       |  V      |         |          |
14+ 5       1.5061      2.36  | Q       |  V      |         |          |
14+10       1.5226      2.40  | Q       |  V      |         |          |
14+15       1.5395      2.44  | Q       |  V      |         |          |
14+20       1.5566      2.49  | Q       |  V      |         |          |
14+25       1.5741      2.54  | Q       |  V      |         |          |
14+30       1.5919      2.59  | Q       |  V      |         |          |
14+35       1.6102      2.65  | Q       |   V     |         |          |
14+40       1.6288      2.71  | Q       |   V     |         |          |
14+45       1.6479      2.77  | Q       |   V     |         |          |
14+50       1.6674      2.84  | Q       |   V     |         |          |
14+55       1.6874      2.91  | Q       |   V     |         |          |
15+ 0       1.7080      2.99  | Q       |   V     |         |          |
15+ 5       1.7292      3.07  |  Q      |    V    |         |          |
15+10       1.7510      3.17  |  Q      |    V    |         |          |
15+15       1.7736      3.27  |  Q      |    V    |         |          |
15+20       1.7969      3.39  |  Q      |    V    |         |          |
15+25       1.8210      3.50  |  Q      |    V    |         |          |
15+30       1.8457      3.58  |  Q      |     V   |         |          |
15+35       1.8705      3.61  |  Q      |     V   |         |          |
15+40       1.8947      3.51  |  Q      |     V   |         |          |
15+45       1.9182      3.41  |  Q      |     V   |         |          |
15+50       1.9421      3.48  |  Q      |     V   |         |          |
15+55       1.9676      3.69  |  Q      |      V  |         |          |
16+ 0       1.9965      4.20  |   Q     |      V  |         |          |
16+ 5       2.0425      6.68  |     Q   |      V  |         |          |
16+10       2.1253     12.03  |         | Q     V |         |          |
16+15       2.2584     19.33  |         |        Q|         |          |
16+20       2.4902     33.65  |         |         |V        |  Q       |
16+25       2.7274     34.45  |         |         |  V      |   Q      |
16+30       2.8958     24.44  |         |         |   QV    |          |
16+35       3.0170     17.60  |         |      Q  |     V   |          |
16+40       3.1138     14.06  |         |   Q     |      V  |          |
```

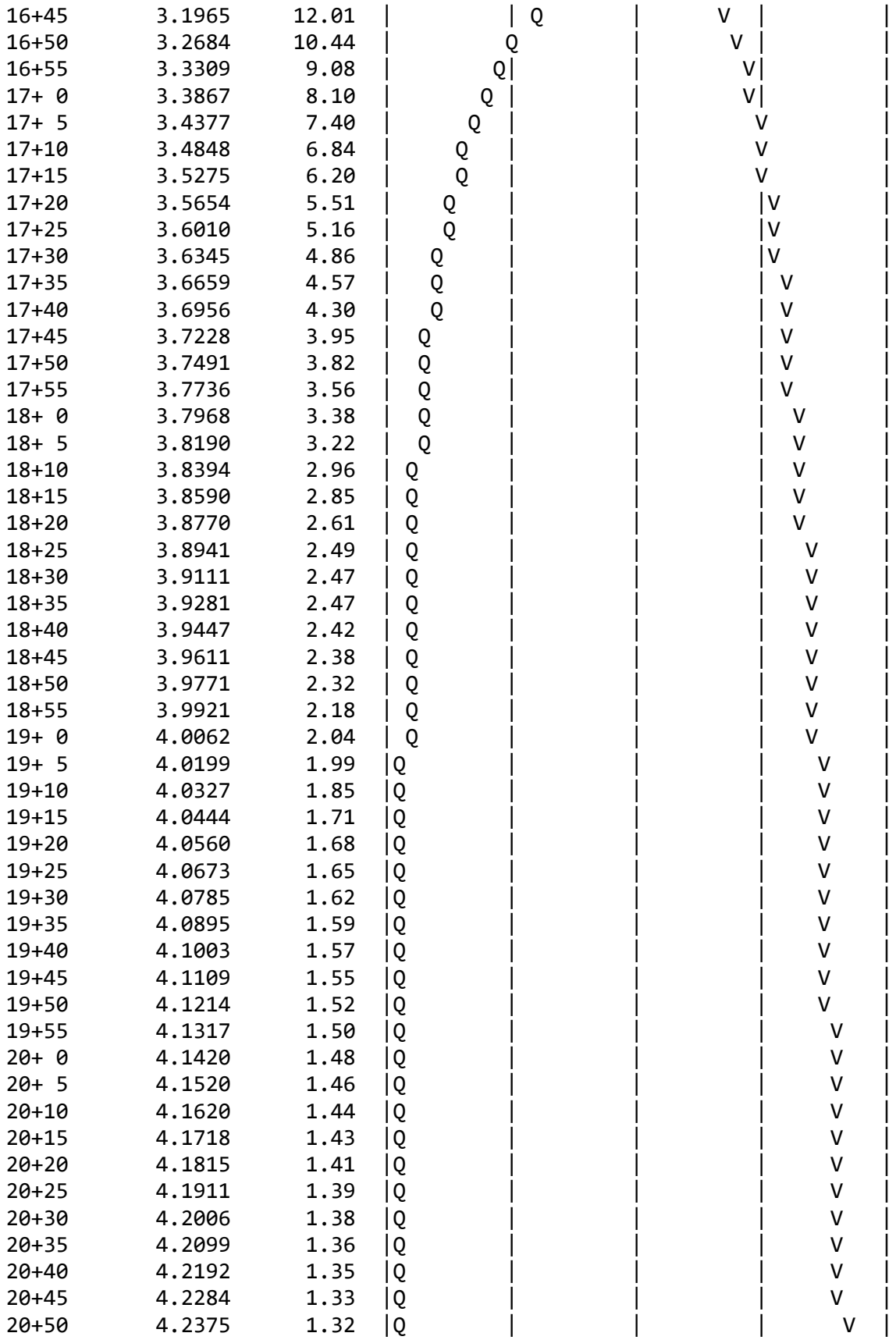

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  20+55       4.2465      1.31  |Q        |         |         |      V  |
  21+ 0       4.2554      1.29  |Q        |         |         |      V  |
  21+ 5       4.2642      1.28  |Q        |         |         |      V  |
  21+10       4.2729      1.27  |Q        |         |         |      V  |
  21+15       4.2815      1.26  |Q        |         |         |      V  |
  21+20       4.2901      1.24  |Q        |         |         |      V  |
  21+25       4.2986      1.23  |Q        |         |         |      V  |
  21+30       4.3070      1.22  |Q        |         |         |      V  |
  21+35       4.3154      1.21  |Q        |         |         |      V  |
  21+40       4.3236      1.20  |Q        |         |         |      V  |
  21+45       4.3318      1.19  |Q        |         |         |      V  |
  21+50       4.3400      1.18  |Q        |         |         |      V  |
  21+55       4.3480      1.17  |Q        |         |         |      V  |
  22+ 0       4.3560      1.16  |Q        |         |         |       V |
  22+ 5       4.3640      1.15  |Q        |         |         |       V |
  22+10       4.3718      1.14  |Q        |         |         |       V |
  22+15       4.3797      1.14  |Q        |         |         |       V |
  22+20       4.3874      1.13  |Q        |         |         |       V |
  22+25       4.3951      1.12  |Q        |         |         |       V |
  22+30       4.4028      1.11  |Q        |         |         |       V |
  22+35       4.4104      1.10  |Q        |         |         |       V |
  22+40       4.4179      1.09  |Q        |         |         |       V |
  22+45       4.4254      1.09  |Q        |         |         |       V |
  22+50       4.4328      1.08  |Q        |         |         |       V |
  22+55       4.4402      1.07  |Q        |         |         |       V |
  23+ 0       4.4476      1.07  |Q        |         |         |       V |
  23+ 5       4.4548      1.06  |Q        |         |         |       V |
  23+10       4.4621      1.05  |Q        |         |         |       V |
  23+15       4.4693      1.04  |Q        |         |         |        V|
  23+20       4.4764      1.04  |Q        |         |         |        V|
  23+25       4.4835      1.03  |Q        |         |         |        V|
  23+30       4.4906      1.03  |Q        |         |         |        V|
  23+35       4.4976      1.02  |Q        |         |         |        V|
  23+40       4.5046      1.01  |Q        |         |         |        V|
  23+45       4.5115      1.01  |Q        |         |         |        V|
  23+50       4.5184      1.00  |Q        |         |         |        V|
  23+55       4.5253      1.00  Q         |         |         |        V|
  24+ 0       4.5321      0.99  Q         |         |         |        V|
  24+ 5       4.5388      0.97  Q         |         |         |        V|
  24+10       4.5452      0.93  Q         |         |         |        V|
  24+15       4.5511      0.86  Q         |         |         |        V|
  24+20       4.5560      0.70  Q         |         |         |        V|
  24+25       4.5597      0.54  Q         |         |         |        V|
  24+30       4.5626      0.43  Q         |         |         |        V|
-------------------------------------------------------------------------
```

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

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Study date 11/29/20

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

Program License Serial Number 6277

2020-326 HCC V
PRE-DEVELOPMENT CONDITIONS
UNIT HYDROGRAPH - 10 YEAR STORM
DA B

Storm Event Year = 10

Antecedent Moisture Condition = 2

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 10		
15.20	1	0.79
Rainfall data for year 2		
15.20	6	1.12
Rainfall data for year 2		
15.20	24	2.11
Rainfall data for year 100		

```
            15.20            1            1.31
------------------------------------------------------------------------
Rainfall data for year 100
            15.20            6            3.05
------------------------------------------------------------------------
Rainfall data for year 100
            15.20           24            6.31
------------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

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


SCS curve  SCS curve     Area     Area     Fp(Fig C6)    Ap      Fm
No.(AMCII) NO.(AMC 2)    (Ac.)    Fraction     (In/Hr)  (dec.)   (In/Hr)
 67.0      67.0         15.20      1.000     0.578    1.000    0.578

Area-averaged adjusted loss rate Fm (In/Hr) =  0.578

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

Area       Area          SCS CN    SCS CN      S     Pervious
 (Ac.)      Fract         (AMC2)    (AMC2)           Yield Fr
    15.20   1.000         67.0      67.0       4.93     0.273

Area-averaged catchment yield fraction, Y =  0.273
Area-averaged low loss fraction, Yb =  0.727
User entry of time of concentration  =   0.306 (hours)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watershed area =      15.20(Ac.)
Catchment Lag time =   0.245 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 34.0414
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.578(In/Hr)
Average low loss rate fraction (Yb) = 0.727 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall =  0.372(In)
Computed peak 30-minute rainfall =  0.638(In)
Specified peak 1-hour rainfall =  0.785(In)
Computed peak 3-hour rainfall =  1.356(In)
Specified peak 6-hour rainfall =  1.914(In)
Specified peak 24-hour rainfall =  3.838(In)


Rainfall depth area reduction factors:
Using a total area of      15.20(Ac.) (Ref: fig. E-4)

5-minute factor = 0.999     Adjusted rainfall =  0.372(In)
30-minute factor = 0.999    Adjusted rainfall =  0.637(In)
```

1-hour factor = 0.999 Adjusted rainfall = 0.784(In)
3-hour factor = 1.000 Adjusted rainfall = 1.356(In)
6-hour factor = 1.000 Adjusted rainfall = 1.914(In)
24-hour factor = 1.000 Adjusted rainfall = 3.838(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 = 183.82 (CFS))	
1	2.139	3.932
2	12.508	19.061
3	39.144	48.963
4	58.705	35.957
5	69.161	19.221
6	76.101	12.758
7	81.045	9.088
8	84.786	6.876
9	87.835	5.605
10	90.090	4.145
11	91.946	3.413
12	93.514	2.883
13	94.768	2.304
14	95.842	1.975
15	96.720	1.615
16	97.398	1.245
17	97.913	0.948
18	98.262	0.641
19	98.657	0.726
20	99.066	0.751
21	99.456	0.717
22	99.699	0.448
23	100.000	0.224

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.3722	0.3722
2	0.4583	0.0860
3	0.5175	0.0593
4	0.5642	0.0467
5	0.6032	0.0391
6	0.6372	0.0339
7	0.6673	0.0302
8	0.6946	0.0273
9	0.7196	0.0250
10	0.7427	0.0231
11	0.7642	0.0215

12	0.7844	0.0202
13	0.8163	0.0319
14	0.8470	0.0307
15	0.8766	0.0296
16	0.9053	0.0286
17	0.9330	0.0277
18	0.9600	0.0269
19	0.9862	0.0262
20	1.0117	0.0255
21	1.0366	0.0249
22	1.0608	0.0243
23	1.0846	0.0237
24	1.1078	0.0232
25	1.1306	0.0228
26	1.1529	0.0223
27	1.1748	0.0219
28	1.1962	0.0215
29	1.2173	0.0211
30	1.2380	0.0207
31	1.2584	0.0204
32	1.2785	0.0201
33	1.2982	0.0197
34	1.3177	0.0194
35	1.3368	0.0192
36	1.3557	0.0189
37	1.3743	0.0186
38	1.3927	0.0184
39	1.4108	0.0181
40	1.4287	0.0179
41	1.4463	0.0177
42	1.4638	0.0174
43	1.4810	0.0172
44	1.4980	0.0170
45	1.5149	0.0168
46	1.5315	0.0167
47	1.5480	0.0165
48	1.5643	0.0163
49	1.5804	0.0161
50	1.5964	0.0160
51	1.6122	0.0158
52	1.6279	0.0156
53	1.6434	0.0155
54	1.6587	0.0154
55	1.6739	0.0152
56	1.6890	0.0151
57	1.7039	0.0149
58	1.7187	0.0148
59	1.7334	0.0147
60	1.7480	0.0146
61	1.7624	0.0144

62	1.7767	0.0143
63	1.7909	0.0142
64	1.8050	0.0141
65	1.8190	0.0140
66	1.8328	0.0139
67	1.8466	0.0138
68	1.8603	0.0137
69	1.8738	0.0136
70	1.8873	0.0135
71	1.9007	0.0134
72	1.9139	0.0133
73	1.9272	0.0133
74	1.9404	0.0132
75	1.9535	0.0131
76	1.9666	0.0130
77	1.9795	0.0129
78	1.9924	0.0129
79	2.0052	0.0128
80	2.0179	0.0127
81	2.0305	0.0126
82	2.0430	0.0125
83	2.0555	0.0125
84	2.0679	0.0124
85	2.0802	0.0123
86	2.0924	0.0122
87	2.1046	0.0122
88	2.1167	0.0121
89	2.1288	0.0120
90	2.1407	0.0120
91	2.1526	0.0119
92	2.1645	0.0118
93	2.1763	0.0118
94	2.1880	0.0117
95	2.1996	0.0117
96	2.2112	0.0116
97	2.2227	0.0115
98	2.2342	0.0115
99	2.2456	0.0114
100	2.2570	0.0114
101	2.2683	0.0113
102	2.2795	0.0112
103	2.2907	0.0112
104	2.3018	0.0111
105	2.3129	0.0111
106	2.3240	0.0110
107	2.3349	0.0110
108	2.3459	0.0109
109	2.3567	0.0109
110	2.3676	0.0108
111	2.3783	0.0108

112	2.3891	0.0107
113	2.3998	0.0107
114	2.4104	0.0106
115	2.4210	0.0106
116	2.4315	0.0105
117	2.4420	0.0105
118	2.4525	0.0105
119	2.4629	0.0104
120	2.4732	0.0104
121	2.4836	0.0103
122	2.4938	0.0103
123	2.5041	0.0102
124	2.5143	0.0102
125	2.5244	0.0102
126	2.5346	0.0101
127	2.5446	0.0101
128	2.5547	0.0100
129	2.5647	0.0100
130	2.5746	0.0100
131	2.5845	0.0099
132	2.5944	0.0099
133	2.6043	0.0098
134	2.6141	0.0098
135	2.6239	0.0098
136	2.6336	0.0097
137	2.6433	0.0097
138	2.6530	0.0097
139	2.6626	0.0096
140	2.6722	0.0096
141	2.6817	0.0096
142	2.6913	0.0095
143	2.7008	0.0095
144	2.7102	0.0095
145	2.7197	0.0094
146	2.7291	0.0094
147	2.7384	0.0094
148	2.7478	0.0093
149	2.7571	0.0093
150	2.7663	0.0093
151	2.7756	0.0092
152	2.7848	0.0092
153	2.7940	0.0092
154	2.8031	0.0092
155	2.8122	0.0091
156	2.8213	0.0091
157	2.8304	0.0091
158	2.8394	0.0090
159	2.8484	0.0090
160	2.8574	0.0090
161	2.8663	0.0089

162	2.8753	0.0089
163	2.8842	0.0089
164	2.8930	0.0089
165	2.9019	0.0088
166	2.9107	0.0088
167	2.9195	0.0088
168	2.9282	0.0088
169	2.9370	0.0087
170	2.9457	0.0087
171	2.9544	0.0087
172	2.9630	0.0087
173	2.9717	0.0086
174	2.9803	0.0086
175	2.9888	0.0086
176	2.9974	0.0086
177	3.0059	0.0085
178	3.0144	0.0085
179	3.0229	0.0085
180	3.0314	0.0085
181	3.0398	0.0084
182	3.0483	0.0084
183	3.0567	0.0084
184	3.0650	0.0084
185	3.0734	0.0083
186	3.0817	0.0083
187	3.0900	0.0083
188	3.0983	0.0083
189	3.1065	0.0083
190	3.1148	0.0082
191	3.1230	0.0082
192	3.1312	0.0082
193	3.1394	0.0082
194	3.1475	0.0082
195	3.1557	0.0081
196	3.1638	0.0081
197	3.1719	0.0081
198	3.1799	0.0081
199	3.1880	0.0081
200	3.1960	0.0080
201	3.2040	0.0080
202	3.2120	0.0080
203	3.2200	0.0080
204	3.2279	0.0080
205	3.2359	0.0079
206	3.2438	0.0079
207	3.2517	0.0079
208	3.2595	0.0079
209	3.2674	0.0079
210	3.2752	0.0078
211	3.2831	0.0078

212	3.2909	0.0078
213	3.2986	0.0078
214	3.3064	0.0078
215	3.3141	0.0077
216	3.3219	0.0077
217	3.3296	0.0077
218	3.3373	0.0077
219	3.3449	0.0077
220	3.3526	0.0077
221	3.3602	0.0076
222	3.3679	0.0076
223	3.3755	0.0076
224	3.3831	0.0076
225	3.3906	0.0076
226	3.3982	0.0076
227	3.4057	0.0075
228	3.4132	0.0075
229	3.4208	0.0075
230	3.4282	0.0075
231	3.4357	0.0075
232	3.4432	0.0075
233	3.4506	0.0074
234	3.4580	0.0074
235	3.4654	0.0074
236	3.4728	0.0074
237	3.4802	0.0074
238	3.4876	0.0074
239	3.4949	0.0073
240	3.5023	0.0073
241	3.5096	0.0073
242	3.5169	0.0073
243	3.5242	0.0073
244	3.5314	0.0073
245	3.5387	0.0073
246	3.5459	0.0072
247	3.5532	0.0072
248	3.5604	0.0072
249	3.5676	0.0072
250	3.5747	0.0072
251	3.5819	0.0072
252	3.5891	0.0072
253	3.5962	0.0071
254	3.6033	0.0071
255	3.6105	0.0071
256	3.6176	0.0071
257	3.6246	0.0071
258	3.6317	0.0071
259	3.6388	0.0071
260	3.6458	0.0070
261	3.6528	0.0070

262	3.6599	0.0070
263	3.6669	0.0070
264	3.6739	0.0070
265	3.6808	0.0070
266	3.6878	0.0070
267	3.6947	0.0070
268	3.7017	0.0069
269	3.7086	0.0069
270	3.7155	0.0069
271	3.7224	0.0069
272	3.7293	0.0069
273	3.7362	0.0069
274	3.7430	0.0069
275	3.7499	0.0068
276	3.7567	0.0068
277	3.7636	0.0068
278	3.7704	0.0068
279	3.7772	0.0068
280	3.7840	0.0068
281	3.7907	0.0068
282	3.7975	0.0068
283	3.8043	0.0068
284	3.8110	0.0067
285	3.8177	0.0067
286	3.8244	0.0067
287	3.8311	0.0067
288	3.8378	0.0067

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0067	0.0049	0.0018
2	0.0067	0.0049	0.0018
3	0.0067	0.0049	0.0018
4	0.0067	0.0049	0.0018
5	0.0068	0.0049	0.0018
6	0.0068	0.0049	0.0018
7	0.0068	0.0049	0.0019
8	0.0068	0.0050	0.0019
9	0.0068	0.0050	0.0019
10	0.0068	0.0050	0.0019
11	0.0069	0.0050	0.0019
12	0.0069	0.0050	0.0019
13	0.0069	0.0050	0.0019
14	0.0069	0.0050	0.0019
15	0.0070	0.0051	0.0019
16	0.0070	0.0051	0.0019
17	0.0070	0.0051	0.0019
18	0.0070	0.0051	0.0019

19	0.0070	0.0051	0.0019
20	0.0070	0.0051	0.0019
21	0.0071	0.0051	0.0019
22	0.0071	0.0052	0.0019
23	0.0071	0.0052	0.0019
24	0.0071	0.0052	0.0019
25	0.0072	0.0052	0.0020
26	0.0072	0.0052	0.0020
27	0.0072	0.0052	0.0020
28	0.0072	0.0052	0.0020
29	0.0072	0.0053	0.0020
30	0.0073	0.0053	0.0020
31	0.0073	0.0053	0.0020
32	0.0073	0.0053	0.0020
33	0.0073	0.0053	0.0020
34	0.0073	0.0053	0.0020
35	0.0074	0.0054	0.0020
36	0.0074	0.0054	0.0020
37	0.0074	0.0054	0.0020
38	0.0074	0.0054	0.0020
39	0.0075	0.0054	0.0020
40	0.0075	0.0054	0.0020
41	0.0075	0.0055	0.0021
42	0.0075	0.0055	0.0021
43	0.0076	0.0055	0.0021
44	0.0076	0.0055	0.0021
45	0.0076	0.0055	0.0021
46	0.0076	0.0056	0.0021
47	0.0077	0.0056	0.0021
48	0.0077	0.0056	0.0021
49	0.0077	0.0056	0.0021
50	0.0077	0.0056	0.0021
51	0.0078	0.0057	0.0021
52	0.0078	0.0057	0.0021
53	0.0078	0.0057	0.0021
54	0.0079	0.0057	0.0021
55	0.0079	0.0057	0.0022
56	0.0079	0.0058	0.0022
57	0.0080	0.0058	0.0022
58	0.0080	0.0058	0.0022
59	0.0080	0.0058	0.0022
60	0.0080	0.0058	0.0022
61	0.0081	0.0059	0.0022
62	0.0081	0.0059	0.0022
63	0.0081	0.0059	0.0022
64	0.0082	0.0059	0.0022
65	0.0082	0.0060	0.0022
66	0.0082	0.0060	0.0022
67	0.0083	0.0060	0.0023
68	0.0083	0.0060	0.0023

69	0.0083	0.0061	0.0023
70	0.0083	0.0061	0.0023
71	0.0084	0.0061	0.0023
72	0.0084	0.0061	0.0023
73	0.0085	0.0062	0.0023
74	0.0085	0.0062	0.0023
75	0.0085	0.0062	0.0023
76	0.0086	0.0062	0.0023
77	0.0086	0.0063	0.0023
78	0.0086	0.0063	0.0024
79	0.0087	0.0063	0.0024
80	0.0087	0.0063	0.0024
81	0.0088	0.0064	0.0024
82	0.0088	0.0064	0.0024
83	0.0088	0.0064	0.0024
84	0.0089	0.0064	0.0024
85	0.0089	0.0065	0.0024
86	0.0089	0.0065	0.0024
87	0.0090	0.0066	0.0025
88	0.0090	0.0066	0.0025
89	0.0091	0.0066	0.0025
90	0.0091	0.0066	0.0025
91	0.0092	0.0067	0.0025
92	0.0092	0.0067	0.0025
93	0.0093	0.0067	0.0025
94	0.0093	0.0068	0.0025
95	0.0094	0.0068	0.0026
96	0.0094	0.0068	0.0026
97	0.0095	0.0069	0.0026
98	0.0095	0.0069	0.0026
99	0.0096	0.0070	0.0026
100	0.0096	0.0070	0.0026
101	0.0097	0.0070	0.0026
102	0.0097	0.0071	0.0026
103	0.0098	0.0071	0.0027
104	0.0098	0.0071	0.0027
105	0.0099	0.0072	0.0027
106	0.0099	0.0072	0.0027
107	0.0100	0.0073	0.0027
108	0.0100	0.0073	0.0027
109	0.0101	0.0074	0.0028
110	0.0102	0.0074	0.0028
111	0.0102	0.0074	0.0028
112	0.0103	0.0075	0.0028
113	0.0104	0.0075	0.0028
114	0.0104	0.0076	0.0028
115	0.0105	0.0076	0.0029
116	0.0105	0.0077	0.0029
117	0.0106	0.0077	0.0029
118	0.0107	0.0078	0.0029

119	0.0108	0.0078	0.0029
120	0.0108	0.0079	0.0030
121	0.0109	0.0079	0.0030
122	0.0110	0.0080	0.0030
123	0.0111	0.0081	0.0030
124	0.0111	0.0081	0.0030
125	0.0112	0.0082	0.0031
126	0.0113	0.0082	0.0031
127	0.0114	0.0083	0.0031
128	0.0115	0.0083	0.0031
129	0.0116	0.0084	0.0032
130	0.0117	0.0085	0.0032
131	0.0118	0.0086	0.0032
132	0.0118	0.0086	0.0032
133	0.0120	0.0087	0.0033
134	0.0120	0.0088	0.0033
135	0.0122	0.0089	0.0033
136	0.0122	0.0089	0.0033
137	0.0124	0.0090	0.0034
138	0.0125	0.0091	0.0034
139	0.0126	0.0092	0.0034
140	0.0127	0.0092	0.0035
141	0.0129	0.0094	0.0035
142	0.0129	0.0094	0.0035
143	0.0131	0.0095	0.0036
144	0.0132	0.0096	0.0036
145	0.0133	0.0097	0.0036
146	0.0134	0.0097	0.0036
147	0.0136	0.0099	0.0037
148	0.0137	0.0099	0.0037
149	0.0139	0.0101	0.0038
150	0.0140	0.0102	0.0038
151	0.0142	0.0103	0.0039
152	0.0143	0.0104	0.0039
153	0.0146	0.0106	0.0040
154	0.0147	0.0107	0.0040
155	0.0149	0.0109	0.0041
156	0.0151	0.0110	0.0041
157	0.0154	0.0112	0.0042
158	0.0155	0.0113	0.0042
159	0.0158	0.0115	0.0043
160	0.0160	0.0116	0.0044
161	0.0163	0.0119	0.0044
162	0.0165	0.0120	0.0045
163	0.0168	0.0123	0.0046
164	0.0170	0.0124	0.0046
165	0.0174	0.0127	0.0048
166	0.0177	0.0128	0.0048
167	0.0181	0.0132	0.0049
168	0.0184	0.0134	0.0050

169	0.0189	0.0137	0.0051
170	0.0192	0.0139	0.0052
171	0.0197	0.0144	0.0054
172	0.0201	0.0146	0.0055
173	0.0207	0.0151	0.0057
174	0.0211	0.0153	0.0057
175	0.0219	0.0159	0.0060
176	0.0223	0.0162	0.0061
177	0.0232	0.0169	0.0063
178	0.0237	0.0173	0.0065
179	0.0249	0.0181	0.0068
180	0.0255	0.0186	0.0070
181	0.0269	0.0196	0.0073
182	0.0277	0.0202	0.0076
183	0.0296	0.0215	0.0081
184	0.0307	0.0223	0.0084
185	0.0202	0.0147	0.0055
186	0.0215	0.0157	0.0059
187	0.0250	0.0182	0.0068
188	0.0273	0.0198	0.0074
189	0.0339	0.0247	0.0092
190	0.0391	0.0284	0.0106
191	0.0593	0.0431	0.0162
192	0.0860	0.0482	0.0378
193	0.3722	0.0482	0.3240
194	0.0467	0.0339	0.0127
195	0.0302	0.0219	0.0082
196	0.0231	0.0168	0.0063
197	0.0319	0.0232	0.0087
198	0.0286	0.0208	0.0078
199	0.0262	0.0191	0.0071
200	0.0243	0.0177	0.0066
201	0.0228	0.0165	0.0062
202	0.0215	0.0156	0.0059
203	0.0204	0.0148	0.0056
204	0.0194	0.0141	0.0053
205	0.0186	0.0135	0.0051
206	0.0179	0.0130	0.0049
207	0.0172	0.0125	0.0047
208	0.0167	0.0121	0.0045
209	0.0161	0.0117	0.0044
210	0.0156	0.0114	0.0043
211	0.0152	0.0111	0.0041
212	0.0148	0.0108	0.0040
213	0.0144	0.0105	0.0039
214	0.0141	0.0102	0.0038
215	0.0138	0.0100	0.0038
216	0.0135	0.0098	0.0037
217	0.0133	0.0097	0.0036
218	0.0130	0.0095	0.0036

219	0.0128	0.0093	0.0035
220	0.0125	0.0091	0.0034
221	0.0123	0.0090	0.0034
222	0.0121	0.0088	0.0033
223	0.0119	0.0087	0.0032
224	0.0117	0.0085	0.0032
225	0.0115	0.0084	0.0031
226	0.0114	0.0083	0.0031
227	0.0112	0.0081	0.0031
228	0.0110	0.0080	0.0030
229	0.0109	0.0079	0.0030
230	0.0107	0.0078	0.0029
231	0.0106	0.0077	0.0029
232	0.0105	0.0076	0.0028
233	0.0103	0.0075	0.0028
234	0.0102	0.0074	0.0028
235	0.0101	0.0073	0.0027
236	0.0100	0.0072	0.0027
237	0.0098	0.0072	0.0027
238	0.0097	0.0071	0.0027
239	0.0096	0.0070	0.0026
240	0.0095	0.0069	0.0026
241	0.0094	0.0069	0.0026
242	0.0093	0.0068	0.0025
243	0.0092	0.0067	0.0025
244	0.0092	0.0067	0.0025
245	0.0091	0.0066	0.0025
246	0.0090	0.0065	0.0024
247	0.0089	0.0065	0.0024
248	0.0088	0.0064	0.0024
249	0.0087	0.0064	0.0024
250	0.0087	0.0063	0.0024
251	0.0086	0.0062	0.0023
252	0.0085	0.0062	0.0023
253	0.0084	0.0061	0.0023
254	0.0084	0.0061	0.0023
255	0.0083	0.0060	0.0023
256	0.0082	0.0060	0.0022
257	0.0082	0.0059	0.0022
258	0.0081	0.0059	0.0022
259	0.0081	0.0059	0.0022
260	0.0080	0.0058	0.0022
261	0.0079	0.0058	0.0022
262	0.0079	0.0057	0.0021
263	0.0078	0.0057	0.0021
264	0.0078	0.0056	0.0021
265	0.0077	0.0056	0.0021
266	0.0077	0.0056	0.0021
267	0.0076	0.0055	0.0021
268	0.0076	0.0055	0.0021

269	0.0075	0.0055	0.0020
270	0.0075	0.0054	0.0020
271	0.0074	0.0054	0.0020
272	0.0074	0.0054	0.0020
273	0.0073	0.0053	0.0020
274	0.0073	0.0053	0.0020
275	0.0072	0.0053	0.0020
276	0.0072	0.0052	0.0020
277	0.0071	0.0052	0.0019
278	0.0071	0.0052	0.0019
279	0.0071	0.0051	0.0019
280	0.0070	0.0051	0.0019
281	0.0070	0.0051	0.0019
282	0.0069	0.0050	0.0019
283	0.0069	0.0050	0.0019
284	0.0069	0.0050	0.0019
285	0.0068	0.0050	0.0019
286	0.0068	0.0049	0.0019
287	0.0068	0.0049	0.0018
288	0.0067	0.0049	0.0018

Total soil rain loss = 2.55(In)
Total effective rainfall = 1.28(In)
Peak flow rate in flood hydrograph = 18.27(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	0.04	Q	|	|	|	|
0+15	0.0012	0.13	Q	|	|	|	|
0+20	0.0026	0.20	Q	|	|	|	|
0+25	0.0042	0.23	Q	|	|	|	|
0+30	0.0060	0.26	Q	|	|	|	|
0+35	0.0079	0.27	Q	|	|	|	|
0+40	0.0098	0.29	Q	|	|	|	|
0+45	0.0119	0.30	Q	|	|	|	|
0+50	0.0140	0.31	Q	|	|	|	|
0+55	0.0162	0.31	Q	|	|	|	|
1+ 0	0.0184	0.32	Q	|	|	|	|
1+ 5	0.0206	0.32	Q	|	|	|	|
1+10	0.0229	0.33	Q	|	|	|	|
1+15	0.0252	0.33	Q	|	|	|	|

1+20	0.0275	0.34	Q	|	|	|	|
1+25	0.0298	0.34	Q	|	|	|	|
1+30	0.0322	0.34	Q	|	|	|	|
1+35	0.0345	0.34	Q	|	|	|	|
1+40	0.0369	0.35	Q	|	|	|	|
1+45	0.0393	0.35	Q	|	|	|	|
1+50	0.0417	0.35	QV	|	|	|	|
1+55	0.0441	0.35	QV	|	|	|	|
2+ 0	0.0466	0.35	QV	|	|	|	|
2+ 5	0.0490	0.35	QV	|	|	|	|
2+10	0.0514	0.35	QV	|	|	|	|
2+15	0.0539	0.36	QV	|	|	|	|
2+20	0.0563	0.36	QV	|	|	|	|
2+25	0.0588	0.36	QV	|	|	|	|
2+30	0.0613	0.36	QV	|	|	|	|
2+35	0.0638	0.36	QV	|	|	|	|
2+40	0.0662	0.36	QV	|	|	|	|
2+45	0.0687	0.36	QV	|	|	|	|
2+50	0.0712	0.36	QV	|	|	|	|
2+55	0.0737	0.36	QV	|	|	|	|
3+ 0	0.0763	0.37	QV	|	|	|	|
3+ 5	0.0788	0.37	QV	|	|	|	|
3+10	0.0813	0.37	Q V	|	|	|	|
3+15	0.0838	0.37	Q V	|	|	|	|
3+20	0.0864	0.37	Q V	|	|	|	|
3+25	0.0889	0.37	Q V	|	|	|	|
3+30	0.0915	0.37	Q V	|	|	|	|
3+35	0.0941	0.37	Q V	|	|	|	|
3+40	0.0967	0.37	Q V	|	|	|	|
3+45	0.0992	0.38	Q V	|	|	|	|
3+50	0.1018	0.38	Q V	|	|	|	|
3+55	0.1045	0.38	Q V	|	|	|	|
4+ 0	0.1071	0.38	Q V	|	|	|	|
4+ 5	0.1097	0.38	Q V	|	|	|	|
4+10	0.1123	0.38	Q V	|	|	|	|
4+15	0.1150	0.38	Q V	|	|	|	|
4+20	0.1176	0.38	Q V	|	|	|	|
4+25	0.1203	0.39	Q V	|	|	|	|
4+30	0.1229	0.39	Q V	|	|	|	|
4+35	0.1256	0.39	Q V	|	|	|	|
4+40	0.1283	0.39	Q V	|	|	|	|
4+45	0.1310	0.39	Q V	|	|	|	|
4+50	0.1337	0.39	Q V	|	|	|	|
4+55	0.1364	0.39	Q V	|	|	|	|
5+ 0	0.1391	0.40	Q V	|	|	|	|
5+ 5	0.1419	0.40	Q V	|	|	|	|
5+10	0.1446	0.40	Q V	|	|	|	|
5+15	0.1474	0.40	Q V	|	|	|	|
5+20	0.1501	0.40	Q V	|	|	|	|
5+25	0.1529	0.40	Q V	|	|	|	|

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5+30       0.1557      0.40  Q  V      |          |          |          |
5+35       0.1585      0.41  Q  V      |          |          |          |
5+40       0.1613      0.41  Q  V      |          |          |          |
5+45       0.1641      0.41  Q   V     |          |          |          |
5+50       0.1670      0.41  Q   V     |          |          |          |
5+55       0.1698      0.41  Q   V     |          |          |          |
6+ 0       0.1727      0.41  Q   V     |          |          |          |
6+ 5       0.1755      0.42  Q   V     |          |          |          |
6+10       0.1784      0.42  Q   V     |          |          |          |
6+15       0.1813      0.42  Q   V     |          |          |          |
6+20       0.1842      0.42  Q   V     |          |          |          |
6+25       0.1871      0.42  Q   V     |          |          |          |
6+30       0.1900      0.42  Q   V     |          |          |          |
6+35       0.1930      0.43  Q   V     |          |          |          |
6+40       0.1959      0.43  Q   V     |          |          |          |
6+45       0.1989      0.43  Q   V     |          |          |          |
6+50       0.2018      0.43  Q   V     |          |          |          |
6+55       0.2048      0.43  Q    V    |          |          |          |
7+ 0       0.2078      0.44  Q    V    |          |          |          |
7+ 5       0.2108      0.44  Q    V    |          |          |          |
7+10       0.2139      0.44  Q    V    |          |          |          |
7+15       0.2169      0.44  Q    V    |          |          |          |
7+20       0.2200      0.44  Q    V    |          |          |          |
7+25       0.2230      0.45  Q    V    |          |          |          |
7+30       0.2261      0.45  Q    V    |          |          |          |
7+35       0.2292      0.45  Q    V    |          |          |          |
7+40       0.2323      0.45  Q    V    |          |          |          |
7+45       0.2354      0.45  Q    V    |          |          |          |
7+50       0.2386      0.46  Q    V    |          |          |          |
7+55       0.2417      0.46  Q    V    |          |          |          |
8+ 0       0.2449      0.46  Q     V   |          |          |          |
8+ 5       0.2481      0.46  Q     V   |          |          |          |
8+10       0.2513      0.47  Q     V   |          |          |          |
8+15       0.2545      0.47  Q     V   |          |          |          |
8+20       0.2578      0.47  Q     V   |          |          |          |
8+25       0.2610      0.47  Q     V   |          |          |          |
8+30       0.2643      0.47  Q     V   |          |          |          |
8+35       0.2676      0.48  Q     V   |          |          |          |
8+40       0.2709      0.48  Q     V   |          |          |          |
8+45       0.2742      0.48  Q     V   |          |          |          |
8+50       0.2775      0.49  Q     V   |          |          |          |
8+55       0.2809      0.49  Q     V   |          |          |          |
9+ 0       0.2843      0.49  Q      V  |          |          |          |
9+ 5       0.2877      0.49  Q      V  |          |          |          |
9+10       0.2911      0.50  Q      V  |          |          |          |
9+15       0.2945      0.50  Q      V  |          |          |          |
9+20       0.2980      0.50  |Q     V  |          |          |          |
9+25       0.3015      0.50  |Q     V  |          |          |          |
9+30       0.3050      0.51  |Q     V  |          |          |          |
9+35       0.3085      0.51  |Q     V  |          |          |          |
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 9+40       0.3120      0.51  |Q     V  |          |          |          |
 9+45       0.3156      0.52  |Q     V  |          |          |          |
 9+50       0.3192      0.52  |Q     V  |          |          |          |
 9+55       0.3228      0.52  |Q     V  |          |          |          |
10+ 0       0.3264      0.53  |Q      V |          |          |          |
10+ 5       0.3301      0.53  |Q      V |          |          |          |
10+10       0.3338      0.53  |Q      V |          |          |          |
10+15       0.3375      0.54  |Q      V |          |          |          |
10+20       0.3412      0.54  |Q      V |          |          |          |
10+25       0.3449      0.55  |Q      V |          |          |          |
10+30       0.3487      0.55  |Q      V |          |          |          |
10+35       0.3525      0.55  |Q      V |          |          |          |
10+40       0.3564      0.56  |Q      V |          |          |          |
10+45       0.3602      0.56  |Q      V |          |          |          |
10+50       0.3641      0.57  |Q      V |          |          |          |
10+55       0.3680      0.57  |Q       V|          |          |          |
11+ 0       0.3720      0.57  |Q       V|          |          |          |
11+ 5       0.3760      0.58  |Q       V|          |          |          |
11+10       0.3800      0.58  |Q       V|          |          |          |
11+15       0.3840      0.59  |Q       V|          |          |          |
11+20       0.3881      0.59  |Q       V|          |          |          |
11+25       0.3922      0.60  |Q       V|          |          |          |
11+30       0.3964      0.60  |Q       V|          |          |          |
11+35       0.4006      0.61  |Q       V|          |          |          |
11+40       0.4048      0.61  |Q       V|          |          |          |
11+45       0.4090      0.62  |Q        V          |          |          |
11+50       0.4133      0.62  |Q        V          |          |          |
11+55       0.4177      0.63  |Q        V          |          |          |
12+ 0       0.4221      0.64  |Q        V          |          |          |
12+ 5       0.4265      0.64  |Q        V          |          |          |
12+10       0.4309      0.65  |Q        V          |          |          |
12+15       0.4354      0.65  |Q        V          |          |          |
12+20       0.4399      0.66  |Q        V          |          |          |
12+25       0.4445      0.66  |Q        V          |          |          |
12+30       0.4491      0.67  |Q         |V         |          |          |
12+35       0.4538      0.68  |Q         |V         |          |          |
12+40       0.4585      0.68  |Q         |V         |          |          |
12+45       0.4633      0.69  |Q         |V         |          |          |
12+50       0.4681      0.70  |Q         |V         |          |          |
12+55       0.4730      0.71  |Q         |V         |          |          |
13+ 0       0.4779      0.72  |Q         |V         |          |          |
13+ 5       0.4829      0.73  |Q         |V         |          |          |
13+10       0.4880      0.74  |Q         | V        |          |          |
13+15       0.4931      0.75  |Q         | V        |          |          |
13+20       0.4983      0.76  |Q         | V        |          |          |
13+25       0.5036      0.77  |Q         | V        |          |          |
13+30       0.5089      0.78  |Q         | V        |          |          |
13+35       0.5144      0.79  |Q         | V        |          |          |
13+40       0.5199      0.80  |Q         | V        |          |          |
13+45       0.5255      0.81  |Q         | V        |          |          |
```

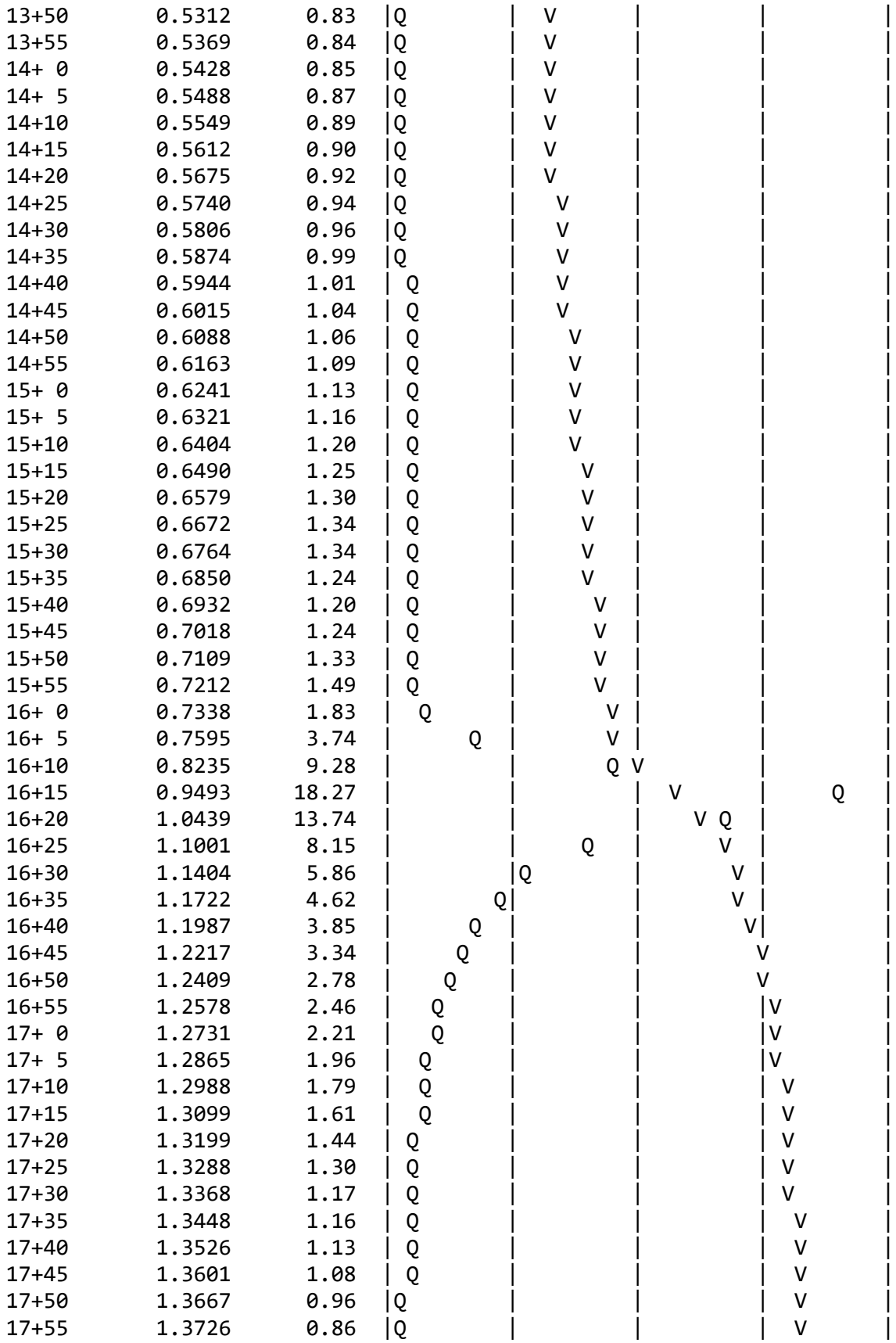

18+ 0	1.3779	0.77	Q			V	
18+ 5	1.3830	0.74	Q			V	
18+10	1.3880	0.73	Q			V	
18+15	1.3929	0.71	Q			V	
18+20	1.3977	0.69	Q			V	
18+25	1.4024	0.68	Q			V	
18+30	1.4069	0.66	Q			V	
18+35	1.4114	0.65	Q			V	
18+40	1.4158	0.64	Q			V	
18+45	1.4201	0.62	Q			V	
18+50	1.4243	0.61	Q			V	
18+55	1.4285	0.60	Q			V	
19+ 0	1.4325	0.59	Q			V	
19+ 5	1.4366	0.58	Q			V	
19+10	1.4405	0.57	Q			V	
19+15	1.4444	0.57	Q			V	
19+20	1.4482	0.56	Q			V	
19+25	1.4520	0.55	Q			V	
19+30	1.4558	0.54	Q			V	
19+35	1.4594	0.53	Q			V	
19+40	1.4631	0.53	Q			V	
19+45	1.4667	0.52	Q			V	
19+50	1.4702	0.51	Q			V	
19+55	1.4737	0.51	Q			V	
20+ 0	1.4772	0.50	Q			V	
20+ 5	1.4806	0.50	Q			V	
20+10	1.4839	0.49	Q			V	
20+15	1.4873	0.48	Q			V	
20+20	1.4906	0.48	Q			V	
20+25	1.4939	0.47	Q			V	
20+30	1.4971	0.47	Q			V	
20+35	1.5003	0.46	Q			V	
20+40	1.5035	0.46	Q			V	
20+45	1.5066	0.46	Q			V	
20+50	1.5097	0.45	Q			V	
20+55	1.5128	0.45	Q			V	
21+ 0	1.5158	0.44	Q			V	
21+ 5	1.5189	0.44	Q			V	
21+10	1.5219	0.44	Q			V	
21+15	1.5248	0.43	Q			V	
21+20	1.5278	0.43	Q			V	
21+25	1.5307	0.42	Q			V	
21+30	1.5336	0.42	Q			V	
21+35	1.5365	0.42	Q			V	
21+40	1.5393	0.41	Q			V	
21+45	1.5421	0.41	Q			V	
21+50	1.5450	0.41	Q			V	
21+55	1.5477	0.40	Q			V	
22+ 0	1.5505	0.40	Q			V	
22+ 5	1.5532	0.40	Q			V	

22+10	1.5560	0.40	Q	|	|	|	V |
22+15	1.5587	0.39	Q	|	|	|	V |
22+20	1.5614	0.39	Q	|	|	|	V |
22+25	1.5640	0.39	Q	|	|	|	V |
22+30	1.5667	0.38	Q	|	|	|	V |
22+35	1.5693	0.38	Q	|	|	|	V |
22+40	1.5719	0.38	Q	|	|	|	V |
22+45	1.5745	0.38	Q	|	|	|	V |
22+50	1.5771	0.37	Q	|	|	|	V |
22+55	1.5796	0.37	Q	|	|	|	V |
23+ 0	1.5822	0.37	Q	|	|	|	V|
23+ 5	1.5847	0.37	Q	|	|	|	V|
23+10	1.5872	0.36	Q	|	|	|	V|
23+15	1.5897	0.36	Q	|	|	|	V|
23+20	1.5922	0.36	Q	|	|	|	V|
23+25	1.5947	0.36	Q	|	|	|	V|
23+30	1.5971	0.36	Q	|	|	|	V|
23+35	1.5996	0.35	Q	|	|	|	V|
23+40	1.6020	0.35	Q	|	|	|	V|
23+45	1.6044	0.35	Q	|	|	|	V|
23+50	1.6068	0.35	Q	|	|	|	V|
23+55	1.6092	0.35	Q	|	|	|	V|
24+ 0	1.6115	0.34	Q	|	|	|	V|
24+ 5	1.6138	0.34	Q	|	|	|	V|
24+10	1.6159	0.30	Q	|	|	|	V|
24+15	1.6173	0.21	Q	|	|	|	V|
24+20	1.6183	0.14	Q	|	|	|	V|
24+25	1.6190	0.11	Q	|	|	|	V|
24+30	1.6196	0.08	Q	|	|	|	V|

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

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Study date 11/29/20

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

Program License Serial Number 6277

2020-326 HCC V
PRE-DEVELOPMENT CONDITIONS
UNIT HYDROGRAPH - 10 YEAR STORM
DA C

Storm Event Year = 10

Antecedent Moisture Condition = 2

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 10		
3.09	1	0.79
Rainfall data for year 2		
3.09	6	1.12
Rainfall data for year 2		
3.09	24	2.11

Rainfall data for year 100

```
             3.09            1           1.31
------------------------------------------------------------------------
Rainfall data for year 100
             3.09            6           3.05
------------------------------------------------------------------------
Rainfall data for year 100
             3.09           24           6.31
------------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

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


SCS curve  SCS curve     Area     Area     Fp(Fig C6)    Ap      Fm
No.(AMCII) NO.(AMC 2)    (Ac.)    Fraction     (In/Hr)  (dec.)   (In/Hr)
 67.0      67.0          3.09      1.000     0.578    1.000    0.578

Area-averaged adjusted loss rate Fm (In/Hr) =  0.578

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

Area       Area          SCS CN    SCS CN      S     Pervious
 (Ac.)      Fract         (AMC2)    (AMC2)           Yield Fr
     3.09   1.000         67.0      67.0       4.93     0.273

Area-averaged catchment yield fraction, Y =  0.273
Area-averaged low loss fraction, Yb =  0.727
User entry of time of concentration  =   0.272 (hours)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watershed area =       3.09(Ac.)
Catchment Lag time =   0.218 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 38.2966
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.578(In/Hr)
Average low loss rate fraction (Yb) = 0.727 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall =  0.372(In)
Computed peak 30-minute rainfall =  0.638(In)
Specified peak 1-hour rainfall =  0.785(In)
Computed peak 3-hour rainfall =  1.356(In)
Specified peak 6-hour rainfall =  1.914(In)
Specified peak 24-hour rainfall =  3.838(In)


Rainfall depth area reduction factors:
Using a total area of       3.09(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000     Adjusted rainfall =  0.372(In)
30-minute factor = 1.000    Adjusted rainfall =  0.638(In)
```

1-hour factor = 1.000 Adjusted rainfall = 0.785(In)
3-hour factor = 1.000 Adjusted rainfall = 1.356(In)
6-hour factor = 1.000 Adjusted rainfall = 1.914(In)
24-hour factor = 1.000 Adjusted rainfall = 3.838(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 = 37.37 (CFS))	
1	2.566	0.959
2	16.799	5.319
3	46.582	11.130
4	63.866	6.459
5	73.335	3.538
6	79.662	2.364
7	84.133	1.671
8	87.657	1.317
9	90.211	0.954
10	92.257	0.765
11	93.934	0.627
12	95.264	0.497
13	96.346	0.404
14	97.206	0.321
15	97.833	0.234
16	98.240	0.152
17	98.683	0.165
18	99.142	0.172
19	99.545	0.150
20	99.792	0.093
21	100.000	0.078

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.3724	0.3724
2	0.4585	0.0861
3	0.5178	0.0593
4	0.5645	0.0467
5	0.6036	0.0391
6	0.6375	0.0339
7	0.6677	0.0302
8	0.6950	0.0273
9	0.7200	0.0250
10	0.7431	0.0231
11	0.7647	0.0216
12	0.7849	0.0202
13	0.8168	0.0319

14	0.8475	0.0307
15	0.8770	0.0296
16	0.9057	0.0286
17	0.9334	0.0277
18	0.9603	0.0269
19	0.9865	0.0262
20	1.0120	0.0255
21	1.0369	0.0249
22	1.0612	0.0243
23	1.0849	0.0237
24	1.1081	0.0232
25	1.1308	0.0227
26	1.1531	0.0223
27	1.1750	0.0219
28	1.1964	0.0215
29	1.2175	0.0211
30	1.2382	0.0207
31	1.2586	0.0204
32	1.2786	0.0200
33	1.2984	0.0197
34	1.3178	0.0194
35	1.3369	0.0191
36	1.3558	0.0189
37	1.3744	0.0186
38	1.3928	0.0184
39	1.4109	0.0181
40	1.4288	0.0179
41	1.4464	0.0177
42	1.4639	0.0174
43	1.4811	0.0172
44	1.4981	0.0170
45	1.5150	0.0168
46	1.5316	0.0167
47	1.5481	0.0165
48	1.5644	0.0163
49	1.5805	0.0161
50	1.5965	0.0160
51	1.6123	0.0158
52	1.6279	0.0156
53	1.6434	0.0155
54	1.6588	0.0154
55	1.6740	0.0152
56	1.6891	0.0151
57	1.7040	0.0149
58	1.7188	0.0148
59	1.7335	0.0147
60	1.7480	0.0146
61	1.7625	0.0144
62	1.7768	0.0143
63	1.7910	0.0142

64	1.8051	0.0141
65	1.8191	0.0140
66	1.8329	0.0139
67	1.8467	0.0138
68	1.8603	0.0137
69	1.8739	0.0136
70	1.8874	0.0135
71	1.9007	0.0134
72	1.9140	0.0133
73	1.9273	0.0133
74	1.9405	0.0132
75	1.9536	0.0131
76	1.9666	0.0130
77	1.9796	0.0129
78	1.9925	0.0129
79	2.0052	0.0128
80	2.0179	0.0127
81	2.0305	0.0126
82	2.0431	0.0125
83	2.0556	0.0125
84	2.0679	0.0124
85	2.0803	0.0123
86	2.0925	0.0122
87	2.1047	0.0122
88	2.1168	0.0121
89	2.1288	0.0120
90	2.1408	0.0120
91	2.1527	0.0119
92	2.1646	0.0118
93	2.1763	0.0118
94	2.1880	0.0117
95	2.1997	0.0117
96	2.2113	0.0116
97	2.2228	0.0115
98	2.2343	0.0115
99	2.2457	0.0114
100	2.2571	0.0114
101	2.2683	0.0113
102	2.2796	0.0112
103	2.2908	0.0112
104	2.3019	0.0111
105	2.3130	0.0111
106	2.3240	0.0110
107	2.3350	0.0110
108	2.3459	0.0109
109	2.3568	0.0109
110	2.3676	0.0108
111	2.3784	0.0108
112	2.3891	0.0107
113	2.3998	0.0107

114	2.4105	0.0106
115	2.4210	0.0106
116	2.4316	0.0105
117	2.4421	0.0105
118	2.4525	0.0105
119	2.4629	0.0104
120	2.4733	0.0104
121	2.4836	0.0103
122	2.4939	0.0103
123	2.5042	0.0102
124	2.5144	0.0102
125	2.5245	0.0102
126	2.5346	0.0101
127	2.5447	0.0101
128	2.5547	0.0100
129	2.5647	0.0100
130	2.5747	0.0100
131	2.5846	0.0099
132	2.5945	0.0099
133	2.6043	0.0098
134	2.6142	0.0098
135	2.6239	0.0098
136	2.6337	0.0097
137	2.6434	0.0097
138	2.6530	0.0097
139	2.6627	0.0096
140	2.6723	0.0096
141	2.6818	0.0096
142	2.6913	0.0095
143	2.7008	0.0095
144	2.7103	0.0095
145	2.7197	0.0094
146	2.7291	0.0094
147	2.7385	0.0094
148	2.7478	0.0093
149	2.7571	0.0093
150	2.7664	0.0093
151	2.7756	0.0092
152	2.7849	0.0092
153	2.7940	0.0092
154	2.8032	0.0091
155	2.8123	0.0091
156	2.8214	0.0091
157	2.8305	0.0091
158	2.8395	0.0090
159	2.8485	0.0090
160	2.8575	0.0090
161	2.8664	0.0089
162	2.8753	0.0089
163	2.8842	0.0089

164	2.8931	0.0089
165	2.9019	0.0088
166	2.9108	0.0088
167	2.9195	0.0088
168	2.9283	0.0088
169	2.9370	0.0087
170	2.9457	0.0087
171	2.9544	0.0087
172	2.9631	0.0087
173	2.9717	0.0086
174	2.9803	0.0086
175	2.9889	0.0086
176	2.9975	0.0086
177	3.0060	0.0085
178	3.0145	0.0085
179	3.0230	0.0085
180	3.0315	0.0085
181	3.0399	0.0084
182	3.0483	0.0084
183	3.0567	0.0084
184	3.0651	0.0084
185	3.0734	0.0083
186	3.0818	0.0083
187	3.0901	0.0083
188	3.0984	0.0083
189	3.1066	0.0083
190	3.1149	0.0082
191	3.1231	0.0082
192	3.1313	0.0082
193	3.1394	0.0082
194	3.1476	0.0082
195	3.1557	0.0081
196	3.1638	0.0081
197	3.1719	0.0081
198	3.1800	0.0081
199	3.1880	0.0081
200	3.1961	0.0080
201	3.2041	0.0080
202	3.2121	0.0080
203	3.2200	0.0080
204	3.2280	0.0080
205	3.2359	0.0079
206	3.2438	0.0079
207	3.2517	0.0079
208	3.2596	0.0079
209	3.2675	0.0079
210	3.2753	0.0078
211	3.2831	0.0078
212	3.2909	0.0078
213	3.2987	0.0078

214	3.3065	0.0078
215	3.3142	0.0077
216	3.3219	0.0077
217	3.3296	0.0077
218	3.3373	0.0077
219	3.3450	0.0077
220	3.3527	0.0077
221	3.3603	0.0076
222	3.3679	0.0076
223	3.3755	0.0076
224	3.3831	0.0076
225	3.3907	0.0076
226	3.3983	0.0076
227	3.4058	0.0075
228	3.4133	0.0075
229	3.4208	0.0075
230	3.4283	0.0075
231	3.4358	0.0075
232	3.4432	0.0075
233	3.4507	0.0074
234	3.4581	0.0074
235	3.4655	0.0074
236	3.4729	0.0074
237	3.4803	0.0074
238	3.4876	0.0074
239	3.4950	0.0073
240	3.5023	0.0073
241	3.5096	0.0073
242	3.5169	0.0073
243	3.5242	0.0073
244	3.5315	0.0073
245	3.5387	0.0073
246	3.5460	0.0072
247	3.5532	0.0072
248	3.5604	0.0072
249	3.5676	0.0072
250	3.5748	0.0072
251	3.5820	0.0072
252	3.5891	0.0072
253	3.5963	0.0071
254	3.6034	0.0071
255	3.6105	0.0071
256	3.6176	0.0071
257	3.6247	0.0071
258	3.6318	0.0071
259	3.6388	0.0071
260	3.6459	0.0070
261	3.6529	0.0070
262	3.6599	0.0070
263	3.6669	0.0070

264	3.6739	0.0070
265	3.6809	0.0070
266	3.6879	0.0070
267	3.6948	0.0070
268	3.7017	0.0069
269	3.7087	0.0069
270	3.7156	0.0069
271	3.7225	0.0069
272	3.7294	0.0069
273	3.7362	0.0069
274	3.7431	0.0069
275	3.7500	0.0068
276	3.7568	0.0068
277	3.7636	0.0068
278	3.7704	0.0068
279	3.7772	0.0068
280	3.7840	0.0068
281	3.7908	0.0068
282	3.7976	0.0068
283	3.8043	0.0068
284	3.8111	0.0067
285	3.8178	0.0067
286	3.8245	0.0067
287	3.8312	0.0067
288	3.8379	0.0067

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0067	0.0049	0.0018
2	0.0067	0.0049	0.0018
3	0.0067	0.0049	0.0018
4	0.0067	0.0049	0.0018
5	0.0068	0.0049	0.0018
6	0.0068	0.0049	0.0018
7	0.0068	0.0049	0.0019
8	0.0068	0.0050	0.0019
9	0.0068	0.0050	0.0019
10	0.0068	0.0050	0.0019
11	0.0069	0.0050	0.0019
12	0.0069	0.0050	0.0019
13	0.0069	0.0050	0.0019
14	0.0069	0.0050	0.0019
15	0.0070	0.0051	0.0019
16	0.0070	0.0051	0.0019
17	0.0070	0.0051	0.0019
18	0.0070	0.0051	0.0019
19	0.0070	0.0051	0.0019
20	0.0070	0.0051	0.0019

21	0.0071	0.0051	0.0019
22	0.0071	0.0052	0.0019
23	0.0071	0.0052	0.0019
24	0.0071	0.0052	0.0019
25	0.0072	0.0052	0.0020
26	0.0072	0.0052	0.0020
27	0.0072	0.0052	0.0020
28	0.0072	0.0052	0.0020
29	0.0072	0.0053	0.0020
30	0.0073	0.0053	0.0020
31	0.0073	0.0053	0.0020
32	0.0073	0.0053	0.0020
33	0.0073	0.0053	0.0020
34	0.0073	0.0053	0.0020
35	0.0074	0.0054	0.0020
36	0.0074	0.0054	0.0020
37	0.0074	0.0054	0.0020
38	0.0074	0.0054	0.0020
39	0.0075	0.0054	0.0020
40	0.0075	0.0054	0.0020
41	0.0075	0.0055	0.0021
42	0.0075	0.0055	0.0021
43	0.0076	0.0055	0.0021
44	0.0076	0.0055	0.0021
45	0.0076	0.0055	0.0021
46	0.0076	0.0056	0.0021
47	0.0077	0.0056	0.0021
48	0.0077	0.0056	0.0021
49	0.0077	0.0056	0.0021
50	0.0077	0.0056	0.0021
51	0.0078	0.0057	0.0021
52	0.0078	0.0057	0.0021
53	0.0078	0.0057	0.0021
54	0.0079	0.0057	0.0021
55	0.0079	0.0057	0.0022
56	0.0079	0.0058	0.0022
57	0.0080	0.0058	0.0022
58	0.0080	0.0058	0.0022
59	0.0080	0.0058	0.0022
60	0.0080	0.0058	0.0022
61	0.0081	0.0059	0.0022
62	0.0081	0.0059	0.0022
63	0.0081	0.0059	0.0022
64	0.0082	0.0059	0.0022
65	0.0082	0.0060	0.0022
66	0.0082	0.0060	0.0022
67	0.0083	0.0060	0.0023
68	0.0083	0.0060	0.0023
69	0.0083	0.0061	0.0023
70	0.0083	0.0061	0.0023

71	0.0084	0.0061	0.0023
72	0.0084	0.0061	0.0023
73	0.0085	0.0062	0.0023
74	0.0085	0.0062	0.0023
75	0.0085	0.0062	0.0023
76	0.0086	0.0062	0.0023
77	0.0086	0.0063	0.0023
78	0.0086	0.0063	0.0024
79	0.0087	0.0063	0.0024
80	0.0087	0.0063	0.0024
81	0.0088	0.0064	0.0024
82	0.0088	0.0064	0.0024
83	0.0088	0.0064	0.0024
84	0.0089	0.0064	0.0024
85	0.0089	0.0065	0.0024
86	0.0089	0.0065	0.0024
87	0.0090	0.0065	0.0025
88	0.0090	0.0066	0.0025
89	0.0091	0.0066	0.0025
90	0.0091	0.0066	0.0025
91	0.0092	0.0067	0.0025
92	0.0092	0.0067	0.0025
93	0.0093	0.0067	0.0025
94	0.0093	0.0068	0.0025
95	0.0094	0.0068	0.0026
96	0.0094	0.0068	0.0026
97	0.0095	0.0069	0.0026
98	0.0095	0.0069	0.0026
99	0.0096	0.0070	0.0026
100	0.0096	0.0070	0.0026
101	0.0097	0.0070	0.0026
102	0.0097	0.0071	0.0026
103	0.0098	0.0071	0.0027
104	0.0098	0.0071	0.0027
105	0.0099	0.0072	0.0027
106	0.0099	0.0072	0.0027
107	0.0100	0.0073	0.0027
108	0.0100	0.0073	0.0027
109	0.0101	0.0074	0.0028
110	0.0102	0.0074	0.0028
111	0.0102	0.0074	0.0028
112	0.0103	0.0075	0.0028
113	0.0104	0.0075	0.0028
114	0.0104	0.0076	0.0028
115	0.0105	0.0076	0.0029
116	0.0105	0.0077	0.0029
117	0.0106	0.0077	0.0029
118	0.0107	0.0078	0.0029
119	0.0108	0.0078	0.0029
120	0.0108	0.0079	0.0030

121	0.0109	0.0079	0.0030
122	0.0110	0.0080	0.0030
123	0.0111	0.0081	0.0030
124	0.0111	0.0081	0.0030
125	0.0112	0.0082	0.0031
126	0.0113	0.0082	0.0031
127	0.0114	0.0083	0.0031
128	0.0115	0.0083	0.0031
129	0.0116	0.0084	0.0032
130	0.0117	0.0085	0.0032
131	0.0118	0.0086	0.0032
132	0.0118	0.0086	0.0032
133	0.0120	0.0087	0.0033
134	0.0120	0.0088	0.0033
135	0.0122	0.0089	0.0033
136	0.0122	0.0089	0.0033
137	0.0124	0.0090	0.0034
138	0.0125	0.0091	0.0034
139	0.0126	0.0092	0.0034
140	0.0127	0.0092	0.0035
141	0.0129	0.0094	0.0035
142	0.0129	0.0094	0.0035
143	0.0131	0.0095	0.0036
144	0.0132	0.0096	0.0036
145	0.0133	0.0097	0.0036
146	0.0134	0.0097	0.0036
147	0.0136	0.0099	0.0037
148	0.0137	0.0099	0.0037
149	0.0139	0.0101	0.0038
150	0.0140	0.0102	0.0038
151	0.0142	0.0103	0.0039
152	0.0143	0.0104	0.0039
153	0.0146	0.0106	0.0040
154	0.0147	0.0107	0.0040
155	0.0149	0.0109	0.0041
156	0.0151	0.0110	0.0041
157	0.0154	0.0112	0.0042
158	0.0155	0.0113	0.0042
159	0.0158	0.0115	0.0043
160	0.0160	0.0116	0.0044
161	0.0163	0.0119	0.0044
162	0.0165	0.0120	0.0045
163	0.0168	0.0122	0.0046
164	0.0170	0.0124	0.0046
165	0.0174	0.0127	0.0048
166	0.0177	0.0128	0.0048
167	0.0181	0.0132	0.0049
168	0.0184	0.0134	0.0050
169	0.0189	0.0137	0.0051
170	0.0191	0.0139	0.0052

171	0.0197	0.0143	0.0054
172	0.0200	0.0146	0.0055
173	0.0207	0.0151	0.0056
174	0.0211	0.0153	0.0057
175	0.0219	0.0159	0.0060
176	0.0223	0.0162	0.0061
177	0.0232	0.0169	0.0063
178	0.0237	0.0173	0.0065
179	0.0249	0.0181	0.0068
180	0.0255	0.0185	0.0070
181	0.0269	0.0196	0.0073
182	0.0277	0.0202	0.0076
183	0.0296	0.0215	0.0081
184	0.0307	0.0223	0.0084
185	0.0202	0.0147	0.0055
186	0.0216	0.0157	0.0059
187	0.0250	0.0182	0.0068
188	0.0273	0.0199	0.0074
189	0.0339	0.0247	0.0093
190	0.0391	0.0284	0.0107
191	0.0593	0.0431	0.0162
192	0.0861	0.0482	0.0379
193	0.3724	0.0482	0.3242
194	0.0467	0.0340	0.0127
195	0.0302	0.0219	0.0082
196	0.0231	0.0168	0.0063
197	0.0319	0.0232	0.0087
198	0.0286	0.0208	0.0078
199	0.0262	0.0190	0.0071
200	0.0243	0.0177	0.0066
201	0.0227	0.0165	0.0062
202	0.0215	0.0156	0.0058
203	0.0204	0.0148	0.0056
204	0.0194	0.0141	0.0053
205	0.0186	0.0135	0.0051
206	0.0179	0.0130	0.0049
207	0.0172	0.0125	0.0047
208	0.0167	0.0121	0.0045
209	0.0161	0.0117	0.0044
210	0.0156	0.0114	0.0043
211	0.0152	0.0111	0.0041
212	0.0148	0.0108	0.0040
213	0.0144	0.0105	0.0039
214	0.0141	0.0102	0.0038
215	0.0138	0.0100	0.0038
216	0.0135	0.0098	0.0037
217	0.0133	0.0097	0.0036
218	0.0130	0.0095	0.0036
219	0.0128	0.0093	0.0035
220	0.0125	0.0091	0.0034

221	0.0123	0.0090	0.0034
222	0.0121	0.0088	0.0033
223	0.0119	0.0087	0.0032
224	0.0117	0.0085	0.0032
225	0.0115	0.0084	0.0031
226	0.0114	0.0083	0.0031
227	0.0112	0.0081	0.0031
228	0.0110	0.0080	0.0030
229	0.0109	0.0079	0.0030
230	0.0107	0.0078	0.0029
231	0.0106	0.0077	0.0029
232	0.0105	0.0076	0.0028
233	0.0103	0.0075	0.0028
234	0.0102	0.0074	0.0028
235	0.0101	0.0073	0.0027
236	0.0100	0.0072	0.0027
237	0.0098	0.0072	0.0027
238	0.0097	0.0071	0.0027
239	0.0096	0.0070	0.0026
240	0.0095	0.0069	0.0026
241	0.0094	0.0069	0.0026
242	0.0093	0.0068	0.0025
243	0.0092	0.0067	0.0025
244	0.0091	0.0067	0.0025
245	0.0091	0.0066	0.0025
246	0.0090	0.0065	0.0024
247	0.0089	0.0065	0.0024
248	0.0088	0.0064	0.0024
249	0.0087	0.0064	0.0024
250	0.0087	0.0063	0.0024
251	0.0086	0.0062	0.0023
252	0.0085	0.0062	0.0023
253	0.0084	0.0061	0.0023
254	0.0084	0.0061	0.0023
255	0.0083	0.0060	0.0023
256	0.0082	0.0060	0.0022
257	0.0082	0.0059	0.0022
258	0.0081	0.0059	0.0022
259	0.0081	0.0059	0.0022
260	0.0080	0.0058	0.0022
261	0.0079	0.0058	0.0022
262	0.0079	0.0057	0.0021
263	0.0078	0.0057	0.0021
264	0.0078	0.0056	0.0021
265	0.0077	0.0056	0.0021
266	0.0077	0.0056	0.0021
267	0.0076	0.0055	0.0021
268	0.0076	0.0055	0.0021
269	0.0075	0.0055	0.0020
270	0.0075	0.0054	0.0020

271	0.0074	0.0054	0.0020
272	0.0074	0.0054	0.0020
273	0.0073	0.0053	0.0020
274	0.0073	0.0053	0.0020
275	0.0072	0.0053	0.0020
276	0.0072	0.0052	0.0020
277	0.0071	0.0052	0.0019
278	0.0071	0.0052	0.0019
279	0.0071	0.0051	0.0019
280	0.0070	0.0051	0.0019
281	0.0070	0.0051	0.0019
282	0.0069	0.0050	0.0019
283	0.0069	0.0050	0.0019
284	0.0069	0.0050	0.0019
285	0.0068	0.0050	0.0019
286	0.0068	0.0049	0.0019
287	0.0068	0.0049	0.0018
288	0.0067	0.0049	0.0018

Total soil rain loss = 2.55(In)
Total effective rainfall = 1.28(In)
Peak flow rate in flood hydrograph = 4.07(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	2.5	5.0	7.5	10.0
0+ 5	0.0000	0.00	Q	|	|	|	|
0+10	0.0001	0.01	Q	|	|	|	|
0+15	0.0003	0.03	Q	|	|	|	|
0+20	0.0006	0.04	Q	|	|	|	|
0+25	0.0010	0.05	Q	|	|	|	|
0+30	0.0013	0.05	Q	|	|	|	|
0+35	0.0017	0.06	Q	|	|	|	|
0+40	0.0021	0.06	Q	|	|	|	|
0+45	0.0026	0.06	Q	|	|	|	|
0+50	0.0030	0.06	Q	|	|	|	|
0+55	0.0035	0.07	Q	|	|	|	|
1+ 0	0.0039	0.07	Q	|	|	|	|
1+ 5	0.0044	0.07	Q	|	|	|	|
1+10	0.0049	0.07	Q	|	|	|	|
1+15	0.0053	0.07	Q	|	|	|	|
1+20	0.0058	0.07	Q	|	|	|	|
1+25	0.0063	0.07	Q	|	|	|	|

1+30	0.0068	0.07	Q	|	|	|	|
1+35	0.0072	0.07	Q	|	|	|	|
1+40	0.0077	0.07	Q	|	|	|	|
1+45	0.0082	0.07	Q	|	|	|	|
1+50	0.0087	0.07	QV	|	|	|	|
1+55	0.0092	0.07	QV	|	|	|	|
2+ 0	0.0097	0.07	QV	|	|	|	|
2+ 5	0.0102	0.07	QV	|	|	|	|
2+10	0.0107	0.07	QV	|	|	|	|
2+15	0.0112	0.07	QV	|	|	|	|
2+20	0.0117	0.07	QV	|	|	|	|
2+25	0.0122	0.07	QV	|	|	|	|
2+30	0.0127	0.07	QV	|	|	|	|
2+35	0.0132	0.07	QV	|	|	|	|
2+40	0.0137	0.07	QV	|	|	|	|
2+45	0.0142	0.07	QV	|	|	|	|
2+50	0.0147	0.07	QV	|	|	|	|
2+55	0.0152	0.07	QV	|	|	|	|
3+ 0	0.0158	0.07	QV	|	|	|	|
3+ 5	0.0163	0.07	QV	|	|	|	|
3+10	0.0168	0.07	Q V	|	|	|	|
3+15	0.0173	0.08	Q V	|	|	|	|
3+20	0.0178	0.08	Q V	|	|	|	|
3+25	0.0183	0.08	Q V	|	|	|	|
3+30	0.0189	0.08	Q V	|	|	|	|
3+35	0.0194	0.08	Q V	|	|	|	|
3+40	0.0199	0.08	Q V	|	|	|	|
3+45	0.0204	0.08	Q V	|	|	|	|
3+50	0.0210	0.08	Q V	|	|	|	|
3+55	0.0215	0.08	Q V	|	|	|	|
4+ 0	0.0220	0.08	Q V	|	|	|	|
4+ 5	0.0226	0.08	Q V	|	|	|	|
4+10	0.0231	0.08	Q V	|	|	|	|
4+15	0.0237	0.08	Q V	|	|	|	|
4+20	0.0242	0.08	Q V	|	|	|	|
4+25	0.0247	0.08	Q V	|	|	|	|
4+30	0.0253	0.08	Q V	|	|	|	|
4+35	0.0258	0.08	Q V	|	|	|	|
4+40	0.0264	0.08	Q V	|	|	|	|
4+45	0.0269	0.08	Q V	|	|	|	|
4+50	0.0275	0.08	Q V	|	|	|	|
4+55	0.0280	0.08	Q V	|	|	|	|
5+ 0	0.0286	0.08	Q V	|	|	|	|
5+ 5	0.0291	0.08	Q V	|	|	|	|
5+10	0.0297	0.08	Q V	|	|	|	|
5+15	0.0303	0.08	Q V	|	|	|	|
5+20	0.0308	0.08	Q V	|	|	|	|
5+25	0.0314	0.08	Q V	|	|	|	|
5+30	0.0320	0.08	Q V	|	|	|	|
5+35	0.0325	0.08	Q V	|	|	|	|

5+40	0.0331	0.08	Q	V				
5+45	0.0337	0.08	Q	V				
5+50	0.0343	0.08	Q	V				
5+55	0.0348	0.08	Q	V				
6+ 0	0.0354	0.08	Q	V				
6+ 5	0.0360	0.08	Q	V				
6+10	0.0366	0.09	Q	V				
6+15	0.0372	0.09	Q	V				
6+20	0.0378	0.09	Q	V				
6+25	0.0384	0.09	Q	V				
6+30	0.0390	0.09	Q	V				
6+35	0.0396	0.09	Q	V				
6+40	0.0402	0.09	Q	V				
6+45	0.0408	0.09	Q	V				
6+50	0.0414	0.09	Q	V				
6+55	0.0420	0.09	Q	V				
7+ 0	0.0426	0.09	Q	V				
7+ 5	0.0432	0.09	Q	V				
7+10	0.0438	0.09	Q	V				
7+15	0.0444	0.09	Q	V				
7+20	0.0451	0.09	Q	V				
7+25	0.0457	0.09	Q	V				
7+30	0.0463	0.09	Q	V				
7+35	0.0470	0.09	Q	V				
7+40	0.0476	0.09	Q	V				
7+45	0.0482	0.09	Q	V				
7+50	0.0489	0.09	Q	V				
7+55	0.0495	0.09	Q	V				
8+ 0	0.0502	0.09	Q	V				
8+ 5	0.0508	0.09	Q	V				
8+10	0.0515	0.09	Q	V				
8+15	0.0521	0.10	Q	V				
8+20	0.0528	0.10	Q	V				
8+25	0.0535	0.10	Q	V				
8+30	0.0541	0.10	Q	V				
8+35	0.0548	0.10	Q	V				
8+40	0.0555	0.10	Q	V				
8+45	0.0561	0.10	Q	V				
8+50	0.0568	0.10	Q	V				
8+55	0.0575	0.10	Q	V				
9+ 0	0.0582	0.10	Q	V				
9+ 5	0.0589	0.10	Q	V				
9+10	0.0596	0.10	Q	V				
9+15	0.0603	0.10	Q	V				
9+20	0.0610	0.10	Q	V				
9+25	0.0617	0.10	Q	V				
9+30	0.0624	0.10	Q	V				
9+35	0.0631	0.10	Q	V				
9+40	0.0639	0.10	Q	V				
9+45	0.0646	0.11	Q	V				

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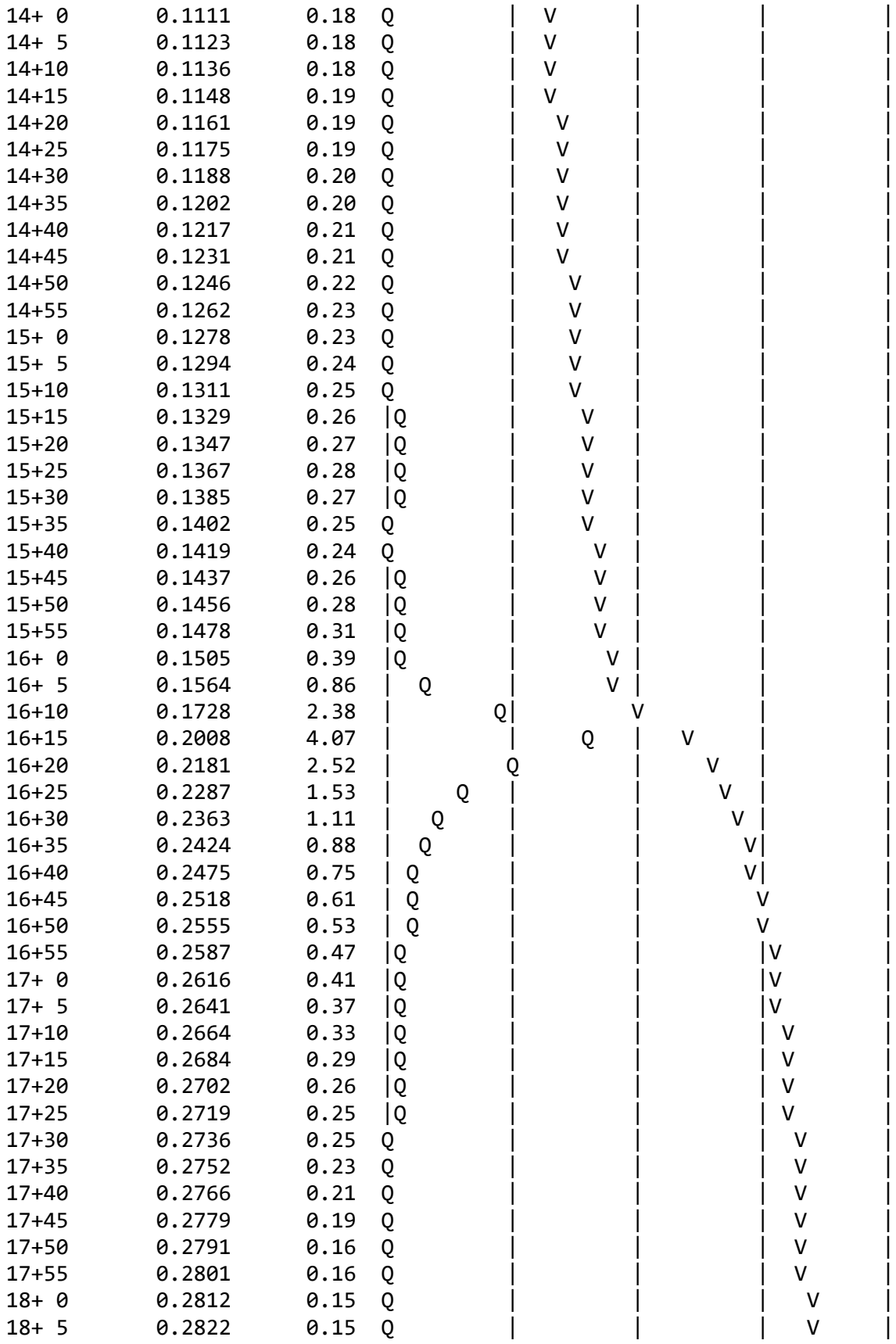
 9+50       0.0653      0.11  Q      V  |          |          |          |
 9+55       0.0661      0.11  Q      V  |          |          |          |
10+ 0       0.0668      0.11  Q       V |          |          |          |
10+ 5       0.0676      0.11  Q       V |          |          |          |
10+10       0.0683      0.11  Q       V |          |          |          |
10+15       0.0691      0.11  Q       V |          |          |          |
10+20       0.0698      0.11  Q       V |          |          |          |
10+25       0.0706      0.11  Q       V |          |          |          |
10+30       0.0714      0.11  Q       V |          |          |          |
10+35       0.0721      0.11  Q       V |          |          |          |
10+40       0.0729      0.11  Q       V |          |          |          |
10+45       0.0737      0.11  Q       V |          |          |          |
10+50       0.0745      0.12  Q        V|          |          |          |
10+55       0.0753      0.12  Q        V|          |          |          |
11+ 0       0.0761      0.12  Q        V|          |          |          |
11+ 5       0.0769      0.12  Q        V|          |          |          |
11+10       0.0778      0.12  Q        V|          |          |          |
11+15       0.0786      0.12  Q        V|          |          |          |
11+20       0.0794      0.12  Q        V|          |          |          |
11+25       0.0803      0.12  Q        V|          |          |          |
11+30       0.0811      0.12  Q        V|          |          |          |
11+35       0.0820      0.12  Q        V|          |          |          |
11+40       0.0828      0.13  Q         V          |          |          |
11+45       0.0837      0.13  Q         V          |          |          |
11+50       0.0846      0.13  Q         V          |          |          |
11+55       0.0855      0.13  Q         V          |          |          |
12+ 0       0.0863      0.13  Q         V          |          |          |
12+ 5       0.0873      0.13  Q         V          |          |          |
12+10       0.0882      0.13  Q         V          |          |          |
12+15       0.0891      0.13  Q         V          |          |          |
12+20       0.0900      0.13  Q         V          |          |          |
12+25       0.0909      0.14  Q         |V         |          |          |
12+30       0.0919      0.14  Q         |V         |          |          |
12+35       0.0928      0.14  Q         |V         |          |          |
12+40       0.0938      0.14  Q         |V         |          |          |
12+45       0.0948      0.14  Q         |V         |          |          |
12+50       0.0958      0.14  Q         |V         |          |          |
12+55       0.0968      0.15  Q         |V         |          |          |
13+ 0       0.0978      0.15  Q         |V         |          |          |
13+ 5       0.0988      0.15  Q         |V         |          |          |
13+10       0.0998      0.15  Q         | V        |          |          |
13+15       0.1009      0.15  Q         | V        |          |          |
13+20       0.1019      0.15  Q         | V        |          |          |
13+25       0.1030      0.16  Q         | V        |          |          |
13+30       0.1041      0.16  Q         | V        |          |          |
13+35       0.1052      0.16  Q         | V        |          |          |
13+40       0.1064      0.16  Q         | V        |          |          |
13+45       0.1075      0.17  Q         |  V       |          |          |
13+50       0.1087      0.17  Q         |  V       |          |          |
13+55       0.1099      0.17  Q         |  V       |          |          |
```



18+10	0.2832	0.15	Q	|	|	| V	|
18+15	0.2842	0.14	Q	|	|	| V	|
18+20	0.2852	0.14	Q	|	|	| V	|
18+25	0.2861	0.14	Q	|	|	| V	|
18+30	0.2870	0.13	Q	|	|	| V	|
18+35	0.2879	0.13	Q	|	|	| V	|
18+40	0.2888	0.13	Q	|	|	| V	|
18+45	0.2897	0.13	Q	|	|	| V	|
18+50	0.2905	0.12	Q	|	|	| V	|
18+55	0.2914	0.12	Q	|	|	| V	|
19+ 0	0.2922	0.12	Q	|	|	| V	|
19+ 5	0.2930	0.12	Q	|	|	| V	|
19+10	0.2938	0.12	Q	|	|	| V	|
19+15	0.2946	0.11	Q	|	|	| V	|
19+20	0.2954	0.11	Q	|	|	| V	|
19+25	0.2961	0.11	Q	|	|	| V	|
19+30	0.2969	0.11	Q	|	|	| V	|
19+35	0.2976	0.11	Q	|	|	| V	|
19+40	0.2984	0.11	Q	|	|	| V	|
19+45	0.2991	0.11	Q	|	|	| V	|
19+50	0.2998	0.10	Q	|	|	| V	|
19+55	0.3005	0.10	Q	|	|	| V	|
20+ 0	0.3012	0.10	Q	|	|	| V	|
20+ 5	0.3019	0.10	Q	|	|	| V	|
20+10	0.3026	0.10	Q	|	|	| V	|
20+15	0.3033	0.10	Q	|	|	| V	|
20+20	0.3039	0.10	Q	|	|	| V	|
20+25	0.3046	0.10	Q	|	|	| V	|
20+30	0.3052	0.10	Q	|	|	| V	|
20+35	0.3059	0.09	Q	|	|	| V	|
20+40	0.3065	0.09	Q	|	|	| V	|
20+45	0.3072	0.09	Q	|	|	| V	|
20+50	0.3078	0.09	Q	|	|	| V	|
20+55	0.3084	0.09	Q	|	|	| V	|
21+ 0	0.3090	0.09	Q	|	|	| V	|
21+ 5	0.3097	0.09	Q	|	|	| V	|
21+10	0.3103	0.09	Q	|	|	| V	|
21+15	0.3109	0.09	Q	|	|	| V	|
21+20	0.3115	0.09	Q	|	|	| V	|
21+25	0.3121	0.09	Q	|	|	| V	|
21+30	0.3126	0.09	Q	|	|	| V	|
21+35	0.3132	0.08	Q	|	|	| V	|
21+40	0.3138	0.08	Q	|	|	| V	|
21+45	0.3144	0.08	Q	|	|	| V	|
21+50	0.3150	0.08	Q	|	|	| V	|
21+55	0.3155	0.08	Q	|	|	| V	|
22+ 0	0.3161	0.08	Q	|	|	| V	|
22+ 5	0.3166	0.08	Q	|	|	| V	|
22+10	0.3172	0.08	Q	|	|	| V	|
22+15	0.3177	0.08	Q	|	|	| V	|

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   22+20       0.3183      0.08  Q          |          |          |        V |
   22+25       0.3188      0.08  Q          |          |          |        V |
   22+30       0.3194      0.08  Q          |          |          |        V |
   22+35       0.3199      0.08  Q          |          |          |        V |
   22+40       0.3204      0.08  Q          |          |          |        V |
   22+45       0.3209      0.08  Q          |          |          |        V |
   22+50       0.3215      0.08  Q          |          |          |        V |
   22+55       0.3220      0.08  Q          |          |          |        V |
   23+ 0       0.3225      0.07  Q          |          |          |         V|
   23+ 5       0.3230      0.07  Q          |          |          |         V|
   23+10       0.3235      0.07  Q          |          |          |         V|
   23+15       0.3240      0.07  Q          |          |          |         V|
   23+20       0.3245      0.07  Q          |          |          |         V|
   23+25       0.3250      0.07  Q          |          |          |         V|
   23+30       0.3255      0.07  Q          |          |          |         V|
   23+35       0.3260      0.07  Q          |          |          |         V|
   23+40       0.3265      0.07  Q          |          |          |         V|
   23+45       0.3270      0.07  Q          |          |          |         V|
   23+50       0.3275      0.07  Q          |          |          |         V|
   23+55       0.3280      0.07  Q          |          |          |         V|
   24+ 0       0.3285      0.07  Q          |          |          |         V|
   24+ 5       0.3289      0.07  Q          |          |          |         V|
   24+10       0.3293      0.06  Q          |          |          |         V|
   24+15       0.3296      0.04  Q          |          |          |         V|
   24+20       0.3298      0.03  Q          |          |          |         V|
   24+25       0.3299      0.02  Q          |          |          |         V|
   24+30       0.3300      0.01  Q          |          |          |         V|
-------------------------------------------------------------------------
```

Appendix D – Unit Hydrograph (Pre-Development)

- 100-Year Storm Event

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

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Study date 12/03/20

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

Program License Serial Number 6277

2020-326 HCC V
PRE-DEVELOPMENT CONDITIONS
UNIT HYDROGRAPH - 100 YEAR STORM
DA 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 10		
42.92	1	0.79
Rainfall data for year 2		
42.92	6	1.12
Rainfall data for year 2		
42.92	24	2.11
Rainfall data for year 100		

```
            42.92            1            1.31
------------------------------------------------------------------------
Rainfall data for year 100
            42.92            6            3.05
------------------------------------------------------------------------
Rainfall data for year 100
            42.92           24            6.31
------------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

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


SCS curve  SCS curve     Area     Area     Fp(Fig C6)    Ap      Fm
No.(AMCII) NO.(AMC 3)    (Ac.)    Fraction     (In/Hr)  (dec.)   (In/Hr)
 67.0      84.6         42.92      1.000     0.290    1.000    0.290

Area-averaged adjusted loss rate Fm (In/Hr) =  0.290

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

Area       Area          SCS CN    SCS CN      S     Pervious
 (Ac.)      Fract         (AMC2)    (AMC3)           Yield Fr
    42.92   1.000         67.0      84.6       1.82     0.721

Area-averaged catchment yield fraction, Y =  0.721
Area-averaged low loss fraction, Yb =  0.279
User entry of time of concentration  =   0.454 (hours)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watershed area =      42.92(Ac.)
Catchment Lag time =   0.363 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 22.9442
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.290(In/Hr)
Average low loss rate fraction (Yb) = 0.279 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall =  0.622(In)
Computed peak 30-minute rainfall =  1.064(In)
Specified peak 1-hour rainfall =  1.310(In)
Computed peak 3-hour rainfall =  2.199(In)
Specified peak 6-hour rainfall =  3.050(In)
Specified peak 24-hour rainfall =  6.310(In)


Rainfall depth area reduction factors:
Using a total area of      42.92(Ac.) (Ref: fig. E-4)

5-minute factor = 0.998     Adjusted rainfall =  0.620(In)
30-minute factor = 0.998    Adjusted rainfall =  1.062(In)
```

1-hour factor = 0.998 Adjusted rainfall = 1.307(In)
3-hour factor = 1.000 Adjusted rainfall = 2.199(In)
6-hour factor = 1.000 Adjusted rainfall = 3.050(In)
24-hour factor = 1.000 Adjusted rainfall = 6.310(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 = 519.06 (CFS))	
1	1.200	6.227
2	5.678	23.243
3	15.658	51.806
4	35.615	103.590
5	51.498	82.440
6	61.506	51.950
7	68.213	34.813
8	73.375	26.792
9	77.428	21.041
10	80.662	16.783
11	83.317	13.784
12	85.630	12.007
13	87.644	10.453
14	89.284	8.509
15	90.629	6.986
16	91.865	6.411
17	92.952	5.645
18	93.930	5.077
19	94.732	4.161
20	95.498	3.978
21	96.129	3.275
22	96.722	3.076
23	97.192	2.443
24	97.605	2.143
25	97.921	1.640
26	98.151	1.191
27	98.397	1.277
28	98.672	1.426
29	98.947	1.429
30	99.222	1.429
31	99.482	1.347
32	99.642	0.833
33	99.786	0.744
34	100.000	0.372

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)

1	0.6204	0.6204
2	0.7638	0.1434
3	0.8625	0.0988
4	0.9403	0.0777
5	1.0054	0.0651
6	1.0619	0.0565
7	1.1122	0.0503
8	1.1576	0.0455
9	1.1993	0.0416
10	1.2378	0.0385
11	1.2737	0.0359
12	1.3074	0.0337
13	1.3578	0.0505
14	1.4063	0.0485
15	1.4530	0.0467
16	1.4980	0.0451
17	1.5417	0.0436
18	1.5839	0.0423
19	1.6250	0.0411
20	1.6649	0.0399
21	1.7038	0.0389
22	1.7417	0.0379
23	1.7788	0.0370
24	1.8150	0.0362
25	1.8504	0.0354
26	1.8850	0.0347
27	1.9190	0.0340
28	1.9523	0.0333
29	1.9850	0.0327
30	2.0171	0.0321
31	2.0487	0.0315
32	2.0797	0.0310
33	2.1102	0.0305
34	2.1402	0.0300
35	2.1698	0.0296
36	2.1989	0.0291
37	2.2275	0.0286
38	2.2557	0.0282
39	2.2835	0.0278
40	2.3110	0.0274
41	2.3380	0.0271
42	2.3648	0.0267
43	2.3912	0.0264
44	2.4173	0.0261
45	2.4430	0.0258
46	2.4685	0.0255
47	2.4937	0.0252
48	2.5186	0.0249
49	2.5432	0.0246
50	2.5676	0.0244

51	2.5917	0.0241
52	2.6155	0.0239
53	2.6391	0.0236
54	2.6625	0.0234
55	2.6857	0.0232
56	2.7086	0.0229
57	2.7313	0.0227
58	2.7538	0.0225
59	2.7761	0.0223
60	2.7982	0.0221
61	2.8201	0.0219
62	2.8418	0.0217
63	2.8634	0.0215
64	2.8847	0.0214
65	2.9059	0.0212
66	2.9269	0.0210
67	2.9478	0.0208
68	2.9684	0.0207
69	2.9890	0.0205
70	3.0093	0.0204
71	3.0295	0.0202
72	3.0496	0.0201
73	3.0717	0.0221
74	3.0937	0.0220
75	3.1156	0.0219
76	3.1373	0.0217
77	3.1589	0.0216
78	3.1803	0.0215
79	3.2017	0.0213
80	3.2229	0.0212
81	3.2439	0.0211
82	3.2649	0.0209
83	3.2857	0.0208
84	3.3064	0.0207
85	3.3270	0.0206
86	3.3474	0.0205
87	3.3678	0.0204
88	3.3880	0.0202
89	3.4082	0.0201
90	3.4282	0.0200
91	3.4481	0.0199
92	3.4680	0.0198
93	3.4877	0.0197
94	3.5073	0.0196
95	3.5268	0.0195
96	3.5462	0.0194
97	3.5656	0.0193
98	3.5848	0.0192
99	3.6039	0.0191
100	3.6230	0.0190

101	3.6419	0.0190
102	3.6608	0.0189
103	3.6796	0.0188
104	3.6983	0.0187
105	3.7169	0.0186
106	3.7354	0.0185
107	3.7539	0.0184
108	3.7722	0.0184
109	3.7905	0.0183
110	3.8087	0.0182
111	3.8268	0.0181
112	3.8449	0.0180
113	3.8628	0.0180
114	3.8807	0.0179
115	3.8985	0.0178
116	3.9163	0.0177
117	3.9339	0.0177
118	3.9515	0.0176
119	3.9691	0.0175
120	3.9865	0.0175
121	4.0039	0.0174
122	4.0212	0.0173
123	4.0385	0.0173
124	4.0557	0.0172
125	4.0728	0.0171
126	4.0899	0.0171
127	4.1069	0.0170
128	4.1238	0.0169
129	4.1406	0.0169
130	4.1575	0.0168
131	4.1742	0.0167
132	4.1909	0.0167
133	4.2075	0.0166
134	4.2241	0.0166
135	4.2406	0.0165
136	4.2570	0.0164
137	4.2734	0.0164
138	4.2897	0.0163
139	4.3060	0.0163
140	4.3222	0.0162
141	4.3384	0.0162
142	4.3545	0.0161
143	4.3706	0.0161
144	4.3866	0.0160
145	4.4025	0.0160
146	4.4184	0.0159
147	4.4343	0.0158
148	4.4500	0.0158
149	4.4658	0.0157
150	4.4815	0.0157

151	4.4971	0.0156
152	4.5127	0.0156
153	4.5283	0.0155
154	4.5438	0.0155
155	4.5592	0.0155
156	4.5746	0.0154
157	4.5900	0.0154
158	4.6053	0.0153
159	4.6206	0.0153
160	4.6358	0.0152
161	4.6509	0.0152
162	4.6661	0.0151
163	4.6812	0.0151
164	4.6962	0.0150
165	4.7112	0.0150
166	4.7262	0.0150
167	4.7411	0.0149
168	4.7559	0.0149
169	4.7708	0.0148
170	4.7855	0.0148
171	4.8003	0.0147
172	4.8150	0.0147
173	4.8297	0.0147
174	4.8443	0.0146
175	4.8589	0.0146
176	4.8734	0.0145
177	4.8879	0.0145
178	4.9024	0.0145
179	4.9168	0.0144
180	4.9312	0.0144
181	4.9455	0.0143
182	4.9598	0.0143
183	4.9741	0.0143
184	4.9883	0.0142
185	5.0025	0.0142
186	5.0167	0.0142
187	5.0308	0.0141
188	5.0449	0.0141
189	5.0590	0.0141
190	5.0730	0.0140
191	5.0870	0.0140
192	5.1009	0.0140
193	5.1149	0.0139
194	5.1287	0.0139
195	5.1426	0.0138
196	5.1564	0.0138
197	5.1702	0.0138
198	5.1839	0.0137
199	5.1977	0.0137
200	5.2113	0.0137

201	5.2250	0.0136
202	5.2386	0.0136
203	5.2522	0.0136
204	5.2657	0.0136
205	5.2793	0.0135
206	5.2928	0.0135
207	5.3062	0.0135
208	5.3196	0.0134
209	5.3330	0.0134
210	5.3464	0.0134
211	5.3597	0.0133
212	5.3731	0.0133
213	5.3863	0.0133
214	5.3996	0.0132
215	5.4128	0.0132
216	5.4260	0.0132
217	5.4392	0.0132
218	5.4523	0.0131
219	5.4654	0.0131
220	5.4785	0.0131
221	5.4915	0.0130
222	5.5045	0.0130
223	5.5175	0.0130
224	5.5305	0.0130
225	5.5434	0.0129
226	5.5563	0.0129
227	5.5692	0.0129
228	5.5821	0.0129
229	5.5949	0.0128
230	5.6077	0.0128
231	5.6205	0.0128
232	5.6332	0.0127
233	5.6459	0.0127
234	5.6586	0.0127
235	5.6713	0.0127
236	5.6839	0.0126
237	5.6966	0.0126
238	5.7092	0.0126
239	5.7217	0.0126
240	5.7343	0.0125
241	5.7468	0.0125
242	5.7593	0.0125
243	5.7717	0.0125
244	5.7842	0.0124
245	5.7966	0.0124
246	5.8090	0.0124
247	5.8214	0.0124
248	5.8337	0.0123
249	5.8461	0.0123
250	5.8584	0.0123

251	5.8706	0.0123
252	5.8829	0.0123
253	5.8951	0.0122
254	5.9073	0.0122
255	5.9195	0.0122
256	5.9317	0.0122
257	5.9438	0.0121
258	5.9559	0.0121
259	5.9680	0.0121
260	5.9801	0.0121
261	5.9922	0.0121
262	6.0042	0.0120
263	6.0162	0.0120
264	6.0282	0.0120
265	6.0402	0.0120
266	6.0521	0.0119
267	6.0640	0.0119
268	6.0759	0.0119
269	6.0878	0.0119
270	6.0997	0.0119
271	6.1115	0.0118
272	6.1233	0.0118
273	6.1351	0.0118
274	6.1469	0.0118
275	6.1586	0.0118
276	6.1704	0.0117
277	6.1821	0.0117
278	6.1938	0.0117
279	6.2055	0.0117
280	6.2171	0.0117
281	6.2288	0.0116
282	6.2404	0.0116
283	6.2520	0.0116
284	6.2635	0.0116
285	6.2751	0.0116
286	6.2866	0.0115
287	6.2982	0.0115
288	6.3097	0.0115

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0115	0.0032	0.0083
2	0.0115	0.0032	0.0083
3	0.0116	0.0032	0.0083
4	0.0116	0.0032	0.0084
5	0.0116	0.0032	0.0084
6	0.0116	0.0032	0.0084
7	0.0117	0.0033	0.0084

8	0.0117	0.0033	0.0084
9	0.0117	0.0033	0.0085
10	0.0118	0.0033	0.0085
11	0.0118	0.0033	0.0085
12	0.0118	0.0033	0.0085
13	0.0119	0.0033	0.0086
14	0.0119	0.0033	0.0086
15	0.0119	0.0033	0.0086
16	0.0119	0.0033	0.0086
17	0.0120	0.0033	0.0086
18	0.0120	0.0033	0.0087
19	0.0121	0.0034	0.0087
20	0.0121	0.0034	0.0087
21	0.0121	0.0034	0.0087
22	0.0121	0.0034	0.0088
23	0.0122	0.0034	0.0088
24	0.0122	0.0034	0.0088
25	0.0123	0.0034	0.0088
26	0.0123	0.0034	0.0089
27	0.0123	0.0034	0.0089
28	0.0123	0.0034	0.0089
29	0.0124	0.0035	0.0089
30	0.0124	0.0035	0.0090
31	0.0125	0.0035	0.0090
32	0.0125	0.0035	0.0090
33	0.0125	0.0035	0.0090
34	0.0126	0.0035	0.0091
35	0.0126	0.0035	0.0091
36	0.0126	0.0035	0.0091
37	0.0127	0.0035	0.0092
38	0.0127	0.0035	0.0092
39	0.0128	0.0036	0.0092
40	0.0128	0.0036	0.0092
41	0.0129	0.0036	0.0093
42	0.0129	0.0036	0.0093
43	0.0129	0.0036	0.0093
44	0.0130	0.0036	0.0094
45	0.0130	0.0036	0.0094
46	0.0130	0.0036	0.0094
47	0.0131	0.0037	0.0095
48	0.0131	0.0037	0.0095
49	0.0132	0.0037	0.0095
50	0.0132	0.0037	0.0095
51	0.0133	0.0037	0.0096
52	0.0133	0.0037	0.0096
53	0.0134	0.0037	0.0096
54	0.0134	0.0037	0.0097
55	0.0135	0.0037	0.0097
56	0.0135	0.0038	0.0097
57	0.0136	0.0038	0.0098

58	0.0136	0.0038	0.0098
59	0.0136	0.0038	0.0098
60	0.0137	0.0038	0.0099
61	0.0137	0.0038	0.0099
62	0.0138	0.0038	0.0099
63	0.0138	0.0039	0.0100
64	0.0139	0.0039	0.0100
65	0.0140	0.0039	0.0101
66	0.0140	0.0039	0.0101
67	0.0141	0.0039	0.0101
68	0.0141	0.0039	0.0102
69	0.0142	0.0039	0.0102
70	0.0142	0.0040	0.0102
71	0.0143	0.0040	0.0103
72	0.0143	0.0040	0.0103
73	0.0144	0.0040	0.0104
74	0.0144	0.0040	0.0104
75	0.0145	0.0040	0.0105
76	0.0145	0.0041	0.0105
77	0.0146	0.0041	0.0105
78	0.0147	0.0041	0.0106
79	0.0147	0.0041	0.0106
80	0.0148	0.0041	0.0107
81	0.0149	0.0041	0.0107
82	0.0149	0.0042	0.0108
83	0.0150	0.0042	0.0108
84	0.0150	0.0042	0.0109
85	0.0151	0.0042	0.0109
86	0.0152	0.0042	0.0109
87	0.0153	0.0043	0.0110
88	0.0153	0.0043	0.0110
89	0.0154	0.0043	0.0111
90	0.0155	0.0043	0.0111
91	0.0155	0.0043	0.0112
92	0.0156	0.0043	0.0113
93	0.0157	0.0044	0.0113
94	0.0157	0.0044	0.0114
95	0.0158	0.0044	0.0114
96	0.0159	0.0044	0.0115
97	0.0160	0.0045	0.0115
98	0.0161	0.0045	0.0116
99	0.0162	0.0045	0.0117
100	0.0162	0.0045	0.0117
101	0.0163	0.0045	0.0118
102	0.0164	0.0046	0.0118
103	0.0165	0.0046	0.0119
104	0.0166	0.0046	0.0119
105	0.0167	0.0046	0.0120
106	0.0167	0.0047	0.0121
107	0.0169	0.0047	0.0122

108	0.0169	0.0047	0.0122
109	0.0171	0.0048	0.0123
110	0.0171	0.0048	0.0124
111	0.0173	0.0048	0.0124
112	0.0173	0.0048	0.0125
113	0.0175	0.0049	0.0126
114	0.0175	0.0049	0.0126
115	0.0177	0.0049	0.0127
116	0.0177	0.0049	0.0128
117	0.0179	0.0050	0.0129
118	0.0180	0.0050	0.0130
119	0.0181	0.0050	0.0131
120	0.0182	0.0051	0.0131
121	0.0184	0.0051	0.0132
122	0.0184	0.0051	0.0133
123	0.0186	0.0052	0.0134
124	0.0187	0.0052	0.0135
125	0.0189	0.0053	0.0136
126	0.0190	0.0053	0.0137
127	0.0191	0.0053	0.0138
128	0.0192	0.0054	0.0139
129	0.0194	0.0054	0.0140
130	0.0195	0.0054	0.0141
131	0.0197	0.0055	0.0142
132	0.0198	0.0055	0.0143
133	0.0200	0.0056	0.0145
134	0.0201	0.0056	0.0145
135	0.0204	0.0057	0.0147
136	0.0205	0.0057	0.0148
137	0.0207	0.0058	0.0149
138	0.0208	0.0058	0.0150
139	0.0211	0.0059	0.0152
140	0.0212	0.0059	0.0153
141	0.0215	0.0060	0.0155
142	0.0216	0.0060	0.0156
143	0.0219	0.0061	0.0158
144	0.0220	0.0061	0.0159
145	0.0201	0.0056	0.0145
146	0.0202	0.0056	0.0146
147	0.0205	0.0057	0.0148
148	0.0207	0.0058	0.0149
149	0.0210	0.0059	0.0152
150	0.0212	0.0059	0.0153
151	0.0215	0.0060	0.0155
152	0.0217	0.0061	0.0157
153	0.0221	0.0062	0.0159
154	0.0223	0.0062	0.0161
155	0.0227	0.0063	0.0164
156	0.0229	0.0064	0.0165
157	0.0234	0.0065	0.0169

158	0.0236	0.0066	0.0170
159	0.0241	0.0067	0.0174
160	0.0244	0.0068	0.0176
161	0.0249	0.0069	0.0180
162	0.0252	0.0070	0.0182
163	0.0258	0.0072	0.0186
164	0.0261	0.0073	0.0188
165	0.0267	0.0074	0.0193
166	0.0271	0.0075	0.0195
167	0.0278	0.0077	0.0201
168	0.0282	0.0079	0.0203
169	0.0291	0.0081	0.0210
170	0.0296	0.0082	0.0213
171	0.0305	0.0085	0.0220
172	0.0310	0.0086	0.0224
173	0.0321	0.0089	0.0232
174	0.0327	0.0091	0.0236
175	0.0340	0.0095	0.0245
176	0.0347	0.0097	0.0250
177	0.0362	0.0101	0.0261
178	0.0370	0.0103	0.0267
179	0.0389	0.0108	0.0281
180	0.0399	0.0111	0.0288
181	0.0423	0.0118	0.0305
182	0.0436	0.0121	0.0315
183	0.0467	0.0130	0.0337
184	0.0485	0.0135	0.0350
185	0.0337	0.0094	0.0243
186	0.0359	0.0100	0.0259
187	0.0416	0.0116	0.0300
188	0.0455	0.0127	0.0328
189	0.0565	0.0157	0.0408
190	0.0651	0.0181	0.0470
191	0.0988	0.0242	0.0746
192	0.1434	0.0242	0.1192
193	0.6204	0.0242	0.5962
194	0.0777	0.0217	0.0561
195	0.0503	0.0140	0.0363
196	0.0385	0.0107	0.0278
197	0.0505	0.0141	0.0364
198	0.0451	0.0126	0.0325
199	0.0411	0.0114	0.0296
200	0.0379	0.0106	0.0274
201	0.0354	0.0099	0.0255
202	0.0333	0.0093	0.0240
203	0.0315	0.0088	0.0228
204	0.0300	0.0084	0.0217
205	0.0286	0.0080	0.0206
206	0.0274	0.0076	0.0198
207	0.0264	0.0074	0.0190

208	0.0255	0.0071	0.0184
209	0.0246	0.0069	0.0178
210	0.0239	0.0066	0.0172
211	0.0232	0.0064	0.0167
212	0.0225	0.0063	0.0162
213	0.0219	0.0061	0.0158
214	0.0214	0.0059	0.0154
215	0.0208	0.0058	0.0150
216	0.0204	0.0057	0.0147
217	0.0221	0.0062	0.0160
218	0.0217	0.0060	0.0157
219	0.0213	0.0059	0.0154
220	0.0209	0.0058	0.0151
221	0.0206	0.0057	0.0149
222	0.0202	0.0056	0.0146
223	0.0199	0.0056	0.0144
224	0.0196	0.0055	0.0142
225	0.0193	0.0054	0.0139
226	0.0190	0.0053	0.0137
227	0.0188	0.0052	0.0135
228	0.0185	0.0052	0.0134
229	0.0183	0.0051	0.0132
230	0.0180	0.0050	0.0130
231	0.0178	0.0050	0.0129
232	0.0176	0.0049	0.0127
233	0.0174	0.0048	0.0125
234	0.0172	0.0048	0.0124
235	0.0170	0.0047	0.0123
236	0.0168	0.0047	0.0121
237	0.0166	0.0046	0.0120
238	0.0164	0.0046	0.0119
239	0.0163	0.0045	0.0117
240	0.0161	0.0045	0.0116
241	0.0160	0.0044	0.0115
242	0.0158	0.0044	0.0114
243	0.0156	0.0044	0.0113
244	0.0155	0.0043	0.0112
245	0.0154	0.0043	0.0111
246	0.0152	0.0042	0.0110
247	0.0151	0.0042	0.0109
248	0.0150	0.0042	0.0108
249	0.0148	0.0041	0.0107
250	0.0147	0.0041	0.0106
251	0.0146	0.0041	0.0105
252	0.0145	0.0040	0.0104
253	0.0143	0.0040	0.0104
254	0.0142	0.0040	0.0103
255	0.0141	0.0039	0.0102
256	0.0140	0.0039	0.0101
257	0.0139	0.0039	0.0100

258	0.0138	0.0038	0.0100
259	0.0137	0.0038	0.0099
260	0.0136	0.0038	0.0098
261	0.0135	0.0038	0.0098
262	0.0134	0.0037	0.0097
263	0.0133	0.0037	0.0096
264	0.0132	0.0037	0.0096
265	0.0132	0.0037	0.0095
266	0.0131	0.0036	0.0094
267	0.0130	0.0036	0.0094
268	0.0129	0.0036	0.0093
269	0.0128	0.0036	0.0093
270	0.0127	0.0036	0.0092
271	0.0127	0.0035	0.0091
272	0.0126	0.0035	0.0091
273	0.0125	0.0035	0.0090
274	0.0124	0.0035	0.0090
275	0.0124	0.0034	0.0089
276	0.0123	0.0034	0.0089
277	0.0122	0.0034	0.0088
278	0.0122	0.0034	0.0088
279	0.0121	0.0034	0.0087
280	0.0120	0.0034	0.0087
281	0.0120	0.0033	0.0086
282	0.0119	0.0033	0.0086
283	0.0118	0.0033	0.0085
284	0.0118	0.0033	0.0085
285	0.0117	0.0033	0.0085
286	0.0117	0.0032	0.0084
287	0.0116	0.0032	0.0084
288	0.0115	0.0032	0.0083

Total soil rain loss = 1.59(In)
Total effective rainfall = 4.72(In)
Peak flow rate in flood hydrograph = 86.05(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	22.5	45.0	67.5	90.0
0+ 5	0.0004	0.05	Q	|	|	|	|
0+10	0.0020	0.24	Q	|	|	|	|
0+15	0.0067	0.67	Q	|	|	|	|
0+20	0.0173	1.54	Q	|	|	|	|

0+25	0.0326	2.22	Q	|	|	|	|
0+30	0.0509	2.66	VQ	|	|	|	|
0+35	0.0712	2.95	VQ	|	|	|	|
0+40	0.0932	3.18	VQ	|	|	|	|
0+45	0.1164	3.37	VQ	|	|	|	|
0+50	0.1406	3.51	VQ	|	|	|	|
0+55	0.1656	3.64	VQ	|	|	|	|
1+ 0	0.1914	3.75	VQ	|	|	|	|
1+ 5	0.2179	3.84	VQ	|	|	|	|
1+10	0.2449	3.92	VQ	|	|	|	|
1+15	0.2724	3.99	VQ	|	|	|	|
1+20	0.3003	4.06	VQ	|	|	|	|
1+25	0.3287	4.11	VQ	|	|	|	|
1+30	0.3574	4.17	VQ	|	|	|	|
1+35	0.3864	4.21	VQ	|	|	|	|
1+40	0.4157	4.26	VQ	|	|	|	|
1+45	0.4453	4.29	|Q	|	|	|	|
1+50	0.4751	4.33	|Q	|	|	|	|
1+55	0.5051	4.36	|Q	|	|	|	|
2+ 0	0.5354	4.39	|Q	|	|	|	|
2+ 5	0.5658	4.42	|Q	|	|	|	|
2+10	0.5964	4.44	|Q	|	|	|	|
2+15	0.6271	4.46	|Q	|	|	|	|
2+20	0.6581	4.49	|Q	|	|	|	|
2+25	0.6891	4.51	|VQ	|	|	|	|
2+30	0.7204	4.54	|VQ	|	|	|	|
2+35	0.7518	4.56	|VQ	|	|	|	|
2+40	0.7833	4.58	|VQ	|	|	|	|
2+45	0.8150	4.60	|VQ	|	|	|	|
2+50	0.8468	4.62	| Q	|	|	|	|
2+55	0.8787	4.63	| Q	|	|	|	|
3+ 0	0.9107	4.64	| Q	|	|	|	|
3+ 5	0.9427	4.66	| Q	|	|	|	|
3+10	0.9749	4.67	| Q	|	|	|	|
3+15	1.0072	4.68	| Q	|	|	|	|
3+20	1.0395	4.70	| Q	|	|	|	|
3+25	1.0720	4.71	| Q	|	|	|	|
3+30	1.1045	4.73	| Q	|	|	|	|
3+35	1.1372	4.74	| Q	|	|	|	|
3+40	1.1699	4.76	| Q	|	|	|	|
3+45	1.2028	4.77	| Q	|	|	|	|
3+50	1.2357	4.79	| Q	|	|	|	|
3+55	1.2688	4.80	| QV	|	|	|	|
4+ 0	1.3019	4.82	| QV	|	|	|	|
4+ 5	1.3352	4.83	| QV	|	|	|	|
4+10	1.3686	4.85	| QV	|	|	|	|
4+15	1.4021	4.86	| QV	|	|	|	|
4+20	1.4356	4.88	| QV	|	|	|	|
4+25	1.4693	4.89	| QV	|	|	|	|
4+30	1.5032	4.91	| QV	|	|	|	|

4+35	1.5371	4.92	QV			
4+40	1.5711	4.94	QV			
4+45	1.6052	4.96	QV			
4+50	1.6395	4.97	QV			
4+55	1.6739	4.99	QV			
5+ 0	1.7084	5.01	Q V			
5+ 5	1.7430	5.03	Q V			
5+10	1.7777	5.04	Q V			
5+15	1.8126	5.06	Q V			
5+20	1.8475	5.08	Q V			
5+25	1.8826	5.10	Q V			
5+30	1.9179	5.11	Q V			
5+35	1.9532	5.13	Q V			
5+40	1.9887	5.15	Q V			
5+45	2.0243	5.17	Q V			
5+50	2.0601	5.19	Q V			
5+55	2.0959	5.21	Q V			
6+ 0	2.1319	5.23	Q V			
6+ 5	2.1681	5.25	Q V			
6+10	2.2044	5.27	Q V			
6+15	2.2408	5.29	Q V			
6+20	2.2773	5.31	Q V			
6+25	2.3140	5.33	Q V			
6+30	2.3509	5.35	Q V			
6+35	2.3879	5.37	Q V			
6+40	2.4250	5.39	Q V			
6+45	2.4623	5.41	Q V			
6+50	2.4997	5.44	Q V			
6+55	2.5373	5.46	Q V			
7+ 0	2.5751	5.48	Q V			
7+ 5	2.6130	5.50	Q V			
7+10	2.6511	5.53	Q V			
7+15	2.6893	5.55	Q V			
7+20	2.7277	5.57	Q V			
7+25	2.7662	5.60	Q V			
7+30	2.8049	5.62	Q V			
7+35	2.8438	5.65	Q V			
7+40	2.8829	5.67	Q V			
7+45	2.9221	5.70	Q V			
7+50	2.9616	5.72	Q V			
7+55	3.0012	5.75	Q V			
8+ 0	3.0409	5.78	Q V			
8+ 5	3.0809	5.80	Q V			
8+10	3.1211	5.83	Q V			
8+15	3.1614	5.86	Q V			
8+20	3.2020	5.89	Q V			
8+25	3.2427	5.91	Q V			
8+30	3.2836	5.94	Q V			
8+35	3.3248	5.97	Q V			
8+40	3.3661	6.00	Q V			

8+45	3.4077	6.03	Q V				
8+50	3.4494	6.06	Q V				
8+55	3.4914	6.10	Q V				
9+ 0	3.5336	6.13	Q V				
9+ 5	3.5760	6.16	Q V				
9+10	3.6187	6.19	Q V				
9+15	3.6616	6.23	Q V				
9+20	3.7047	6.26	Q V				
9+25	3.7480	6.29	Q V				
9+30	3.7916	6.33	Q V				
9+35	3.8355	6.37	Q V				
9+40	3.8795	6.40	Q V				
9+45	3.9239	6.44	Q V				
9+50	3.9685	6.48	Q V				
9+55	4.0134	6.52	Q V				
10+ 0	4.0585	6.55	Q V				
10+ 5	4.1039	6.59	Q V				
10+10	4.1496	6.64	Q V				
10+15	4.1956	6.68	Q V				
10+20	4.2419	6.72	Q V				
10+25	4.2885	6.76	Q V				
10+30	4.3353	6.81	Q V				
10+35	4.3825	6.85	Q V				
10+40	4.4300	6.90	Q V				
10+45	4.4779	6.94	Q V				
10+50	4.5260	6.99	Q V				
10+55	4.5745	7.04	Q V				
11+ 0	4.6233	7.09	Q V				
11+ 5	4.6725	7.14	Q V				
11+10	4.7221	7.19	Q V				
11+15	4.7720	7.25	Q V				
11+20	4.8223	7.30	Q V				
11+25	4.8730	7.36	Q V				
11+30	4.9240	7.42	Q V				
11+35	4.9755	7.47	Q V				
11+40	5.0274	7.54	Q V				
11+45	5.0797	7.60	Q V				
11+50	5.1325	7.66	Q V				
11+55	5.1857	7.73	Q V				
12+ 0	5.2394	7.79	Q V				
12+ 5	5.2935	7.85	Q V				
12+10	5.3478	7.89	Q V				
12+15	5.4020	7.87	Q V				
12+20	5.4556	7.78	Q V				
12+25	5.5088	7.73	Q V				
12+30	5.5620	7.72	Q V				
12+35	5.6154	7.75	Q V				
12+40	5.6691	7.79	Q V				
12+45	5.7231	7.84	Q V				
12+50	5.7776	7.91	Q V				

12+55	5.8325	7.98	Q	V			
13+ 0	5.8881	8.06	Q	V			
13+ 5	5.9441	8.14	Q	V			
13+10	6.0008	8.23	Q	V			
13+15	6.0582	8.33	Q	V			
13+20	6.1163	8.43	Q	V			
13+25	6.1751	8.54	Q	V			
13+30	6.2348	8.66	Q	V			
13+35	6.2952	8.78	Q	V			
13+40	6.3565	8.91	Q	V			
13+45	6.4188	9.04	Q	V			
13+50	6.4820	9.18	Q	V			
13+55	6.5463	9.33	Q	V			
14+ 0	6.6117	9.49	Q	V			
14+ 5	6.6782	9.66	Q	V			
14+10	6.7459	9.84	Q	V			
14+15	6.8150	10.03	Q	V			
14+20	6.8855	10.24	Q	V			
14+25	6.9575	10.45	Q	V			
14+30	7.0310	10.68	Q	V			
14+35	7.1062	10.92	Q	V			
14+40	7.1832	11.18	Q	V			
14+45	7.2622	11.46	Q	V			
14+50	7.3432	11.76	Q	V			
14+55	7.4264	12.09	Q	V			
15+ 0	7.5121	12.45	Q	V			
15+ 5	7.6005	12.83	Q	V			
15+10	7.6919	13.26	Q	V			
15+15	7.7864	13.73	Q	V			
15+20	7.8847	14.27	Q	V			
15+25	7.9864	14.77	Q	V			
15+30	8.0907	15.14	Q	V			
15+35	8.1953	15.19	Q	V			
15+40	8.2965	14.68	Q	V			
15+45	8.3969	14.59	Q	V			
15+50	8.5015	15.18	Q	V			
15+55	8.6146	16.43	Q	V			
16+ 0	8.7445	18.86	Q	V			
16+ 5	8.9224	25.83	Q	V			
16+10	9.1967	39.82	Q	V			
16+15	9.6064	59.49	Q	V			
16+20	10.1991	86.05	Q	V			Q
16+25	10.6946	71.94	Q	V		Q	
16+30	11.0562	52.51	Q	V			
16+35	11.3382	40.94	Q	V			
16+40	11.5822	35.44	Q	V			
16+45	11.7978	31.29	Q	V			
16+50	11.9898	27.88	Q	V			
16+55	12.1634	25.20	Q	V			
17+ 0	12.3235	23.25	Q	V			

17+ 5	12.4714	21.48	| Q|	|	V|	|
17+10	12.6063	19.59	| Q |	|	V|	|
17+15	12.7305	18.04	| Q |	|	V	|
17+20	12.8480	17.05	| Q |	|	V	|
17+25	12.9584	16.04	| Q |	|	V	|
17+30	13.0628	15.16	| Q |	|	|V	|
17+35	13.1604	14.16	| Q |	|	|V	|
17+40	13.2538	13.56	| Q |	|	|V	|
17+45	13.3416	12.75	| Q |	|	|V	|
17+50	13.4256	12.20	| Q |	|	|V	|
17+55	13.5045	11.46	| Q |	|	| V	|
18+ 0	13.5798	10.92	| Q |	|	| V	|
18+ 5	13.6509	10.33	| Q |	|	| V	|
18+10	13.7188	9.86	| Q |	|	| V	|
18+15	13.7859	9.75	| Q |	|	| V	|
18+20	13.8532	9.77	| Q |	|	| V	|
18+25	13.9198	9.67	| Q |	|	| V	|
18+30	13.9854	9.52	| Q |	|	| V	|
18+35	14.0492	9.28	| Q |	|	| V	|
18+40	14.1100	8.82	| Q |	|	| V	|
18+45	14.1690	8.57	| Q |	|	| V	|
18+50	14.2254	8.19	| Q |	|	| V	|
18+55	14.2794	7.84	| Q |	|	| V	|
19+ 0	14.3324	7.70	| Q |	|	| V	|
19+ 5	14.3846	7.57	| Q |	|	| V	|
19+10	14.4359	7.45	| Q |	|	| V	|
19+15	14.4864	7.33	| Q |	|	| V	|
19+20	14.5361	7.22	| Q |	|	| V	|
19+25	14.5851	7.12	| Q |	|	| V	|
19+30	14.6335	7.02	| Q |	|	| V	|
19+35	14.6811	6.92	| Q |	|	| V	|
19+40	14.7282	6.83	| Q |	|	| V	|
19+45	14.7746	6.74	| Q |	|	| V	|
19+50	14.8205	6.66	| Q |	|	| V	|
19+55	14.8658	6.58	| Q |	|	| V	|
20+ 0	14.9105	6.50	| Q |	|	| V	|
20+ 5	14.9548	6.42	| Q |	|	| V	|
20+10	14.9985	6.35	| Q |	|	| V	|
20+15	15.0417	6.28	| Q |	|	| V	|
20+20	15.0845	6.21	| Q |	|	| V	|
20+25	15.1269	6.15	| Q |	|	| V	|
20+30	15.1688	6.08	| Q |	|	| V	|
20+35	15.2102	6.02	| Q |	|	| V	|
20+40	15.2513	5.96	| Q |	|	| V	|
20+45	15.2920	5.91	| Q |	|	| V	|
20+50	15.3323	5.85	| Q |	|	| V	|
20+55	15.3722	5.79	| Q |	|	| V	|
21+ 0	15.4117	5.74	| Q |	|	| V	|
21+ 5	15.4509	5.69	| Q |	|	| V	|
21+10	15.4897	5.64	| Q |	|	| V	|

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   21+15      15.5282      5.59  | Q       |         |         |     V   |
   21+20      15.5664      5.54  | Q       |         |         |     V   |
   21+25      15.6042      5.49  | Q       |         |         |      V  |
   21+30      15.6417      5.45  | Q       |         |         |      V  |
   21+35      15.6789      5.40  | Q       |         |         |      V  |
   21+40      15.7159      5.36  | Q       |         |         |      V  |
   21+45      15.7525      5.32  | Q       |         |         |      V  |
   21+50      15.7888      5.28  | Q       |         |         |      V  |
   21+55      15.8249      5.24  | Q       |         |         |      V  |
   22+ 0      15.8607      5.20  | Q       |         |         |      V  |
   22+ 5      15.8962      5.16  | Q       |         |         |      V  |
   22+10      15.9315      5.12  | Q       |         |         |      V  |
   22+15      15.9665      5.09  | Q       |         |         |      V  |
   22+20      16.0013      5.05  | Q       |         |         |      V  |
   22+25      16.0358      5.01  | Q       |         |         |       V |
   22+30      16.0701      4.98  | Q       |         |         |       V |
   22+35      16.1042      4.95  | Q       |         |         |       V |
   22+40      16.1381      4.91  | Q       |         |         |       V |
   22+45      16.1717      4.88  | Q       |         |         |       V |
   22+50      16.2051      4.85  | Q       |         |         |       V |
   22+55      16.2383      4.82  | Q       |         |         |       V |
   23+ 0      16.2713      4.79  | Q       |         |         |       V |
   23+ 5      16.3040      4.76  | Q       |         |         |       V |
   23+10      16.3366      4.73  | Q       |         |         |       V |
   23+15      16.3690      4.70  | Q       |         |         |       V |
   23+20      16.4012      4.67  | Q       |         |         |       V |
   23+25      16.4332      4.65  | Q       |         |         |        V|
   23+30      16.4650      4.62  | Q       |         |         |        V|
   23+35      16.4967      4.59  | Q       |         |         |        V|
   23+40      16.5281      4.57  | Q       |         |         |        V|
   23+45      16.5594      4.54  | Q       |         |         |        V|
   23+50      16.5905      4.52  | Q       |         |         |        V|
   23+55      16.6214      4.49  |Q        |         |         |        V|
   24+ 0      16.6522      4.47  |Q        |         |         |        V|
   24+ 5      16.6824      4.39  |Q        |         |         |        V|
   24+10      16.7112      4.18  |Q        |         |         |        V|
   24+15      16.7368      3.72  |Q        |         |         |        V|
   24+20      16.7565      2.85  |Q        |         |         |        V|
   24+25      16.7713      2.15  Q         |         |         |        V|
   24+30      16.7830      1.71  Q         |         |         |        V|
-------------------------------------------------------------------------
```

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

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Study date 11/29/20

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

Program License Serial Number 6277

2020-326 HCC V
PRE-DEVELOPMENT CONDITIONS
UNIT HYDROGRAPH - 100 YEAR STORM
DA 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 10		
15.20	1	0.79
Rainfall data for year 2		
15.20	6	1.12
Rainfall data for year 2		
15.20	24	2.11
Rainfall data for year 100		

```
            15.20            1            1.31
------------------------------------------------------------------------
Rainfall data for year 100
            15.20            6            3.05
------------------------------------------------------------------------
Rainfall data for year 100
            15.20           24            6.31
------------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

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


SCS curve  SCS curve     Area     Area     Fp(Fig C6)    Ap      Fm
No.(AMCII) NO.(AMC 3)    (Ac.)    Fraction     (In/Hr)  (dec.)   (In/Hr)
 67.0      84.6         15.20      1.000     0.290    1.000    0.290

Area-averaged adjusted loss rate Fm (In/Hr) =  0.290

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

Area       Area          SCS CN    SCS CN      S     Pervious
 (Ac.)      Fract         (AMC2)    (AMC3)           Yield Fr
    15.20   1.000         67.0      84.6       1.82     0.721

Area-averaged catchment yield fraction, Y =  0.721
Area-averaged low loss fraction, Yb =  0.279
User entry of time of concentration  =   0.285 (hours)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watershed area =      15.20(Ac.)
Catchment Lag time =   0.228 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 36.5497
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.290(In/Hr)
Average low loss rate fraction (Yb) = 0.279 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall =  0.622(In)
Computed peak 30-minute rainfall =  1.064(In)
Specified peak 1-hour rainfall =  1.310(In)
Computed peak 3-hour rainfall =  2.199(In)
Specified peak 6-hour rainfall =  3.050(In)
Specified peak 24-hour rainfall =  6.310(In)


Rainfall depth area reduction factors:
Using a total area of      15.20(Ac.) (Ref: fig. E-4)

5-minute factor = 0.999     Adjusted rainfall =  0.621(In)
30-minute factor = 0.999    Adjusted rainfall =  1.063(In)
```

1-hour factor = 0.999 Adjusted rainfall = 1.309(In)
3-hour factor = 1.000 Adjusted rainfall = 2.199(In)
6-hour factor = 1.000 Adjusted rainfall = 3.050(In)
24-hour factor = 1.000 Adjusted rainfall = 6.310(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 = 183.82 (CFS))	
1	2.387	4.388
2	14.931	23.059
3	43.706	52.894
4	61.915	33.474
5	71.725	18.032
6	78.286	12.061
7	82.942	8.558
8	86.550	6.632
9	89.324	5.100
10	91.418	3.850
11	93.180	3.240
12	94.591	2.593
13	95.764	2.157
14	96.714	1.746
15	97.439	1.334
16	97.965	0.966
17	98.343	0.695
18	98.775	0.795
19	99.214	0.806
20	99.577	0.667
21	99.808	0.424
22	100.000	0.353

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.6212	0.6212
2	0.7647	0.1436
3	0.8637	0.0989
4	0.9415	0.0778
5	1.0067	0.0652
6	1.0633	0.0566
7	1.1136	0.0503
8	1.1591	0.0455
9	1.2008	0.0417
10	1.2394	0.0386
11	1.2753	0.0359
12	1.3091	0.0337

13	1.3595	0.0504
14	1.4079	0.0484
15	1.4545	0.0466
16	1.4996	0.0450
17	1.5431	0.0436
18	1.5853	0.0422
19	1.6263	0.0410
20	1.6662	0.0399
21	1.7050	0.0388
22	1.7429	0.0379
23	1.7799	0.0370
24	1.8160	0.0361
25	1.8514	0.0353
26	1.8860	0.0346
27	1.9199	0.0339
28	1.9531	0.0333
29	1.9858	0.0326
30	2.0178	0.0320
31	2.0493	0.0315
32	2.0803	0.0310
33	2.1107	0.0304
34	2.1407	0.0300
35	2.1702	0.0295
36	2.1993	0.0291
37	2.2279	0.0286
38	2.2561	0.0282
39	2.2839	0.0278
40	2.3113	0.0274
41	2.3384	0.0271
42	2.3651	0.0267
43	2.3915	0.0264
44	2.4176	0.0261
45	2.4434	0.0258
46	2.4688	0.0255
47	2.4940	0.0252
48	2.5189	0.0249
49	2.5435	0.0246
50	2.5679	0.0244
51	2.5920	0.0241
52	2.6158	0.0239
53	2.6394	0.0236
54	2.6628	0.0234
55	2.6860	0.0231
56	2.7089	0.0229
57	2.7316	0.0227
58	2.7541	0.0225
59	2.7764	0.0223
60	2.7985	0.0221
61	2.8204	0.0219
62	2.8421	0.0217

63	2.8637	0.0215
64	2.8850	0.0214
65	2.9062	0.0212
66	2.9272	0.0210
67	2.9480	0.0208
68	2.9687	0.0207
69	2.9892	0.0205
70	3.0096	0.0204
71	3.0298	0.0202
72	3.0499	0.0201
73	3.0720	0.0221
74	3.0940	0.0220
75	3.1159	0.0219
76	3.1376	0.0217
77	3.1592	0.0216
78	3.1806	0.0215
79	3.2019	0.0213
80	3.2231	0.0212
81	3.2442	0.0211
82	3.2651	0.0209
83	3.2859	0.0208
84	3.3067	0.0207
85	3.3272	0.0206
86	3.3477	0.0205
87	3.3681	0.0204
88	3.3883	0.0202
89	3.4085	0.0201
90	3.4285	0.0200
91	3.4484	0.0199
92	3.4682	0.0198
93	3.4880	0.0197
94	3.5076	0.0196
95	3.5271	0.0195
96	3.5465	0.0194
97	3.5658	0.0193
98	3.5851	0.0192
99	3.6042	0.0191
100	3.6233	0.0190
101	3.6422	0.0190
102	3.6611	0.0189
103	3.6799	0.0188
104	3.6986	0.0187
105	3.7172	0.0186
106	3.7357	0.0185
107	3.7541	0.0184
108	3.7725	0.0184
109	3.7908	0.0183
110	3.8090	0.0182
111	3.8271	0.0181
112	3.8451	0.0180

113	3.8631	0.0180
114	3.8810	0.0179
115	3.8988	0.0178
116	3.9165	0.0177
117	3.9342	0.0177
118	3.9518	0.0176
119	3.9693	0.0175
120	3.9868	0.0175
121	4.0042	0.0174
122	4.0215	0.0173
123	4.0388	0.0173
124	4.0560	0.0172
125	4.0731	0.0171
126	4.0901	0.0171
127	4.1071	0.0170
128	4.1241	0.0169
129	4.1409	0.0169
130	4.1577	0.0168
131	4.1745	0.0167
132	4.1911	0.0167
133	4.2078	0.0166
134	4.2243	0.0166
135	4.2408	0.0165
136	4.2573	0.0164
137	4.2737	0.0164
138	4.2900	0.0163
139	4.3063	0.0163
140	4.3225	0.0162
141	4.3387	0.0162
142	4.3548	0.0161
143	4.3708	0.0161
144	4.3868	0.0160
145	4.4028	0.0160
146	4.4187	0.0159
147	4.4345	0.0158
148	4.4503	0.0158
149	4.4661	0.0157
150	4.4818	0.0157
151	4.4974	0.0156
152	4.5130	0.0156
153	4.5285	0.0155
154	4.5440	0.0155
155	4.5595	0.0155
156	4.5749	0.0154
157	4.5902	0.0154
158	4.6056	0.0153
159	4.6208	0.0153
160	4.6360	0.0152
161	4.6512	0.0152
162	4.6663	0.0151

163	4.6814	0.0151
164	4.6965	0.0150
165	4.7115	0.0150
166	4.7264	0.0150
167	4.7413	0.0149
168	4.7562	0.0149
169	4.7710	0.0148
170	4.7858	0.0148
171	4.8005	0.0147
172	4.8152	0.0147
173	4.8299	0.0147
174	4.8445	0.0146
175	4.8591	0.0146
176	4.8737	0.0145
177	4.8882	0.0145
178	4.9026	0.0145
179	4.9170	0.0144
180	4.9314	0.0144
181	4.9458	0.0143
182	4.9601	0.0143
183	4.9744	0.0143
184	4.9886	0.0142
185	5.0028	0.0142
186	5.0170	0.0142
187	5.0311	0.0141
188	5.0452	0.0141
189	5.0592	0.0141
190	5.0733	0.0140
191	5.0873	0.0140
192	5.1012	0.0140
193	5.1151	0.0139
194	5.1290	0.0139
195	5.1428	0.0138
196	5.1567	0.0138
197	5.1704	0.0138
198	5.1842	0.0137
199	5.1979	0.0137
200	5.2116	0.0137
201	5.2252	0.0136
202	5.2389	0.0136
203	5.2524	0.0136
204	5.2660	0.0136
205	5.2795	0.0135
206	5.2930	0.0135
207	5.3065	0.0135
208	5.3199	0.0134
209	5.3333	0.0134
210	5.3467	0.0134
211	5.3600	0.0133
212	5.3733	0.0133

213	5.3866	0.0133
214	5.3998	0.0132
215	5.4130	0.0132
216	5.4262	0.0132
217	5.4394	0.0132
218	5.4525	0.0131
219	5.4656	0.0131
220	5.4787	0.0131
221	5.4918	0.0130
222	5.5048	0.0130
223	5.5178	0.0130
224	5.5307	0.0130
225	5.5437	0.0129
226	5.5566	0.0129
227	5.5694	0.0129
228	5.5823	0.0129
229	5.5951	0.0128
230	5.6079	0.0128
231	5.6207	0.0128
232	5.6334	0.0127
233	5.6462	0.0127
234	5.6589	0.0127
235	5.6715	0.0127
236	5.6842	0.0126
237	5.6968	0.0126
238	5.7094	0.0126
239	5.7220	0.0126
240	5.7345	0.0125
241	5.7470	0.0125
242	5.7595	0.0125
243	5.7720	0.0125
244	5.7844	0.0124
245	5.7968	0.0124
246	5.8092	0.0124
247	5.8216	0.0124
248	5.8340	0.0123
249	5.8463	0.0123
250	5.8586	0.0123
251	5.8709	0.0123
252	5.8831	0.0123
253	5.8954	0.0122
254	5.9076	0.0122
255	5.9198	0.0122
256	5.9319	0.0122
257	5.9441	0.0121
258	5.9562	0.0121
259	5.9683	0.0121
260	5.9803	0.0121
261	5.9924	0.0121
262	6.0044	0.0120

263	6.0164	0.0120
264	6.0284	0.0120
265	6.0404	0.0120
266	6.0523	0.0119
267	6.0642	0.0119
268	6.0761	0.0119
269	6.0880	0.0119
270	6.0999	0.0119
271	6.1117	0.0118
272	6.1235	0.0118
273	6.1353	0.0118
274	6.1471	0.0118
275	6.1589	0.0118
276	6.1706	0.0117
277	6.1823	0.0117
278	6.1940	0.0117
279	6.2057	0.0117
280	6.2173	0.0117
281	6.2290	0.0116
282	6.2406	0.0116
283	6.2522	0.0116
284	6.2638	0.0116
285	6.2753	0.0116
286	6.2869	0.0115
287	6.2984	0.0115
288	6.3099	0.0115

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0115	0.0032	0.0083
2	0.0115	0.0032	0.0083
3	0.0116	0.0032	0.0083
4	0.0116	0.0032	0.0084
5	0.0116	0.0032	0.0084
6	0.0116	0.0032	0.0084
7	0.0117	0.0033	0.0084
8	0.0117	0.0033	0.0084
9	0.0117	0.0033	0.0085
10	0.0118	0.0033	0.0085
11	0.0118	0.0033	0.0085
12	0.0118	0.0033	0.0085
13	0.0119	0.0033	0.0086
14	0.0119	0.0033	0.0086
15	0.0119	0.0033	0.0086
16	0.0119	0.0033	0.0086
17	0.0120	0.0033	0.0086
18	0.0120	0.0033	0.0087
19	0.0121	0.0034	0.0087

20	0.0121	0.0034	0.0087
21	0.0121	0.0034	0.0087
22	0.0121	0.0034	0.0088
23	0.0122	0.0034	0.0088
24	0.0122	0.0034	0.0088
25	0.0123	0.0034	0.0088
26	0.0123	0.0034	0.0089
27	0.0123	0.0034	0.0089
28	0.0123	0.0034	0.0089
29	0.0124	0.0035	0.0089
30	0.0124	0.0035	0.0090
31	0.0125	0.0035	0.0090
32	0.0125	0.0035	0.0090
33	0.0125	0.0035	0.0090
34	0.0126	0.0035	0.0091
35	0.0126	0.0035	0.0091
36	0.0126	0.0035	0.0091
37	0.0127	0.0035	0.0092
38	0.0127	0.0035	0.0092
39	0.0128	0.0036	0.0092
40	0.0128	0.0036	0.0092
41	0.0129	0.0036	0.0093
42	0.0129	0.0036	0.0093
43	0.0129	0.0036	0.0093
44	0.0130	0.0036	0.0094
45	0.0130	0.0036	0.0094
46	0.0130	0.0036	0.0094
47	0.0131	0.0036	0.0095
48	0.0131	0.0037	0.0095
49	0.0132	0.0037	0.0095
50	0.0132	0.0037	0.0095
51	0.0133	0.0037	0.0096
52	0.0133	0.0037	0.0096
53	0.0134	0.0037	0.0096
54	0.0134	0.0037	0.0097
55	0.0135	0.0037	0.0097
56	0.0135	0.0038	0.0097
57	0.0136	0.0038	0.0098
58	0.0136	0.0038	0.0098
59	0.0136	0.0038	0.0098
60	0.0137	0.0038	0.0099
61	0.0137	0.0038	0.0099
62	0.0138	0.0038	0.0099
63	0.0138	0.0039	0.0100
64	0.0139	0.0039	0.0100
65	0.0140	0.0039	0.0101
66	0.0140	0.0039	0.0101
67	0.0141	0.0039	0.0101
68	0.0141	0.0039	0.0102
69	0.0142	0.0039	0.0102

70	0.0142	0.0040	0.0102
71	0.0143	0.0040	0.0103
72	0.0143	0.0040	0.0103
73	0.0144	0.0040	0.0104
74	0.0144	0.0040	0.0104
75	0.0145	0.0040	0.0105
76	0.0145	0.0041	0.0105
77	0.0146	0.0041	0.0105
78	0.0147	0.0041	0.0106
79	0.0147	0.0041	0.0106
80	0.0148	0.0041	0.0107
81	0.0149	0.0041	0.0107
82	0.0149	0.0042	0.0108
83	0.0150	0.0042	0.0108
84	0.0150	0.0042	0.0109
85	0.0151	0.0042	0.0109
86	0.0152	0.0042	0.0109
87	0.0153	0.0043	0.0110
88	0.0153	0.0043	0.0110
89	0.0154	0.0043	0.0111
90	0.0155	0.0043	0.0111
91	0.0155	0.0043	0.0112
92	0.0156	0.0043	0.0113
93	0.0157	0.0044	0.0113
94	0.0157	0.0044	0.0114
95	0.0158	0.0044	0.0114
96	0.0159	0.0044	0.0115
97	0.0160	0.0045	0.0115
98	0.0161	0.0045	0.0116
99	0.0162	0.0045	0.0117
100	0.0162	0.0045	0.0117
101	0.0163	0.0045	0.0118
102	0.0164	0.0046	0.0118
103	0.0165	0.0046	0.0119
104	0.0166	0.0046	0.0119
105	0.0167	0.0046	0.0120
106	0.0167	0.0047	0.0121
107	0.0169	0.0047	0.0122
108	0.0169	0.0047	0.0122
109	0.0171	0.0048	0.0123
110	0.0171	0.0048	0.0124
111	0.0173	0.0048	0.0124
112	0.0173	0.0048	0.0125
113	0.0175	0.0049	0.0126
114	0.0175	0.0049	0.0126
115	0.0177	0.0049	0.0127
116	0.0177	0.0049	0.0128
117	0.0179	0.0050	0.0129
118	0.0180	0.0050	0.0130
119	0.0181	0.0050	0.0131

120	0.0182	0.0051	0.0131
121	0.0184	0.0051	0.0132
122	0.0184	0.0051	0.0133
123	0.0186	0.0052	0.0134
124	0.0187	0.0052	0.0135
125	0.0189	0.0053	0.0136
126	0.0190	0.0053	0.0137
127	0.0191	0.0053	0.0138
128	0.0192	0.0054	0.0139
129	0.0194	0.0054	0.0140
130	0.0195	0.0054	0.0141
131	0.0197	0.0055	0.0142
132	0.0198	0.0055	0.0143
133	0.0200	0.0056	0.0145
134	0.0201	0.0056	0.0145
135	0.0204	0.0057	0.0147
136	0.0205	0.0057	0.0148
137	0.0207	0.0058	0.0149
138	0.0208	0.0058	0.0150
139	0.0211	0.0059	0.0152
140	0.0212	0.0059	0.0153
141	0.0215	0.0060	0.0155
142	0.0216	0.0060	0.0156
143	0.0219	0.0061	0.0158
144	0.0220	0.0061	0.0159
145	0.0201	0.0056	0.0145
146	0.0202	0.0056	0.0146
147	0.0205	0.0057	0.0148
148	0.0207	0.0058	0.0149
149	0.0210	0.0059	0.0152
150	0.0212	0.0059	0.0153
151	0.0215	0.0060	0.0155
152	0.0217	0.0060	0.0157
153	0.0221	0.0062	0.0159
154	0.0223	0.0062	0.0161
155	0.0227	0.0063	0.0164
156	0.0229	0.0064	0.0165
157	0.0234	0.0065	0.0169
158	0.0236	0.0066	0.0170
159	0.0241	0.0067	0.0174
160	0.0244	0.0068	0.0176
161	0.0249	0.0069	0.0180
162	0.0252	0.0070	0.0182
163	0.0258	0.0072	0.0186
164	0.0261	0.0073	0.0188
165	0.0267	0.0074	0.0193
166	0.0271	0.0075	0.0195
167	0.0278	0.0077	0.0201
168	0.0282	0.0079	0.0203
169	0.0291	0.0081	0.0210

170	0.0295	0.0082	0.0213
171	0.0304	0.0085	0.0220
172	0.0310	0.0086	0.0223
173	0.0320	0.0089	0.0231
174	0.0326	0.0091	0.0235
175	0.0339	0.0094	0.0245
176	0.0346	0.0096	0.0250
177	0.0361	0.0101	0.0261
178	0.0370	0.0103	0.0267
179	0.0388	0.0108	0.0280
180	0.0399	0.0111	0.0288
181	0.0422	0.0118	0.0305
182	0.0436	0.0121	0.0314
183	0.0466	0.0130	0.0336
184	0.0484	0.0135	0.0349
185	0.0337	0.0094	0.0243
186	0.0359	0.0100	0.0259
187	0.0417	0.0116	0.0301
188	0.0455	0.0127	0.0328
189	0.0566	0.0158	0.0408
190	0.0652	0.0182	0.0470
191	0.0989	0.0242	0.0748
192	0.1436	0.0242	0.1194
193	0.6212	0.0242	0.5970
194	0.0778	0.0217	0.0562
195	0.0503	0.0140	0.0363
196	0.0386	0.0107	0.0278
197	0.0504	0.0140	0.0364
198	0.0450	0.0125	0.0325
199	0.0410	0.0114	0.0296
200	0.0379	0.0105	0.0273
201	0.0353	0.0098	0.0255
202	0.0333	0.0093	0.0240
203	0.0315	0.0088	0.0227
204	0.0300	0.0083	0.0216
205	0.0286	0.0080	0.0206
206	0.0274	0.0076	0.0198
207	0.0264	0.0074	0.0190
208	0.0255	0.0071	0.0184
209	0.0246	0.0069	0.0178
210	0.0239	0.0066	0.0172
211	0.0231	0.0064	0.0167
212	0.0225	0.0063	0.0162
213	0.0219	0.0061	0.0158
214	0.0214	0.0059	0.0154
215	0.0208	0.0058	0.0150
216	0.0204	0.0057	0.0147
217	0.0221	0.0062	0.0160
218	0.0217	0.0061	0.0157
219	0.0213	0.0059	0.0154

220	0.0209	0.0058	0.0151
221	0.0206	0.0057	0.0149
222	0.0202	0.0056	0.0146
223	0.0199	0.0056	0.0144
224	0.0196	0.0055	0.0142
225	0.0193	0.0054	0.0139
226	0.0190	0.0053	0.0137
227	0.0188	0.0052	0.0135
228	0.0185	0.0052	0.0134
229	0.0183	0.0051	0.0132
230	0.0180	0.0050	0.0130
231	0.0178	0.0050	0.0129
232	0.0176	0.0049	0.0127
233	0.0174	0.0048	0.0125
234	0.0172	0.0048	0.0124
235	0.0170	0.0047	0.0123
236	0.0168	0.0047	0.0121
237	0.0166	0.0046	0.0120
238	0.0164	0.0046	0.0119
239	0.0163	0.0045	0.0117
240	0.0161	0.0045	0.0116
241	0.0160	0.0044	0.0115
242	0.0158	0.0044	0.0114
243	0.0156	0.0044	0.0113
244	0.0155	0.0043	0.0112
245	0.0154	0.0043	0.0111
246	0.0152	0.0042	0.0110
247	0.0151	0.0042	0.0109
248	0.0150	0.0042	0.0108
249	0.0148	0.0041	0.0107
250	0.0147	0.0041	0.0106
251	0.0146	0.0041	0.0105
252	0.0145	0.0040	0.0104
253	0.0143	0.0040	0.0104
254	0.0142	0.0040	0.0103
255	0.0141	0.0039	0.0102
256	0.0140	0.0039	0.0101
257	0.0139	0.0039	0.0100
258	0.0138	0.0038	0.0100
259	0.0137	0.0038	0.0099
260	0.0136	0.0038	0.0098
261	0.0135	0.0038	0.0098
262	0.0134	0.0037	0.0097
263	0.0133	0.0037	0.0096
264	0.0132	0.0037	0.0096
265	0.0132	0.0037	0.0095
266	0.0131	0.0036	0.0094
267	0.0130	0.0036	0.0094
268	0.0129	0.0036	0.0093
269	0.0128	0.0036	0.0093

270	0.0127	0.0036	0.0092
271	0.0127	0.0035	0.0091
272	0.0126	0.0035	0.0091
273	0.0125	0.0035	0.0090
274	0.0124	0.0035	0.0090
275	0.0124	0.0034	0.0089
276	0.0123	0.0034	0.0089
277	0.0122	0.0034	0.0088
278	0.0122	0.0034	0.0088
279	0.0121	0.0034	0.0087
280	0.0120	0.0034	0.0087
281	0.0120	0.0033	0.0086
282	0.0119	0.0033	0.0086
283	0.0118	0.0033	0.0085
284	0.0118	0.0033	0.0085
285	0.0117	0.0033	0.0085
286	0.0117	0.0032	0.0084
287	0.0116	0.0032	0.0084
288	0.0115	0.0032	0.0083

Total soil rain loss = 1.59(In)
Total effective rainfall = 4.72(In)
Peak flow rate in flood hydrograph = 40.23(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	12.5	25.0	37.5	50.0
0+ 5	0.0003	0.04	Q	|	|	|	|
0+10	0.0018	0.23	Q	|	|	|	|
0+15	0.0064	0.67	Q	|	|	|	|
0+20	0.0129	0.95	Q	|	|	|	|
0+25	0.0205	1.10	Q	|	|	|	|
0+30	0.0288	1.20	Q	|	|	|	|
0+35	0.0375	1.27	VQ	|	|	|	|
0+40	0.0467	1.33	VQ	|	|	|	|
0+45	0.0562	1.38	VQ	|	|	|	|
0+50	0.0660	1.41	VQ	|	|	|	|
0+55	0.0759	1.44	VQ	|	|	|	|
1+ 0	0.0860	1.47	VQ	|	|	|	|
1+ 5	0.0963	1.49	VQ	|	|	|	|
1+10	0.1067	1.51	VQ	|	|	|	|
1+15	0.1172	1.53	VQ	|	|	|	|
1+20	0.1278	1.54	VQ	|	|	|	|

1+25	0.1384	1.55	VQ	|	|	|	|
1+30	0.1492	1.56	VQ	|	|	|	|
1+35	0.1600	1.57	|Q	|	|	|	|
1+40	0.1708	1.58	|Q	|	|	|	|
1+45	0.1818	1.59	|Q	|	|	|	|
1+50	0.1927	1.59	|Q	|	|	|	|
1+55	0.2037	1.60	|Q	|	|	|	|
2+ 0	0.2148	1.60	|Q	|	|	|	|
2+ 5	0.2258	1.61	|Q	|	|	|	|
2+10	0.2369	1.61	|Q	|	|	|	|
2+15	0.2481	1.62	|Q	|	|	|	|
2+20	0.2592	1.62	|Q	|	|	|	|
2+25	0.2704	1.62	|Q	|	|	|	|
2+30	0.2816	1.63	|Q	|	|	|	|
2+35	0.2929	1.63	|Q	|	|	|	|
2+40	0.3042	1.64	|QV	|	|	|	|
2+45	0.3155	1.64	|QV	|	|	|	|
2+50	0.3268	1.65	|QV	|	|	|	|
2+55	0.3382	1.65	|QV	|	|	|	|
3+ 0	0.3496	1.66	|QV	|	|	|	|
3+ 5	0.3611	1.66	|QV	|	|	|	|
3+10	0.3726	1.67	|QV	|	|	|	|
3+15	0.3841	1.67	|QV	|	|	|	|
3+20	0.3956	1.68	|QV	|	|	|	|
3+25	0.4072	1.68	|QV	|	|	|	|
3+30	0.4188	1.69	|QV	|	|	|	|
3+35	0.4305	1.69	|QV	|	|	|	|
3+40	0.4422	1.70	|QV	|	|	|	|
3+45	0.4539	1.70	|Q V	|	|	|	|
3+50	0.4657	1.71	|Q V	|	|	|	|
3+55	0.4775	1.71	|Q V	|	|	|	|
4+ 0	0.4894	1.72	|Q V	|	|	|	|
4+ 5	0.5012	1.73	|Q V	|	|	|	|
4+10	0.5132	1.73	|Q V	|	|	|	|
4+15	0.5251	1.74	|Q V	|	|	|	|
4+20	0.5371	1.74	|Q V	|	|	|	|
4+25	0.5492	1.75	|Q V	|	|	|	|
4+30	0.5613	1.75	|Q V	|	|	|	|
4+35	0.5734	1.76	|Q V	|	|	|	|
4+40	0.5855	1.77	|Q V	|	|	|	|
4+45	0.5977	1.77	|Q V	|	|	|	|
4+50	0.6100	1.78	|Q V	|	|	|	|
4+55	0.6223	1.78	|Q V	|	|	|	|
5+ 0	0.6346	1.79	|Q V	|	|	|	|
5+ 5	0.6470	1.80	|Q V	|	|	|	|
5+10	0.6594	1.80	|Q V	|	|	|	|
5+15	0.6718	1.81	|Q V	|	|	|	|
5+20	0.6843	1.82	|Q V	|	|	|	|
5+25	0.6969	1.82	|Q V	|	|	|	|
5+30	0.7095	1.83	|Q V	|	|	|	|

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5+35       0.7221      1.84  |Q  V     |          |          |          |
5+40       0.7348      1.84  |Q  V     |          |          |          |
5+45       0.7476      1.85  |Q   V    |          |          |          |
5+50       0.7603      1.86  |Q   V    |          |          |          |
5+55       0.7732      1.86  |Q   V    |          |          |          |
6+ 0       0.7860      1.87  |Q   V    |          |          |          |
6+ 5       0.7990      1.88  |Q   V    |          |          |          |
6+10       0.8120      1.88  |Q   V    |          |          |          |
6+15       0.8250      1.89  |Q   V    |          |          |          |
6+20       0.8381      1.90  |Q   V    |          |          |          |
6+25       0.8512      1.91  |Q   V    |          |          |          |
6+30       0.8644      1.91  |Q   V    |          |          |          |
6+35       0.8776      1.92  |Q   V    |          |          |          |
6+40       0.8909      1.93  |Q   V    |          |          |          |
6+45       0.9043      1.94  |Q    V   |          |          |          |
6+50       0.9177      1.95  |Q    V   |          |          |          |
6+55       0.9311      1.95  |Q    V   |          |          |          |
7+ 0       0.9446      1.96  |Q    V   |          |          |          |
7+ 5       0.9582      1.97  |Q    V   |          |          |          |
7+10       0.9718      1.98  |Q    V   |          |          |          |
7+15       0.9855      1.99  |Q    V   |          |          |          |
7+20       0.9993      2.00  |Q    V   |          |          |          |
7+25       1.0131      2.01  |Q    V   |          |          |          |
7+30       1.0270      2.01  |Q    V   |          |          |          |
7+35       1.0409      2.02  |Q    V   |          |          |          |
7+40       1.0549      2.03  |Q     V  |          |          |          |
7+45       1.0689      2.04  |Q     V  |          |          |          |
7+50       1.0831      2.05  |Q     V  |          |          |          |
7+55       1.0973      2.06  |Q     V  |          |          |          |
8+ 0       1.1115      2.07  |Q     V  |          |          |          |
8+ 5       1.1258      2.08  |Q     V  |          |          |          |
8+10       1.1402      2.09  |Q     V  |          |          |          |
8+15       1.1547      2.10  |Q     V  |          |          |          |
8+20       1.1692      2.11  |Q     V  |          |          |          |
8+25       1.1838      2.12  |Q     V  |          |          |          |
8+30       1.1985      2.13  |Q      V |          |          |          |
8+35       1.2133      2.14  |Q      V |          |          |          |
8+40       1.2281      2.15  |Q      V |          |          |          |
8+45       1.2430      2.16  |Q      V |          |          |          |
8+50       1.2580      2.18  |Q      V |          |          |          |
8+55       1.2731      2.19  |Q      V |          |          |          |
9+ 0       1.2882      2.20  |Q      V |          |          |          |
9+ 5       1.3034      2.21  |Q      V |          |          |          |
9+10       1.3187      2.22  |Q      V |          |          |          |
9+15       1.3341      2.24  |Q      V |          |          |          |
9+20       1.3496      2.25  |Q       V|          |          |          |
9+25       1.3652      2.26  |Q       V|          |          |          |
9+30       1.3808      2.27  |Q       V|          |          |          |
9+35       1.3966      2.29  |Q       V|          |          |          |
9+40       1.4124      2.30  |Q       V|          |          |          |
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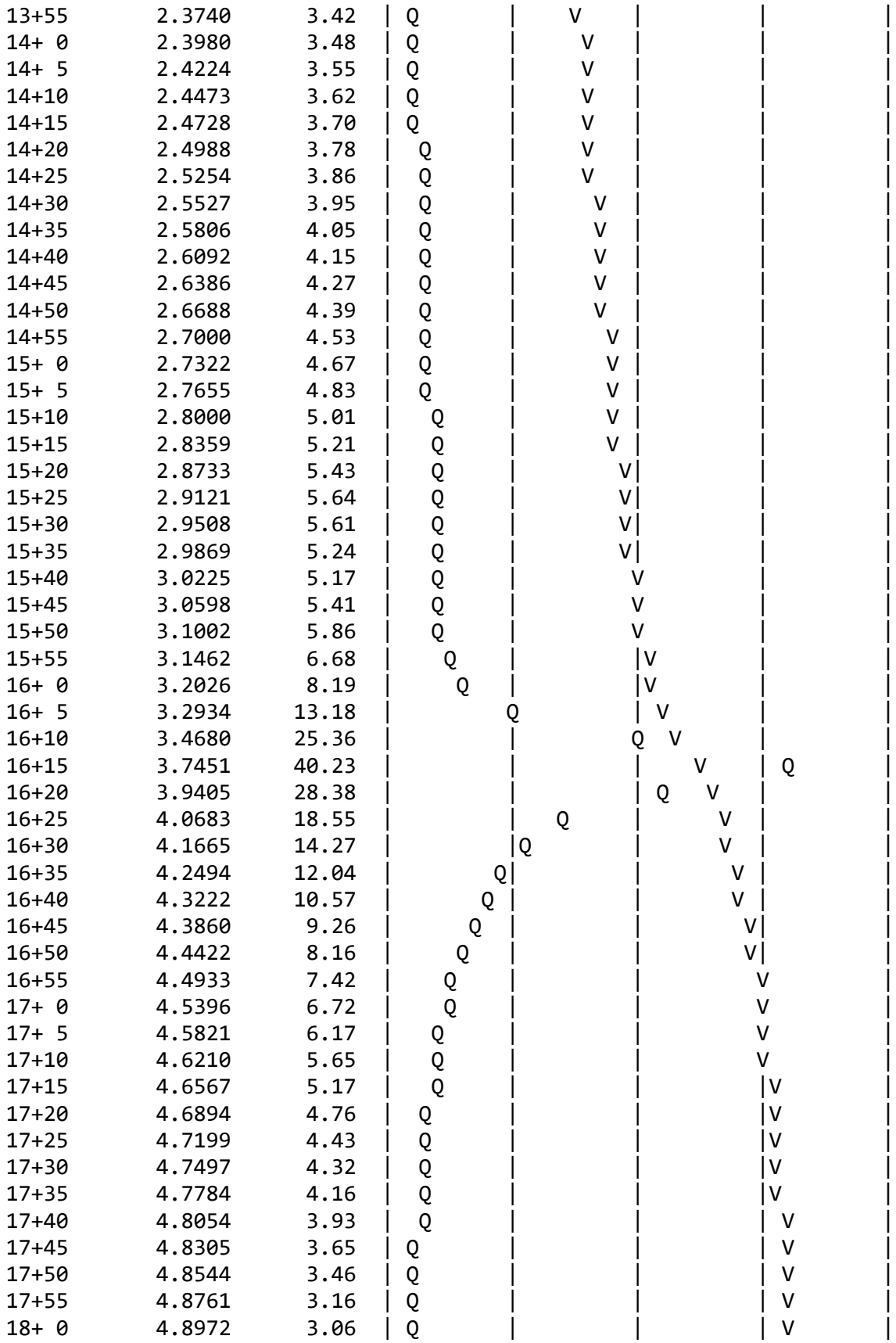
9+45	1.4284	2.31	Q	V			
9+50	1.4444	2.33	Q	V			
9+55	1.4605	2.34	Q	V			
10+ 0	1.4767	2.36	Q	V			
10+ 5	1.4931	2.37	Q	V			
10+10	1.5095	2.39	Q	V			
10+15	1.5261	2.40	Q	V			
10+20	1.5427	2.42	Q	V			
10+25	1.5595	2.43	Q	V			
10+30	1.5763	2.45	Q	V			
10+35	1.5933	2.47	Q	V			
10+40	1.6104	2.48	Q	V			
10+45	1.6276	2.50	Q	V			
10+50	1.6450	2.52	Q	V			
10+55	1.6624	2.54	Q	V			
11+ 0	1.6800	2.55	Q	V			
11+ 5	1.6978	2.57	Q	V			
11+10	1.7156	2.59	Q	V			
11+15	1.7336	2.61	Q	V			
11+20	1.7518	2.63	Q	V			
11+25	1.7701	2.66	Q	V			
11+30	1.7885	2.68	Q	V			
11+35	1.8071	2.70	Q	V			
11+40	1.8258	2.72	Q	V			
11+45	1.8447	2.74	Q	V			
11+50	1.8638	2.77	Q	V			
11+55	1.8830	2.79	Q	V			
12+ 0	1.9024	2.82	Q	V			
12+ 5	1.9219	2.84	Q	V			
12+10	1.9414	2.83	Q	V			
12+15	1.9605	2.77	Q	V			
12+20	1.9793	2.74	Q	V			
12+25	1.9982	2.74	Q	V			
12+30	2.0172	2.75	Q	V			
12+35	2.0363	2.77	Q	V			
12+40	2.0555	2.79	Q	V			
12+45	2.0749	2.82	Q	V			
12+50	2.0945	2.84	Q	V			
12+55	2.1143	2.88	Q	V			
13+ 0	2.1343	2.91	Q	V			
13+ 5	2.1546	2.94	Q	V			
13+10	2.1751	2.98	Q	V			
13+15	2.1959	3.02	Q	V			
13+20	2.2170	3.06	Q	V			
13+25	2.2384	3.11	Q	V			
13+30	2.2601	3.15	Q	V			
13+35	2.2821	3.20	Q	V			
13+40	2.3045	3.25	Q	V			
13+45	2.3273	3.30	Q	V			
13+50	2.3504	3.36	Q	V			



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18+ 5       4.9177      2.98  | Q       |         |         | V       |
18+10       4.9379      2.94  | Q       |         |         |  V      |
18+15       4.9582      2.94  | Q       |         |         |  V      |
18+20       4.9784      2.93  | Q       |         |         |  V      |
18+25       4.9983      2.89  | Q       |         |         |  V      |
18+30       5.0179      2.85  | Q       |         |         |  V      |
18+35       5.0372      2.81  | Q       |         |         |  V      |
18+40       5.0563      2.76  | Q       |         |         |  V      |
18+45       5.0750      2.72  | Q       |         |         |  V      |
18+50       5.0935      2.68  | Q       |         |         |   V     |
18+55       5.1117      2.64  | Q       |         |         |   V     |
19+ 0       5.1296      2.60  | Q       |         |         |   V     |
19+ 5       5.1473      2.57  | Q       |         |         |   V     |
19+10       5.1647      2.53  | Q       |         |         |   V     |
19+15       5.1819      2.50  |Q        |         |         |   V     |
19+20       5.1989      2.46  |Q        |         |         |   V     |
19+25       5.2156      2.43  |Q        |         |         |   V     |
19+30       5.2322      2.40  |Q        |         |         |    V    |
19+35       5.2485      2.37  |Q        |         |         |    V    |
19+40       5.2646      2.34  |Q        |         |         |    V    |
19+45       5.2806      2.31  |Q        |         |         |    V    |
19+50       5.2963      2.29  |Q        |         |         |    V    |
19+55       5.3119      2.26  |Q        |         |         |    V    |
20+ 0       5.3273      2.24  |Q        |         |         |    V    |
20+ 5       5.3425      2.21  |Q        |         |         |    V    |
20+10       5.3576      2.19  |Q        |         |         |    V    |
20+15       5.3725      2.16  |Q        |         |         |    V    |
20+20       5.3873      2.14  |Q        |         |         |     V   |
20+25       5.4019      2.12  |Q        |         |         |     V   |
20+30       5.4163      2.10  |Q        |         |         |     V   |
20+35       5.4307      2.08  |Q        |         |         |     V   |
20+40       5.4449      2.06  |Q        |         |         |     V   |
20+45       5.4589      2.04  |Q        |         |         |     V   |
20+50       5.4728      2.02  |Q        |         |         |     V   |
20+55       5.4867      2.00  |Q        |         |         |     V   |
21+ 0       5.5003      1.99  |Q        |         |         |     V   |
21+ 5       5.5139      1.97  |Q        |         |         |     V   |
21+10       5.5274      1.95  |Q        |         |         |     V   |
21+15       5.5407      1.94  |Q        |         |         |      V  |
21+20       5.5539      1.92  |Q        |         |         |      V  |
21+25       5.5671      1.91  |Q        |         |         |      V  |
21+30       5.5801      1.89  |Q        |         |         |      V  |
21+35       5.5930      1.88  |Q        |         |         |      V  |
21+40       5.6059      1.86  |Q        |         |         |      V  |
21+45       5.6186      1.85  |Q        |         |         |      V  |
21+50       5.6312      1.83  |Q        |         |         |      V  |
21+55       5.6438      1.82  |Q        |         |         |      V  |
22+ 0       5.6562      1.81  |Q        |         |         |      V  |
22+ 5       5.6686      1.80  |Q        |         |         |      V  |
22+10       5.6809      1.78  |Q        |         |         |       V |
```

```
   22+15       5.6931      1.77  |Q        |         |         |        V |
   22+20       5.7052      1.76  |Q        |         |         |        V |
   22+25       5.7172      1.75  |Q        |         |         |        V |
   22+30       5.7292      1.74  |Q        |         |         |        V |
   22+35       5.7411      1.72  |Q        |         |         |        V |
   22+40       5.7529      1.71  |Q        |         |         |        V |
   22+45       5.7646      1.70  |Q        |         |         |        V |
   22+50       5.7762      1.69  |Q        |         |         |        V |
   22+55       5.7878      1.68  |Q        |         |         |        V |
   23+ 0       5.7993      1.67  |Q        |         |         |        V |
   23+ 5       5.8108      1.66  |Q        |         |         |        V |
   23+10       5.8222      1.65  |Q        |         |         |        V |
   23+15       5.8335      1.64  |Q        |         |         |         V|
   23+20       5.8447      1.63  |Q        |         |         |         V|
   23+25       5.8559      1.62  |Q        |         |         |         V|
   23+30       5.8670      1.61  |Q        |         |         |         V|
   23+35       5.8781      1.61  |Q        |         |         |         V|
   23+40       5.8891      1.60  |Q        |         |         |         V|
   23+45       5.9000      1.59  |Q        |         |         |         V|
   23+50       5.9109      1.58  |Q        |         |         |         V|
   23+55       5.9217      1.57  |Q        |         |         |         V|
   24+ 0       5.9325      1.56  |Q        |         |         |         V|
   24+ 5       5.9429      1.52  |Q        |         |         |         V|
   24+10       5.9520      1.32  |Q        |         |         |         V|
   24+15       5.9581      0.87  Q         |         |         |         V|
   24+20       5.9621      0.59  Q         |         |         |         V|
   24+25       5.9652      0.44  Q         |         |         |         V|
   24+30       5.9675      0.34  Q         |         |         |         V|
-------------------------------------------------------------------------
```

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

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Study date 11/29/20

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

Program License Serial Number 6277

2020-326 HCC V
PRE-DEVELOPMENT CONDITIONS
UNIT HYDROGRAPH - 100 YEAR STORM
DA C

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 10		
3.09	1	0.79
Rainfall data for year 2		
3.09	6	1.12
Rainfall data for year 2		
3.09	24	2.11
Rainfall data for year 100		

```
             3.09            1           1.31
------------------------------------------------------------------------
Rainfall data for year 100
             3.09            6           3.05
------------------------------------------------------------------------
Rainfall data for year 100
             3.09           24           6.31
------------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

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


SCS curve  SCS curve     Area     Area     Fp(Fig C6)    Ap      Fm
No.(AMCII) NO.(AMC 3)    (Ac.)    Fraction     (In/Hr)  (dec.)   (In/Hr)
 67.0      84.6          3.09      1.000     0.290    1.000    0.290

Area-averaged adjusted loss rate Fm (In/Hr) =  0.290

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

Area       Area          SCS CN    SCS CN      S     Pervious
 (Ac.)      Fract         (AMC2)    (AMC3)           Yield Fr
     3.09   1.000         67.0      84.6       1.82     0.721

Area-averaged catchment yield fraction, Y =  0.721
Area-averaged low loss fraction, Yb =  0.279
User entry of time of concentration  =   0.263 (hours)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watershed area =       3.09(Ac.)
Catchment Lag time =   0.210 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 39.6071
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.290(In/Hr)
Average low loss rate fraction (Yb) = 0.279 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall =  0.622(In)
Computed peak 30-minute rainfall =  1.064(In)
Specified peak 1-hour rainfall =  1.310(In)
Computed peak 3-hour rainfall =  2.199(In)
Specified peak 6-hour rainfall =  3.050(In)
Specified peak 24-hour rainfall =  6.310(In)


Rainfall depth area reduction factors:
Using a total area of       3.09(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000     Adjusted rainfall =  0.622(In)
30-minute factor = 1.000    Adjusted rainfall =  1.064(In)
```

1-hour factor = 1.000 Adjusted rainfall = 1.310(In)
3-hour factor = 1.000 Adjusted rainfall = 2.199(In)
6-hour factor = 1.000 Adjusted rainfall = 3.050(In)
24-hour factor = 1.000 Adjusted rainfall = 6.310(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 = 37.37 (CFS))	
1	2.705	1.011
2	18.254	5.811
3	48.579	11.332
4	65.229	6.222
5	74.466	3.452
6	80.605	2.294
7	84.991	1.639
8	88.393	1.271
9	90.845	0.917
10	92.838	0.745
11	94.438	0.598
12	95.722	0.480
13	96.750	0.384
14	97.522	0.289
15	98.043	0.195
16	98.468	0.159
17	98.942	0.177
18	99.405	0.173
19	99.705	0.112
20	100.000	0.110

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.6215	0.6215
2	0.7652	0.1437
3	0.8642	0.0990
4	0.9420	0.0779
5	1.0073	0.0652
6	1.0639	0.0566
7	1.1143	0.0504
8	1.1598	0.0455
9	1.2015	0.0417
10	1.2401	0.0386
11	1.2761	0.0360
12	1.3098	0.0337
13	1.3602	0.0504
14	1.4086	0.0484

15	1.4552	0.0466
16	1.5002	0.0450
17	1.5437	0.0435
18	1.5859	0.0422
19	1.6269	0.0410
20	1.6668	0.0399
21	1.7056	0.0388
22	1.7434	0.0378
23	1.7804	0.0369
24	1.8165	0.0361
25	1.8518	0.0353
26	1.8864	0.0346
27	1.9203	0.0339
28	1.9535	0.0332
29	1.9861	0.0326
30	2.0181	0.0320
31	2.0496	0.0315
32	2.0805	0.0309
33	2.1109	0.0304
34	2.1409	0.0299
35	2.1704	0.0295
36	2.1994	0.0290
37	2.2280	0.0286
38	2.2562	0.0282
39	2.2840	0.0278
40	2.3115	0.0274
41	2.3386	0.0271
42	2.3653	0.0267
43	2.3917	0.0264
44	2.4178	0.0261
45	2.4435	0.0258
46	2.4690	0.0255
47	2.4942	0.0252
48	2.5191	0.0249
49	2.5437	0.0246
50	2.5680	0.0244
51	2.5921	0.0241
52	2.6160	0.0239
53	2.6396	0.0236
54	2.6630	0.0234
55	2.6861	0.0231
56	2.7090	0.0229
57	2.7317	0.0227
58	2.7542	0.0225
59	2.7765	0.0223
60	2.7986	0.0221
61	2.8205	0.0219
62	2.8423	0.0217
63	2.8638	0.0215
64	2.8851	0.0214

65	2.9063	0.0212
66	2.9273	0.0210
67	2.9482	0.0208
68	2.9688	0.0207
69	2.9894	0.0205
70	3.0097	0.0204
71	3.0299	0.0202
72	3.0500	0.0201
73	3.0721	0.0221
74	3.0941	0.0220
75	3.1160	0.0219
76	3.1377	0.0217
77	3.1593	0.0216
78	3.1807	0.0215
79	3.2020	0.0213
80	3.2232	0.0212
81	3.2443	0.0211
82	3.2652	0.0209
83	3.2861	0.0208
84	3.3068	0.0207
85	3.3274	0.0206
86	3.3478	0.0205
87	3.3682	0.0204
88	3.3884	0.0202
89	3.4086	0.0201
90	3.4286	0.0200
91	3.4485	0.0199
92	3.4683	0.0198
93	3.4881	0.0197
94	3.5077	0.0196
95	3.5272	0.0195
96	3.5466	0.0194
97	3.5660	0.0193
98	3.5852	0.0192
99	3.6043	0.0191
100	3.6234	0.0190
101	3.6423	0.0190
102	3.6612	0.0189
103	3.6800	0.0188
104	3.6987	0.0187
105	3.7173	0.0186
106	3.7358	0.0185
107	3.7542	0.0184
108	3.7726	0.0184
109	3.7909	0.0183
110	3.8091	0.0182
111	3.8272	0.0181
112	3.8452	0.0180
113	3.8632	0.0180
114	3.8811	0.0179

115	3.8989	0.0178
116	3.9167	0.0177
117	3.9343	0.0177
118	3.9519	0.0176
119	3.9695	0.0175
120	3.9869	0.0175
121	4.0043	0.0174
122	4.0216	0.0173
123	4.0389	0.0173
124	4.0561	0.0172
125	4.0732	0.0171
126	4.0902	0.0171
127	4.1072	0.0170
128	4.1242	0.0169
129	4.1410	0.0169
130	4.1578	0.0168
131	4.1746	0.0167
132	4.1913	0.0167
133	4.2079	0.0166
134	4.2244	0.0166
135	4.2409	0.0165
136	4.2574	0.0164
137	4.2738	0.0164
138	4.2901	0.0163
139	4.3064	0.0163
140	4.3226	0.0162
141	4.3388	0.0162
142	4.3549	0.0161
143	4.3709	0.0161
144	4.3869	0.0160
145	4.4029	0.0160
146	4.4188	0.0159
147	4.4346	0.0158
148	4.4504	0.0158
149	4.4662	0.0157
150	4.4819	0.0157
151	4.4975	0.0156
152	4.5131	0.0156
153	4.5287	0.0155
154	4.5442	0.0155
155	4.5596	0.0155
156	4.5750	0.0154
157	4.5904	0.0154
158	4.6057	0.0153
159	4.6209	0.0153
160	4.6362	0.0152
161	4.6513	0.0152
162	4.6665	0.0151
163	4.6815	0.0151
164	4.6966	0.0150

165	4.7116	0.0150
166	4.7265	0.0150
167	4.7414	0.0149
168	4.7563	0.0149
169	4.7711	0.0148
170	4.7859	0.0148
171	4.8007	0.0147
172	4.8154	0.0147
173	4.8300	0.0147
174	4.8446	0.0146
175	4.8592	0.0146
176	4.8738	0.0145
177	4.8883	0.0145
178	4.9027	0.0145
179	4.9172	0.0144
180	4.9315	0.0144
181	4.9459	0.0143
182	4.9602	0.0143
183	4.9745	0.0143
184	4.9887	0.0142
185	5.0029	0.0142
186	5.0171	0.0142
187	5.0312	0.0141
188	5.0453	0.0141
189	5.0594	0.0141
190	5.0734	0.0140
191	5.0874	0.0140
192	5.1013	0.0140
193	5.1152	0.0139
194	5.1291	0.0139
195	5.1430	0.0138
196	5.1568	0.0138
197	5.1706	0.0138
198	5.1843	0.0137
199	5.1980	0.0137
200	5.2117	0.0137
201	5.2253	0.0136
202	5.2390	0.0136
203	5.2526	0.0136
204	5.2661	0.0136
205	5.2796	0.0135
206	5.2931	0.0135
207	5.3066	0.0135
208	5.3200	0.0134
209	5.3334	0.0134
210	5.3468	0.0134
211	5.3601	0.0133
212	5.3734	0.0133
213	5.3867	0.0133
214	5.3999	0.0132

215	5.4132	0.0132
216	5.4263	0.0132
217	5.4395	0.0132
218	5.4526	0.0131
219	5.4657	0.0131
220	5.4788	0.0131
221	5.4919	0.0130
222	5.5049	0.0130
223	5.5179	0.0130
224	5.5308	0.0130
225	5.5438	0.0129
226	5.5567	0.0129
227	5.5696	0.0129
228	5.5824	0.0129
229	5.5952	0.0128
230	5.6080	0.0128
231	5.6208	0.0128
232	5.6336	0.0127
233	5.6463	0.0127
234	5.6590	0.0127
235	5.6716	0.0127
236	5.6843	0.0126
237	5.6969	0.0126
238	5.7095	0.0126
239	5.7221	0.0126
240	5.7346	0.0125
241	5.7471	0.0125
242	5.7596	0.0125
243	5.7721	0.0125
244	5.7845	0.0124
245	5.7970	0.0124
246	5.8093	0.0124
247	5.8217	0.0124
248	5.8341	0.0123
249	5.8464	0.0123
250	5.8587	0.0123
251	5.8710	0.0123
252	5.8832	0.0123
253	5.8955	0.0122
254	5.9077	0.0122
255	5.9199	0.0122
256	5.9320	0.0122
257	5.9442	0.0121
258	5.9563	0.0121
259	5.9684	0.0121
260	5.9804	0.0121
261	5.9925	0.0121
262	6.0045	0.0120
263	6.0165	0.0120
264	6.0285	0.0120

265	6.0405	0.0120
266	6.0524	0.0119
267	6.0643	0.0119
268	6.0762	0.0119
269	6.0881	0.0119
270	6.1000	0.0119
271	6.1118	0.0118
272	6.1236	0.0118
273	6.1354	0.0118
274	6.1472	0.0118
275	6.1590	0.0118
276	6.1707	0.0117
277	6.1824	0.0117
278	6.1941	0.0117
279	6.2058	0.0117
280	6.2174	0.0117
281	6.2291	0.0116
282	6.2407	0.0116
283	6.2523	0.0116
284	6.2639	0.0116
285	6.2754	0.0116
286	6.2870	0.0115
287	6.2985	0.0115
288	6.3100	0.0115

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0115	0.0032	0.0083
2	0.0115	0.0032	0.0083
3	0.0116	0.0032	0.0083
4	0.0116	0.0032	0.0084
5	0.0116	0.0032	0.0084
6	0.0116	0.0032	0.0084
7	0.0117	0.0033	0.0084
8	0.0117	0.0033	0.0084
9	0.0117	0.0033	0.0085
10	0.0118	0.0033	0.0085
11	0.0118	0.0033	0.0085
12	0.0118	0.0033	0.0085
13	0.0119	0.0033	0.0086
14	0.0119	0.0033	0.0086
15	0.0119	0.0033	0.0086
16	0.0119	0.0033	0.0086
17	0.0120	0.0033	0.0086
18	0.0120	0.0033	0.0087
19	0.0121	0.0034	0.0087
20	0.0121	0.0034	0.0087
21	0.0121	0.0034	0.0087

22	0.0121	0.0034	0.0088
23	0.0122	0.0034	0.0088
24	0.0122	0.0034	0.0088
25	0.0123	0.0034	0.0088
26	0.0123	0.0034	0.0089
27	0.0123	0.0034	0.0089
28	0.0123	0.0034	0.0089
29	0.0124	0.0035	0.0089
30	0.0124	0.0035	0.0090
31	0.0125	0.0035	0.0090
32	0.0125	0.0035	0.0090
33	0.0125	0.0035	0.0090
34	0.0126	0.0035	0.0091
35	0.0126	0.0035	0.0091
36	0.0126	0.0035	0.0091
37	0.0127	0.0035	0.0092
38	0.0127	0.0035	0.0092
39	0.0128	0.0036	0.0092
40	0.0128	0.0036	0.0092
41	0.0129	0.0036	0.0093
42	0.0129	0.0036	0.0093
43	0.0129	0.0036	0.0093
44	0.0130	0.0036	0.0094
45	0.0130	0.0036	0.0094
46	0.0130	0.0036	0.0094
47	0.0131	0.0036	0.0095
48	0.0131	0.0037	0.0095
49	0.0132	0.0037	0.0095
50	0.0132	0.0037	0.0095
51	0.0133	0.0037	0.0096
52	0.0133	0.0037	0.0096
53	0.0134	0.0037	0.0096
54	0.0134	0.0037	0.0097
55	0.0135	0.0037	0.0097
56	0.0135	0.0038	0.0097
57	0.0136	0.0038	0.0098
58	0.0136	0.0038	0.0098
59	0.0136	0.0038	0.0098
60	0.0137	0.0038	0.0099
61	0.0137	0.0038	0.0099
62	0.0138	0.0038	0.0099
63	0.0138	0.0039	0.0100
64	0.0139	0.0039	0.0100
65	0.0140	0.0039	0.0101
66	0.0140	0.0039	0.0101
67	0.0141	0.0039	0.0101
68	0.0141	0.0039	0.0102
69	0.0142	0.0039	0.0102
70	0.0142	0.0040	0.0102
71	0.0143	0.0040	0.0103

72	0.0143	0.0040	0.0103
73	0.0144	0.0040	0.0104
74	0.0144	0.0040	0.0104
75	0.0145	0.0040	0.0105
76	0.0145	0.0041	0.0105
77	0.0146	0.0041	0.0105
78	0.0147	0.0041	0.0106
79	0.0147	0.0041	0.0106
80	0.0148	0.0041	0.0107
81	0.0149	0.0041	0.0107
82	0.0149	0.0042	0.0108
83	0.0150	0.0042	0.0108
84	0.0150	0.0042	0.0109
85	0.0151	0.0042	0.0109
86	0.0152	0.0042	0.0109
87	0.0153	0.0043	0.0110
88	0.0153	0.0043	0.0110
89	0.0154	0.0043	0.0111
90	0.0155	0.0043	0.0111
91	0.0155	0.0043	0.0112
92	0.0156	0.0043	0.0113
93	0.0157	0.0044	0.0113
94	0.0157	0.0044	0.0114
95	0.0158	0.0044	0.0114
96	0.0159	0.0044	0.0115
97	0.0160	0.0045	0.0115
98	0.0161	0.0045	0.0116
99	0.0162	0.0045	0.0117
100	0.0162	0.0045	0.0117
101	0.0163	0.0045	0.0118
102	0.0164	0.0046	0.0118
103	0.0165	0.0046	0.0119
104	0.0166	0.0046	0.0119
105	0.0167	0.0046	0.0120
106	0.0167	0.0047	0.0121
107	0.0169	0.0047	0.0122
108	0.0169	0.0047	0.0122
109	0.0171	0.0048	0.0123
110	0.0171	0.0048	0.0124
111	0.0173	0.0048	0.0124
112	0.0173	0.0048	0.0125
113	0.0175	0.0049	0.0126
114	0.0175	0.0049	0.0126
115	0.0177	0.0049	0.0127
116	0.0177	0.0049	0.0128
117	0.0179	0.0050	0.0129
118	0.0180	0.0050	0.0130
119	0.0181	0.0050	0.0131
120	0.0182	0.0051	0.0131
121	0.0184	0.0051	0.0132

122	0.0184	0.0051	0.0133
123	0.0186	0.0052	0.0134
124	0.0187	0.0052	0.0135
125	0.0189	0.0053	0.0136
126	0.0190	0.0053	0.0137
127	0.0191	0.0053	0.0138
128	0.0192	0.0054	0.0139
129	0.0194	0.0054	0.0140
130	0.0195	0.0054	0.0141
131	0.0197	0.0055	0.0142
132	0.0198	0.0055	0.0143
133	0.0200	0.0056	0.0145
134	0.0201	0.0056	0.0145
135	0.0204	0.0057	0.0147
136	0.0205	0.0057	0.0148
137	0.0207	0.0058	0.0149
138	0.0208	0.0058	0.0150
139	0.0211	0.0059	0.0152
140	0.0212	0.0059	0.0153
141	0.0215	0.0060	0.0155
142	0.0216	0.0060	0.0156
143	0.0219	0.0061	0.0158
144	0.0220	0.0061	0.0159
145	0.0201	0.0056	0.0145
146	0.0202	0.0056	0.0146
147	0.0205	0.0057	0.0148
148	0.0207	0.0058	0.0149
149	0.0210	0.0059	0.0152
150	0.0212	0.0059	0.0153
151	0.0215	0.0060	0.0155
152	0.0217	0.0060	0.0157
153	0.0221	0.0062	0.0159
154	0.0223	0.0062	0.0161
155	0.0227	0.0063	0.0164
156	0.0229	0.0064	0.0165
157	0.0234	0.0065	0.0169
158	0.0236	0.0066	0.0170
159	0.0241	0.0067	0.0174
160	0.0244	0.0068	0.0176
161	0.0249	0.0069	0.0180
162	0.0252	0.0070	0.0182
163	0.0258	0.0072	0.0186
164	0.0261	0.0073	0.0188
165	0.0267	0.0074	0.0193
166	0.0271	0.0075	0.0195
167	0.0278	0.0077	0.0201
168	0.0282	0.0079	0.0203
169	0.0290	0.0081	0.0209
170	0.0295	0.0082	0.0213
171	0.0304	0.0085	0.0219

172	0.0309	0.0086	0.0223
173	0.0320	0.0089	0.0231
174	0.0326	0.0091	0.0235
175	0.0339	0.0094	0.0244
176	0.0346	0.0096	0.0250
177	0.0361	0.0101	0.0261
178	0.0369	0.0103	0.0267
179	0.0388	0.0108	0.0280
180	0.0399	0.0111	0.0287
181	0.0422	0.0118	0.0304
182	0.0435	0.0121	0.0314
183	0.0466	0.0130	0.0336
184	0.0484	0.0135	0.0349
185	0.0337	0.0094	0.0243
186	0.0360	0.0100	0.0259
187	0.0417	0.0116	0.0301
188	0.0455	0.0127	0.0329
189	0.0566	0.0158	0.0409
190	0.0652	0.0182	0.0471
191	0.0990	0.0242	0.0748
192	0.1437	0.0242	0.1195
193	0.6215	0.0242	0.5974
194	0.0779	0.0217	0.0562
195	0.0504	0.0140	0.0363
196	0.0386	0.0107	0.0278
197	0.0504	0.0140	0.0364
198	0.0450	0.0125	0.0325
199	0.0410	0.0114	0.0296
200	0.0378	0.0105	0.0273
201	0.0353	0.0098	0.0255
202	0.0332	0.0093	0.0240
203	0.0315	0.0088	0.0227
204	0.0299	0.0083	0.0216
205	0.0286	0.0080	0.0206
206	0.0274	0.0076	0.0198
207	0.0264	0.0074	0.0190
208	0.0255	0.0071	0.0184
209	0.0246	0.0069	0.0178
210	0.0239	0.0066	0.0172
211	0.0231	0.0064	0.0167
212	0.0225	0.0063	0.0162
213	0.0219	0.0061	0.0158
214	0.0214	0.0059	0.0154
215	0.0208	0.0058	0.0150
216	0.0204	0.0057	0.0147
217	0.0221	0.0062	0.0160
218	0.0217	0.0061	0.0157
219	0.0213	0.0059	0.0154
220	0.0209	0.0058	0.0151
221	0.0206	0.0057	0.0149

222	0.0202	0.0056	0.0146
223	0.0199	0.0056	0.0144
224	0.0196	0.0055	0.0142
225	0.0193	0.0054	0.0139
226	0.0190	0.0053	0.0137
227	0.0188	0.0052	0.0135
228	0.0185	0.0052	0.0134
229	0.0183	0.0051	0.0132
230	0.0180	0.0050	0.0130
231	0.0178	0.0050	0.0129
232	0.0176	0.0049	0.0127
233	0.0174	0.0048	0.0125
234	0.0172	0.0048	0.0124
235	0.0170	0.0047	0.0123
236	0.0168	0.0047	0.0121
237	0.0166	0.0046	0.0120
238	0.0164	0.0046	0.0119
239	0.0163	0.0045	0.0117
240	0.0161	0.0045	0.0116
241	0.0160	0.0044	0.0115
242	0.0158	0.0044	0.0114
243	0.0156	0.0044	0.0113
244	0.0155	0.0043	0.0112
245	0.0154	0.0043	0.0111
246	0.0152	0.0042	0.0110
247	0.0151	0.0042	0.0109
248	0.0150	0.0042	0.0108
249	0.0148	0.0041	0.0107
250	0.0147	0.0041	0.0106
251	0.0146	0.0041	0.0105
252	0.0145	0.0040	0.0104
253	0.0143	0.0040	0.0104
254	0.0142	0.0040	0.0103
255	0.0141	0.0039	0.0102
256	0.0140	0.0039	0.0101
257	0.0139	0.0039	0.0100
258	0.0138	0.0038	0.0100
259	0.0137	0.0038	0.0099
260	0.0136	0.0038	0.0098
261	0.0135	0.0038	0.0098
262	0.0134	0.0037	0.0097
263	0.0133	0.0037	0.0096
264	0.0132	0.0037	0.0096
265	0.0132	0.0037	0.0095
266	0.0131	0.0036	0.0094
267	0.0130	0.0036	0.0094
268	0.0129	0.0036	0.0093
269	0.0128	0.0036	0.0093
270	0.0127	0.0036	0.0092
271	0.0127	0.0035	0.0091

272	0.0126	0.0035	0.0091
273	0.0125	0.0035	0.0090
274	0.0124	0.0035	0.0090
275	0.0124	0.0034	0.0089
276	0.0123	0.0034	0.0089
277	0.0122	0.0034	0.0088
278	0.0122	0.0034	0.0088
279	0.0121	0.0034	0.0087
280	0.0120	0.0034	0.0087
281	0.0120	0.0033	0.0086
282	0.0119	0.0033	0.0086
283	0.0118	0.0033	0.0085
284	0.0118	0.0033	0.0085
285	0.0117	0.0033	0.0085
286	0.0117	0.0032	0.0084
287	0.0116	0.0032	0.0084
288	0.0115	0.0032	0.0083

Total soil rain loss = 1.59(In)
Total effective rainfall = 4.72(In)
Peak flow rate in flood hydrograph = 8.48(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	2.5	5.0	7.5	10.0
0+ 5	0.0001	0.01	Q	|	|	|	|
0+10	0.0004	0.06	Q	|	|	|	|
0+15	0.0015	0.15	Q	|	|	|	|
0+20	0.0029	0.20	Q	|	|	|	|
0+25	0.0045	0.23	Q	|	|	|	|
0+30	0.0062	0.25	VQ	|	|	|	|
0+35	0.0080	0.27	VQ	|	|	|	|
0+40	0.0099	0.28	VQ	|	|	|	|
0+45	0.0119	0.29	VQ	|	|	|	|
0+50	0.0139	0.29	VQ	|	|	|	|
0+55	0.0160	0.30	VQ	|	|	|	|
1+ 0	0.0181	0.30	VQ	|	|	|	|
1+ 5	0.0202	0.31	VQ	|	|	|	|
1+10	0.0223	0.31	VQ	|	|	|	|
1+15	0.0244	0.31	VQ	|	|	|	|
1+20	0.0266	0.31	VQ	|	|	|	|
1+25	0.0288	0.32	VQ	|	|	|	|
1+30	0.0310	0.32	|Q	|	|	|	|

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1+35       0.0332      0.32  |Q         |          |          |          |
1+40       0.0354      0.32  |Q         |          |          |          |
1+45       0.0376      0.32  |Q         |          |          |          |
1+50       0.0399      0.32  |Q         |          |          |          |
1+55       0.0421      0.33  |Q         |          |          |          |
2+ 0       0.0444      0.33  |Q         |          |          |          |
2+ 5       0.0466      0.33  |Q         |          |          |          |
2+10       0.0489      0.33  |Q         |          |          |          |
2+15       0.0511      0.33  |Q         |          |          |          |
2+20       0.0534      0.33  |Q         |          |          |          |
2+25       0.0557      0.33  |Q         |          |          |          |
2+30       0.0580      0.33  |Q         |          |          |          |
2+35       0.0602      0.33  |Q         |          |          |          |
2+40       0.0625      0.33  |QV        |          |          |          |
2+45       0.0648      0.33  |QV        |          |          |          |
2+50       0.0672      0.34  |QV        |          |          |          |
2+55       0.0695      0.34  |QV        |          |          |          |
3+ 0       0.0718      0.34  |QV        |          |          |          |
3+ 5       0.0741      0.34  |QV        |          |          |          |
3+10       0.0765      0.34  |QV        |          |          |          |
3+15       0.0788      0.34  |QV        |          |          |          |
3+20       0.0812      0.34  |QV        |          |          |          |
3+25       0.0835      0.34  |QV        |          |          |          |
3+30       0.0859      0.34  |QV        |          |          |          |
3+35       0.0883      0.34  |QV        |          |          |          |
3+40       0.0906      0.35  |QV        |          |          |          |
3+45       0.0930      0.35  |Q V       |          |          |          |
3+50       0.0954      0.35  |Q V       |          |          |          |
3+55       0.0978      0.35  |Q V       |          |          |          |
4+ 0       0.1002      0.35  |Q V       |          |          |          |
4+ 5       0.1026      0.35  |Q V       |          |          |          |
4+10       0.1051      0.35  |Q V       |          |          |          |
4+15       0.1075      0.35  |Q V       |          |          |          |
4+20       0.1100      0.35  |Q V       |          |          |          |
4+25       0.1124      0.36  |Q V       |          |          |          |
4+30       0.1149      0.36  |Q V       |          |          |          |
4+35       0.1173      0.36  |Q V       |          |          |          |
4+40       0.1198      0.36  |Q V       |          |          |          |
4+45       0.1223      0.36  |Q  V      |          |          |          |
4+50       0.1248      0.36  |Q  V      |          |          |          |
4+55       0.1273      0.36  |Q  V      |          |          |          |
5+ 0       0.1298      0.36  |Q  V      |          |          |          |
5+ 5       0.1323      0.37  |Q  V      |          |          |          |
5+10       0.1348      0.37  |Q  V      |          |          |          |
5+15       0.1374      0.37  |Q  V      |          |          |          |
5+20       0.1399      0.37  |Q  V      |          |          |          |
5+25       0.1425      0.37  |Q  V      |          |          |          |
5+30       0.1450      0.37  |Q  V      |          |          |          |
5+35       0.1476      0.37  |Q  V      |          |          |          |
5+40       0.1502      0.37  |Q  V      |          |          |          |
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5+45       0.1528      0.38  |Q   V    |          |          |          |
5+50       0.1554      0.38  |Q   V    |          |          |          |
5+55       0.1580      0.38  |Q   V    |          |          |          |
6+ 0       0.1606      0.38  |Q   V    |          |          |          |
6+ 5       0.1632      0.38  |Q   V    |          |          |          |
6+10       0.1659      0.38  |Q   V    |          |          |          |
6+15       0.1685      0.39  |Q   V    |          |          |          |
6+20       0.1712      0.39  |Q   V    |          |          |          |
6+25       0.1739      0.39  |Q   V    |          |          |          |
6+30       0.1766      0.39  |Q   V    |          |          |          |
6+35       0.1792      0.39  |Q   V    |          |          |          |
6+40       0.1820      0.39  |Q   V    |          |          |          |
6+45       0.1847      0.39  |Q    V   |          |          |          |
6+50       0.1874      0.40  |Q    V   |          |          |          |
6+55       0.1901      0.40  |Q    V   |          |          |          |
7+ 0       0.1929      0.40  |Q    V   |          |          |          |
7+ 5       0.1956      0.40  |Q    V   |          |          |          |
7+10       0.1984      0.40  |Q    V   |          |          |          |
7+15       0.2012      0.40  |Q    V   |          |          |          |
7+20       0.2040      0.41  |Q    V   |          |          |          |
7+25       0.2068      0.41  |Q    V   |          |          |          |
7+30       0.2096      0.41  |Q    V   |          |          |          |
7+35       0.2125      0.41  |Q    V   |          |          |          |
7+40       0.2153      0.41  |Q     V  |          |          |          |
7+45       0.2182      0.42  |Q     V  |          |          |          |
7+50       0.2211      0.42  |Q     V  |          |          |          |
7+55       0.2240      0.42  |Q     V  |          |          |          |
8+ 0       0.2269      0.42  |Q     V  |          |          |          |
8+ 5       0.2298      0.42  |Q     V  |          |          |          |
8+10       0.2327      0.43  |Q     V  |          |          |          |
8+15       0.2356      0.43  |Q     V  |          |          |          |
8+20       0.2386      0.43  |Q     V  |          |          |          |
8+25       0.2416      0.43  |Q     V  |          |          |          |
8+30       0.2446      0.43  |Q      V |          |          |          |
8+35       0.2476      0.44  |Q      V |          |          |          |
8+40       0.2506      0.44  |Q      V |          |          |          |
8+45       0.2536      0.44  |Q      V |          |          |          |
8+50       0.2567      0.44  |Q      V |          |          |          |
8+55       0.2597      0.45  |Q      V |          |          |          |
9+ 0       0.2628      0.45  |Q      V |          |          |          |
9+ 5       0.2659      0.45  |Q      V |          |          |          |
9+10       0.2690      0.45  |Q      V |          |          |          |
9+15       0.2722      0.46  |Q      V |          |          |          |
9+20       0.2753      0.46  |Q       V|          |          |          |
9+25       0.2785      0.46  |Q       V|          |          |          |
9+30       0.2817      0.46  |Q       V|          |          |          |
9+35       0.2849      0.47  |Q       V|          |          |          |
9+40       0.2881      0.47  |Q       V|          |          |          |
9+45       0.2914      0.47  |Q       V|          |          |          |
9+50       0.2946      0.47  |Q       V|          |          |          |
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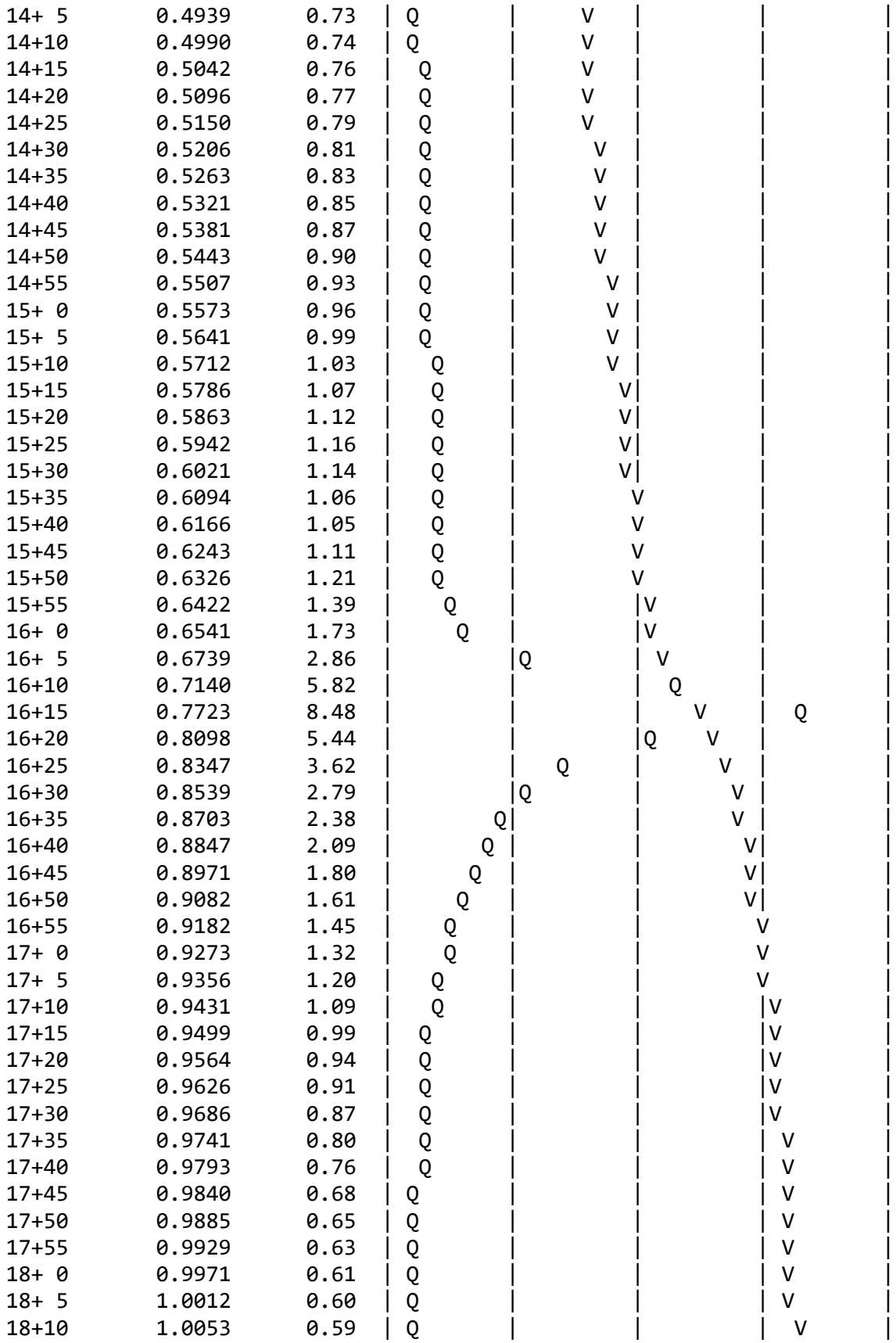
 9+55       0.2979      0.48  |Q       V|          |          |          |
10+ 0       0.3012      0.48  |Q       V|          |          |          |
10+ 5       0.3046      0.48  |Q        V          |          |          |
10+10       0.3079      0.49  |Q        V          |          |          |
10+15       0.3113      0.49  |Q        V          |          |          |
10+20       0.3147      0.49  |Q        V          |          |          |
10+25       0.3181      0.50  |Q        V          |          |          |
10+30       0.3215      0.50  |Q        V          |          |          |
10+35       0.3250      0.50  | Q       V          |          |          |
10+40       0.3285      0.51  | Q       V          |          |          |
10+45       0.3320      0.51  | Q       V          |          |          |
10+50       0.3355      0.51  | Q       |V         |          |          |
10+55       0.3391      0.52  | Q       |V         |          |          |
11+ 0       0.3426      0.52  | Q       |V         |          |          |
11+ 5       0.3462      0.52  | Q       |V         |          |          |
11+10       0.3499      0.53  | Q       |V         |          |          |
11+15       0.3536      0.53  | Q       |V         |          |          |
11+20       0.3573      0.54  | Q       |V         |          |          |
11+25       0.3610      0.54  | Q       |V         |          |          |
11+30       0.3647      0.55  | Q       | V        |          |          |
11+35       0.3685      0.55  | Q       | V        |          |          |
11+40       0.3723      0.55  | Q       | V        |          |          |
11+45       0.3762      0.56  | Q       | V        |          |          |
11+50       0.3801      0.56  | Q       | V        |          |          |
11+55       0.3840      0.57  | Q       | V        |          |          |
12+ 0       0.3879      0.57  | Q       | V        |          |          |
12+ 5       0.3919      0.58  | Q       | V        |          |          |
12+10       0.3959      0.57  | Q       |  V       |          |          |
12+15       0.3997      0.56  | Q       |  V       |          |          |
12+20       0.4036      0.56  | Q       |  V       |          |          |
12+25       0.4074      0.56  | Q       |  V       |          |          |
12+30       0.4113      0.56  | Q       |  V       |          |          |
12+35       0.4152      0.56  | Q       |  V       |          |          |
12+40       0.4191      0.57  | Q       |  V       |          |          |
12+45       0.4230      0.57  | Q       |  V       |          |          |
12+50       0.4270      0.58  | Q       |   V      |          |          |
12+55       0.4311      0.59  | Q       |   V      |          |          |
13+ 0       0.4351      0.59  | Q       |   V      |          |          |
13+ 5       0.4393      0.60  | Q       |   V      |          |          |
13+10       0.4435      0.61  | Q       |   V      |          |          |
13+15       0.4477      0.62  | Q       |   V      |          |          |
13+20       0.4520      0.62  | Q       |   V      |          |          |
13+25       0.4564      0.63  | Q       |    V     |          |          |
13+30       0.4608      0.64  | Q       |    V     |          |          |
13+35       0.4653      0.65  | Q       |    V     |          |          |
13+40       0.4699      0.66  | Q       |    V     |          |          |
13+45       0.4745      0.67  | Q       |    V     |          |          |
13+50       0.4792      0.69  | Q       |    V     |          |          |
13+55       0.4840      0.70  | Q       |    V     |          |          |
14+ 0       0.4889      0.71  | Q       |     V    |          |          |
```



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18+15       1.0094      0.59  | Q       |         |         |  V      |
18+20       1.0134      0.59  | Q       |         |         |  V      |
18+25       1.0175      0.58  | Q       |         |         |  V      |
18+30       1.0214      0.58  | Q       |         |         |  V      |
18+35       1.0253      0.57  | Q       |         |         |  V      |
18+40       1.0292      0.56  | Q       |         |         |  V      |
18+45       1.0330      0.55  | Q       |         |         |   V     |
18+50       1.0367      0.54  | Q       |         |         |   V     |
18+55       1.0404      0.53  | Q       |         |         |   V     |
19+ 0       1.0440      0.53  | Q       |         |         |   V     |
19+ 5       1.0476      0.52  | Q       |         |         |   V     |
19+10       1.0511      0.51  | Q       |         |         |   V     |
19+15       1.0546      0.51  | Q       |         |         |   V     |
19+20       1.0580      0.50  |Q        |         |         |   V     |
19+25       1.0614      0.49  |Q        |         |         |   V     |
19+30       1.0648      0.49  |Q        |         |         |    V    |
19+35       1.0681      0.48  |Q        |         |         |    V    |
19+40       1.0714      0.47  |Q        |         |         |    V    |
19+45       1.0746      0.47  |Q        |         |         |    V    |
19+50       1.0778      0.46  |Q        |         |         |    V    |
19+55       1.0809      0.46  |Q        |         |         |    V    |
20+ 0       1.0840      0.45  |Q        |         |         |    V    |
20+ 5       1.0871      0.45  |Q        |         |         |    V    |
20+10       1.0902      0.44  |Q        |         |         |    V    |
20+15       1.0932      0.44  |Q        |         |         |    V    |
20+20       1.0962      0.43  |Q        |         |         |     V   |
20+25       1.0992      0.43  |Q        |         |         |     V   |
20+30       1.1021      0.43  |Q        |         |         |     V   |
20+35       1.1050      0.42  |Q        |         |         |     V   |
20+40       1.1079      0.42  |Q        |         |         |     V   |
20+45       1.1107      0.41  |Q        |         |         |     V   |
20+50       1.1135      0.41  |Q        |         |         |     V   |
20+55       1.1163      0.41  |Q        |         |         |     V   |
21+ 0       1.1191      0.40  |Q        |         |         |     V   |
21+ 5       1.1219      0.40  |Q        |         |         |     V   |
21+10       1.1246      0.40  |Q        |         |         |      V  |
21+15       1.1273      0.39  |Q        |         |         |      V  |
21+20       1.1300      0.39  |Q        |         |         |      V  |
21+25       1.1326      0.39  |Q        |         |         |      V  |
21+30       1.1353      0.38  |Q        |         |         |      V  |
21+35       1.1379      0.38  |Q        |         |         |      V  |
21+40       1.1405      0.38  |Q        |         |         |      V  |
21+45       1.1431      0.37  |Q        |         |         |      V  |
21+50       1.1456      0.37  |Q        |         |         |      V  |
21+55       1.1482      0.37  |Q        |         |         |      V  |
22+ 0       1.1507      0.37  |Q        |         |         |      V  |
22+ 5       1.1532      0.36  |Q        |         |         |      V  |
22+10       1.1557      0.36  |Q        |         |         |       V |
22+15       1.1582      0.36  |Q        |         |         |       V |
22+20       1.1606      0.36  |Q        |         |         |       V |
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   22+25       1.1631      0.35  |Q        |         |         |        V |
   22+30       1.1655      0.35  |Q        |         |         |        V |
   22+35       1.1679      0.35  |Q        |         |         |        V |
   22+40       1.1703      0.35  |Q        |         |         |        V |
   22+45       1.1727      0.35  |Q        |         |         |        V |
   22+50       1.1751      0.34  |Q        |         |         |        V |
   22+55       1.1774      0.34  |Q        |         |         |        V |
   23+ 0       1.1797      0.34  |Q        |         |         |        V |
   23+ 5       1.1821      0.34  |Q        |         |         |        V |
   23+10       1.1844      0.34  |Q        |         |         |        V |
   23+15       1.1867      0.33  |Q        |         |         |         V|
   23+20       1.1890      0.33  |Q        |         |         |         V|
   23+25       1.1912      0.33  |Q        |         |         |         V|
   23+30       1.1935      0.33  |Q        |         |         |         V|
   23+35       1.1957      0.33  |Q        |         |         |         V|
   23+40       1.1980      0.32  |Q        |         |         |         V|
   23+45       1.2002      0.32  |Q        |         |         |         V|
   23+50       1.2024      0.32  |Q        |         |         |         V|
   23+55       1.2046      0.32  |Q        |         |         |         V|
   24+ 0       1.2068      0.32  |Q        |         |         |         V|
   24+ 5       1.2089      0.31  |Q        |         |         |         V|
   24+10       1.2106      0.26  |Q        |         |         |         V|
   24+15       1.2118      0.16  Q         |         |         |         V|
   24+20       1.2125      0.11  Q         |         |         |         V|
   24+25       1.2131      0.08  Q         |         |         |         V|
   24+30       1.2135      0.06  Q         |         |         |         V|
-------------------------------------------------------------------------
```

Appendix E – Unit Hydrograph (Post-Development)

- 10-Year Storm Event
- 100-Year Storm Event

Appendix E – Unit Hydrograph (Post-Development)

- 10-Year Storm Event

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

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Study date 12/06/20

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

Program License Serial Number 6277

2020-326 HCC V
POST-DEVELOPMENT CONDITIONS
UNIT HYDROGRAPH - 10 YEAR STORM
DA A

Storm Event Year = 10

Antecedent Moisture Condition = 2

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 10		
34.50	1	0.79
Rainfall data for year 2		
34.50	6	1.12
Rainfall data for year 2		
34.50	24	2.11
Rainfall data for year 100		

```
            34.50            1            1.31
------------------------------------------------------------------------
Rainfall data for year 100
            34.50            6            3.05
------------------------------------------------------------------------
Rainfall data for year 100
            34.50           24            6.31
------------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

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


SCS curve  SCS curve     Area     Area     Fp(Fig C6)    Ap      Fm
No.(AMCII) NO.(AMC 2)    (Ac.)    Fraction     (In/Hr)  (dec.)   (In/Hr)
 32.0      32.0         34.50      1.000     0.978    0.150    0.147

Area-averaged adjusted loss rate Fm (In/Hr) =  0.147

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

Area       Area          SCS CN    SCS CN      S     Pervious
 (Ac.)      Fract         (AMC2)    (AMC2)           Yield Fr
     5.17   0.150         32.0      32.0      19.19     0.000
    29.32   0.850         98.0      98.0       0.20     0.939

Area-averaged catchment yield fraction, Y =  0.798
Area-averaged low loss fraction, Yb =  0.202
User entry of time of concentration  =   0.221 (hours)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watershed area =      34.50(Ac.)
Catchment Lag time =   0.177 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 47.1342
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.147(In/Hr)
Average low loss rate fraction (Yb) = 0.202 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall =  0.372(In)
Computed peak 30-minute rainfall =  0.638(In)
Specified peak 1-hour rainfall =  0.785(In)
Computed peak 3-hour rainfall =  1.356(In)
Specified peak 6-hour rainfall =  1.914(In)
Specified peak 24-hour rainfall =  3.838(In)


Rainfall depth area reduction factors:
Using a total area of      34.50(Ac.) (Ref: fig. E-4)

5-minute factor = 0.998     Adjusted rainfall =  0.372(In)
```

30-minute factor = 0.998 Adjusted rainfall = 0.637(In)
1-hour factor = 0.998 Adjusted rainfall = 0.784(In)
3-hour factor = 1.000 Adjusted rainfall = 1.356(In)
6-hour factor = 1.000 Adjusted rainfall = 1.914(In)
24-hour factor = 1.000 Adjusted rainfall = 3.838(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 = 417.23 (CFS))	
1	3.594	14.997
2	27.120	98.157
3	57.814	128.068
4	71.740	58.101
5	79.819	33.708
6	85.150	22.246
7	89.019	16.139
8	91.734	11.330
9	93.866	8.896
10	95.486	6.758
11	96.739	5.228
12	97.636	3.744
13	98.195	2.333
14	98.736	2.255
15	99.298	2.347
16	99.691	1.639
17	100.000	1.289

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.3719	0.3719
2	0.4578	0.0860
3	0.5171	0.0592
4	0.5637	0.0466
5	0.6027	0.0390
6	0.6366	0.0339
7	0.6667	0.0301
8	0.6940	0.0273
9	0.7189	0.0250
10	0.7420	0.0231
11	0.7635	0.0215
12	0.7837	0.0202
13	0.8156	0.0319
14	0.8464	0.0307
15	0.8760	0.0296
16	0.9046	0.0287

17	0.9324	0.0278
18	0.9594	0.0270
19	0.9856	0.0262
20	1.0111	0.0255
21	1.0360	0.0249
22	1.0604	0.0243
23	1.0841	0.0238
24	1.1074	0.0233
25	1.1302	0.0228
26	1.1525	0.0223
27	1.1744	0.0219
28	1.1959	0.0215
29	1.2170	0.0211
30	1.2377	0.0208
31	1.2581	0.0204
32	1.2782	0.0201
33	1.2980	0.0198
34	1.3175	0.0195
35	1.3366	0.0192
36	1.3555	0.0189
37	1.3742	0.0186
38	1.3925	0.0184
39	1.4106	0.0181
40	1.4285	0.0179
41	1.4462	0.0177
42	1.4636	0.0174
43	1.4808	0.0172
44	1.4979	0.0170
45	1.5147	0.0168
46	1.5314	0.0167
47	1.5479	0.0165
48	1.5642	0.0163
49	1.5803	0.0161
50	1.5963	0.0160
51	1.6121	0.0158
52	1.6277	0.0157
53	1.6432	0.0155
54	1.6586	0.0154
55	1.6738	0.0152
56	1.6889	0.0151
57	1.7038	0.0149
58	1.7186	0.0148
59	1.7333	0.0147
60	1.7478	0.0146
61	1.7623	0.0144
62	1.7766	0.0143
63	1.7908	0.0142
64	1.8049	0.0141
65	1.8189	0.0140
66	1.8327	0.0139

67	1.8465	0.0138
68	1.8601	0.0137
69	1.8737	0.0136
70	1.8872	0.0135
71	1.9005	0.0134
72	1.9138	0.0133
73	1.9271	0.0133
74	1.9403	0.0132
75	1.9534	0.0131
76	1.9665	0.0130
77	1.9794	0.0129
78	1.9923	0.0129
79	2.0050	0.0128
80	2.0177	0.0127
81	2.0304	0.0126
82	2.0429	0.0125
83	2.0554	0.0125
84	2.0678	0.0124
85	2.0801	0.0123
86	2.0923	0.0122
87	2.1045	0.0122
88	2.1166	0.0121
89	2.1286	0.0120
90	2.1406	0.0120
91	2.1525	0.0119
92	2.1644	0.0118
93	2.1761	0.0118
94	2.1878	0.0117
95	2.1995	0.0117
96	2.2111	0.0116
97	2.2226	0.0115
98	2.2341	0.0115
99	2.2455	0.0114
100	2.2569	0.0114
101	2.2682	0.0113
102	2.2794	0.0112
103	2.2906	0.0112
104	2.3017	0.0111
105	2.3128	0.0111
106	2.3238	0.0110
107	2.3348	0.0110
108	2.3457	0.0109
109	2.3566	0.0109
110	2.3674	0.0108
111	2.3782	0.0108
112	2.3890	0.0107
113	2.3996	0.0107
114	2.4103	0.0106
115	2.4209	0.0106
116	2.4314	0.0105

117	2.4419	0.0105
118	2.4524	0.0105
119	2.4628	0.0104
120	2.4731	0.0104
121	2.4834	0.0103
122	2.4937	0.0103
123	2.5040	0.0102
124	2.5142	0.0102
125	2.5243	0.0102
126	2.5344	0.0101
127	2.5445	0.0101
128	2.5545	0.0100
129	2.5645	0.0100
130	2.5745	0.0100
131	2.5844	0.0099
132	2.5943	0.0099
133	2.6042	0.0098
134	2.6140	0.0098
135	2.6237	0.0098
136	2.6335	0.0097
137	2.6432	0.0097
138	2.6528	0.0097
139	2.6625	0.0096
140	2.6721	0.0096
141	2.6816	0.0096
142	2.6912	0.0095
143	2.7007	0.0095
144	2.7101	0.0095
145	2.7195	0.0094
146	2.7289	0.0094
147	2.7383	0.0094
148	2.7476	0.0093
149	2.7569	0.0093
150	2.7662	0.0093
151	2.7755	0.0092
152	2.7847	0.0092
153	2.7938	0.0092
154	2.8030	0.0092
155	2.8121	0.0091
156	2.8212	0.0091
157	2.8303	0.0091
158	2.8393	0.0090
159	2.8483	0.0090
160	2.8573	0.0090
161	2.8662	0.0089
162	2.8752	0.0089
163	2.8841	0.0089
164	2.8929	0.0089
165	2.9018	0.0088
166	2.9106	0.0088

167	2.9194	0.0088
168	2.9281	0.0088
169	2.9369	0.0087
170	2.9456	0.0087
171	2.9542	0.0087
172	2.9629	0.0087
173	2.9715	0.0086
174	2.9801	0.0086
175	2.9887	0.0086
176	2.9973	0.0086
177	3.0058	0.0085
178	3.0143	0.0085
179	3.0228	0.0085
180	3.0313	0.0085
181	3.0397	0.0084
182	3.0481	0.0084
183	3.0565	0.0084
184	3.0649	0.0084
185	3.0733	0.0083
186	3.0816	0.0083
187	3.0899	0.0083
188	3.0982	0.0083
189	3.1064	0.0083
190	3.1147	0.0082
191	3.1229	0.0082
192	3.1311	0.0082
193	3.1393	0.0082
194	3.1474	0.0082
195	3.1555	0.0081
196	3.1637	0.0081
197	3.1718	0.0081
198	3.1798	0.0081
199	3.1879	0.0081
200	3.1959	0.0080
201	3.2039	0.0080
202	3.2119	0.0080
203	3.2199	0.0080
204	3.2278	0.0080
205	3.2358	0.0079
206	3.2437	0.0079
207	3.2516	0.0079
208	3.2594	0.0079
209	3.2673	0.0079
210	3.2751	0.0078
211	3.2829	0.0078
212	3.2907	0.0078
213	3.2985	0.0078
214	3.3063	0.0078
215	3.3140	0.0077
216	3.3218	0.0077

217	3.3295	0.0077
218	3.3372	0.0077
219	3.3448	0.0077
220	3.3525	0.0077
221	3.3601	0.0076
222	3.3678	0.0076
223	3.3754	0.0076
224	3.3830	0.0076
225	3.3905	0.0076
226	3.3981	0.0076
227	3.4056	0.0075
228	3.4131	0.0075
229	3.4206	0.0075
230	3.4281	0.0075
231	3.4356	0.0075
232	3.4431	0.0075
233	3.4505	0.0074
234	3.4579	0.0074
235	3.4653	0.0074
236	3.4727	0.0074
237	3.4801	0.0074
238	3.4875	0.0074
239	3.4948	0.0073
240	3.5022	0.0073
241	3.5095	0.0073
242	3.5168	0.0073
243	3.5241	0.0073
244	3.5313	0.0073
245	3.5386	0.0073
246	3.5458	0.0072
247	3.5531	0.0072
248	3.5603	0.0072
249	3.5675	0.0072
250	3.5746	0.0072
251	3.5818	0.0072
252	3.5890	0.0072
253	3.5961	0.0071
254	3.6032	0.0071
255	3.6104	0.0071
256	3.6175	0.0071
257	3.6245	0.0071
258	3.6316	0.0071
259	3.6387	0.0071
260	3.6457	0.0070
261	3.6527	0.0070
262	3.6598	0.0070
263	3.6668	0.0070
264	3.6738	0.0070
265	3.6807	0.0070
266	3.6877	0.0070

267	3.6946	0.0070
268	3.7016	0.0069
269	3.7085	0.0069
270	3.7154	0.0069
271	3.7223	0.0069
272	3.7292	0.0069
273	3.7361	0.0069
274	3.7430	0.0069
275	3.7498	0.0069
276	3.7566	0.0068
277	3.7635	0.0068
278	3.7703	0.0068
279	3.7771	0.0068
280	3.7839	0.0068
281	3.7906	0.0068
282	3.7974	0.0068
283	3.8042	0.0068
284	3.8109	0.0067
285	3.8176	0.0067
286	3.8243	0.0067
287	3.8311	0.0067
288	3.8377	0.0067

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0067	0.0014	0.0053
2	0.0067	0.0014	0.0054
3	0.0067	0.0014	0.0054
4	0.0067	0.0014	0.0054
5	0.0068	0.0014	0.0054
6	0.0068	0.0014	0.0054
7	0.0068	0.0014	0.0054
8	0.0068	0.0014	0.0054
9	0.0068	0.0014	0.0055
10	0.0069	0.0014	0.0055
11	0.0069	0.0014	0.0055
12	0.0069	0.0014	0.0055
13	0.0069	0.0014	0.0055
14	0.0069	0.0014	0.0055
15	0.0070	0.0014	0.0055
16	0.0070	0.0014	0.0056
17	0.0070	0.0014	0.0056
18	0.0070	0.0014	0.0056
19	0.0070	0.0014	0.0056
20	0.0070	0.0014	0.0056
21	0.0071	0.0014	0.0056
22	0.0071	0.0014	0.0057
23	0.0071	0.0014	0.0057

24	0.0071	0.0014	0.0057
25	0.0072	0.0014	0.0057
26	0.0072	0.0014	0.0057
27	0.0072	0.0015	0.0057
28	0.0072	0.0015	0.0058
29	0.0072	0.0015	0.0058
30	0.0073	0.0015	0.0058
31	0.0073	0.0015	0.0058
32	0.0073	0.0015	0.0058
33	0.0073	0.0015	0.0059
34	0.0073	0.0015	0.0059
35	0.0074	0.0015	0.0059
36	0.0074	0.0015	0.0059
37	0.0074	0.0015	0.0059
38	0.0074	0.0015	0.0059
39	0.0075	0.0015	0.0060
40	0.0075	0.0015	0.0060
41	0.0075	0.0015	0.0060
42	0.0075	0.0015	0.0060
43	0.0076	0.0015	0.0060
44	0.0076	0.0015	0.0061
45	0.0076	0.0015	0.0061
46	0.0076	0.0015	0.0061
47	0.0077	0.0015	0.0061
48	0.0077	0.0016	0.0061
49	0.0077	0.0016	0.0062
50	0.0077	0.0016	0.0062
51	0.0078	0.0016	0.0062
52	0.0078	0.0016	0.0062
53	0.0078	0.0016	0.0063
54	0.0079	0.0016	0.0063
55	0.0079	0.0016	0.0063
56	0.0079	0.0016	0.0063
57	0.0080	0.0016	0.0063
58	0.0080	0.0016	0.0064
59	0.0080	0.0016	0.0064
60	0.0080	0.0016	0.0064
61	0.0081	0.0016	0.0064
62	0.0081	0.0016	0.0065
63	0.0081	0.0016	0.0065
64	0.0082	0.0016	0.0065
65	0.0082	0.0017	0.0065
66	0.0082	0.0017	0.0066
67	0.0083	0.0017	0.0066
68	0.0083	0.0017	0.0066
69	0.0083	0.0017	0.0066
70	0.0083	0.0017	0.0067
71	0.0084	0.0017	0.0067
72	0.0084	0.0017	0.0067
73	0.0085	0.0017	0.0068

74	0.0085	0.0017	0.0068
75	0.0085	0.0017	0.0068
76	0.0086	0.0017	0.0068
77	0.0086	0.0017	0.0069
78	0.0086	0.0017	0.0069
79	0.0087	0.0018	0.0069
80	0.0087	0.0018	0.0070
81	0.0088	0.0018	0.0070
82	0.0088	0.0018	0.0070
83	0.0088	0.0018	0.0071
84	0.0089	0.0018	0.0071
85	0.0089	0.0018	0.0071
86	0.0089	0.0018	0.0071
87	0.0090	0.0018	0.0072
88	0.0090	0.0018	0.0072
89	0.0091	0.0018	0.0073
90	0.0091	0.0018	0.0073
91	0.0092	0.0019	0.0073
92	0.0092	0.0019	0.0074
93	0.0093	0.0019	0.0074
94	0.0093	0.0019	0.0074
95	0.0094	0.0019	0.0075
96	0.0094	0.0019	0.0075
97	0.0095	0.0019	0.0076
98	0.0095	0.0019	0.0076
99	0.0096	0.0019	0.0076
100	0.0096	0.0019	0.0077
101	0.0097	0.0020	0.0077
102	0.0097	0.0020	0.0077
103	0.0098	0.0020	0.0078
104	0.0098	0.0020	0.0078
105	0.0099	0.0020	0.0079
106	0.0099	0.0020	0.0079
107	0.0100	0.0020	0.0080
108	0.0100	0.0020	0.0080
109	0.0101	0.0020	0.0081
110	0.0102	0.0021	0.0081
111	0.0102	0.0021	0.0082
112	0.0103	0.0021	0.0082
113	0.0104	0.0021	0.0083
114	0.0104	0.0021	0.0083
115	0.0105	0.0021	0.0084
116	0.0105	0.0021	0.0084
117	0.0106	0.0021	0.0085
118	0.0107	0.0022	0.0085
119	0.0108	0.0022	0.0086
120	0.0108	0.0022	0.0086
121	0.0109	0.0022	0.0087
122	0.0110	0.0022	0.0088
123	0.0111	0.0022	0.0088

124	0.0111	0.0022	0.0089
125	0.0112	0.0023	0.0090
126	0.0113	0.0023	0.0090
127	0.0114	0.0023	0.0091
128	0.0115	0.0023	0.0092
129	0.0116	0.0023	0.0092
130	0.0117	0.0024	0.0093
131	0.0118	0.0024	0.0094
132	0.0118	0.0024	0.0094
133	0.0120	0.0024	0.0096
134	0.0120	0.0024	0.0096
135	0.0122	0.0025	0.0097
136	0.0122	0.0025	0.0098
137	0.0124	0.0025	0.0099
138	0.0125	0.0025	0.0099
139	0.0126	0.0025	0.0101
140	0.0127	0.0026	0.0101
141	0.0129	0.0026	0.0103
142	0.0129	0.0026	0.0103
143	0.0131	0.0026	0.0105
144	0.0132	0.0027	0.0105
145	0.0133	0.0027	0.0106
146	0.0134	0.0027	0.0107
147	0.0136	0.0027	0.0108
148	0.0137	0.0028	0.0109
149	0.0139	0.0028	0.0111
150	0.0140	0.0028	0.0112
151	0.0142	0.0029	0.0113
152	0.0143	0.0029	0.0114
153	0.0146	0.0029	0.0116
154	0.0147	0.0030	0.0117
155	0.0149	0.0030	0.0119
156	0.0151	0.0030	0.0120
157	0.0154	0.0031	0.0123
158	0.0155	0.0031	0.0124
159	0.0158	0.0032	0.0126
160	0.0160	0.0032	0.0127
161	0.0163	0.0033	0.0130
162	0.0165	0.0033	0.0131
163	0.0168	0.0034	0.0134
164	0.0170	0.0034	0.0136
165	0.0174	0.0035	0.0139
166	0.0177	0.0036	0.0141
167	0.0181	0.0037	0.0145
168	0.0184	0.0037	0.0146
169	0.0189	0.0038	0.0151
170	0.0192	0.0039	0.0153
171	0.0198	0.0040	0.0158
172	0.0201	0.0041	0.0160
173	0.0208	0.0042	0.0166

174	0.0211	0.0043	0.0168
175	0.0219	0.0044	0.0175
176	0.0223	0.0045	0.0178
177	0.0233	0.0047	0.0186
178	0.0238	0.0048	0.0190
179	0.0249	0.0050	0.0199
180	0.0255	0.0052	0.0204
181	0.0270	0.0054	0.0215
182	0.0278	0.0056	0.0222
183	0.0296	0.0060	0.0236
184	0.0307	0.0062	0.0245
185	0.0202	0.0041	0.0161
186	0.0215	0.0043	0.0172
187	0.0250	0.0050	0.0199
188	0.0273	0.0055	0.0217
189	0.0339	0.0068	0.0270
190	0.0390	0.0079	0.0311
191	0.0592	0.0120	0.0473
192	0.0860	0.0122	0.0737
193	0.3719	0.0122	0.3597
194	0.0466	0.0094	0.0372
195	0.0301	0.0061	0.0240
196	0.0231	0.0047	0.0184
197	0.0319	0.0064	0.0255
198	0.0287	0.0058	0.0229
199	0.0262	0.0053	0.0209
200	0.0243	0.0049	0.0194
201	0.0228	0.0046	0.0182
202	0.0215	0.0043	0.0172
203	0.0204	0.0041	0.0163
204	0.0195	0.0039	0.0155
205	0.0186	0.0038	0.0148
206	0.0179	0.0036	0.0143
207	0.0172	0.0035	0.0138
208	0.0167	0.0034	0.0133
209	0.0161	0.0033	0.0129
210	0.0157	0.0032	0.0125
211	0.0152	0.0031	0.0121
212	0.0148	0.0030	0.0118
213	0.0144	0.0029	0.0115
214	0.0141	0.0028	0.0112
215	0.0138	0.0028	0.0110
216	0.0135	0.0027	0.0107
217	0.0133	0.0027	0.0106
218	0.0130	0.0026	0.0104
219	0.0128	0.0026	0.0102
220	0.0125	0.0025	0.0100
221	0.0123	0.0025	0.0098
222	0.0121	0.0024	0.0097
223	0.0119	0.0024	0.0095

224	0.0117	0.0024	0.0093
225	0.0115	0.0023	0.0092
226	0.0114	0.0023	0.0091
227	0.0112	0.0023	0.0089
228	0.0110	0.0022	0.0088
229	0.0109	0.0022	0.0087
230	0.0107	0.0022	0.0086
231	0.0106	0.0021	0.0085
232	0.0105	0.0021	0.0083
233	0.0103	0.0021	0.0082
234	0.0102	0.0021	0.0081
235	0.0101	0.0020	0.0080
236	0.0100	0.0020	0.0079
237	0.0098	0.0020	0.0079
238	0.0097	0.0020	0.0078
239	0.0096	0.0019	0.0077
240	0.0095	0.0019	0.0076
241	0.0094	0.0019	0.0075
242	0.0093	0.0019	0.0074
243	0.0092	0.0019	0.0074
244	0.0092	0.0018	0.0073
245	0.0091	0.0018	0.0072
246	0.0090	0.0018	0.0072
247	0.0089	0.0018	0.0071
248	0.0088	0.0018	0.0070
249	0.0087	0.0018	0.0070
250	0.0087	0.0017	0.0069
251	0.0086	0.0017	0.0069
252	0.0085	0.0017	0.0068
253	0.0084	0.0017	0.0067
254	0.0084	0.0017	0.0067
255	0.0083	0.0017	0.0066
256	0.0082	0.0017	0.0066
257	0.0082	0.0017	0.0065
258	0.0081	0.0016	0.0065
259	0.0081	0.0016	0.0064
260	0.0080	0.0016	0.0064
261	0.0079	0.0016	0.0063
262	0.0079	0.0016	0.0063
263	0.0078	0.0016	0.0062
264	0.0078	0.0016	0.0062
265	0.0077	0.0016	0.0062
266	0.0077	0.0015	0.0061
267	0.0076	0.0015	0.0061
268	0.0076	0.0015	0.0060
269	0.0075	0.0015	0.0060
270	0.0075	0.0015	0.0060
271	0.0074	0.0015	0.0059
272	0.0074	0.0015	0.0059
273	0.0073	0.0015	0.0058

274	0.0073	0.0015	0.0058
275	0.0072	0.0015	0.0058
276	0.0072	0.0015	0.0057
277	0.0071	0.0014	0.0057
278	0.0071	0.0014	0.0057
279	0.0071	0.0014	0.0056
280	0.0070	0.0014	0.0056
281	0.0070	0.0014	0.0056
282	0.0069	0.0014	0.0055
283	0.0069	0.0014	0.0055
284	0.0069	0.0014	0.0055
285	0.0068	0.0014	0.0054
286	0.0068	0.0014	0.0054
287	0.0068	0.0014	0.0054
288	0.0067	0.0014	0.0054

Total soil rain loss = 0.71(In)
Total effective rainfall = 3.13(In)
Peak flow rate in flood hydrograph = 58.01(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	15.0	30.0	45.0	60.0
0+ 5	0.0006	0.08	Q	|	|	|	|
0+10	0.0047	0.60	Q	|	|	|	|
0+15	0.0136	1.29	Q	|	|	|	|
0+20	0.0246	1.60	VQ	|	|	|	|
0+25	0.0370	1.79	VQ	|	|	|	|
0+30	0.0501	1.91	VQ	|	|	|	|
0+35	0.0639	2.00	VQ	|	|	|	|
0+40	0.0782	2.07	VQ	|	|	|	|
0+45	0.0928	2.12	VQ	|	|	|	|
0+50	0.1077	2.16	VQ	|	|	|	|
0+55	0.1228	2.20	VQ	|	|	|	|
1+ 0	0.1381	2.22	VQ	|	|	|	|
1+ 5	0.1535	2.24	VQ	|	|	|	|
1+10	0.1691	2.26	VQ	|	|	|	|
1+15	0.1848	2.28	VQ	|	|	|	|
1+20	0.2006	2.29	VQ	|	|	|	|
1+25	0.2165	2.31	VQ	|	|	|	|
1+30	0.2324	2.31	|Q	|	|	|	|
1+35	0.2484	2.32	|Q	|	|	|	|
1+40	0.2644	2.33	|Q	|	|	|	|

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1+45       0.2805      2.33  |Q         |          |          |          |
1+50       0.2966      2.34  |Q         |          |          |          |
1+55       0.3127      2.35  |Q         |          |          |          |
2+ 0       0.3289      2.35  |Q         |          |          |          |
2+ 5       0.3452      2.36  |Q         |          |          |          |
2+10       0.3615      2.37  |Q         |          |          |          |
2+15       0.3778      2.37  |Q         |          |          |          |
2+20       0.3942      2.38  |Q         |          |          |          |
2+25       0.4107      2.39  |Q         |          |          |          |
2+30       0.4272      2.39  |Q         |          |          |          |
2+35       0.4437      2.40  |Q         |          |          |          |
2+40       0.4603      2.41  |QV        |          |          |          |
2+45       0.4769      2.42  |QV        |          |          |          |
2+50       0.4936      2.42  |QV        |          |          |          |
2+55       0.5104      2.43  |QV        |          |          |          |
3+ 0       0.5272      2.44  |QV        |          |          |          |
3+ 5       0.5440      2.45  |QV        |          |          |          |
3+10       0.5609      2.45  |QV        |          |          |          |
3+15       0.5779      2.46  |QV        |          |          |          |
3+20       0.5949      2.47  |QV        |          |          |          |
3+25       0.6120      2.48  |QV        |          |          |          |
3+30       0.6291      2.49  |QV        |          |          |          |
3+35       0.6463      2.49  |QV        |          |          |          |
3+40       0.6635      2.50  |QV        |          |          |          |
3+45       0.6808      2.51  |Q V       |          |          |          |
3+50       0.6981      2.52  |Q V       |          |          |          |
3+55       0.7155      2.53  |Q V       |          |          |          |
4+ 0       0.7330      2.54  |Q V       |          |          |          |
4+ 5       0.7505      2.54  |Q V       |          |          |          |
4+10       0.7681      2.55  |Q V       |          |          |          |
4+15       0.7858      2.56  |Q V       |          |          |          |
4+20       0.8035      2.57  |Q V       |          |          |          |
4+25       0.8212      2.58  |Q V       |          |          |          |
4+30       0.8391      2.59  |Q V       |          |          |          |
4+35       0.8570      2.60  |Q V       |          |          |          |
4+40       0.8749      2.61  |Q V       |          |          |          |
4+45       0.8929      2.62  |Q V       |          |          |          |
4+50       0.9110      2.63  |Q  V      |          |          |          |
4+55       0.9292      2.64  |Q  V      |          |          |          |
5+ 0       0.9474      2.64  |Q  V      |          |          |          |
5+ 5       0.9657      2.65  |Q  V      |          |          |          |
5+10       0.9840      2.66  |Q  V      |          |          |          |
5+15       1.0024      2.67  |Q  V      |          |          |          |
5+20       1.0209      2.68  |Q  V      |          |          |          |
5+25       1.0395      2.69  |Q  V      |          |          |          |
5+30       1.0581      2.71  |Q  V      |          |          |          |
5+35       1.0768      2.72  |Q  V      |          |          |          |
5+40       1.0956      2.73  |Q  V      |          |          |          |
5+45       1.1144      2.74  |Q  V      |          |          |          |
5+50       1.1334      2.75  |Q   V     |          |          |          |
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5+55	1.1524	2.76	Q V			
6+ 0	1.1714	2.77	Q V			
6+ 5	1.1906	2.78	Q V			
6+10	1.2098	2.79	Q V			
6+15	1.2291	2.80	Q V			
6+20	1.2485	2.82	Q V			
6+25	1.2680	2.83	Q V			
6+30	1.2875	2.84	Q V			
6+35	1.3072	2.85	Q V			
6+40	1.3269	2.86	Q V			
6+45	1.3467	2.88	Q V			
6+50	1.3666	2.89	Q V			
6+55	1.3866	2.90	Q V			
7+ 0	1.4066	2.91	Q V			
7+ 5	1.4268	2.93	Q V			
7+10	1.4470	2.94	Q V			
7+15	1.4674	2.95	Q V			
7+20	1.4878	2.97	Q V			
7+25	1.5083	2.98	Q V			
7+30	1.5290	2.99	Q V			
7+35	1.5497	3.01	Q V			
7+40	1.5705	3.02	Q V			
7+45	1.5914	3.04	Q V			
7+50	1.6125	3.05	Q V			
7+55	1.6336	3.07	Q V			
8+ 0	1.6548	3.08	Q V			
8+ 5	1.6762	3.10	Q V			
8+10	1.6976	3.11	Q V			
8+15	1.7192	3.13	Q V			
8+20	1.7409	3.15	Q V			
8+25	1.7626	3.16	Q V			
8+30	1.7845	3.18	Q V			
8+35	1.8066	3.20	Q V			
8+40	1.8287	3.21	Q V			
8+45	1.8509	3.23	Q V			
8+50	1.8733	3.25	Q V			
8+55	1.8958	3.27	Q V			
9+ 0	1.9185	3.29	Q V			
9+ 5	1.9412	3.31	Q V			
9+10	1.9641	3.32	Q V			
9+15	1.9871	3.34	Q V			
9+20	2.0103	3.36	Q V			
9+25	2.0336	3.38	Q V			
9+30	2.0571	3.40	Q V			
9+35	2.0806	3.43	Q V			
9+40	2.1044	3.45	Q V			
9+45	2.1283	3.47	Q V			
9+50	2.1523	3.49	Q V			
9+55	2.1765	3.51	Q V			
10+ 0	2.2008	3.54	Q V			

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10+ 5       2.2254      3.56  | Q      V|         |         |         |
10+10       2.2500      3.58  | Q       V         |         |         |
10+15       2.2749      3.61  | Q       V         |         |         |
10+20       2.2999      3.63  | Q       V         |         |         |
10+25       2.3251      3.66  | Q       V         |         |         |
10+30       2.3505      3.68  | Q       V         |         |         |
10+35       2.3760      3.71  | Q       V         |         |         |
10+40       2.4018      3.74  | Q       V         |         |         |
10+45       2.4277      3.77  | Q       V         |         |         |
10+50       2.4538      3.79  | Q       V         |         |         |
10+55       2.4801      3.82  | Q       |V         |         |         |
11+ 0       2.5067      3.85  | Q       |V         |         |         |
11+ 5       2.5334      3.88  | Q       |V         |         |         |
11+10       2.5604      3.91  | Q       |V         |         |         |
11+15       2.5875      3.95  | Q       |V         |         |         |
11+20       2.6150      3.98  | Q       |V         |         |         |
11+25       2.6426      4.01  | Q       |V         |         |         |
11+30       2.6705      4.05  | Q       |V         |         |         |
11+35       2.6986      4.08  | Q       |V         |         |         |
11+40       2.7269      4.12  | Q       | V        |         |         |
11+45       2.7556      4.16  | Q       | V        |         |         |
11+50       2.7844      4.19  | Q       | V        |         |         |
11+55       2.8136      4.23  | Q       | V        |         |         |
12+ 0       2.8430      4.27  | Q       | V        |         |         |
12+ 5       2.8727      4.31  | Q       | V        |         |         |
12+10       2.9027      4.35  | Q       | V        |         |         |
12+15       2.9329      4.38  | Q       |  V       |         |         |
12+20       2.9633      4.42  | Q       |  V       |         |         |
12+25       2.9941      4.47  | Q       |  V       |         |         |
12+30       3.0251      4.51  |  Q      |  V       |         |         |
12+35       3.0565      4.56  |  Q      |  V       |         |         |
12+40       3.0883      4.61  |  Q      |  V       |         |         |
12+45       3.1204      4.66  |  Q      |  V       |         |         |
12+50       3.1529      4.72  |  Q      |   V      |         |         |
12+55       3.1858      4.78  |  Q      |   V      |         |         |
13+ 0       3.2191      4.84  |  Q      |   V      |         |         |
13+ 5       3.2529      4.90  |  Q      |   V      |         |         |
13+10       3.2871      4.96  |  Q      |   V      |         |         |
13+15       3.3217      5.03  |  Q      |   V      |         |         |
13+20       3.3568      5.10  |  Q      |   V      |         |         |
13+25       3.3925      5.17  |  Q      |    V     |         |         |
13+30       3.4286      5.25  |  Q      |    V     |         |         |
13+35       3.4653      5.33  |  Q      |    V     |         |         |
13+40       3.5026      5.41  |  Q      |    V     |         |         |
13+45       3.5405      5.50  |  Q      |    V     |         |         |
13+50       3.5791      5.59  |  Q      |    V     |         |         |
13+55       3.6183      5.69  |  Q      |     V    |         |         |
14+ 0       3.6582      5.79  |  Q      |     V    |         |         |
14+ 5       3.6988      5.90  |  Q      |     V    |         |         |
14+10       3.7403      6.02  |   Q     |     V    |         |         |
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14+15	3.7827	6.15	Q	V			
14+20	3.8259	6.28	Q	V			
14+25	3.8701	6.42	Q	V			
14+30	3.9153	6.57	Q	V			
14+35	3.9616	6.73	Q	V			
14+40	4.0091	6.90	Q	V			
14+45	4.0579	7.08	Q	V			
14+50	4.1081	7.28	Q	V			
14+55	4.1597	7.50	Q	V			
15+ 0	4.2130	7.74	Q	V			
15+ 5	4.2681	8.00	Q	V			
15+10	4.3253	8.30	Q	V			
15+15	4.3847	8.63	Q	V			
15+20	4.4467	9.00	Q	V			
15+25	4.5106	9.27	Q	V			
15+30	4.5708	8.74	Q	V			
15+35	4.6257	7.97	Q	V			
15+40	4.6810	8.02	Q	V			
15+45	4.7394	8.49	Q	V			
15+50	4.8039	9.37	Q	V			
15+55	4.8784	10.82	Q	V			
16+ 0	4.9728	13.71	Q	V			
16+ 5	5.1320	23.12	Q	V			
16+10	5.4830	50.96	V	Q			
16+15	5.8825	58.01	V	Q			
16+20	6.1122	33.35	Q	V			
16+25	6.2711	23.08	Q	V			
16+30	6.3981	18.43	Q	V			
16+35	6.5098	16.22	Q	V			
16+40	6.6063	14.02	Q	V			
16+45	6.6926	12.53	Q	V			
16+50	6.7698	11.21	Q	V			
16+55	6.8397	10.14	Q	V			
17+ 0	6.9028	9.15	Q	V			
17+ 5	6.9598	8.29	Q	V			
17+10	7.0142	7.89	Q	V			
17+15	7.0663	7.56	Q	V			
17+20	7.1145	7.01	Q	V			
17+25	7.1597	6.56	Q	V			
17+30	7.2003	5.90	Q	V			
17+35	7.2394	5.68	Q	V			
17+40	7.2772	5.49	Q	V			
17+45	7.3138	5.32	Q	V			
17+50	7.3494	5.16	Q	V			
17+55	7.3838	5.01	Q	V			
18+ 0	7.4174	4.87	Q	V			
18+ 5	7.4501	4.75	Q	V			
18+10	7.4821	4.65	Q	V			
18+15	7.5135	4.55	Q	V			
18+20	7.5442	4.46	Q	V			

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18+25       7.5743      4.37  | Q       |         |         |  V      |
18+30       7.6038      4.28  | Q       |         |         |  V      |
18+35       7.6327      4.20  | Q       |         |         |  V      |
18+40       7.6612      4.13  | Q       |         |         |   V     |
18+45       7.6891      4.06  | Q       |         |         |   V     |
18+50       7.7166      3.99  | Q       |         |         |   V     |
18+55       7.7436      3.92  | Q       |         |         |   V     |
19+ 0       7.7702      3.86  | Q       |         |         |   V     |
19+ 5       7.7963      3.80  | Q       |         |         |   V     |
19+10       7.8221      3.74  | Q       |         |         |   V     |
19+15       7.8475      3.69  | Q       |         |         |   V     |
19+20       7.8726      3.64  | Q       |         |         |    V    |
19+25       7.8973      3.59  | Q       |         |         |    V    |
19+30       7.9217      3.54  | Q       |         |         |    V    |
19+35       7.9457      3.49  | Q       |         |         |    V    |
19+40       7.9695      3.45  | Q       |         |         |    V    |
19+45       7.9930      3.41  | Q       |         |         |    V    |
19+50       8.0162      3.37  | Q       |         |         |    V    |
19+55       8.0391      3.33  | Q       |         |         |    V    |
20+ 0       8.0617      3.29  | Q       |         |         |    V    |
20+ 5       8.0841      3.25  | Q       |         |         |    V    |
20+10       8.1063      3.22  | Q       |         |         |     V   |
20+15       8.1282      3.18  | Q       |         |         |     V   |
20+20       8.1499      3.15  | Q       |         |         |     V   |
20+25       8.1714      3.12  | Q       |         |         |     V   |
20+30       8.1926      3.09  | Q       |         |         |     V   |
20+35       8.2137      3.05  | Q       |         |         |     V   |
20+40       8.2345      3.03  | Q       |         |         |     V   |
20+45       8.2551      3.00  |Q        |         |         |     V   |
20+50       8.2756      2.97  |Q        |         |         |     V   |
20+55       8.2958      2.94  |Q        |         |         |     V   |
21+ 0       8.3159      2.92  |Q        |         |         |     V   |
21+ 5       8.3358      2.89  |Q        |         |         |      V  |
21+10       8.3555      2.86  |Q        |         |         |      V  |
21+15       8.3751      2.84  |Q        |         |         |      V  |
21+20       8.3945      2.82  |Q        |         |         |      V  |
21+25       8.4137      2.79  |Q        |         |         |      V  |
21+30       8.4328      2.77  |Q        |         |         |      V  |
21+35       8.4517      2.75  |Q        |         |         |      V  |
21+40       8.4705      2.73  |Q        |         |         |      V  |
21+45       8.4892      2.71  |Q        |         |         |      V  |
21+50       8.5077      2.69  |Q        |         |         |      V  |
21+55       8.5260      2.67  |Q        |         |         |      V  |
22+ 0       8.5442      2.65  |Q        |         |         |      V  |
22+ 5       8.5623      2.63  |Q        |         |         |       V |
22+10       8.5803      2.61  |Q        |         |         |       V |
22+15       8.5981      2.59  |Q        |         |         |       V |
22+20       8.6158      2.57  |Q        |         |         |       V |
22+25       8.6334      2.55  |Q        |         |         |       V |
22+30       8.6509      2.54  |Q        |         |         |       V |
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   22+35       8.6682      2.52  |Q        |         |         |       V |
   22+40       8.6855      2.50  |Q        |         |         |       V |
   22+45       8.7026      2.49  |Q        |         |         |       V |
   22+50       8.7196      2.47  |Q        |         |         |       V |
   22+55       8.7365      2.45  |Q        |         |         |       V |
   23+ 0       8.7533      2.44  |Q        |         |         |       V |
   23+ 5       8.7700      2.42  |Q        |         |         |       V |
   23+10       8.7866      2.41  |Q        |         |         |        V|
   23+15       8.8031      2.40  |Q        |         |         |        V|
   23+20       8.8195      2.38  |Q        |         |         |        V|
   23+25       8.8358      2.37  |Q        |         |         |        V|
   23+30       8.8520      2.35  |Q        |         |         |        V|
   23+35       8.8681      2.34  |Q        |         |         |        V|
   23+40       8.8841      2.33  |Q        |         |         |        V|
   23+45       8.9001      2.31  |Q        |         |         |        V|
   23+50       8.9159      2.30  |Q        |         |         |        V|
   23+55       8.9317      2.29  |Q        |         |         |        V|
   24+ 0       8.9473      2.28  |Q        |         |         |        V|
   24+ 5       8.9624      2.18  |Q        |         |         |        V|
   24+10       8.9737      1.65  |Q        |         |         |        V|
   24+15       8.9803      0.96  Q         |         |         |        V|
   24+20       8.9847      0.64  Q         |         |         |        V|
   24+25       8.9879      0.46  Q         |         |         |        V|
   24+30       8.9902      0.34  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

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Study date 12/06/20

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

Program License Serial Number 6277

2020-326 HCC V
POST-DEVELOPMENT CONDITIONS
UNIT HYDROGRAPH - 10 YEAR STORM
DA B

Storm Event Year = 10

Antecedent Moisture Condition = 2

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 10		
26.71	1	0.79
Rainfall data for year 2		
26.71	6	1.12
Rainfall data for year 2		
26.71	24	2.11
Rainfall data for year 100		

```
            26.71            1           1.31
------------------------------------------------------------------------
Rainfall data for year 100
            26.71            6           3.05
------------------------------------------------------------------------
Rainfall data for year 100
            26.71           24           6.31
------------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

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


SCS curve  SCS curve     Area     Area     Fp(Fig C6)    Ap      Fm
No.(AMCII) NO.(AMC 2)    (Ac.)    Fraction     (In/Hr)  (dec.)   (In/Hr)
 32.0      32.0         26.71      1.000     0.978    0.140    0.137

Area-averaged adjusted loss rate Fm (In/Hr) =  0.137

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

Area       Area          SCS CN    SCS CN      S     Pervious
 (Ac.)      Fract         (AMC2)    (AMC2)           Yield Fr
     3.74   0.140         32.0      32.0      19.19     0.000
    22.97   0.860         98.0      98.0       0.20     0.939

Area-averaged catchment yield fraction, Y =  0.807
Area-averaged low loss fraction, Yb =  0.193
User entry of time of concentration  =   0.204 (hours)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watershed area =      26.71(Ac.)
Catchment Lag time =   0.163 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 51.0621
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.137(In/Hr)
Average low loss rate fraction (Yb) = 0.193 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall =  0.372(In)
Computed peak 30-minute rainfall =  0.638(In)
Specified peak 1-hour rainfall =  0.785(In)
Computed peak 3-hour rainfall =  1.356(In)
Specified peak 6-hour rainfall =  1.914(In)
Specified peak 24-hour rainfall =  3.838(In)


Rainfall depth area reduction factors:
Using a total area of      26.71(Ac.) (Ref: fig. E-4)

5-minute factor = 0.999     Adjusted rainfall =  0.372(In)
```

30-minute factor = 0.999 Adjusted rainfall = 0.637(In)
1-hour factor = 0.999 Adjusted rainfall = 0.784(In)
3-hour factor = 1.000 Adjusted rainfall = 1.356(In)
6-hour factor = 1.000 Adjusted rainfall = 1.914(In)
24-hour factor = 1.000 Adjusted rainfall = 3.838(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 = 323.02 (CFS))	
1	4.106	13.262
2	31.755	89.315
3	61.498	96.076
4	74.480	41.935
5	82.012	24.329
6	87.099	16.432
7	90.569	11.209
8	93.131	8.278
9	95.050	6.197
10	96.503	4.696
11	97.540	3.348
12	98.175	2.052
13	98.759	1.886
14	99.360	1.939
15	99.753	1.269
16	100.000	0.799

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.3720	0.3720
2	0.4580	0.0860
3	0.5173	0.0592
4	0.5639	0.0466
5	0.6029	0.0390
6	0.6368	0.0339
7	0.6670	0.0301
8	0.6942	0.0273
9	0.7192	0.0250
10	0.7423	0.0231
11	0.7638	0.0215
12	0.7840	0.0202
13	0.8159	0.0319
14	0.8466	0.0307
15	0.8763	0.0296
16	0.9049	0.0286
17	0.9327	0.0278

18	0.9596	0.0270
19	0.9858	0.0262
20	1.0113	0.0255
21	1.0362	0.0249
22	1.0606	0.0243
23	1.0843	0.0238
24	1.1076	0.0232
25	1.1303	0.0228
26	1.1526	0.0223
27	1.1745	0.0219
28	1.1960	0.0215
29	1.2171	0.0211
30	1.2379	0.0207
31	1.2583	0.0204
32	1.2783	0.0201
33	1.2981	0.0198
34	1.3175	0.0195
35	1.3367	0.0192
36	1.3556	0.0189
37	1.3742	0.0186
38	1.3926	0.0184
39	1.4107	0.0181
40	1.4286	0.0179
41	1.4462	0.0177
42	1.4637	0.0174
43	1.4809	0.0172
44	1.4979	0.0170
45	1.5148	0.0168
46	1.5314	0.0167
47	1.5479	0.0165
48	1.5642	0.0163
49	1.5803	0.0161
50	1.5963	0.0160
51	1.6121	0.0158
52	1.6278	0.0157
53	1.6433	0.0155
54	1.6586	0.0154
55	1.6738	0.0152
56	1.6889	0.0151
57	1.7038	0.0149
58	1.7187	0.0148
59	1.7333	0.0147
60	1.7479	0.0146
61	1.7623	0.0144
62	1.7766	0.0143
63	1.7908	0.0142
64	1.8049	0.0141
65	1.8189	0.0140
66	1.8328	0.0139
67	1.8465	0.0138

68	1.8602	0.0137
69	1.8738	0.0136
70	1.8872	0.0135
71	1.9006	0.0134
72	1.9139	0.0133
73	1.9272	0.0133
74	1.9404	0.0132
75	1.9535	0.0131
76	1.9665	0.0130
77	1.9794	0.0129
78	1.9923	0.0129
79	2.0051	0.0128
80	2.0178	0.0127
81	2.0304	0.0126
82	2.0429	0.0125
83	2.0554	0.0125
84	2.0678	0.0124
85	2.0801	0.0123
86	2.0924	0.0122
87	2.1045	0.0122
88	2.1167	0.0121
89	2.1287	0.0120
90	2.1407	0.0120
91	2.1526	0.0119
92	2.1644	0.0118
93	2.1762	0.0118
94	2.1879	0.0117
95	2.1995	0.0117
96	2.2111	0.0116
97	2.2227	0.0115
98	2.2341	0.0115
99	2.2456	0.0114
100	2.2569	0.0114
101	2.2682	0.0113
102	2.2795	0.0112
103	2.2906	0.0112
104	2.3018	0.0111
105	2.3129	0.0111
106	2.3239	0.0110
107	2.3349	0.0110
108	2.3458	0.0109
109	2.3567	0.0109
110	2.3675	0.0108
111	2.3783	0.0108
112	2.3890	0.0107
113	2.3997	0.0107
114	2.4103	0.0106
115	2.4209	0.0106
116	2.4314	0.0105
117	2.4419	0.0105

118	2.4524	0.0105
119	2.4628	0.0104
120	2.4732	0.0104
121	2.4835	0.0103
122	2.4938	0.0103
123	2.5040	0.0102
124	2.5142	0.0102
125	2.5244	0.0102
126	2.5345	0.0101
127	2.5446	0.0101
128	2.5546	0.0100
129	2.5646	0.0100
130	2.5746	0.0100
131	2.5845	0.0099
132	2.5944	0.0099
133	2.6042	0.0098
134	2.6140	0.0098
135	2.6238	0.0098
136	2.6335	0.0097
137	2.6432	0.0097
138	2.6529	0.0097
139	2.6625	0.0096
140	2.6721	0.0096
141	2.6817	0.0096
142	2.6912	0.0095
143	2.7007	0.0095
144	2.7102	0.0095
145	2.7196	0.0094
146	2.7290	0.0094
147	2.7384	0.0094
148	2.7477	0.0093
149	2.7570	0.0093
150	2.7663	0.0093
151	2.7755	0.0092
152	2.7847	0.0092
153	2.7939	0.0092
154	2.8030	0.0092
155	2.8122	0.0091
156	2.8213	0.0091
157	2.8303	0.0091
158	2.8393	0.0090
159	2.8484	0.0090
160	2.8573	0.0090
161	2.8663	0.0089
162	2.8752	0.0089
163	2.8841	0.0089
164	2.8930	0.0089
165	2.9018	0.0088
166	2.9106	0.0088
167	2.9194	0.0088

168	2.9282	0.0088
169	2.9369	0.0087
170	2.9456	0.0087
171	2.9543	0.0087
172	2.9630	0.0087
173	2.9716	0.0086
174	2.9802	0.0086
175	2.9888	0.0086
176	2.9973	0.0086
177	3.0059	0.0085
178	3.0144	0.0085
179	3.0229	0.0085
180	3.0313	0.0085
181	3.0398	0.0084
182	3.0482	0.0084
183	3.0566	0.0084
184	3.0650	0.0084
185	3.0733	0.0083
186	3.0816	0.0083
187	3.0899	0.0083
188	3.0982	0.0083
189	3.1065	0.0083
190	3.1147	0.0082
191	3.1229	0.0082
192	3.1311	0.0082
193	3.1393	0.0082
194	3.1475	0.0082
195	3.1556	0.0081
196	3.1637	0.0081
197	3.1718	0.0081
198	3.1799	0.0081
199	3.1879	0.0081
200	3.1959	0.0080
201	3.2040	0.0080
202	3.2119	0.0080
203	3.2199	0.0080
204	3.2279	0.0080
205	3.2358	0.0079
206	3.2437	0.0079
207	3.2516	0.0079
208	3.2595	0.0079
209	3.2673	0.0079
210	3.2752	0.0078
211	3.2830	0.0078
212	3.2908	0.0078
213	3.2986	0.0078
214	3.3063	0.0078
215	3.3141	0.0077
216	3.3218	0.0077
217	3.3295	0.0077

218	3.3372	0.0077
219	3.3449	0.0077
220	3.3525	0.0077
221	3.3602	0.0076
222	3.3678	0.0076
223	3.3754	0.0076
224	3.3830	0.0076
225	3.3906	0.0076
226	3.3981	0.0076
227	3.4057	0.0075
228	3.4132	0.0075
229	3.4207	0.0075
230	3.4282	0.0075
231	3.4357	0.0075
232	3.4431	0.0075
233	3.4505	0.0074
234	3.4580	0.0074
235	3.4654	0.0074
236	3.4728	0.0074
237	3.4802	0.0074
238	3.4875	0.0074
239	3.4949	0.0073
240	3.5022	0.0073
241	3.5095	0.0073
242	3.5168	0.0073
243	3.5241	0.0073
244	3.5314	0.0073
245	3.5386	0.0073
246	3.5459	0.0072
247	3.5531	0.0072
248	3.5603	0.0072
249	3.5675	0.0072
250	3.5747	0.0072
251	3.5819	0.0072
252	3.5890	0.0072
253	3.5962	0.0071
254	3.6033	0.0071
255	3.6104	0.0071
256	3.6175	0.0071
257	3.6246	0.0071
258	3.6316	0.0071
259	3.6387	0.0071
260	3.6458	0.0070
261	3.6528	0.0070
262	3.6598	0.0070
263	3.6668	0.0070
264	3.6738	0.0070
265	3.6808	0.0070
266	3.6877	0.0070
267	3.6947	0.0070

268	3.7016	0.0069
269	3.7086	0.0069
270	3.7155	0.0069
271	3.7224	0.0069
272	3.7293	0.0069
273	3.7361	0.0069
274	3.7430	0.0069
275	3.7498	0.0068
276	3.7567	0.0068
277	3.7635	0.0068
278	3.7703	0.0068
279	3.7771	0.0068
280	3.7839	0.0068
281	3.7907	0.0068
282	3.7974	0.0068
283	3.8042	0.0068
284	3.8109	0.0067
285	3.8177	0.0067
286	3.8244	0.0067
287	3.8311	0.0067
288	3.8378	0.0067

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0067	0.0013	0.0054
2	0.0067	0.0013	0.0054
3	0.0067	0.0013	0.0054
4	0.0067	0.0013	0.0054
5	0.0068	0.0013	0.0055
6	0.0068	0.0013	0.0055
7	0.0068	0.0013	0.0055
8	0.0068	0.0013	0.0055
9	0.0068	0.0013	0.0055
10	0.0068	0.0013	0.0055
11	0.0069	0.0013	0.0056
12	0.0069	0.0013	0.0056
13	0.0069	0.0013	0.0056
14	0.0069	0.0013	0.0056
15	0.0070	0.0013	0.0056
16	0.0070	0.0013	0.0056
17	0.0070	0.0013	0.0056
18	0.0070	0.0013	0.0057
19	0.0070	0.0014	0.0057
20	0.0070	0.0014	0.0057
21	0.0071	0.0014	0.0057
22	0.0071	0.0014	0.0057
23	0.0071	0.0014	0.0057
24	0.0071	0.0014	0.0058

25	0.0072	0.0014	0.0058
26	0.0072	0.0014	0.0058
27	0.0072	0.0014	0.0058
28	0.0072	0.0014	0.0058
29	0.0072	0.0014	0.0058
30	0.0073	0.0014	0.0059
31	0.0073	0.0014	0.0059
32	0.0073	0.0014	0.0059
33	0.0073	0.0014	0.0059
34	0.0073	0.0014	0.0059
35	0.0074	0.0014	0.0060
36	0.0074	0.0014	0.0060
37	0.0074	0.0014	0.0060
38	0.0074	0.0014	0.0060
39	0.0075	0.0014	0.0060
40	0.0075	0.0014	0.0060
41	0.0075	0.0014	0.0061
42	0.0075	0.0015	0.0061
43	0.0076	0.0015	0.0061
44	0.0076	0.0015	0.0061
45	0.0076	0.0015	0.0062
46	0.0076	0.0015	0.0062
47	0.0077	0.0015	0.0062
48	0.0077	0.0015	0.0062
49	0.0077	0.0015	0.0062
50	0.0077	0.0015	0.0063
51	0.0078	0.0015	0.0063
52	0.0078	0.0015	0.0063
53	0.0078	0.0015	0.0063
54	0.0079	0.0015	0.0063
55	0.0079	0.0015	0.0064
56	0.0079	0.0015	0.0064
57	0.0080	0.0015	0.0064
58	0.0080	0.0015	0.0064
59	0.0080	0.0015	0.0065
60	0.0080	0.0015	0.0065
61	0.0081	0.0016	0.0065
62	0.0081	0.0016	0.0065
63	0.0081	0.0016	0.0066
64	0.0082	0.0016	0.0066
65	0.0082	0.0016	0.0066
66	0.0082	0.0016	0.0066
67	0.0083	0.0016	0.0067
68	0.0083	0.0016	0.0067
69	0.0083	0.0016	0.0067
70	0.0083	0.0016	0.0067
71	0.0084	0.0016	0.0068
72	0.0084	0.0016	0.0068
73	0.0085	0.0016	0.0068
74	0.0085	0.0016	0.0069

75	0.0085	0.0016	0.0069
76	0.0086	0.0016	0.0069
77	0.0086	0.0017	0.0070
78	0.0086	0.0017	0.0070
79	0.0087	0.0017	0.0070
80	0.0087	0.0017	0.0070
81	0.0088	0.0017	0.0071
82	0.0088	0.0017	0.0071
83	0.0088	0.0017	0.0071
84	0.0089	0.0017	0.0072
85	0.0089	0.0017	0.0072
86	0.0089	0.0017	0.0072
87	0.0090	0.0017	0.0073
88	0.0090	0.0017	0.0073
89	0.0091	0.0018	0.0073
90	0.0091	0.0018	0.0074
91	0.0092	0.0018	0.0074
92	0.0092	0.0018	0.0074
93	0.0093	0.0018	0.0075
94	0.0093	0.0018	0.0075
95	0.0094	0.0018	0.0076
96	0.0094	0.0018	0.0076
97	0.0095	0.0018	0.0076
98	0.0095	0.0018	0.0077
99	0.0096	0.0018	0.0077
100	0.0096	0.0018	0.0077
101	0.0097	0.0019	0.0078
102	0.0097	0.0019	0.0078
103	0.0098	0.0019	0.0079
104	0.0098	0.0019	0.0079
105	0.0099	0.0019	0.0080
106	0.0099	0.0019	0.0080
107	0.0100	0.0019	0.0081
108	0.0100	0.0019	0.0081
109	0.0101	0.0019	0.0082
110	0.0102	0.0020	0.0082
111	0.0102	0.0020	0.0083
112	0.0103	0.0020	0.0083
113	0.0104	0.0020	0.0084
114	0.0104	0.0020	0.0084
115	0.0105	0.0020	0.0085
116	0.0105	0.0020	0.0085
117	0.0106	0.0020	0.0086
118	0.0107	0.0021	0.0086
119	0.0108	0.0021	0.0087
120	0.0108	0.0021	0.0087
121	0.0109	0.0021	0.0088
122	0.0110	0.0021	0.0089
123	0.0111	0.0021	0.0089
124	0.0111	0.0021	0.0090

125	0.0112	0.0022	0.0091
126	0.0113	0.0022	0.0091
127	0.0114	0.0022	0.0092
128	0.0115	0.0022	0.0093
129	0.0116	0.0022	0.0094
130	0.0117	0.0022	0.0094
131	0.0118	0.0023	0.0095
132	0.0118	0.0023	0.0096
133	0.0120	0.0023	0.0097
134	0.0120	0.0023	0.0097
135	0.0122	0.0023	0.0098
136	0.0122	0.0024	0.0099
137	0.0124	0.0024	0.0100
138	0.0125	0.0024	0.0101
139	0.0126	0.0024	0.0102
140	0.0127	0.0024	0.0103
141	0.0129	0.0025	0.0104
142	0.0129	0.0025	0.0105
143	0.0131	0.0025	0.0106
144	0.0132	0.0025	0.0107
145	0.0133	0.0026	0.0107
146	0.0134	0.0026	0.0108
147	0.0136	0.0026	0.0109
148	0.0137	0.0026	0.0110
149	0.0139	0.0027	0.0112
150	0.0140	0.0027	0.0113
151	0.0142	0.0027	0.0115
152	0.0143	0.0028	0.0116
153	0.0146	0.0028	0.0118
154	0.0147	0.0028	0.0119
155	0.0149	0.0029	0.0121
156	0.0151	0.0029	0.0122
157	0.0154	0.0030	0.0124
158	0.0155	0.0030	0.0125
159	0.0158	0.0030	0.0128
160	0.0160	0.0031	0.0129
161	0.0163	0.0031	0.0132
162	0.0165	0.0032	0.0133
163	0.0168	0.0032	0.0136
164	0.0170	0.0033	0.0138
165	0.0174	0.0034	0.0141
166	0.0177	0.0034	0.0143
167	0.0181	0.0035	0.0146
168	0.0184	0.0035	0.0148
169	0.0189	0.0036	0.0153
170	0.0192	0.0037	0.0155
171	0.0198	0.0038	0.0160
172	0.0201	0.0039	0.0162
173	0.0207	0.0040	0.0167
174	0.0211	0.0041	0.0170

175	0.0219	0.0042	0.0177
176	0.0223	0.0043	0.0180
177	0.0232	0.0045	0.0188
178	0.0238	0.0046	0.0192
179	0.0249	0.0048	0.0201
180	0.0255	0.0049	0.0206
181	0.0270	0.0052	0.0218
182	0.0278	0.0053	0.0224
183	0.0296	0.0057	0.0239
184	0.0307	0.0059	0.0248
185	0.0202	0.0039	0.0163
186	0.0215	0.0041	0.0174
187	0.0250	0.0048	0.0202
188	0.0273	0.0052	0.0220
189	0.0339	0.0065	0.0274
190	0.0390	0.0075	0.0315
191	0.0592	0.0114	0.0478
192	0.0860	0.0114	0.0746
193	0.3720	0.0114	0.3606
194	0.0466	0.0090	0.0376
195	0.0301	0.0058	0.0243
196	0.0231	0.0044	0.0186
197	0.0319	0.0061	0.0258
198	0.0286	0.0055	0.0231
199	0.0262	0.0050	0.0212
200	0.0243	0.0047	0.0196
201	0.0228	0.0044	0.0184
202	0.0215	0.0041	0.0173
203	0.0204	0.0039	0.0165
204	0.0195	0.0037	0.0157
205	0.0186	0.0036	0.0150
206	0.0179	0.0034	0.0144
207	0.0172	0.0033	0.0139
208	0.0167	0.0032	0.0134
209	0.0161	0.0031	0.0130
210	0.0157	0.0030	0.0126
211	0.0152	0.0029	0.0123
212	0.0148	0.0029	0.0120
213	0.0144	0.0028	0.0117
214	0.0141	0.0027	0.0114
215	0.0138	0.0027	0.0111
216	0.0135	0.0026	0.0109
217	0.0133	0.0026	0.0107
218	0.0130	0.0025	0.0105
219	0.0128	0.0025	0.0103
220	0.0125	0.0024	0.0101
221	0.0123	0.0024	0.0099
222	0.0121	0.0023	0.0098
223	0.0119	0.0023	0.0096
224	0.0117	0.0023	0.0095

225	0.0115	0.0022	0.0093
226	0.0114	0.0022	0.0092
227	0.0112	0.0022	0.0090
228	0.0110	0.0021	0.0089
229	0.0109	0.0021	0.0088
230	0.0107	0.0021	0.0087
231	0.0106	0.0020	0.0085
232	0.0105	0.0020	0.0084
233	0.0103	0.0020	0.0083
234	0.0102	0.0020	0.0082
235	0.0101	0.0019	0.0081
236	0.0100	0.0019	0.0080
237	0.0098	0.0019	0.0080
238	0.0097	0.0019	0.0079
239	0.0096	0.0019	0.0078
240	0.0095	0.0018	0.0077
241	0.0094	0.0018	0.0076
242	0.0093	0.0018	0.0075
243	0.0092	0.0018	0.0075
244	0.0092	0.0018	0.0074
245	0.0091	0.0017	0.0073
246	0.0090	0.0017	0.0072
247	0.0089	0.0017	0.0072
248	0.0088	0.0017	0.0071
249	0.0087	0.0017	0.0071
250	0.0087	0.0017	0.0070
251	0.0086	0.0017	0.0069
252	0.0085	0.0016	0.0069
253	0.0084	0.0016	0.0068
254	0.0084	0.0016	0.0068
255	0.0083	0.0016	0.0067
256	0.0082	0.0016	0.0067
257	0.0082	0.0016	0.0066
258	0.0081	0.0016	0.0065
259	0.0081	0.0016	0.0065
260	0.0080	0.0015	0.0065
261	0.0079	0.0015	0.0064
262	0.0079	0.0015	0.0064
263	0.0078	0.0015	0.0063
264	0.0078	0.0015	0.0063
265	0.0077	0.0015	0.0062
266	0.0077	0.0015	0.0062
267	0.0076	0.0015	0.0061
268	0.0076	0.0015	0.0061
269	0.0075	0.0014	0.0061
270	0.0075	0.0014	0.0060
271	0.0074	0.0014	0.0060
272	0.0074	0.0014	0.0059
273	0.0073	0.0014	0.0059
274	0.0073	0.0014	0.0059

275	0.0072	0.0014	0.0058
276	0.0072	0.0014	0.0058
277	0.0071	0.0014	0.0058
278	0.0071	0.0014	0.0057
279	0.0071	0.0014	0.0057
280	0.0070	0.0014	0.0057
281	0.0070	0.0013	0.0056
282	0.0069	0.0013	0.0056
283	0.0069	0.0013	0.0056
284	0.0069	0.0013	0.0055
285	0.0068	0.0013	0.0055
286	0.0068	0.0013	0.0055
287	0.0068	0.0013	0.0055
288	0.0067	0.0013	0.0054

Total soil rain loss = 0.67(In)
Total effective rainfall = 3.16(In)
Peak flow rate in flood hydrograph = 44.08(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	12.5	25.0	37.5	50.0
0+ 5	0.0005	0.07	Q	|	|	|	|
0+10	0.0043	0.55	Q	|	|	|	|
0+15	0.0117	1.07	Q	|	|	|	|
0+20	0.0207	1.30	VQ	|	|	|	|
0+25	0.0306	1.44	VQ	|	|	|	|
0+30	0.0412	1.53	VQ	|	|	|	|
0+35	0.0522	1.60	VQ	|	|	|	|
0+40	0.0635	1.65	VQ	|	|	|	|
0+45	0.0751	1.68	VQ	|	|	|	|
0+50	0.0869	1.71	VQ	|	|	|	|
0+55	0.0988	1.74	VQ	|	|	|	|
1+ 0	0.1109	1.75	VQ	|	|	|	|
1+ 5	0.1231	1.77	VQ	|	|	|	|
1+10	0.1353	1.78	VQ	|	|	|	|
1+15	0.1477	1.79	VQ	|	|	|	|
1+20	0.1601	1.80	VQ	|	|	|	|
1+25	0.1725	1.81	VQ	|	|	|	|
1+30	0.1850	1.81	|Q	|	|	|	|
1+35	0.1976	1.82	|Q	|	|	|	|
1+40	0.2101	1.82	|Q	|	|	|	|
1+45	0.2227	1.83	|Q	|	|	|	|

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1+50       0.2353      1.83  |Q         |          |          |          |
1+55       0.2480      1.84  |Q         |          |          |          |
2+ 0       0.2607      1.84  |Q         |          |          |          |
2+ 5       0.2734      1.85  |Q         |          |          |          |
2+10       0.2862      1.86  |Q         |          |          |          |
2+15       0.2990      1.86  |Q         |          |          |          |
2+20       0.3119      1.87  |Q         |          |          |          |
2+25       0.3248      1.87  |Q         |          |          |          |
2+30       0.3377      1.88  |Q         |          |          |          |
2+35       0.3507      1.88  |Q         |          |          |          |
2+40       0.3637      1.89  |QV        |          |          |          |
2+45       0.3767      1.89  |QV        |          |          |          |
2+50       0.3898      1.90  |QV        |          |          |          |
2+55       0.4029      1.91  |QV        |          |          |          |
3+ 0       0.4161      1.91  |QV        |          |          |          |
3+ 5       0.4293      1.92  |QV        |          |          |          |
3+10       0.4426      1.92  |QV        |          |          |          |
3+15       0.4559      1.93  |QV        |          |          |          |
3+20       0.4692      1.94  |QV        |          |          |          |
3+25       0.4826      1.94  |QV        |          |          |          |
3+30       0.4960      1.95  |QV        |          |          |          |
3+35       0.5095      1.96  |QV        |          |          |          |
3+40       0.5230      1.96  |QV        |          |          |          |
3+45       0.5365      1.97  |Q V       |          |          |          |
3+50       0.5501      1.97  |Q V       |          |          |          |
3+55       0.5638      1.98  |Q V       |          |          |          |
4+ 0       0.5775      1.99  |Q V       |          |          |          |
4+ 5       0.5912      1.99  |Q V       |          |          |          |
4+10       0.6050      2.00  |Q V       |          |          |          |
4+15       0.6188      2.01  |Q V       |          |          |          |
4+20       0.6327      2.02  |Q V       |          |          |          |
4+25       0.6466      2.02  |Q V       |          |          |          |
4+30       0.6606      2.03  |Q V       |          |          |          |
4+35       0.6746      2.04  |Q V       |          |          |          |
4+40       0.6887      2.04  |Q V       |          |          |          |
4+45       0.7028      2.05  |Q V       |          |          |          |
4+50       0.7170      2.06  |Q  V      |          |          |          |
4+55       0.7312      2.07  |Q  V      |          |          |          |
5+ 0       0.7455      2.07  |Q  V      |          |          |          |
5+ 5       0.7598      2.08  |Q  V      |          |          |          |
5+10       0.7742      2.09  |Q  V      |          |          |          |
5+15       0.7887      2.10  |Q  V      |          |          |          |
5+20       0.8032      2.10  |Q  V      |          |          |          |
5+25       0.8177      2.11  |Q  V      |          |          |          |
5+30       0.8323      2.12  |Q  V      |          |          |          |
5+35       0.8470      2.13  |Q  V      |          |          |          |
5+40       0.8617      2.14  |Q  V      |          |          |          |
5+45       0.8765      2.15  |Q  V      |          |          |          |
5+50       0.8913      2.15  |Q   V     |          |          |          |
5+55       0.9062      2.16  |Q   V     |          |          |          |
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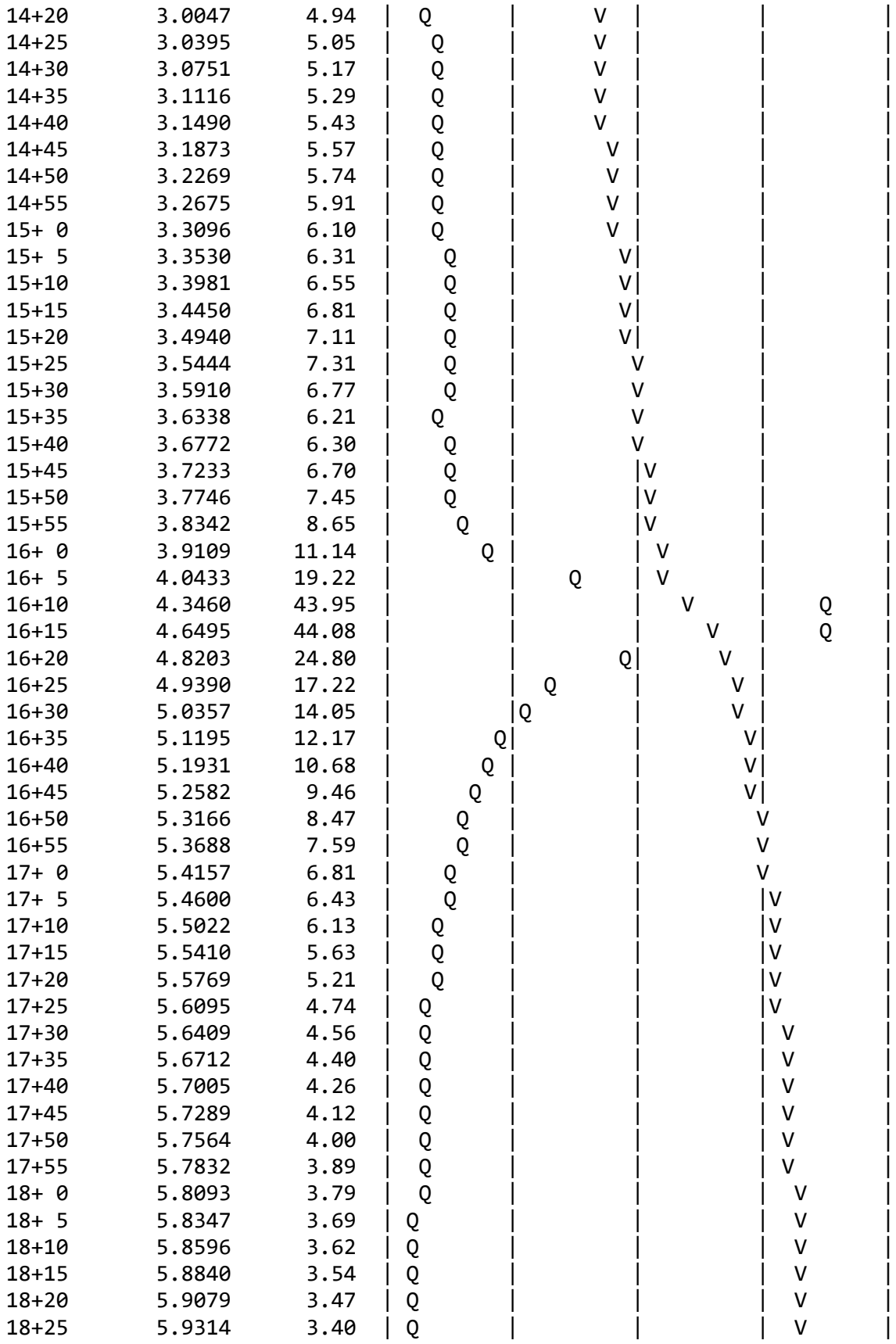
6+ 0	0.9212	2.17	Q V			
6+ 5	0.9362	2.18	Q V			
6+10	0.9513	2.19	Q V			
6+15	0.9664	2.20	Q V			
6+20	0.9816	2.21	Q V			
6+25	0.9969	2.22	Q V			
6+30	1.0122	2.23	Q V			
6+35	1.0276	2.24	Q V			
6+40	1.0431	2.25	Q V			
6+45	1.0586	2.25	Q V			
6+50	1.0742	2.26	Q V			
6+55	1.0899	2.27	Q V			
7+ 0	1.1056	2.28	Q V			
7+ 5	1.1214	2.30	Q V			
7+10	1.1373	2.31	Q V			
7+15	1.1532	2.32	Q V			
7+20	1.1692	2.33	Q V			
7+25	1.1853	2.34	Q V			
7+30	1.2015	2.35	Q V			
7+35	1.2178	2.36	Q V			
7+40	1.2341	2.37	Q V			
7+45	1.2505	2.38	Q V			
7+50	1.2670	2.39	Q V			
7+55	1.2836	2.41	Q V			
8+ 0	1.3002	2.42	Q V			
8+ 5	1.3170	2.43	Q V			
8+10	1.3338	2.44	Q V			
8+15	1.3507	2.45	Q V			
8+20	1.3677	2.47	Q V			
8+25	1.3848	2.48	Q V			
8+30	1.4019	2.49	Q V			
8+35	1.4192	2.51	Q V			
8+40	1.4366	2.52	Q V			
8+45	1.4540	2.53	Q V			
8+50	1.4716	2.55	Q V			
8+55	1.4892	2.56	Q V			
9+ 0	1.5070	2.58	Q V			
9+ 5	1.5248	2.59	Q V			
9+10	1.5428	2.61	Q V			
9+15	1.5609	2.62	Q V			
9+20	1.5790	2.64	Q V			
9+25	1.5973	2.65	Q V			
9+30	1.6157	2.67	Q V			
9+35	1.6342	2.69	Q V			
9+40	1.6528	2.70	Q V			
9+45	1.6716	2.72	Q V			
9+50	1.6904	2.74	Q V			
9+55	1.7094	2.76	Q V			
10+ 0	1.7285	2.77	Q V			
10+ 5	1.7477	2.79	Q V			

10+10	1.7671	2.81	Q	V			
10+15	1.7866	2.83	Q	V			
10+20	1.8062	2.85	Q	V			
10+25	1.8260	2.87	Q	V			
10+30	1.8459	2.89	Q	V			
10+35	1.8659	2.91	Q	V			
10+40	1.8861	2.93	Q	V			
10+45	1.9065	2.95	Q	V			
10+50	1.9270	2.98	Q	V			
10+55	1.9476	3.00	Q	V			
11+ 0	1.9685	3.02	Q	V			
11+ 5	1.9894	3.05	Q	V			
11+10	2.0106	3.07	Q	V			
11+15	2.0319	3.10	Q	V			
11+20	2.0534	3.12	Q	V			
11+25	2.0751	3.15	Q	V			
11+30	2.0970	3.18	Q	V			
11+35	2.1191	3.20	Q	V			
11+40	2.1413	3.23	Q	V			
11+45	2.1638	3.26	Q	V			
11+50	2.1865	3.29	Q	V			
11+55	2.2093	3.32	Q	V			
12+ 0	2.2324	3.36	Q	V			
12+ 5	2.2558	3.39	Q	V			
12+10	2.2793	3.41	Q	V			
12+15	2.3030	3.44	Q	V			
12+20	2.3269	3.47	Q	V			
12+25	2.3510	3.51	Q	V			
12+30	2.3754	3.54	Q	V			
12+35	2.4000	3.58	Q	V			
12+40	2.4250	3.62	Q	V			
12+45	2.4502	3.66	Q	V			
12+50	2.4757	3.71	Q	V			
12+55	2.5016	3.75	Q	V			
13+ 0	2.5277	3.80	Q	V			
13+ 5	2.5542	3.85	Q	V			
13+10	2.5811	3.90	Q	V			
13+15	2.6083	3.95	Q	V			
13+20	2.6359	4.01	Q	V			
13+25	2.6639	4.07	Q	V			
13+30	2.6923	4.13	Q	V			
13+35	2.7212	4.19	Q	V			
13+40	2.7505	4.26	Q	V			
13+45	2.7803	4.33	Q	V			
13+50	2.8106	4.40	Q	V			
13+55	2.8414	4.48	Q	V			
14+ 0	2.8728	4.56	Q	V			
14+ 5	2.9048	4.64	Q	V			
14+10	2.9374	4.74	Q	V			
14+15	2.9707	4.84	Q	V			



18+30	5.9543	3.34	Q			V	
18+35	5.9769	3.28	Q			V	
18+40	5.9991	3.22	Q			V	
18+45	6.0208	3.16	Q			V	
18+50	6.0423	3.11	Q			V	
18+55	6.0633	3.06	Q			V	
19+ 0	6.0841	3.01	Q			V	
19+ 5	6.1045	2.96	Q			V	
19+10	6.1246	2.92	Q			V	
19+15	6.1444	2.88	Q			V	
19+20	6.1640	2.84	Q			V	
19+25	6.1833	2.80	Q			V	
19+30	6.2023	2.76	Q			V	
19+35	6.2211	2.73	Q			V	
19+40	6.2396	2.69	Q			V	
19+45	6.2580	2.66	Q			V	
19+50	6.2761	2.63	Q			V	
19+55	6.2940	2.60	Q			V	
20+ 0	6.3117	2.57	Q			V	
20+ 5	6.3291	2.54	Q			V	
20+10	6.3465	2.51	Q			V	
20+15	6.3636	2.49	Q			V	
20+20	6.3805	2.46	Q			V	
20+25	6.3973	2.43	Q			V	
20+30	6.4139	2.41	Q			V	
20+35	6.4303	2.39	Q			V	
20+40	6.4466	2.36	Q			V	
20+45	6.4627	2.34	Q			V	
20+50	6.4787	2.32	Q			V	
20+55	6.4945	2.30	Q			V	
21+ 0	6.5102	2.28	Q			V	
21+ 5	6.5258	2.26	Q			V	
21+10	6.5412	2.24	Q			V	
21+15	6.5565	2.22	Q			V	
21+20	6.5716	2.20	Q			V	
21+25	6.5867	2.18	Q			V	
21+30	6.6016	2.17	Q			V	
21+35	6.6164	2.15	Q			V	
21+40	6.6311	2.13	Q			V	
21+45	6.6456	2.12	Q			V	
21+50	6.6601	2.10	Q			V	
21+55	6.6745	2.08	Q			V	
22+ 0	6.6887	2.07	Q			V	
22+ 5	6.7028	2.05	Q			V	
22+10	6.7169	2.04	Q			V	
22+15	6.7308	2.02	Q			V	
22+20	6.7447	2.01	Q			V	
22+25	6.7584	2.00	Q			V	
22+30	6.7721	1.98	Q			V	
22+35	6.7857	1.97	Q			V	

```
   22+40       6.7991      1.96  |Q        |         |         |       V |
   22+45       6.8125      1.94  |Q        |         |         |       V |
   22+50       6.8258      1.93  |Q        |         |         |       V |
   22+55       6.8391      1.92  |Q        |         |         |       V |
   23+ 0       6.8522      1.91  |Q        |         |         |       V |
   23+ 5       6.8653      1.90  |Q        |         |         |        V|
   23+10       6.8782      1.88  |Q        |         |         |        V|
   23+15       6.8911      1.87  |Q        |         |         |        V|
   23+20       6.9040      1.86  |Q        |         |         |        V|
   23+25       6.9167      1.85  |Q        |         |         |        V|
   23+30       6.9294      1.84  |Q        |         |         |        V|
   23+35       6.9420      1.83  |Q        |         |         |        V|
   23+40       6.9545      1.82  |Q        |         |         |        V|
   23+45       6.9670      1.81  |Q        |         |         |        V|
   23+50       6.9794      1.80  |Q        |         |         |        V|
   23+55       6.9917      1.79  |Q        |         |         |        V|
   24+ 0       7.0040      1.78  |Q        |         |         |        V|
   24+ 5       7.0157      1.70  |Q        |         |         |        V|
   24+10       7.0240      1.21  Q         |         |         |        V|
   24+15       7.0287      0.68  Q         |         |         |        V|
   24+20       7.0318      0.45  Q         |         |         |        V|
   24+25       7.0340      0.32  Q         |         |         |        V|
   24+30       7.0356      0.23  Q         |         |         |        V|
-------------------------------------------------------------------------
```

Appendix E – Unit Hydrograph (Post-Development)

- 100-Year Storm Event

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

Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2004, Version 7.0

Study date 12/06/20

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

Program License Serial Number 6277

2020-326 HCC V
POST-DEVELOPMENT CONDITIONS
UNIT HYDROGRAPH - 100 YEAR STORM
DA 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 10		
34.50	1	0.79
Rainfall data for year 2		
34.50	6	1.12
Rainfall data for year 2		
34.50	24	2.11
Rainfall data for year 100		

```
            34.50            1            1.31
------------------------------------------------------------------------
Rainfall data for year 100
            34.50            6            3.05
------------------------------------------------------------------------
Rainfall data for year 100
            34.50           24            6.31
------------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

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


SCS curve  SCS curve     Area     Area     Fp(Fig C6)    Ap      Fm
No.(AMCII) NO.(AMC 3)    (Ac.)    Fraction     (In/Hr)  (dec.)   (In/Hr)
 32.0      52.0         34.50      1.000     0.785    0.150    0.118

Area-averaged adjusted loss rate Fm (In/Hr) =  0.118

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

Area       Area          SCS CN    SCS CN      S     Pervious
 (Ac.)      Fract         (AMC2)    (AMC3)           Yield Fr
     5.17   0.150         32.0      52.0       9.23     0.231
    29.32   0.850         98.0      98.0       0.20     0.962

Area-averaged catchment yield fraction, Y =  0.852
Area-averaged low loss fraction, Yb =  0.148
User entry of time of concentration  =   0.218 (hours)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watershed area =      34.50(Ac.)
Catchment Lag time =   0.174 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 47.7829
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.118(In/Hr)
Average low loss rate fraction (Yb) = 0.148 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall =  0.622(In)
Computed peak 30-minute rainfall =  1.064(In)
Specified peak 1-hour rainfall =  1.310(In)
Computed peak 3-hour rainfall =  2.199(In)
Specified peak 6-hour rainfall =  3.050(In)
Specified peak 24-hour rainfall =  6.310(In)


Rainfall depth area reduction factors:
Using a total area of      34.50(Ac.) (Ref: fig. E-4)

5-minute factor = 0.998     Adjusted rainfall =  0.621(In)
```

30-minute factor = 0.998 Adjusted rainfall = 1.062(In)
1-hour factor = 0.998 Adjusted rainfall = 1.308(In)
3-hour factor = 1.000 Adjusted rainfall = 2.199(In)
6-hour factor = 1.000 Adjusted rainfall = 3.050(In)
24-hour factor = 1.000 Adjusted rainfall = 6.310(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 = 417.23 (CFS))	
1	3.676	15.339
2	27.890	101.027
3	58.468	127.582
4	72.217	57.366
5	80.205	33.328
6	85.491	22.056
7	89.295	15.870
8	91.979	11.202
9	94.076	8.749
10	95.669	6.645
11	96.890	5.093
12	97.745	3.569
13	98.282	2.241
14	98.841	2.331
15	99.397	2.322
16	99.754	1.488
17	100.000	1.027

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.6206	0.6206
2	0.7641	0.1434
3	0.8629	0.0988
4	0.9407	0.0778
5	1.0058	0.0651
6	1.0623	0.0565
7	1.1126	0.0503
8	1.1581	0.0455
9	1.1997	0.0417
10	1.2383	0.0385
11	1.2742	0.0359
12	1.3079	0.0337
13	1.3583	0.0505
14	1.4068	0.0485
15	1.4535	0.0467
16	1.4985	0.0450

17	1.5421	0.0436
18	1.5844	0.0423
19	1.6254	0.0410
20	1.6653	0.0399
21	1.7042	0.0389
22	1.7421	0.0379
23	1.7791	0.0370
24	1.8153	0.0362
25	1.8507	0.0354
26	1.8853	0.0346
27	1.9193	0.0340
28	1.9526	0.0333
29	1.9852	0.0327
30	2.0173	0.0321
31	2.0489	0.0315
32	2.0799	0.0310
33	2.1103	0.0305
34	2.1403	0.0300
35	2.1699	0.0295
36	2.1990	0.0291
37	2.2276	0.0286
38	2.2558	0.0282
39	2.2836	0.0278
40	2.3111	0.0274
41	2.3382	0.0271
42	2.3649	0.0267
43	2.3913	0.0264
44	2.4174	0.0261
45	2.4431	0.0258
46	2.4686	0.0255
47	2.4938	0.0252
48	2.5187	0.0249
49	2.5433	0.0246
50	2.5677	0.0244
51	2.5918	0.0241
52	2.6156	0.0239
53	2.6392	0.0236
54	2.6626	0.0234
55	2.6858	0.0232
56	2.7087	0.0229
57	2.7314	0.0227
58	2.7539	0.0225
59	2.7762	0.0223
60	2.7983	0.0221
61	2.8202	0.0219
62	2.8419	0.0217
63	2.8635	0.0215
64	2.8848	0.0214
65	2.9060	0.0212
66	2.9270	0.0210

67	2.9479	0.0208
68	2.9685	0.0207
69	2.9890	0.0205
70	3.0094	0.0204
71	3.0296	0.0202
72	3.0497	0.0201
73	3.0718	0.0221
74	3.0938	0.0220
75	3.1157	0.0219
76	3.1374	0.0217
77	3.1590	0.0216
78	3.1804	0.0215
79	3.2017	0.0213
80	3.2229	0.0212
81	3.2440	0.0211
82	3.2649	0.0209
83	3.2858	0.0208
84	3.3065	0.0207
85	3.3271	0.0206
86	3.3475	0.0205
87	3.3679	0.0204
88	3.3881	0.0202
89	3.4083	0.0201
90	3.4283	0.0200
91	3.4482	0.0199
92	3.4680	0.0198
93	3.4878	0.0197
94	3.5074	0.0196
95	3.5269	0.0195
96	3.5463	0.0194
97	3.5657	0.0193
98	3.5849	0.0192
99	3.6040	0.0191
100	3.6231	0.0190
101	3.6420	0.0190
102	3.6609	0.0189
103	3.6797	0.0188
104	3.6984	0.0187
105	3.7170	0.0186
106	3.7355	0.0185
107	3.7539	0.0184
108	3.7723	0.0184
109	3.7906	0.0183
110	3.8088	0.0182
111	3.8269	0.0181
112	3.8449	0.0180
113	3.8629	0.0180
114	3.8808	0.0179
115	3.8986	0.0178
116	3.9164	0.0177

117	3.9340	0.0177
118	3.9516	0.0176
119	3.9692	0.0175
120	3.9866	0.0175
121	4.0040	0.0174
122	4.0213	0.0173
123	4.0386	0.0173
124	4.0558	0.0172
125	4.0729	0.0171
126	4.0899	0.0171
127	4.1069	0.0170
128	4.1239	0.0169
129	4.1407	0.0169
130	4.1575	0.0168
131	4.1743	0.0167
132	4.1910	0.0167
133	4.2076	0.0166
134	4.2241	0.0166
135	4.2406	0.0165
136	4.2571	0.0164
137	4.2735	0.0164
138	4.2898	0.0163
139	4.3061	0.0163
140	4.3223	0.0162
141	4.3385	0.0162
142	4.3546	0.0161
143	4.3706	0.0161
144	4.3866	0.0160
145	4.4026	0.0160
146	4.4185	0.0159
147	4.4343	0.0158
148	4.4501	0.0158
149	4.4659	0.0157
150	4.4816	0.0157
151	4.4972	0.0156
152	4.5128	0.0156
153	4.5284	0.0155
154	4.5439	0.0155
155	4.5593	0.0155
156	4.5747	0.0154
157	4.5901	0.0154
158	4.6054	0.0153
159	4.6206	0.0153
160	4.6359	0.0152
161	4.6510	0.0152
162	4.6662	0.0151
163	4.6812	0.0151
164	4.6963	0.0150
165	4.7113	0.0150
166	4.7262	0.0150

167	4.7411	0.0149
168	4.7560	0.0149
169	4.7708	0.0148
170	4.7856	0.0148
171	4.8004	0.0147
172	4.8151	0.0147
173	4.8297	0.0147
174	4.8444	0.0146
175	4.8589	0.0146
176	4.8735	0.0145
177	4.8880	0.0145
178	4.9024	0.0145
179	4.9169	0.0144
180	4.9313	0.0144
181	4.9456	0.0143
182	4.9599	0.0143
183	4.9742	0.0143
184	4.9884	0.0142
185	5.0026	0.0142
186	5.0168	0.0142
187	5.0309	0.0141
188	5.0450	0.0141
189	5.0591	0.0141
190	5.0731	0.0140
191	5.0871	0.0140
192	5.1010	0.0140
193	5.1149	0.0139
194	5.1288	0.0139
195	5.1427	0.0138
196	5.1565	0.0138
197	5.1703	0.0138
198	5.1840	0.0137
199	5.1977	0.0137
200	5.2114	0.0137
201	5.2251	0.0136
202	5.2387	0.0136
203	5.2523	0.0136
204	5.2658	0.0136
205	5.2793	0.0135
206	5.2928	0.0135
207	5.3063	0.0135
208	5.3197	0.0134
209	5.3331	0.0134
210	5.3465	0.0134
211	5.3598	0.0133
212	5.3731	0.0133
213	5.3864	0.0133
214	5.3997	0.0132
215	5.4129	0.0132
216	5.4261	0.0132

217	5.4392	0.0132
218	5.4524	0.0131
219	5.4655	0.0131
220	5.4785	0.0131
221	5.4916	0.0130
222	5.5046	0.0130
223	5.5176	0.0130
224	5.5306	0.0130
225	5.5435	0.0129
226	5.5564	0.0129
227	5.5693	0.0129
228	5.5821	0.0129
229	5.5950	0.0128
230	5.6078	0.0128
231	5.6205	0.0128
232	5.6333	0.0127
233	5.6460	0.0127
234	5.6587	0.0127
235	5.6714	0.0127
236	5.6840	0.0126
237	5.6966	0.0126
238	5.7092	0.0126
239	5.7218	0.0126
240	5.7343	0.0125
241	5.7469	0.0125
242	5.7593	0.0125
243	5.7718	0.0125
244	5.7843	0.0124
245	5.7967	0.0124
246	5.8091	0.0124
247	5.8215	0.0124
248	5.8338	0.0123
249	5.8461	0.0123
250	5.8584	0.0123
251	5.8707	0.0123
252	5.8830	0.0123
253	5.8952	0.0122
254	5.9074	0.0122
255	5.9196	0.0122
256	5.9318	0.0122
257	5.9439	0.0121
258	5.9560	0.0121
259	5.9681	0.0121
260	5.9802	0.0121
261	5.9922	0.0121
262	6.0043	0.0120
263	6.0163	0.0120
264	6.0283	0.0120
265	6.0402	0.0120
266	6.0522	0.0119

267	6.0641	0.0119
268	6.0760	0.0119
269	6.0879	0.0119
270	6.0997	0.0119
271	6.1116	0.0118
272	6.1234	0.0118
273	6.1352	0.0118
274	6.1470	0.0118
275	6.1587	0.0118
276	6.1704	0.0117
277	6.1822	0.0117
278	6.1939	0.0117
279	6.2055	0.0117
280	6.2172	0.0117
281	6.2288	0.0116
282	6.2404	0.0116
283	6.2520	0.0116
284	6.2636	0.0116
285	6.2752	0.0116
286	6.2867	0.0115
287	6.2982	0.0115
288	6.3097	0.0115

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0115	0.0017	0.0098
2	0.0115	0.0017	0.0098
3	0.0116	0.0017	0.0099
4	0.0116	0.0017	0.0099
5	0.0116	0.0017	0.0099
6	0.0116	0.0017	0.0099
7	0.0117	0.0017	0.0100
8	0.0117	0.0017	0.0100
9	0.0117	0.0017	0.0100
10	0.0118	0.0017	0.0100
11	0.0118	0.0017	0.0101
12	0.0118	0.0017	0.0101
13	0.0119	0.0017	0.0101
14	0.0119	0.0018	0.0101
15	0.0119	0.0018	0.0102
16	0.0119	0.0018	0.0102
17	0.0120	0.0018	0.0102
18	0.0120	0.0018	0.0102
19	0.0121	0.0018	0.0103
20	0.0121	0.0018	0.0103
21	0.0121	0.0018	0.0103
22	0.0121	0.0018	0.0103
23	0.0122	0.0018	0.0104

24	0.0122	0.0018	0.0104
25	0.0123	0.0018	0.0104
26	0.0123	0.0018	0.0105
27	0.0123	0.0018	0.0105
28	0.0123	0.0018	0.0105
29	0.0124	0.0018	0.0106
30	0.0124	0.0018	0.0106
31	0.0125	0.0018	0.0106
32	0.0125	0.0018	0.0107
33	0.0125	0.0019	0.0107
34	0.0126	0.0019	0.0107
35	0.0126	0.0019	0.0108
36	0.0126	0.0019	0.0108
37	0.0127	0.0019	0.0108
38	0.0127	0.0019	0.0108
39	0.0128	0.0019	0.0109
40	0.0128	0.0019	0.0109
41	0.0129	0.0019	0.0110
42	0.0129	0.0019	0.0110
43	0.0129	0.0019	0.0110
44	0.0130	0.0019	0.0111
45	0.0130	0.0019	0.0111
46	0.0130	0.0019	0.0111
47	0.0131	0.0019	0.0112
48	0.0131	0.0019	0.0112
49	0.0132	0.0019	0.0112
50	0.0132	0.0020	0.0113
51	0.0133	0.0020	0.0113
52	0.0133	0.0020	0.0113
53	0.0134	0.0020	0.0114
54	0.0134	0.0020	0.0114
55	0.0135	0.0020	0.0115
56	0.0135	0.0020	0.0115
57	0.0136	0.0020	0.0116
58	0.0136	0.0020	0.0116
59	0.0136	0.0020	0.0116
60	0.0137	0.0020	0.0117
61	0.0137	0.0020	0.0117
62	0.0138	0.0020	0.0117
63	0.0138	0.0020	0.0118
64	0.0139	0.0020	0.0118
65	0.0140	0.0021	0.0119
66	0.0140	0.0021	0.0119
67	0.0141	0.0021	0.0120
68	0.0141	0.0021	0.0120
69	0.0142	0.0021	0.0121
70	0.0142	0.0021	0.0121
71	0.0143	0.0021	0.0122
72	0.0143	0.0021	0.0122
73	0.0144	0.0021	0.0123

74	0.0144	0.0021	0.0123
75	0.0145	0.0021	0.0124
76	0.0145	0.0021	0.0124
77	0.0146	0.0022	0.0125
78	0.0147	0.0022	0.0125
79	0.0147	0.0022	0.0126
80	0.0148	0.0022	0.0126
81	0.0149	0.0022	0.0127
82	0.0149	0.0022	0.0127
83	0.0150	0.0022	0.0128
84	0.0150	0.0022	0.0128
85	0.0151	0.0022	0.0129
86	0.0152	0.0022	0.0129
87	0.0153	0.0023	0.0130
88	0.0153	0.0023	0.0131
89	0.0154	0.0023	0.0131
90	0.0155	0.0023	0.0132
91	0.0155	0.0023	0.0133
92	0.0156	0.0023	0.0133
93	0.0157	0.0023	0.0134
94	0.0157	0.0023	0.0134
95	0.0158	0.0023	0.0135
96	0.0159	0.0023	0.0136
97	0.0160	0.0024	0.0136
98	0.0161	0.0024	0.0137
99	0.0162	0.0024	0.0138
100	0.0162	0.0024	0.0138
101	0.0163	0.0024	0.0139
102	0.0164	0.0024	0.0140
103	0.0165	0.0024	0.0141
104	0.0166	0.0024	0.0141
105	0.0167	0.0025	0.0142
106	0.0167	0.0025	0.0143
107	0.0169	0.0025	0.0144
108	0.0169	0.0025	0.0144
109	0.0171	0.0025	0.0145
110	0.0171	0.0025	0.0146
111	0.0173	0.0025	0.0147
112	0.0173	0.0026	0.0148
113	0.0175	0.0026	0.0149
114	0.0175	0.0026	0.0149
115	0.0177	0.0026	0.0151
116	0.0177	0.0026	0.0151
117	0.0179	0.0026	0.0153
118	0.0180	0.0027	0.0153
119	0.0181	0.0027	0.0154
120	0.0182	0.0027	0.0155
121	0.0184	0.0027	0.0157
122	0.0184	0.0027	0.0157
123	0.0186	0.0027	0.0159

124	0.0187	0.0028	0.0159
125	0.0189	0.0028	0.0161
126	0.0190	0.0028	0.0162
127	0.0191	0.0028	0.0163
128	0.0192	0.0028	0.0164
129	0.0194	0.0029	0.0166
130	0.0195	0.0029	0.0166
131	0.0197	0.0029	0.0168
132	0.0198	0.0029	0.0169
133	0.0200	0.0030	0.0171
134	0.0201	0.0030	0.0172
135	0.0204	0.0030	0.0174
136	0.0205	0.0030	0.0175
137	0.0207	0.0031	0.0176
138	0.0208	0.0031	0.0178
139	0.0211	0.0031	0.0180
140	0.0212	0.0031	0.0181
141	0.0215	0.0032	0.0183
142	0.0216	0.0032	0.0184
143	0.0219	0.0032	0.0186
144	0.0220	0.0032	0.0188
145	0.0201	0.0030	0.0171
146	0.0202	0.0030	0.0172
147	0.0205	0.0030	0.0175
148	0.0207	0.0031	0.0176
149	0.0210	0.0031	0.0179
150	0.0212	0.0031	0.0181
151	0.0215	0.0032	0.0184
152	0.0217	0.0032	0.0185
153	0.0221	0.0033	0.0188
154	0.0223	0.0033	0.0190
155	0.0227	0.0034	0.0194
156	0.0229	0.0034	0.0195
157	0.0234	0.0034	0.0199
158	0.0236	0.0035	0.0201
159	0.0241	0.0036	0.0205
160	0.0244	0.0036	0.0208
161	0.0249	0.0037	0.0212
162	0.0252	0.0037	0.0215
163	0.0258	0.0038	0.0220
164	0.0261	0.0038	0.0222
165	0.0267	0.0039	0.0228
166	0.0271	0.0040	0.0231
167	0.0278	0.0041	0.0237
168	0.0282	0.0042	0.0240
169	0.0291	0.0043	0.0248
170	0.0295	0.0044	0.0252
171	0.0305	0.0045	0.0260
172	0.0310	0.0046	0.0264
173	0.0321	0.0047	0.0274

174	0.0327	0.0048	0.0279
175	0.0340	0.0050	0.0289
176	0.0346	0.0051	0.0295
177	0.0362	0.0053	0.0308
178	0.0370	0.0055	0.0316
179	0.0389	0.0057	0.0331
180	0.0399	0.0059	0.0340
181	0.0423	0.0062	0.0360
182	0.0436	0.0064	0.0372
183	0.0467	0.0069	0.0398
184	0.0485	0.0071	0.0413
185	0.0337	0.0050	0.0287
186	0.0359	0.0053	0.0306
187	0.0417	0.0061	0.0355
188	0.0455	0.0067	0.0388
189	0.0565	0.0083	0.0482
190	0.0651	0.0096	0.0555
191	0.0988	0.0098	0.0890
192	0.1434	0.0098	0.1336
193	0.6206	0.0098	0.6108
194	0.0778	0.0098	0.0680
195	0.0503	0.0074	0.0429
196	0.0385	0.0057	0.0328
197	0.0505	0.0074	0.0430
198	0.0450	0.0066	0.0384
199	0.0410	0.0061	0.0350
200	0.0379	0.0056	0.0323
201	0.0354	0.0052	0.0302
202	0.0333	0.0049	0.0284
203	0.0315	0.0047	0.0269
204	0.0300	0.0044	0.0256
205	0.0286	0.0042	0.0244
206	0.0274	0.0040	0.0234
207	0.0264	0.0039	0.0225
208	0.0255	0.0038	0.0217
209	0.0246	0.0036	0.0210
210	0.0239	0.0035	0.0203
211	0.0232	0.0034	0.0197
212	0.0225	0.0033	0.0192
213	0.0219	0.0032	0.0187
214	0.0214	0.0032	0.0182
215	0.0208	0.0031	0.0178
216	0.0204	0.0030	0.0174
217	0.0221	0.0033	0.0189
218	0.0217	0.0032	0.0185
219	0.0213	0.0031	0.0182
220	0.0209	0.0031	0.0179
221	0.0206	0.0030	0.0175
222	0.0202	0.0030	0.0173
223	0.0199	0.0029	0.0170

224	0.0196	0.0029	0.0167
225	0.0193	0.0029	0.0165
226	0.0190	0.0028	0.0162
227	0.0188	0.0028	0.0160
228	0.0185	0.0027	0.0158
229	0.0183	0.0027	0.0156
230	0.0180	0.0027	0.0154
231	0.0178	0.0026	0.0152
232	0.0176	0.0026	0.0150
233	0.0174	0.0026	0.0148
234	0.0172	0.0025	0.0147
235	0.0170	0.0025	0.0145
236	0.0168	0.0025	0.0143
237	0.0166	0.0025	0.0142
238	0.0164	0.0024	0.0140
239	0.0163	0.0024	0.0139
240	0.0161	0.0024	0.0137
241	0.0160	0.0024	0.0136
242	0.0158	0.0023	0.0135
243	0.0156	0.0023	0.0133
244	0.0155	0.0023	0.0132
245	0.0154	0.0023	0.0131
246	0.0152	0.0022	0.0130
247	0.0151	0.0022	0.0129
248	0.0150	0.0022	0.0127
249	0.0148	0.0022	0.0126
250	0.0147	0.0022	0.0125
251	0.0146	0.0022	0.0124
252	0.0145	0.0021	0.0123
253	0.0143	0.0021	0.0122
254	0.0142	0.0021	0.0121
255	0.0141	0.0021	0.0120
256	0.0140	0.0021	0.0120
257	0.0139	0.0021	0.0119
258	0.0138	0.0020	0.0118
259	0.0137	0.0020	0.0117
260	0.0136	0.0020	0.0116
261	0.0135	0.0020	0.0115
262	0.0134	0.0020	0.0114
263	0.0133	0.0020	0.0114
264	0.0132	0.0020	0.0113
265	0.0132	0.0019	0.0112
266	0.0131	0.0019	0.0111
267	0.0130	0.0019	0.0111
268	0.0129	0.0019	0.0110
269	0.0128	0.0019	0.0109
270	0.0127	0.0019	0.0109
271	0.0127	0.0019	0.0108
272	0.0126	0.0019	0.0107
273	0.0125	0.0018	0.0107

274	0.0124	0.0018	0.0106
275	0.0124	0.0018	0.0105
276	0.0123	0.0018	0.0105
277	0.0122	0.0018	0.0104
278	0.0122	0.0018	0.0104
279	0.0121	0.0018	0.0103
280	0.0120	0.0018	0.0103
281	0.0120	0.0018	0.0102
282	0.0119	0.0018	0.0101
283	0.0118	0.0017	0.0101
284	0.0118	0.0017	0.0100
285	0.0117	0.0017	0.0100
286	0.0117	0.0017	0.0099
287	0.0116	0.0017	0.0099
288	0.0115	0.0017	0.0098

Total soil rain loss = 0.83(In)
Total effective rainfall = 5.48(In)
Peak flow rate in flood hydrograph = 99.66(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

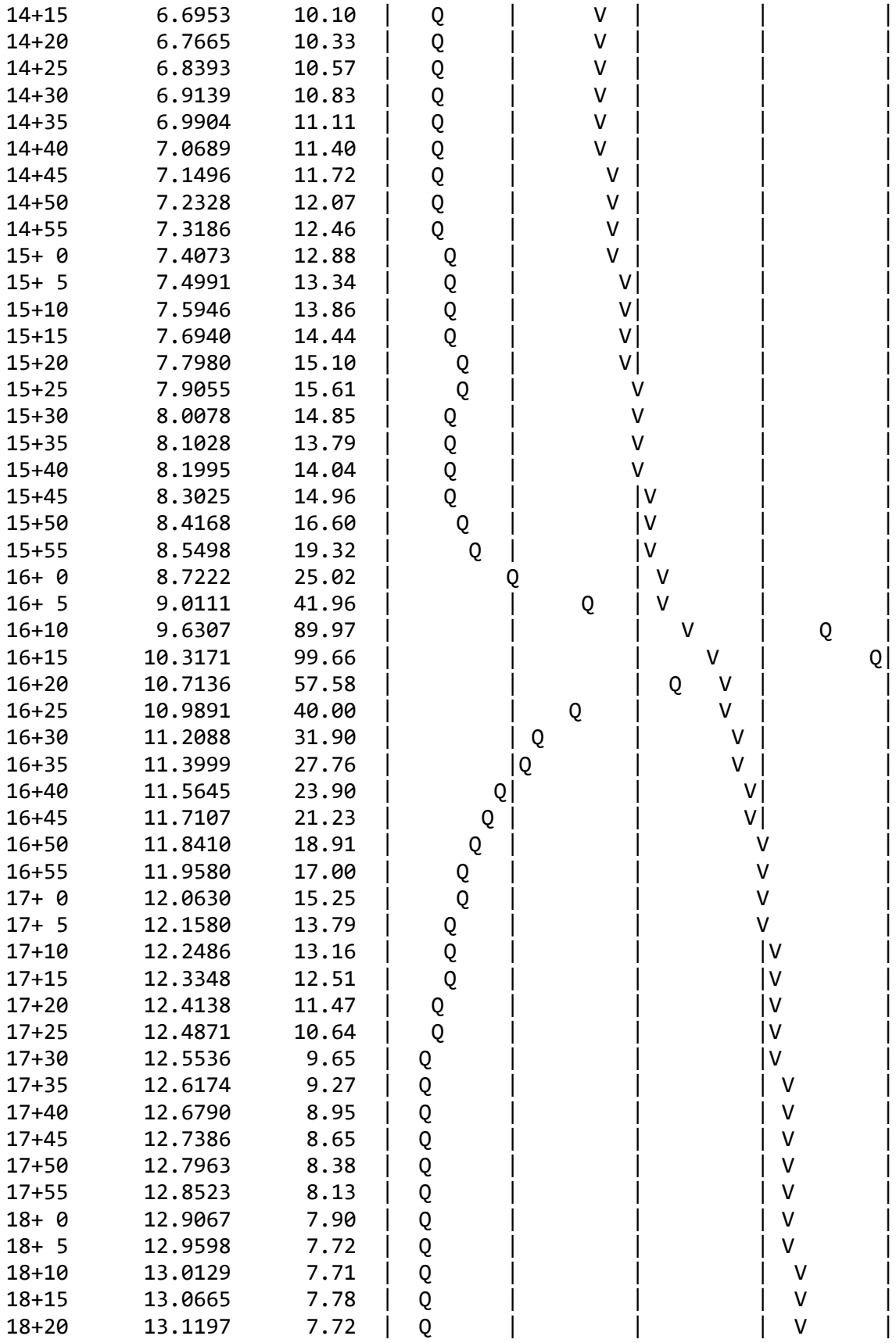
Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	25.0	50.0	75.0	100.0
0+ 5	0.0010	0.15	Q				
0+10	0.0089	1.14	Q				
0+15	0.0254	2.39	Q				
0+20	0.0458	2.96	VQ				
0+25	0.0685	3.30	VQ				
0+30	0.0927	3.52	VQ				
0+35	0.1181	3.68	VQ				
0+40	0.1443	3.80	VQ				
0+45	0.1711	3.90	VQ				
0+50	0.1985	3.97	VQ				
0+55	0.2263	4.03	VQ				
1+ 0	0.2544	4.08	VQ				
1+ 5	0.2827	4.11	VQ				
1+10	0.3113	4.15	VQ				
1+15	0.3401	4.18	VQ				
1+20	0.3690	4.21	VQ				
1+25	0.3981	4.23	|Q				
1+30	0.4273	4.24	|Q				
1+35	0.4566	4.25	|Q				
1+40	0.4859	4.26	|Q				

1+45	0.5154	4.27	|Q	|	|	|	|
1+50	0.5449	4.28	|Q	|	|	|	|
1+55	0.5744	4.30	|Q	|	|	|	|
2+ 0	0.6041	4.31	|Q	|	|	|	|
2+ 5	0.6339	4.32	|Q	|	|	|	|
2+10	0.6637	4.33	|Q	|	|	|	|
2+15	0.6936	4.34	|Q	|	|	|	|
2+20	0.7236	4.36	|Q	|	|	|	|
2+25	0.7537	4.37	|Q	|	|	|	|
2+30	0.7839	4.38	|Q	|	|	|	|
2+35	0.8141	4.39	|QV	|	|	|	|
2+40	0.8445	4.41	|QV	|	|	|	|
2+45	0.8749	4.42	|QV	|	|	|	|
2+50	0.9054	4.43	|QV	|	|	|	|
2+55	0.9360	4.45	|QV	|	|	|	|
3+ 0	0.9667	4.46	|QV	|	|	|	|
3+ 5	0.9975	4.47	|QV	|	|	|	|
3+10	1.0284	4.49	|QV	|	|	|	|
3+15	1.0594	4.50	|QV	|	|	|	|
3+20	1.0905	4.51	|QV	|	|	|	|
3+25	1.1217	4.53	|QV	|	|	|	|
3+30	1.1529	4.54	|QV	|	|	|	|
3+35	1.1843	4.55	|Q V	|	|	|	|
3+40	1.2158	4.57	|Q V	|	|	|	|
3+45	1.2473	4.58	|Q V	|	|	|	|
3+50	1.2790	4.60	|Q V	|	|	|	|
3+55	1.3107	4.61	|Q V	|	|	|	|
4+ 0	1.3426	4.63	|Q V	|	|	|	|
4+ 5	1.3746	4.64	|Q V	|	|	|	|
4+10	1.4066	4.66	|Q V	|	|	|	|
4+15	1.4388	4.67	|Q V	|	|	|	|
4+20	1.4711	4.69	|Q V	|	|	|	|
4+25	1.5035	4.70	|Q V	|	|	|	|
4+30	1.5360	4.72	|Q V	|	|	|	|
4+35	1.5686	4.73	|Q V	|	|	|	|
4+40	1.6013	4.75	|Q V	|	|	|	|
4+45	1.6342	4.77	|Q V	|	|	|	|
4+50	1.6671	4.78	|Q V	|	|	|	|
4+55	1.7002	4.80	|Q V	|	|	|	|
5+ 0	1.7333	4.82	|Q V	|	|	|	|
5+ 5	1.7666	4.83	|Q V	|	|	|	|
5+10	1.8000	4.85	|Q V	|	|	|	|
5+15	1.8336	4.87	|Q V	|	|	|	|
5+20	1.8672	4.89	|Q V	|	|	|	|
5+25	1.9010	4.90	|Q V	|	|	|	|
5+30	1.9349	4.92	|Q V	|	|	|	|
5+35	1.9689	4.94	|Q V	|	|	|	|
5+40	2.0030	4.96	|Q V	|	|	|	|
5+45	2.0373	4.98	|Q V	|	|	|	|
5+50	2.0717	5.00	|Q V	|	|	|	|

5+55	2.1063	5.01	Q V			
6+ 0	2.1409	5.03	Q V			
6+ 5	2.1757	5.05	Q V			
6+10	2.2107	5.07	Q V			
6+15	2.2457	5.09	Q V			
6+20	2.2809	5.11	Q V			
6+25	2.3163	5.13	Q V			
6+30	2.3518	5.15	Q V			
6+35	2.3874	5.17	Q V			
6+40	2.4232	5.20	Q V			
6+45	2.4591	5.22	Q V			
6+50	2.4952	5.24	Q V			
6+55	2.5315	5.26	Q V			
7+ 0	2.5678	5.28	Q V			
7+ 5	2.6044	5.31	Q V			
7+10	2.6411	5.33	Q V			
7+15	2.6779	5.35	Q V			
7+20	2.7150	5.38	Q V			
7+25	2.7522	5.40	Q V			
7+30	2.7895	5.42	Q V			
7+35	2.8270	5.45	Q V			
7+40	2.8647	5.47	Q V			
7+45	2.9026	5.50	Q V			
7+50	2.9406	5.52	Q V			
7+55	2.9789	5.55	Q V			
8+ 0	3.0173	5.58	Q V			
8+ 5	3.0559	5.60	Q V			
8+10	3.0946	5.63	Q V			
8+15	3.1336	5.66	Q V			
8+20	3.1728	5.69	Q V			
8+25	3.2121	5.71	Q V			
8+30	3.2517	5.74	Q V			
8+35	3.2914	5.77	Q V			
8+40	3.3314	5.80	Q V			
8+45	3.3716	5.83	Q V			
8+50	3.4119	5.86	Q V			
8+55	3.4525	5.89	Q V			
9+ 0	3.4933	5.93	Q V			
9+ 5	3.5344	5.96	Q V			
9+10	3.5757	5.99	Q V			
9+15	3.6172	6.03	Q V			
9+20	3.6589	6.06	Q V			
9+25	3.7009	6.09	Q V			
9+30	3.7431	6.13	Q V			
9+35	3.7855	6.17	Q V			
9+40	3.8282	6.20	Q V			
9+45	3.8712	6.24	Q V			
9+50	3.9144	6.28	Q V			
9+55	3.9579	6.32	Q V			
10+ 0	4.0017	6.36	Q V			

10+ 5	4.0458	6.40	Q	V			
10+10	4.0901	6.44	Q	V			
10+15	4.1347	6.48	Q	V			
10+20	4.1796	6.52	Q	V			
10+25	4.2248	6.57	Q	V			
10+30	4.2704	6.61	Q	V			
10+35	4.3162	6.66	Q	V			
10+40	4.3624	6.70	Q	V			
10+45	4.4088	6.75	Q	V			
10+50	4.4557	6.80	Q	V			
10+55	4.5028	6.85	Q	V			
11+ 0	4.5503	6.90	Q	V			
11+ 5	4.5982	6.95	Q	V			
11+10	4.6464	7.00	Q	V			
11+15	4.6950	7.06	Q	V			
11+20	4.7440	7.11	Q	V			
11+25	4.7934	7.17	Q	V			
11+30	4.8432	7.23	Q	V			
11+35	4.8934	7.29	Q	V			
11+40	4.9441	7.35	Q	V			
11+45	4.9952	7.42	Q	V			
11+50	5.0467	7.48	Q	V			
11+55	5.0987	7.55	Q	V			
12+ 0	5.1511	7.62	Q	V			
12+ 5	5.2039	7.66	Q	V			
12+10	5.2558	7.54	Q	V			
12+15	5.3066	7.37	Q	V			
12+20	5.3572	7.34	Q	V			
12+25	5.4078	7.36	Q	V			
12+30	5.4588	7.40	Q	V			
12+35	5.5101	7.46	Q	V			
12+40	5.5619	7.52	Q	V			
12+45	5.6143	7.60	Q	V			
12+50	5.6672	7.68	Q	V			
12+55	5.7207	7.77	Q	V			
13+ 0	5.7748	7.86	Q	V			
13+ 5	5.8297	7.97	Q	V			
13+10	5.8853	8.07	Q	V			
13+15	5.9417	8.18	Q	V			
13+20	5.9988	8.30	Q	V			
13+25	6.0569	8.43	Q	V			
13+30	6.1158	8.56	Q	V			
13+35	6.1757	8.69	Q	V			
13+40	6.2366	8.84	Q	V			
13+45	6.2985	8.99	Q	V			
13+50	6.3615	9.15	Q	V			
13+55	6.4256	9.32	Q	V			
14+ 0	6.4910	9.49	Q	V			
14+ 5	6.5577	9.68	Q	V			
14+10	6.6258	9.88	Q	V			



18+25	13.1722	7.63	Q			V	
18+30	13.2240	7.52	Q			V	
18+35	13.2750	7.41	Q			V	
18+40	13.3253	7.30	Q			V	
18+45	13.3748	7.19	Q			V	
18+50	13.4237	7.09	Q			V	
18+55	13.4718	6.99	Q			V	
19+ 0	13.5192	6.89	Q			V	
19+ 5	13.5660	6.79	Q			V	
19+10	13.6121	6.70	Q			V	
19+15	13.6576	6.61	Q			V	
19+20	13.7026	6.52	Q			V	
19+25	13.7469	6.44	Q			V	
19+30	13.7907	6.36	Q			V	
19+35	13.8340	6.28	Q			V	
19+40	13.8767	6.20	Q			V	
19+45	13.9189	6.13	Q			V	
19+50	13.9607	6.06	Q			V	
19+55	14.0019	5.99	Q			V	
20+ 0	14.0427	5.93	Q			V	
20+ 5	14.0831	5.86	Q			V	
20+10	14.1231	5.80	Q			V	
20+15	14.1627	5.74	Q			V	
20+20	14.2018	5.69	Q			V	
20+25	14.2406	5.63	Q			V	
20+30	14.2790	5.58	Q			V	
20+35	14.3170	5.52	Q			V	
20+40	14.3547	5.47	Q			V	
20+45	14.3921	5.42	Q			V	
20+50	14.4291	5.38	Q			V	
20+55	14.4658	5.33	Q			V	
21+ 0	14.5022	5.28	Q			V	
21+ 5	14.5383	5.24	Q			V	
21+10	14.5740	5.20	Q			V	
21+15	14.6095	5.15	Q			V	
21+20	14.6447	5.11	Q			V	
21+25	14.6797	5.07	Q			V	
21+30	14.7143	5.03	Q			V	
21+35	14.7487	4.99	Q			V	
21+40	14.7829	4.96	Q			V	
21+45	14.8167	4.92	Q			V	
21+50	14.8504	4.88	Q			V	
21+55	14.8838	4.85	Q			V	
22+ 0	14.9170	4.82	Q			V	
22+ 5	14.9499	4.78	Q			V	
22+10	14.9826	4.75	Q			V	
22+15	15.0151	4.72	Q			V	
22+20	15.0474	4.69	Q			V	
22+25	15.0794	4.66	Q			V	
22+30	15.1113	4.63	Q			V	

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   22+35      15.1429      4.60  |Q        |         |         |       V |
   22+40      15.1744      4.57  |Q        |         |         |       V |
   22+45      15.2057      4.54  |Q        |         |         |       V |
   22+50      15.2367      4.51  |Q        |         |         |       V |
   22+55      15.2676      4.48  |Q        |         |         |       V |
   23+ 0      15.2983      4.46  |Q        |         |         |       V |
   23+ 5      15.3288      4.43  |Q        |         |         |       V |
   23+10      15.3592      4.41  |Q        |         |         |        V|
   23+15      15.3893      4.38  |Q        |         |         |        V|
   23+20      15.4193      4.35  |Q        |         |         |        V|
   23+25      15.4491      4.33  |Q        |         |         |        V|
   23+30      15.4788      4.31  |Q        |         |         |        V|
   23+35      15.5083      4.28  |Q        |         |         |        V|
   23+40      15.5376      4.26  |Q        |         |         |        V|
   23+45      15.5668      4.24  |Q        |         |         |        V|
   23+50      15.5958      4.21  |Q        |         |         |        V|
   23+55      15.6247      4.19  |Q        |         |         |        V|
   24+ 0      15.6534      4.17  |Q        |         |         |        V|
   24+ 5      15.6810      4.00  |Q        |         |         |        V|
   24+10      15.7016      2.99  |Q        |         |         |        V|
   24+15      15.7134      1.73  Q         |         |         |        V|
   24+20      15.7214      1.16  Q         |         |         |        V|
   24+25      15.7271      0.82  Q         |         |         |        V|
   24+30      15.7312      0.60  Q         |         |         |        V|
-------------------------------------------------------------------------
```

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

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Study date 12/06/20

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

Program License Serial Number 6277

2020-326 HCC V
POST-DEVELOPMENT CONDITIONS
UNIT HYDROGRAPH - 100 YEAR STORM
DA 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 10		
26.71	1	0.79
Rainfall data for year 2		
26.71	6	1.12
Rainfall data for year 2		
26.71	24	2.11
Rainfall data for year 100		

```
            26.71            1           1.31
-------------------------------------------------------------------
Rainfall data for year 100
            26.71            6           3.05
-------------------------------------------------------------------
Rainfall data for year 100
            26.71           24           6.31
-------------------------------------------------------------------
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

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


SCS curve  SCS curve     Area     Area     Fp(Fig C6)    Ap      Fm
No.(AMCII) NO.(AMC 3)    (Ac.)    Fraction     (In/Hr)  (dec.)   (In/Hr)
 32.0      52.0         26.71      1.000     0.785    0.140    0.110

Area-averaged adjusted loss rate Fm (In/Hr) =  0.110

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

Area       Area          SCS CN    SCS CN      S     Pervious
 (Ac.)      Fract         (AMC2)    (AMC3)           Yield Fr
     3.74   0.140         32.0      52.0       9.23     0.231
    22.97   0.860         98.0      98.0       0.20     0.962

Area-averaged catchment yield fraction, Y =  0.860
Area-averaged low loss fraction, Yb =  0.140
User entry of time of concentration  =   0.196 (hours)
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watershed area =      26.71(Ac.)
Catchment Lag time =   0.157 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 53.1463
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.110(In/Hr)
Average low loss rate fraction (Yb) = 0.140 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall =  0.622(In)
Computed peak 30-minute rainfall =  1.064(In)
Specified peak 1-hour rainfall =  1.310(In)
Computed peak 3-hour rainfall =  2.199(In)
Specified peak 6-hour rainfall =  3.050(In)
Specified peak 24-hour rainfall =  6.310(In)


Rainfall depth area reduction factors:
Using a total area of      26.71(Ac.) (Ref: fig. E-4)

5-minute factor = 0.999     Adjusted rainfall =  0.621(In)
```

30-minute factor = 0.999 Adjusted rainfall = 1.063(In)
1-hour factor = 0.999 Adjusted rainfall = 1.308(In)
3-hour factor = 1.000 Adjusted rainfall = 2.199(In)
6-hour factor = 1.000 Adjusted rainfall = 3.050(In)
24-hour factor = 1.000 Adjusted rainfall = 6.310(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 = 323.02 (CFS))	
1	4.409	14.243
2	34.139	96.034
3	63.230	93.973
4	75.779	40.535
5	83.066	23.540
6	88.004	15.951
7	91.307	10.669
8	93.778	7.982
9	95.599	5.881
10	96.953	4.373
11	97.854	2.913
12	98.439	1.887
13	99.072	2.046
14	99.605	1.721
15	100.000	1.277

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.6208	0.6208
2	0.7643	0.1435
3	0.8632	0.0989
4	0.9410	0.0778
5	1.0062	0.0651
6	1.0627	0.0566
7	1.1130	0.0503
8	1.1585	0.0455
9	1.2002	0.0417
10	1.2387	0.0385
11	1.2746	0.0359
12	1.3084	0.0337
13	1.3588	0.0504
14	1.4072	0.0484
15	1.4539	0.0466
16	1.4989	0.0450
17	1.5425	0.0436
18	1.5847	0.0422

19	1.6258	0.0410
20	1.6657	0.0399
21	1.7045	0.0389
22	1.7424	0.0379
23	1.7794	0.0370
24	1.8156	0.0362
25	1.8509	0.0354
26	1.8856	0.0346
27	1.9195	0.0339
28	1.9528	0.0333
29	1.9855	0.0327
30	2.0175	0.0321
31	2.0490	0.0315
32	2.0800	0.0310
33	2.1105	0.0305
34	2.1405	0.0300
35	2.1700	0.0295
36	2.1991	0.0291
37	2.2277	0.0286
38	2.2559	0.0282
39	2.2837	0.0278
40	2.3112	0.0274
41	2.3383	0.0271
42	2.3650	0.0267
43	2.3914	0.0264
44	2.4175	0.0261
45	2.4432	0.0258
46	2.4687	0.0255
47	2.4939	0.0252
48	2.5188	0.0249
49	2.5434	0.0246
50	2.5677	0.0244
51	2.5918	0.0241
52	2.6157	0.0239
53	2.6393	0.0236
54	2.6627	0.0234
55	2.6858	0.0232
56	2.7088	0.0229
57	2.7315	0.0227
58	2.7540	0.0225
59	2.7763	0.0223
60	2.7984	0.0221
61	2.8203	0.0219
62	2.8420	0.0217
63	2.8635	0.0215
64	2.8849	0.0214
65	2.9061	0.0212
66	2.9271	0.0210
67	2.9479	0.0208
68	2.9686	0.0207

69	2.9891	0.0205
70	3.0095	0.0204
71	3.0297	0.0202
72	3.0497	0.0201
73	3.0719	0.0221
74	3.0939	0.0220
75	3.1157	0.0219
76	3.1375	0.0217
77	3.1590	0.0216
78	3.1805	0.0215
79	3.2018	0.0213
80	3.2230	0.0212
81	3.2441	0.0211
82	3.2650	0.0209
83	3.2858	0.0208
84	3.3065	0.0207
85	3.3271	0.0206
86	3.3476	0.0205
87	3.3680	0.0204
88	3.3882	0.0202
89	3.4083	0.0201
90	3.4284	0.0200
91	3.4483	0.0199
92	3.4681	0.0198
93	3.4878	0.0197
94	3.5075	0.0196
95	3.5270	0.0195
96	3.5464	0.0194
97	3.5657	0.0193
98	3.5850	0.0192
99	3.6041	0.0191
100	3.6231	0.0190
101	3.6421	0.0190
102	3.6610	0.0189
103	3.6797	0.0188
104	3.6984	0.0187
105	3.7171	0.0186
106	3.7356	0.0185
107	3.7540	0.0184
108	3.7724	0.0184
109	3.7907	0.0183
110	3.8089	0.0182
111	3.8270	0.0181
112	3.8450	0.0180
113	3.8630	0.0180
114	3.8809	0.0179
115	3.8987	0.0178
116	3.9164	0.0177
117	3.9341	0.0177
118	3.9517	0.0176

119	3.9692	0.0175
120	3.9867	0.0175
121	4.0041	0.0174
122	4.0214	0.0173
123	4.0387	0.0173
124	4.0558	0.0172
125	4.0730	0.0171
126	4.0900	0.0171
127	4.1070	0.0170
128	4.1239	0.0169
129	4.1408	0.0169
130	4.1576	0.0168
131	4.1744	0.0167
132	4.1910	0.0167
133	4.2077	0.0166
134	4.2242	0.0166
135	4.2407	0.0165
136	4.2572	0.0164
137	4.2736	0.0164
138	4.2899	0.0163
139	4.3062	0.0163
140	4.3224	0.0162
141	4.3385	0.0162
142	4.3547	0.0161
143	4.3707	0.0161
144	4.3867	0.0160
145	4.4027	0.0160
146	4.4186	0.0159
147	4.4344	0.0158
148	4.4502	0.0158
149	4.4659	0.0157
150	4.4816	0.0157
151	4.4973	0.0156
152	4.5129	0.0156
153	4.5284	0.0155
154	4.5439	0.0155
155	4.5594	0.0155
156	4.5748	0.0154
157	4.5901	0.0154
158	4.6054	0.0153
159	4.6207	0.0153
160	4.6359	0.0152
161	4.6511	0.0152
162	4.6662	0.0151
163	4.6813	0.0151
164	4.6964	0.0150
165	4.7114	0.0150
166	4.7263	0.0150
167	4.7412	0.0149
168	4.7561	0.0149

169	4.7709	0.0148
170	4.7857	0.0148
171	4.8004	0.0147
172	4.8151	0.0147
173	4.8298	0.0147
174	4.8444	0.0146
175	4.8590	0.0146
176	4.8735	0.0145
177	4.8881	0.0145
178	4.9025	0.0145
179	4.9169	0.0144
180	4.9313	0.0144
181	4.9457	0.0143
182	4.9600	0.0143
183	4.9743	0.0143
184	4.9885	0.0142
185	5.0027	0.0142
186	5.0169	0.0142
187	5.0310	0.0141
188	5.0451	0.0141
189	5.0591	0.0141
190	5.0732	0.0140
191	5.0871	0.0140
192	5.1011	0.0140
193	5.1150	0.0139
194	5.1289	0.0139
195	5.1427	0.0138
196	5.1566	0.0138
197	5.1703	0.0138
198	5.1841	0.0137
199	5.1978	0.0137
200	5.2115	0.0137
201	5.2251	0.0136
202	5.2388	0.0136
203	5.2523	0.0136
204	5.2659	0.0136
205	5.2794	0.0135
206	5.2929	0.0135
207	5.3064	0.0135
208	5.3198	0.0134
209	5.3332	0.0134
210	5.3466	0.0134
211	5.3599	0.0133
212	5.3732	0.0133
213	5.3865	0.0133
214	5.3997	0.0132
215	5.4129	0.0132
216	5.4261	0.0132
217	5.4393	0.0132
218	5.4524	0.0131

219	5.4655	0.0131
220	5.4786	0.0131
221	5.4916	0.0130
222	5.5047	0.0130
223	5.5177	0.0130
224	5.5306	0.0130
225	5.5436	0.0129
226	5.5565	0.0129
227	5.5693	0.0129
228	5.5822	0.0129
229	5.5950	0.0128
230	5.6078	0.0128
231	5.6206	0.0128
232	5.6333	0.0127
233	5.6461	0.0127
234	5.6588	0.0127
235	5.6714	0.0127
236	5.6841	0.0126
237	5.6967	0.0126
238	5.7093	0.0126
239	5.7219	0.0126
240	5.7344	0.0125
241	5.7469	0.0125
242	5.7594	0.0125
243	5.7719	0.0125
244	5.7843	0.0124
245	5.7967	0.0124
246	5.8091	0.0124
247	5.8215	0.0124
248	5.8339	0.0123
249	5.8462	0.0123
250	5.8585	0.0123
251	5.8708	0.0123
252	5.8830	0.0123
253	5.8953	0.0122
254	5.9075	0.0122
255	5.9197	0.0122
256	5.9318	0.0122
257	5.9440	0.0121
258	5.9561	0.0121
259	5.9682	0.0121
260	5.9802	0.0121
261	5.9923	0.0121
262	6.0043	0.0120
263	6.0163	0.0120
264	6.0283	0.0120
265	6.0403	0.0120
266	6.0522	0.0119
267	6.0642	0.0119
268	6.0761	0.0119

269	6.0879	0.0119
270	6.0998	0.0119
271	6.1116	0.0118
272	6.1234	0.0118
273	6.1352	0.0118
274	6.1470	0.0118
275	6.1588	0.0118
276	6.1705	0.0117
277	6.1822	0.0117
278	6.1939	0.0117
279	6.2056	0.0117
280	6.2173	0.0117
281	6.2289	0.0116
282	6.2405	0.0116
283	6.2521	0.0116
284	6.2637	0.0116
285	6.2752	0.0116
286	6.2868	0.0115
287	6.2983	0.0115
288	6.3098	0.0115

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0115	0.0016	0.0099
2	0.0115	0.0016	0.0099
3	0.0116	0.0016	0.0099
4	0.0116	0.0016	0.0100
5	0.0116	0.0016	0.0100
6	0.0116	0.0016	0.0100
7	0.0117	0.0016	0.0100
8	0.0117	0.0016	0.0101
9	0.0117	0.0016	0.0101
10	0.0118	0.0016	0.0101
11	0.0118	0.0017	0.0101
12	0.0118	0.0017	0.0102
13	0.0119	0.0017	0.0102
14	0.0119	0.0017	0.0102
15	0.0119	0.0017	0.0103
16	0.0119	0.0017	0.0103
17	0.0120	0.0017	0.0103
18	0.0120	0.0017	0.0103
19	0.0121	0.0017	0.0104
20	0.0121	0.0017	0.0104
21	0.0121	0.0017	0.0104
22	0.0121	0.0017	0.0104
23	0.0122	0.0017	0.0105
24	0.0122	0.0017	0.0105
25	0.0123	0.0017	0.0105

26	0.0123	0.0017	0.0106
27	0.0123	0.0017	0.0106
28	0.0123	0.0017	0.0106
29	0.0124	0.0017	0.0107
30	0.0124	0.0017	0.0107
31	0.0125	0.0017	0.0107
32	0.0125	0.0018	0.0107
33	0.0125	0.0018	0.0108
34	0.0126	0.0018	0.0108
35	0.0126	0.0018	0.0108
36	0.0126	0.0018	0.0109
37	0.0127	0.0018	0.0109
38	0.0127	0.0018	0.0109
39	0.0128	0.0018	0.0110
40	0.0128	0.0018	0.0110
41	0.0129	0.0018	0.0111
42	0.0129	0.0018	0.0111
43	0.0129	0.0018	0.0111
44	0.0130	0.0018	0.0111
45	0.0130	0.0018	0.0112
46	0.0130	0.0018	0.0112
47	0.0131	0.0018	0.0113
48	0.0131	0.0018	0.0113
49	0.0132	0.0018	0.0113
50	0.0132	0.0019	0.0114
51	0.0133	0.0019	0.0114
52	0.0133	0.0019	0.0114
53	0.0134	0.0019	0.0115
54	0.0134	0.0019	0.0115
55	0.0135	0.0019	0.0116
56	0.0135	0.0019	0.0116
57	0.0136	0.0019	0.0117
58	0.0136	0.0019	0.0117
59	0.0136	0.0019	0.0117
60	0.0137	0.0019	0.0118
61	0.0137	0.0019	0.0118
62	0.0138	0.0019	0.0118
63	0.0138	0.0019	0.0119
64	0.0139	0.0019	0.0119
65	0.0140	0.0020	0.0120
66	0.0140	0.0020	0.0120
67	0.0141	0.0020	0.0121
68	0.0141	0.0020	0.0121
69	0.0142	0.0020	0.0122
70	0.0142	0.0020	0.0122
71	0.0143	0.0020	0.0123
72	0.0143	0.0020	0.0123
73	0.0144	0.0020	0.0124
74	0.0144	0.0020	0.0124
75	0.0145	0.0020	0.0125

76	0.0145	0.0020	0.0125
77	0.0146	0.0021	0.0126
78	0.0147	0.0021	0.0126
79	0.0147	0.0021	0.0127
80	0.0148	0.0021	0.0127
81	0.0149	0.0021	0.0128
82	0.0149	0.0021	0.0128
83	0.0150	0.0021	0.0129
84	0.0150	0.0021	0.0129
85	0.0151	0.0021	0.0130
86	0.0152	0.0021	0.0130
87	0.0153	0.0021	0.0131
88	0.0153	0.0021	0.0132
89	0.0154	0.0022	0.0132
90	0.0155	0.0022	0.0133
91	0.0155	0.0022	0.0134
92	0.0156	0.0022	0.0134
93	0.0157	0.0022	0.0135
94	0.0157	0.0022	0.0135
95	0.0158	0.0022	0.0136
96	0.0159	0.0022	0.0137
97	0.0160	0.0022	0.0138
98	0.0161	0.0023	0.0138
99	0.0162	0.0023	0.0139
100	0.0162	0.0023	0.0139
101	0.0163	0.0023	0.0140
102	0.0164	0.0023	0.0141
103	0.0165	0.0023	0.0142
104	0.0166	0.0023	0.0142
105	0.0167	0.0023	0.0143
106	0.0167	0.0023	0.0144
107	0.0169	0.0024	0.0145
108	0.0169	0.0024	0.0146
109	0.0171	0.0024	0.0147
110	0.0171	0.0024	0.0147
111	0.0173	0.0024	0.0148
112	0.0173	0.0024	0.0149
113	0.0175	0.0024	0.0150
114	0.0175	0.0025	0.0151
115	0.0177	0.0025	0.0152
116	0.0177	0.0025	0.0153
117	0.0179	0.0025	0.0154
118	0.0180	0.0025	0.0154
119	0.0181	0.0025	0.0156
120	0.0182	0.0026	0.0156
121	0.0184	0.0026	0.0158
122	0.0184	0.0026	0.0159
123	0.0186	0.0026	0.0160
124	0.0187	0.0026	0.0161
125	0.0189	0.0026	0.0162

126	0.0190	0.0027	0.0163
127	0.0191	0.0027	0.0165
128	0.0192	0.0027	0.0165
129	0.0194	0.0027	0.0167
130	0.0195	0.0027	0.0168
131	0.0197	0.0028	0.0170
132	0.0198	0.0028	0.0170
133	0.0200	0.0028	0.0172
134	0.0201	0.0028	0.0173
135	0.0204	0.0029	0.0175
136	0.0205	0.0029	0.0176
137	0.0207	0.0029	0.0178
138	0.0208	0.0029	0.0179
139	0.0211	0.0030	0.0181
140	0.0212	0.0030	0.0182
141	0.0215	0.0030	0.0184
142	0.0216	0.0030	0.0186
143	0.0219	0.0031	0.0188
144	0.0220	0.0031	0.0189
145	0.0201	0.0028	0.0172
146	0.0202	0.0028	0.0174
147	0.0205	0.0029	0.0176
148	0.0207	0.0029	0.0178
149	0.0210	0.0029	0.0181
150	0.0212	0.0030	0.0182
151	0.0215	0.0030	0.0185
152	0.0217	0.0030	0.0187
153	0.0221	0.0031	0.0190
154	0.0223	0.0031	0.0192
155	0.0227	0.0032	0.0195
156	0.0229	0.0032	0.0197
157	0.0234	0.0033	0.0201
158	0.0236	0.0033	0.0203
159	0.0241	0.0034	0.0207
160	0.0244	0.0034	0.0209
161	0.0249	0.0035	0.0214
162	0.0252	0.0035	0.0216
163	0.0258	0.0036	0.0222
164	0.0261	0.0037	0.0224
165	0.0267	0.0037	0.0230
166	0.0271	0.0038	0.0233
167	0.0278	0.0039	0.0239
168	0.0282	0.0040	0.0243
169	0.0291	0.0041	0.0250
170	0.0295	0.0041	0.0254
171	0.0305	0.0043	0.0262
172	0.0310	0.0043	0.0266
173	0.0321	0.0045	0.0276
174	0.0327	0.0046	0.0281
175	0.0339	0.0048	0.0292

176	0.0346	0.0049	0.0298
177	0.0362	0.0051	0.0311
178	0.0370	0.0052	0.0318
179	0.0389	0.0054	0.0334
180	0.0399	0.0056	0.0343
181	0.0422	0.0059	0.0363
182	0.0436	0.0061	0.0375
183	0.0466	0.0065	0.0401
184	0.0484	0.0068	0.0416
185	0.0337	0.0047	0.0290
186	0.0359	0.0050	0.0309
187	0.0417	0.0058	0.0358
188	0.0455	0.0064	0.0391
189	0.0566	0.0079	0.0486
190	0.0651	0.0091	0.0560
191	0.0989	0.0092	0.0897
192	0.1435	0.0092	0.1343
193	0.6208	0.0092	0.6117
194	0.0778	0.0092	0.0686
195	0.0503	0.0071	0.0432
196	0.0385	0.0054	0.0331
197	0.0504	0.0071	0.0434
198	0.0450	0.0063	0.0387
199	0.0410	0.0058	0.0353
200	0.0379	0.0053	0.0326
201	0.0354	0.0050	0.0304
202	0.0333	0.0047	0.0286
203	0.0315	0.0044	0.0271
204	0.0300	0.0042	0.0258
205	0.0286	0.0040	0.0246
206	0.0274	0.0038	0.0236
207	0.0264	0.0037	0.0227
208	0.0255	0.0036	0.0219
209	0.0246	0.0035	0.0212
210	0.0239	0.0033	0.0205
211	0.0232	0.0032	0.0199
212	0.0225	0.0032	0.0193
213	0.0219	0.0031	0.0188
214	0.0214	0.0030	0.0184
215	0.0208	0.0029	0.0179
216	0.0204	0.0029	0.0175
217	0.0221	0.0031	0.0190
218	0.0217	0.0030	0.0187
219	0.0213	0.0030	0.0183
220	0.0209	0.0029	0.0180
221	0.0206	0.0029	0.0177
222	0.0202	0.0028	0.0174
223	0.0199	0.0028	0.0171
224	0.0196	0.0028	0.0169
225	0.0193	0.0027	0.0166

226	0.0190	0.0027	0.0164
227	0.0188	0.0026	0.0161
228	0.0185	0.0026	0.0159
229	0.0183	0.0026	0.0157
230	0.0180	0.0025	0.0155
231	0.0178	0.0025	0.0153
232	0.0176	0.0025	0.0151
233	0.0174	0.0024	0.0150
234	0.0172	0.0024	0.0148
235	0.0170	0.0024	0.0146
236	0.0168	0.0024	0.0144
237	0.0166	0.0023	0.0143
238	0.0164	0.0023	0.0141
239	0.0163	0.0023	0.0140
240	0.0161	0.0023	0.0139
241	0.0160	0.0022	0.0137
242	0.0158	0.0022	0.0136
243	0.0156	0.0022	0.0135
244	0.0155	0.0022	0.0133
245	0.0154	0.0022	0.0132
246	0.0152	0.0021	0.0131
247	0.0151	0.0021	0.0130
248	0.0150	0.0021	0.0129
249	0.0148	0.0021	0.0127
250	0.0147	0.0021	0.0126
251	0.0146	0.0020	0.0125
252	0.0145	0.0020	0.0124
253	0.0143	0.0020	0.0123
254	0.0142	0.0020	0.0122
255	0.0141	0.0020	0.0121
256	0.0140	0.0020	0.0121
257	0.0139	0.0020	0.0120
258	0.0138	0.0019	0.0119
259	0.0137	0.0019	0.0118
260	0.0136	0.0019	0.0117
261	0.0135	0.0019	0.0116
262	0.0134	0.0019	0.0115
263	0.0133	0.0019	0.0115
264	0.0132	0.0019	0.0114
265	0.0132	0.0018	0.0113
266	0.0131	0.0018	0.0112
267	0.0130	0.0018	0.0112
268	0.0129	0.0018	0.0111
269	0.0128	0.0018	0.0110
270	0.0127	0.0018	0.0110
271	0.0127	0.0018	0.0109
272	0.0126	0.0018	0.0108
273	0.0125	0.0018	0.0108
274	0.0124	0.0017	0.0107
275	0.0124	0.0017	0.0106

276	0.0123	0.0017	0.0106
277	0.0122	0.0017	0.0105
278	0.0122	0.0017	0.0105
279	0.0121	0.0017	0.0104
280	0.0120	0.0017	0.0103
281	0.0120	0.0017	0.0103
282	0.0119	0.0017	0.0102
283	0.0118	0.0017	0.0102
284	0.0118	0.0017	0.0101
285	0.0117	0.0016	0.0101
286	0.0117	0.0016	0.0100
287	0.0116	0.0016	0.0100
288	0.0115	0.0016	0.0099

Total soil rain loss = 0.79(In)
Total effective rainfall = 5.52(In)
Peak flow rate in flood hydrograph = 79.47(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

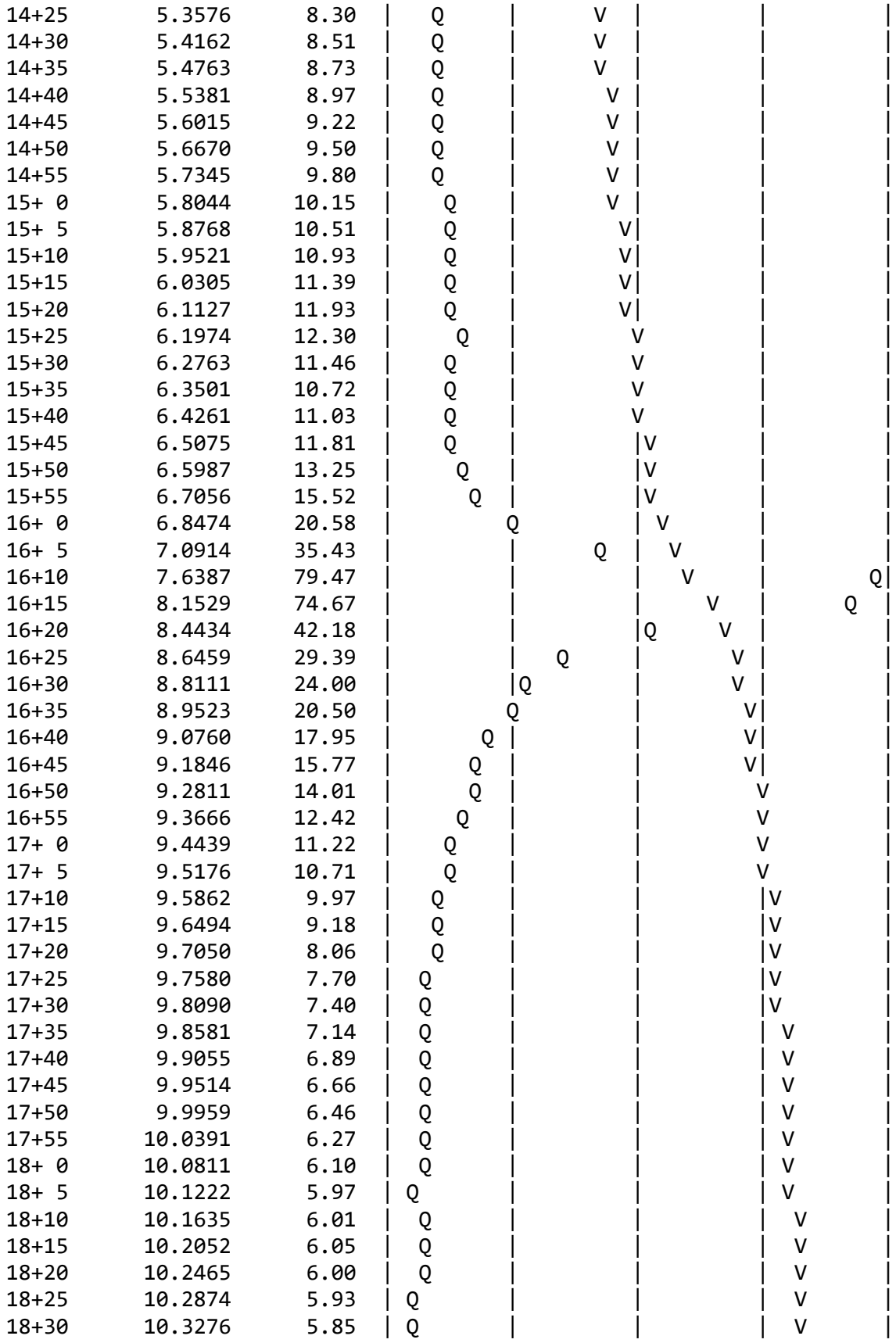
Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	20.0	40.0	60.0	80.0
0+ 5	0.0010	0.14	Q	|	|	|	|
0+10	0.0085	1.09	Q	|	|	|	|
0+15	0.0224	2.02	VQ	|	|	|	|
0+20	0.0391	2.43	VQ	|	|	|	|
0+25	0.0575	2.67	VQ	|	|	|	|
0+30	0.0770	2.83	VQ	|	|	|	|
0+35	0.0972	2.94	VQ	|	|	|	|
0+40	0.1181	3.03	VQ	|	|	|	|
0+45	0.1394	3.10	VQ	|	|	|	|
0+50	0.1611	3.15	VQ	|	|	|	|
0+55	0.1830	3.18	VQ	|	|	|	|
1+ 0	0.2051	3.21	VQ	|	|	|	|
1+ 5	0.2274	3.24	VQ	|	|	|	|
1+10	0.2499	3.26	VQ	|	|	|	|
1+15	0.2725	3.29	VQ	|	|	|	|
1+20	0.2952	3.29	VQ	|	|	|	|
1+25	0.3180	3.30	|Q	|	|	|	|
1+30	0.3408	3.31	|Q	|	|	|	|
1+35	0.3637	3.32	|Q	|	|	|	|
1+40	0.3866	3.33	|Q	|	|	|	|
1+45	0.4096	3.34	|Q	|	|	|	|
1+50	0.4326	3.35	|Q	|	|	|	|

1+55	0.4558	3.36	Q				
2+ 0	0.4789	3.37	Q				
2+ 5	0.5022	3.38	Q				
2+10	0.5255	3.39	Q				
2+15	0.5489	3.39	Q				
2+20	0.5723	3.40	Q				
2+25	0.5958	3.41	Q				
2+30	0.6194	3.42	QV				
2+35	0.6431	3.43	QV				
2+40	0.6668	3.44	QV				
2+45	0.6906	3.45	QV				
2+50	0.7144	3.46	QV				
2+55	0.7384	3.47	QV				
3+ 0	0.7624	3.48	QV				
3+ 5	0.7864	3.49	QV				
3+10	0.8106	3.51	QV				
3+15	0.8348	3.52	QV				
3+20	0.8591	3.53	QV				
3+25	0.8834	3.54	QV				
3+30	0.9079	3.55	QV				
3+35	0.9324	3.56	Q V				
3+40	0.9570	3.57	Q V				
3+45	0.9816	3.58	Q V				
3+50	1.0064	3.59	Q V				
3+55	1.0312	3.60	Q V				
4+ 0	1.0561	3.62	Q V				
4+ 5	1.0811	3.63	Q V				
4+10	1.1062	3.64	Q V				
4+15	1.1313	3.65	Q V				
4+20	1.1566	3.66	Q V				
4+25	1.1819	3.68	Q V				
4+30	1.2073	3.69	Q V				
4+35	1.2328	3.70	Q V				
4+40	1.2584	3.71	Q V				
4+45	1.2840	3.73	Q V				
4+50	1.3098	3.74	Q V				
4+55	1.3356	3.75	Q V				
5+ 0	1.3615	3.77	Q V				
5+ 5	1.3876	3.78	Q V				
5+10	1.4137	3.79	Q V				
5+15	1.4399	3.81	Q V				
5+20	1.4662	3.82	Q V				
5+25	1.4926	3.83	Q V				
5+30	1.5191	3.85	Q V				
5+35	1.5457	3.86	Q V				
5+40	1.5724	3.88	Q V				
5+45	1.5992	3.89	Q V				
5+50	1.6261	3.91	Q V				
5+55	1.6531	3.92	Q V				
6+ 0	1.6802	3.94	Q V				

6+ 5	1.7074	3.95	Q V			
6+10	1.7347	3.97	Q V			
6+15	1.7621	3.98	Q V			
6+20	1.7896	4.00	Q V			
6+25	1.8173	4.01	Q V			
6+30	1.8450	4.03	Q V			
6+35	1.8729	4.05	Q V			
6+40	1.9008	4.06	Q V			
6+45	1.9289	4.08	Q V			
6+50	1.9571	4.10	Q V			
6+55	1.9855	4.11	Q V			
7+ 0	2.0139	4.13	Q V			
7+ 5	2.0425	4.15	Q V			
7+10	2.0712	4.17	Q V			
7+15	2.1000	4.18	Q V			
7+20	2.1290	4.20	Q V			
7+25	2.1580	4.22	Q V			
7+30	2.1872	4.24	Q V			
7+35	2.2166	4.26	Q V			
7+40	2.2461	4.28	Q V			
7+45	2.2757	4.30	Q V			
7+50	2.3054	4.32	Q V			
7+55	2.3353	4.34	Q V			
8+ 0	2.3653	4.36	Q V			
8+ 5	2.3955	4.38	Q V			
8+10	2.4258	4.40	Q V			
8+15	2.4563	4.42	Q V			
8+20	2.4869	4.45	Q V			
8+25	2.5177	4.47	Q V			
8+30	2.5486	4.49	Q V			
8+35	2.5797	4.51	Q V			
8+40	2.6110	4.54	Q V			
8+45	2.6424	4.56	Q V			
8+50	2.6740	4.59	Q V			
8+55	2.7057	4.61	Q V			
9+ 0	2.7377	4.64	Q V			
9+ 5	2.7698	4.66	Q V			
9+10	2.8020	4.69	Q V			
9+15	2.8345	4.71	Q V			
9+20	2.8671	4.74	Q V			
9+25	2.9000	4.77	Q V			
9+30	2.9330	4.79	Q V			
9+35	2.9662	4.82	Q V			
9+40	2.9996	4.85	Q V			
9+45	3.0332	4.88	Q V			
9+50	3.0671	4.91	Q V			
9+55	3.1011	4.94	Q V			
10+ 0	3.1353	4.97	Q V			
10+ 5	3.1698	5.00	Q V			
10+10	3.2045	5.04	Q V			

10+15	3.2394	5.07	Q	V			
10+20	3.2745	5.10	Q	V			
10+25	3.3099	5.14	Q	V			
10+30	3.3455	5.17	Q	V			
10+35	3.3814	5.21	Q	|V			
10+40	3.4175	5.24	Q	|V			
10+45	3.4539	5.28	Q	|V			
10+50	3.4905	5.32	Q	|V			
10+55	3.5274	5.36	Q	|V			
11+ 0	3.5646	5.40	Q	|V			
11+ 5	3.6021	5.44	Q	|V			
11+10	3.6398	5.48	Q	|V			
11+15	3.6779	5.52	Q	|V			
11+20	3.7162	5.57	Q	| V			
11+25	3.7549	5.61	Q	| V			
11+30	3.7938	5.66	Q	| V			
11+35	3.8332	5.71	Q	| V			
11+40	3.8728	5.76	Q	| V			
11+45	3.9128	5.81	Q	| V			
11+50	3.9531	5.86	Q	| V			
11+55	3.9938	5.91	Q	| V			
12+ 0	4.0349	5.96	Q	| V			
12+ 5	4.0762	5.99	Q	| V			
12+10	4.1166	5.87	Q	| V			
12+15	4.1561	5.74	Q	| V			
12+20	4.1956	5.73	Q	| V			
12+25	4.2352	5.75	Q	| V			
12+30	4.2750	5.78	Q	| V			
12+35	4.3151	5.83	Q	| V			
12+40	4.3557	5.88	Q	| V			
12+45	4.3966	5.94	Q	| V			
12+50	4.4380	6.01	| Q	| V			
12+55	4.4799	6.08	| Q	| V			
13+ 0	4.5223	6.16	| Q	| V			
13+ 5	4.5653	6.24	| Q	| V			
13+10	4.6089	6.33	| Q	| V			
13+15	4.6530	6.41	| Q	| V			
13+20	4.6978	6.51	| Q	| V			
13+25	4.7434	6.61	| Q	| V			
13+30	4.7896	6.71	| Q	| V			
13+35	4.8365	6.82	| Q	| V			
13+40	4.8843	6.94	| Q	| V			
13+45	4.9329	7.05	| Q	| V			
13+50	4.9823	7.18	| Q	| V			
13+55	5.0327	7.31	| Q	| V			
14+ 0	5.0840	7.45	| Q	| V			
14+ 5	5.1364	7.60	| Q	| V			
14+10	5.1898	7.76	| Q	| V			
14+15	5.2445	7.93	| Q	| V			
14+20	5.3004	8.12	| Q	| V			



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18+35      10.3673      5.76  | Q       |         |         |  V      |
18+40      10.4064      5.68  | Q       |         |         |  V      |
18+45      10.4449      5.59  | Q       |         |         |   V     |
18+50      10.4829      5.51  | Q       |         |         |   V     |
18+55      10.5203      5.43  | Q       |         |         |   V     |
19+ 0      10.5572      5.35  | Q       |         |         |   V     |
19+ 5      10.5935      5.28  | Q       |         |         |   V     |
19+10      10.6294      5.21  | Q       |         |         |   V     |
19+15      10.6648      5.14  | Q       |         |         |   V     |
19+20      10.6997      5.07  | Q       |         |         |   V     |
19+25      10.7342      5.01  | Q       |         |         |   V     |
19+30      10.7683      4.94  | Q       |         |         |    V    |
19+35      10.8019      4.88  | Q       |         |         |    V    |
19+40      10.8351      4.82  | Q       |         |         |    V    |
19+45      10.8679      4.77  | Q       |         |         |    V    |
19+50      10.9004      4.71  | Q       |         |         |    V    |
19+55      10.9325      4.66  | Q       |         |         |    V    |
20+ 0      10.9643      4.61  | Q       |         |         |    V    |
20+ 5      10.9957      4.56  | Q       |         |         |    V    |
20+10      11.0268      4.52  | Q       |         |         |    V    |
20+15      11.0576      4.47  | Q       |         |         |     V   |
20+20      11.0881      4.43  | Q       |         |         |     V   |
20+25      11.1182      4.38  | Q       |         |         |     V   |
20+30      11.1481      4.34  | Q       |         |         |     V   |
20+35      11.1777      4.30  | Q       |         |         |     V   |
20+40      11.2071      4.26  | Q       |         |         |     V   |
20+45      11.2362      4.22  | Q       |         |         |     V   |
20+50      11.2650      4.18  | Q       |         |         |     V   |
20+55      11.2935      4.15  | Q       |         |         |     V   |
21+ 0      11.3219      4.11  | Q       |         |         |     V   |
21+ 5      11.3500      4.08  | Q       |         |         |     V   |
21+10      11.3778      4.05  | Q       |         |         |      V  |
21+15      11.4055      4.01  | Q       |         |         |      V  |
21+20      11.4329      3.98  |Q        |         |         |      V  |
21+25      11.4601      3.95  |Q        |         |         |      V  |
21+30      11.4871      3.92  |Q        |         |         |      V  |
21+35      11.5139      3.89  |Q        |         |         |      V  |
21+40      11.5405      3.86  |Q        |         |         |      V  |
21+45      11.5669      3.83  |Q        |         |         |      V  |
21+50      11.5931      3.81  |Q        |         |         |      V  |
21+55      11.6191      3.78  |Q        |         |         |      V  |
22+ 0      11.6449      3.75  |Q        |         |         |      V  |
22+ 5      11.6706      3.73  |Q        |         |         |       V |
22+10      11.6961      3.70  |Q        |         |         |       V |
22+15      11.7214      3.68  |Q        |         |         |       V |
22+20      11.7465      3.65  |Q        |         |         |       V |
22+25      11.7715      3.63  |Q        |         |         |       V |
22+30      11.7963      3.60  |Q        |         |         |       V |
22+35      11.8210      3.58  |Q        |         |         |       V |
22+40      11.8455      3.56  |Q        |         |         |       V |
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   22+45      11.8699      3.54  |Q        |         |         |       V |
   22+50      11.8941      3.52  |Q        |         |         |       V |
   22+55      11.9182      3.49  |Q        |         |         |       V |
   23+ 0      11.9421      3.47  |Q        |         |         |       V |
   23+ 5      11.9659      3.45  |Q        |         |         |       V |
   23+10      11.9895      3.43  |Q        |         |         |        V|
   23+15      12.0130      3.41  |Q        |         |         |        V|
   23+20      12.0364      3.39  |Q        |         |         |        V|
   23+25      12.0596      3.38  |Q        |         |         |        V|
   23+30      12.0828      3.36  |Q        |         |         |        V|
   23+35      12.1057      3.34  |Q        |         |         |        V|
   23+40      12.1286      3.32  |Q        |         |         |        V|
   23+45      12.1514      3.30  |Q        |         |         |        V|
   23+50      12.1740      3.28  |Q        |         |         |        V|
   23+55      12.1965      3.27  |Q        |         |         |        V|
   24+ 0      12.2189      3.25  |Q        |         |         |        V|
   24+ 5      12.2402      3.09  |Q        |         |         |        V|
   24+10      12.2548      2.13  |Q        |         |         |        V|
   24+15      12.2631      1.19  Q         |         |         |        V|
   24+20      12.2685      0.79  Q         |         |         |        V|
   24+25      12.2722      0.55  Q         |         |         |        V|
   24+30      12.2749      0.39  Q         |         |         |        V|
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Appendix F – Basin Routing Analysis

- Basin Summary Table

Basin Requirements		
Storm Event	**Max Flow Allowed (CFS)**	**Required Retention (CF)**
10-Year	54.40	378,172
100-Year	70.26*	378,172

Basin Summary			
Drainage Area	**10-Year Max Flow (CFS)**	**100-Year Max Flow (CFS)**	**Provided Onsite Retention (CF)**
DA A (Basin 1 and CMP)	0.00	0.00	682,561
DA B (Basin 2 and CMP)	0.00	0.00	532,814
Total	0.00	0.00	1,215,376

Note: * Calculated Using Data for 25-Year Storm Event

Basin 1 (DA A)						
Elevation (ft)	**Surface Area (SF)**	**Depth (ft)**	**Basin Volume (CF)**	**CMP Volume (CF)**	**Volume (ac-ft)**	**Outflow (cfs)**
3541*	10,268	0	14,375	481,775	11.39	0.00
3542	11,752	1	25,376	481,775	11.64	0.00
3543	13,304	2	37,896	481,775	11.93	0.00
3544	14,919	3	52,000	481,775	12.25	0.00
3545	16,597	4	67,750	481,775	12.62	0.00
3546	18,342	5	85,212	481,775	13.02	0.00
3547	20,159	6	104,455	481,775	13.46	0.00
3548	22,053	7	125,554	481,775	13.94	0.00
3549	24,026	8	148,587	481,775	14.47	0.00
3550	26,084	9	173,635	481,775	15.05	0.00
3551**	28,233	10	200,786	481,775	15.67	0.00
3552***	30,519	11	230,155	481,775	16.34	0.00

Requirements		
Storm Event	**Max Flow (CFS)**	**Required Retention (CF)**
10-Year	54.40	378,172
100-Year	70.26****	378,172

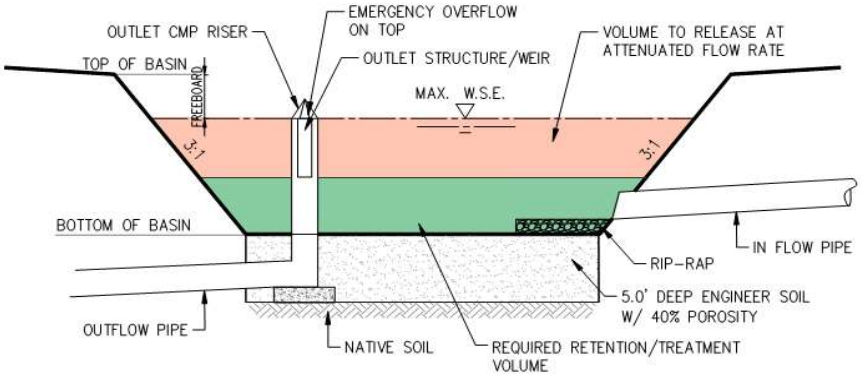
Summary Table			
Storm Event	**Storm Volume (CF)**	**Volume Retained (CF)**	**Max Flow Out (CFS)**
10-Year	389,744	682,561	0.00
100-Year	681,862	682,561	0.00

Note: * Bottom of Basin w/ 4.0' of Engineered Soil with 35% Porosity

** Retention Volume/Weir Crest Elevation

*** Top of Basin

**** Calculated Using Data for 25-Year Storm Event



INFILTRATION/DETENTION BASIN DETAIL

N.T.S

Basin 2 and Underground CMP (DA B)						
Elevation (ft)	**Surface Area (SF)**	**Depth (ft)**	**Volume (CF)**	**CMP Volume**	**Volume (ac-ft)**	**Outflow (cfs)**
3536*	8,334	0	11,668	408,016	9.63	0.00
3537	11,674	1	21,626	408,016	9.86	0.00
3538	15,131	2	34,991	408,016	10.17	0.00
3539	18,703	3	51,876	408,016	10.56	0.00
3540	22,391	4	72,396	408,016	11.03	0.00
3541	26,196	5	96,665	408,016	11.59	0.00
3542**	30,117	6	124,798	408,016	12.23	0.00
3543***	34,154	7	156,912	408,016	12.97	0.00

Requirements		
Storm Event	**Max Flow (CFS)**	**Required Retention (CF)**
10-Year	54.40	378,172
100-Year	70.26****	378,172

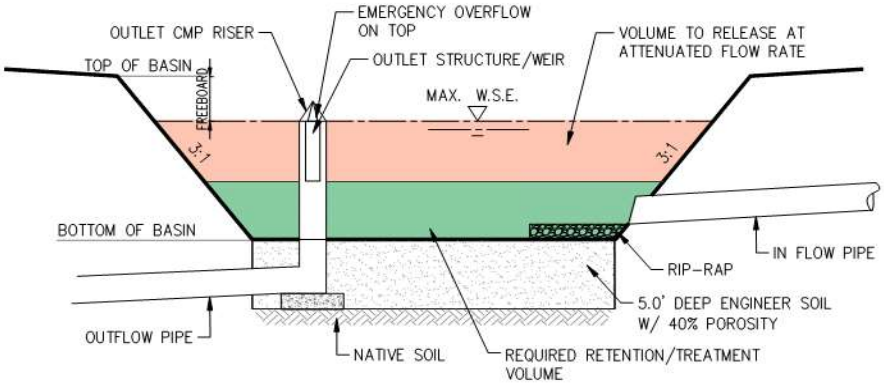
Summary Table			
Storm Event	**Storm Volume (CF)**	**Volume Retained (CF)**	**Max Flow Out (CFS)**
10-Year	305,094	532,814	0.00
100-Year	532,255	532,814	0.00

Note: * Bottom of Basin w/ 4.0' of Engineered Soil with 35% Porosity

** Retention Volume/Weir Crest Elevation

*** Top of Basin

**** Calculated Using Data for 25-Year Storm Event



INFILTRATION/DETENTION BASIN DETAIL

N.T.S

Appendix G – Hydraulic Analysis (Prepared in Final Engineering)

- Weir Calculations
- Pipe Sizing Calculations
- Catch Basin Calculations

Appendix H – Reference Documents

- Precipitation Data
- Hydrologic Soil Map
- Infiltration Report (Prepared in Final Engineering)

NOAA Atlas 14, Volume 6, Version 2
Location name: Hesperia, California, USA*
Latitude: 34.4159°, Longitude: -117.3904°
Elevation: 3607.01 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	0.087 (0.072-0.106)	0.124 (0.102-0.151)	0.172 (0.142-0.211)	0.212 (0.173-0.262)	0.267 (0.211-0.341)	0.310 (0.240-0.404)	0.354 (0.267-0.473)	0.400 (0.294-0.550)	0.464 (0.327-0.665)	0.514 (0.350-0.762)
10-min	0.125 (0.103-0.152)	0.177 (0.147-0.217)	0.247 (0.203-0.302)	0.304 (0.248-0.375)	0.383 (0.303-0.489)	0.444 (0.344-0.579)	0.507 (0.383-0.678)	0.573 (0.421-0.788)	0.664 (0.468-0.953)	0.736 (0.501-1.09)
15-min	0.151 (0.125-0.184)	0.214 (0.177-0.262)	0.298 (0.246-0.366)	0.367 (0.300-0.454)	0.463 (0.366-0.591)	0.537 (0.416-0.700)	0.613 (0.463-0.820)	0.693 (0.509-0.953)	0.804 (0.566-1.15)	0.890 (0.606-1.32)
30-min	0.228 (0.189-0.278)	0.324 (0.268-0.396)	0.451 (0.371-0.552)	0.555 (0.454-0.686)	0.699 (0.553-0.893)	0.811 (0.628-1.06)	0.927 (0.700-1.24)	1.05 (0.769-1.44)	1.21 (0.855-1.74)	1.35 (0.915-2.00)
60-min	0.323 (0.267-0.394)	0.458 (0.379-0.560)	0.637 (0.525-0.781)	0.785 (0.642-0.970)	0.989 (0.782-1.26)	1.15 (0.888-1.50)	1.31 (0.990-1.75)	1.48 (1.09-2.04)	1.72 (1.21-2.46)	1.90 (1.30-2.82)
2-hr	0.473 (0.391-0.577)	0.641 (0.530-0.784)	0.869 (0.716-1.07)	1.06 (0.867-1.31)	1.33 (1.05-1.70)	1.54 (1.19-2.01)	1.76 (1.33-2.36)	2.00 (1.47-2.75)	2.33 (1.64-3.34)	2.59 (1.76-3.85)
3-hr	0.596 (0.494-0.728)	0.797 (0.659-0.974)	1.07 (0.882-1.31)	1.30 (1.06-1.61)	1.63 (1.29-2.08)	1.89 (1.46-2.46)	2.16 (1.63-2.89)	2.46 (1.81-3.38)	2.87 (2.02-4.12)	3.21 (2.19-4.77)
6-hr	0.849 (0.702-1.04)	1.12 (0.929-1.37)	1.50 (1.24-1.84)	1.82 (1.49-2.25)	2.28 (1.81-2.92)	2.66 (2.06-3.47)	3.05 (2.31-4.08)	3.48 (2.56-4.79)	4.10 (2.89-5.87)	4.60 (3.13-6.83)
12-hr	1.11 (0.918-1.35)	1.51 (1.24-1.84)	2.05 (1.69-2.51)	2.51 (2.05-3.10)	3.17 (2.51-4.06)	3.71 (2.87-4.84)	4.28 (3.23-5.72)	4.90 (3.60-6.73)	5.78 (4.07-8.29)	6.51 (4.43-9.66)
24-hr	1.50 (1.33-1.73)	2.11 (1.87-2.43)	2.93 (2.59-3.39)	3.63 (3.18-4.24)	4.64 (3.93-5.58)	5.45 (4.52-6.70)	6.31 (5.11-7.94)	7.23 (5.70-9.37)	8.56 (6.47-11.6)	9.65 (7.05-13.5)
2-day	1.73 (1.54-2.00)	2.43 (2.15-2.80)	3.40 (3.00-3.93)	4.23 (3.70-4.93)	5.43 (4.60-6.54)	6.41 (5.32-7.88)	7.46 (6.04-9.40)	8.61 (6.78-11.1)	10.3 (7.76-13.9)	11.6 (8.50-16.3)
3-day	1.86 (1.65-2.14)	2.61 (2.31-3.00)	3.65 (3.22-4.21)	4.55 (3.98-5.30)	5.86 (4.96-7.05)	6.94 (5.76-8.53)	8.10 (6.56-10.2)	9.37 (7.38-12.1)	11.2 (8.49-15.2)	12.8 (9.33-17.8)
4-day	2.00 (1.78-2.31)	2.81 (2.49-3.24)	3.93 (3.47-4.54)	4.91 (4.30-5.72)	6.33 (5.36-7.62)	7.50 (6.22-9.22)	8.76 (7.10-11.0)	10.1 (7.99-13.1)	12.2 (9.20-16.4)	13.9 (10.1-19.4)
7-day	2.25 (1.99-2.59)	3.13 (2.77-3.61)	4.36 (3.85-5.04)	5.42 (4.75-6.32)	6.97 (5.90-8.39)	8.24 (6.84-10.1)	9.62 (7.79-12.1)	11.1 (8.76-14.4)	13.3 (10.1-18.0)	15.1 (11.1-21.2)
10-day	2.40 (2.13-2.77)	3.34 (2.95-3.85)	4.63 (4.09-5.35)	5.75 (5.04-6.70)	7.37 (6.25-8.88)	8.71 (7.23-10.7)	10.1 (8.22-12.8)	11.7 (9.24-15.2)	14.0 (10.6-18.9)	15.9 (11.6-22.2)
20-day	2.89 (2.56-3.32)	3.99 (3.53-4.60)	5.52 (4.87-6.38)	6.84 (5.99-7.97)	8.74 (7.41-10.5)	10.3 (8.56-12.7)	12.0 (9.72-15.1)	13.8 (10.9-17.9)	16.5 (12.5-22.3)	18.8 (13.7-26.3)
30-day	3.40 (3.02-3.92)	4.68 (4.14-5.40)	6.45 (5.69-7.45)	7.96 (6.98-9.28)	10.2 (8.61-12.2)	12.0 (9.93-14.7)	13.9 (11.3-17.5)	16.1 (12.7-20.8)	19.2 (14.5-25.9)	21.8 (15.9-30.5)
45-day	4.06 (3.60-4.67)	5.51 (4.88-6.35)	7.51 (6.63-8.68)	9.24 (8.09-10.8)	11.7 (9.95-14.1)	13.8 (11.4-17.0)	16.0 (13.0-20.2)	18.5 (14.6-23.9)	22.1 (16.7-29.8)	25.1 (18.4-35.1)
60-day	4.63 (4.11-5.33)	6.19 (5.48-7.14)	8.34 (7.37-9.64)	10.2 (8.93-11.9)	12.9 (10.9-15.5)	15.1 (12.5-18.6)	17.5 (14.2-22.0)	20.2 (15.9-26.1)	24.1 (18.2-32.6)	27.5 (20.1-38.4)

[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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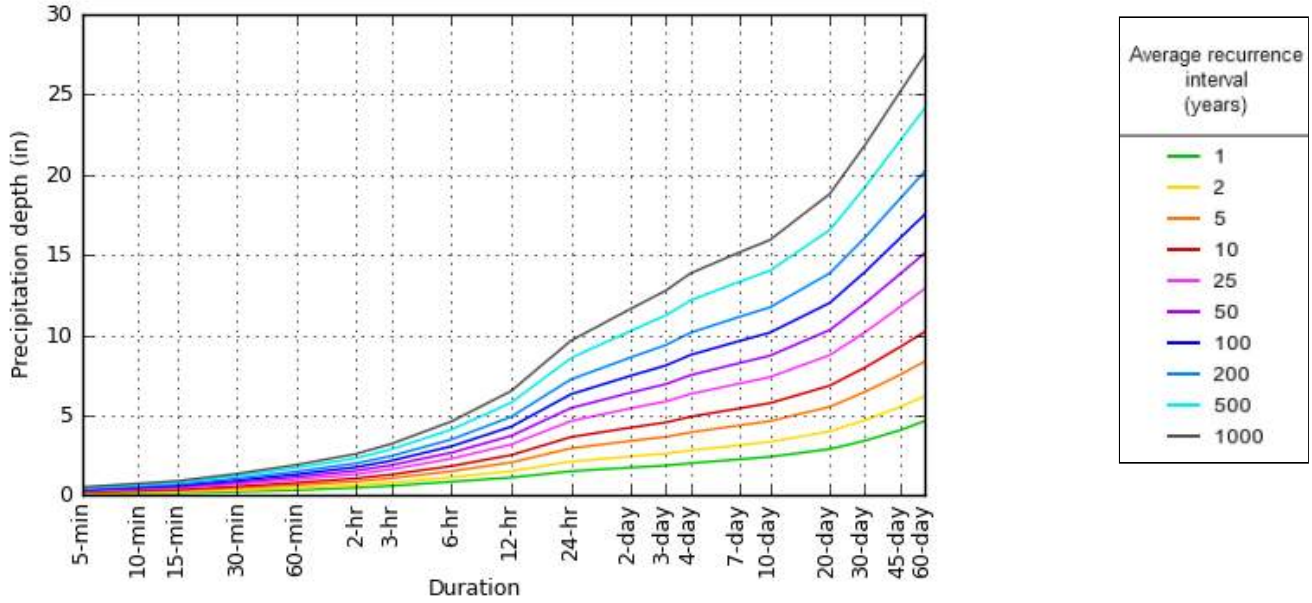
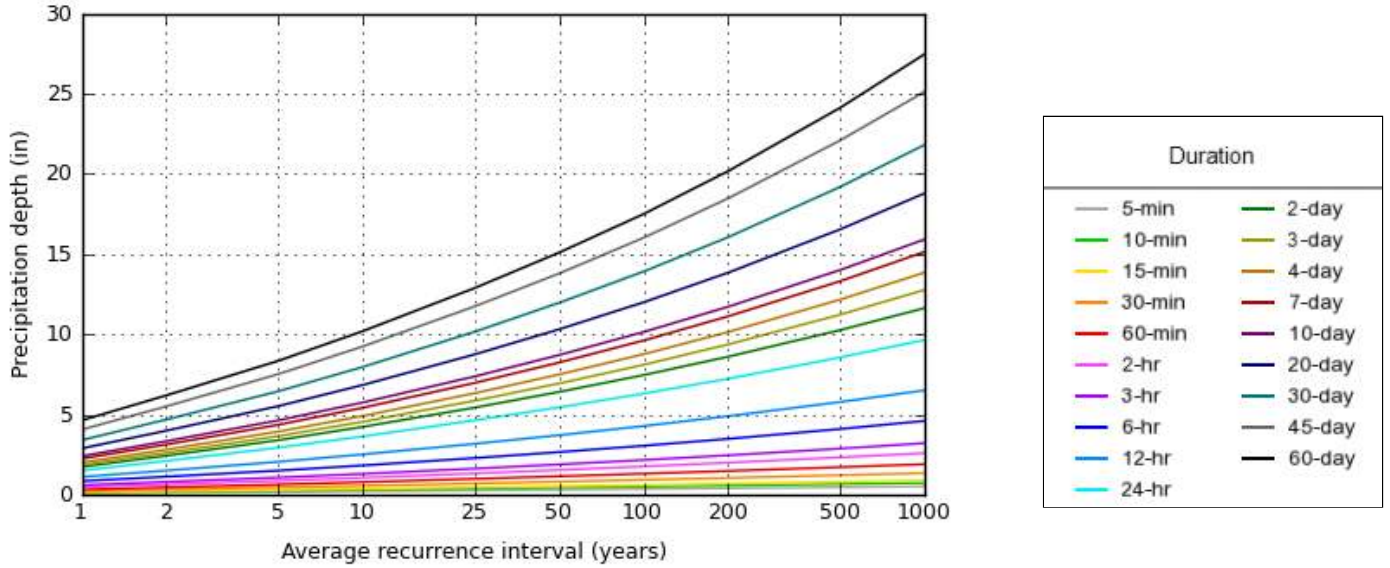
PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 34.4159°, Longitude: -117.3904°





NOAA Atlas 14, Volume 6, Version 2

Created (GMT): Wed Nov 25 23:27:45 2020

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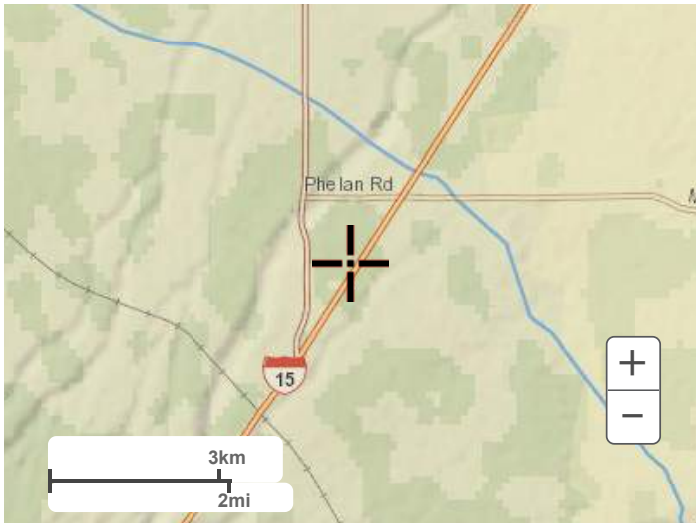
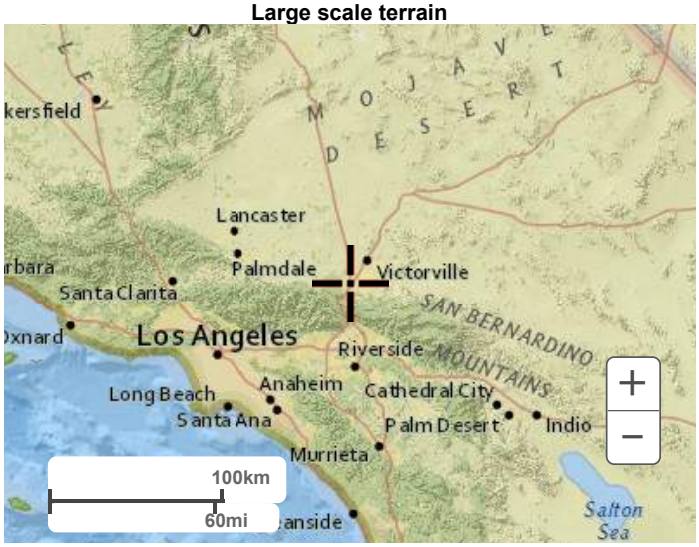
Maps & aerials

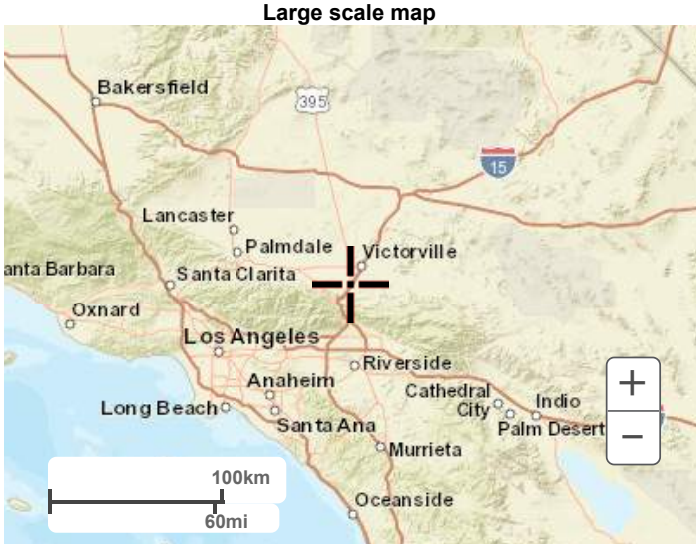
Small scale terrain



Large scale terrain



Large scale map



Large scale aerial

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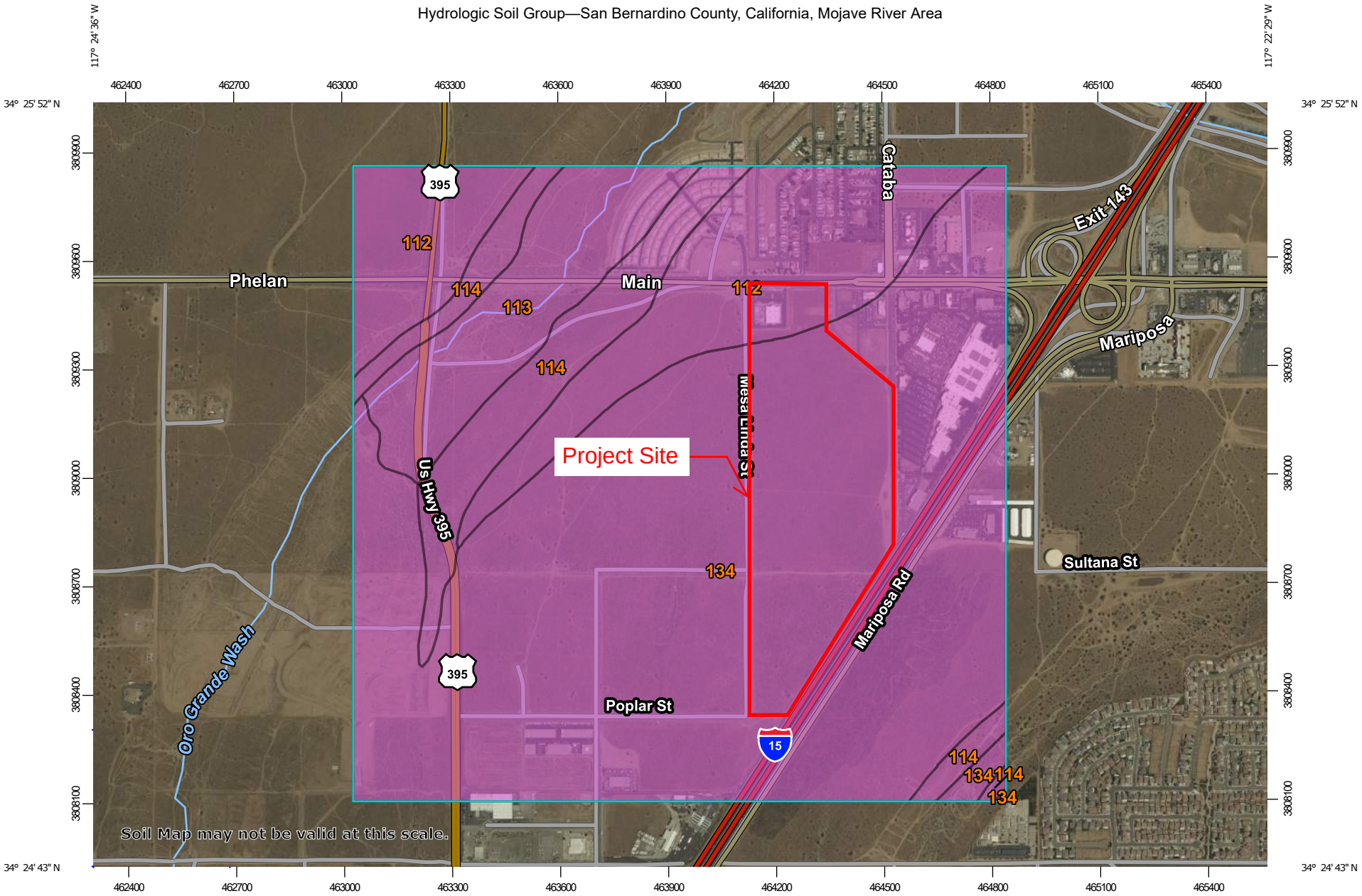
US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer



Map Scale: 1:14,900 if printed on A landscape (11" x 8.5") sheet.

N

0 200 400 800 1200 Meters

0 500 1000 2000 3000 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: San Bernardino County, California, Mojave River Area
Survey Area Data: Version 12, May 27, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 26, 2019—Jul 8, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
112	CAJON SAND, 0 TO 2 PERCENT SLOPES	A	137.5	17.4%
113	CAJON SAND, 2 TO 9 PERCENT SLOPES	A	65.4	8.3%
114	CAJON SAND, 9 TO 15 PERCENT SLOPES	A	66.7	8.4%
134	HESPERIA LOAMY FINE SAND, 2 TO 5 PERCENT SLOPES	A	521.5	65.9%
Totals for Area of Interest			**791.1**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Building 2 Preliminary Drainage Report

February, 2022
2020-281

I-15 Industrial Park Building 2
City of Hesperia, CA

Preliminary Drainage Report

Prepared For:
Covington Group Inc.
14180 Dallas Parkway, Suite 730
Dallas, TX 75254

Prepared By:
WestLAND Group, Inc.
4150 Concours, Suite 100
Ontario, CA 91764
Tel: 909-989-9789

WestLAND Group, Inc.

WestLAND Group, Inc.

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Appendix

A. Hydrology Exhibits

1. *Pre-Development Exhibit*
2. *Post-Development Exhibit*

B. Rational Method Calculations – Pre-Development

1. *10-Year Storm Event*
2. *25-Year Storm Event*
3. *100-Year Storm Event*

C. Rational Method Calculations – Post-Development

1. *10-Year Storm Event*
2. *100-Year Storm Event*

D. Unit Hydrograph Calculations – Pre-Development

1. *10-Year Storm Event*
2. *100-Year Storm Event*

E. Unit Hydrograph Calculations – Post-Development

1. *10-Year Storm Event*
2. *100-Year Storm Event*

F. Reference Documents

1. *Precipitation Data*
2. *Hydrologic Soil Map*
3. *Infiltration Report (Prepared in Final Engineering)*

1. Purpose and Scope

The I-15 Industrial Park Building 2 is located within the County of San Bernardino in the City of Hesperia and is intended to be developed into an industrial/commercial complex. The proposed development is bounded by Poplar Street to the South, Main Street to the North, Mesa Linda Street to the East, and Highway 395 to the West. The project intends to develop Parcel 1 of Parcel Map 14447, which measures to be approximately 36.32 acres.

The purpose of this study is to evaluate the Post-development hydrological conditions of the site including the storm drain system and Best Management Practices (BMPs) to ensure that they provide flood protection from the 100-year storm event without harming downstream conditions offsite.

2. Project Description

2.1 Project Description

The project site is located Southwest of the intersection between Interstate Highway 15 and Main Street. The entire I-15 Industrial Park Building 2 measures approximately 36.32 acres and is intended to be developed into an industrial/commercial complex.

The project site is currently vacant, undeveloped land with poor coverage. The soils have a hydrologic soil group classification of "A", and the site topography shows that stormwater runoff sheet flows to the northeast where it will naturally evaporate and infiltrate into the soil. See the exhibit for the Pre-Development conditions in Appendix A for more information.

The proposed site for Phase I is considered an industrial development and intends to develop approximately 36.32 acres into one industrial building, parking areas, loading areas, drive aisles, and landscape areas. Stormwater runoff will be collected by nearby catch basins and conveyed to the proposed underground basin via a storm drain system. Prior to entering the underground basin, runoff will first be pretreated via filter inserts placed in the catch basins. Further downstream within the storm drain system, the runoff will be further pretreated via a baffle box. After pretreatment, runoff is released into the underground CMP infiltration system where it will collect and infiltrate into the soil. The basins are sized and designed to prevent flooding from a 100-year storm while also accommodating the required retention volume for water quality purposes.

The site proposes one underground CMP infiltration system and to better understand the post-development conditions, the site has been divided into three drainage areas that convey runoff to the basin at their respective connection points. The basin is required to prevent flooding from a 100-year storm while also accommodating the required retention volume for water quality purposes. For this project, the basins are designed to capture the entire volume generated from a 100-year storm even meaning that no runoff will be discharged off site. For more information, please refer to the exhibit for the post-development conditions in Appendix A.

2.2 Soil Conditions

At this point in time, an infiltration study has not yet been performed. Therefore, the infiltration rate is currently assumed to be 7.8 in/hr, which is the infiltration rate that was measured for the Hesperia Commerce Center I project, a nearby site. Applying a safety factor of 2 results in a design infiltration rate of 3.90 in/hr and shows that the entire basin will be able to drawdown within 24 hours after the storm event.

3. Methodology

3.1 Background

The methodology described in the San Bernardino County Hydrology Manual is used to compute hydrologic data from the project site. The main methods used for this project were the Rational Method, Unit Hydrograph Method, and Basin Analysis, and the Civil Design software was used to compute the data. Solving for the Rational Method returns the peak flowrate of the site along with the time of concentration. The time of concentration is then used to solve for the Unit Hydrograph of the site which returns the total volume generated from a storm event. The inflow hydrograph returned from the Unit Hydrograph Method is then used along with the storage-outflow-elevation relationship of the basin to perform basin routing analysis which returns the storage, outflow, and elevation of the basin at each timestep within the storm event.

In addition, since the site does not meet any of the hydromodification exemption criteria provided in the Mojave Watershed Technical Guidance Documentation, the project must demonstrate that the post-development runoff volume, time of concentration, and peak flow velocity for the 10-year storm does not exceed that of the pre-development condition by more than five percent to comply with hydromodification requirements. This report will refer to the volume retention and allowable runoff required for compliance as the hydromodification volume retention requirement and the hydromodification allowable peak flow respectively.

3.2 Design Methodology

To assist in determining the adequate size of the onsite storage BMPs, the required retention volume was computed. This is taken to be the greater of the Design Capture Volume (DCV), the hydromodification volume retention requirement, and the difference in stormwater runoff volume for the 100-year storm between the post-development and pre-development conditions. Refer to the WQMP for more information regarding the DCV and the hydromodification requirements.

Once the required retention volume is retained onsite, the project site will begin releasing stormwater runoff offsite. However, for water quality and flood control purposes, the project is required to attenuate flows before discharging offsite. This will result in additional storage volume in the BMPs as runoff will continue to build up due to the inflow being higher than the outflow. The allowable flow rate out of the BMP is the hydromodification allowable peak flow for a 10-year storm, and the pre-development peak flow for a 100-year storm. When calculating the allowable peak flow rate for a 100-year storm, the 25-year pre-development rainfall data and AMC II was used in order to give more confidence that the basin does not adversely impact downstream conditions.

For this preliminary drainage study, the storm drain pipes and inlets have not been analyzed, but they will be sized to be able to accommodate the design storm of a 100-year storm event during final engineering.

3.3 Calculations Performed

Below is a summary of the calculations that were performed for hydrological analysis. Refer to Appendix H for pertinent information used in the calculations such as the precipitation data and the hydrologic soil group.

1. *Rational Method*
    a. *10-year storm event for pre-development and post-development conditions*
        i. *Used to determine hydromodification requirements*
    b. *25-year storm event for pre-development conditions*
        i. *Used to determine allowable flow rate for 100-year storm*
    c. *100-year storm event for pre-development and post-development conditions*
        i. *Used to determine volume differences*

2. *Unit Hydrograph*
    a. *10-year storm event for pre-development and post-development conditions*
        i. *Used to determine hydromodification requirements*
        ii. *Used to generate inflow hydrograph for post-development conditions*

    b. *100-year storm event for pre-development and post-development conditions*
        i. *Used to determine volume differences*
        ii. *Used to generate inflow hydrograph for post-development conditions*

3. *Storm Drain Pipe Sizing*
    a. *To be performed during final engineering*

4. *Inlet Sizing*
    a. *To be performed during final engineering*

4. Results and Analysis

Table 4.1 below shows the different volume required to be retained onsite. The calculations show that the BMPs will need to retain the entire hydromodification retention volume of 276,851 CF.

Table 4.1: Required Onsite Retention Volume

Onsite Retention Volume Requirement			
Area ID	DCV (CF)	Hydromodification Retention Volume (CF)	ΔV_{100} (CF)
Total	**101,718**	**276,851**	**87,255**

Tables 4.2a and 4.2b show a summary of the flow rate and volumes calculated using the Rational Method and the Unit Hydrograph for the pre-development and post-development conditions respectively. In addition, Table 4.2c shows a summary of the HCOC calculations. The results show that once the two basins retain the entire required retention volume, they will be allowed to release a total maximum of 54.40 cfs for a 10-year storm and 70.26 cfs for a 100-year storm. Since the site proposes to retain the entire runoff volume from a 100-year storm event, there will be no runoff being released offsite.

Table 4.2a: Pre-Development Peak Flows and Volumes (Refer to Pre-Development Exhibit)

Pre-Development Conditions					
Area ID	Q_{10}, cfs	V_{10}, cf	Q_{25}, cfs	Q_{100}, cfs	V_{100}, cf
A	26.64	**173,526**	40.52	66.13	**738,233**
B	11.76		16.70	27.40	
C	1.81		2.40	3.56	
Total	**40.21**		**59.61**	**97.08**	

Table 4.2b: Post-Development Peak Flows and Volumes (Refer to Post-Development Exhibit)

POST-DEVELOPMENT CONDITIONS (WITHOUT BMPS)				
Area ID	Q_{10}, cfs	V_{10}, cf	Q_{100}, cfs	V_{100}, cf
A	37.60	**474,081**	63.59	**825,488**
B	24.31		41.20	
C	18.23		31.13	
Total	**80.15**		**135.91**	

Table 4.2c: HCOC Calculations

HCOC CALCULATIONS SUMMARY			
	10-Year Time of Concentration (Min)	10-Year Peak Runoff (Cfs)	10-Year, 24-Hour Runoff Volume (CF)
Pre-Development Condition	18.19	40.21	173,526
Post-Development Condition	14.11	80.15	474,081
HCOC Requirement *0.95*(Post-Development) – Pre-Development*	4.47 *(Additional time to provide)*	35.93 *(Amount of runoff to reduce)*	276,851 *(Amount of runoff to retain)*
Summary (10-Year Storm)	**18.58** *(Minimum Tc for Post-Conditions)*	**44.22** *(Maximum outflow for Post-Conditions)*	**276,851** *(Minimum amount of runoff to retain)*

The underground CMP is designed to be approximately 12' deep providing a total volume of 825,511 CF for the entire site. The underground CMP is designed to capture and store the runoff from the entire 100-year storm event. For the 100-year storm event, the underground CMP and the gravel backfill will be filled, and for a 10-year storm event, stormwater will pond approximately 7.33' from the bottom of the gravel backfill. Table 4.3 below provides a summary of the results, and for more information, refer to the stage storage worksheet for the CMP in Appendix F.

Table 4.3: Basin Analysis

BASIN ANALYSIS				
10-Year Volume (CF)	100-Year Volume (CF)	Total Volume Provided (CF)	100-Year Peak Runoff (Cfs)	Max Water Surface Elevation (Ft)
474,081	825,488	825,511	0.00	13.00 (0.5' Gravel Backfill above and below the CMP + 12' CMP)

The calculations show that the proposed underground CMP is sized large enough to accommodate the required retention volume for water quality purposes while also mitigating enough flows to prevent adverse impacts downstream of the project site. Since the basins are designed to retain and infiltrate the entire volume from the 100-year storm, there will be no runoff leaving the site for up to a 100-year storm.

The below table summarizes the calculations pertinent to the design.

PROJECT DESIGN CRITERIA	
Hydrology Results & Analysis Summary Table:	ΔV_{100} = **87,255 ft³**= V_{POST} - V_{PRE} = 825,488 – 738,233 DCV = **101,718 ft³** ΔV_{10} (Hydromodification) = **276,851 ft³**= 0.95*V_{POST} - V_{PRE} = 0.95*474,081 – 173,526 ΔV_{10} > DCV > ΔV_{100}, ΔV_{10} = site design storage requirement V_{100} = **825,488 ft³** Total $V_{PROVIDED}$ = **825,111 ft³** Peak Q_{100} (Post w/ BMPs)= **0.00 cfs (Entire Site)** $V_{PROVIDED}$ > V_{100} = Full Retention Onsite

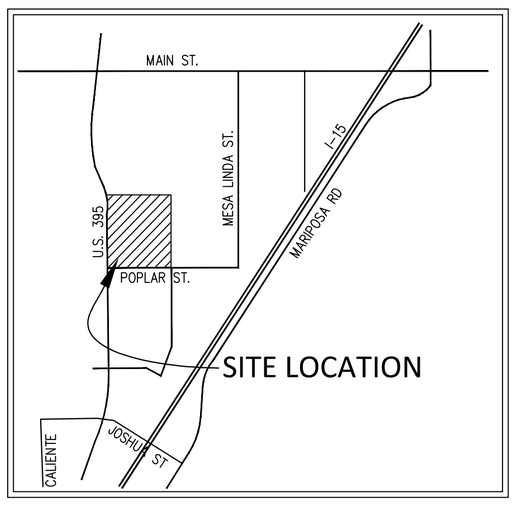
5. Conclusion

The results show that the proposed development will provide enough on-site retention volume and flow attenuation to prevent adverse impacts downstream of the project site. As shown in the post-development exhibit, the proposed BMPs for stormwater management is one underground CMP system. The proposed CMP will retain and infiltrate the entire volume generated from a 100-year storm event, and no stormwater runoff will be released offsite. The results demonstrate that the proposed underground CMP system will comply with the flood protection and WQMP requirements of the City of Hesperia and County of San Bernardino.

Appendix A – Hydrology Exhibits

- Pre-Development Exhibit
- Post-Development Exhibit

CITY OF HESPERIA
HYDROLOGY EXHIBIT
FOR
I-15 INDUSTRIAL PARK
BUILDING 2

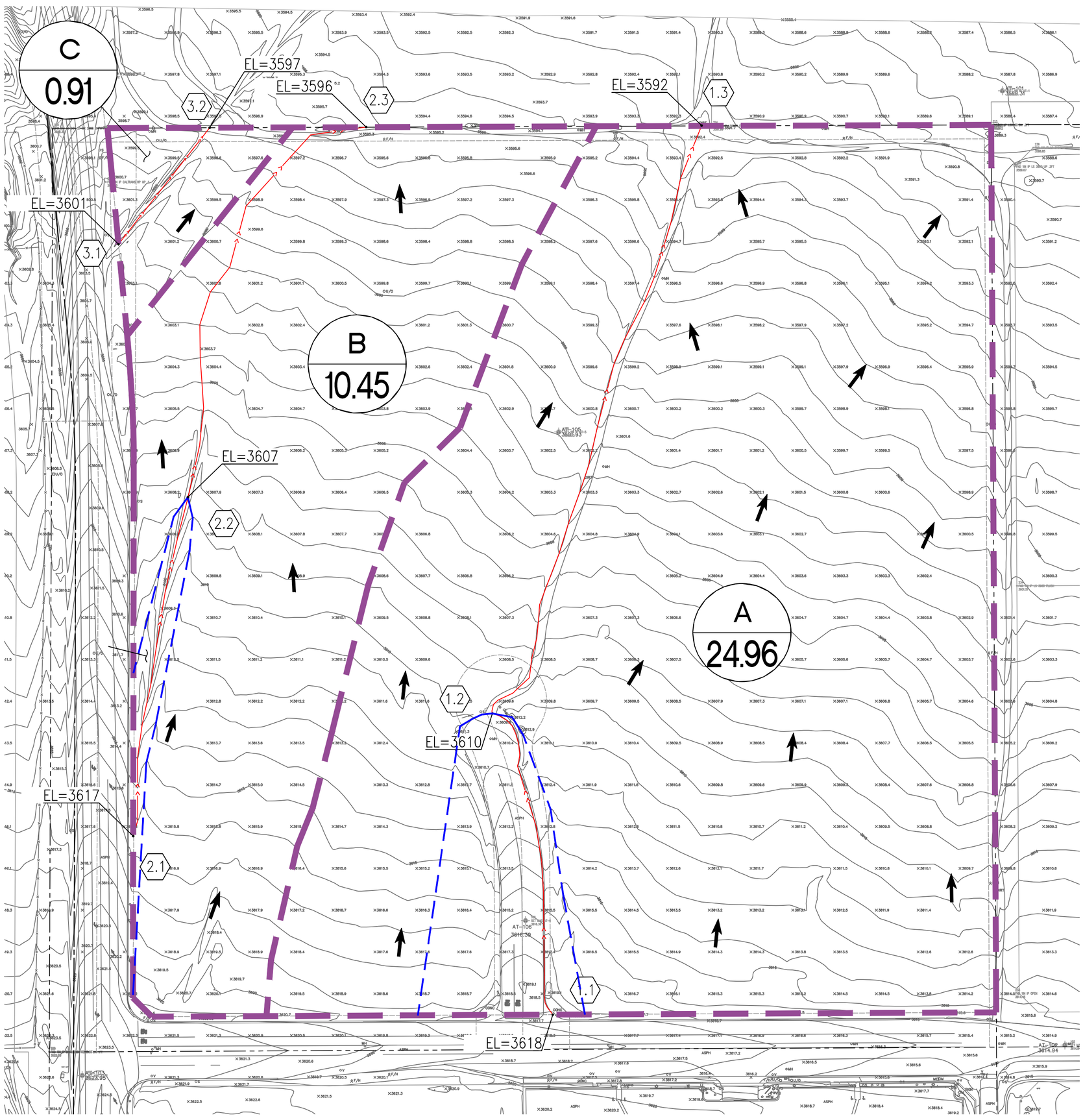


VICINITY MAP
NOT TO SCALE

HYDROLOGY INFORMATION

SITE AREA:	36.32 ACRE	
SOIL GROUP:	A	(NRCS WEB SOIL SURVEY)
IMPERVIOUS:	0%	
ISOHYETALS:	1.32"	(100-YEAR 1 HOUR)
	0.793"	(10-YEAR 1 HOUR)
CN NUMBER:	67	(SOIL GROUP A)
FREQUENCY:	100 YEAR	
	10 YEAR	

METHOD: SAN BERNARDINO COUNTY HYDROLOGY MANUAL



LEGEND:

- SUB DRAINAGE AREA BOUNDARY
- DRAINAGE AREA BOUNDARY
- FLOW PATH
- PROPOSED FLOW DIRECTION ARROW
- X / XXX — DRAINAGE AREA DESIGNATION / AREA (AC)

HYDROLOGY SUMMARY

DRAINAGE AREA No.	TRIBUTARY AREA (AC)	IMPERVIOUS RATIO	10-YEAR VOLUME (CF)	100-YEAR VOLUME (CF)	25-YEAR PEAK FLOW (CFS)
A	24.96	0.00	173,526	738,233	40.52
B	10.45	0.00			16.70
C	0.91	0.00			2.40
TOTAL	36.32	0.00			59.61

100' 0' 50' 100'
SCALE: 1" = 100'

PREPARED BY:
WestLAND Group, Inc. Land Surveyors • Civil Engineers • GIS
4150 CONCOURS, ONTARIO, CA 91764
PHONE: (909) 989-9789 FAX: (909) 989-9660

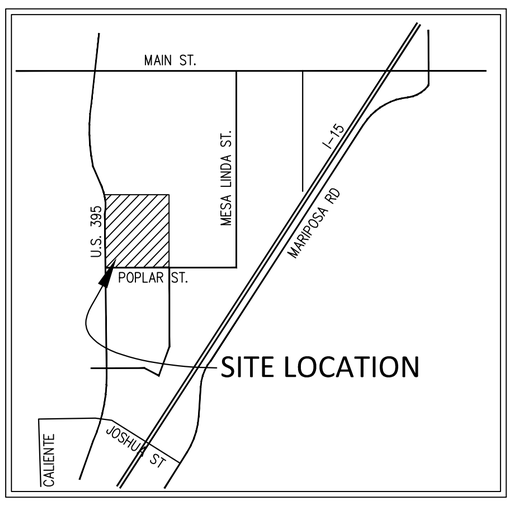
JOB NO: 2020-326

I-15 INDUSTRIAL PARK BUILDING 2
PRE-DEVELOPED HYDROLOGY EXHIBIT
CITY OF HESPERIA

DATE: FEB 2021
SHEET 1 OF 1

PLOTTED: 2020/2020-281 HESPERIA COMMERCE CENTER 4 - CONVISION GROUP, INC. - MARK MILAKOVICH\00 ENGINEERING\07\REPORTS\HYDROLOGY\3_EXHIBITS\2020-281_PRE HYDROLOGY.DWG (03-10-21 5:43:17PM)
Plotted by: marcus.gabovenier
03/10/2021

CITY OF HESPERIA
HYDROLOGY EXHIBIT
FOR
I-15 INDUSTRIAL PARK
BUILDING 2



VICINITY MAP
NOT TO SCALE

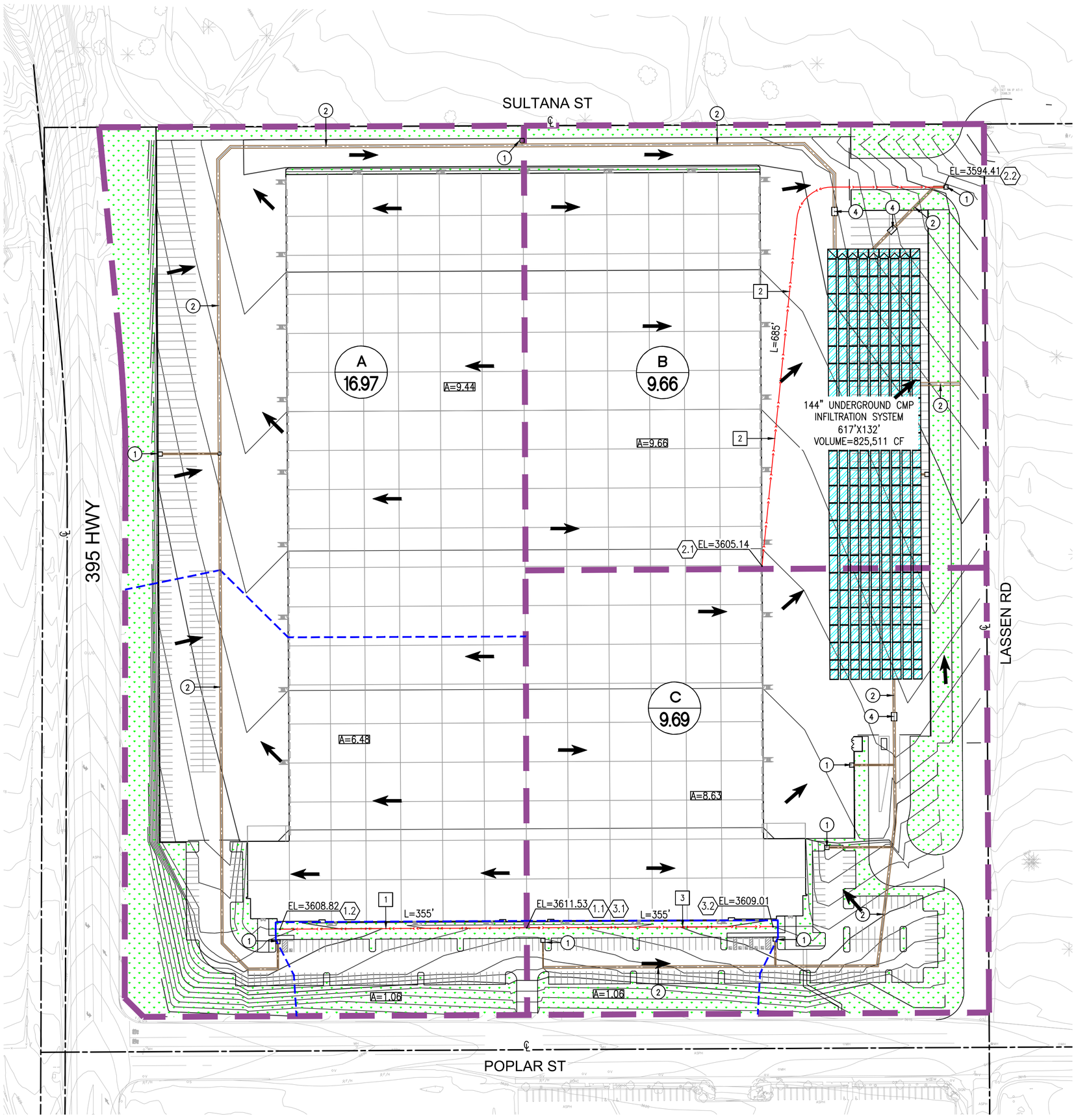
HYDROLOGY INFORMATION

SITE AREA:	36.32 ACRE	
SOIL GROUP:	A	(NRCS WEB SOIL SURVEY)
IMPERVIOUS:	88%	
ISOHYETALS:	1.32"	(100-YEAR 1 HOUR)
	0.793"	(10-YEAR 1 HOUR)
CN NUMBER:	32	(SOIL GROUP A)
FREQUENCY:	100 YEAR	
	10 YEAR	

METHOD: SAN BERNARDINO COUNTY HYDROLOGY MANUAL

LEGEND:

- DETENTION BASIN
- SUB DRAINAGE AREA BOUNDARY
- DRAINAGE AREA BOUNDARY
- FLOW PATH
- STORM DRAIN
- PROPOSED FLOW DIRECTION ARROW
- X / X.XX — DRAINAGE AREA DESIGNATION / AREA (AC)



DRAINAGE NOTES:

1. PROPOSED CATCH BASIN WITH FILTER INSERT
2. PROPOSED STORM DRAIN PIPE PRIVATE MAINTAINED
3. PROPOSED BMP – UNDERGROUND DETENTION BASIN
4. PROPOSED BMP – BAFFLE BOX

HYDROLOGY SUMMARY

DRAINAGE AREA No.	TRIBUTARY AREA (AC)	IMPERVIOUS RATIO	RUNOFF COEFFICIENT	DCV (CF)	HYDROMODIFICATION VOLUME TO RETAIN (CF)	100-YEAR VOLUME (CF)	TOTAL RETENTION VOLUME (CF)
A	16.97	0.84	0.64	–	276,851	825,488	825,511 (UNDERGROUND 144" CMP)
B	9.66	0.94	0.79	–			
C	9.69	0.85	0.67	–			
TOTAL	36.32	0.88	0.69	101,718			

100' 0' 50' 100'
SCALE: 1" = 100'

PREPARED BY:
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PHONE: (909) 989-9789 FAX: (909) 989-9660
JOB NO: 2020-281

I-15 INDUSTRIAL PARK BUILDING 2
POST-DEVELOPED HYDROLOGY EXHIBIT
CITY OF HESPERIA

DATE: MAR 2022
SHEET 1 OF 1

D:\USER_2020\2020-281 HESPERIA COMMERCE CENTER 4 - CONNTON GROUP, INC. - MARK MEANOR\04 ENGINEERING\01\REPORTS\HYDROLOGY\3_EXHIBITS\2020-281_POST HYDROLOGY.DWG (03-10-22 8:14:25PM)
Plotted by: tomTrieu
03/10/2022

Appendix B – Rational Method (Pre-Development)

- 10-Year Storm Event
- 25-Year Storm Event
- 100-Year Storm Event

Appendix B – Rational Method (Pre-Development)

- 10-Year Storm Event

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: 02/25/21

HCC IV PRE DEVELOPED CONDITIONS
10 YR SUB AREA A
MGUBBAREINER 2021-02-24

Program License Serial Number 6277

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.793 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 1.100 to Point/Station 1.200
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
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) = 67.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.578(In/Hr)
Initial subarea data:
Initial area flow distance = 460.000(Ft.)
Top (of initial area) elevation = 3618.000(Ft.)
Bottom (of initial area) elevation = 3610.000(Ft.)
Difference in elevation = 8.000(Ft.)
Slope = 0.01739 s(%)= 1.74
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 13.715 min.
Rainfall intensity = 2.228(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.666
Subarea runoff = 2.450(CFS)

```
Total initial stream area =        1.650(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.578(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.200 to Point/Station        1.300
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.261(Ft.), Average velocity =   3.692(Ft/s)
!!Warning: Water is above left or right bank elevations
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              0.10
        2             10.00              0.00
        3             20.00              0.10
Manning's 'N' friction factor =   0.020
------------------------------------------------------------------
Sub-Channel flow  =     15.572(CFS)
  '     '        flow top width =     20.000(Ft.)
  '     '    velocity=    3.692(Ft/s)
  '     '        area =      4.218(Sq.Ft)
  '     '        Froude number =     1.417

Upstream point elevation =  3610.000(Ft.)
Downstream point elevation =  3592.000(Ft.)
Flow length =   915.000(Ft.)
Travel time  =    4.13 min.
Time of concentration =   17.85 min.
Depth of flow =   0.261(Ft.)
Average velocity =   3.692(Ft/s)
Total irregular channel flow =    15.572(CFS)
Irregular channel normal depth above invert elev. =   0.261(Ft.)
Average velocity of channel(s) =   3.692(Ft/s)
!!Warning: Water is above left or right bank elevations
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
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)  = 67.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.578(In/Hr)
Rainfall intensity =      1.853(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.619
Subarea runoff =     26.188(CFS) for   23.310(Ac.)
Total runoff =     28.638(CFS)
```

Effective area this stream = 24.96(Ac.)
Total Study Area (Main Stream No. 1) = 24.96(Ac.)
Area averaged Fm value = 0.578(In/Hr)
Depth of flow = 0.354(Ft.), Average velocity = 4.711(Ft/s)
!!Warning: Water is above left or right bank elevations
End of computations, Total Study Area = 24.96 (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) = 1.000
Area averaged SCS curve number = 67.0

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: 02/25/21

HCC IV PRE DEVELOPED CONDITIONS
10 YR SUB AREA B
MGUBBAREINER 2021-02-24

Program License Serial Number 6277

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.793 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 2.100 to Point/Station 2.200
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
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) = 67.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.578(In/Hr)
Initial subarea data:
Initial area flow distance = 495.000(Ft.)
Top (of initial area) elevation = 3617.000(Ft.)
Bottom (of initial area) elevation = 3607.000(Ft.)
Difference in elevation = 10.000(Ft.)
Slope = 0.02020 s(%)= 2.02
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 13.706 min.
Rainfall intensity = 2.229(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.667
Subarea runoff = 0.565(CFS)

```
Total initial stream area =        0.380(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.578(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.200 to Point/Station        2.300
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.177(Ft.), Average velocity =   2.437(Ft/s)
!!Warning: Water is above left or right bank elevations
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              0.10
        2             10.00              0.00
        3             20.00              0.10
Manning's 'N' friction factor =   0.020
------------------------------------------------------------------
Sub-Channel flow  =      6.208(CFS)
  '     '        flow top width =     20.000(Ft.)
  '     '    velocity=    2.437(Ft/s)
  '     '        area =      2.547(Sq.Ft)
  '     '        Froude number =     1.204

Upstream point elevation =  3607.000(Ft.)
Downstream point elevation =  3596.000(Ft.)
Flow length =   655.000(Ft.)
Travel time  =    4.48 min.
Time of concentration =   18.19 min.
Depth of flow =   0.177(Ft.)
Average velocity =   2.437(Ft/s)
Total irregular channel flow =     6.208(CFS)
Irregular channel normal depth above invert elev. =   0.177(Ft.)
Average velocity of channel(s) =   2.437(Ft/s)
!!Warning: Water is above left or right bank elevations
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
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)  = 67.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.578(In/Hr)
Rainfall intensity =      1.829(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.615
Subarea runoff =     11.196(CFS) for   10.070(Ac.)
Total runoff =     11.761(CFS)
```

Effective area this stream = 10.45(Ac.)
Total Study Area (Main Stream No. 1) = 10.45(Ac.)
Area averaged Fm value = 0.578(In/Hr)
Depth of flow = 0.237(Ft.), Average velocity = 3.147(Ft/s)
!!Warning: Water is above left or right bank elevations
End of computations, Total Study Area = 10.45 (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) = 1.000
Area averaged SCS curve number = 67.0

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: 02/25/21

HCC IV PRE DEVELOPED CONDITIONS
10 YR SUB AREA C
MGUBBAREINER 2021-02-24

Program License Serial Number 6277

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.793 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 3.100 to Point/Station 3.200
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
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) = 67.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.578(In/Hr)
Initial subarea data:
Initial area flow distance = 215.000(Ft.)
Top (of initial area) elevation = 3601.000(Ft.)
Bottom (of initial area) elevation = 3597.000(Ft.)
Difference in elevation = 4.000(Ft.)
Slope = 0.01860 s(%)= 1.86
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 9.982 min.
Rainfall intensity = 2.783(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.713
Subarea runoff = 1.806(CFS)

Total initial stream area = 0.910(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.578(In/Hr)
End of computations, Total Study Area = 0.91 (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) = 1.000
Area averaged SCS curve number = 67.0

Appendix B – Rational Method (Pre-Development)

- 25-Year Storm Event

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: 02/25/21

HCC IV PRE DEVELOPED CONDITIONS
25 YR SUB AREA A
MGUBBAREINER 2021-02-25

Program License Serial Number 6277

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

Rational hydrology study storm event year is 25.0
Computed rainfall intensity:
Storm year = 25.00 1 hour rainfall = 0.998 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 1.100 to Point/Station 1.200
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
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) = 67.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.578(In/Hr)
Initial subarea data:
Initial area flow distance = 460.000(Ft.)
Top (of initial area) elevation = 3618.000(Ft.)
Bottom (of initial area) elevation = 3610.000(Ft.)
Difference in elevation = 8.000(Ft.)
Slope = 0.01739 s(%)= 1.74
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 13.715 min.
Rainfall intensity = 2.804(In/Hr) for a 25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.714
Subarea runoff = 3.305(CFS)

```
Total initial stream area =        1.650(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.578(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.200 to Point/Station        1.300
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.309(Ft.), Average velocity =   4.235(Ft/s)
!!Warning: Water is above left or right bank elevations
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              0.10
        2             10.00              0.00
        3             20.00              0.10
Manning's 'N' friction factor =   0.020
------------------------------------------------------------------
Sub-Channel flow  =     21.940(CFS)
  '     '        flow top width =     20.000(Ft.)
  '     '    velocity=    4.235(Ft/s)
  '     '        area =      5.181(Sq.Ft)
  '     '        Froude number =     1.466

Upstream point elevation =  3610.000(Ft.)
Downstream point elevation =  3592.000(Ft.)
Flow length =   915.000(Ft.)
Travel time  =    3.60 min.
Time of concentration =   17.32 min.
Depth of flow =   0.309(Ft.)
Average velocity =   4.235(Ft/s)
Total irregular channel flow =    21.939(CFS)
Irregular channel normal depth above invert elev. =   0.309(Ft.)
Average velocity of channel(s) =   4.235(Ft/s)
!!Warning: Water is above left or right bank elevations
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
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)  = 67.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.578(In/Hr)
Rainfall intensity =      2.382(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.681
Subarea runoff =     37.210(CFS) for   23.310(Ac.)
Total runoff =     40.515(CFS)
```

Effective area this stream = 24.96(Ac.)
Total Study Area (Main Stream No. 1) = 24.96(Ac.)
Area averaged Fm value = 0.578(In/Hr)
Depth of flow = 0.424(Ft.), Average velocity = 5.412(Ft/s)
!!Warning: Water is above left or right bank elevations
End of computations, Total Study Area = 24.96 (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) = 1.000
Area averaged SCS curve number = 67.0

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: 02/25/21

HCC IV PRE DEVELOPED CONDITIONS
25 YR SUB AREA B
MGUBBAREINER 2021-02-25

Program License Serial Number 6277

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

Rational hydrology study storm event year is 25.0
Computed rainfall intensity:
Storm year = 25.00 1 hour rainfall = 0.998 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 2.100 to Point/Station 2.200
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
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) = 67.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.578(In/Hr)
Initial subarea data:
Initial area flow distance = 495.000(Ft.)
Top (of initial area) elevation = 3617.000(Ft.)
Bottom (of initial area) elevation = 3607.000(Ft.)
Difference in elevation = 10.000(Ft.)
Slope = 0.02020 s(%)= 2.02
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 13.706 min.
Rainfall intensity = 2.805(In/Hr) for a 25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.714
Subarea runoff = 0.762(CFS)

```
Total initial stream area =        0.380(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.578(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.200 to Point/Station        2.300
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.207(Ft.), Average velocity =   2.800(Ft/s)
!!Warning: Water is above left or right bank elevations
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              0.10
        2             10.00              0.00
        3             20.00              0.10
Manning's 'N' friction factor =   0.020
------------------------------------------------------------------
Sub-Channel flow  =      8.780(CFS)
  '     '        flow top width =     20.000(Ft.)
  '     '    velocity=    2.800(Ft/s)
  '     '        area =      3.136(Sq.Ft)
  '     '        Froude number =     1.246

Upstream point elevation =  3607.000(Ft.)
Downstream point elevation =  3596.000(Ft.)
Flow length =   655.000(Ft.)
Travel time  =    3.90 min.
Time of concentration =   17.61 min.
Depth of flow =   0.207(Ft.)
Average velocity =   2.800(Ft/s)
Total irregular channel flow =     8.780(CFS)
Irregular channel normal depth above invert elev. =   0.207(Ft.)
Average velocity of channel(s) =   2.800(Ft/s)
!!Warning: Water is above left or right bank elevations
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
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)  = 67.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.578(In/Hr)
Rainfall intensity =      2.354(In/Hr) for a    25.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.679
Subarea runoff =     15.942(CFS) for   10.070(Ac.)
Total runoff =     16.704(CFS)
```

Effective area this stream = 10.45(Ac.)
Total Study Area (Main Stream No. 1) = 10.45(Ac.)
Area averaged Fm value = 0.578(In/Hr)
Depth of flow = 0.281(Ft.), Average velocity = 3.621(Ft/s)
!!Warning: Water is above left or right bank elevations
End of computations, Total Study Area = 10.45 (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) = 1.000
Area averaged SCS curve number = 67.0

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: 02/25/21

HCC IV PRE DEVELOPED CONDITIONS
25 YR SUB AREA C
MGUBBAREINER 2021-02-25

Program License Serial Number 6277

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

Rational hydrology study storm event year is 25.0
Computed rainfall intensity:
Storm year = 25.00 1 hour rainfall = 0.998 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 3.100 to Point/Station 3.200
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
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) = 67.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.578(In/Hr)
Initial subarea data:
Initial area flow distance = 215.000(Ft.)
Top (of initial area) elevation = 3601.000(Ft.)
Bottom (of initial area) elevation = 3597.000(Ft.)
Difference in elevation = 4.000(Ft.)
Slope = 0.01860 s(%)= 1.86
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 9.982 min.
Rainfall intensity = 3.503(In/Hr) for a 25.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.751
Subarea runoff = 2.395(CFS)

Total initial stream area = 0.910(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.578(In/Hr)
End of computations, Total Study Area = 0.91 (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) = 1.000
Area averaged SCS curve number = 67.0

Appendix B – Rational Method (Pre-Development)

- 100-Year Storm Event

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: 02/24/21

HCC IV PRE DEVELOPED CONDITIONS
100 YR SUBAREA A
MGUBBAREINER 2021-02-24

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 = 1.320 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 3

++

Process from Point/Station 1.100 to Point/Station 1.200
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
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) = 67.00
Adjusted SCS curve number for AMC 3 = 84.60
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.290(In/Hr)
Initial subarea data:
Initial area flow distance = 460.000(Ft.)
Top (of initial area) elevation = 3618.000(Ft.)
Bottom (of initial area) elevation = 3610.000(Ft.)
Difference in elevation = 8.000(Ft.)
Slope = 0.01739 s(%)= 1.74
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 13.715 min.
Rainfall intensity = 3.709(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.830

```
Subarea runoff =      5.077(CFS)
Total initial stream area =        1.650(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.290(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.200 to Point/Station        1.300
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.397(Ft.), Average velocity =   5.141(Ft/s)
!!Warning: Water is above left or right bank elevations
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              0.10
        2             10.00              0.00
        3             20.00              0.10
Manning's 'N' friction factor =   0.020
------------------------------------------------------------------
Sub-Channel flow  =     35.633(CFS)
  '     '        flow top width =     20.000(Ft.)
  '     '    velocity=    5.141(Ft/s)
  '     '        area =      6.931(Sq.Ft)
  '     '        Froude number =     1.539

Upstream point elevation =  3610.000(Ft.)
Downstream point elevation =  3592.000(Ft.)
Flow length =   915.000(Ft.)
Travel time  =    2.97 min.
Time of concentration =   16.68 min.
Depth of flow =   0.397(Ft.)
Average velocity =   5.141(Ft/s)
Total irregular channel flow =    35.633(CFS)
Irregular channel normal depth above invert elev. =   0.397(Ft.)
Average velocity of channel(s) =   5.141(Ft/s)
!!Warning: Water is above left or right bank elevations
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
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)  = 67.00
Adjusted SCS curve number for AMC 3 = 84.60
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.290(In/Hr)
Rainfall intensity =      3.234(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.819
```

Subarea runoff = 61.054(CFS) for 23.310(Ac.)
Total runoff = 66.131(CFS)
Effective area this stream = 24.96(Ac.)
Total Study Area (Main Stream No. 1) = 24.96(Ac.)
Area averaged Fm value = 0.290(In/Hr)
Depth of flow = 0.552(Ft.), Average velocity = 6.584(Ft/s)
!!Warning: Water is above left or right bank elevations
End of computations, Total Study Area = 24.96 (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) = 1.000
Area averaged SCS curve number = 67.0

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: 02/24/21

HCC IV PRE DEVELOPED CONDITIONS
100 YR SUBAREA B
MGUBBAREINER 2021-02-24

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 = 1.320 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 3

++

Process from Point/Station 2.100 to Point/Station 2.200
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
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) = 67.00
Adjusted SCS curve number for AMC 3 = 84.60
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.290(In/Hr)
Initial subarea data:
Initial area flow distance = 495.000(Ft.)
Top (of initial area) elevation = 3617.000(Ft.)
Bottom (of initial area) elevation = 3607.000(Ft.)
Difference in elevation = 10.000(Ft.)
Slope = 0.02020 s(%)= 2.02
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 13.706 min.
Rainfall intensity = 3.711(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.830

```
Subarea runoff =      1.170(CFS)
Total initial stream area =        0.380(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.290(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.200 to Point/Station        2.300
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.260(Ft.), Average velocity =   3.406(Ft/s)
!!Warning: Water is above left or right bank elevations
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              0.10
        2             10.00              0.00
        3             20.00              0.10
Manning's 'N' friction factor =   0.020
------------------------------------------------------------------
Sub-Channel flow  =     14.332(CFS)
  '     '        flow top width =     20.000(Ft.)
  '     '    velocity=    3.406(Ft/s)
  '     '        area =      4.208(Sq.Ft)
  '     '        Froude number =     1.309

Upstream point elevation =  3607.000(Ft.)
Downstream point elevation =  3596.000(Ft.)
Flow length =   655.000(Ft.)
Travel time  =    3.21 min.
Time of concentration =   16.91 min.
Depth of flow =   0.260(Ft.)
Average velocity =   3.406(Ft/s)
Total irregular channel flow =    14.331(CFS)
Irregular channel normal depth above invert elev. =   0.260(Ft.)
Average velocity of channel(s) =   3.406(Ft/s)
!!Warning: Water is above left or right bank elevations
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
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)  = 67.00
Adjusted SCS curve number for AMC 3 = 84.60
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.290(In/Hr)
Rainfall intensity =      3.203(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.819
```

Subarea runoff = 26.227(CFS) for 10.070(Ac.)
Total runoff = 27.396(CFS)
Effective area this stream = 10.45(Ac.)
Total Study Area (Main Stream No. 1) = 10.45(Ac.)
Area averaged Fm value = 0.290(In/Hr)
Depth of flow = 0.360(Ft.), Average velocity = 4.414(Ft/s)
!!Warning: Water is above left or right bank elevations
End of computations, Total Study Area = 10.45 (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) = 1.000
Area averaged SCS curve number = 67.0

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

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HCC IV PRE DEVELOPED CONDITIONS
100 YR SUB AREA C
MGUBBAREINER 2021-02-24

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 = 1.320 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 3

++

Process from Point/Station 3.100 to Point/Station 3.200
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
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) = 67.00
Adjusted SCS curve number for AMC 3 = 84.60
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.290(In/Hr)
Initial subarea data:
Initial area flow distance = 215.000(Ft.)
Top (of initial area) elevation = 3601.000(Ft.)
Bottom (of initial area) elevation = 3597.000(Ft.)
Difference in elevation = 4.000(Ft.)
Slope = 0.01860 s(%)= 1.86
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 9.982 min.
Rainfall intensity = 4.633(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.844

Appendix C – Rational Method (Post-Development)

- 10-Year Storm Event
- 100-Year Storm Event

Appendix C – Rational Method (Post-Development)

- 10-Year Storm Event

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

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HCC IV POST DEVELOPED CONDITION
10 YR SUB AREA A
MGUBBAREINER 2021-02-24

Program License Serial Number 6277

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.793 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 1.100 to Point/Station 1.200
**** 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
Pervious ratio(Ap) = 0.1000 Max loss rate(Fm)= 0.098(In/Hr)
Initial subarea data:
Initial area flow distance = 355.000(Ft.)
Top (of initial area) elevation = 3611.530(Ft.)
Bottom (of initial area) elevation = 3608.820(Ft.)
Difference in elevation = 2.710(Ft.)
Slope = 0.00763 s(%)= 0.76
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 8.441 min.
Rainfall intensity = 3.130(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.872
Subarea runoff = 2.892(CFS)

```
Total initial stream area =        1.060(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.098(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.200 to Point/Station        1.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  3608.820(Ft.)
Downstream point/station elevation =  3603.570(Ft.)
Pipe length  =   660.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.892(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     2.892(CFS)
Normal flow depth in pipe =    8.99(In.)
Flow top width inside pipe =   10.41(In.)
Critical Depth =    8.75(In.)
Pipe flow velocity =      4.59(Ft/s)
Travel time through pipe =    2.40 min.
Time of concentration (TC) =    10.84 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.200 to Point/Station        1.300
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      1.060(Ac.)
Runoff from this stream =      2.892(CFS)
Time of concentration =   10.84 min.
Rainfall intensity =     2.627(In/Hr)
Area averaged loss rate (Fm) =    0.0978(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.400 to Point/Station        1.300
**** 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
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.098(In/Hr)
Initial subarea data:
Initial area flow distance =   470.000(Ft.)
Top (of initial area) elevation =  3607.510(Ft.)
Bottom (of initial area) elevation =  3603.570(Ft.)
```

```
Difference in elevation =     3.940(Ft.)
Slope =    0.00838  s(%)=       0.84
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.269 min.
Rainfall intensity =      2.931(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.870
Subarea runoff =     16.525(CFS)
Total initial stream area =        6.480(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.098(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.400 to Point/Station        1.300
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      6.480(Ac.)
Runoff from this stream =     16.525(CFS)
Time of concentration =    9.27 min.
Rainfall intensity =     2.931(In/Hr)
Area averaged loss rate (Fm) =    0.0978(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      2.89     1.060     10.84    0.098      2.627
2     16.52     6.480      9.27    0.098      2.931
Qmax(1) =
           1.000 *    1.000 *     2.892) +
           0.893 *    1.000 *    16.525) + =      17.642
Qmax(2) =
           1.120 *    0.855 *     2.892) +
           1.000 *    1.000 *    16.525) + =      19.296

Total of 2 streams to confluence:
Flow rates before confluence point:
       2.892      16.525
Maximum flow rates at confluence using above data:
       17.642       19.296
Area of streams before confluence:
        1.060        6.480
Effective area values after confluence:
        7.540        7.386
Results of confluence:
Total flow rate =     19.296(CFS)
Time of concentration =     9.269 min.
Effective stream area after confluence =      7.386(Ac.)
```

```
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.098(In/Hr)
Study area total (this main stream) =       7.54(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.300 to Point/Station        1.500
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  3603.570(Ft.)
Downstream point/station elevation =  3599.010(Ft.)
Pipe length  =  1035.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    19.296(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    19.296(CFS)
Normal flow depth in pipe =   20.77(In.)
Flow top width inside pipe =   22.76(In.)
Critical Depth =   18.44(In.)
Pipe flow velocity =      5.88(Ft/s)
Travel time through pipe =    2.93 min.
Time of concentration (TC) =    12.20 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.300 to Point/Station        1.500
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      7.386(Ac.)
Runoff from this stream =     19.296(CFS)
Time of concentration =   12.20 min.
Rainfall intensity =     2.418(In/Hr)
Area averaged loss rate (Fm) =    0.0978(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.600 to Point/Station        1.500
**** 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
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.098(In/Hr)
Initial subarea data:
Initial area flow distance =  1000.000(Ft.)
Top (of initial area) elevation =  3605.640(Ft.)
Bottom (of initial area) elevation =  3599.010(Ft.)
```

```
Difference in elevation =     6.630(Ft.)
Slope =    0.00663  s(%)=       0.66
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.139 min.
Rainfall intensity =      2.296(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.862
Subarea runoff =     18.676(CFS)
Total initial stream area =        9.440(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.098(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.600 to Point/Station        1.500
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      9.440(Ac.)
Runoff from this stream =     18.676(CFS)
Time of concentration =   13.14 min.
Rainfall intensity =     2.296(In/Hr)
Area averaged loss rate (Fm) =    0.0978(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     19.30     7.386     12.20    0.098      2.418
2     18.68     9.440     13.14    0.098      2.296
Qmax(1) =
           1.000 *    1.000 *    19.296) +
           1.055 *    0.929 *    18.676) + =      37.604
Qmax(2) =
           0.948 *    1.000 *    19.296) +
           1.000 *    1.000 *    18.676) + =      36.959

Total of 2 streams to confluence:
Flow rates before confluence point:
      19.296      18.676
Maximum flow rates at confluence using above data:
       37.604       36.959
Area of streams before confluence:
        7.386        9.440
Effective area values after confluence:
       16.154       16.826
Results of confluence:
Total flow rate =     37.604(CFS)
Time of concentration =    12.204 min.
Effective stream area after confluence =     16.154(Ac.)
```

```
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.098(In/Hr)
Study area total (this main stream) =      16.83(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.500 to Point/Station        1.700
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  3599.010(Ft.)
Downstream point/station elevation =  3598.250(Ft.)
Pipe length  =   520.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    37.604(CFS)
Nearest computed pipe diameter  =     42.00(In.)
Calculated individual pipe flow  =    37.604(CFS)
Normal flow depth in pipe =   33.61(In.)
Flow top width inside pipe =   33.59(In.)
Critical Depth =   22.87(In.)
Pipe flow velocity =      4.56(Ft/s)
Travel time through pipe =    1.90 min.
Time of concentration (TC) =    14.11 min.
End of computations, Total Study Area =           16.98 (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
```

Subarea runoff = 3.557(CFS)
Total initial stream area = 0.910(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.290(In/Hr)
End of computations, Total Study Area = 0.91 (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) = 1.000
Area averaged SCS curve number = 67.0

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: 02/25/21

HCC IV POST DEVELOPED CONDITION
10 YR SUB AREA B
MGUBBAREINER 2021-02-24

Program License Serial Number 6277

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.793 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 2.100 to Point/Station 2.200
**** 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
Pervious ratio(Ap) = 0.1000 Max loss rate(Fm)= 0.098(In/Hr)
Initial subarea data:
Initial area flow distance = 685.000(Ft.)
Top (of initial area) elevation = 3605.140(Ft.)
Bottom (of initial area) elevation = 3594.010(Ft.)
Difference in elevation = 11.130(Ft.)
Slope = 0.01625 s(%)= 1.62
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 9.440 min.
Rainfall intensity = 2.894(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.870
Subarea runoff = 24.310(CFS)

```
Total initial stream area =        9.660(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.098(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.200 to Point/Station        2.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  3594.010(Ft.)
Downstream point/station elevation =  3593.260(Ft.)
Pipe length  =   150.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    24.310(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    24.310(CFS)
Normal flow depth in pipe =   21.02(In.)
Flow top width inside pipe =   27.47(In.)
Critical Depth =   20.13(In.)
Pipe flow velocity =      6.62(Ft/s)
Travel time through pipe =    0.38 min.
Time of concentration (TC) =     9.82 min.
End of computations, Total Study Area =            9.66 (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: 02/25/21

HCC IV POST DEVELOPED CONDITION
10 YR SUB AREA C
MGUBBAREINER 2012-02-24

Program License Serial Number 6277

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.793 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 3.100 to Point/Station 3.200
**** 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
Pervious ratio(Ap) = 0.1000 Max loss rate(Fm)= 0.098(In/Hr)
Initial subarea data:
Initial area flow distance = 785.000(Ft.)
Top (of initial area) elevation = 3611.530(Ft.)
Bottom (of initial area) elevation = 3609.010(Ft.)
Difference in elevation = 2.520(Ft.)
Slope = 0.00321 s(%)= 0.32
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 13.788 min.
Rainfall intensity = 2.220(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.860
Subarea runoff = 2.024(CFS)

```
Total initial stream area =        1.060(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.098(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.200 to Point/Station        3.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  3609.010(Ft.)
Downstream point/station elevation =  3601.010(Ft.)
Pipe length  =   150.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.024(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     2.024(CFS)
Normal flow depth in pipe =    4.66(In.)
Flow top width inside pipe =    8.99(In.)
Critical Depth =    7.74(In.)
Pipe flow velocity =      8.77(Ft/s)
Travel time through pipe =    0.28 min.
Time of concentration (TC) =    14.07 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.200 to Point/Station        3.300
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
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
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.098(In/Hr)
Time of concentration =    14.07 min.
Rainfall intensity =      2.188(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.860
Subarea runoff =     16.207(CFS) for    8.630(Ac.)
Total runoff =     18.231(CFS)
Effective area this stream =        9.69(Ac.)
Total Study Area (Main Stream No. 1) =        9.69(Ac.)
Area averaged Fm value =    0.098(In/Hr)
End of computations, Total Study Area =            9.69 (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
```

Appendix C – Rational Method (Post-Development)

- 100-Year Storm Event

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: 02/24/21

HCC IV POST DEVELOPED CONDITION
100 Y SUB AREA A
MGUBBAREINER 2021-02-24

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 = 1.320 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 3

++

Process from Point/Station 1.100 to Point/Station 1.200
**** 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 = 355.000(Ft.)
Top (of initial area) elevation = 3611.530(Ft.)
Bottom (of initial area) elevation = 3608.820(Ft.)
Difference in elevation = 2.710(Ft.)
Slope = 0.00763 s(%)= 0.76
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 8.441 min.
Rainfall intensity = 5.209(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.886

```
Subarea runoff =      4.895(CFS)
Total initial stream area =        1.060(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.079(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.200 to Point/Station        1.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  3608.820(Ft.)
Downstream point/station elevation =  3603.570(Ft.)
Pipe length  =   660.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     4.895(CFS)
Nearest computed pipe diameter  =     15.00(In.)
Calculated individual pipe flow  =     4.895(CFS)
Normal flow depth in pipe =   10.62(In.)
Flow top width inside pipe =   13.64(In.)
Critical Depth =   10.77(In.)
Pipe flow velocity =      5.27(Ft/s)
Travel time through pipe =    2.09 min.
Time of concentration (TC) =    10.53 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.200 to Point/Station        1.300
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      1.060(Ac.)
Runoff from this stream =      4.895(CFS)
Time of concentration =   10.53 min.
Rainfall intensity =     4.463(In/Hr)
Area averaged loss rate (Fm) =    0.0785(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.400 to Point/Station        1.300
**** 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 =   470.000(Ft.)
```

```
Top (of initial area) elevation =  3607.510(Ft.)
Bottom (of initial area) elevation =  3603.570(Ft.)
Difference in elevation =     3.940(Ft.)
Slope =    0.00838  s(%)=       0.84
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.269 min.
Rainfall intensity =      4.879(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.886
Subarea runoff =     27.998(CFS)
Total initial stream area =        6.480(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.079(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.400 to Point/Station        1.300
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      6.480(Ac.)
Runoff from this stream =     27.998(CFS)
Time of concentration =    9.27 min.
Rainfall intensity =     4.879(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      4.89     1.060     10.53    0.079      4.463
2     28.00     6.480      9.27    0.079      4.879
Qmax(1) =
           1.000 *    1.000 *     4.895) +
           0.913 *    1.000 *    27.998) + =      30.464
Qmax(2) =
           1.095 *    0.880 *     4.895) +
           1.000 *    1.000 *    27.998) + =      32.717

Total of 2 streams to confluence:
Flow rates before confluence point:
       4.895      27.998
Maximum flow rates at confluence using above data:
       30.464       32.717
Area of streams before confluence:
        1.060        6.480
Effective area values after confluence:
        7.540        7.413
Results of confluence:
Total flow rate =     32.717(CFS)
```

```
Time of concentration =     9.269 min.
Effective stream area after confluence =      7.413(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.079(In/Hr)
Study area total (this main stream) =       7.54(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.300 to Point/Station        1.500
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  3603.570(Ft.)
Downstream point/station elevation =  3599.010(Ft.)
Pipe length  =  1035.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    32.717(CFS)
Nearest computed pipe diameter  =     33.00(In.)
Calculated individual pipe flow  =    32.717(CFS)
Normal flow depth in pipe =   25.22(In.)
Flow top width inside pipe =   28.02(In.)
Critical Depth =   22.84(In.)
Pipe flow velocity =      6.71(Ft/s)
Travel time through pipe =    2.57 min.
Time of concentration (TC) =    11.84 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.300 to Point/Station        1.500
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      7.413(Ac.)
Runoff from this stream =     32.717(CFS)
Time of concentration =   11.84 min.
Rainfall intensity =     4.111(In/Hr)
Area averaged loss rate (Fm) =    0.0785(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.600 to Point/Station        1.500
**** 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 =  1000.000(Ft.)
Top (of initial area) elevation =  3605.640(Ft.)
Bottom (of initial area) elevation =  3599.010(Ft.)
Difference in elevation =     6.630(Ft.)
Slope =    0.00663  s(%)=       0.66
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.139 min.
Rainfall intensity =      3.822(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.882
Subarea runoff =     31.804(CFS)
Total initial stream area =        9.440(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.079(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.600 to Point/Station        1.500
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      9.440(Ac.)
Runoff from this stream =     31.804(CFS)
Time of concentration =   13.14 min.
Rainfall intensity =     3.822(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     32.72     7.413     11.84    0.079      4.111
2     31.80     9.440     13.14    0.079      3.822
Qmax(1) =
           1.000 *    1.000 *    32.717) +
           1.077 *    0.901 *    31.804) + =      63.586
Qmax(2) =
           0.928 *    1.000 *    32.717) +
           1.000 *    1.000 *    31.804) + =      62.173

Total of 2 streams to confluence:
Flow rates before confluence point:
      32.717      31.804
Maximum flow rates at confluence using above data:
       63.586       62.173
Area of streams before confluence:
        7.413        9.440
Effective area values after confluence:
       15.918       16.853
Results of confluence:
```

```
Total flow rate =     63.586(CFS)
Time of concentration =    11.838 min.
Effective stream area after confluence =     15.918(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.079(In/Hr)
Study area total (this main stream) =      16.85(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.500 to Point/Station        1.700
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  3599.010(Ft.)
Downstream point/station elevation =  3598.250(Ft.)
Pipe length  =   520.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    63.586(CFS)
Nearest computed pipe diameter  =     51.00(In.)
Calculated individual pipe flow  =    63.586(CFS)
Normal flow depth in pipe =   41.16(In.)
Flow top width inside pipe =   40.26(In.)
Critical Depth =   28.33(In.)
Pipe flow velocity =      5.19(Ft/s)
Travel time through pipe =    1.67 min.
Time of concentration (TC) =    13.51 min.
End of computations, Total Study Area =           16.98 (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: 02/24/21

HCC IV POST DEVELOPED CONDITION
100 YR SUB AREA B
MGUBBAREINER 2021-02-24

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 = 1.320 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 3

++

Process from Point/Station 2.100 to Point/Station 2.200
**** 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 = 685.000(Ft.)
Top (of initial area) elevation = 3605.140(Ft.)
Bottom (of initial area) elevation = 3594.010(Ft.)
Difference in elevation = 11.130(Ft.)
Slope = 0.01625 s(%)= 1.62
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 9.440 min.
Rainfall intensity = 4.817(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.885

Subarea runoff = 41.197(CFS)
Total initial stream area = 9.660(Ac.)
Pervious area fraction = 0.100
Initial area Fm value = 0.079(In/Hr)

++
Process from Point/Station 2.200 to Point/Station 2.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
____
Upstream point/station elevation = 3594.010(Ft.)
Downstream point/station elevation = 3593.260(Ft.)
Pipe length = 150.00(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 41.197(CFS)
Nearest computed pipe diameter = 36.00(In.)
Calculated individual pipe flow = 41.197(CFS)
Normal flow depth in pipe = 26.06(In.)
Flow top width inside pipe = 32.19(In.)
Critical Depth = 25.09(In.)
Pipe flow velocity = 7.52(Ft/s)
Travel time through pipe = 0.33 min.
Time of concentration (TC) = 9.77 min.
End of computations, Total Study Area = 9.66 (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: 02/24/21

HCC IV POST DEVELOPED CONDITION
100 YR SUB AREA C
MGUBBAREINER 2012-02-24

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 = 1.320 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 3

++

Process from Point/Station 3.100 to Point/Station 3.200
**** 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 = 785.000(Ft.)
Top (of initial area) elevation = 3611.530(Ft.)
Bottom (of initial area) elevation = 3609.010(Ft.)
Difference in elevation = 2.520(Ft.)
Slope = 0.00321 s(%)= 0.32
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 13.788 min.
Rainfall intensity = 3.695(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.881

```
Subarea runoff =      3.450(CFS)
Total initial stream area =        1.060(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.079(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.200 to Point/Station        3.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  3609.010(Ft.)
Downstream point/station elevation =  3601.010(Ft.)
Pipe length  =   150.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     3.450(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     3.450(CFS)
Normal flow depth in pipe =    6.69(In.)
Flow top width inside pipe =    7.86(In.)
Critical depth could not be calculated.
Pipe flow velocity =      9.79(Ft/s)
Travel time through pipe =    0.26 min.
Time of concentration (TC) =    14.04 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.200 to Point/Station        3.300
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
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)
Time of concentration =    14.04 min.
Rainfall intensity =      3.648(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.881
Subarea runoff =     27.678(CFS) for    8.630(Ac.)
Total runoff =     31.128(CFS)
Effective area this stream =        9.69(Ac.)
Total Study Area (Main Stream No. 1) =        9.69(Ac.)
Area averaged Fm value =    0.079(In/Hr)
End of computations, Total Study Area =            9.69 (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

Appendix D – Unit Hydrograph (Pre-Development)

- 10-Year Storm Event
- 100-Year Storm Event

Appendix D – Unit Hydrograph (Pre-Development)

- 10-Year Storm Event

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

Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2004, Version 7.0

Study date 02/25/21

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

Program License Serial Number 6277

HCC IV PRE DEVELOPED CONDITIONS
10 YR UNIT HYDROGRAPH
MGUBBAREINER 2021-02-25

Storm Event Year = 10

Antecedent Moisture Condition = 2

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 10		
36.32	1	0.79
Rainfall data for year 2		
36.32	6	1.15
Rainfall data for year 2		
36.32	24	2.15
Rainfall data for year 100		
36.32	1	1.32

```
------------------------------------------------------------------------
Rainfall data for year 100
           36.32           6           3.11
------------------------------------------------------------------------
Rainfall data for year 100
           36.32          24           6.42
------------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

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


SCS curve  SCS curve     Area     Area     Fp(Fig C6)    Ap      Fm
No.(AMCII) NO.(AMC 2)    (Ac.)    Fraction     (In/Hr)  (dec.)   (In/Hr)
 67.0      67.0         36.32      1.000     0.578    1.000    0.578

Area-averaged adjusted loss rate Fm (In/Hr) =  0.578

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

Area       Area          SCS CN    SCS CN      S     Pervious
 (Ac.)      Fract         (AMC2)    (AMC2)           Yield Fr
    36.32   1.000         67.0      67.0       4.93     0.278

Area-averaged catchment yield fraction, Y =  0.278
Area-averaged low loss fraction, Yb =  0.722
User entry of time of concentration  =   0.300 (hours)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watershed area =      36.32(Ac.)
Catchment Lag time =   0.240 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 34.7222
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.578(In/Hr)
Average low loss rate fraction (Yb) = 0.722 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall =  0.376(In)
Computed peak 30-minute rainfall =  0.644(In)
Specified peak 1-hour rainfall =  0.793(In)
Computed peak 3-hour rainfall =  1.380(In)
Specified peak 6-hour rainfall =  1.956(In)
Specified peak 24-hour rainfall =  3.907(In)


Rainfall depth area reduction factors:
Using a total area of      36.32(Ac.) (Ref: fig. E-4)

5-minute factor = 0.998     Adjusted rainfall =  0.376(In)
30-minute factor = 0.998    Adjusted rainfall =  0.643(In)
1-hour factor = 0.998       Adjusted rainfall =  0.792(In)
3-hour factor = 1.000       Adjusted rainfall =  1.379(In)
```

6-hour factor = 1.000 Adjusted rainfall = 1.956(In)
24-hour factor = 1.000 Adjusted rainfall = 3.907(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 = 439.25 (CFS))	
1	2.206	9.688
2	13.132	47.992
3	40.437	119.937
4	59.629	84.302
5	69.886	45.053
6	76.724	30.037
7	81.579	21.323
8	85.290	16.300
9	88.266	13.073
10	90.463	9.651
11	92.296	8.052
12	93.829	6.734
13	95.057	5.391
14	96.088	4.528
15	96.940	3.746
16	97.584	2.827
17	98.029	1.956
18	98.394	1.604
19	98.808	1.818
20	99.225	1.830
21	99.571	1.521
22	99.791	0.964
23	100.000	0.919

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.3756	0.3756
2	0.4625	0.0868
3	0.5223	0.0598
4	0.5694	0.0471
5	0.6088	0.0394
6	0.6430	0.0342
7	0.6735	0.0304
8	0.7010	0.0275
9	0.7262	0.0252
10	0.7495	0.0233
11	0.7713	0.0217
12	0.7916	0.0204
13	0.8243	0.0327
14	0.8558	0.0315

15	0.8861	0.0304
16	0.9155	0.0294
17	0.9440	0.0285
18	0.9717	0.0277
19	0.9986	0.0269
20	1.0248	0.0262
21	1.0504	0.0256
22	1.0754	0.0250
23	1.0998	0.0244
24	1.1237	0.0239
25	1.1471	0.0234
26	1.1701	0.0230
27	1.1926	0.0225
28	1.2147	0.0221
29	1.2365	0.0217
30	1.2578	0.0214
31	1.2789	0.0210
32	1.2995	0.0207
33	1.3199	0.0204
34	1.3400	0.0201
35	1.3597	0.0198
36	1.3792	0.0195
37	1.3984	0.0192
38	1.4174	0.0189
39	1.4360	0.0187
40	1.4545	0.0184
41	1.4727	0.0182
42	1.4907	0.0180
43	1.5085	0.0178
44	1.5261	0.0176
45	1.5435	0.0174
46	1.5607	0.0172
47	1.5777	0.0170
48	1.5945	0.0168
49	1.6112	0.0167
50	1.6277	0.0165
51	1.6440	0.0163
52	1.6602	0.0162
53	1.6762	0.0160
54	1.6921	0.0159
55	1.7078	0.0157
56	1.7234	0.0156
57	1.7388	0.0154
58	1.7541	0.0153
59	1.7693	0.0152
60	1.7844	0.0151
61	1.7993	0.0149
62	1.8141	0.0148
63	1.8288	0.0147
64	1.8434	0.0146
65	1.8578	0.0145

66	1.8722	0.0144
67	1.8864	0.0142
68	1.9006	0.0141
69	1.9146	0.0140
70	1.9286	0.0139
71	1.9424	0.0138
72	1.9561	0.0137
73	1.9696	0.0135
74	1.9831	0.0134
75	1.9964	0.0133
76	2.0096	0.0132
77	2.0228	0.0132
78	2.0358	0.0131
79	2.0488	0.0130
80	2.0617	0.0129
81	2.0745	0.0128
82	2.0873	0.0127
83	2.0999	0.0127
84	2.1125	0.0126
85	2.1250	0.0125
86	2.1375	0.0124
87	2.1498	0.0124
88	2.1621	0.0123
89	2.1744	0.0122
90	2.1865	0.0122
91	2.1986	0.0121
92	2.2106	0.0120
93	2.2226	0.0120
94	2.2345	0.0119
95	2.2463	0.0118
96	2.2581	0.0118
97	2.2698	0.0117
98	2.2814	0.0116
99	2.2930	0.0116
100	2.3045	0.0115
101	2.3160	0.0115
102	2.3274	0.0114
103	2.3388	0.0114
104	2.3501	0.0113
105	2.3613	0.0112
106	2.3725	0.0112
107	2.3837	0.0111
108	2.3947	0.0111
109	2.4058	0.0110
110	2.4168	0.0110
111	2.4277	0.0109
112	2.4386	0.0109
113	2.4494	0.0108
114	2.4602	0.0108
115	2.4710	0.0107
116	2.4817	0.0107

117	2.4923	0.0107
118	2.5029	0.0106
119	2.5135	0.0106
120	2.5240	0.0105
121	2.5345	0.0105
122	2.5449	0.0104
123	2.5553	0.0104
124	2.5656	0.0103
125	2.5759	0.0103
126	2.5862	0.0103
127	2.5964	0.0102
128	2.6066	0.0102
129	2.6167	0.0101
130	2.6268	0.0101
131	2.6369	0.0101
132	2.6469	0.0100
133	2.6569	0.0100
134	2.6669	0.0099
135	2.6768	0.0099
136	2.6866	0.0099
137	2.6965	0.0098
138	2.7063	0.0098
139	2.7161	0.0098
140	2.7258	0.0097
141	2.7355	0.0097
142	2.7451	0.0097
143	2.7548	0.0096
144	2.7644	0.0096
145	2.7739	0.0096
146	2.7835	0.0095
147	2.7930	0.0095
148	2.8024	0.0095
149	2.8118	0.0094
150	2.8212	0.0094
151	2.8306	0.0094
152	2.8400	0.0093
153	2.8493	0.0093
154	2.8585	0.0093
155	2.8678	0.0092
156	2.8770	0.0092
157	2.8862	0.0092
158	2.8953	0.0092
159	2.9045	0.0091
160	2.9136	0.0091
161	2.9226	0.0091
162	2.9317	0.0090
163	2.9407	0.0090
164	2.9497	0.0090
165	2.9587	0.0090
166	2.9676	0.0089
167	2.9765	0.0089

168	2.9854	0.0089
169	2.9942	0.0089
170	3.0030	0.0088
171	3.0119	0.0088
172	3.0206	0.0088
173	3.0294	0.0087
174	3.0381	0.0087
175	3.0468	0.0087
176	3.0555	0.0087
177	3.0641	0.0086
178	3.0727	0.0086
179	3.0813	0.0086
180	3.0899	0.0086
181	3.0985	0.0086
182	3.1070	0.0085
183	3.1155	0.0085
184	3.1240	0.0085
185	3.1325	0.0085
186	3.1409	0.0084
187	3.1493	0.0084
188	3.1577	0.0084
189	3.1661	0.0084
190	3.1744	0.0083
191	3.1827	0.0083
192	3.1910	0.0083
193	3.1993	0.0083
194	3.2076	0.0083
195	3.2158	0.0082
196	3.2240	0.0082
197	3.2322	0.0082
198	3.2404	0.0082
199	3.2486	0.0082
200	3.2567	0.0081
201	3.2648	0.0081
202	3.2729	0.0081
203	3.2810	0.0081
204	3.2890	0.0081
205	3.2971	0.0080
206	3.3051	0.0080
207	3.3131	0.0080
208	3.3211	0.0080
209	3.3290	0.0080
210	3.3370	0.0079
211	3.3449	0.0079
212	3.3528	0.0079
213	3.3607	0.0079
214	3.3685	0.0079
215	3.3764	0.0078
216	3.3842	0.0078
217	3.3920	0.0078
218	3.3998	0.0078

219	3.4076	0.0078
220	3.4153	0.0078
221	3.4231	0.0077
222	3.4308	0.0077
223	3.4385	0.0077
224	3.4462	0.0077
225	3.4538	0.0077
226	3.4615	0.0077
227	3.4691	0.0076
228	3.4767	0.0076
229	3.4843	0.0076
230	3.4919	0.0076
231	3.4995	0.0076
232	3.5070	0.0076
233	3.5146	0.0075
234	3.5221	0.0075
235	3.5296	0.0075
236	3.5371	0.0075
237	3.5445	0.0075
238	3.5520	0.0075
239	3.5594	0.0074
240	3.5669	0.0074
241	3.5743	0.0074
242	3.5817	0.0074
243	3.5890	0.0074
244	3.5964	0.0074
245	3.6037	0.0073
246	3.6111	0.0073
247	3.6184	0.0073
248	3.6257	0.0073
249	3.6330	0.0073
250	3.6402	0.0073
251	3.6475	0.0073
252	3.6547	0.0072
253	3.6620	0.0072
254	3.6692	0.0072
255	3.6764	0.0072
256	3.6836	0.0072
257	3.6907	0.0072
258	3.6979	0.0072
259	3.7051	0.0071
260	3.7122	0.0071
261	3.7193	0.0071
262	3.7264	0.0071
263	3.7335	0.0071
264	3.7406	0.0071
265	3.7476	0.0071
266	3.7547	0.0070
267	3.7617	0.0070
268	3.7687	0.0070
269	3.7757	0.0070

270	3.7827	0.0070
271	3.7897	0.0070
272	3.7967	0.0070
273	3.8037	0.0070
274	3.8106	0.0069
275	3.8175	0.0069
276	3.8245	0.0069
277	3.8314	0.0069
278	3.8383	0.0069
279	3.8451	0.0069
280	3.8520	0.0069
281	3.8589	0.0069
282	3.8657	0.0068
283	3.8725	0.0068
284	3.8794	0.0068
285	3.8862	0.0068
286	3.8930	0.0068
287	3.8998	0.0068
288	3.9065	0.0068

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0068	0.0049	0.0019
2	0.0068	0.0049	0.0019
3	0.0068	0.0049	0.0019
4	0.0068	0.0049	0.0019
5	0.0068	0.0049	0.0019
6	0.0069	0.0049	0.0019
7	0.0069	0.0050	0.0019
8	0.0069	0.0050	0.0019
9	0.0069	0.0050	0.0019
10	0.0069	0.0050	0.0019
11	0.0070	0.0050	0.0019
12	0.0070	0.0050	0.0019
13	0.0070	0.0050	0.0019
14	0.0070	0.0051	0.0020
15	0.0070	0.0051	0.0020
16	0.0070	0.0051	0.0020
17	0.0071	0.0051	0.0020
18	0.0071	0.0051	0.0020
19	0.0071	0.0051	0.0020
20	0.0071	0.0051	0.0020
21	0.0072	0.0052	0.0020
22	0.0072	0.0052	0.0020
23	0.0072	0.0052	0.0020
24	0.0072	0.0052	0.0020
25	0.0072	0.0052	0.0020
26	0.0073	0.0052	0.0020
27	0.0073	0.0053	0.0020

28	0.0073	0.0053	0.0020
29	0.0073	0.0053	0.0020
30	0.0073	0.0053	0.0020
31	0.0074	0.0053	0.0021
32	0.0074	0.0053	0.0021
33	0.0074	0.0054	0.0021
34	0.0074	0.0054	0.0021
35	0.0075	0.0054	0.0021
36	0.0075	0.0054	0.0021
37	0.0075	0.0054	0.0021
38	0.0075	0.0054	0.0021
39	0.0076	0.0055	0.0021
40	0.0076	0.0055	0.0021
41	0.0076	0.0055	0.0021
42	0.0076	0.0055	0.0021
43	0.0077	0.0055	0.0021
44	0.0077	0.0055	0.0021
45	0.0077	0.0056	0.0021
46	0.0077	0.0056	0.0022
47	0.0078	0.0056	0.0022
48	0.0078	0.0056	0.0022
49	0.0078	0.0056	0.0022
50	0.0078	0.0057	0.0022
51	0.0079	0.0057	0.0022
52	0.0079	0.0057	0.0022
53	0.0079	0.0057	0.0022
54	0.0080	0.0057	0.0022
55	0.0080	0.0058	0.0022
56	0.0080	0.0058	0.0022
57	0.0081	0.0058	0.0022
58	0.0081	0.0058	0.0022
59	0.0081	0.0059	0.0023
60	0.0081	0.0059	0.0023
61	0.0082	0.0059	0.0023
62	0.0082	0.0059	0.0023
63	0.0082	0.0059	0.0023
64	0.0083	0.0060	0.0023
65	0.0083	0.0060	0.0023
66	0.0083	0.0060	0.0023
67	0.0084	0.0060	0.0023
68	0.0084	0.0061	0.0023
69	0.0084	0.0061	0.0023
70	0.0085	0.0061	0.0024
71	0.0085	0.0061	0.0024
72	0.0085	0.0062	0.0024
73	0.0086	0.0062	0.0024
74	0.0086	0.0062	0.0024
75	0.0086	0.0062	0.0024
76	0.0087	0.0063	0.0024
77	0.0087	0.0063	0.0024
78	0.0087	0.0063	0.0024

79	0.0088	0.0064	0.0025
80	0.0088	0.0064	0.0025
81	0.0089	0.0064	0.0025
82	0.0089	0.0064	0.0025
83	0.0090	0.0065	0.0025
84	0.0090	0.0065	0.0025
85	0.0090	0.0065	0.0025
86	0.0091	0.0065	0.0025
87	0.0091	0.0066	0.0025
88	0.0092	0.0066	0.0025
89	0.0092	0.0067	0.0026
90	0.0092	0.0067	0.0026
91	0.0093	0.0067	0.0026
92	0.0093	0.0067	0.0026
93	0.0094	0.0068	0.0026
94	0.0094	0.0068	0.0026
95	0.0095	0.0069	0.0026
96	0.0095	0.0069	0.0027
97	0.0096	0.0069	0.0027
98	0.0096	0.0069	0.0027
99	0.0097	0.0070	0.0027
100	0.0097	0.0070	0.0027
101	0.0098	0.0071	0.0027
102	0.0098	0.0071	0.0027
103	0.0099	0.0072	0.0028
104	0.0099	0.0072	0.0028
105	0.0100	0.0072	0.0028
106	0.0101	0.0073	0.0028
107	0.0101	0.0073	0.0028
108	0.0102	0.0073	0.0028
109	0.0103	0.0074	0.0029
110	0.0103	0.0074	0.0029
111	0.0104	0.0075	0.0029
112	0.0104	0.0075	0.0029
113	0.0105	0.0076	0.0029
114	0.0106	0.0076	0.0029
115	0.0107	0.0077	0.0030
116	0.0107	0.0077	0.0030
117	0.0108	0.0078	0.0030
118	0.0108	0.0078	0.0030
119	0.0109	0.0079	0.0030
120	0.0110	0.0079	0.0031
121	0.0111	0.0080	0.0031
122	0.0111	0.0080	0.0031
123	0.0112	0.0081	0.0031
124	0.0113	0.0082	0.0031
125	0.0114	0.0082	0.0032
126	0.0115	0.0083	0.0032
127	0.0116	0.0084	0.0032
128	0.0116	0.0084	0.0032
129	0.0118	0.0085	0.0033

130	0.0118	0.0085	0.0033
131	0.0120	0.0086	0.0033
132	0.0120	0.0087	0.0033
133	0.0122	0.0088	0.0034
134	0.0122	0.0088	0.0034
135	0.0124	0.0089	0.0034
136	0.0124	0.0090	0.0035
137	0.0126	0.0091	0.0035
138	0.0127	0.0091	0.0035
139	0.0128	0.0092	0.0036
140	0.0129	0.0093	0.0036
141	0.0131	0.0094	0.0036
142	0.0132	0.0095	0.0037
143	0.0133	0.0096	0.0037
144	0.0134	0.0097	0.0037
145	0.0137	0.0099	0.0038
146	0.0138	0.0100	0.0039
147	0.0140	0.0101	0.0039
148	0.0141	0.0102	0.0039
149	0.0144	0.0104	0.0040
150	0.0145	0.0104	0.0040
151	0.0147	0.0106	0.0041
152	0.0148	0.0107	0.0041
153	0.0151	0.0109	0.0042
154	0.0152	0.0110	0.0042
155	0.0154	0.0111	0.0043
156	0.0156	0.0112	0.0043
157	0.0159	0.0115	0.0044
158	0.0160	0.0116	0.0045
159	0.0163	0.0118	0.0045
160	0.0165	0.0119	0.0046
161	0.0168	0.0121	0.0047
162	0.0170	0.0123	0.0047
163	0.0174	0.0125	0.0048
164	0.0176	0.0127	0.0049
165	0.0180	0.0130	0.0050
166	0.0182	0.0131	0.0051
167	0.0187	0.0135	0.0052
168	0.0189	0.0137	0.0053
169	0.0195	0.0141	0.0054
170	0.0198	0.0143	0.0055
171	0.0204	0.0147	0.0057
172	0.0207	0.0149	0.0058
173	0.0214	0.0154	0.0059
174	0.0217	0.0157	0.0061
175	0.0225	0.0163	0.0063
176	0.0230	0.0166	0.0064
177	0.0239	0.0173	0.0067
178	0.0244	0.0176	0.0068
179	0.0256	0.0185	0.0071
180	0.0262	0.0189	0.0073

181	0.0277	0.0200	0.0077
182	0.0285	0.0206	0.0079
183	0.0304	0.0219	0.0085
184	0.0315	0.0227	0.0088
185	0.0204	0.0147	0.0057
186	0.0217	0.0157	0.0061
187	0.0252	0.0182	0.0070
188	0.0275	0.0199	0.0077
189	0.0342	0.0247	0.0095
190	0.0394	0.0284	0.0110
191	0.0598	0.0432	0.0167
192	0.0868	0.0482	0.0386
193	0.3756	0.0482	0.3275
194	0.0471	0.0340	0.0131
195	0.0304	0.0220	0.0085
196	0.0233	0.0168	0.0065
197	0.0327	0.0236	0.0091
198	0.0294	0.0212	0.0082
199	0.0269	0.0194	0.0075
200	0.0250	0.0180	0.0070
201	0.0234	0.0169	0.0065
202	0.0221	0.0160	0.0062
203	0.0210	0.0152	0.0059
204	0.0201	0.0145	0.0056
205	0.0192	0.0138	0.0053
206	0.0184	0.0133	0.0051
207	0.0178	0.0128	0.0050
208	0.0172	0.0124	0.0048
209	0.0167	0.0120	0.0046
210	0.0162	0.0117	0.0045
211	0.0157	0.0113	0.0044
212	0.0153	0.0110	0.0043
213	0.0149	0.0108	0.0042
214	0.0146	0.0105	0.0041
215	0.0142	0.0103	0.0040
216	0.0139	0.0101	0.0039
217	0.0135	0.0097	0.0038
218	0.0132	0.0096	0.0037
219	0.0130	0.0094	0.0036
220	0.0127	0.0092	0.0035
221	0.0125	0.0090	0.0035
222	0.0123	0.0089	0.0034
223	0.0121	0.0087	0.0034
224	0.0119	0.0086	0.0033
225	0.0117	0.0084	0.0033
226	0.0115	0.0083	0.0032
227	0.0114	0.0082	0.0032
228	0.0112	0.0081	0.0031
229	0.0110	0.0080	0.0031
230	0.0109	0.0079	0.0030
231	0.0107	0.0078	0.0030

232	0.0106	0.0077	0.0030
233	0.0105	0.0076	0.0029
234	0.0103	0.0075	0.0029
235	0.0102	0.0074	0.0028
236	0.0101	0.0073	0.0028
237	0.0100	0.0072	0.0028
238	0.0099	0.0071	0.0027
239	0.0098	0.0070	0.0027
240	0.0097	0.0070	0.0027
241	0.0096	0.0069	0.0027
242	0.0095	0.0068	0.0026
243	0.0094	0.0068	0.0026
244	0.0093	0.0067	0.0026
245	0.0092	0.0066	0.0026
246	0.0091	0.0066	0.0025
247	0.0090	0.0065	0.0025
248	0.0089	0.0064	0.0025
249	0.0089	0.0064	0.0025
250	0.0088	0.0063	0.0024
251	0.0087	0.0063	0.0024
252	0.0086	0.0062	0.0024
253	0.0086	0.0062	0.0024
254	0.0085	0.0061	0.0024
255	0.0084	0.0061	0.0023
256	0.0083	0.0060	0.0023
257	0.0083	0.0060	0.0023
258	0.0082	0.0059	0.0023
259	0.0082	0.0059	0.0023
260	0.0081	0.0058	0.0023
261	0.0080	0.0058	0.0022
262	0.0080	0.0058	0.0022
263	0.0079	0.0057	0.0022
264	0.0079	0.0057	0.0022
265	0.0078	0.0056	0.0022
266	0.0078	0.0056	0.0022
267	0.0077	0.0056	0.0021
268	0.0077	0.0055	0.0021
269	0.0076	0.0055	0.0021
270	0.0076	0.0054	0.0021
271	0.0075	0.0054	0.0021
272	0.0075	0.0054	0.0021
273	0.0074	0.0053	0.0021
274	0.0074	0.0053	0.0020
275	0.0073	0.0053	0.0020
276	0.0073	0.0052	0.0020
277	0.0072	0.0052	0.0020
278	0.0072	0.0052	0.0020
279	0.0071	0.0052	0.0020
280	0.0071	0.0051	0.0020
281	0.0071	0.0051	0.0020
282	0.0070	0.0051	0.0020

283	0.0070	0.0050	0.0019
284	0.0069	0.0050	0.0019
285	0.0069	0.0050	0.0019
286	0.0069	0.0050	0.0019
287	0.0068	0.0049	0.0019
288	0.0068	0.0049	0.0019

Total soil rain loss = 2.58(In)
Total effective rainfall = 1.33(In)
Peak flow rate in flood hydrograph = 45.11(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	12.5	25.0	37.5	50.0
0+ 5	0.0001	0.02	Q				
0+10	0.0009	0.11	Q				
0+15	0.0032	0.34	Q				
0+20	0.0066	0.50	Q				
0+25	0.0106	0.58	Q				
0+30	0.0150	0.64	Q				
0+35	0.0197	0.68	Q				
0+40	0.0246	0.71	Q				
0+45	0.0297	0.74	Q				
0+50	0.0349	0.76	Q				
0+55	0.0403	0.78	Q				
1+ 0	0.0458	0.79	Q				
1+ 5	0.0513	0.80	Q				
1+10	0.0569	0.82	Q				
1+15	0.0626	0.83	Q				
1+20	0.0683	0.83	Q				
1+25	0.0741	0.84	Q				
1+30	0.0799	0.84	Q				
1+35	0.0858	0.85	Q				
1+40	0.0917	0.86	Q				
1+45	0.0976	0.86	Q				
1+50	0.1036	0.87	QV				
1+55	0.1096	0.87	QV				
2+ 0	0.1156	0.87	QV				
2+ 5	0.1216	0.87	QV				
2+10	0.1276	0.88	QV				
2+15	0.1337	0.88	QV				
2+20	0.1398	0.88	QV				
2+25	0.1459	0.88	QV				
2+30	0.1520	0.89	QV				

2+35	0.1581	0.89	QV	|	|	|	|
2+40	0.1642	0.89	QV	|	|	|	|
2+45	0.1704	0.90	QV	|	|	|	|
2+50	0.1766	0.90	QV	|	|	|	|
2+55	0.1828	0.90	QV	|	|	|	|
3+ 0	0.1890	0.90	QV	|	|	|	|
3+ 5	0.1953	0.91	QV	|	|	|	|
3+10	0.2015	0.91	Q V	|	|	|	|
3+15	0.2078	0.91	Q V	|	|	|	|
3+20	0.2141	0.92	Q V	|	|	|	|
3+25	0.2205	0.92	Q V	|	|	|	|
3+30	0.2268	0.92	Q V	|	|	|	|
3+35	0.2332	0.92	Q V	|	|	|	|
3+40	0.2396	0.93	Q V	|	|	|	|
3+45	0.2460	0.93	Q V	|	|	|	|
3+50	0.2524	0.93	Q V	|	|	|	|
3+55	0.2588	0.94	Q V	|	|	|	|
4+ 0	0.2653	0.94	Q V	|	|	|	|
4+ 5	0.2718	0.94	Q V	|	|	|	|
4+10	0.2783	0.95	Q V	|	|	|	|
4+15	0.2849	0.95	Q V	|	|	|	|
4+20	0.2914	0.95	Q V	|	|	|	|
4+25	0.2980	0.96	Q V	|	|	|	|
4+30	0.3046	0.96	Q V	|	|	|	|
4+35	0.3112	0.96	Q V	|	|	|	|
4+40	0.3179	0.97	Q V	|	|	|	|
4+45	0.3246	0.97	Q V	|	|	|	|
4+50	0.3313	0.97	Q V	|	|	|	|
4+55	0.3380	0.98	Q V	|	|	|	|
5+ 0	0.3448	0.98	Q V	|	|	|	|
5+ 5	0.3515	0.98	Q V	|	|	|	|
5+10	0.3583	0.99	Q V	|	|	|	|
5+15	0.3652	0.99	Q V	|	|	|	|
5+20	0.3720	0.99	Q V	|	|	|	|
5+25	0.3789	1.00	Q V	|	|	|	|
5+30	0.3858	1.00	Q V	|	|	|	|
5+35	0.3927	1.01	Q V	|	|	|	|
5+40	0.3997	1.01	Q V	|	|	|	|
5+45	0.4067	1.01	Q V	|	|	|	|
5+50	0.4137	1.02	Q V	|	|	|	|
5+55	0.4207	1.02	Q V	|	|	|	|
6+ 0	0.4278	1.03	Q V	|	|	|	|
6+ 5	0.4349	1.03	Q V	|	|	|	|
6+10	0.4420	1.03	Q V	|	|	|	|
6+15	0.4492	1.04	Q V	|	|	|	|
6+20	0.4563	1.04	Q V	|	|	|	|
6+25	0.4636	1.05	Q V	|	|	|	|
6+30	0.4708	1.05	Q V	|	|	|	|
6+35	0.4781	1.06	Q V	|	|	|	|
6+40	0.4854	1.06	Q V	|	|	|	|
6+45	0.4927	1.07	Q V	|	|	|	|

6+50	0.5001	1.07	Q	V	|	|	|
6+55	0.5075	1.07	Q	V	|	|	|
7+ 0	0.5149	1.08	Q	V	|	|	|
7+ 5	0.5224	1.08	Q	V	|	|	|
7+10	0.5299	1.09	Q	V	|	|	|
7+15	0.5374	1.09	Q	V	|	|	|
7+20	0.5450	1.10	Q	V	|	|	|
7+25	0.5526	1.10	Q	V	|	|	|
7+30	0.5602	1.11	Q	V	|	|	|
7+35	0.5679	1.11	Q	V	|	|	|
7+40	0.5756	1.12	Q	V	|	|	|
7+45	0.5834	1.13	Q	V	|	|	|
7+50	0.5912	1.13	Q	V	|	|	|
7+55	0.5990	1.14	Q	V	|	|	|
8+ 0	0.6069	1.14	Q	V	|	|	|
8+ 5	0.6148	1.15	Q	V	|	|	|
8+10	0.6227	1.15	Q	V	|	|	|
8+15	0.6307	1.16	Q	V	|	|	|
8+20	0.6387	1.17	Q	V	|	|	|
8+25	0.6468	1.17	Q	V	|	|	|
8+30	0.6549	1.18	Q	V	|	|	|
8+35	0.6631	1.18	Q	V	|	|	|
8+40	0.6713	1.19	Q	V	|	|	|
8+45	0.6795	1.20	Q	V	|	|	|
8+50	0.6878	1.20	Q	V	|	|	|
8+55	0.6961	1.21	Q	V	|	|	|
9+ 0	0.7045	1.22	Q	V	|	|	|
9+ 5	0.7129	1.22	Q	V	|	|	|
9+10	0.7214	1.23	Q	V	|	|	|
9+15	0.7299	1.24	Q	V	|	|	|
9+20	0.7385	1.25	Q	V	|	|	|
9+25	0.7471	1.25	|Q	V	|	|	|
9+30	0.7558	1.26	|Q	V	|	|	|
9+35	0.7645	1.27	|Q	V	|	|	|
9+40	0.7733	1.28	|Q	V	|	|	|
9+45	0.7822	1.28	|Q	V	|	|	|
9+50	0.7911	1.29	|Q	V	|	|	|
9+55	0.8000	1.30	|Q	V	|	|	|
10+ 0	0.8090	1.31	|Q	V	|	|	|
10+ 5	0.8181	1.32	|Q	V	|	|	|
10+10	0.8272	1.33	|Q	V	|	|	|
10+15	0.8364	1.34	|Q	V	|	|	|
10+20	0.8457	1.34	|Q	V	|	|	|
10+25	0.8550	1.35	|Q	V	|	|	|
10+30	0.8644	1.36	|Q	V	|	|	|
10+35	0.8738	1.37	|Q	V	|	|	|
10+40	0.8834	1.38	|Q	V	|	|	|
10+45	0.8930	1.39	|Q	V	|	|	|
10+50	0.9026	1.40	|Q	V|		|	|
10+55	0.9124	1.41	|Q	V|		|	|
11+ 0	0.9222	1.42	|Q	V|		|	|

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11+ 5       0.9321      1.44  |Q       V|         |         |         |
11+10       0.9420      1.45  |Q       V|         |         |         |
11+15       0.9521      1.46  |Q       V|         |         |         |
11+20       0.9622      1.47  |Q       V|         |         |         |
11+25       0.9724      1.48  |Q       V|         |         |         |
11+30       0.9827      1.50  |Q       V|         |         |         |
11+35       0.9931      1.51  |Q       V|         |         |         |
11+40       1.0036      1.52  |Q        V         |         |         |
11+45       1.0142      1.54  |Q        V         |         |         |
11+50       1.0248      1.55  |Q        V         |         |         |
11+55       1.0356      1.56  |Q        V         |         |         |
12+ 0       1.0465      1.58  |Q        V         |         |         |
12+ 5       1.0575      1.59  |Q        V         |         |         |
12+10       1.0686      1.61  |Q        V         |         |         |
12+15       1.0798      1.63  |Q        V         |         |         |
12+20       1.0912      1.65  |Q        V         |         |         |
12+25       1.1027      1.67  |Q        |V        |         |         |
12+30       1.1144      1.69  |Q        |V        |         |         |
12+35       1.1261      1.71  |Q        |V        |         |         |
12+40       1.1380      1.73  |Q        |V        |         |         |
12+45       1.1501      1.75  |Q        |V        |         |         |
12+50       1.1623      1.77  |Q        |V        |         |         |
12+55       1.1746      1.79  |Q        |V        |         |         |
13+ 0       1.1871      1.81  |Q        |V        |         |         |
13+ 5       1.1997      1.84  |Q        |V        |         |         |
13+10       1.2125      1.86  |Q        | V       |         |         |
13+15       1.2255      1.88  |Q        | V       |         |         |
13+20       1.2387      1.91  |Q        | V       |         |         |
13+25       1.2520      1.94  |Q        | V       |         |         |
13+30       1.2655      1.96  |Q        | V       |         |         |
13+35       1.2792      1.99  |Q        | V       |         |         |
13+40       1.2932      2.02  |Q        | V       |         |         |
13+45       1.3073      2.05  |Q        |  V      |         |         |
13+50       1.3217      2.09  |Q        |  V      |         |         |
13+55       1.3363      2.12  |Q        |  V      |         |         |
14+ 0       1.3512      2.16  |Q        |  V      |         |         |
14+ 5       1.3663      2.20  |Q        |  V      |         |         |
14+10       1.3817      2.24  |Q        |  V      |         |         |
14+15       1.3974      2.28  |Q        |  V      |         |         |
14+20       1.4135      2.33  |Q        |   V     |         |         |
14+25       1.4299      2.38  |Q        |   V     |         |         |
14+30       1.4466      2.43  |Q        |   V     |         |         |
14+35       1.4637      2.49  |Q        |   V     |         |         |
14+40       1.4813      2.55  | Q       |   V     |         |         |
14+45       1.4993      2.61  | Q       |   V     |         |         |
14+50       1.5177      2.68  | Q       |    V    |         |         |
14+55       1.5367      2.76  | Q       |    V    |         |         |
15+ 0       1.5562      2.84  | Q       |    V    |         |         |
15+ 5       1.5764      2.93  | Q       |    V    |         |         |
15+10       1.5973      3.03  | Q       |    V    |         |         |
15+15       1.6189      3.14  | Q       |     V   |         |         |
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15+20       1.6414      3.27  | Q       |     V   |         |          |
15+25       1.6647      3.38  | Q       |     V   |         |          |
15+30       1.6878      3.35  | Q       |     V   |         |          |
15+35       1.7091      3.09  | Q       |      V  |         |          |
15+40       1.7296      2.98  | Q       |      V  |         |          |
15+45       1.7509      3.08  | Q       |      V  |         |          |
15+50       1.7736      3.30  | Q       |      V  |         |          |
15+55       1.7991      3.71  | Q       |      V  |         |          |
16+ 0       1.8306      4.56  |  Q      |       V |         |          |
16+ 5       1.8948      9.32  |      Q  |       V |         |          |
16+10       2.0559     23.39  |         |       Q V         |          |
16+15       2.3665     45.11  |         |         |  V      |     Q    |
16+20       2.5920     32.74  |         |         |    VQ   |          |
16+25       2.7260     19.46  |         |    Q    |      V  |          |
16+30       2.8229     14.07  |         |Q        |       V |          |
16+35       2.8996     11.13  |       Q |         |       V |          |
16+40       2.9640      9.35  |      Q  |         |        V|          |
16+45       3.0195      8.06  |     Q   |         |         V          |
16+50       3.0659      6.74  |    Q    |         |         V          |
16+55       3.1073      6.01  |   Q     |         |         |V         |
17+ 0       3.1445      5.39  |   Q     |         |         |V         |
17+ 5       3.1774      4.79  |  Q      |         |         |V         |
17+10       3.2074      4.35  |  Q      |         |         | V        |
17+15       3.2346      3.95  |  Q      |         |         | V        |
17+20       3.2588      3.52  | Q       |         |         | V        |
17+25       3.2804      3.13  | Q       |         |         | V        |
17+30       3.3006      2.93  | Q       |         |         | V        |
17+35       3.3206      2.91  | Q       |         |         |  V       |
17+40       3.3401      2.83  | Q       |         |         |  V       |
17+45       3.3583      2.64  | Q       |         |         |  V       |
17+50       3.3747      2.39  |Q        |         |         |  V       |
17+55       3.3904      2.28  |Q        |         |         |  V       |
18+ 0       3.4038      1.93  |Q        |         |         |  V       |
18+ 5       3.4167      1.88  |Q        |         |         |   V      |
18+10       3.4293      1.83  |Q        |         |         |   V      |
18+15       3.4415      1.78  |Q        |         |         |   V      |
18+20       3.4535      1.73  |Q        |         |         |   V      |
18+25       3.4651      1.69  |Q        |         |         |   V      |
18+30       3.4765      1.65  |Q        |         |         |   V      |
18+35       3.4876      1.62  |Q        |         |         |   V      |
18+40       3.4985      1.58  |Q        |         |         |   V      |
18+45       3.5092      1.55  |Q        |         |         |    V     |
18+50       3.5198      1.53  |Q        |         |         |    V     |
18+55       3.5301      1.50  |Q        |         |         |    V     |
19+ 0       3.5402      1.47  |Q        |         |         |    V     |
19+ 5       3.5502      1.45  |Q        |         |         |    V     |
19+10       3.5600      1.43  |Q        |         |         |    V     |
19+15       3.5697      1.40  |Q        |         |         |    V     |
19+20       3.5792      1.38  |Q        |         |         |    V     |
19+25       3.5886      1.36  |Q        |         |         |    V     |
19+30       3.5978      1.34  |Q        |         |         |    V     |
```

19+35	3.6069	1.32	|Q	|	|	|	V |
19+40	3.6160	1.31	|Q	|	|	|	V |
19+45	3.6248	1.29	|Q	|	|	|	V |
19+50	3.6336	1.27	|Q	|	|	|	V |
19+55	3.6423	1.26	|Q	|	|	|	V |
20+ 0	3.6508	1.24	Q	|	|	|	V |
20+ 5	3.6593	1.23	Q	|	|	|	V |
20+10	3.6677	1.22	Q	|	|	|	V |
20+15	3.6760	1.20	Q	|	|	|	V |
20+20	3.6841	1.19	Q	|	|	|	V |
20+25	3.6922	1.18	Q	|	|	|	V |
20+30	3.7003	1.16	Q	|	|	|	V |
20+35	3.7082	1.15	Q	|	|	|	V |
20+40	3.7160	1.14	Q	|	|	|	V |
20+45	3.7238	1.13	Q	|	|	|	V |
20+50	3.7315	1.12	Q	|	|	|	V |
20+55	3.7391	1.11	Q	|	|	|	V |
21+ 0	3.7467	1.10	Q	|	|	|	V |
21+ 5	3.7542	1.09	Q	|	|	|	V |
21+10	3.7616	1.08	Q	|	|	|	V |
21+15	3.7690	1.07	Q	|	|	|	V |
21+20	3.7763	1.06	Q	|	|	|	V |
21+25	3.7835	1.05	Q	|	|	|	V |
21+30	3.7907	1.04	Q	|	|	|	V |
21+35	3.7978	1.03	Q	|	|	|	V |
21+40	3.8048	1.02	Q	|	|	|	V |
21+45	3.8118	1.02	Q	|	|	|	V |
21+50	3.8188	1.01	Q	|	|	|	V |
21+55	3.8257	1.00	Q	|	|	|	V |
22+ 0	3.8325	0.99	Q	|	|	|	V |
22+ 5	3.8393	0.99	Q	|	|	|	V |
22+10	3.8460	0.98	Q	|	|	|	V |
22+15	3.8527	0.97	Q	|	|	|	V |
22+20	3.8594	0.96	Q	|	|	|	V |
22+25	3.8660	0.96	Q	|	|	|	V |
22+30	3.8725	0.95	Q	|	|	|	V |
22+35	3.8790	0.94	Q	|	|	|	V |
22+40	3.8855	0.94	Q	|	|	|	V |
22+45	3.8919	0.93	Q	|	|	|	V |
22+50	3.8983	0.93	Q	|	|	|	V |
22+55	3.9046	0.92	Q	|	|	|	V |
23+ 0	3.9109	0.91	Q	|	|	|	V|
23+ 5	3.9172	0.91	Q	|	|	|	V|
23+10	3.9234	0.90	Q	|	|	|	V|
23+15	3.9296	0.90	Q	|	|	|	V|
23+20	3.9357	0.89	Q	|	|	|	V|
23+25	3.9418	0.89	Q	|	|	|	V|
23+30	3.9479	0.88	Q	|	|	|	V|
23+35	3.9539	0.88	Q	|	|	|	V|
23+40	3.9599	0.87	Q	|	|	|	V|
23+45	3.9659	0.87	Q	|	|	|	V|

```
   23+50       3.9718      0.86  Q         |          |          |         V|
   23+55       3.9777      0.86  Q         |          |          |         V|
   24+ 0       3.9836      0.85  Q         |          |          |         V|
   24+ 5       3.9893      0.83  Q         |          |          |         V|
   24+10       3.9943      0.73  Q         |          |          |         V|
   24+15       3.9978      0.50  Q         |          |          |         V|
   24+20       4.0002      0.34  Q         |          |          |         V|
   24+25       4.0019      0.26  Q         |          |          |         V|
   24+30       4.0033      0.20  Q         |          |          |         V|
   24+35       4.0044      0.16  Q         |          |          |         V|
   24+40       4.0052      0.12  Q         |          |          |         V|
   24+45       4.0059      0.10  Q         |          |          |         V|
   24+50       4.0065      0.08  Q         |          |          |         V|
   24+55       4.0069      0.07  Q         |          |          |         V|
   25+ 0       4.0073      0.05  Q         |          |          |         V|
   25+ 5       4.0076      0.04  Q         |          |          |         V|
   25+10       4.0078      0.03  Q         |          |          |         V|
   25+15       4.0080      0.03  Q         |          |          |         V|
   25+20       4.0081      0.02  Q         |          |          |         V|
   25+25       4.0082      0.02  Q         |          |          |         V|
   25+30       4.0083      0.01  Q         |          |          |         V|
   25+35       4.0084      0.01  Q         |          |          |         V|
   25+40       4.0084      0.01  Q         |          |          |         V|
   25+45       4.0084      0.00  Q         |          |          |         V|
   25+50       4.0085      0.00  Q         |          |          |          V
-------------------------------------------------------------------------
```

Appendix D – Unit Hydrograph (Pre-Development)

- 100-Year Storm Event

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

Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2004, Version 7.0

Study date 02/25/21

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

Program License Serial Number 6277

HCC IV PRE DEVELOPED CONDITIONS
100 YR UNIT HYDROGRAPH
MGUBBAREINER 2021-02-25

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 10		
36.32	1	0.79
Rainfall data for year 2		
36.32	6	1.15
Rainfall data for year 2		
36.32	24	2.15
Rainfall data for year 100		
36.32	1	1.32

```
------------------------------------------------------------------------
Rainfall data for year 100
           36.32           6           3.11
------------------------------------------------------------------------
Rainfall data for year 100
           36.32          24           6.42
------------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

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


SCS curve  SCS curve     Area     Area     Fp(Fig C6)    Ap      Fm
No.(AMCII) NO.(AMC 3)    (Ac.)    Fraction     (In/Hr)  (dec.)   (In/Hr)
 78.0      92.8         36.32      1.000     0.140    1.000    0.140

Area-averaged adjusted loss rate Fm (In/Hr) =  0.140

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

Area       Area          SCS CN    SCS CN      S     Pervious
 (Ac.)      Fract         (AMC2)    (AMC3)           Yield Fr
    36.32   1.000         78.0      92.8       0.78     0.868

Area-averaged catchment yield fraction, Y =  0.868
Area-averaged low loss fraction, Yb =  0.132
User entry of time of concentration  =   0.280 (hours)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watershed area =      36.32(Ac.)
Catchment Lag time =   0.224 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 37.2024
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.140(In/Hr)
Average low loss rate fraction (Yb) = 0.132 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall =  0.626(In)
Computed peak 30-minute rainfall =  1.072(In)
Specified peak 1-hour rainfall =  1.320(In)
Computed peak 3-hour rainfall =  2.232(In)
Specified peak 6-hour rainfall =  3.110(In)
Specified peak 24-hour rainfall =  6.420(In)


Rainfall depth area reduction factors:
Using a total area of      36.32(Ac.) (Ref: fig. E-4)

5-minute factor = 0.998     Adjusted rainfall =  0.625(In)
30-minute factor = 0.998    Adjusted rainfall =  1.070(In)
1-hour factor = 0.998       Adjusted rainfall =  1.318(In)
3-hour factor = 1.000       Adjusted rainfall =  2.232(In)
```

6-hour factor = 1.000 Adjusted rainfall = 3.110(In)
24-hour factor = 1.000 Adjusted rainfall = 6.420(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 = 439.25 (CFS))	
1	2.453	10.775
2	15.615	57.813
3	44.808	128.228
4	62.667	78.447
5	72.342	42.494
6	78.814	28.429
7	83.398	20.133
8	86.976	15.717
9	89.667	11.819
10	91.740	9.106
11	93.476	7.626
12	94.846	6.020
13	95.989	5.022
14	96.911	4.050
15	97.603	3.037
16	98.066	2.036
17	98.467	1.758
18	98.913	1.958
19	99.355	1.945
20	99.659	1.334
21	100.000	0.667

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.6253	0.6253
2	0.7698	0.1445
3	0.8694	0.0996
4	0.9478	0.0784
5	1.0134	0.0656
6	1.0703	0.0570
7	1.1210	0.0507
8	1.1668	0.0458
9	1.2088	0.0420
10	1.2476	0.0388
11	1.2838	0.0362
12	1.3178	0.0340
13	1.3693	0.0516
14	1.4189	0.0495
15	1.4666	0.0477
16	1.5127	0.0461

17	1.5574	0.0446
18	1.6006	0.0433
19	1.6427	0.0421
20	1.6836	0.0409
21	1.7235	0.0399
22	1.7624	0.0389
23	1.8004	0.0380
24	1.8375	0.0371
25	1.8738	0.0363
26	1.9094	0.0356
27	1.9443	0.0349
28	1.9785	0.0342
29	2.0121	0.0336
30	2.0451	0.0330
31	2.0775	0.0324
32	2.1094	0.0319
33	2.1407	0.0314
34	2.1716	0.0309
35	2.2020	0.0304
36	2.2320	0.0300
37	2.2614	0.0295
38	2.2904	0.0290
39	2.3191	0.0286
40	2.3473	0.0283
41	2.3752	0.0279
42	2.4028	0.0275
43	2.4300	0.0272
44	2.4569	0.0269
45	2.4834	0.0266
46	2.5097	0.0263
47	2.5356	0.0260
48	2.5613	0.0257
49	2.5867	0.0254
50	2.6118	0.0251
51	2.6367	0.0249
52	2.6613	0.0246
53	2.6857	0.0244
54	2.7098	0.0241
55	2.7337	0.0239
56	2.7573	0.0237
57	2.7808	0.0234
58	2.8040	0.0232
59	2.8271	0.0230
60	2.8499	0.0228
61	2.8725	0.0226
62	2.8949	0.0224
63	2.9172	0.0222
64	2.9393	0.0221
65	2.9611	0.0219
66	2.9829	0.0217
67	3.0044	0.0215

68	3.0258	0.0214
69	3.0470	0.0212
70	3.0680	0.0210
71	3.0889	0.0209
72	3.1096	0.0207
73	3.1322	0.0225
74	3.1545	0.0224
75	3.1767	0.0222
76	3.1988	0.0221
77	3.2208	0.0219
78	3.2426	0.0218
79	3.2642	0.0217
80	3.2858	0.0215
81	3.3072	0.0214
82	3.3285	0.0213
83	3.3496	0.0212
84	3.3707	0.0210
85	3.3916	0.0209
86	3.4124	0.0208
87	3.4331	0.0207
88	3.4537	0.0206
89	3.4741	0.0205
90	3.4945	0.0204
91	3.5147	0.0202
92	3.5349	0.0201
93	3.5549	0.0200
94	3.5749	0.0199
95	3.5947	0.0198
96	3.6144	0.0197
97	3.6341	0.0196
98	3.6536	0.0195
99	3.6730	0.0194
100	3.6924	0.0194
101	3.7117	0.0193
102	3.7308	0.0192
103	3.7499	0.0191
104	3.7689	0.0190
105	3.7878	0.0189
106	3.8066	0.0188
107	3.8254	0.0187
108	3.8440	0.0187
109	3.8626	0.0186
110	3.8811	0.0185
111	3.8995	0.0184
112	3.9178	0.0183
113	3.9361	0.0183
114	3.9542	0.0182
115	3.9723	0.0181
116	3.9904	0.0180
117	4.0083	0.0180
118	4.0262	0.0179

119	4.0440	0.0178
120	4.0617	0.0177
121	4.0794	0.0177
122	4.0970	0.0176
123	4.1145	0.0175
124	4.1320	0.0175
125	4.1494	0.0174
126	4.1667	0.0173
127	4.1839	0.0173
128	4.2011	0.0172
129	4.2183	0.0171
130	4.2353	0.0171
131	4.2523	0.0170
132	4.2693	0.0169
133	4.2862	0.0169
134	4.3030	0.0168
135	4.3197	0.0168
136	4.3364	0.0167
137	4.3531	0.0166
138	4.3697	0.0166
139	4.3862	0.0165
140	4.4027	0.0165
141	4.4191	0.0164
142	4.4354	0.0164
143	4.4517	0.0163
144	4.4680	0.0163
145	4.4842	0.0162
146	4.5003	0.0161
147	4.5164	0.0161
148	4.5325	0.0160
149	4.5485	0.0160
150	4.5644	0.0159
151	4.5803	0.0159
152	4.5961	0.0158
153	4.6119	0.0158
154	4.6276	0.0157
155	4.6433	0.0157
156	4.6590	0.0156
157	4.6746	0.0156
158	4.6901	0.0155
159	4.7056	0.0155
160	4.7211	0.0155
161	4.7365	0.0154
162	4.7518	0.0154
163	4.7671	0.0153
164	4.7824	0.0153
165	4.7976	0.0152
166	4.8128	0.0152
167	4.8279	0.0151
168	4.8430	0.0151
169	4.8581	0.0151

170	4.8731	0.0150
171	4.8881	0.0150
172	4.9030	0.0149
173	4.9179	0.0149
174	4.9327	0.0148
175	4.9475	0.0148
176	4.9623	0.0148
177	4.9770	0.0147
178	4.9917	0.0147
179	5.0063	0.0146
180	5.0209	0.0146
181	5.0355	0.0146
182	5.0500	0.0145
183	5.0645	0.0145
184	5.0790	0.0145
185	5.0934	0.0144
186	5.1078	0.0144
187	5.1221	0.0143
188	5.1364	0.0143
189	5.1507	0.0143
190	5.1649	0.0142
191	5.1791	0.0142
192	5.1933	0.0142
193	5.2074	0.0141
194	5.2215	0.0141
195	5.2355	0.0141
196	5.2496	0.0140
197	5.2636	0.0140
198	5.2775	0.0140
199	5.2914	0.0139
200	5.3053	0.0139
201	5.3192	0.0139
202	5.3330	0.0138
203	5.3468	0.0138
204	5.3605	0.0138
205	5.3743	0.0137
206	5.3879	0.0137
207	5.4016	0.0137
208	5.4152	0.0136
209	5.4288	0.0136
210	5.4424	0.0136
211	5.4559	0.0135
212	5.4694	0.0135
213	5.4829	0.0135
214	5.4964	0.0134
215	5.5098	0.0134
216	5.5232	0.0134
217	5.5365	0.0134
218	5.5498	0.0133
219	5.5631	0.0133
220	5.5764	0.0133

221	5.5896	0.0132
222	5.6029	0.0132
223	5.6160	0.0132
224	5.6292	0.0132
225	5.6423	0.0131
226	5.6554	0.0131
227	5.6685	0.0131
228	5.6815	0.0130
229	5.6945	0.0130
230	5.7075	0.0130
231	5.7205	0.0130
232	5.7334	0.0129
233	5.7463	0.0129
234	5.7592	0.0129
235	5.7721	0.0129
236	5.7849	0.0128
237	5.7977	0.0128
238	5.8105	0.0128
239	5.8232	0.0128
240	5.8360	0.0127
241	5.8487	0.0127
242	5.8614	0.0127
243	5.8740	0.0127
244	5.8866	0.0126
245	5.8992	0.0126
246	5.9118	0.0126
247	5.9244	0.0126
248	5.9369	0.0125
249	5.9494	0.0125
250	5.9619	0.0125
251	5.9743	0.0125
252	5.9868	0.0124
253	5.9992	0.0124
254	6.0116	0.0124
255	6.0239	0.0124
256	6.0363	0.0123
257	6.0486	0.0123
258	6.0609	0.0123
259	6.0732	0.0123
260	6.0854	0.0122
261	6.0976	0.0122
262	6.1098	0.0122
263	6.1220	0.0122
264	6.1342	0.0122
265	6.1463	0.0121
266	6.1584	0.0121
267	6.1705	0.0121
268	6.1826	0.0121
269	6.1947	0.0121
270	6.2067	0.0120
271	6.2187	0.0120

272	6.2307	0.0120
273	6.2426	0.0120
274	6.2546	0.0119
275	6.2665	0.0119
276	6.2784	0.0119
277	6.2903	0.0119
278	6.3022	0.0119
279	6.3140	0.0118
280	6.3258	0.0118
281	6.3376	0.0118
282	6.3494	0.0118
283	6.3612	0.0118
284	6.3729	0.0117
285	6.3847	0.0117
286	6.3964	0.0117
287	6.4080	0.0117
288	6.4197	0.0117

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0117	0.0015	0.0101
2	0.0117	0.0015	0.0101
3	0.0117	0.0015	0.0102
4	0.0117	0.0015	0.0102
5	0.0118	0.0016	0.0102
6	0.0118	0.0016	0.0102
7	0.0118	0.0016	0.0103
8	0.0119	0.0016	0.0103
9	0.0119	0.0016	0.0103
10	0.0119	0.0016	0.0104
11	0.0120	0.0016	0.0104
12	0.0120	0.0016	0.0104
13	0.0120	0.0016	0.0104
14	0.0121	0.0016	0.0105
15	0.0121	0.0016	0.0105
16	0.0121	0.0016	0.0105
17	0.0122	0.0016	0.0106
18	0.0122	0.0016	0.0106
19	0.0122	0.0016	0.0106
20	0.0122	0.0016	0.0106
21	0.0123	0.0016	0.0107
22	0.0123	0.0016	0.0107
23	0.0124	0.0016	0.0107
24	0.0124	0.0016	0.0108
25	0.0124	0.0016	0.0108
26	0.0125	0.0016	0.0108
27	0.0125	0.0016	0.0109
28	0.0125	0.0017	0.0109
29	0.0126	0.0017	0.0109

30	0.0126	0.0017	0.0109
31	0.0127	0.0017	0.0110
32	0.0127	0.0017	0.0110
33	0.0127	0.0017	0.0111
34	0.0128	0.0017	0.0111
35	0.0128	0.0017	0.0111
36	0.0128	0.0017	0.0111
37	0.0129	0.0017	0.0112
38	0.0129	0.0017	0.0112
39	0.0130	0.0017	0.0113
40	0.0130	0.0017	0.0113
41	0.0130	0.0017	0.0113
42	0.0131	0.0017	0.0113
43	0.0131	0.0017	0.0114
44	0.0132	0.0017	0.0114
45	0.0132	0.0017	0.0115
46	0.0132	0.0017	0.0115
47	0.0133	0.0018	0.0115
48	0.0133	0.0018	0.0116
49	0.0134	0.0018	0.0116
50	0.0134	0.0018	0.0116
51	0.0135	0.0018	0.0117
52	0.0135	0.0018	0.0117
53	0.0136	0.0018	0.0118
54	0.0136	0.0018	0.0118
55	0.0137	0.0018	0.0119
56	0.0137	0.0018	0.0119
57	0.0138	0.0018	0.0119
58	0.0138	0.0018	0.0120
59	0.0139	0.0018	0.0120
60	0.0139	0.0018	0.0121
61	0.0140	0.0018	0.0121
62	0.0140	0.0018	0.0121
63	0.0141	0.0019	0.0122
64	0.0141	0.0019	0.0122
65	0.0142	0.0019	0.0123
66	0.0142	0.0019	0.0123
67	0.0143	0.0019	0.0124
68	0.0143	0.0019	0.0124
69	0.0144	0.0019	0.0125
70	0.0144	0.0019	0.0125
71	0.0145	0.0019	0.0126
72	0.0145	0.0019	0.0126
73	0.0146	0.0019	0.0127
74	0.0146	0.0019	0.0127
75	0.0147	0.0019	0.0128
76	0.0148	0.0019	0.0128
77	0.0148	0.0020	0.0129
78	0.0149	0.0020	0.0129
79	0.0150	0.0020	0.0130
80	0.0150	0.0020	0.0130

81	0.0151	0.0020	0.0131
82	0.0151	0.0020	0.0131
83	0.0152	0.0020	0.0132
84	0.0153	0.0020	0.0133
85	0.0154	0.0020	0.0133
86	0.0154	0.0020	0.0134
87	0.0155	0.0020	0.0135
88	0.0155	0.0020	0.0135
89	0.0156	0.0021	0.0136
90	0.0157	0.0021	0.0136
91	0.0158	0.0021	0.0137
92	0.0158	0.0021	0.0137
93	0.0159	0.0021	0.0138
94	0.0160	0.0021	0.0139
95	0.0161	0.0021	0.0140
96	0.0161	0.0021	0.0140
97	0.0163	0.0021	0.0141
98	0.0163	0.0021	0.0142
99	0.0164	0.0022	0.0143
100	0.0165	0.0022	0.0143
101	0.0166	0.0022	0.0144
102	0.0166	0.0022	0.0145
103	0.0168	0.0022	0.0146
104	0.0168	0.0022	0.0146
105	0.0169	0.0022	0.0147
106	0.0170	0.0022	0.0148
107	0.0171	0.0023	0.0149
108	0.0172	0.0023	0.0149
109	0.0173	0.0023	0.0150
110	0.0174	0.0023	0.0151
111	0.0175	0.0023	0.0152
112	0.0176	0.0023	0.0153
113	0.0177	0.0023	0.0154
114	0.0178	0.0023	0.0155
115	0.0180	0.0024	0.0156
116	0.0180	0.0024	0.0157
117	0.0182	0.0024	0.0158
118	0.0183	0.0024	0.0158
119	0.0184	0.0024	0.0160
120	0.0185	0.0024	0.0161
121	0.0187	0.0025	0.0162
122	0.0187	0.0025	0.0163
123	0.0189	0.0025	0.0164
124	0.0190	0.0025	0.0165
125	0.0192	0.0025	0.0166
126	0.0193	0.0025	0.0167
127	0.0194	0.0026	0.0169
128	0.0195	0.0026	0.0170
129	0.0197	0.0026	0.0171
130	0.0198	0.0026	0.0172
131	0.0200	0.0026	0.0174

132	0.0201	0.0027	0.0175
133	0.0204	0.0027	0.0177
134	0.0205	0.0027	0.0178
135	0.0207	0.0027	0.0180
136	0.0208	0.0027	0.0181
137	0.0210	0.0028	0.0183
138	0.0212	0.0028	0.0184
139	0.0214	0.0028	0.0186
140	0.0215	0.0028	0.0187
141	0.0218	0.0029	0.0189
142	0.0219	0.0029	0.0190
143	0.0222	0.0029	0.0193
144	0.0224	0.0029	0.0194
145	0.0207	0.0027	0.0180
146	0.0209	0.0028	0.0181
147	0.0212	0.0028	0.0184
148	0.0214	0.0028	0.0186
149	0.0217	0.0029	0.0189
150	0.0219	0.0029	0.0190
151	0.0222	0.0029	0.0193
152	0.0224	0.0030	0.0195
153	0.0228	0.0030	0.0198
154	0.0230	0.0030	0.0200
155	0.0234	0.0031	0.0204
156	0.0237	0.0031	0.0206
157	0.0241	0.0032	0.0209
158	0.0244	0.0032	0.0212
159	0.0249	0.0033	0.0216
160	0.0251	0.0033	0.0218
161	0.0257	0.0034	0.0223
162	0.0260	0.0034	0.0225
163	0.0266	0.0035	0.0231
164	0.0269	0.0035	0.0233
165	0.0275	0.0036	0.0239
166	0.0279	0.0037	0.0242
167	0.0286	0.0038	0.0249
168	0.0290	0.0038	0.0252
169	0.0300	0.0039	0.0260
170	0.0304	0.0040	0.0264
171	0.0314	0.0041	0.0272
172	0.0319	0.0042	0.0277
173	0.0330	0.0043	0.0286
174	0.0336	0.0044	0.0292
175	0.0349	0.0046	0.0303
176	0.0356	0.0047	0.0309
177	0.0371	0.0049	0.0322
178	0.0380	0.0050	0.0330
179	0.0399	0.0053	0.0346
180	0.0409	0.0054	0.0355
181	0.0433	0.0057	0.0376
182	0.0446	0.0059	0.0388

183	0.0477	0.0063	0.0415
184	0.0495	0.0065	0.0430
185	0.0340	0.0045	0.0295
186	0.0362	0.0048	0.0314
187	0.0420	0.0055	0.0364
188	0.0458	0.0060	0.0398
189	0.0570	0.0075	0.0495
190	0.0656	0.0086	0.0570
191	0.0996	0.0117	0.0879
192	0.1445	0.0117	0.1329
193	0.6253	0.0117	0.6136
194	0.0784	0.0103	0.0680
195	0.0507	0.0067	0.0440
196	0.0388	0.0051	0.0337
197	0.0516	0.0068	0.0448
198	0.0461	0.0061	0.0400
199	0.0421	0.0055	0.0365
200	0.0389	0.0051	0.0338
201	0.0363	0.0048	0.0315
202	0.0342	0.0045	0.0297
203	0.0324	0.0043	0.0281
204	0.0309	0.0041	0.0268
205	0.0295	0.0039	0.0256
206	0.0283	0.0037	0.0245
207	0.0272	0.0036	0.0236
208	0.0263	0.0035	0.0228
209	0.0254	0.0033	0.0220
210	0.0246	0.0032	0.0214
211	0.0239	0.0031	0.0207
212	0.0232	0.0031	0.0202
213	0.0226	0.0030	0.0196
214	0.0221	0.0029	0.0192
215	0.0215	0.0028	0.0187
216	0.0210	0.0028	0.0183
217	0.0225	0.0030	0.0195
218	0.0221	0.0029	0.0192
219	0.0217	0.0029	0.0188
220	0.0213	0.0028	0.0185
221	0.0209	0.0028	0.0182
222	0.0206	0.0027	0.0179
223	0.0202	0.0027	0.0176
224	0.0199	0.0026	0.0173
225	0.0196	0.0026	0.0171
226	0.0194	0.0025	0.0168
227	0.0191	0.0025	0.0166
228	0.0188	0.0025	0.0163
229	0.0186	0.0024	0.0161
230	0.0183	0.0024	0.0159
231	0.0181	0.0024	0.0157
232	0.0179	0.0024	0.0155
233	0.0177	0.0023	0.0153

234	0.0175	0.0023	0.0152
235	0.0173	0.0023	0.0150
236	0.0171	0.0022	0.0148
237	0.0169	0.0022	0.0147
238	0.0167	0.0022	0.0145
239	0.0165	0.0022	0.0144
240	0.0164	0.0022	0.0142
241	0.0162	0.0021	0.0141
242	0.0160	0.0021	0.0139
243	0.0159	0.0021	0.0138
244	0.0157	0.0021	0.0137
245	0.0156	0.0021	0.0135
246	0.0155	0.0020	0.0134
247	0.0153	0.0020	0.0133
248	0.0152	0.0020	0.0132
249	0.0151	0.0020	0.0131
250	0.0149	0.0020	0.0130
251	0.0148	0.0019	0.0129
252	0.0147	0.0019	0.0127
253	0.0146	0.0019	0.0126
254	0.0145	0.0019	0.0125
255	0.0143	0.0019	0.0125
256	0.0142	0.0019	0.0124
257	0.0141	0.0019	0.0123
258	0.0140	0.0018	0.0122
259	0.0139	0.0018	0.0121
260	0.0138	0.0018	0.0120
261	0.0137	0.0018	0.0119
262	0.0136	0.0018	0.0118
263	0.0135	0.0018	0.0118
264	0.0134	0.0018	0.0117
265	0.0134	0.0018	0.0116
266	0.0133	0.0017	0.0115
267	0.0132	0.0017	0.0114
268	0.0131	0.0017	0.0114
269	0.0130	0.0017	0.0113
270	0.0129	0.0017	0.0112
271	0.0129	0.0017	0.0112
272	0.0128	0.0017	0.0111
273	0.0127	0.0017	0.0110
274	0.0126	0.0017	0.0110
275	0.0126	0.0017	0.0109
276	0.0125	0.0016	0.0108
277	0.0124	0.0016	0.0108
278	0.0123	0.0016	0.0107
279	0.0123	0.0016	0.0107
280	0.0122	0.0016	0.0106
281	0.0121	0.0016	0.0105
282	0.0121	0.0016	0.0105
283	0.0120	0.0016	0.0104
284	0.0119	0.0016	0.0104

285	0.0119	0.0016	0.0103
286	0.0118	0.0016	0.0103
287	0.0118	0.0015	0.0102
288	0.0117	0.0015	0.0102

Total soil rain loss = 0.77(In)
Total effective rainfall = 5.65(In)
Peak flow rate in flood hydrograph = 102.49(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

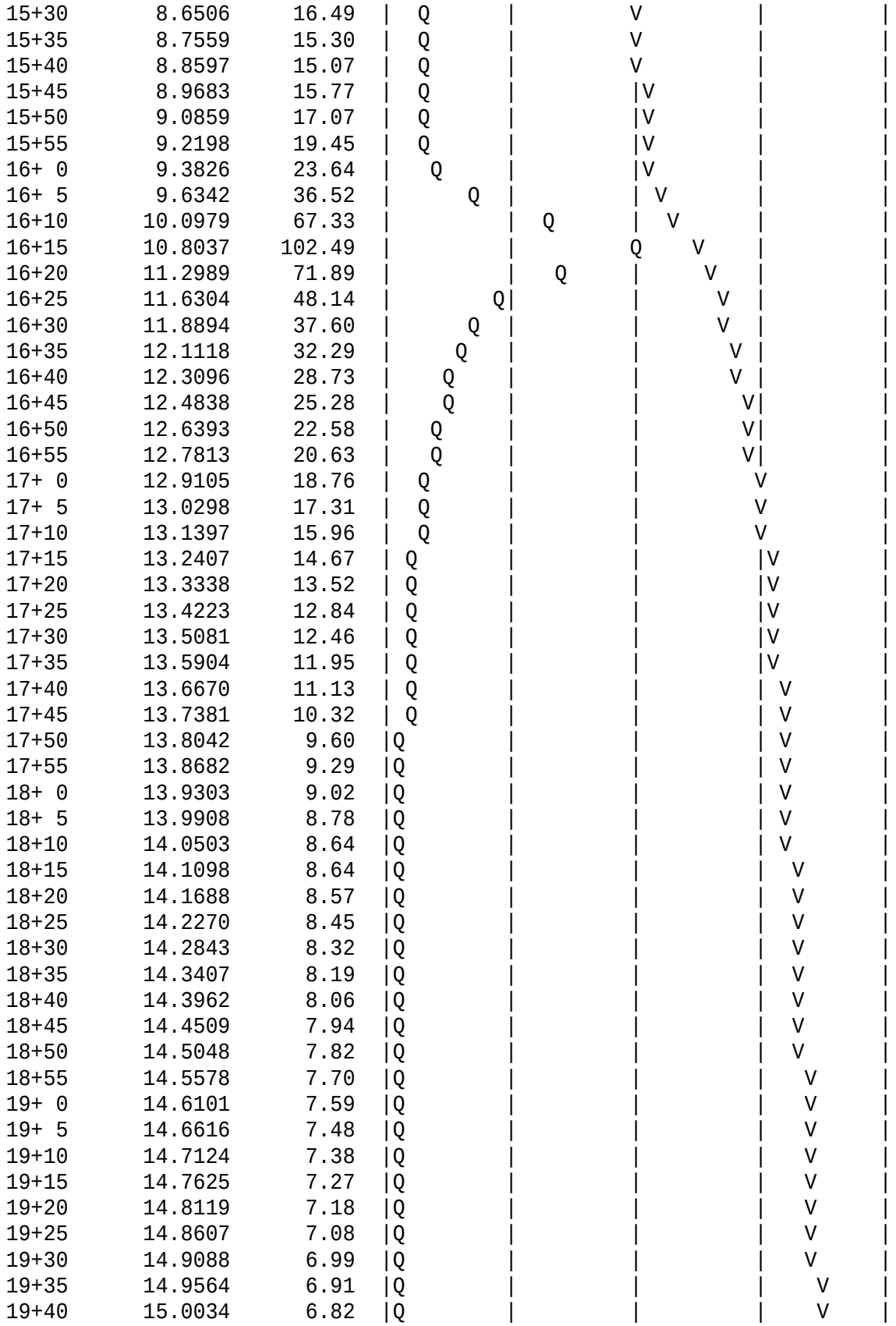
Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	50.0	100.0	150.0	200.0
0+ 5	0.0008	0.11	Q				
0+10	0.0055	0.69	Q				
0+15	0.0193	2.00	Q				
0+20	0.0385	2.79	Q				
0+25	0.0608	3.23	Q				
0+30	0.0851	3.53	Q				
0+35	0.1108	3.74	Q				
0+40	0.1377	3.91	Q				
0+45	0.1656	4.04	Q				
0+50	0.1941	4.14	Q				
0+55	0.2232	4.23	Q				
1+ 0	0.2528	4.30	Q				
1+ 5	0.2829	4.36	Q				
1+10	0.3133	4.41	Q				
1+15	0.3440	4.46	Q				
1+20	0.3749	4.49	Q				
1+25	0.4060	4.52	Q				
1+30	0.4373	4.55	QV				
1+35	0.4689	4.58	QV				
1+40	0.5007	4.61	QV				
1+45	0.5325	4.63	QV				
1+50	0.5645	4.64	QV				
1+55	0.5965	4.65	QV				
2+ 0	0.6287	4.67	QV				
2+ 5	0.6609	4.68	QV				
2+10	0.6932	4.69	QV				
2+15	0.7256	4.71	QV				
2+20	0.7581	4.72	QV				
2+25	0.7907	4.73	QV				
2+30	0.8234	4.75	QV				
2+35	0.8562	4.76	Q V				
2+40	0.8891	4.77	Q V				

2+45	0.9220	4.79	Q V	|	|	|	|
2+50	0.9551	4.80	Q V	|	|	|	|
2+55	0.9883	4.82	Q V	|	|	|	|
3+ 0	1.0215	4.83	Q V	|	|	|	|
3+ 5	1.0549	4.84	Q V	|	|	|	|
3+10	1.0883	4.86	Q V	|	|	|	|
3+15	1.1219	4.87	Q V	|	|	|	|
3+20	1.1556	4.89	Q V	|	|	|	|
3+25	1.1893	4.90	Q V	|	|	|	|
3+30	1.2232	4.92	Q V	|	|	|	|
3+35	1.2572	4.93	Q V	|	|	|	|
3+40	1.2913	4.95	Q V	|	|	|	|
3+45	1.3254	4.96	Q V	|	|	|	|
3+50	1.3597	4.98	Q V	|	|	|	|
3+55	1.3942	5.00	Q V	|	|	|	|
4+ 0	1.4287	5.01	|Q V	|	|	|	|
4+ 5	1.4633	5.03	|Q V	|	|	|	|
4+10	1.4980	5.04	|Q V	|	|	|	|
4+15	1.5329	5.06	|Q V	|	|	|	|
4+20	1.5679	5.08	|Q V	|	|	|	|
4+25	1.6029	5.09	|Q V	|	|	|	|
4+30	1.6381	5.11	|Q V	|	|	|	|
4+35	1.6735	5.13	|Q V	|	|	|	|
4+40	1.7089	5.15	|Q V	|	|	|	|
4+45	1.7445	5.16	|Q V	|	|	|	|
4+50	1.7801	5.18	|Q V	|	|	|	|
4+55	1.8160	5.20	|Q V	|	|	|	|
5+ 0	1.8519	5.22	|Q V	|	|	|	|
5+ 5	1.8879	5.24	|Q V	|	|	|	|
5+10	1.9241	5.25	|Q V	|	|	|	|
5+15	1.9604	5.27	|Q V	|	|	|	|
5+20	1.9969	5.29	|Q V	|	|	|	|
5+25	2.0335	5.31	|Q V	|	|	|	|
5+30	2.0702	5.33	|Q V	|	|	|	|
5+35	2.1070	5.35	|Q V	|	|	|	|
5+40	2.1440	5.37	|Q V	|	|	|	|
5+45	2.1811	5.39	|Q V	|	|	|	|
5+50	2.2184	5.41	|Q V	|	|	|	|
5+55	2.2558	5.43	|Q V	|	|	|	|
6+ 0	2.2933	5.45	|Q V	|	|	|	|
6+ 5	2.3310	5.47	|Q V	|	|	|	|
6+10	2.3688	5.49	|Q V	|	|	|	|
6+15	2.4068	5.51	|Q V	|	|	|	|
6+20	2.4449	5.54	|Q V	|	|	|	|
6+25	2.4832	5.56	|Q V	|	|	|	|
6+30	2.5216	5.58	|Q V	|	|	|	|
6+35	2.5602	5.60	|Q V	|	|	|	|
6+40	2.5990	5.63	|Q V	|	|	|	|
6+45	2.6379	5.65	|Q V	|	|	|	|
6+50	2.6770	5.67	|Q V	|	|	|	|
6+55	2.7162	5.70	|Q V	|	|	|	|

7+ 0	2.7556	5.72	|Q	V	|	|	|
7+ 5	2.7952	5.75	|Q	V	|	|	|
7+10	2.8349	5.77	|Q	V	|	|	|
7+15	2.8748	5.80	|Q	V	|	|	|
7+20	2.9149	5.82	|Q	V	|	|	|
7+25	2.9552	5.85	|Q	V	|	|	|
7+30	2.9956	5.87	|Q	V	|	|	|
7+35	3.0362	5.90	|Q	V	|	|	|
7+40	3.0770	5.93	|Q	V	|	|	|
7+45	3.1180	5.95	|Q	V	|	|	|
7+50	3.1592	5.98	|Q	V	|	|	|
7+55	3.2006	6.01	|Q	V	|	|	|
8+ 0	3.2422	6.04	|Q	V	|	|	|
8+ 5	3.2839	6.07	|Q	V	|	|	|
8+10	3.3259	6.09	|Q	V	|	|	|
8+15	3.3681	6.12	|Q	V	|	|	|
8+20	3.4105	6.15	|Q	V	|	|	|
8+25	3.4531	6.19	|Q	V	|	|	|
8+30	3.4959	6.22	|Q	V	|	|	|
8+35	3.5389	6.25	|Q	V	|	|	|
8+40	3.5822	6.28	|Q	V	|	|	|
8+45	3.6256	6.31	|Q	V	|	|	|
8+50	3.6693	6.35	|Q	V	|	|	|
8+55	3.7133	6.38	|Q	V	|	|	|
9+ 0	3.7575	6.41	|Q	V	|	|	|
9+ 5	3.8019	6.45	|Q	V	|	|	|
9+10	3.8465	6.48	|Q	V	|	|	|
9+15	3.8914	6.52	|Q	V	|	|	|
9+20	3.9366	6.56	|Q	V	|	|	|
9+25	3.9820	6.59	|Q	V	|	|	|
9+30	4.0277	6.63	|Q	V	|	|	|
9+35	4.0736	6.67	|Q	V	|	|	|
9+40	4.1198	6.71	|Q	V	|	|	|
9+45	4.1663	6.75	|Q	V	|	|	|
9+50	4.2131	6.79	|Q	V	|	|	|
9+55	4.2601	6.83	|Q	V	|	|	|
10+ 0	4.3075	6.87	|Q	V	|	|	|
10+ 5	4.3551	6.92	|Q	V	|	|	|
10+10	4.4031	6.96	|Q	V	|	|	|
10+15	4.4513	7.01	|Q	V	|	|	|
10+20	4.4999	7.05	|Q	V	|	|	|
10+25	4.5488	7.10	|Q	V	|	|	|
10+30	4.5980	7.15	|Q	V	|	|	|
10+35	4.6476	7.20	|Q	V	|	|	|
10+40	4.6975	7.25	|Q	|V	|	|	|
10+45	4.7478	7.30	|Q	|V	|	|	|
10+50	4.7984	7.35	|Q	|V	|	|	|
10+55	4.8494	7.40	|Q	|V	|	|	|
11+ 0	4.9007	7.46	|Q	|V	|	|	|
11+ 5	4.9525	7.51	|Q	|V	|	|	|
11+10	5.0046	7.57	|Q	|V	|	|	|

11+15	5.0572	7.63	Q	V			
11+20	5.1101	7.69	Q	V			
11+25	5.1635	7.75	Q	V			
11+30	5.2173	7.81	Q	V			
11+35	5.2715	7.88	Q	V			
11+40	5.3262	7.94	Q	V			
11+45	5.3814	8.01	Q	V			
11+50	5.4371	8.08	Q	V			
11+55	5.4932	8.15	Q	V			
12+ 0	5.5499	8.23	Q	V			
12+ 5	5.6070	8.29	Q	V			
12+10	5.6639	8.27	Q	V			
12+15	5.7199	8.13	Q	V			
12+20	5.7756	8.08	Q	V			
12+25	5.8314	8.10	Q	V			
12+30	5.8874	8.14	Q	V			
12+35	5.9439	8.20	Q	V			
12+40	6.0008	8.27	Q	V			
12+45	6.0583	8.35	Q	V			
12+50	6.1164	8.43	Q	V			
12+55	6.1751	8.52	Q	V			
13+ 0	6.2344	8.62	Q	V			
13+ 5	6.2945	8.73	Q	V			
13+10	6.3554	8.84	Q	V			
13+15	6.4171	8.96	Q	V			
13+20	6.4796	9.08	Q	V			
13+25	6.5430	9.21	Q	V			
13+30	6.6073	9.34	Q	V			
13+35	6.6727	9.49	Q	V			
13+40	6.7390	9.63	Q	V			
13+45	6.8064	9.79	Q	V			
13+50	6.8750	9.96	Q	V			
13+55	6.9448	10.14	Q	V			
14+ 0	7.0159	10.32	Q	V			
14+ 5	7.0883	10.52	Q	V			
14+10	7.1622	10.72	Q	V			
14+15	7.2377	10.96	Q	V			
14+20	7.3147	11.19	Q	V			
14+25	7.3936	11.45	Q	V			
14+30	7.4742	11.71	Q	V			
14+35	7.5569	12.00	Q	V			
14+40	7.6416	12.30	Q	V			
14+45	7.7287	12.64	Q	V			
14+50	7.8181	12.99	Q	V			
14+55	7.9104	13.39	Q	V			
15+ 0	8.0055	13.81	Q	V			
15+ 5	8.1039	14.29	Q	V			
15+10	8.2059	14.80	Q	V			
15+15	8.3120	15.40	Q	V			
15+20	8.4225	16.05	Q	V			
15+25	8.5370	16.64	Q	V			



```
19+45      15.0498      6.74  |Q        |         |         |    V    |
19+50      15.0957      6.66  |Q        |         |         |    V    |
19+55      15.1410      6.58  |Q        |         |         |    V    |
20+ 0      15.1858      6.51  |Q        |         |         |    V    |
20+ 5      15.2302      6.44  |Q        |         |         |    V    |
20+10      15.2741      6.37  |Q        |         |         |    V    |
20+15      15.3175      6.30  |Q        |         |         |    V    |
20+20      15.3604      6.24  |Q        |         |         |    V    |
20+25      15.4030      6.18  |Q        |         |         |     V   |
20+30      15.4451      6.11  |Q        |         |         |     V   |
20+35      15.4868      6.06  |Q        |         |         |     V   |
20+40      15.5281      6.00  |Q        |         |         |     V   |
20+45      15.5690      5.94  |Q        |         |         |     V   |
20+50      15.6096      5.89  |Q        |         |         |     V   |
20+55      15.6498      5.84  |Q        |         |         |     V   |
21+ 0      15.6896      5.79  |Q        |         |         |     V   |
21+ 5      15.7291      5.74  |Q        |         |         |     V   |
21+10      15.7683      5.69  |Q        |         |         |     V   |
21+15      15.8071      5.64  |Q        |         |         |      V  |
21+20      15.8457      5.59  |Q        |         |         |      V  |
21+25      15.8839      5.55  |Q        |         |         |      V  |
21+30      15.9218      5.51  |Q        |         |         |      V  |
21+35      15.9594      5.46  |Q        |         |         |      V  |
21+40      15.9968      5.42  |Q        |         |         |      V  |
21+45      16.0339      5.38  |Q        |         |         |      V  |
21+50      16.0706      5.34  |Q        |         |         |      V  |
21+55      16.1072      5.30  |Q        |         |         |      V  |
22+ 0      16.1434      5.26  |Q        |         |         |      V  |
22+ 5      16.1794      5.23  |Q        |         |         |      V  |
22+10      16.2152      5.19  |Q        |         |         |      V  |
22+15      16.2507      5.16  |Q        |         |         |       V |
22+20      16.2859      5.12  |Q        |         |         |       V |
22+25      16.3210      5.09  |Q        |         |         |       V |
22+30      16.3558      5.05  |Q        |         |         |       V |
22+35      16.3904      5.02  |Q        |         |         |       V |
22+40      16.4247      4.99  Q        |         |         |       V |
22+45      16.4589      4.96  Q        |         |         |       V |
22+50      16.4928      4.93  Q        |         |         |       V |
22+55      16.5265      4.90  Q        |         |         |       V |
23+ 0      16.5600      4.87  Q        |         |         |       V |
23+ 5      16.5933      4.84  Q        |         |         |       V |
23+10      16.6265      4.81  Q        |         |         |       V |
23+15      16.6594      4.78  Q        |         |         |        V|
23+20      16.6921      4.75  Q        |         |         |        V|
23+25      16.7247      4.73  Q        |         |         |        V|
23+30      16.7570      4.70  Q        |         |         |        V|
23+35      16.7892      4.67  Q        |         |         |        V|
23+40      16.8212      4.65  Q        |         |         |        V|
23+45      16.8531      4.62  Q        |         |         |        V|
23+50      16.8847      4.60  Q        |         |         |        V|
23+55      16.9162      4.57  Q        |         |         |        V|
```

24+ 0	16.9475	4.55	Q				V
24+ 5	16.9780	4.42	Q				V
24+10	17.0042	3.81	Q				V
24+15	17.0214	2.49	Q				V
24+20	17.0330	1.69	Q				V
24+25	17.0416	1.25	Q				V
24+30	17.0481	0.95	Q				V
24+35	17.0533	0.75	Q				V
24+40	17.0573	0.58	Q				V
24+45	17.0605	0.46	Q				V
24+50	17.0630	0.37	Q				V
24+55	17.0650	0.29	Q				V
25+ 0	17.0665	0.22	Q				V
25+ 5	17.0677	0.17	Q				V
25+10	17.0686	0.13	Q				V
25+15	17.0693	0.10	Q				V
25+20	17.0698	0.08	Q				V
25+25	17.0702	0.06	Q				V
25+30	17.0705	0.04	Q				V
25+35	17.0707	0.02	Q				V
25+40	17.0707	0.01	Q				V

Appendix E – Unit Hydrograph (Post-Development)

- 10-Year Storm Event
- 100-Year Storm Event

Appendix E – Unit Hydrograph (Post-Development)

- 10-Year Storm Event

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

Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2004, Version 7.0

Study date 02/25/21

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

Program License Serial Number 6277

HCC IV POST DEVELOPED CONDITION
10 YR
MGUBBAREINER 2021-02-25

Storm Event Year = 10

Antecedent Moisture Condition = 2

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 10		
36.32	1	0.79
Rainfall data for year 2		
36.32	6	1.15
Rainfall data for year 2		
36.32	24	2.15
Rainfall data for year 100		
36.32	1	1.32

```
------------------------------------------------------------------------
Rainfall data for year 100
            36.32            6           3.11
------------------------------------------------------------------------
Rainfall data for year 100
            36.32           24           6.42
------------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

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


SCS curve  SCS curve     Area     Area     Fp(Fig C6)    Ap      Fm
No.(AMCII) NO.(AMC 2)    (Ac.)    Fraction     (In/Hr)  (dec.)   (In/Hr)
 90.0      90.0         36.32      1.000     0.192    0.123    0.024

Area-averaged adjusted loss rate Fm (In/Hr) =  0.024

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

Area       Area          SCS CN    SCS CN      S     Pervious
 (Ac.)      Fract         (AMC2)    (AMC2)           Yield Fr
     4.47   0.123         90.0      90.0       1.11     0.725
    31.85   0.877         98.0      98.0       0.20     0.940

Area-averaged catchment yield fraction, Y =  0.913
Area-averaged low loss fraction, Yb =  0.087
User entry of time of concentration  =   0.235 (hours)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watershed area =      36.32(Ac.)
Catchment Lag time =   0.188 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 44.3262
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.024(In/Hr)
Average low loss rate fraction (Yb) = 0.087 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall =  0.376(In)
Computed peak 30-minute rainfall =  0.644(In)
Specified peak 1-hour rainfall =  0.793(In)
Computed peak 3-hour rainfall =  1.380(In)
Specified peak 6-hour rainfall =  1.956(In)
Specified peak 24-hour rainfall =  3.907(In)


Rainfall depth area reduction factors:
Using a total area of      36.32(Ac.) (Ref: fig. E-4)

5-minute factor = 0.998     Adjusted rainfall =  0.376(In)
30-minute factor = 0.998    Adjusted rainfall =  0.643(In)
1-hour factor = 0.998       Adjusted rainfall =  0.792(In)
```

3-hour factor = 1.000 Adjusted rainfall = 1.379(In)
6-hour factor = 1.000 Adjusted rainfall = 1.956(In)
24-hour factor = 1.000 Adjusted rainfall = 3.907(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 = 439.25 (CFS))	
1	3.248	14.265
2	23.770	90.142
3	54.755	136.100
4	69.544	64.962
5	78.011	37.191
6	83.592	24.514
7	87.711	18.092
8	90.605	12.713
9	92.859	9.900
10	94.617	7.722
11	95.997	6.060
12	97.062	4.676
13	97.811	3.293
14	98.294	2.119
15	98.813	2.280
16	99.339	2.312
17	99.696	1.568
18	100.000	1.335

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.3756	0.3756
2	0.4625	0.0868
3	0.5223	0.0598
4	0.5694	0.0471
5	0.6088	0.0394
6	0.6430	0.0342
7	0.6735	0.0304
8	0.7010	0.0275
9	0.7262	0.0252
10	0.7495	0.0233
11	0.7713	0.0217
12	0.7916	0.0204
13	0.8243	0.0327
14	0.8558	0.0315
15	0.8861	0.0304
16	0.9155	0.0294
17	0.9440	0.0285
18	0.9717	0.0277

19	0.9986	0.0269
20	1.0248	0.0262
21	1.0504	0.0256
22	1.0754	0.0250
23	1.0998	0.0244
24	1.1237	0.0239
25	1.1471	0.0234
26	1.1701	0.0230
27	1.1926	0.0225
28	1.2147	0.0221
29	1.2365	0.0217
30	1.2578	0.0214
31	1.2789	0.0210
32	1.2995	0.0207
33	1.3199	0.0204
34	1.3400	0.0201
35	1.3597	0.0198
36	1.3792	0.0195
37	1.3984	0.0192
38	1.4174	0.0189
39	1.4360	0.0187
40	1.4545	0.0184
41	1.4727	0.0182
42	1.4907	0.0180
43	1.5085	0.0178
44	1.5261	0.0176
45	1.5435	0.0174
46	1.5607	0.0172
47	1.5777	0.0170
48	1.5945	0.0168
49	1.6112	0.0167
50	1.6277	0.0165
51	1.6440	0.0163
52	1.6602	0.0162
53	1.6762	0.0160
54	1.6921	0.0159
55	1.7078	0.0157
56	1.7234	0.0156
57	1.7388	0.0154
58	1.7541	0.0153
59	1.7693	0.0152
60	1.7844	0.0151
61	1.7993	0.0149
62	1.8141	0.0148
63	1.8288	0.0147
64	1.8434	0.0146
65	1.8578	0.0145
66	1.8722	0.0144
67	1.8864	0.0142
68	1.9006	0.0141
69	1.9146	0.0140

70	1.9286	0.0139
71	1.9424	0.0138
72	1.9561	0.0137
73	1.9696	0.0135
74	1.9831	0.0134
75	1.9964	0.0133
76	2.0096	0.0132
77	2.0228	0.0132
78	2.0358	0.0131
79	2.0488	0.0130
80	2.0617	0.0129
81	2.0745	0.0128
82	2.0873	0.0127
83	2.0999	0.0127
84	2.1125	0.0126
85	2.1250	0.0125
86	2.1375	0.0124
87	2.1498	0.0124
88	2.1621	0.0123
89	2.1744	0.0122
90	2.1865	0.0122
91	2.1986	0.0121
92	2.2106	0.0120
93	2.2226	0.0120
94	2.2345	0.0119
95	2.2463	0.0118
96	2.2581	0.0118
97	2.2698	0.0117
98	2.2814	0.0116
99	2.2930	0.0116
100	2.3045	0.0115
101	2.3160	0.0115
102	2.3274	0.0114
103	2.3388	0.0114
104	2.3501	0.0113
105	2.3613	0.0112
106	2.3725	0.0112
107	2.3837	0.0111
108	2.3947	0.0111
109	2.4058	0.0110
110	2.4168	0.0110
111	2.4277	0.0109
112	2.4386	0.0109
113	2.4494	0.0108
114	2.4602	0.0108
115	2.4710	0.0107
116	2.4817	0.0107
117	2.4923	0.0107
118	2.5029	0.0106
119	2.5135	0.0106
120	2.5240	0.0105

121	2.5345	0.0105
122	2.5449	0.0104
123	2.5553	0.0104
124	2.5656	0.0103
125	2.5759	0.0103
126	2.5862	0.0103
127	2.5964	0.0102
128	2.6066	0.0102
129	2.6167	0.0101
130	2.6268	0.0101
131	2.6369	0.0101
132	2.6469	0.0100
133	2.6569	0.0100
134	2.6669	0.0099
135	2.6768	0.0099
136	2.6866	0.0099
137	2.6965	0.0098
138	2.7063	0.0098
139	2.7161	0.0098
140	2.7258	0.0097
141	2.7355	0.0097
142	2.7451	0.0097
143	2.7548	0.0096
144	2.7644	0.0096
145	2.7739	0.0096
146	2.7835	0.0095
147	2.7930	0.0095
148	2.8024	0.0095
149	2.8118	0.0094
150	2.8212	0.0094
151	2.8306	0.0094
152	2.8400	0.0093
153	2.8493	0.0093
154	2.8585	0.0093
155	2.8678	0.0092
156	2.8770	0.0092
157	2.8862	0.0092
158	2.8953	0.0092
159	2.9045	0.0091
160	2.9136	0.0091
161	2.9226	0.0091
162	2.9317	0.0090
163	2.9407	0.0090
164	2.9497	0.0090
165	2.9587	0.0090
166	2.9676	0.0089
167	2.9765	0.0089
168	2.9854	0.0089
169	2.9942	0.0089
170	3.0030	0.0088
171	3.0119	0.0088

172	3.0206	0.0088
173	3.0294	0.0087
174	3.0381	0.0087
175	3.0468	0.0087
176	3.0555	0.0087
177	3.0641	0.0086
178	3.0727	0.0086
179	3.0813	0.0086
180	3.0899	0.0086
181	3.0985	0.0086
182	3.1070	0.0085
183	3.1155	0.0085
184	3.1240	0.0085
185	3.1325	0.0085
186	3.1409	0.0084
187	3.1493	0.0084
188	3.1577	0.0084
189	3.1661	0.0084
190	3.1744	0.0083
191	3.1827	0.0083
192	3.1910	0.0083
193	3.1993	0.0083
194	3.2076	0.0083
195	3.2158	0.0082
196	3.2240	0.0082
197	3.2322	0.0082
198	3.2404	0.0082
199	3.2486	0.0082
200	3.2567	0.0081
201	3.2648	0.0081
202	3.2729	0.0081
203	3.2810	0.0081
204	3.2890	0.0081
205	3.2971	0.0080
206	3.3051	0.0080
207	3.3131	0.0080
208	3.3211	0.0080
209	3.3290	0.0080
210	3.3370	0.0079
211	3.3449	0.0079
212	3.3528	0.0079
213	3.3607	0.0079
214	3.3685	0.0079
215	3.3764	0.0078
216	3.3842	0.0078
217	3.3920	0.0078
218	3.3998	0.0078
219	3.4076	0.0078
220	3.4153	0.0078
221	3.4231	0.0077
222	3.4308	0.0077

223	3.4385	0.0077
224	3.4462	0.0077
225	3.4538	0.0077
226	3.4615	0.0077
227	3.4691	0.0076
228	3.4767	0.0076
229	3.4843	0.0076
230	3.4919	0.0076
231	3.4995	0.0076
232	3.5070	0.0076
233	3.5146	0.0075
234	3.5221	0.0075
235	3.5296	0.0075
236	3.5371	0.0075
237	3.5445	0.0075
238	3.5520	0.0075
239	3.5594	0.0074
240	3.5669	0.0074
241	3.5743	0.0074
242	3.5817	0.0074
243	3.5890	0.0074
244	3.5964	0.0074
245	3.6037	0.0073
246	3.6111	0.0073
247	3.6184	0.0073
248	3.6257	0.0073
249	3.6330	0.0073
250	3.6402	0.0073
251	3.6475	0.0073
252	3.6547	0.0072
253	3.6620	0.0072
254	3.6692	0.0072
255	3.6764	0.0072
256	3.6836	0.0072
257	3.6907	0.0072
258	3.6979	0.0072
259	3.7051	0.0071
260	3.7122	0.0071
261	3.7193	0.0071
262	3.7264	0.0071
263	3.7335	0.0071
264	3.7406	0.0071
265	3.7476	0.0071
266	3.7547	0.0070
267	3.7617	0.0070
268	3.7687	0.0070
269	3.7757	0.0070
270	3.7827	0.0070
271	3.7897	0.0070
272	3.7967	0.0070
273	3.8037	0.0070

274	3.8106	0.0069
275	3.8175	0.0069
276	3.8245	0.0069
277	3.8314	0.0069
278	3.8383	0.0069
279	3.8451	0.0069
280	3.8520	0.0069
281	3.8589	0.0069
282	3.8657	0.0068
283	3.8725	0.0068
284	3.8794	0.0068
285	3.8862	0.0068
286	3.8930	0.0068
287	3.8998	0.0068
288	3.9065	0.0068

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0068	0.0006	0.0062
2	0.0068	0.0006	0.0062
3	0.0068	0.0006	0.0062
4	0.0068	0.0006	0.0062
5	0.0068	0.0006	0.0063
6	0.0069	0.0006	0.0063
7	0.0069	0.0006	0.0063
8	0.0069	0.0006	0.0063
9	0.0069	0.0006	0.0063
10	0.0069	0.0006	0.0063
11	0.0070	0.0006	0.0064
12	0.0070	0.0006	0.0064
13	0.0070	0.0006	0.0064
14	0.0070	0.0006	0.0064
15	0.0070	0.0006	0.0064
16	0.0070	0.0006	0.0064
17	0.0071	0.0006	0.0065
18	0.0071	0.0006	0.0065
19	0.0071	0.0006	0.0065
20	0.0071	0.0006	0.0065
21	0.0072	0.0006	0.0065
22	0.0072	0.0006	0.0066
23	0.0072	0.0006	0.0066
24	0.0072	0.0006	0.0066
25	0.0072	0.0006	0.0066
26	0.0073	0.0006	0.0066
27	0.0073	0.0006	0.0067
28	0.0073	0.0006	0.0067
29	0.0073	0.0006	0.0067
30	0.0073	0.0006	0.0067
31	0.0074	0.0006	0.0067

32	0.0074	0.0006	0.0068
33	0.0074	0.0006	0.0068
34	0.0074	0.0006	0.0068
35	0.0075	0.0006	0.0068
36	0.0075	0.0006	0.0068
37	0.0075	0.0007	0.0069
38	0.0075	0.0007	0.0069
39	0.0076	0.0007	0.0069
40	0.0076	0.0007	0.0069
41	0.0076	0.0007	0.0070
42	0.0076	0.0007	0.0070
43	0.0077	0.0007	0.0070
44	0.0077	0.0007	0.0070
45	0.0077	0.0007	0.0071
46	0.0077	0.0007	0.0071
47	0.0078	0.0007	0.0071
48	0.0078	0.0007	0.0071
49	0.0078	0.0007	0.0071
50	0.0078	0.0007	0.0072
51	0.0079	0.0007	0.0072
52	0.0079	0.0007	0.0072
53	0.0079	0.0007	0.0073
54	0.0080	0.0007	0.0073
55	0.0080	0.0007	0.0073
56	0.0080	0.0007	0.0073
57	0.0081	0.0007	0.0074
58	0.0081	0.0007	0.0074
59	0.0081	0.0007	0.0074
60	0.0081	0.0007	0.0074
61	0.0082	0.0007	0.0075
62	0.0082	0.0007	0.0075
63	0.0082	0.0007	0.0075
64	0.0083	0.0007	0.0075
65	0.0083	0.0007	0.0076
66	0.0083	0.0007	0.0076
67	0.0084	0.0007	0.0076
68	0.0084	0.0007	0.0077
69	0.0084	0.0007	0.0077
70	0.0085	0.0007	0.0077
71	0.0085	0.0007	0.0078
72	0.0085	0.0007	0.0078
73	0.0086	0.0007	0.0078
74	0.0086	0.0007	0.0079
75	0.0086	0.0007	0.0079
76	0.0087	0.0008	0.0079
77	0.0087	0.0008	0.0080
78	0.0087	0.0008	0.0080
79	0.0088	0.0008	0.0080
80	0.0088	0.0008	0.0081
81	0.0089	0.0008	0.0081
82	0.0089	0.0008	0.0081

83	0.0090	0.0008	0.0082
84	0.0090	0.0008	0.0082
85	0.0090	0.0008	0.0083
86	0.0091	0.0008	0.0083
87	0.0091	0.0008	0.0083
88	0.0092	0.0008	0.0084
89	0.0092	0.0008	0.0084
90	0.0092	0.0008	0.0084
91	0.0093	0.0008	0.0085
92	0.0093	0.0008	0.0085
93	0.0094	0.0008	0.0086
94	0.0094	0.0008	0.0086
95	0.0095	0.0008	0.0087
96	0.0095	0.0008	0.0087
97	0.0096	0.0008	0.0088
98	0.0096	0.0008	0.0088
99	0.0097	0.0008	0.0089
100	0.0097	0.0008	0.0089
101	0.0098	0.0008	0.0090
102	0.0098	0.0009	0.0090
103	0.0099	0.0009	0.0091
104	0.0099	0.0009	0.0091
105	0.0100	0.0009	0.0092
106	0.0101	0.0009	0.0092
107	0.0101	0.0009	0.0093
108	0.0102	0.0009	0.0093
109	0.0103	0.0009	0.0094
110	0.0103	0.0009	0.0094
111	0.0104	0.0009	0.0095
112	0.0104	0.0009	0.0095
113	0.0105	0.0009	0.0096
114	0.0106	0.0009	0.0096
115	0.0107	0.0009	0.0097
116	0.0107	0.0009	0.0098
117	0.0108	0.0009	0.0099
118	0.0108	0.0009	0.0099
119	0.0109	0.0009	0.0100
120	0.0110	0.0010	0.0100
121	0.0111	0.0010	0.0101
122	0.0111	0.0010	0.0102
123	0.0112	0.0010	0.0103
124	0.0113	0.0010	0.0103
125	0.0114	0.0010	0.0104
126	0.0115	0.0010	0.0105
127	0.0116	0.0010	0.0106
128	0.0116	0.0010	0.0106
129	0.0118	0.0010	0.0107
130	0.0118	0.0010	0.0108
131	0.0120	0.0010	0.0109
132	0.0120	0.0010	0.0110
133	0.0122	0.0011	0.0111

134	0.0122	0.0011	0.0112
135	0.0124	0.0011	0.0113
136	0.0124	0.0011	0.0114
137	0.0126	0.0011	0.0115
138	0.0127	0.0011	0.0116
139	0.0128	0.0011	0.0117
140	0.0129	0.0011	0.0118
141	0.0131	0.0011	0.0119
142	0.0132	0.0011	0.0120
143	0.0133	0.0012	0.0122
144	0.0134	0.0012	0.0123
145	0.0137	0.0012	0.0126
146	0.0138	0.0012	0.0126
147	0.0140	0.0012	0.0128
148	0.0141	0.0012	0.0129
149	0.0144	0.0012	0.0131
150	0.0145	0.0013	0.0132
151	0.0147	0.0013	0.0134
152	0.0148	0.0013	0.0135
153	0.0151	0.0013	0.0138
154	0.0152	0.0013	0.0139
155	0.0154	0.0013	0.0141
156	0.0156	0.0013	0.0142
157	0.0159	0.0014	0.0145
158	0.0160	0.0014	0.0146
159	0.0163	0.0014	0.0149
160	0.0165	0.0014	0.0151
161	0.0168	0.0015	0.0154
162	0.0170	0.0015	0.0155
163	0.0174	0.0015	0.0159
164	0.0176	0.0015	0.0161
165	0.0180	0.0016	0.0164
166	0.0182	0.0016	0.0166
167	0.0187	0.0016	0.0171
168	0.0189	0.0016	0.0173
169	0.0195	0.0017	0.0178
170	0.0198	0.0017	0.0181
171	0.0204	0.0018	0.0186
172	0.0207	0.0018	0.0189
173	0.0214	0.0018	0.0195
174	0.0217	0.0019	0.0199
175	0.0225	0.0020	0.0206
176	0.0230	0.0020	0.0210
177	0.0239	0.0020	0.0219
178	0.0244	0.0020	0.0225
179	0.0256	0.0020	0.0236
180	0.0262	0.0020	0.0243
181	0.0277	0.0020	0.0257
182	0.0285	0.0020	0.0265
183	0.0304	0.0020	0.0284
184	0.0315	0.0020	0.0295

185	0.0204	0.0018	0.0186
186	0.0217	0.0019	0.0199
187	0.0252	0.0020	0.0232
188	0.0275	0.0020	0.0256
189	0.0342	0.0020	0.0323
190	0.0394	0.0020	0.0374
191	0.0598	0.0020	0.0578
192	0.0868	0.0020	0.0849
193	0.3756	0.0020	0.3737
194	0.0471	0.0020	0.0451
195	0.0304	0.0020	0.0285
196	0.0233	0.0020	0.0213
197	0.0327	0.0020	0.0307
198	0.0294	0.0020	0.0274
199	0.0269	0.0020	0.0249
200	0.0250	0.0020	0.0230
201	0.0234	0.0020	0.0215
202	0.0221	0.0019	0.0202
203	0.0210	0.0018	0.0192
204	0.0201	0.0017	0.0183
205	0.0192	0.0017	0.0175
206	0.0184	0.0016	0.0168
207	0.0178	0.0015	0.0162
208	0.0172	0.0015	0.0157
209	0.0167	0.0014	0.0152
210	0.0162	0.0014	0.0148
211	0.0157	0.0014	0.0144
212	0.0153	0.0013	0.0140
213	0.0149	0.0013	0.0136
214	0.0146	0.0013	0.0133
215	0.0142	0.0012	0.0130
216	0.0139	0.0012	0.0127
217	0.0135	0.0012	0.0123
218	0.0132	0.0011	0.0121
219	0.0130	0.0011	0.0119
220	0.0127	0.0011	0.0116
221	0.0125	0.0011	0.0114
222	0.0123	0.0011	0.0112
223	0.0121	0.0010	0.0110
224	0.0119	0.0010	0.0109
225	0.0117	0.0010	0.0107
226	0.0115	0.0010	0.0105
227	0.0114	0.0010	0.0104
228	0.0112	0.0010	0.0102
229	0.0110	0.0010	0.0101
230	0.0109	0.0009	0.0099
231	0.0107	0.0009	0.0098
232	0.0106	0.0009	0.0097
233	0.0105	0.0009	0.0096
234	0.0103	0.0009	0.0094
235	0.0102	0.0009	0.0093

236	0.0101	0.0009	0.0092
237	0.0100	0.0009	0.0091
238	0.0099	0.0009	0.0090
239	0.0098	0.0008	0.0089
240	0.0097	0.0008	0.0088
241	0.0096	0.0008	0.0087
242	0.0095	0.0008	0.0086
243	0.0094	0.0008	0.0086
244	0.0093	0.0008	0.0085
245	0.0092	0.0008	0.0084
246	0.0091	0.0008	0.0083
247	0.0090	0.0008	0.0082
248	0.0089	0.0008	0.0082
249	0.0089	0.0008	0.0081
250	0.0088	0.0008	0.0080
251	0.0087	0.0008	0.0079
252	0.0086	0.0007	0.0079
253	0.0086	0.0007	0.0078
254	0.0085	0.0007	0.0077
255	0.0084	0.0007	0.0077
256	0.0083	0.0007	0.0076
257	0.0083	0.0007	0.0076
258	0.0082	0.0007	0.0075
259	0.0082	0.0007	0.0074
260	0.0081	0.0007	0.0074
261	0.0080	0.0007	0.0073
262	0.0080	0.0007	0.0073
263	0.0079	0.0007	0.0072
264	0.0079	0.0007	0.0072
265	0.0078	0.0007	0.0071
266	0.0078	0.0007	0.0071
267	0.0077	0.0007	0.0070
268	0.0077	0.0007	0.0070
269	0.0076	0.0007	0.0069
270	0.0076	0.0007	0.0069
271	0.0075	0.0006	0.0069
272	0.0075	0.0006	0.0068
273	0.0074	0.0006	0.0068
274	0.0074	0.0006	0.0067
275	0.0073	0.0006	0.0067
276	0.0073	0.0006	0.0066
277	0.0072	0.0006	0.0066
278	0.0072	0.0006	0.0066
279	0.0071	0.0006	0.0065
280	0.0071	0.0006	0.0065
281	0.0071	0.0006	0.0065
282	0.0070	0.0006	0.0064
283	0.0070	0.0006	0.0064
284	0.0069	0.0006	0.0063
285	0.0069	0.0006	0.0063
286	0.0069	0.0006	0.0063

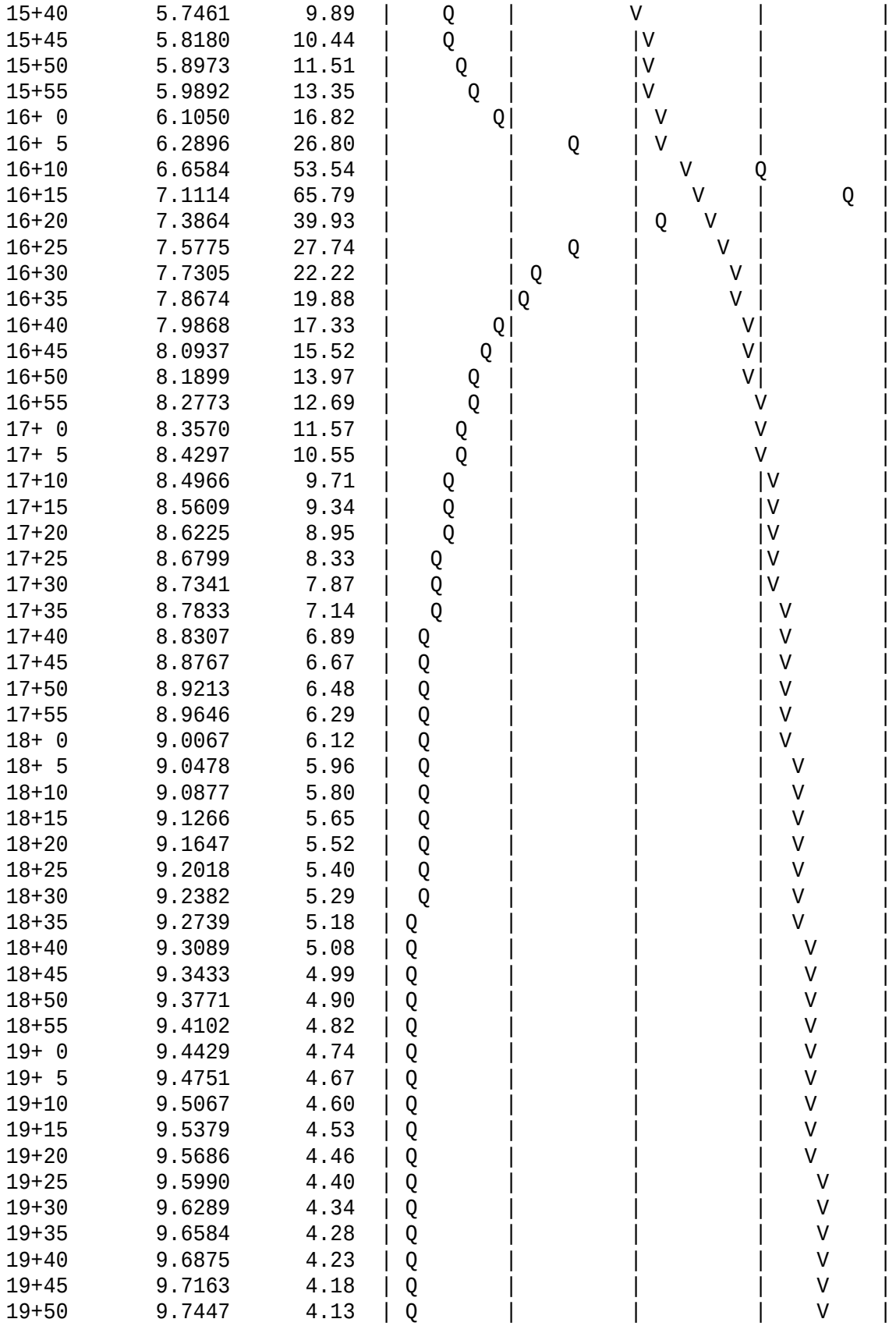
```
287              0.0068           0.0006              0.0062
288              0.0068           0.0006              0.0062
-------------------------------------------------------------------
-------------------------------------------------------------------
Total soil rain loss =      0.29(In)
Total effective rainfall =      3.62(In)
Peak flow rate in flood hydrograph =     65.79(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       17.5      35.0      52.5      70.0
-------------------------------------------------------------------
  0+ 5       0.0006      0.09  Q         |         |         |         |
  0+10       0.0051      0.65  Q         |         |         |         |
  0+15       0.0153      1.49  Q         |         |         |         |
  0+20       0.0284      1.90  VQ        |         |         |         |
  0+25       0.0430      2.13  VQ        |         |         |         |
  0+30       0.0588      2.29  VQ        |         |         |         |
  0+35       0.0754      2.41  VQ        |         |         |         |
  0+40       0.0925      2.49  VQ        |         |         |         |
  0+45       0.1101      2.56  VQ        |         |         |         |
  0+50       0.1281      2.61  VQ        |         |         |         |
  0+55       0.1464      2.66  VQ        |         |         |         |
  1+ 0       0.1650      2.69  VQ        |         |         |         |
  1+ 5       0.1837      2.72  VQ        |         |         |         |
  1+10       0.2026      2.74  VQ        |         |         |         |
  1+15       0.2216      2.76  VQ        |         |         |         |
  1+20       0.2408      2.79  VQ        |         |         |         |
  1+25       0.2601      2.80  VQ        |         |         |         |
  1+30       0.2795      2.82  |Q        |         |         |         |
  1+35       0.2990      2.83  |Q        |         |         |         |
  1+40       0.3185      2.84  |Q        |         |         |         |
  1+45       0.3381      2.84  |Q        |         |         |         |
  1+50       0.3578      2.85  |Q        |         |         |         |
  1+55       0.3775      2.86  |Q        |         |         |         |
  2+ 0       0.3972      2.87  |Q        |         |         |         |
  2+ 5       0.4170      2.88  |Q        |         |         |         |
  2+10       0.4369      2.88  |Q        |         |         |         |
  2+15       0.4568      2.89  |Q        |         |         |         |
  2+20       0.4768      2.90  |Q        |         |         |         |
  2+25       0.4969      2.91  |Q        |         |         |         |
  2+30       0.5170      2.92  |Q        |         |         |         |
  2+35       0.5371      2.93  |Q        |         |         |         |
  2+40       0.5574      2.94  |QV       |         |         |         |
  2+45       0.5777      2.95  |QV       |         |         |         |
  2+50       0.5980      2.96  |QV       |         |         |         |
```

2+55	0.6184	2.96	QV			
3+ 0	0.6389	2.97	QV			
3+ 5	0.6595	2.98	QV			
3+10	0.6801	2.99	QV			
3+15	0.7007	3.00	QV			
3+20	0.7215	3.01	QV			
3+25	0.7423	3.02	QV			
3+30	0.7632	3.03	QV			
3+35	0.7841	3.04	QV			
3+40	0.8051	3.05	QV			
3+45	0.8262	3.06	Q V			
3+50	0.8474	3.07	Q V			
3+55	0.8686	3.08	Q V			
4+ 0	0.8899	3.09	Q V			
4+ 5	0.9113	3.10	Q V			
4+10	0.9327	3.11	Q V			
4+15	0.9542	3.12	Q V			
4+20	0.9758	3.13	Q V			
4+25	0.9975	3.15	Q V			
4+30	1.0192	3.16	Q V			
4+35	1.0410	3.17	Q V			
4+40	1.0629	3.18	Q V			
4+45	1.0849	3.19	Q V			
4+50	1.1070	3.20	Q V			
4+55	1.1291	3.21	Q V			
5+ 0	1.1513	3.23	Q V			
5+ 5	1.1736	3.24	Q V			
5+10	1.1960	3.25	Q V			
5+15	1.2185	3.26	Q V			
5+20	1.2410	3.27	Q V			
5+25	1.2637	3.29	Q V			
5+30	1.2864	3.30	Q V			
5+35	1.3092	3.31	Q V			
5+40	1.3321	3.33	Q V			
5+45	1.3551	3.34	Q V			
5+50	1.3782	3.35	Q V			
5+55	1.4014	3.37	Q V			
6+ 0	1.4246	3.38	Q V			
6+ 5	1.4480	3.39	Q V			
6+10	1.4715	3.41	Q V			
6+15	1.4950	3.42	Q V			
6+20	1.5187	3.43	Q V			
6+25	1.5424	3.45	Q V			
6+30	1.5663	3.46	Q V			
6+35	1.5902	3.48	Q V			
6+40	1.6143	3.49	Q V			
6+45	1.6385	3.51	Q V			
6+50	1.6627	3.52	Q V			
6+55	1.6871	3.54	Q V			
7+ 0	1.7116	3.56	Q V			
7+ 5	1.7362	3.57	Q V			

7+10	1.7609	3.59	Q	V			
7+15	1.7857	3.60	Q	V			
7+20	1.8107	3.62	Q	V			
7+25	1.8357	3.64	Q	V			
7+30	1.8609	3.65	Q	V			
7+35	1.8862	3.67	Q	V			
7+40	1.9116	3.69	Q	V			
7+45	1.9371	3.71	Q	V			
7+50	1.9628	3.73	Q	V			
7+55	1.9886	3.74	Q	V			
8+ 0	2.0145	3.76	Q	V			
8+ 5	2.0405	3.78	Q	V			
8+10	2.0667	3.80	Q	V			
8+15	2.0930	3.82	Q	V			
8+20	2.1195	3.84	Q	V			
8+25	2.1461	3.86	Q	V			
8+30	2.1728	3.88	Q	V			
8+35	2.1997	3.90	Q	V			
8+40	2.2267	3.92	Q	V			
8+45	2.2539	3.95	Q	V			
8+50	2.2812	3.97	Q	V			
8+55	2.3087	3.99	Q	V			
9+ 0	2.3363	4.01	Q	V			
9+ 5	2.3641	4.04	Q	V			
9+10	2.3920	4.06	Q	V			
9+15	2.4202	4.08	Q	V			
9+20	2.4484	4.11	Q	V			
9+25	2.4769	4.13	Q	V			
9+30	2.5055	4.16	Q	V			
9+35	2.5343	4.18	Q	V			
9+40	2.5633	4.21	Q	V			
9+45	2.5925	4.23	Q	V			
9+50	2.6218	4.26	Q	V			
9+55	2.6513	4.29	Q	V			
10+ 0	2.6811	4.32	Q	V			
10+ 5	2.7110	4.35	Q	V			
10+10	2.7411	4.38	Q	V			
10+15	2.7715	4.41	Q	V			
10+20	2.8020	4.44	Q	V			
10+25	2.8328	4.47	Q	V			
10+30	2.8638	4.50	Q	V			
10+35	2.8950	4.53	Q	V			
10+40	2.9264	4.56	Q	V			
10+45	2.9581	4.60	Q	V			
10+50	2.9900	4.63	Q	V			
10+55	3.0222	4.67	Q	V			
11+ 0	3.0546	4.71	Q	V			
11+ 5	3.0873	4.74	Q	V			
11+10	3.1202	4.78	Q	V			
11+15	3.1534	4.82	Q	V			
11+20	3.1869	4.86	Q	V			

11+25	3.2206	4.90	Q	V			
11+30	3.2547	4.94	Q	V			
11+35	3.2890	4.99	Q	V			
11+40	3.3237	5.03	Q	V			
11+45	3.3586	5.08	Q	V			
11+50	3.3939	5.12	Q	V			
11+55	3.4295	5.17	Q	V			
12+ 0	3.4655	5.22	Q	V			
12+ 5	3.5018	5.28	Q	V			
12+10	3.5386	5.34	Q	V			
12+15	3.5759	5.41	Q	V			
12+20	3.6136	5.47	Q	V			
12+25	3.6517	5.54	Q	V			
12+30	3.6903	5.60	Q	V			
12+35	3.7293	5.66	Q	V			
12+40	3.7688	5.73	Q	V			
12+45	3.8087	5.80	Q	V			
12+50	3.8491	5.87	Q	V			
12+55	3.8900	5.94	Q	V			
13+ 0	3.9314	6.01	Q	V			
13+ 5	3.9733	6.09	Q	V			
13+10	4.0158	6.17	Q	V			
13+15	4.0588	6.25	Q	V			
13+20	4.1025	6.34	Q	V			
13+25	4.1467	6.43	Q	V			
13+30	4.1916	6.52	Q	V			
13+35	4.2372	6.62	Q	V			
13+40	4.2835	6.72	Q	V			
13+45	4.3305	6.83	Q	V			
13+50	4.3783	6.94	Q	V			
13+55	4.4269	7.06	Q	V			
14+ 0	4.4764	7.18	Q	V			
14+ 5	4.5267	7.32	Q	V			
14+10	4.5781	7.46	Q	V			
14+15	4.6305	7.61	Q	V			
14+20	4.6840	7.77	Q	V			
14+25	4.7387	7.94	Q	V			
14+30	4.7946	8.12	Q	V			
14+35	4.8519	8.31	Q	V			
14+40	4.9106	8.52	Q	V			
14+45	4.9708	8.75	Q	V			
14+50	5.0327	9.00	Q	V			
14+55	5.0967	9.28	Q	V			
15+ 0	5.1627	9.59	Q	V			
15+ 5	5.2311	9.94	Q	V			
15+10	5.3022	10.32	Q	V			
15+15	5.3762	10.75	Q	V			
15+20	5.4536	11.24	Q	V			
15+25	5.5335	11.61	Q	V			
15+30	5.6095	11.03	Q	V			
15+35	5.6780	9.94	Q	V			



```
19+55       9.7728      4.08  | Q       |         |         |    V    |
20+ 0       9.8005      4.03  | Q       |         |         |    V    |
20+ 5       9.8280      3.98  | Q       |         |         |    V    |
20+10       9.8551      3.94  | Q       |         |         |     V   |
20+15       9.8819      3.90  | Q       |         |         |     V   |
20+20       9.9085      3.86  | Q       |         |         |     V   |
20+25       9.9348      3.82  | Q       |         |         |     V   |
20+30       9.9608      3.78  | Q       |         |         |     V   |
20+35       9.9866      3.74  | Q       |         |         |     V   |
20+40      10.0121      3.70  | Q       |         |         |     V   |
20+45      10.0373      3.67  | Q       |         |         |     V   |
20+50      10.0623      3.63  | Q       |         |         |     V   |
20+55      10.0871      3.60  | Q       |         |         |     V   |
21+ 0      10.1117      3.57  | Q       |         |         |     V   |
21+ 5      10.1361      3.54  | Q       |         |         |      V  |
21+10      10.1602      3.50  | Q       |         |         |      V  |
21+15      10.1841      3.47  |Q        |         |         |      V  |
21+20      10.2078      3.44  |Q        |         |         |      V  |
21+25      10.2314      3.42  |Q        |         |         |      V  |
21+30      10.2547      3.39  |Q        |         |         |      V  |
21+35      10.2779      3.36  |Q        |         |         |      V  |
21+40      10.3008      3.33  |Q        |         |         |      V  |
21+45      10.3236      3.31  |Q        |         |         |      V  |
21+50      10.3462      3.28  |Q        |         |         |      V  |
21+55      10.3687      3.26  |Q        |         |         |      V  |
22+ 0      10.3909      3.23  |Q        |         |         |      V  |
22+ 5      10.4130      3.21  |Q        |         |         |       V |
22+10      10.4350      3.19  |Q        |         |         |       V |
22+15      10.4568      3.16  |Q        |         |         |       V |
22+20      10.4784      3.14  |Q        |         |         |       V |
22+25      10.4999      3.12  |Q        |         |         |       V |
22+30      10.5213      3.10  |Q        |         |         |       V |
22+35      10.5425      3.08  |Q        |         |         |       V |
22+40      10.5635      3.06  |Q        |         |         |       V |
22+45      10.5845      3.04  |Q        |         |         |       V |
22+50      10.6052      3.02  |Q        |         |         |       V |
22+55      10.6259      3.00  |Q        |         |         |       V |
23+ 0      10.6464      2.98  |Q        |         |         |       V |
23+ 5      10.6668      2.96  |Q        |         |         |       V |
23+10      10.6871      2.94  |Q        |         |         |        V|
23+15      10.7072      2.93  |Q        |         |         |        V|
23+20      10.7273      2.91  |Q        |         |         |        V|
23+25      10.7472      2.89  |Q        |         |         |        V|
23+30      10.7670      2.87  |Q        |         |         |        V|
23+35      10.7866      2.86  |Q        |         |         |        V|
23+40      10.8062      2.84  |Q        |         |         |        V|
23+45      10.8257      2.82  |Q        |         |         |        V|
23+50      10.8450      2.81  |Q        |         |         |        V|
23+55      10.8642      2.79  |Q        |         |         |        V|
24+ 0      10.8834      2.78  |Q        |         |         |        V|
24+ 5      10.9018      2.67  |Q        |         |         |        V|
```

```
   24+10      10.9163      2.10  |Q        |         |         |        V|
   24+15      10.9249      1.25  Q         |         |         |        V|
   24+20      10.9307      0.84  Q         |         |         |        V|
   24+25      10.9349      0.61  Q         |         |         |        V|
   24+30      10.9380      0.45  Q         |         |         |        V|
   24+35      10.9404      0.34  Q         |         |         |        V|
   24+40      10.9422      0.26  Q         |         |         |        V|
   24+45      10.9435      0.20  Q         |         |         |        V|
   24+50      10.9445      0.15  Q         |         |         |        V|
   24+55      10.9453      0.11  Q         |         |         |        V|
   25+ 0      10.9459      0.08  Q         |         |         |        V|
   25+ 5      10.9463      0.06  Q         |         |         |        V|
   25+10      10.9466      0.05  Q         |         |         |        V|
   25+15      10.9468      0.03  Q         |         |         |        V|
   25+20      10.9470      0.02  Q         |         |         |        V|
   25+25      10.9470      0.01  Q         |         |         |        V|
-------------------------------------------------------------------------
```

Appendix E – Unit Hydrograph (Post-Development)

- 100-Year Storm Event

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

Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2004, Version 7.0

Study date 02/25/21

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

Program License Serial Number 6277

HCC IV POST DEVELOPED CONDITION
100 YR
MGUBBAREINER 2021-02-25

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 10		
36.32	1	0.79
Rainfall data for year 2		
36.32	6	1.15
Rainfall data for year 2		
36.32	24	2.15
Rainfall data for year 100		
36.32	1	1.32

```
------------------------------------------------------------------------
Rainfall data for year 100
           36.32           6           3.11
------------------------------------------------------------------------
Rainfall data for year 100
           36.32          24           6.42
------------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

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


SCS curve  SCS curve     Area     Area     Fp(Fig C6)    Ap      Fm
No.(AMCII) NO.(AMC 3)    (Ac.)    Fraction     (In/Hr)  (dec.)   (In/Hr)
 90.0      98.0         36.32      1.000     0.040    0.123    0.005

Area-averaged adjusted loss rate Fm (In/Hr) =  0.005

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

Area       Area          SCS CN    SCS CN      S     Pervious
 (Ac.)      Fract         (AMC2)    (AMC3)           Yield Fr
     4.47   0.123         90.0      98.0       0.20     0.963
    31.85   0.877         98.0      98.0       0.20     0.963

Area-averaged catchment yield fraction, Y =  0.963
Area-averaged low loss fraction, Yb =  0.037
User entry of time of concentration  =   0.234 (hours)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watershed area =      36.32(Ac.)
Catchment Lag time =   0.187 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 44.5157
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.005(In/Hr)
Average low loss rate fraction (Yb) = 0.037 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall =  0.626(In)
Computed peak 30-minute rainfall =  1.072(In)
Specified peak 1-hour rainfall =  1.320(In)
Computed peak 3-hour rainfall =  2.232(In)
Specified peak 6-hour rainfall =  3.110(In)
Specified peak 24-hour rainfall =  6.420(In)


Rainfall depth area reduction factors:
Using a total area of      36.32(Ac.) (Ref: fig. E-4)

5-minute factor = 0.998     Adjusted rainfall =  0.625(In)
30-minute factor = 0.998    Adjusted rainfall =  1.070(In)
1-hour factor = 0.998       Adjusted rainfall =  1.318(In)
```

3-hour factor = 1.000 Adjusted rainfall = 2.232(In)
6-hour factor = 1.000 Adjusted rainfall = 3.110(In)
24-hour factor = 1.000 Adjusted rainfall = 6.420(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 = 439.25 (CFS))	
1	3.271	14.366
2	23.997	91.038
3	54.972	136.060
4	69.700	64.692
5	78.140	37.069
6	83.701	24.429
7	87.807	18.032
8	90.685	12.644
9	92.933	9.873
10	94.679	7.668
11	96.051	6.027
12	97.105	4.632
13	97.842	3.237
14	98.322	2.107
15	98.846	2.302
16	99.370	2.304
17	99.716	1.517
18	100.000	1.249

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.6253	0.6253
2	0.7698	0.1445
3	0.8694	0.0996
4	0.9478	0.0784
5	1.0134	0.0656
6	1.0703	0.0570
7	1.1210	0.0507
8	1.1668	0.0458
9	1.2088	0.0420
10	1.2476	0.0388
11	1.2838	0.0362
12	1.3178	0.0340
13	1.3693	0.0516
14	1.4189	0.0495
15	1.4666	0.0477
16	1.5127	0.0461
17	1.5574	0.0446
18	1.6006	0.0433

19	1.6427	0.0421
20	1.6836	0.0409
21	1.7235	0.0399
22	1.7624	0.0389
23	1.8004	0.0380
24	1.8375	0.0371
25	1.8738	0.0363
26	1.9094	0.0356
27	1.9443	0.0349
28	1.9785	0.0342
29	2.0121	0.0336
30	2.0451	0.0330
31	2.0775	0.0324
32	2.1094	0.0319
33	2.1407	0.0314
34	2.1716	0.0309
35	2.2020	0.0304
36	2.2320	0.0300
37	2.2614	0.0295
38	2.2904	0.0290
39	2.3191	0.0286
40	2.3473	0.0283
41	2.3752	0.0279
42	2.4028	0.0275
43	2.4300	0.0272
44	2.4569	0.0269
45	2.4834	0.0266
46	2.5097	0.0263
47	2.5356	0.0260
48	2.5613	0.0257
49	2.5867	0.0254
50	2.6118	0.0251
51	2.6367	0.0249
52	2.6613	0.0246
53	2.6857	0.0244
54	2.7098	0.0241
55	2.7337	0.0239
56	2.7573	0.0237
57	2.7808	0.0234
58	2.8040	0.0232
59	2.8271	0.0230
60	2.8499	0.0228
61	2.8725	0.0226
62	2.8949	0.0224
63	2.9172	0.0222
64	2.9393	0.0221
65	2.9611	0.0219
66	2.9829	0.0217
67	3.0044	0.0215
68	3.0258	0.0214
69	3.0470	0.0212

70	3.0680	0.0210
71	3.0889	0.0209
72	3.1096	0.0207
73	3.1322	0.0225
74	3.1545	0.0224
75	3.1767	0.0222
76	3.1988	0.0221
77	3.2208	0.0219
78	3.2426	0.0218
79	3.2642	0.0217
80	3.2858	0.0215
81	3.3072	0.0214
82	3.3285	0.0213
83	3.3496	0.0212
84	3.3707	0.0210
85	3.3916	0.0209
86	3.4124	0.0208
87	3.4331	0.0207
88	3.4537	0.0206
89	3.4741	0.0205
90	3.4945	0.0204
91	3.5147	0.0202
92	3.5349	0.0201
93	3.5549	0.0200
94	3.5749	0.0199
95	3.5947	0.0198
96	3.6144	0.0197
97	3.6341	0.0196
98	3.6536	0.0195
99	3.6730	0.0194
100	3.6924	0.0194
101	3.7117	0.0193
102	3.7308	0.0192
103	3.7499	0.0191
104	3.7689	0.0190
105	3.7878	0.0189
106	3.8066	0.0188
107	3.8254	0.0187
108	3.8440	0.0187
109	3.8626	0.0186
110	3.8811	0.0185
111	3.8995	0.0184
112	3.9178	0.0183
113	3.9361	0.0183
114	3.9542	0.0182
115	3.9723	0.0181
116	3.9904	0.0180
117	4.0083	0.0180
118	4.0262	0.0179
119	4.0440	0.0178
120	4.0617	0.0177

121	4.0794	0.0177
122	4.0970	0.0176
123	4.1145	0.0175
124	4.1320	0.0175
125	4.1494	0.0174
126	4.1667	0.0173
127	4.1839	0.0173
128	4.2011	0.0172
129	4.2183	0.0171
130	4.2353	0.0171
131	4.2523	0.0170
132	4.2693	0.0169
133	4.2862	0.0169
134	4.3030	0.0168
135	4.3197	0.0168
136	4.3364	0.0167
137	4.3531	0.0166
138	4.3697	0.0166
139	4.3862	0.0165
140	4.4027	0.0165
141	4.4191	0.0164
142	4.4354	0.0164
143	4.4517	0.0163
144	4.4680	0.0163
145	4.4842	0.0162
146	4.5003	0.0161
147	4.5164	0.0161
148	4.5325	0.0160
149	4.5485	0.0160
150	4.5644	0.0159
151	4.5803	0.0159
152	4.5961	0.0158
153	4.6119	0.0158
154	4.6276	0.0157
155	4.6433	0.0157
156	4.6590	0.0156
157	4.6746	0.0156
158	4.6901	0.0155
159	4.7056	0.0155
160	4.7211	0.0155
161	4.7365	0.0154
162	4.7518	0.0154
163	4.7671	0.0153
164	4.7824	0.0153
165	4.7976	0.0152
166	4.8128	0.0152
167	4.8279	0.0151
168	4.8430	0.0151
169	4.8581	0.0151
170	4.8731	0.0150
171	4.8881	0.0150

172	4.9030	0.0149
173	4.9179	0.0149
174	4.9327	0.0148
175	4.9475	0.0148
176	4.9623	0.0148
177	4.9770	0.0147
178	4.9917	0.0147
179	5.0063	0.0146
180	5.0209	0.0146
181	5.0355	0.0146
182	5.0500	0.0145
183	5.0645	0.0145
184	5.0790	0.0145
185	5.0934	0.0144
186	5.1078	0.0144
187	5.1221	0.0143
188	5.1364	0.0143
189	5.1507	0.0143
190	5.1649	0.0142
191	5.1791	0.0142
192	5.1933	0.0142
193	5.2074	0.0141
194	5.2215	0.0141
195	5.2355	0.0141
196	5.2496	0.0140
197	5.2636	0.0140
198	5.2775	0.0140
199	5.2914	0.0139
200	5.3053	0.0139
201	5.3192	0.0139
202	5.3330	0.0138
203	5.3468	0.0138
204	5.3605	0.0138
205	5.3743	0.0137
206	5.3879	0.0137
207	5.4016	0.0137
208	5.4152	0.0136
209	5.4288	0.0136
210	5.4424	0.0136
211	5.4559	0.0135
212	5.4694	0.0135
213	5.4829	0.0135
214	5.4964	0.0134
215	5.5098	0.0134
216	5.5232	0.0134
217	5.5365	0.0134
218	5.5498	0.0133
219	5.5631	0.0133
220	5.5764	0.0133
221	5.5896	0.0132
222	5.6029	0.0132

223	5.6160	0.0132
224	5.6292	0.0132
225	5.6423	0.0131
226	5.6554	0.0131
227	5.6685	0.0131
228	5.6815	0.0130
229	5.6945	0.0130
230	5.7075	0.0130
231	5.7205	0.0130
232	5.7334	0.0129
233	5.7463	0.0129
234	5.7592	0.0129
235	5.7721	0.0129
236	5.7849	0.0128
237	5.7977	0.0128
238	5.8105	0.0128
239	5.8232	0.0128
240	5.8360	0.0127
241	5.8487	0.0127
242	5.8614	0.0127
243	5.8740	0.0127
244	5.8866	0.0126
245	5.8992	0.0126
246	5.9118	0.0126
247	5.9244	0.0126
248	5.9369	0.0125
249	5.9494	0.0125
250	5.9619	0.0125
251	5.9743	0.0125
252	5.9868	0.0124
253	5.9992	0.0124
254	6.0116	0.0124
255	6.0239	0.0124
256	6.0363	0.0123
257	6.0486	0.0123
258	6.0609	0.0123
259	6.0732	0.0123
260	6.0854	0.0122
261	6.0976	0.0122
262	6.1098	0.0122
263	6.1220	0.0122
264	6.1342	0.0122
265	6.1463	0.0121
266	6.1584	0.0121
267	6.1705	0.0121
268	6.1826	0.0121
269	6.1947	0.0121
270	6.2067	0.0120
271	6.2187	0.0120
272	6.2307	0.0120
273	6.2426	0.0120

274	6.2546	0.0119
275	6.2665	0.0119
276	6.2784	0.0119
277	6.2903	0.0119
278	6.3022	0.0119
279	6.3140	0.0118
280	6.3258	0.0118
281	6.3376	0.0118
282	6.3494	0.0118
283	6.3612	0.0118
284	6.3729	0.0117
285	6.3847	0.0117
286	6.3964	0.0117
287	6.4080	0.0117
288	6.4197	0.0117

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0117	0.0004	0.0113
2	0.0117	0.0004	0.0113
3	0.0117	0.0004	0.0113
4	0.0117	0.0004	0.0113
5	0.0118	0.0004	0.0114
6	0.0118	0.0004	0.0114
7	0.0118	0.0004	0.0114
8	0.0119	0.0004	0.0115
9	0.0119	0.0004	0.0115
10	0.0119	0.0004	0.0115
11	0.0120	0.0004	0.0116
12	0.0120	0.0004	0.0116
13	0.0120	0.0004	0.0116
14	0.0121	0.0004	0.0116
15	0.0121	0.0004	0.0117
16	0.0121	0.0004	0.0117
17	0.0122	0.0004	0.0118
18	0.0122	0.0004	0.0118
19	0.0122	0.0004	0.0118
20	0.0122	0.0004	0.0118
21	0.0123	0.0004	0.0119
22	0.0123	0.0004	0.0119
23	0.0124	0.0004	0.0120
24	0.0124	0.0004	0.0120
25	0.0124	0.0004	0.0120
26	0.0125	0.0004	0.0121
27	0.0125	0.0004	0.0121
28	0.0125	0.0004	0.0121
29	0.0126	0.0004	0.0122
30	0.0126	0.0004	0.0122
31	0.0127	0.0004	0.0122

32	0.0127	0.0004	0.0123
33	0.0127	0.0004	0.0123
34	0.0128	0.0004	0.0123
35	0.0128	0.0004	0.0124
36	0.0128	0.0004	0.0124
37	0.0129	0.0004	0.0125
38	0.0129	0.0004	0.0125
39	0.0130	0.0004	0.0126
40	0.0130	0.0004	0.0126
41	0.0130	0.0004	0.0126
42	0.0131	0.0004	0.0127
43	0.0131	0.0004	0.0127
44	0.0132	0.0004	0.0127
45	0.0132	0.0004	0.0128
46	0.0132	0.0004	0.0128
47	0.0133	0.0004	0.0129
48	0.0133	0.0004	0.0129
49	0.0134	0.0004	0.0130
50	0.0134	0.0004	0.0130
51	0.0135	0.0004	0.0131
52	0.0135	0.0004	0.0131
53	0.0136	0.0004	0.0132
54	0.0136	0.0004	0.0132
55	0.0137	0.0004	0.0133
56	0.0137	0.0004	0.0133
57	0.0138	0.0004	0.0133
58	0.0138	0.0004	0.0134
59	0.0139	0.0004	0.0134
60	0.0139	0.0004	0.0135
61	0.0140	0.0004	0.0135
62	0.0140	0.0004	0.0136
63	0.0141	0.0004	0.0136
64	0.0141	0.0004	0.0137
65	0.0142	0.0004	0.0138
66	0.0142	0.0004	0.0138
67	0.0143	0.0004	0.0139
68	0.0143	0.0004	0.0139
69	0.0144	0.0004	0.0140
70	0.0144	0.0004	0.0140
71	0.0145	0.0004	0.0141
72	0.0145	0.0004	0.0141
73	0.0146	0.0004	0.0142
74	0.0146	0.0004	0.0142
75	0.0147	0.0004	0.0143
76	0.0148	0.0004	0.0144
77	0.0148	0.0004	0.0144
78	0.0149	0.0004	0.0145
79	0.0150	0.0004	0.0146
80	0.0150	0.0004	0.0146
81	0.0151	0.0004	0.0147
82	0.0151	0.0004	0.0147

83	0.0152	0.0004	0.0148
84	0.0153	0.0004	0.0149
85	0.0154	0.0004	0.0150
86	0.0154	0.0004	0.0150
87	0.0155	0.0004	0.0151
88	0.0155	0.0004	0.0151
89	0.0156	0.0004	0.0152
90	0.0157	0.0004	0.0153
91	0.0158	0.0004	0.0154
92	0.0158	0.0004	0.0154
93	0.0159	0.0004	0.0155
94	0.0160	0.0004	0.0156
95	0.0161	0.0004	0.0157
96	0.0161	0.0004	0.0157
97	0.0163	0.0004	0.0158
98	0.0163	0.0004	0.0159
99	0.0164	0.0004	0.0160
100	0.0165	0.0004	0.0161
101	0.0166	0.0004	0.0162
102	0.0166	0.0004	0.0162
103	0.0168	0.0004	0.0164
104	0.0168	0.0004	0.0164
105	0.0169	0.0004	0.0165
106	0.0170	0.0004	0.0166
107	0.0171	0.0004	0.0167
108	0.0172	0.0004	0.0168
109	0.0173	0.0004	0.0169
110	0.0174	0.0004	0.0170
111	0.0175	0.0004	0.0171
112	0.0176	0.0004	0.0172
113	0.0177	0.0004	0.0173
114	0.0178	0.0004	0.0174
115	0.0180	0.0004	0.0175
116	0.0180	0.0004	0.0176
117	0.0182	0.0004	0.0178
118	0.0183	0.0004	0.0178
119	0.0184	0.0004	0.0180
120	0.0185	0.0004	0.0181
121	0.0187	0.0004	0.0182
122	0.0187	0.0004	0.0183
123	0.0189	0.0004	0.0185
124	0.0190	0.0004	0.0186
125	0.0192	0.0004	0.0188
126	0.0193	0.0004	0.0189
127	0.0194	0.0004	0.0190
128	0.0195	0.0004	0.0191
129	0.0197	0.0004	0.0193
130	0.0198	0.0004	0.0194
131	0.0200	0.0004	0.0196
132	0.0201	0.0004	0.0197
133	0.0204	0.0004	0.0199

134	0.0205	0.0004	0.0201
135	0.0207	0.0004	0.0203
136	0.0208	0.0004	0.0204
137	0.0210	0.0004	0.0206
138	0.0212	0.0004	0.0208
139	0.0214	0.0004	0.0210
140	0.0215	0.0004	0.0211
141	0.0218	0.0004	0.0214
142	0.0219	0.0004	0.0215
143	0.0222	0.0004	0.0218
144	0.0224	0.0004	0.0220
145	0.0207	0.0004	0.0203
146	0.0209	0.0004	0.0205
147	0.0212	0.0004	0.0208
148	0.0214	0.0004	0.0210
149	0.0217	0.0004	0.0213
150	0.0219	0.0004	0.0215
151	0.0222	0.0004	0.0218
152	0.0224	0.0004	0.0220
153	0.0228	0.0004	0.0224
154	0.0230	0.0004	0.0226
155	0.0234	0.0004	0.0230
156	0.0237	0.0004	0.0233
157	0.0241	0.0004	0.0237
158	0.0244	0.0004	0.0240
159	0.0249	0.0004	0.0245
160	0.0251	0.0004	0.0247
161	0.0257	0.0004	0.0253
162	0.0260	0.0004	0.0255
163	0.0266	0.0004	0.0262
164	0.0269	0.0004	0.0265
165	0.0275	0.0004	0.0271
166	0.0279	0.0004	0.0275
167	0.0286	0.0004	0.0282
168	0.0290	0.0004	0.0286
169	0.0300	0.0004	0.0295
170	0.0304	0.0004	0.0300
171	0.0314	0.0004	0.0310
172	0.0319	0.0004	0.0315
173	0.0330	0.0004	0.0326
174	0.0336	0.0004	0.0332
175	0.0349	0.0004	0.0345
176	0.0356	0.0004	0.0352
177	0.0371	0.0004	0.0367
178	0.0380	0.0004	0.0376
179	0.0399	0.0004	0.0395
180	0.0409	0.0004	0.0405
181	0.0433	0.0004	0.0429
182	0.0446	0.0004	0.0442
183	0.0477	0.0004	0.0473
184	0.0495	0.0004	0.0491

185	0.0340	0.0004	0.0335
186	0.0362	0.0004	0.0358
187	0.0420	0.0004	0.0416
188	0.0458	0.0004	0.0454
189	0.0570	0.0004	0.0566
190	0.0656	0.0004	0.0652
191	0.0996	0.0004	0.0992
192	0.1445	0.0004	0.1441
193	0.6253	0.0004	0.6249
194	0.0784	0.0004	0.0780
195	0.0507	0.0004	0.0503
196	0.0388	0.0004	0.0384
197	0.0516	0.0004	0.0512
198	0.0461	0.0004	0.0457
199	0.0421	0.0004	0.0416
200	0.0389	0.0004	0.0385
201	0.0363	0.0004	0.0359
202	0.0342	0.0004	0.0338
203	0.0324	0.0004	0.0320
204	0.0309	0.0004	0.0305
205	0.0295	0.0004	0.0290
206	0.0283	0.0004	0.0279
207	0.0272	0.0004	0.0268
208	0.0263	0.0004	0.0258
209	0.0254	0.0004	0.0250
210	0.0246	0.0004	0.0242
211	0.0239	0.0004	0.0235
212	0.0232	0.0004	0.0228
213	0.0226	0.0004	0.0222
214	0.0221	0.0004	0.0217
215	0.0215	0.0004	0.0211
216	0.0210	0.0004	0.0206
217	0.0225	0.0004	0.0221
218	0.0221	0.0004	0.0217
219	0.0217	0.0004	0.0213
220	0.0213	0.0004	0.0209
221	0.0209	0.0004	0.0205
222	0.0206	0.0004	0.0202
223	0.0202	0.0004	0.0198
224	0.0199	0.0004	0.0195
225	0.0196	0.0004	0.0192
226	0.0194	0.0004	0.0189
227	0.0191	0.0004	0.0187
228	0.0188	0.0004	0.0184
229	0.0186	0.0004	0.0182
230	0.0183	0.0004	0.0179
231	0.0181	0.0004	0.0177
232	0.0179	0.0004	0.0175
233	0.0177	0.0004	0.0173
234	0.0175	0.0004	0.0171
235	0.0173	0.0004	0.0169

236	0.0171	0.0004	0.0167
237	0.0169	0.0004	0.0165
238	0.0167	0.0004	0.0163
239	0.0165	0.0004	0.0161
240	0.0164	0.0004	0.0160
241	0.0162	0.0004	0.0158
242	0.0160	0.0004	0.0156
243	0.0159	0.0004	0.0155
244	0.0157	0.0004	0.0153
245	0.0156	0.0004	0.0152
246	0.0155	0.0004	0.0150
247	0.0153	0.0004	0.0149
248	0.0152	0.0004	0.0148
249	0.0151	0.0004	0.0146
250	0.0149	0.0004	0.0145
251	0.0148	0.0004	0.0144
252	0.0147	0.0004	0.0143
253	0.0146	0.0004	0.0142
254	0.0145	0.0004	0.0140
255	0.0143	0.0004	0.0139
256	0.0142	0.0004	0.0138
257	0.0141	0.0004	0.0137
258	0.0140	0.0004	0.0136
259	0.0139	0.0004	0.0135
260	0.0138	0.0004	0.0134
261	0.0137	0.0004	0.0133
262	0.0136	0.0004	0.0132
263	0.0135	0.0004	0.0131
264	0.0134	0.0004	0.0130
265	0.0134	0.0004	0.0129
266	0.0133	0.0004	0.0129
267	0.0132	0.0004	0.0128
268	0.0131	0.0004	0.0127
269	0.0130	0.0004	0.0126
270	0.0129	0.0004	0.0125
271	0.0129	0.0004	0.0124
272	0.0128	0.0004	0.0124
273	0.0127	0.0004	0.0123
274	0.0126	0.0004	0.0122
275	0.0126	0.0004	0.0121
276	0.0125	0.0004	0.0121
277	0.0124	0.0004	0.0120
278	0.0123	0.0004	0.0119
279	0.0123	0.0004	0.0119
280	0.0122	0.0004	0.0118
281	0.0121	0.0004	0.0117
282	0.0121	0.0004	0.0117
283	0.0120	0.0004	0.0116
284	0.0119	0.0004	0.0115
285	0.0119	0.0004	0.0115
286	0.0118	0.0004	0.0114

```
     287              0.0118           0.0004              0.0114
     288              0.0117           0.0004              0.0113
     ------------------------------------------------------------------------
     ------------------------------------------------------------------------
     Total soil rain loss =      0.12(In)
     Total effective rainfall =      6.30(In)
     Peak flow rate in flood hydrograph =    110.69(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       50.0     100.0     150.0     200.0
----------------------------------------------------------------------------
  0+ 5       0.0011      0.16  Q         |          |          |          |
  0+10       0.0093      1.19  Q         |          |          |          |
  0+15       0.0280      2.72  Q         |          |          |          |
  0+20       0.0518      3.46  Q         |          |          |          |
  0+25       0.0786      3.88  Q         |          |          |          |
  0+30       0.1073      4.17  Q         |          |          |          |
  0+35       0.1374      4.38  Q         |          |          |          |
  0+40       0.1687      4.53  Q         |          |          |          |
  0+45       0.2007      4.66  Q         |          |          |          |
  0+50       0.2335      4.76  Q         |          |          |          |
  0+55       0.2668      4.84  Q         |          |          |          |
  1+ 0       0.3006      4.90  Q         |          |          |          |
  1+ 5       0.3347      4.95  Q         |          |          |          |
  1+10       0.3690      4.99  Q         |          |          |          |
  1+15       0.4037      5.03  VQ        |          |          |          |
  1+20       0.4386      5.07  VQ        |          |          |          |
  1+25       0.4737      5.10  VQ        |          |          |          |
  1+30       0.5090      5.13  |Q        |          |          |          |
  1+35       0.5444      5.14  |Q        |          |          |          |
  1+40       0.5799      5.16  |Q        |          |          |          |
  1+45       0.6155      5.17  |Q        |          |          |          |
  1+50       0.6512      5.19  |Q        |          |          |          |
  1+55       0.6871      5.20  |Q        |          |          |          |
  2+ 0       0.7230      5.21  |Q        |          |          |          |
  2+ 5       0.7590      5.23  |Q        |          |          |          |
  2+10       0.7951      5.24  |Q        |          |          |          |
  2+15       0.8313      5.26  |Q        |          |          |          |
  2+20       0.8677      5.28  |Q        |          |          |          |
  2+25       0.9041      5.29  |Q        |          |          |          |
  2+30       0.9407      5.31  |Q        |          |          |          |
  2+35       0.9773      5.32  |QV       |          |          |          |
  2+40       1.0141      5.34  |QV       |          |          |          |
  2+45       1.0510      5.35  |QV       |          |          |          |
  2+50       1.0880      5.37  |QV       |          |          |          |
```

2+55	1.1251	5.39	QV			
3+ 0	1.1623	5.40	QV			
3+ 5	1.1996	5.42	QV			
3+10	1.2371	5.44	QV			
3+15	1.2746	5.45	QV			
3+20	1.3123	5.47	QV			
3+25	1.3501	5.49	QV			
3+30	1.3880	5.51	QV			
3+35	1.4261	5.52	QV			
3+40	1.4643	5.54	Q V			
3+45	1.5026	5.56	Q V			
3+50	1.5410	5.58	Q V			
3+55	1.5795	5.60	Q V			
4+ 0	1.6182	5.62	Q V			
4+ 5	1.6570	5.63	Q V			
4+10	1.6959	5.65	Q V			
4+15	1.7350	5.67	Q V			
4+20	1.7742	5.69	Q V			
4+25	1.8135	5.71	Q V			
4+30	1.8530	5.73	Q V			
4+35	1.8926	5.75	Q V			
4+40	1.9324	5.77	Q V			
4+45	1.9723	5.79	Q V			
4+50	2.0123	5.81	Q V			
4+55	2.0525	5.83	Q V			
5+ 0	2.0928	5.85	Q V			
5+ 5	2.1332	5.88	Q V			
5+10	2.1738	5.90	Q V			
5+15	2.2146	5.92	Q V			
5+20	2.2555	5.94	Q V			
5+25	2.2966	5.96	Q V			
5+30	2.3378	5.99	Q V			
5+35	2.3792	6.01	Q V			
5+40	2.4207	6.03	Q V			
5+45	2.4624	6.05	Q V			
5+50	2.5043	6.08	Q V			
5+55	2.5463	6.10	Q V			
6+ 0	2.5885	6.13	Q V			
6+ 5	2.6308	6.15	Q V			
6+10	2.6734	6.17	Q V			
6+15	2.7161	6.20	Q V			
6+20	2.7589	6.22	Q V			
6+25	2.8020	6.25	Q V			
6+30	2.8452	6.28	Q V			
6+35	2.8886	6.30	Q V			
6+40	2.9322	6.33	Q V			
6+45	2.9760	6.36	Q V			
6+50	3.0199	6.38	Q V			
6+55	3.0641	6.41	Q V			
7+ 0	3.1084	6.44	Q V			
7+ 5	3.1530	6.47	Q V			

7+10	3.1977	6.50	Q	V			
7+15	3.2427	6.53	Q	V			
7+20	3.2878	6.55	Q	V			
7+25	3.3332	6.59	Q	V			
7+30	3.3787	6.62	Q	V			
7+35	3.4245	6.65	Q	V			
7+40	3.4705	6.68	Q	V			
7+45	3.5167	6.71	Q	V			
7+50	3.5631	6.74	Q	V			
7+55	3.6098	6.77	Q	V			
8+ 0	3.6566	6.81	Q	V			
8+ 5	3.7037	6.84	Q	V			
8+10	3.7511	6.87	Q	V			
8+15	3.7987	6.91	Q	V			
8+20	3.8465	6.94	Q	V			
8+25	3.8946	6.98	Q	V			
8+30	3.9429	7.02	Q	V			
8+35	3.9915	7.05	Q	V			
8+40	4.0403	7.09	Q	V			
8+45	4.0894	7.13	Q	V			
8+50	4.1387	7.17	Q	V			
8+55	4.1884	7.21	Q	V			
9+ 0	4.2383	7.25	Q	V			
9+ 5	4.2884	7.29	Q	V			
9+10	4.3389	7.33	Q	V			
9+15	4.3897	7.37	Q	V			
9+20	4.4407	7.41	Q	V			
9+25	4.4921	7.46	Q	V			
9+30	4.5437	7.50	Q	V			
9+35	4.5957	7.55	Q	V			
9+40	4.6480	7.59	Q	V			
9+45	4.7006	7.64	Q	V			
9+50	4.7535	7.69	Q	V			
9+55	4.8068	7.73	Q	V			
10+ 0	4.8604	7.78	Q	V			
10+ 5	4.9143	7.83	Q	V			
10+10	4.9686	7.89	Q	V			
10+15	5.0233	7.94	Q	V			
10+20	5.0783	7.99	Q	V			
10+25	5.1338	8.05	Q	V			
10+30	5.1896	8.10	Q	V			
10+35	5.2458	8.16	Q	V			
10+40	5.3023	8.22	Q	V			
10+45	5.3594	8.28	Q	V			
10+50	5.4168	8.34	Q	V			
10+55	5.4746	8.40	Q	V			
11+ 0	5.5329	8.46	Q	V			
11+ 5	5.5917	8.53	Q	V			
11+10	5.6509	8.60	Q	V			
11+15	5.7105	8.66	Q	V			
11+20	5.7707	8.73	Q	V			

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11+25       5.8313      8.81  |Q        | V       |         |         |
11+30       5.8925      8.88  |Q        | V       |         |         |
11+35       5.9542      8.96  |Q        | V       |         |         |
11+40       6.0164      9.03  |Q        | V       |         |         |
11+45       6.0791      9.11  |Q        | V       |         |         |
11+50       6.1425      9.19  |Q        | V       |         |         |
11+55       6.2064      9.28  |Q        |  V      |         |         |
12+ 0       6.2709      9.36  |Q        |  V      |         |         |
12+ 5       6.3358      9.43  |Q        |  V      |         |         |
12+10       6.4001      9.34  |Q        |  V      |         |         |
12+15       6.4633      9.18  |Q        |  V      |         |         |
12+20       6.5263      9.15  |Q        |  V      |         |         |
12+25       6.5895      9.18  |Q        |  V      |         |         |
12+30       6.6531      9.23  |Q        |  V      |         |         |
12+35       6.7173      9.31  |Q        |   V     |         |         |
12+40       6.7820      9.39  |Q        |   V     |         |         |
12+45       6.8473      9.49  |Q        |   V     |         |         |
12+50       6.9134      9.59  |Q        |   V     |         |         |
12+55       6.9802      9.71  |Q        |   V     |         |         |
13+ 0       7.0479      9.82  |Q        |   V     |         |         |
13+ 5       7.1165      9.95  |Q        |   V     |         |         |
13+10       7.1859     10.09  | Q       |    V    |         |         |
13+15       7.2564     10.23  | Q       |    V    |         |         |
13+20       7.3278     10.37  | Q       |    V    |         |         |
13+25       7.4003     10.53  | Q       |    V    |         |         |
13+30       7.4739     10.69  | Q       |    V    |         |         |
13+35       7.5487     10.86  | Q       |    V    |         |         |
13+40       7.6247     11.04  | Q       |    V    |         |         |
13+45       7.7020     11.23  | Q       |     V   |         |         |
13+50       7.7807     11.42  | Q       |     V   |         |         |
13+55       7.8608     11.63  | Q       |     V   |         |         |
14+ 0       7.9425     11.85  | Q       |     V   |         |         |
14+ 5       8.0257     12.09  | Q       |     V   |         |         |
14+10       8.1107     12.34  | Q       |      V  |         |         |
14+15       8.1975     12.61  | Q       |      V  |         |         |
14+20       8.2863     12.89  | Q       |      V  |         |         |
14+25       8.3772     13.19  | Q       |      V  |         |         |
14+30       8.4702     13.51  | Q       |      V  |         |         |
14+35       8.5657     13.86  | Q       |      V  |         |         |
14+40       8.6636     14.22  | Q       |       V |         |         |
14+45       8.7643     14.62  | Q       |       V |         |         |
14+50       8.8679     15.05  |  Q      |       V |         |         |
14+55       8.9748     15.52  |  Q      |       V |         |         |
15+ 0       9.0853     16.03  |  Q      |        V|         |         |
15+ 5       9.1997     16.61  |  Q      |        V|         |         |
15+10       9.3184     17.24  |  Q      |        V|         |         |
15+15       9.4421     17.96  |  Q      |        V|         |         |
15+20       9.5713     18.76  |  Q      |         V         |         |
15+25       9.7050     19.41  |  Q      |         V         |         |
15+30       9.8335     18.66  |  Q      |         V         |         |
15+35       9.9519     17.19  |  Q      |         V         |         |
```

15+40	10.0712	17.32	Q		V	
15+45	10.1976	18.36	Q		V	
15+50	10.3369	20.23	Q		V	
15+55	10.4977	23.35	Q		V	
16+ 0	10.6988	29.19	Q		V	
16+ 5	11.0150	45.92	Q		V	
16+10	11.6405	90.82	Q		V	
16+15	12.4028	110.69	Q		V	
16+20	12.8679	67.52	Q		V	
16+25	13.1934	47.27	Q		V	
16+30	13.4542	37.87	Q		V	
16+35	13.6858	33.62	Q		V	
16+40	13.8869	29.20	Q		V	
16+45	14.0667	26.11	Q		V	
16+50	14.2284	23.47	Q		V	
16+55	14.3752	21.31	Q		V	
17+ 0	14.5088	19.40	Q		V	
17+ 5	14.6303	17.64	Q		V	
17+10	14.7420	16.22	Q		V	
17+15	14.8492	15.57	Q		V	
17+20	14.9515	14.86	Q		V	
17+25	15.0463	13.77	Q		V	
17+30	15.1356	12.96	Q		V	
17+35	15.2167	11.78	Q		V	
17+40	15.2947	11.33	Q		V	
17+45	15.3701	10.95	Q		V	
17+50	15.4432	10.60	Q		V	
17+55	15.5139	10.28	Q		V	
18+ 0	15.5826	9.98	Q		V	
18+ 5	15.6497	9.73	Q		V	
18+10	15.7162	9.65	Q		V	
18+15	15.7828	9.68	Q		V	
18+20	15.8489	9.59	Q		V	
18+25	15.9141	9.46	Q		V	
18+30	15.9782	9.32	Q		V	
18+35	16.0414	9.17	Q		V	
18+40	16.1036	9.03	Q		V	
18+45	16.1648	8.89	Q		V	
18+50	16.2251	8.76	Q		V	
18+55	16.2845	8.62	Q		V	
19+ 0	16.3430	8.50	Q		V	
19+ 5	16.4007	8.37	Q		V	
19+10	16.4576	8.25	Q		V	
19+15	16.5136	8.14	Q		V	
19+20	16.5689	8.03	Q		V	
19+25	16.6235	7.93	Q		V	
19+30	16.6774	7.82	Q		V	
19+35	16.7306	7.72	Q		V	
19+40	16.7831	7.63	Q		V	
19+45	16.8350	7.53	Q		V	
19+50	16.8863	7.45	Q		V	

```
19+55      16.9370      7.36  |Q        |         |         |    V    |
20+ 0      16.9871      7.28  |Q        |         |         |    V    |
20+ 5      17.0366      7.20  |Q        |         |         |    V    |
20+10      17.0857      7.12  |Q        |         |         |    V    |
20+15      17.1342      7.04  |Q        |         |         |    V    |
20+20      17.1822      6.97  |Q        |         |         |     V   |
20+25      17.2297      6.90  |Q        |         |         |     V   |
20+30      17.2767      6.83  |Q        |         |         |     V   |
20+35      17.3233      6.76  |Q        |         |         |     V   |
20+40      17.3694      6.70  |Q        |         |         |     V   |
20+45      17.4152      6.64  |Q        |         |         |     V   |
20+50      17.4604      6.58  |Q        |         |         |     V   |
20+55      17.5053      6.52  |Q        |         |         |     V   |
21+ 0      17.5498      6.46  |Q        |         |         |     V   |
21+ 5      17.5939      6.40  |Q        |         |         |     V   |
21+10      17.6376      6.35  |Q        |         |         |      V  |
21+15      17.6810      6.29  |Q        |         |         |      V  |
21+20      17.7239      6.24  |Q        |         |         |      V  |
21+25      17.7666      6.19  |Q        |         |         |      V  |
21+30      17.8089      6.14  |Q        |         |         |      V  |
21+35      17.8508      6.09  |Q        |         |         |      V  |
21+40      17.8925      6.05  |Q        |         |         |      V  |
21+45      17.9338      6.00  |Q        |         |         |      V  |
21+50      17.9748      5.95  |Q        |         |         |      V  |
21+55      18.0155      5.91  |Q        |         |         |      V  |
22+ 0      18.0559      5.87  |Q        |         |         |      V  |
22+ 5      18.0961      5.83  |Q        |         |         |      V  |
22+10      18.1359      5.78  |Q        |         |         |       V |
22+15      18.1754      5.74  |Q        |         |         |       V |
22+20      18.2147      5.70  |Q        |         |         |       V |
22+25      18.2537      5.67  |Q        |         |         |       V |
22+30      18.2925      5.63  |Q        |         |         |       V |
22+35      18.3310      5.59  |Q        |         |         |       V |
22+40      18.3692      5.55  |Q        |         |         |       V |
22+45      18.4073      5.52  |Q        |         |         |       V |
22+50      18.4450      5.48  |Q        |         |         |       V |
22+55      18.4825      5.45  |Q        |         |         |       V |
23+ 0      18.5198      5.41  |Q        |         |         |       V |
23+ 5      18.5569      5.38  |Q        |         |         |       V |
23+10      18.5937      5.35  |Q        |         |         |        V|
23+15      18.6303      5.32  |Q        |         |         |        V|
23+20      18.6667      5.29  |Q        |         |         |        V|
23+25      18.7029      5.25  |Q        |         |         |        V|
23+30      18.7389      5.22  |Q        |         |         |        V|
23+35      18.7747      5.19  |Q        |         |         |        V|
23+40      18.8102      5.16  |Q        |         |         |        V|
23+45      18.8456      5.14  |Q        |         |         |        V|
23+50      18.8808      5.11  |Q        |         |         |        V|
23+55      18.9158      5.08  |Q        |         |         |        V|
24+ 0      18.9506      5.05  |Q        |         |         |        V|
24+ 5      18.9841      4.86  Q         |         |         |        V|
```

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   24+10      19.0103      3.81  Q         |         |         |        V|
   24+15      19.0259      2.27  Q         |         |         |        V|
   24+20      19.0365      1.53  Q         |         |         |        V|
   24+25      19.0440      1.10  Q         |         |         |        V|
   24+30      19.0497      0.82  Q         |         |         |        V|
   24+35      19.0539      0.61  Q         |         |         |        V|
   24+40      19.0572      0.47  Q         |         |         |        V|
   24+45      19.0596      0.36  Q         |         |         |        V|
   24+50      19.0614      0.27  Q         |         |         |        V|
   24+55      19.0628      0.20  Q         |         |         |        V|
   25+ 0      19.0638      0.15  Q         |         |         |        V|
   25+ 5      19.0646      0.11  Q         |         |         |        V|
   25+10      19.0651      0.08  Q         |         |         |        V|
   25+15      19.0655      0.06  Q         |         |         |        V|
   25+20      19.0657      0.03  Q         |         |         |        V|
   25+25      19.0658      0.01  Q         |         |         |         V
-------------------------------------------------------------------------
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Appendix F – Reference Documents

- Precipitation Data
- Hydrologic Soil Map
- Infiltration Report (Prepared in Final Engineering)

NOAA Atlas 14, Volume 6, Version 2
Location name: Hesperia, California, USA*
Latitude: 34.4176°, Longitude: -117.3971°
Elevation: m/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	0.088 (0.073-0.107)	0.125 (0.103-0.152)	0.173 (0.143-0.212)	0.213 (0.175-0.264)	0.269 (0.212-0.343)	0.312 (0.241-0.407)	0.356 (0.269-0.476)	0.403 (0.296-0.554)	0.467 (0.329-0.669)	0.517 (0.352-0.768)
10-min	0.126 (0.104-0.154)	0.179 (0.148-0.218)	0.248 (0.205-0.304)	0.306 (0.250-0.378)	0.385 (0.305-0.492)	0.447 (0.346-0.583)	0.511 (0.386-0.683)	0.577 (0.424-0.794)	0.669 (0.471-0.959)	0.741 (0.505-1.10)
15-min	0.152 (0.126-0.186)	0.216 (0.179-0.264)	0.300 (0.248-0.368)	0.370 (0.302-0.457)	0.466 (0.368-0.595)	0.541 (0.419-0.705)	0.618 (0.467-0.826)	0.698 (0.513-0.960)	0.809 (0.570-1.16)	0.897 (0.610-1.33)
30-min	0.230 (0.190-0.280)	0.326 (0.269-0.398)	0.453 (0.374-0.555)	0.558 (0.456-0.689)	0.703 (0.556-0.897)	0.815 (0.631-1.06)	0.932 (0.704-1.25)	1.05 (0.773-1.45)	1.22 (0.860-1.75)	1.35 (0.921-2.01)
60-min	0.326 (0.270-0.398)	0.463 (0.383-0.566)	0.644 (0.531-0.789)	0.793 (0.648-0.979)	0.998 (0.789-1.27)	1.16 (0.897-1.51)	1.32 (1.00-1.77)	1.50 (1.10-2.06)	1.73 (1.22-2.49)	1.92 (1.31-2.85)
2-hr	0.480 (0.397-0.585)	0.651 (0.538-0.795)	0.882 (0.727-1.08)	1.08 (0.879-1.33)	1.35 (1.07-1.72)	1.56 (1.21-2.04)	1.79 (1.35-2.39)	2.03 (1.49-2.79)	2.36 (1.66-3.38)	2.63 (1.79-3.90)
3-hr	0.606 (0.501-0.739)	0.810 (0.669-0.989)	1.09 (0.896-1.33)	1.32 (1.08-1.63)	1.65 (1.31-2.11)	1.92 (1.48-2.50)	2.20 (1.66-2.94)	2.49 (1.83-3.43)	2.92 (2.05-4.18)	3.26 (2.22-4.84)
6-hr	0.864 (0.715-1.06)	1.15 (0.947-1.40)	1.53 (1.26-1.87)	1.86 (1.52-2.30)	2.33 (1.84-2.97)	2.71 (2.09-3.53)	3.11 (2.35-4.16)	3.54 (2.60-4.87)	4.17 (2.94-5.97)	4.68 (3.19-6.95)
12-hr	1.13 (0.937-1.38)	1.54 (1.27-1.88)	2.09 (1.73-2.56)	2.56 (2.10-3.17)	3.24 (2.56-4.14)	3.78 (2.93-4.94)	4.36 (3.30-5.83)	4.99 (3.67-6.86)	5.89 (4.15-8.44)	6.63 (4.51-9.84)
24-hr	1.54 (1.36-1.77)	2.15 (1.90-2.48)	2.99 (2.64-3.46)	3.71 (3.25-4.32)	4.72 (4.00-5.69)	5.55 (4.60-6.82)	6.42 (5.20-8.09)	7.36 (5.80-9.53)	8.71 (6.58-11.8)	9.81 (7.17-13.7)
2-day	1.78 (1.58-2.05)	2.49 (2.21-2.87)	3.48 (3.08-4.03)	4.33 (3.80-5.05)	5.56 (4.71-6.70)	6.57 (5.45-8.07)	7.64 (6.19-9.63)	8.81 (6.94-11.4)	10.5 (7.94-14.2)	11.9 (8.70-16.6)
3-day	1.91 (1.69-2.20)	2.67 (2.37-3.08)	3.74 (3.30-4.32)	4.66 (4.09-5.44)	6.01 (5.09-7.24)	7.12 (5.91-8.75)	8.31 (6.73-10.5)	9.61 (7.57-12.5)	11.5 (8.70-15.5)	13.1 (9.57-18.3)
4-day	2.06 (1.82-2.37)	2.88 (2.55-3.33)	4.04 (3.56-4.67)	5.04 (4.41-5.87)	6.49 (5.50-7.82)	7.70 (6.39-9.47)	9.00 (7.29-11.3)	10.4 (8.21-13.5)	12.5 (9.45-16.9)	14.2 (10.4-19.9)
7-day	2.31 (2.05-2.66)	3.22 (2.85-3.71)	4.48 (3.96-5.18)	5.58 (4.88-6.50)	7.17 (6.08-8.63)	8.48 (7.04-10.4)	9.90 (8.02-12.5)	11.5 (9.02-14.8)	13.7 (10.4-18.5)	15.6 (11.4-21.8)
10-day	2.47 (2.19-2.85)	3.43 (3.04-3.96)	4.77 (4.21-5.51)	5.92 (5.18-6.90)	7.59 (6.43-9.14)	8.97 (7.44-11.0)	10.5 (8.47-13.2)	12.1 (9.52-15.6)	14.4 (10.9-19.5)	16.4 (12.0-22.9)
20-day	2.97 (2.63-3.41)	4.10 (3.63-4.73)	5.68 (5.01-6.56)	7.04 (6.16-8.20)	9.00 (7.62-10.8)	10.6 (8.81-13.0)	12.4 (10.0-15.6)	14.3 (11.2-18.5)	17.0 (12.9-23.0)	19.4 (14.2-27.1)
30-day	3.50 (3.10-4.03)	4.82 (4.26-5.55)	6.63 (5.86-7.66)	8.20 (7.18-9.55)	10.5 (8.86-12.6)	12.3 (10.2-15.1)	14.3 (11.6-18.1)	16.5 (13.0-21.4)	19.8 (15.0-26.7)	22.5 (16.4-31.4)
45-day	4.18 (3.70-4.81)	5.67 (5.02-6.54)	7.74 (6.83-8.94)	9.52 (8.33-11.1)	12.1 (10.2-14.6)	14.2 (11.8-17.5)	16.5 (13.4-20.8)	19.0 (15.0-24.7)	22.8 (17.2-30.7)	25.9 (18.9-36.2)
60-day	4.77 (4.23-5.49)	6.38 (5.65-7.35)	8.59 (7.59-9.93)	10.5 (9.20-12.2)	13.3 (11.2-16.0)	15.5 (12.9-19.1)	18.0 (14.6-22.7)	20.8 (16.4-26.9)	24.9 (18.8-33.6)	28.3 (20.7-39.6)

[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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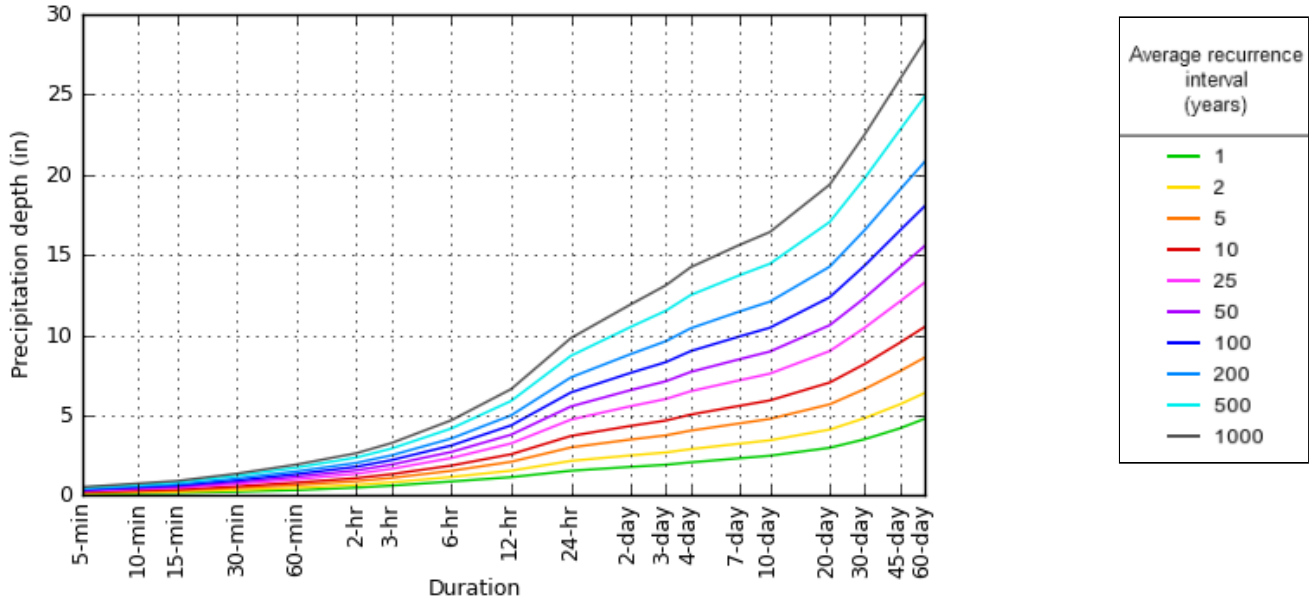
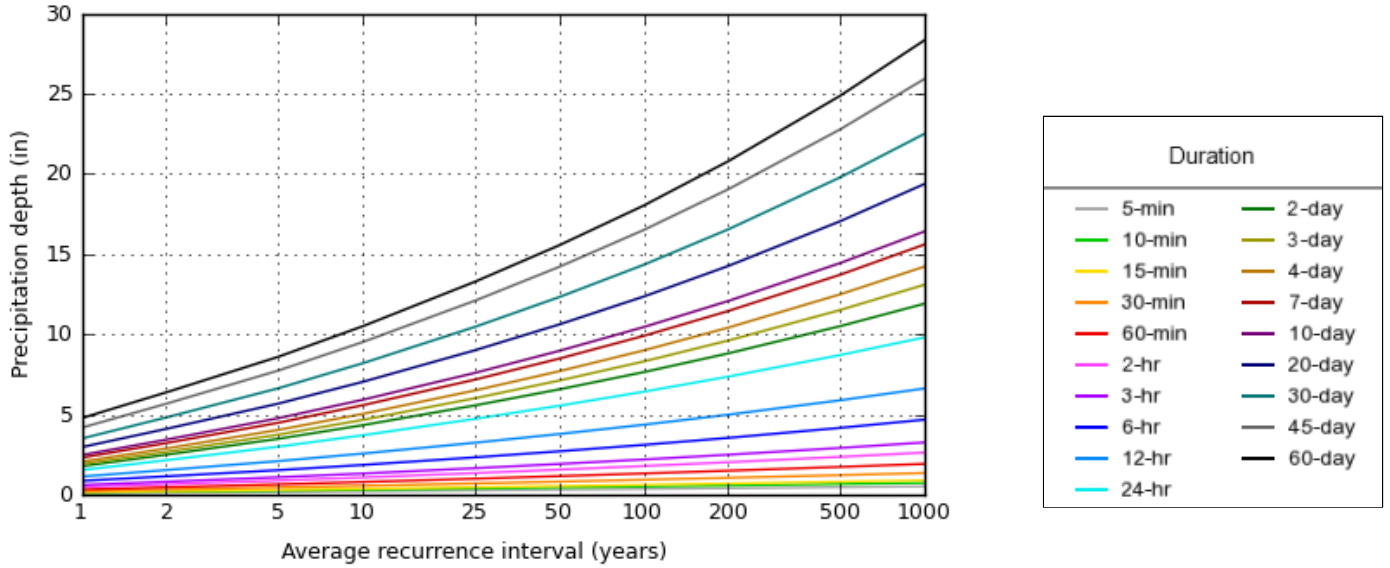
PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 34.4176°, Longitude: -117.3971°





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Created (GMT): Fri Feb 19 15:26:39 2021

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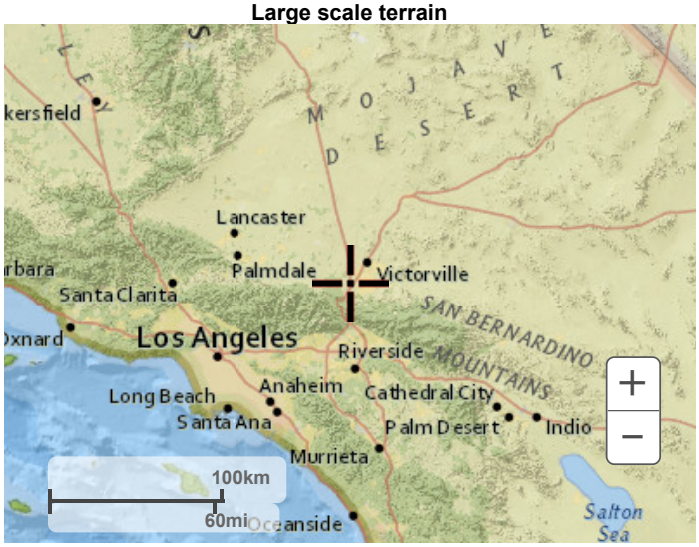
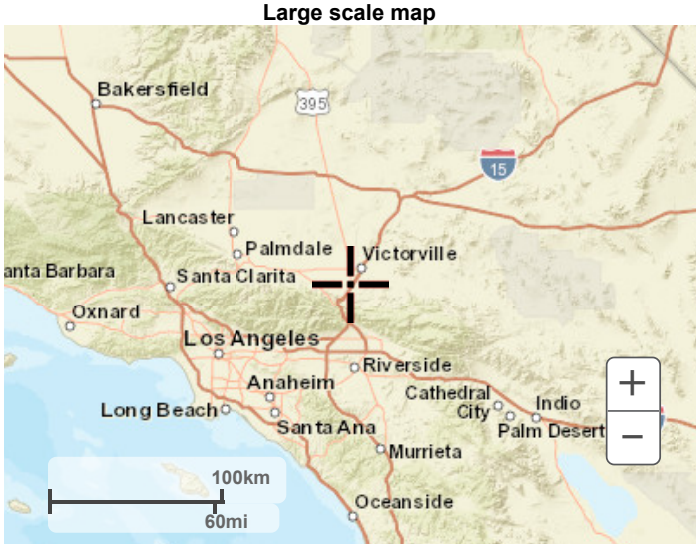
Maps & aerials

Small scale terrain

Large scale terrain



Large scale map



Large scale aerial

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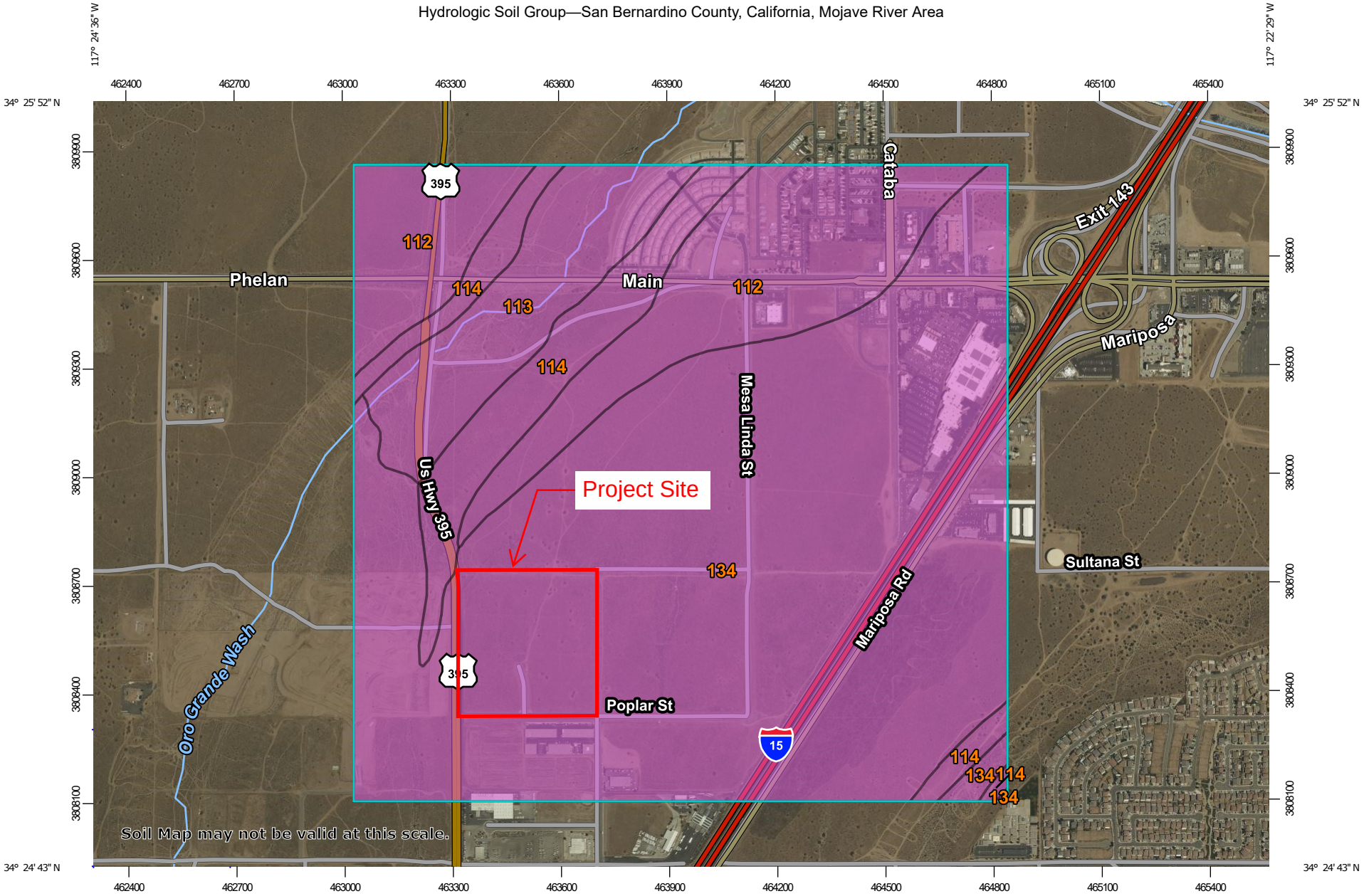
US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer



Map Scale: 1:14,900 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 200 400 800 1200

Feet: 0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: San Bernardino County, California, Mojave River Area
Survey Area Data: Version 12, May 27, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 26, 2019—Jul 8, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
112	CAJON SAND, 0 TO 2 PERCENT SLOPES	A	137.5	17.4%
113	CAJON SAND, 2 TO 9 PERCENT SLOPES	A	65.4	8.3%
114	CAJON SAND, 9 TO 15 PERCENT SLOPES	A	66.7	8.4%
134	HESPERIA LOAMY FINE SAND, 2 TO 5 PERCENT SLOPES	A	521.5	65.9%
Totals for Area of Interest			**791.1**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Appendix G-2

Preliminary Water Quality Management Plans

Building 1 Preliminary Water Quality Management Plan

MOJAVE RIVER WATERSHED

Preliminary Water Quality Management Plan

For:

I-15 Industrial Park Building 1

PARCEL MAP NO. 20315

Prepared for:

Mesa Linda 68, LLC

14180 Dallas Parkway, Suite 730

Dallas, TX 75254

(866) 878-1499

Prepared by:

WestLAND Group

4150 Concours, Suite 100

Ontario, CA 91764

(909) 989-9789

Submittal Date: 02/18/2022

Revision No. and Date: Insert No and Current Revision Date

Revision No. and Date: Insert No and Current Revision Date

Revision No. and Date: Insert No and Current Revision Date

Revision No. and Date: Insert No and Current Revision Date

Revision No. and Date: Insert No and Current Revision Date

Final Approval Date:_____

Project Owner's Certification

This Mojave River Watershed Water Quality Management Plan (WQMP) has been prepared for Mesa Linda 68, LLC by WestLAND Group. The WQMP is intended to comply with the requirements of the City of Hesperia and the Phase II Small MS4 General Permit for the Mojave River Watershed. The undersigned, while it owns the subject property, is responsible for the implementation of the provisions of this plan and will ensure that this plan is amended as appropriate to reflect up-to-date conditions on the site consistent with the Phase II Small MS4 Permit and the intent of San Bernardino County (unincorporated areas of Phelan, Oak Hills, Spring Valley Lake and Victorville) and the incorporated cities of Hesperia and Victorville and the Town of Apple Valley. Once the undersigned transfers its interest in the property, its successors in interest and the city/county/town shall be notified of the transfer. The new owner will be informed of its responsibility under this WQMP. A copy of the approved WQMP shall be available on the subject site in perpetuity.

"I certify under a penalty of law that the provisions (implementation, operation, maintenance, and funding) of the WQMP have been accepted and that the plan will be transferred to future successors."

Project Data			
Permit/Application Number(s):		Grading Permit Number(s):	
Tract/Parcel Map Number(s):	20315	Building Permit Number(s):	
CUP, SUP, and/or APN (Specify Lot Numbers if Portions of Tract):			

Owner's Signature			
Owner Name:			
Title			
Company			
Address			
Email			
Telephone #			
Signature		Date	

Preparer's Certification

Project Data			
Permit/Application Number(s):		Grading Permit Number(s):	
Tract/Parcel Map Number(s):	Parcel Map No. 20315	Building Permit Number(s):	
CUP, SUP, and/or APN (Specify Lot Numbers if Portions of Tract):			

"The selection, sizing and design of stormwater treatment and other stormwater quality and quantity control measures in this plan were prepared under my oversight and meet the requirements of the California State Water Resources Control Board Order No. 2013-0001-DWQ.

Engineer: Glenn Chung, PE QSD		PE Stamp Below
Title	Executive Vice President/Principal	
Company	Westland Group, Inc.	
Address	4150 Concours, Suite 100, Ontario CA 91764	
Email	gchung@westlandgroup.net	
Telephone #	(909) 989-9789	
Signature		
Date		

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Section I – Introduction

This WQMP template has been prepared specifically for the Phase II Small MS4 General Permit in the Mojave River Watershed. This location is within the jurisdiction of the Lahontan Regional Water Quality Control Board (LRWQCB). This document should not be confused with the WQMP template for the Santa Ana Phase I area of San Bernardino County.

WQMP preparers must refer to the MS4 Permit for the Mojave Watershed WQMP template and Technical Guidance (TGD) document found at: http://cms.sbcounty.gov/dpw/Land/NPDES.aspx to find pertinent arid region and Mojave River Watershed specific references and requirements.

Section 1 Discretionary Permit(s)

Form 1-1 Project Information

Project Name	I-15 Industrial Park Building 1				
Project Owner Contact Name:	Brandon Gallup				
Mailing Address:	14180 Dallas Parkway, Suite 730 Dallas, TX 75254	E-mail Address:		Telephone:	(866) 878-1499
Permit/Application Number(s):		Tract/Parcel Map Number(s):	Parcel Map No. 20315		
Additional Information/ Comments:					
Description of Project:	The project site is located on the northwest corner of the intersection between Mesa Linda Street and Poplar Street and measures to be approximately 17.86 acres. The project site is currently vacant, undeveloped land with poor coverage. The soils have a hydrologic soil group classification of "A", and the site topography shows that stormwater runoff sheet flows to the northeast where it will naturally evaporate and infiltrate into the soil. See the exhibit for the Pre-Development conditions in Appendix A for more information. The proposed site will be an industrial development with one industrial building, parking areas, loading areas, drive aisles, and landscape areas. Stormwater runoff will be collected by nearby catch basins and conveyed to the proposed above ground basins and underground CMP via a storm drain system. Prior to entering the storm drain system, runoff will first be pretreated via filter inserts placed on the catch basins. Further downstream within the storm drain system, the runoff will be further pretreated via a hydrodynamic separator CDS unit prior to entering the underground CMP system. The site proposes one above ground basin to the west and one above ground basin and underground CMP infiltration system to the east. After pretreatment, runoff will be routed to the designated infiltration BMP. Runoff in Drainage Area A will be routed to the above ground basin to the northwest along with the Underground CMP where it will collect and infiltrate into the soil. Runoff from Drainage Areas B and C will be routed into the same underground infiltration CMP and the above ground basin to the northeast. The basins are sized and designed to prevent flooding from a 100-year storm while also accommodating the required retention volume for water quality purposes. For this project, the basins are designed to capture the entire volume generated from a 100-year storm even meaning that no runoff will be discharged off site. For more information, please refer to the WQMP exhibit in Section 6.1.				

Provide summary of Conceptual WQMP conditions (if previously submitted and approved). Attach complete copy.	N/A

Section 2 Project Description

2.1 Project Information

The WQMP shall provide the information listed below. The information provided for Conceptual/ Preliminary WQMP should give sufficient detail to identify the major proposed site design and LID BMPs and other anticipated water quality features that impact site planning. Final Project WQMP must specifically identify all BMP incorporated into the final site design and provide other detailed information as described herein.

The purpose of this information is to help determine the applicable development category, pollutants of concern, watershed description, and long term maintenance responsibilities for the project, and any applicable water quality credits. This information will be used in conjunction with the information in Section 3, Site Description, to establish the performance criteria and to select the LID BMP or other BMP for the project or other alternative programs that the project will participate in, which are described in Section 4.

2.1.1 Project Sizing Categorization

If the Project is greater than 5,000 square feet, and not on the excluded list as found on Section 1.4 of the TGD, the Project is a Regulated Development Project.

If the Project is creating and/or replacing greater than 2,500 square feet but less than 5,000 square feet of impervious surface area, then it is considered a Site Design Only project. This criterion is applicable to all development types including detached single family homes that create and/or replace greater than 2,500 square feet of impervious area and are not part of a larger plan of development.

Form 2.1-1 Description of Proposed Project

1 Regulated Development Project Category (Select all that apply):

☒ #1 New development involving the creation of 5,000 ft^2 or more of impervious surface collectively over entire site	☐ #2 Significant re-development involving the addition or replacement of 5,000 ft^2 or more of impervious surface on an already developed site	☐ #3 Road Project – any road, sidewalk, or bicycle lane project that creates greater than 5,000 square feet of contiguous impervious surface	☐ #4 LUPs – linear underground/overhead projects that has a discrete location with 5,000 sq. ft. or more new constructed impervious surface

☐ Site Design Only (Project Total Square Feet > 2,500 but < 5,000 sq.ft.) *Will require source control Site Design Measures. Use the "PCMP" Template. Do not use this WQMP Template.*

2 Project Area (ft2):	2,666,521	**3** Number of Dwelling Units:		**4** SIC Code:	1541

5 Is Project going to be phased? Yes ☐ No ☒ *If yes, ensure that the WQMP evaluates each phase as a distinct DA, requiring LID BMPs to address runoff at time of completion.*

2.2 Property Ownership/Management

Describe the ownership/management of all portions of the project and site. State whether any infrastructure will transfer to public agencies (City, County, Caltrans, etc.) after project completion. State if a homeowners or property owners association will be formed and be responsible for the long-term maintenance of project stormwater facilities. Describe any lot-level stormwater features that will be the responsibility of individual property owners.

Form 2.2-1 Property Ownership/Management

Describe property ownership/management responsible for long-term maintenance of WQMP stormwater facilities:

Maintenance of the WQMP facilities will be the sole responsibility of the property owner:

Mesa Linda 68, LLC
14180 Dallas Parkway, Suite 730
Dallas, TX 75254
Contact: Brandon Gallup
Phone: (866) 878-1499

The owner may choose to contract the appropriate employers for the maintenance of stormwater to whom will provide the proper equipment if the current owners to not have the proper equipment and/or knowledge to do so.

Any future property owner(s) whom will succeed I-15 Industrial Park Building 1 as the entity responsible for long term maintenance.

No infrastructure will be transferred to a public agency after completion. Refer to Section 5 of this WQMP report for detailed maintenance activities.

2.3 Potential Stormwater Pollutants

Best Management Practices (BMP) measures for pollutant generating activities and sources shall be designed consistent with recommendations from the CASQA Stormwater BMP Handbook for New Development and Redevelopment (or an equivalent manual). Pollutant generating activities must be considered when determining the overall pollutants of concern for the Project as presented in Form 2.3-1.

Determine and describe expected stormwater pollutants of concern based on land uses and site activities (refer to Table 3-2 in the TGD for WQMP).

Form 2.3-1 Pollutants of Concern

Pollutant	Please check: E=Expected, N=Not Expected		Additional Information and Comments
Pathogens (Bacterial / Virus)	E ☒	N ☐	Wild Bird and Pet Waste, Garbage
Nutrients - Phosphorous	E ☒	N ☐	Fertilizers, Food Waste, & Garbage
Nutrients - Nitrogen	E ☒	N ☐	Fertilizer & Waste
Noxious Aquatic Plants	E ☐	N ☒	The proposed development does not include any areas where water will be standing long enough to allow the growth of aquatic plants.
Sediment	E ☒	N ☐	Driveways, Rooftops, Sidewalks, Paved areas & landscape
Metals	E ☒	N ☐	Cars, Trucks & Parking Areas
Oil and Grease	E ☒	N ☐	Leaking Vehicles & Parking Areas
Trash/Debris	E ☒	N ☐	Poorly managed Trash Container & Parking area
Pesticides / Herbicides	E ☒	N ☐	Landscape Area
Organic Compounds	E ☒	N ☐	Cars & Trucks
Other:	E ☐	N ☐	
Other:	E ☐	N ☐	
Other:	E ☐	N ☐	

Section 3 Site and Watershed Description

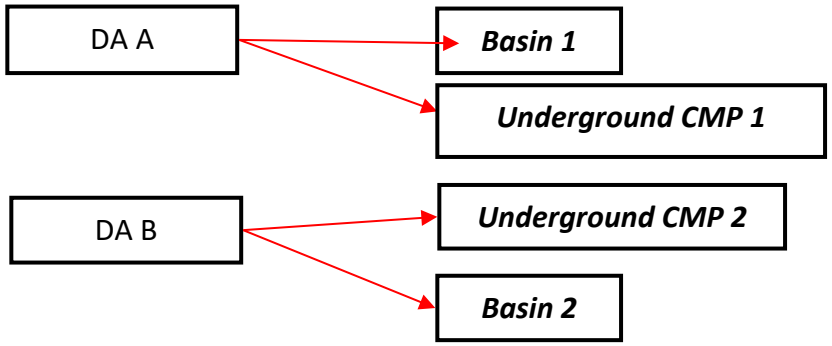
Describe the project site conditions that will facilitate the selection of BMPs through an analysis of the physical conditions and limitations of the site and its receiving waters. Identify distinct drainage areas (DA) that collect flow from a portion of the site and describe how runoff from each DA (and sub-watershed Drainage Management Areas (DMAs)) is conveyed to the site outlet(s). Refer to Section 3.2 in the TGD for WQMP. The form below is provided as an example. Then complete Forms 3.2 and 3.3 for each DA on the project site. ***If the project has more than one drainage area for stormwater management, then complete additional versions of these forms for each DA / outlet. A map presenting the DMAs must be included as an appendix to the WQMP document.***

Form 3-1 Site Location and Hydrologic Features

Site coordinates *take GPS measurement at approximate center of site*	Latitude 34.4159°	Longitude -117.3904°	Thomas Bros Map page 4475

1 San Bernardino County climatic region: ☒ Desert

2 Does the site have more than one drainage area (DA): Yes☒ No☐ *If no, proceed to Form 3-2. If yes, then use this form to show a conceptual schematic describing DMAs and hydrologic feature connecting DMAs to the site outlet(s). An example is provided below that can be modified for proposed project or a drawing clearly showing DMA and flow routing may be attached*



Conveyance	Briefly describe on-site drainage features to convey runoff that is not retained within a DMA
DA1 DMA C flows to DA1 DMA A	*Ex. Bioretention overflow to vegetated bioswale with 4' bottom width, 5:1 side slopes and bed slope of 0.01. Conveys runoff for 1000' through DMA 1 to existing catch basin on SE corner of property*
DA A to Basin 1	Runoff sheet flows into the nearest catch basin and routed into the above ground basin, Basin 1, and Underground CMP 1.
DA B to Basin 2	Runoff sheet flows into the nearest catch basin and routed into the underground CMP infiltration system. Once the underground detention system is filled, runoff will then be routed to the above ground basin, Basin 2.
DA2 to Outlet 2	

Form 3-2 Existing Hydrologic Characteristics for Drainage Area 1

For Drainage Area 1's sub-watershed DMA, provide the following characteristics	DA A	DA B	DA C	
1 DMA drainage area (ft^2)	1,869,786	662,278	134,457	
2 Existing site impervious area (ft^2)	0	0	0	
3 Antecedent moisture condition *For desert areas, use* *http://www.sbcounty.gov/dpw/floodcontrol/pdf/20100412_map.pdf*	AMC II	AMC II	AMC II	
4 Hydrologic soil group *Refer to County Hydrology Manual Addendum for Arid Regions – http://www.sbcounty.gov/dpw/floodcontrol/pdf/20100412_addendum.pdf*	A	A	A	
5 Longest flowpath length (ft)	2,834	1,302	789	
6 Longest flowpath slope (ft/ft)	0.021	0.022	0.024	
7 Current land cover type(s) *Select from Fig C-3 of Hydrology Manual*	Grass, Annual or Perennial (Undeveloped)	Grass, Annual or Perennial (Undeveloped)	Grass, Annual or Perennial (Undeveloped)	
8 Pre-developed pervious area condition: *Based on the extent of wet season vegetated cover good >75%; Fair 50-75%; Poor <50%* ***Attach photos of site to support rating***	Poor	Poor	Poor	

Form 3-3 Watershed Description for Drainage Area

Receiving waters Refer to SWRCB site: http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml	Mojave River (Mojave Forks Reservoir outlet to Upper Narrows) Deep Creek (San Bernardino County) Oro Grande Wash Owner: SBCFCD
Applicable TMDLs *http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml*	**Mojave River (Mojave Forks Reservoir outlet to Upper Narrows)** N/A **Deep Creek (San Bernardino County)** N/A **Oro Grande Wash** N/A
303(d) listed impairments *http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml*	**Mojave River (Mojave Forks Reservoir outlet to Upper Narrows)** Fluoride **Deep Creek (San Bernardino County)** N/A **Oro Grande Wash** N/A
Environmentally Sensitive Areas (ESA) *Refer to Watershed Mapping Tool –* *http://sbcounty.permitrack.com/WAP*	**Environmentally Sensitive Areas within 200':** DESERT TORTOISE HABITAT CAT 3
Hydromodification Assessment	☒ Yes *Complete Hydromodification Assessment. Include Forms 4.2-2 through Form 4.2-5 and Hydromodification BMP Form 4.3-9 in submittal* ☐ No

Section 4 Best Management Practices (BMP)

4.1 Source Control BMPs and Site Design BMP Measures

The information and data in this section are required for both Regulated Development and Site Design Only Projects. Source Control BMPs and Site Design BMP Measures are the basis of site-specific pollution management.

4.1.1 Source Control BMPs

Non-structural and structural source control BMP are required to be incorporated into all new development and significant redevelopment projects. Form 4.1-1 and 4.1-2 are used to describe specific source control BMPs used in the WQMP or to explain why a certain BMP is not applicable. Table 7-3 of the TGD for WQMP provides a list of applicable source control BMP for projects with specific types of potential pollutant sources or activities. The source control BMP in this table must be implemented for projects with these specific types of potential pollutant sources or activities.

The preparers of this WQMP have reviewed the source control BMP requirements for new development and significant redevelopment projects. The preparers have also reviewed the specific BMP required for project as specified in Forms 4.1-1 and 4.1-2. All applicable non-structural and structural source control BMP shall be implemented in the project.

The identified list of source control BMPs correspond to the CASQA Stormwater BMP Handbook for New Development and Redevelopment.

Form 4.1-1 Non-Structural Source Control BMPs

Identifier	Name	Check One		Describe BMP Implementation OR, if not applicable, state reason
		Included	Not Applicable	
N1	Education of Property Owners, Tenants and Occupants on Stormwater BMPs	☒	☐	The current owner/developer and future owners and their POA shall be familiar with the contents of this WQMP and County & City ordinances and brochures and furnish copies of these documents to all future property owners.
N2	Activity Restrictions	☒	☐	Property owners and their tenants or occupants shall not be allowed to discharge chemicals, chemical residues, wastewater or other prohibited discharges listed in the City stormwater Ordinance, to the outside, paved areas of the site; or store chemicals or other pollutant sources in a non-spill contained or covered facilities as stipulated in the CC&Rs.
N3	Landscape Management BMPs	☒	☐	The POA and their landscape maintenance contractor shall inspect the irrigation system plant health and erosion problems after each landscape procedure and shall report all repairs and problems to the POA. All routine landscaping maintenance.
N4	BMP Maintenance	☒	☐	The POA shall inspect for standing water in the water retention/infiltration basins, 48 hours after storm events. BMP maintenance shall be performed per the schedule in Form 5-1, as needed to restore free drainage.
N5	Title 22 CCR Compliance (How development will comply)	☒	☐	The POA will file appropriate hazardous material disclosures, if any storage is conducted, and must comply with all Title 22 CCR, Chapter 29 regulations.
N6	Local Water Quality Ordinances	☒	☐	The POA shall ensure that all maintenance activities at the site comply with the City of Hesperia's Stormwater Ordinance, through the implementation of BMPs.
N7	Spill Contingency Plan	☒	☐	Building operators shall prepare specific plans based on materials on site for the cleanup of spills. Plans shall mandate stock piling of cleanup materials, notification of agencies, disposal, documentation, ect.
N8	Underground Storage Tank Compliance	☐	☒	There are no underground storage tanks at this site.
N9	Hazardous Materials Disclosure Compliance	☐	☒	The current owner and the future POA shall prohibit the storage of hazardous materials.

Form 4.1-1 Non-Structural Source Control BMPs

Identifier	Name	Check One		Describe BMP Implementation OR, if not applicable, state reason
		Included	Not Applicable	
N10	Uniform Fire Code Implementation	☒	☐	The current owners or the future POA shall require all fire code requirements to be implemented at this project site.
N11	Litter/Debris Control Program	☒	☐	The property owners, POA and their contractor shall pick up litter and sweep and clean the existing trash enclosure weekly. The trash enclosure is designed to divert all flows around the dumpsters and shall be roofed. The HOA shall contract with a refuse company to have the dumpsters emptied on a weekly basis, at a minimum.
N12	Employee Training	☒	☐	The POA shall require all maintenance contractors to train their employees in stormwater BMP implementation.
N13	Housekeeping of Loading Docks	☒	☐	Dock areas shall be swept regularly with litter control and cleanup procedures eliminating the use of water.
N14	Catch Basin Inspection Program	☒	☐	The on-site catch basins shall be inspected monthly during the rainy season (October-May) and before and after each storm to ensure proper operation. The HOA shall contract with a qualified landscape contractor to inspect and clean out accumulation of trash, litter and sediment and check for evidence of illegal dumping of waste materials into on-site drains.
N15	Vacuum Sweeping of Private Streets and Parking Lots	☒	☐	The paved areas and common open areas of the project site shall be swept and cleaned weekly by the POA's contractor
N16	Other Non-structural Measures for Public Agency Projects	☐	☒	This development is not part of a Public Agency Project.
N17	Comply with all other applicable NPDES permits	☒	☐	The developer of this site shall comply with all BMP implementation requirements of the City of Hesperia for Stormwater discharges during construction of this project and shall file for a permit coverage under the Statewide General Construction Stormwater Permit, prior to beginning construction/grading activities at this site. Following occupancy, owners, tenants, and POA shall comply with SB County MS4 Permit requirements, enforced by the City of Hesperia.

Form 4.1-2 Structural Source Control BMPs

Identifier	Name	Check One		Describe BMP Implementation OR, If not applicable, state reason
		Included	Not Applicable	
S1	Provide storm drain system stencilling and signage (CASQA New Development BMP Handbook SD-13)	☒	☐	A painted message "No Dumping-Drains to River" shall be placed on each catch basin by developer. The message shall be inspected annually & repainted as necessary by the POA.
S2	Design and construct outdoor material storage areas to reduce pollution introduction (CASQA New Development BMP Handbook SD-34)	☐	☒	This development does not include the storage of materials outdoors.
S3	Design and construct trash and waste storage areas to reduce pollution introduction (CASQA New Development BMP Handbook SD-32)	☒	☐	Stormwater flows are diverted away from the trash enclosure. All dumpsters shall have working lids which shall be kept closed, at all times. Trash enclosure shall comply with CASQA SD-32 and shall have doors and a solid roof.
S4	Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control (Statewide Model Landscape Ordinance; CASQA New Development BMP Handbook SD-12)	☒	☐	The irrigation system will include devices to prevent low head drainage, overspray and run off through the use of pressure regulating devices, check valves, rain shutoff valves, flow sensors, pressure drop sensors, proper spacing, low precipitation emission devices and ET or weather-based controllers. Landscape and irrigation shall be consistent with the State Model Water Efficient landscape Ordinance and the City of Ontario landscape Development Standards. Plants installed will be arranged according to similar hydrozones and meet the required water budget for the site. Shade trees shall be used to intercept rainwater and reduce heat gain on paving.
S5	Finish grade of landscaped areas at a minimum of 1-2 inches below top of curb, sidewalk, or pavement	☒	☐	All landscaped areas shall comply with depressed grading requirements by finish grading to a minimum of 1" below pavement grades or top-of-curb.
S6	Protect slopes and channels and provide energy dissipation (CASQA New Development BMP Handbook SD-10)	☒	☐	All slopes shall be hard lined, rip-rapped or vegetated to provide erosion protection and prevent sediment transport
S7	Covered dock areas (CASQA New Development BMP Handbook SD-31)	☐	☒	Unloading of truck trailers at docks will occur under cover of the building. It is not feasible to cover the entire loading area as it would be cost prohibitive. Project will incorporate dock high rollup doors and sweeping activities at the outside of the building.
S8	Covered maintenance bays with spill containment plans (CASQA New Development BMP Handbook SD-31)	☐	☒	Maintenance bays are not proposed as a part of this development, and no maintenance activities will be allowed on site.

S9	Vehicle wash areas with spill containment plans (CASQA New Development BMP Handbook SD-33)	☐	☒	Vehicle wash areas are not provided as part of this development.
S10	Covered outdoor processing areas (CASQA New Development BMP Handbook SD-36)	☐	☒	Outdoor processing is not associated with the proposed development.

Form 4.1-2 Structural Source Control BMPs

Identifier	Name	Check One		Describe BMP Implementation OR, If not applicable, state reason
		Included	Not Applicable	
S11	Equipment wash areas with spill containment plans (CASQA New Development BMP Handbook SD-33)	☐	☒	Outdoor equipment is not associated with the proposed development.
S12	Fueling areas (CASQA New Development BMP Handbook SD-30)	☐	☒	Fueling areas are not included as part of this development.
S13	Hillside landscaping (CASQA New Development BMP Handbook SD-10)	☐	☒	No hillsides will require re-vegetation as part of the proposed development.
S14	Wash water control for food preparation areas	☐	☒	The proposed development does not include food preparation areas.
S15	Community car wash racks (CASQA New Development BMP Handbook SD-33)	☐	☒	The proposed development does not include community car wash areas

4.1.2 Site Design BMPs

As part of the planning phase of a project, the site design practices associated with new LID requirements in the Phase II Small MS4 Permit must be considered. Site design BMP measures can result in smaller Design Capture Volume (DCV) to be managed by both LID and hydromodification control BMPs by reducing runoff generation.

As is stated in the Permit, it is necessary to evaluate site conditions such as soil type(s), existing vegetation and flow paths will influence the overall site design.

Describe site design and drainage plan including:

- A narrative of site design practices utilized or rationale for not using practices
- A narrative of how site plan incorporates preventive site design practices
- Include an attached Site Plan layout which shows how preventative site design practices are included in WQMP

Refer to Section 5.2 of the TGD for WQMP for more details.

Form 4.1-3 Site Design Practices Checklist

Site Design Practices *If yes, explain how preventative site design practice is addressed in project site plan. If no, other LID BMPs must be selected to meet targets*
Minimize impervious areas: Yes ☒ No ☐ Explanation: Impervious areas will be minimized to the maximum extent practicable. The proposed development requires large areas for loading docks and building foot prints.
Maximize natural infiltration capacity; Including improvement and maintenance of soil: Yes ☒ No ☐ Explanation: All pervious areas will be below adjacent impervious areas to maximize natural infiltration, and the project site utilizes subsurface infiltration basins.
Preserve existing drainage patterns and time of concentration: Yes ☐ No ☒ Explanation: Post-development has different travel distance, surface roughness and time concentration from the existing condition.
Disconnect impervious areas. Including rerouting of rooftop drainage pipes to drain stormwater to storage or infiltration BMPs instead of to storm drain : Yes ☒ No ☐ Explanation: Most areas are run through landscape areas prior to entering the storm drain system. Roof area will be conveyed through adjacent landscaping, where feasible.
Use of Porous Pavement.: Yes ☐ No ☒ Explanation: The project does not propose areas with porous pavement.
Protect existing vegetation and sensitive areas: Yes ☐ No ☒ Explanation: Native vegetation has been mostly removed by agricultural activities, and the existing undeveloped area will not be preserved.
Re-vegetate disturbed areas. Including planting and preservation of drought tolerant vegetation. : Yes ☒ No ☐ Explanation: Any areas that are disturbed will be stabilized prior to project completion.

Minimize unnecessary compaction in stormwater retention/infiltration basin/trench areas: Yes ☒ No ☐ Explanation: Landscaping areas will be staked off after rough grading has been completed to prevent excessive compaction, the areas in which the subsurface basins are to be constructed will minimize compaction.
Utilize naturalized/rock-lined drainage swales in place of underground piping or imperviously lined swales: Yes ☐ No ☒ Explanation: The project does not incorporate naturalized/ rock-lined drainage swales in place of underground piping.
Stake off areas that will be used for landscaping to minimize compaction during construction : Yes ☒ No ☐ Explanation: Landscaping areas will be staked off after rough grading has been completed to prevent excessive compaction.
Use of Rain Barrels and Cisterns, Including the use of on-site water collection systems.: Yes ☐ No ☒ Explanation: The project does not incorporate rain barrels and cisterns.
Stream Setbacks. Includes a specified distance from an adjacent steam: : Yes ☐ No ☒ Explanation: There are no streams adjacent to the property.

It is noted that, in the Phase II Small MS4 Permit, site design elements for green roofs and vegetative swales are required. Due to the local climatology in the Mojave River Watershed, proactive measures are taken to maximize the amount of drought tolerant vegetation. It is not practical in this region to have green roofs or vegetative swales. As part of site design the project proponent should utilize locally recommended vegetation types for landscaping. Typical landscaping recommendations are found in following local references:

San Bernardino County Special Districts:

Guide to High Desert Landscaping -
http://www.specialdistricts.org/Modules/ShowDocument.aspx?documentid=795

Recommended High-Desert Plants -
http://www.specialdistricts.org/modules/showdocument.aspx?documentid=553

Mojave Water Agency:

Desert Ranch: http://www.mojavewater.org/files/desertranchgardenprototype.pdf

Summertree: http://www.mojavewater.org/files/Summertree-Native-Plant-Brochure.pdf

Thornless Garden: http://www.mojavewater.org/files/thornlessgardenprototype.pdf

Mediterranean Garden: http://www.mojavewater.org/files/mediterraneangardenprototype.pdf

Lush and Efficient Garden: http://www.mojavewater.org/files/lushandefficientgardenprototype.pdf

Alliance for Water Awareness and Conservation (AWAC) outdoor tips – http://hdawac.org/save-outdoors.html

4.2 Treatment BMPs

After implementation and design of both Source Control BMPs and Site Design BMP measures, any remaining runoff from impervious DMAs must be directed to one or more on-site, treatment BMPs (LID or biotreatment) designed to infiltrate, evaportranspire, and/or bioretain the amount of runoff specified in Permit Section E.12.e (ii)(c) Numeric Sizing Criteria for Storm Water Retention and Treatment.

4.2.1 Project Specific Hydrology Characterization

The purpose of this section of the Project WQMP is to establish targets for post-development hydrology based on performance criteria specified in Section E.12.e.ii.c and Section E.12.f of the Phase II Small MS4 Permit. These targets include runoff volume for water quality control (referred to as LID design capture volume), and runoff volume, time of concentration, and peak runoff for protection from hydromodification.

If the project has more than one outlet for stormwater runoff, then complete additional versions of these forms for each DA / outlet.

It is noted that in the Phase II Small MS4 Permit jurisdictions, the LID BMP Design Capture Volume criteria is based on the 2-year rain event. The hydromodification performance criterion is based on the 10-year rain event.

Methods applied in the following forms include:

- For LID BMP Design Capture Volume (DCV), San Bernardino County requires use of the P_6 method (Form 4.2-1) For pre- and post-development hydrologic calculation, San Bernardino County requires the use of the Rational Method (San Bernardino County Hydrology Manual Section D). Forms 4.2-2 through Form 4.2-5 calculate hydrologic variables including runoff volume, time of concentration, and peak runoff from the project site pre- and post-development using the Hydrology Manual Rational Method approach. For projects greater than 640 acres (1.0 mi^2), the Rational Method and these forms should not be used. For such projects, the Unit Hydrograph Method (San Bernardino County Hydrology Manual Section E) shall be applied for hydrologic calculations for hydromodification performance criteria.

Refer to Section 4 in the TGD for WQMP for detailed guidance and instructions.

Form 4.2-1 LID BMP Performance Criteria for Design Capture Volume (DA A)		
[1] Project area DA 1 (ft^2): 1,502,989	[2] Imperviousness after applying preventative site design practices (Imp%): 85	[3] Runoff Coefficient (Rc): _0.66 *$R_c = 0.858(Imp\%)^{\wedge 3}-0.78(Imp\%)^{\wedge 2}+0.774(Imp\%)+0.04$*
[4] Determine 1-hour rainfall depth for a 2-year return period $P_{2yr\text{-}1hr}$ (in): 0.458 *http://hdsc.nws.noaa.gov/hdsc/pfds/sa/sca_pfds.html*		
[5] Compute P_6, Mean 6-hr Precipitation (inches): 0.57 *P_6 = Item 4 *C_1, where C_1 is a function of site climatic region specified in Form 3-1 Item 1 (Desert = 1.2371)*		
[6] Drawdown Rate *Use 48 hours as the default condition. Selection and use of the 24 hour drawdown time condition is subject to approval by the local jurisdiction. The necessary BMP footprint is a function of drawdown time. While shorter drawdown times reduce the performance criteria for LID BMP design capture volume, the depth of water that can be stored is also reduced.*		24-hrs ☐ 48-hrs ☒
[7] Compute design capture volume, DCV (ft^3): 92,536 *DCV = 1/12 * [Item 1* Item 3 *Item 5 * C_2], where C_2 is a function of drawdown rate (24-hr = 1.582; 48-hr = 1.963)* *Compute separate DCV for each outlet from the project site per schematic drawn in Form 3-1 Item 2*		

Form 4.2-1 LID BMP Performance Criteria for Design Capture Volume (DA B)		
[1] Project area DA 1 (ft^2): 1,163,532	[2] Imperviousness after applying preventative site design practices (Imp%): 86	[3] Runoff Coefficient (Rc): _0.68 *$R_c = 0.858(Imp\%)^{\wedge 3}-0.78(Imp\%)^{\wedge 2}+0.774(Imp\%)+0.04$*
[4] Determine 1-hour rainfall depth for a 2-year return period $P_{2yr\text{-}1hr}$ (in): 0.458 *http://hdsc.nws.noaa.gov/hdsc/pfds/sa/sca_pfds.html*		
[5] Compute P_6, Mean 6-hr Precipitation (inches): 0.57 *P_6 = Item 4 *C_1, where C_1 is a function of site climatic region specified in Form 3-1 Item 1 (Desert = 1.2371)*		
[6] Drawdown Rate *Use 48 hours as the default condition. Selection and use of the 24 hour drawdown time condition is subject to approval by the local jurisdiction. The necessary BMP footprint is a function of drawdown time. While shorter drawdown times reduce the performance criteria for LID BMP design capture volume, the depth of water that can be stored is also reduced.*		24-hrs ☐ 48-hrs ☒
[7] Compute design capture volume, DCV (ft^3): 72,923 *DCV = 1/12 * [Item 1* Item 3 *Item 5 * C_2], where C_2 is a function of drawdown rate (24-hr = 1.582; 48-hr = 1.963)* *Compute separate DCV for each outlet from the project site per schematic drawn in Form 3-1 Item 2*		

Form 4.2-2 Summary of Hydromodification Assessment (Entire Site)

Is the change in post- and pre- condition flows captured on-site? : Yes ☒ No ☐

If "Yes", then complete Hydromodification assessment of site hydrology for 10yr storm event using Forms 4.2-3 through 4.2-5 and insert results below *(Forms 4.2-3 through 4.2-5 may be replaced by computer software analysis based on the San Bernardino County Hydrology Manual- Addendum 1)*

If "No," then proceed to Section 4.3 BMP Selection and Sizing

Condition	Runoff Volume (ft^3)	Time of Concentration (min)	Peak Runoff (cfs)
Pre-developed	**1** 281,925 *Form 4.2-3 Item 12*	**2** 30.35 *Form 4.2-4 Item 13*	**3** 47.06 *Form 4.2-5 Item 10*
Post-developed	**4** 694,839 *Form 4.2-3 Item 13*	**5** 13.27 *Form 4.2-4 Item 14*	**6** 146.89 *Form 4.2-5 Item 14*
Difference	**7** *412,914* *Item 4 – Item 1*	**8** *17.08* *Item 2 – Item 5*	**9** *99.83* *Item 6 – Item 3*
Difference (as % of pre-developed)	**10** *146%* *Item 7 / Item 1*	**11** *56%* *Item 8 / Item 2*	**12** *212%* *Item 9 / Item 3*

Civil D is a computer software analysis that that can be utilized to assess HCOC and replace Forms 4.2-3 through 4.2-5. The methodology for the program is based off of the San Bernardino County Hydrology Manual. An HCOC summary is provided on Pg. 4-11 and the calculations can be found in Section 6.5.

HCOC Calculation Summary Table	
	10-Year, 24-Hour Runoff Volume (CF)
Pre-Development Condition	281,925
Post-Development Condition	694,839
HCOC Required Volume *0.95*(Post-Development) – Pre-Development*	378,172
DCV *Form 4.2-1*	165,452
Notes	Since the HCOC Required Volume is greater than the DCV, the HCOC volume will be used for the BMP design

4.3 BMP Selection and Sizing

Complete the following forms for each project site DA to document that the proposed treatment (LID/Bioretention) BMPs conform to the project DCV developed to meet performance criteria specified in the Phase II Small MS4 Permit (WQMP Template Section 4.2). For the LID DCV, the forms are ordered according to hierarchy of BMP selection as required by the Phase II Small MS4 Permit (see Section 5.3 in the TGD for WQMP). The forms compute the following for on-site LID BMP:

- Site Design Measures (Form 4.3-2)
- Retention and Infiltration BMPs (Form 4.3-3) or
- Biotreatment BMPs (Form 4.3-4).

> Please note that the selected BMPs may also be used as dual purpose for on-site, hydromodification mitigation and management.

At the end of each form, additional fields facilitate the determination of the extent of mitigation provided by the specific BMP category, allowing for use of the next category of BMP in the hierarchy, if necessary.

The first step in the analysis, using Section 5.3.2 of the TGD for WQMP, is to complete Forms 4.3-1 and 4.3-3) to determine if retention and infiltration BMPs are infeasible for the project. For each feasibility criterion in Form 4.3-1, if the answer is "Yes," provide all study findings that includes relevant calculations, maps, data sources, etc. used to make the determination of infeasibility.

Next, complete Form 4.3-2 to determine the feasibility of applicable Site Design BMPs, and, if their implementation is feasible, the extent of mitigation of the DCV.

If no site constraints exist that would limit the type of BMP to be implemented in a DA, evaluate the use of combinations of LID BMPs, including all applicable Site Design BMPs to maximize on-site retention of the DCV. If no combination of BMP can mitigate the entire DCV, implement the single BMP type, or combination of BMP types, that maximizes on-site retention of the DCV within the minimum effective area.

If the combination of site design, retention and/or infiltration BMPs is unable to mitigate the entire DCV, then the remainder of the volume-based performance criteria that cannot be achieved with site design, retention and/or infiltration BMPs must be managed through biotreatment BMPs. If biotreatment BMPs are used, then they must be sized to provide equivalent effectiveness based on Template Section 4.3.4.

4.3.1 Exceptions to Requirements for Bioretention Facilities

Contingent on a demonstration that use of bioretention or a facility of equivalent effectiveness is infeasible, other types of biotreatment or media filters (such as tree-box-type biofilters or in-vault media filters) may be used for the following categories of Regulated Projects:

1) Projects creating or replacing an acre or less of impervious area, and located in a designated pedestrian-oriented commercial district (i.e., smart growth projects), and having at least 85% of the entire project site covered by permanent structures;

2) Facilities receiving runoff solely from existing (pre-project) impervious areas; and

3) Historic sites, structures or landscapes that cannot alter their original configuration in order to maintain their historic integrity.

Form 4.3-1 Infiltration BMP Feasibility (DA 1)

Feasibility Criterion – Complete evaluation for each DA on the Project Site

[1] Would infiltration BMP pose significant risk for groundwater related concerns? Yes ☐ No ☒
Refer to Section 5.3.2.1 of the TGD for WQMP

If Yes, Provide basis: (attach)

[2] Would installation of infiltration BMP significantly increase the risk of geotechnical hazards? Yes ☐ No ☒
(Yes, if the answer to any of the following questions is yes, as established by a geotechnical expert):

- The location is less than 50 feet away from slopes steeper than 15 percent
- The location is less than ten feet from building foundations or an alternative setback.
- A study certified by a geotechnical professional or an available watershed study determines that stormwater infiltration would result in significantly increased risks of geotechnical hazards.

If Yes, Provide basis: (attach)

[3] Would infiltration of runoff on a Project site violate downstream water rights? Yes ☐ No ☒

If Yes, Provide basis: (attach)

[4] Is proposed infiltration facility located on hydrologic soil group (HSG) D soils or does the site geotechnical investigation indicate presence of soil characteristics, which support categorization as D soils? Yes ☐ No ☒

If Yes, Provide basis: (attach)

[5] Is the design infiltration rate, after accounting for safety factor of 2.0, below proposed facility less than 0.3 in/hr (accounting for soil amendments)? Yes ☐ No ☒

If Yes, Provide basis: (attach)

[6] Would on-site infiltration or reduction of runoff over pre-developed conditions be partially or fully inconsistent with watershed management strategies as defined in the WAP, or impair beneficial uses? Yes ☐ No ☒
See Section 3.5 of the TGD for WQMP and WAP

If Yes, Provide basis: (attach)

[7] Any answer from Item 1 through Item 3 is "Yes": Yes ☐ No ☒
If yes, infiltration of any volume is not feasible onsite. Proceed to Form 4.3-4, Selection and Evaluation of Biotreatment BMP.
If no, then proceed to Item 8 below.

[8] Any answer from Item 4 through Item 6 is "Yes": Yes ☐ No ☒
If yes, infiltration is permissible but is not required to be considered. Proceed to Form 4.3-2, Site Design BMP.
If no, then proceed to Item 9, below.

[9] All answers to Item 1 through Item 6 are "No":
Infiltration of the full DCV is potentially feasible, LID infiltration BMP must be designed to infiltrate the full DCV to the MEP.
Proceed to Form 4.3-2, Site Design BMPs.

4.3.2 Site Design BMP

Section E.12.e. of the Small Phase II MS4 Permit emphasizes the use of LID preventative measures; and the use of Site Design Measures reduces the portion of the DCV that must be addressed in downstream BMPs. Therefore, all applicable Site Design Measures shall be provided except where they are mutually exclusive with each other, or with other BMPs. Mutual exclusivity may result from overlapping BMP footprints such that either would be potentially feasible by itself, but both could not be implemented. Please note that while there are no numeric standards regarding the use of Site Design BMPs. If a project cannot feasibly meet BMP sizing requirements or cannot fully address hydromodification, feasibility of all applicable Site Design BMPs must be part of demonstrating that the BMP system has been designed to retain the maximum feasible portion of the DCV. Complete Form 4.3-2 to identify and calculate estimated retention volume from implementing site design BMP. Refer to Section 5.4 in the TGD for more detailed guidance.

Form 4.3-2 Site Design BMPs (DA 1)

1 Implementation of Impervious Area Dispersion BMP (i.e. routing runoff from impervious to pervious areas), excluding impervious areas planned for routing to on-lot infiltration BMP: Yes ☐ No ☒ *If yes, complete Items 2-5; If no, proceed to Item 6*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
2 Total impervious area draining to pervious area (ft^2)			
3 Ratio of pervious area receiving runoff to impervious area			
4 Retention volume achieved from impervious area dispersion (ft^3) *V = Item2 * Item 3 * (0.5/12), assuming retention of 0.5 inches of runoff*			
5 Sum of retention volume achieved from impervious area dispersion (ft^3):		$V_{retention}$ *=Sum of Item 4 for all BMPs*	
6 Implementation of Localized On-lot Infiltration BMPs (e.g. on-lot rain gardens): Yes ☐ No ☒ *If yes, complete Items 7-13 for aggregate of all on-lot infiltration BMP in each DA; If no, proceed to Item 14*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
7 Ponding surface area (ft^2)			
8 Ponding depth (ft) (min. 0.5 ft.)			
9 Surface area of amended soil/gravel (ft^2)			
10 Average depth of amended soil/gravel (ft) (min. 1 ft.)			
11 Average porosity of amended soil/gravel			
12 Retention volume achieved from on-lot infiltration (ft^3) $V_{retention}$ *= (Item 7 *Item 8) + (Item 9 * Item 10 * Item 11)*			

13 Runoff volume retention from on-lot infiltration (ft^3):	*$V_{retention}$ =Sum of Item 12 for all BMPs*

Form 4.3-2 cont. Site Design BMPs (DA 1)

14 Implementation of Street Trees: Yes ☐ No ☒ *If yes, complete Items 14-18. If no, proceed to Item 19*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
15 Number of Street Trees			
16 Average canopy cover over impervious area (ft^2)			
17 Runoff volume retention from street trees (ft^3) *$V_{retention}$ = Item 15 * Item 16 * (0.05/12) assume runoff retention of 0.05 inches*			
18 Runoff volume retention from street tree BMPs (ft^3):	*$V_{retention}$ = Sum of Item 17 for all BMPs*		
19 Total Retention Volume from Site Design BMPs:	*Sum of Items 5, 13 and 18*		

4.3.3 Infiltration BMPs

Use Form 4.3-3 to compute on-site retention of runoff from proposed retention and infiltration BMPs. Volume retention estimates are sensitive to the percolation rate used, which determines the amount of runoff that can be infiltrated within the specified drawdown time. The infiltration safety factor reduces field measured percolation to account for potential inaccuracy associated with field measurements, declining BMP performance over time, and compaction during construction. Appendix C of the TGD for WQMP provides guidance on estimating an appropriate safety factor to use in Form 4.3-3.

If site constraints limit the use of BMPs to a single type and implementation of retention and infiltration BMPs mitigate no more than 40% of the DCV, then they are considered infeasible and the Project Proponent may evaluate the effectiveness of BMPs lower in the LID hierarchy of use (Section 5.5 of the TGD for WQMP)

If implementation of infiltrations BMPs is feasible as determined using Form 4.3-1, then LID infiltration BMPs shall be implemented to the MEP (section 4.1 of the TGD for WQMP).

4.3.3.1 Allowed Variations for Special Site Conditions

The bioretention system design parameters of this Section may be adjusted for the following special site conditions:

1) Facilities located within 10 feet of structures or other potential geotechnical hazards established by the geotechnical expert for the project may incorporate an impervious cutoff wall between the bioretention facility and the structure or other geotechnical hazard.

2) Facilities with documented high concentrations of pollutants in underlying soil or groundwater, facilities located where infiltration could contribute to a geotechnical hazard, and facilities located on elevated plazas or other structures may incorporate an impervious liner and may locate the underdrain discharge at the bottom of the subsurface drainage/storage layer (this configuration is commonly known as a “flow-through planter”).

3) Facilities located in areas of high groundwater, highly infiltrative soils or where connection of underdrain to a surface drain or to a subsurface storm drain are infeasible, may omit the underdrain.

4) Facilities serving high-risk areas such as fueling stations, truck stops, auto repairs, and heavy industrial sites may be required to provide adequate pretreatment to address pollutants of concern unless these high-risk areas are isolated from storm water runoff or bioretention areas with no chance of spill migration.

Form 4.3-3 Infiltration LID BMP - including underground BMPs (DA 1)

1 Remaining LID DCV not met by site design BMP (ft^3): 165,452 *V_{unmet} = Form 4.2-1 Item 7 - Form 4.3-2 Item19*

BMP Type *Use columns to the right to compute runoff volume retention from proposed infiltration BMP (select BMP from Table 5-4 in TGD for WQMP) - Use additional forms for more BMPs*	DA A DMA BMP Type Infiltration Basin and Underground CMP	DA B DMA BMP Type Infiltration Basin and Underground CMP	DA DMA BMP Type *(Use additional forms for more BMPs)*
2 Infiltration rate of underlying soils (in/hr) *See Section 5.4.2 and Appendix C of the TGD for WQMP for minimum requirements for assessment methods*	7.8	7.8	
3 Infiltration safety factor *See TGD Section 5.4.2 and Appendix D*	2	2	
4 Design percolation rate (in/hr) *P_{design} = Item 2 / Item 3*	3.9	3.9	
5 Ponded water drawdown time (hr) *Copy Item 6 in Form 4.2-1*	48	48	
6 Maximum ponding depth (ft) *BMP specific, see Table 5-4 of the TGD for WQMP for BMP design details*	12	12	
7 Ponding Depth (ft) *d_{BMP} = Minimum of (1/12*Item 4*Item 5) or Item 6*	12	12	
8 Infiltrating surface area, SA_{BMP} (ft^2) *the lesser of the area needed for infiltration of full DCV or minimum space requirements from Table 5.7 of the TGD for WQMP*	28,233	30,117	
9 Amended soil depth, d_{media} (ft) *Only included in certain BMP types, see Table 5-4 in the TGD for WQMP for reference to BMP design details*	4	4	
10 Amended soil porosity	0.35	0.35	
11 Gravel depth, d_{media} (ft) *Only included in certain BMP types, see Table 5-4 of the TGD for WQMP for BMP design details*	0.5	0.5	
12 Gravel porosity	0.40	0.40	
13 Duration of storm as basin is filling (hrs) *Typical ~ 3hrs*	3	3	
14 Above Ground Retention Volume (ft^3) *$V_{retention}$ = Item 8 * [Item7 + (Item 9 * Item 10) + (Item 11 * Item 12) + (Item 13 * (Item 4 / 12))]*	200,786	124,798	
15 Underground Retention Volume (ft^3) *Volume determined using manufacturer's specifications and calculations*	481,775	408,016	

16 Total Retention Volume from LID Infiltration BMPs: 1,215,376 *(Sum of Items 14 and 15 for all infiltration BMP included in plan)*

17 Fraction of DCV achieved with infiltration BMP: 735% *Retention% = Item 16 / Form 4.2-1 Item 7*

18 Is full LID DCV retained onsite with combination of hydrologic source control and LID retention/infiltration BMPs? Yes ☒ No ☐

If yes, demonstrate conformance using Form 4.3-10; If no, then reduce Item 3, Factor of Safety to 2.0 and increase Item 8, Infiltrating Surface Area, such that the portion of the site area used for retention and infiltration BMPs equals or exceeds the minimum effective area thresholds (Table 5-7 of the TGD for WQMP) for the applicable category of development and repeat all above calculations.

4.3.4 Biotreatment BMP

Biotreatment BMPs may be considered if the full LID DCV cannot be met by maximizing retention and infiltration. A key consideration when using biotreatment BMP is the effectiveness of the proposed BMP in addressing the pollutants of concern for the project (see Table 5-5 of the TGD for WQMP).

Use Form 4.3-4 to summarize the potential for volume based and/or flow based biotreatment options to biotreat the remaining unmet LID DCV. Biotreatment computations are included as follows:

- Use Form 4.3-5 to compute biotreatment in small volume based biotreatment BMP (e.g. bioretention w/underdrains);
- Use Form 4.3-6 to compute biotreatment in large volume based biotreatment BMP (e.g. constructed wetlands);
- Use Form 4.3-7 to compute sizing criteria for flow-based biotreatment BMP (e.g. bioswales)

Form 4.3-4 Selection and Evaluation of Biotreatment BMP (DA 1)

1 Remaining LID DCV not met by site design , or infiltration, BMP for potential biotreatment (ft^3): *Form 4.2-1 Item 7 - Form 4.3-2 Item 19 – Form 4.3-3 Item 16*	List pollutants of concern *Copy from Form 2.3-1.*	
2 Biotreatment BMP Selected *(Select biotreatment BMP(s) necessary to ensure all pollutants of concern are addressed through Unit Operations and Processes, described in Table 5-5 of the TGD for WQMP)*	Volume-based biotreatment *Use Forms 4.3-5 and 4.3-6 to compute treated volume*	Flow-based biotreatment *Use Form 4.3-7 to compute treated flow*
	☐ Bioretention with underdrain ☐ Planter box with underdrain ☐ Constructed wetlands ☐ Wet extended detention ☐ Dry extended detention	☐ Vegetated swale ☐ Vegetated filter strip ☐ Proprietary biotreatment
3 Volume biotreated in volume based biotreatment BMP (ft^3): *Form 4.3-5 Item 15 + Form 4.3-6 Item 13*	**4** Compute remaining LID DCV with implementation of volume based biotreatment BMP (ft^3): *Item 1 – Item 3*	**5** Remaining fraction of LID DCV for sizing flow based biotreatment BMP: % *Item 4 / Item 1*
6 Flow-based biotreatment BMP capacity provided (cfs): *Use Figure 5-2 of the TGD for WQMP to determine flow capacity required to provide biotreatment of remaining percentage of unmet LID DCV (Item 5), for the project's precipitation zone (Form 3-1 Item 1)*		
7 Metrics for MEP determination: • Provided a WQMP with the portion of site area used for suite of LID BMP equal to minimum thresholds in Table 5-7 of the TGD for WQMP for the proposed category of development: ☐ *If maximized on-site retention BMPs is feasible for partial capture, then LID BMP implementation must be optimized to retain and infiltrate the maximum portion of the DCV possible within the prescribed minimum effective area. The remaining portion of the DCV shall then be mitigated using biotreatment BMP.*		

4.3.5 Conformance Summary

Complete Form 4.3-8 to demonstrate how on-site LID DCV is met with proposed site design, infiltration, and/or biotreatment BMP. The bottom line of the form is used to describe the basis for infeasibility determination for on-site LID BMP to achieve full LID DCV, and provides methods for computing remaining volume to be addressed in an alternative compliance plan. If the project has more than one outlet, then complete additional versions of this form for each outlet.

Form 4.3-8 Conformance Summary and Alternative Compliance Volume Estimate (DA 1)

1 Total LID DCV for the Project DA-1 (ft^3): 165,452 *Copy Item 7 in Form 4.2-1*

2 On-site retention with site design BMP (ft^3): 0 *Copy Item18 in Form 4.3-2*

3 On-site retention with LID infiltration BMP (ft^3): 1,215,376 *Copy Item 16 in Form 4.3-3*

4 On-site biotreatment with volume based biotreatment BMP (ft^3): 0 *Copy Item 3 in Form 4.3-4*

5 Flow capacity provided by flow based biotreatment BMP (cfs): 0 *Copy Item 6 in Form 4.3-4*

6 LID BMP performance criteria are achieved if answer to any of the following is "Yes":

- Full retention of LID DCV with site design or infiltration BMP: Yes ☒ No ☐
  If yes, sum of Items 2, 3, and 4 is greater than Item 1
- Combination of on-site retention BMPs for a portion of the LID DCV and volume-based biotreatment BMP that address all pollutants of concern for the remaining LID DCV: Yes ☐ No ☒
  If yes, a) sum of Items 2, 3, 4, and 5 is greater than Item 1, and Items 2, 3 and 4 are maximized; or b) Item 6 is greater than Form 4.3--5 Item 6 and Items 2, 3 and 4 are maximized
- On-site retention and infiltration is determined to be infeasible; therefore biotreatment BMP provides biotreatment for all pollutants of concern for full LID DCV: Yes ☐ No ☒
  If yes, Form 4.3-1 Items 7 and 8 were both checked yes

7 If the LID DCV is not achieved by any of these means, then the project may be allowed to develop an alternative compliance plan. Check box that describes the scenario which caused the need for alternative compliance:

- Combination of Site Design, retention and infiltration, , and biotreatment BMPs provide less than full LID DCV capture: ☐
  Checked yes if Form 4.3-4 Item 7is checked yes, Form 4.3-4 Item 6 is zero, and sum of Items 2, 3, 4, and 5 is less than Item 1. If so, apply water quality credits and calculate volume for alternative compliance, V_{alt} *= (Item 1 – Item 2 – Item 3 – Item 4 – Item 5) * (100 - Form 2.4-1 Item 2)%*

- Facilities, or a combination of facilities, of a different design than in Section E.12.e.(ii)(f) may be permitted if all of the following Phase II Small MS4 General Permit 2013-0001-DWQ 55 February 5, 2013 measures of equivalent effectiveness are demonstrated:
  1) Equal or greater amount of runoff infiltrated or evapotranspired; ☐
  2) Equal or lower pollutant concentrations in runoff that is discharged after biotreatment; ☐
  3) Equal or greater protection against shock loadings and spills; ☐
  4) Equal or greater accessibility and ease of inspection and maintenance. ☐

4.3.6 Hydromodification Control BMP

Use Form 4.3-9 to compute the remaining runoff volume retention, after Site Design BMPs are implemented, needed to address hydromodification, and the increase in time of concentration and decrease in peak runoff necessary to meet targets for protection of waterbodies with a potential hydromodification. Describe the proposed hydromodification treatment control BMP. Section 5.6 of the TGD for WQMP provides additional details on selection and evaluation of hydromodification control BMP.

Form 4.3-9 Hydromodification Control BMPs (DA 1)

1 Volume reduction needed for hydromodification performance criteria (ft^3): 378,172 *(Form 4.2-2 Item 4 * 0.95) – Form 4.2-2 Item 1*	**2** On-site retention with site design and infiltration, BMP (ft^3): 1,215,376 *Sum of Form 4.3-8 Items 2, 3, and 4. Evaluate option to increase implementation of on-site retention in Forms 4.3-2, 4.3-3, and 4.3-4 in excess of LID DCV toward achieving hydromodification volume reduction*
3 Remaining volume for hydromodification volume capture (ft^3): 0 *Item 1 – Item 2*	**4** Volume capture provided by incorporating additional on-site BMPs (ft^3): N/A

5 Is Form 4.2-2 Item 11 less than or equal to 5%: Yes ☐ No ☒

If yes, hydromodification performance criteria is achieved. If no, select one or more mitigation options below:

- Demonstrate increase in time of concentration achieved by proposed LID site design, LID BMP, and additional on-site BMP ☒
- Increase time of concentration by preserving pre-developed flow path and/or increase travel time by reducing slope and increasing cross-sectional area and roughness for proposed on-site conveyance facilities ☐

6 Form 4.2-2 Item 12 less than or equal to 5%: Yes ☐ No ☒

If yes, hydromodification performance criteria is achieved. If no, select one or more mitigation options below:

- Demonstrate reduction in peak runoff achieved by proposed LID site design, LID BMPs, and additional on-site retention BMPs ☒

Since there was no remaining volume necessary for HCOC mitigation, additional on-site BMPs are not necessary for this project. Basin design and analysis has been implemented to show the decrease in the peak runoff and increase in the time of concentration. The table on the following page provides a summary of the volumes, time of concentration, and peak runoff after taking into account the BMPs. See Section 6.5 for calculations and basin analysis for the 10-year storm.

HCOC Calculation Summary Table

	10-Year Time of Concentration (Min)	10-Year Peak Runoff (cfs)	10-Year, 24-Hour Runoff Volume (CF)
Pre-Development Condition	30.35	47.06	281,925
Post-Development Condition without BMPs	13.27	146.89	694,839
Post-Development Condition with BMPs	11 hours, 10 minutes	23.07	394,918 (Retention Volume)
HCOC Requirement *0.95*(Post-Development) – Pre-Development*	15.56 (Additional time that must be provided)	92.49 (Runoff reduction)	378,172 (Required Retention)
Notes	The basin retains the entire water quality volume before releasing runoff offsite. For a 10-year storm event, the water quality volume was calculated to be met at 11 hours, 10 minutes.	To comply with HCOC requirements, the allowable flow rate for a 10-year storm is 146.89-92.49 = 54.40 cfs	To comply with HCOC requirements, 378,172 CF will need to be retained onsite. The proposed BMPs will retain a total of 1,215,376 CF prior to discharging excess runoff.

4.4 Alternative Compliance Plan (if applicable)

Describe an alternative compliance plan (if applicable) for projects not fully able to infiltrate, or biotreat the DCV via on-site LID practices. A project proponent must develop an alternative compliance plan to address the remainder of the LID DCV. Depending on project type some projects may qualify for water quality credits that can be applied to reduce the DCV that must be treated prior to development of an alternative compliance plan (see Form 2.4-1, Water Quality Credits). Form 4.3-9 Item 8 includes instructions on how to apply water quality credits when computing the DCV that must be met through alternative compliance.

Alternative Designs — Facilities, or a combination of facilities, of a different design than in Permit Section E.12.e.(ii)(f) may be permitted if all of the following measures of equivalent effectiveness are demonstrated:

1) Equal or greater amount of runoff infiltrated or evapotranspired;

2) Equal or lower pollutant concentrations in runoff that is discharged after biotreatment;

3) Equal or greater protection against shock loadings and spills;

4) Equal or greater accessibility and ease of inspection and maintenance.

The Project Proponent will need to obtain written approval for an alternative design from the Lahontan Regional Water Board Executive Officer (see Section 6 of the TGD for WQMP).

Section 5 Inspection and Maintenance Responsibility for Post Construction BMP

All BMPs included as part of the project WQMP are required to be maintained through regular scheduled inspection and maintenance (refer to Section 8, Post Construction BMP Requirements, in the TGD for WQMP). Fully complete Form 5-1 summarizing all BMP included in the WQMP. Attach additional forms as needed. The WQMP shall also include a detailed Operation and Maintenance Plan for all BMP and a Maintenance Agreement. The Maintenance Agreement must also be attached to the WQMP.

Note that at time of Project construction completion, the Maintenance Agreement must be completed, signed, notarized and submitted to the County Stormwater Department

Form 5-1 BMP Inspection and Maintenance (use additional forms as necessary)

BMP	Reponsible Party(s)	Inspection/ Maintenance Activities Required	Minimum Frequency of Activities
Onsite storm drain catch basins and piping	Property Owner	Onsite catch basins shall be inspected quarterly for debris buildup and evidence of illegal dumping and shall be cleaned whenever debris/sediment accumulates. Removal can be accomplished by vac-truck or other equally effective method.	Quarterly
Hydrodynamic Separator	Property Owner	Visual inspection and debris removed quarterly per manufactures recommendations	Quarterly
Above ground infiltration/detention basins	Property Owner	Inspections and maintenance by owners contracted maintenance staff to ensure that water infiltrates into the subsurface completely in 48 hours or less. Visual inspection, landscape maintenance, debris removal and erosion damage repair.	Monthly and within 48 hours following a significant storm event to verify there is no standing water.
Underground Infiltration System	Property Owner	Regular inspections of system to observe sediment build up and infiltration capacity. Cleaning of accumulated trash, debris, and sediment as determined by inspections. Cleaning is recommended during dry weather. See manufacturer recommendations for additional maintenance activities.	Monthly and within 48 hours following a significant storm event to verify there is no standing water in the chambers.

Landscape Maintenance	Property Owner	Maintain landscape area vegetation, slope protection and grades, adjacent to hardscape and prevent discharges of landscape maintenance waste into storm drains.	Weekly
Litter Control	Property Owner	Maintain roofed waste collection areas and vacuum-sweep drive aisles and parking areas to remove potential stormwater contamination before anticipated storm events.	Weekly/Monthly
Anti-Dumping Stenciling & Signage	Property Owner	Visual inspection and replacement of damaged or illegible stenciling and signage over on-site catch basins	Annually
Irrigation System	Property Owner	Check and repair the irrigation system. Verify there are no leaks or runoff from landscaped areas. Adjust irrigation heads and system run times as necessary to percent overwater of vegetation, overspray or run-off from landscape areas and to ensure the health and aesthetic quality of the landscape.	Weekly
Loading Docks	Property Owner	Sweep and clear debris from dock areas to remove potential stormwater contaminates prior to anticipated storms.	Weekly
Catch Basin Filter Inserts	Property Owner	Visual inspect filter for debris buildup. Removal can be accomplished by vac-truck or other equally effective method. See manufacturer recommendations for additional maintenance activities.	Quarterly and within 48 hours following a significant storm event

Section 6 WQMP Attachments

6.1. Site Plan and Drainage Plan

Include a site plan and drainage plan sheet set containing the following minimum information:

- Project location
- Site boundary
- Land uses and land covers, as applicable
- Suitability/feasibility constraints
- Structural Source Control BMP locations
- Site Design Hydrologic Source Control BMP locations
- LID BMP details
- Drainage delineations and flow information
- Drainage connections

6.2 Electronic Data Submittal

Minimum requirements include submittal of PDF exhibits in addition to hard copies. Format must not require specialized software to open. If the local jurisdiction requires specialized electronic document formats (as described in their Local Implementation Plan), this section will describe the contents (e.g., layering, nomenclature, geo-referencing, etc.) of these documents so that they may be interpreted efficiently and accurately.

6.3 Post Construction

Attach all O&M Plans and Maintenance Agreements for BMP to the WQMP.

6.4 Other Supporting Documentation

- BMP Educational Materials
- Activity Restriction – C,C&R's & Lease Agreements

SECTION 6.1: ATTACHMENT A

Project Site Boundary
Pre-Development Condition PWQMP Exhibit
Post-Development Condition PWQMP Exhibit

CITY OF HESPERIA
PWQMP EXHIBIT
FOR
I-15 INDUSTRIAL PARK BUILDING 1

VICINITY MAP
NOT TO SCALE

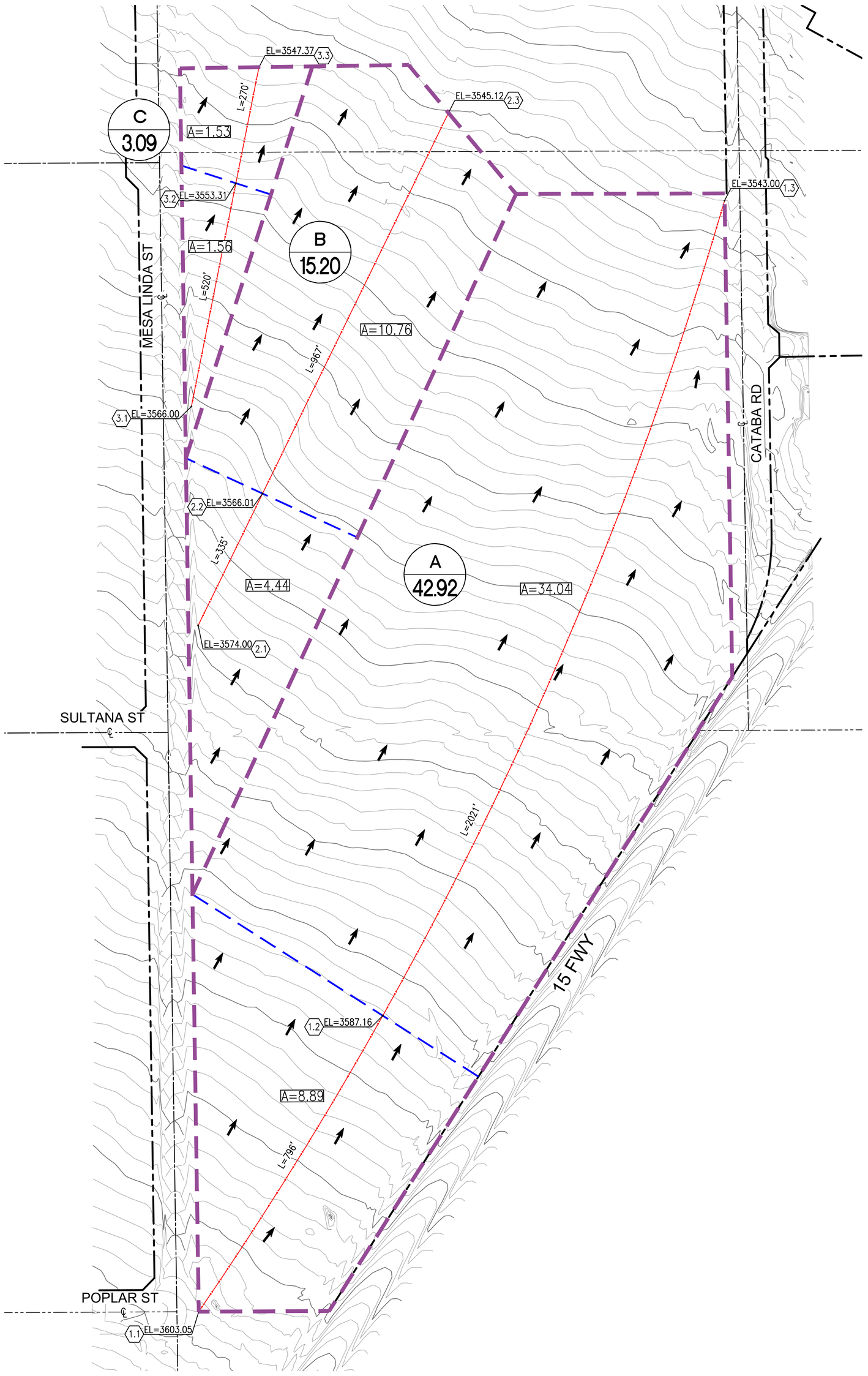
HYDROLOGY INFORMATION

SITE AREA:	61.21 ACRE	
SOIL GROUP:	A	(NRCS WEB SOIL SURVEY)
IMPERVIOUS:	0%	
ISOHYETALS:	1.31"	(100-YEAR 1 HOUR)
	0.785"	(10-YEAR 1 HOUR)
CN NUMBER:	67	(SOIL GROUP A)
FREQUENCY:	100 YEAR	
	10 YEAR	

METHOD: SAN BERNARDINO COUNTY HYDROLOGY MANUAL

LEGEND:

- SUB DRAINAGE AREA BOUNDARY
- DRAINAGE AREA BOUNDARY
- FLOW PATH
- PROPOSED FLOW DIRECTION ARROW
- X / XXX — DRAINAGE AREA DESIGNATION / AREA (AC)



HYDROLOGY SUMMARY					
DRAINAGE AREA No.	TRIBUTARY AREA (AC)	IMPERVIOUS RATIO	10-YEAR VOLUME (CF)	100-YEAR VOLUME (CF)	25-YEAR PEAK FLOW (CFS)
A	42.92	0.00	197,418	725,370	41.18
B	15.20	0.00	70,197	258,420	23.78
C	3.09	0.00	14,309	52,568	5.30
TOTAL	61.21	0.00	281,924	1,036,358	70.26

150' 0' 75' 150'
SCALE: 1" = 150'

PREPARED BY:
WestLAND Group, Inc. Land Surveyors • Civil Engineers • GIS
4150 CONCOURS, ONTARIO, CA 91764
PHONE: (909) 989-9789 FAX: (909) 989-9660

JOB NO: 2020-326

I-15 INDUSTRIAL PARK BUILDING 1
PRE-DEVELOPED PWQMP EXHIBIT
CITY OF HESPERIA

DATE: MAR 2021
SHEET 1 OF 1

PLOTDATE: 2020-326 HESPERIA COMMERCE CENTER V -- CONVOY GROUP, INC. -- MARK S. MLAKOVICH,GIS ENGINEERING\LDI\REPORTS\WQMP\1_EXHIBITS\2020-326_PRE HYDROLOGY.DWG (03-10-21 5:01:54PM)
Plotted by: markm

03/10/2021

CITY OF HESPERIA
PWQMP EXHIBIT
FOR
I-15 INDUSTRIAL PARK BUILDING 1

VICINITY MAP
NOT TO SCALE

HYDROLOGY INFORMATION

SITE AREA:	61.21 ACRE	
SOIL GROUP:	A	(NRCS WEB SOIL SURVEY)
IMPERVIOUS:	0%	
ISOHYETALS:	1.31"	(100-YEAR 1 HOUR)
	0.785"	(10-YEAR 1 HOUR)
CN NUMBER:	67	(SOIL GROUP A)
FREQUENCY:	100 YEAR	
	10 YEAR	

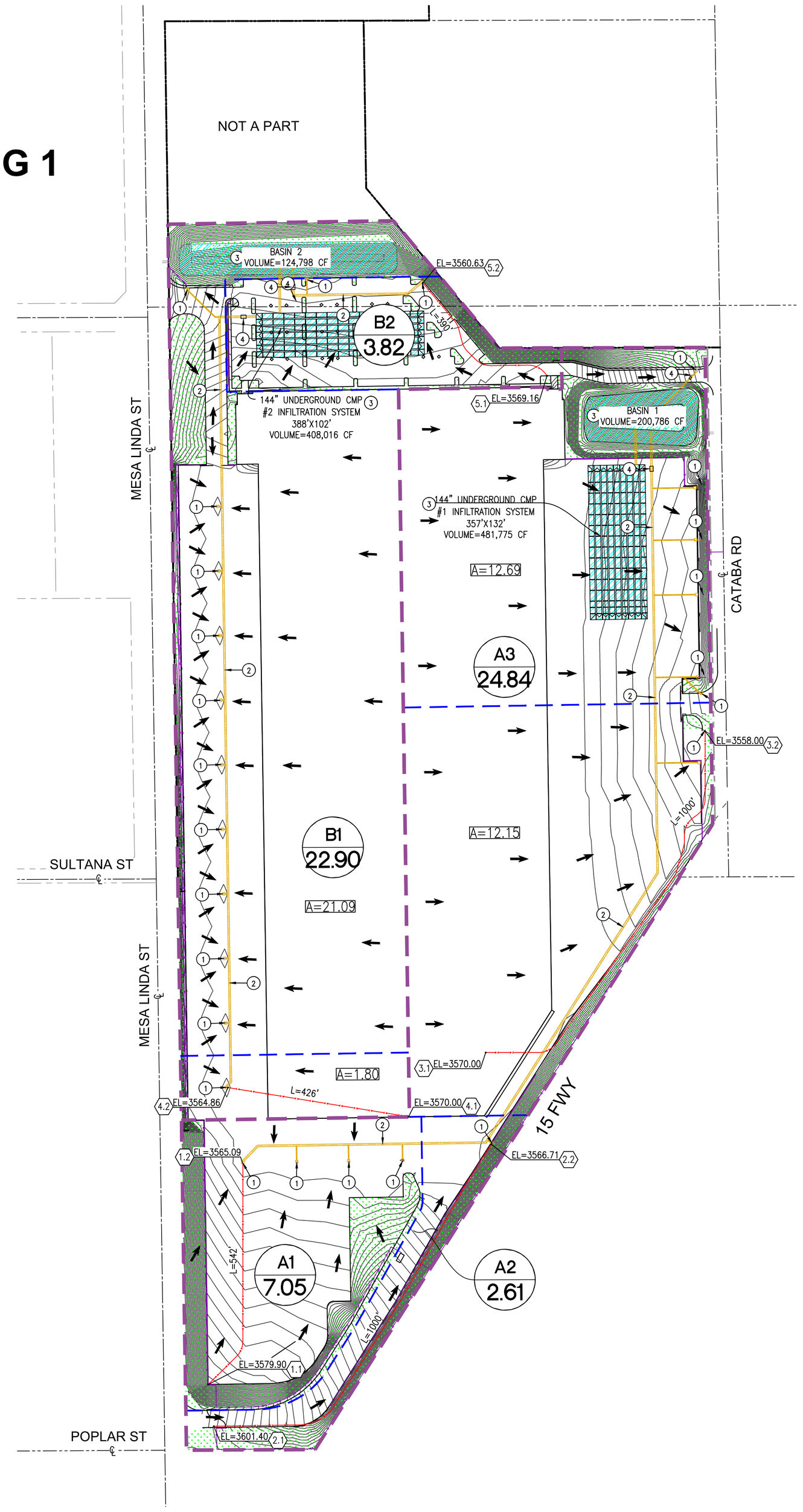
METHOD: SAN BERNARDINO COUNTY HYDROLOGY MANUAL

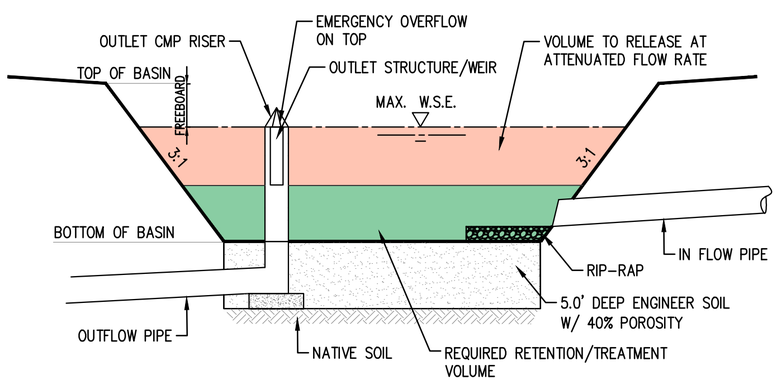
LEGEND:

- DETENTION BASIN
- SUB DRAINAGE AREA BOUNDARY
- DRAINAGE AREA BOUNDARY
- FLOW PATH
- STORM DRAIN
- PROPOSED FLOW DIRECTION ARROW
- X / X.XX — DRAINAGE AREA DESIGNATION / AREA (AC)

DRAINAGE NOTES:

1. PROPOSED CATCH BASIN WITH FILTER INSERT
2. PROPOSED STORM DRAIN PIPE PRIVATE MAINTAINED
3. PROPOSED BMP – ABOVE GROUND/UNDERGROUND DETENTION BASIN
4. PROPOSED BMP – BAFFLE BOX





INFILTRATION/DETENTION BASIN DETAIL
N.T.S

HYDROLOGY SUMMARY

DRAINAGE AREA No.	TRIBUTARY AREA (AC)	IMPERVIOUS RATIO	RUNOFF COEFFICIENT	DCV (CF)	HYDROMODIFICATION VOLUME TO RETAIN (CF)	100-YEAR VOLUME (CF)	TOTAL RETENTION VOLUME (CF)
A	34.50	0.85	0.66	–	378,172	681,862	200,786 (BASIN 1) 481,775 (UNDERGROUND CMP #1)
B	26.71	0.86	0.68	–		532,255	124,798 (BASIN 2) 408,016 (UNDERGROUND CMP #2)
TOTAL	61.21	0.86	0.67	165,452		1,214,117	1,215,376

150' 0' 75' 150'
SCALE: 1" = 150'

PREPARED BY:
WestLAND Group, Inc. Land Surveyors • Civil Engineers • GIS
4150 CONCOURS, ONTARIO, CA 91764
PHONE: (909) 989-9789 FAX: (909) 989-9660
JOB NO: 2020-326

I-15 INDUSTRIAL PARK BUILDING 1 PWQMP EXHIBIT
PARCEL 1 – PARCEL MAP NO. 20315
CITY OF HESPERIA

DATE: MAR 2022
SHEET 1 OF 1

P:\YDR_2020\2020-326 HESPERIA COMMERCE CENTER V - COVINGTON GROUP, INC. - MARK S. MILKOVICH\06 ENGINEERING\LD\REPORTS\WQMP\1_EXHIBITS\2020-326_WQMP.DWG (03-10-22 @11:22PM)
03/10/2022

SECTION 6.1: ATTACHMENT B

BMP & LID Device Detail

SECTION 6.1: ATTACHMENT B.1

Underground CMP Detention System

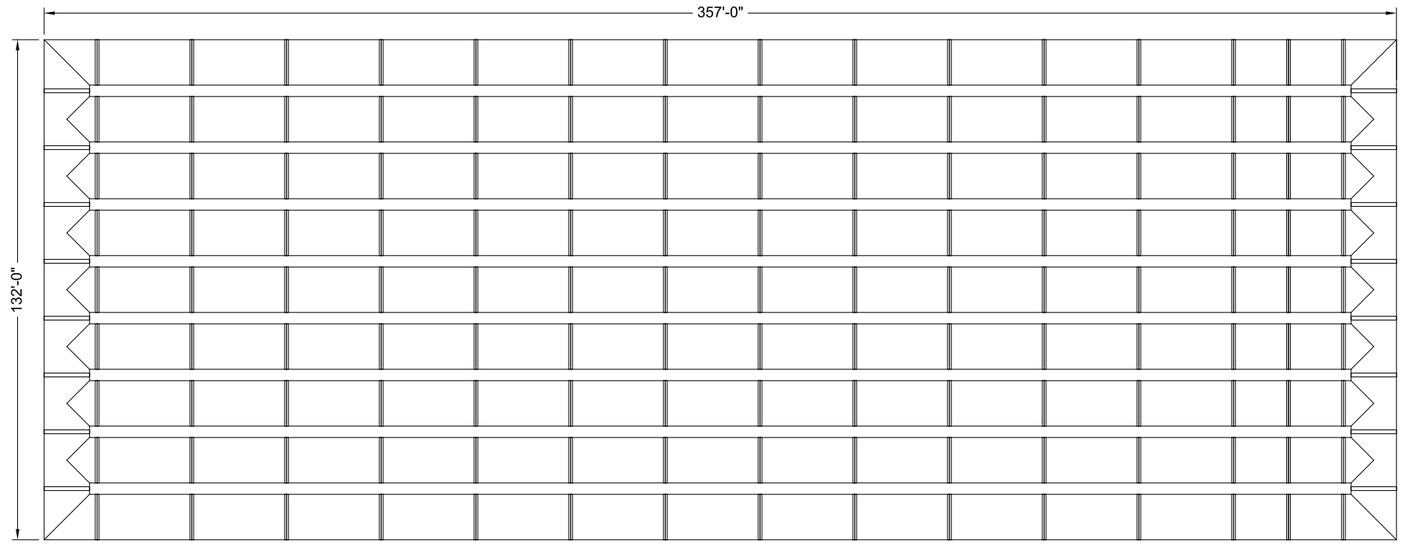
PROJECT SUMMARY

CALCULATION DETAILS
- LOADING = HS20 & HS25
- APPROX. LINEAR FOOTAGE = 3,261 lf.

STORAGE SUMMARY
- STORAGE VOLUME REQUIRED = 481,076 cf.
- PIPE STORAGE VOLUME = 368,810 cf.
- BACKFILL STORAGE VOLUME = 112,964 cf.
- TOTAL STORAGE PROVIDED = 481,775 cf.

PIPE DETAILS
- DIAMETER = 144 IN.
- CORRUGATION = 5x1
- GAGE = 14
- COATING = ALT2
- WALL TYPE = Perforated
- BARRELL SPACING = 36 IN.

BACKFILL DETAILS
- WIDTH AT ENDS = 36 IN.
- ABOVE PIPE = 6 IN.
- WIDTH AT SIDES = 36 IN.
- BELOW PIPE = 6 IN.



NOTES

- ALL RISER AND STUB DIMENSIONS ARE TO CENTERLINE. ALL ELEVATIONS, DIMENSIONS, AND LOCATIONS OF RISERS AND INLETS, SHALL BE VERIFIED BY THE ENGINEER OF RECORD PRIOR TO RELEASING FOR FABRICATION.
- ALL FITTINGS AND REINFORCEMENT COMPLY WITH ASTM A998.
- ALL RISERS AND STUBS ARE $2\frac{2}{3}$" x $\frac{1}{2}$" CORRUGATION AND 16 GAGE UNLESS OTHERWISE NOTED.
- RISERS TO BE FIELD TRIMMED TO GRADE.
- QUANTITY OF PIPE SHOWN DOES NOT PROVIDE EXTRA PIPE FOR CONNECTING THE SYSTEM TO EXISTING PIPE OR DRAINAGE STRUCTURES. OUR SYSTEM AS DETAILED PROVIDES NOMINAL INLET AND/OR OUTLET PIPE STUB FOR CONNECTION TO EXISTING DRAINAGE FACILITIES. IF ADDITIONAL PIPE IS NEEDED IT IS THE RESPONSIBILITY OF THE CONTRACTOR.
- BAND TYPE TO BE DETERMINED UPON FINAL DESIGN.
- THE PROJECT SUMMARY IS REFLECTIVE OF THE DYODS DESIGN, QUANTITIES ARE APPROX. AND SHOULD BE VERIFIED UPON FINAL DESIGN AND APPROVAL. FOR EXAMPLE, TOTAL EXCAVATION DOES NOT CONSIDER ALL VARIABLES SUCH AS SHORING AND ONLY ACCOUNTS FOR MATERIAL WITHIN THE ESTIMATED EXCAVATION FOOTPRINT.
- THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.

ASSEMBLY
SCALE: 1" = 40'

C:\EXPORTS\TEMPLATES\CMP_V5.DWG 10/18/2019 10:02 AM

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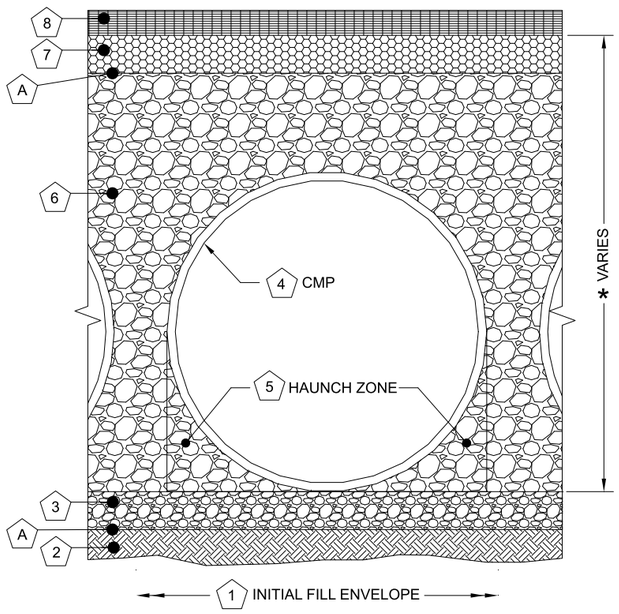
DATE	REVISION DESCRIPTION	BY

CONTECH® ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CONTECH® CMP DETENTION SYSTEMS
CONTECH **DYODS** DRAWING

DYO13634 2020-326 HCC V
2020-326 HCC V 144" CMP #1
Hesperia, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
2860	13634	2/21/2022
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: D1		



Infiltration Systems - CMP Infiltration & CMP Perforated Drainage Pipe			
Material Location	Description	Material Designation	Designation
8 Rigid or Flexible Pavement (if applicable)			
7 Road Base (if applicable			
A Geotextile Layer	Non-Woven Geotextile	CONTECH C-40 or C-45	Engineer Decision for consideration to prevent soil migration into varying soil types. Wrap the trench only.
6 Backfill	Infiltration pipe systems have a pipe perforation sized of 3/8" diameter. An open graded, free draining stone, with a particle size of ½" – 2 ½" diameter is recommended.	AASHTO M 145-A-1 or AASHTO M 43 - 3, 4	Material shall be worked into the pipe haunches by means of shovel-slicing, rodding, air-tamper, vibratory rod, or other effective methods. Compaction of all placed fill material is necessary and shall be considered adequate when no further yielding of the material is observed under the compactor, or under foot, and the Project Engineer or his representative is satisfied with the level of compaction"
3 Bedding Stone	Well graded granular bedding material w/maximum particle size of 3"	AASHTO M43 - 3,357,4,467, 5, 56, 57	For soil aggregates larger than 3/8" a dedicated bedding layer is not required for CMP. Pipe may be placed on the trench bottom comprised of native suitable well graded & granular material. For Arch pipes it is recommended to be shaped to a relatively flat bottom or fine-grade the foundation to a slight v-shape. Soil aggregates less than 3/8" and unsuitable material should be over-excavated and re-placed with a 4"-6" layer of well graded & granular stone per the material designation.
A Geotextile Layer	None	None	Contech does not recommend geotextiles be placed under the invert of Infiltration systems due to the propensity for geotextiles to clog over time.
* Note: The listed AASHTO designations are for gradation only. The stone must also be angular and clean.			

1 MINIMUM WIDTH DEPENDS ON SITE CONDITIONS AND ENGINEERING JUDGEMENT.

FOUNDATION/BEDDING PREPARATION

2 PRIOR TO PLACING THE BEDDING, THE FOUNDATION MUST BE CONSTRUCTED TO A UNIFORM AND STABLE GRADE. IN THE EVENT THAT UNSUITABLE FOUNDATION MATERIALS ARE ENCOUNTERED DURING EXCAVATION, THEY SHALL BE REMOVED AND BROUGHT BACK TO THE GRADE WITH A FILL MATERIAL AS APPROVED BY THE ENGINEER.

5 HAUNCH ZONE MATERIAL SHALL BE PLACED AND UNIFORMLY COMPACTED WITHOUT SOFT SPOTS.

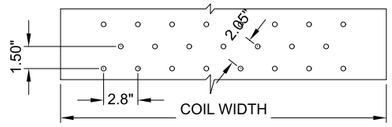
BACKFILL

MATERIAL SHALL BE PLACED IN 8"-10" MAXIMUM LIFTS. INADEQUATE COMPACTION CAN LEAD TO EXCESSIVE DEFLECTIONS WITHIN THE SYSTEM AND SETTLEMENT OF THE SOILS OVER THE SYSTEM. BACKFILL SHALL BE PLACED SUCH THAT THERE IS NO MORE THAN A TWO-LIFT DIFFERENTIAL BETWEEN THE SIDES OF ANY PIPE IN THE SYSTEM AT ALL TIMES DURING THE BACKFILL PROCESS. BACKFILL SHALL BE ADVANCED ALONG THE LENGTH OF THE SYSTEM AT THE SAME RATE TO AVOID DIFFERENTIAL LOADING ON ANY PIPES IN THE SYSTEM.

EQUIPMENT USED TO PLACE AND COMPACT THE BACKFILL SHALL BE OF A SIZE AND TYPE SO AS NOT TO DISTORT, DAMAGE, OR DISPLACE THE PIPE. ATTENTION MUST BE GIVEN TO PROVIDING ADEQUATE MINIMUM COVER FOR SUCH EQUIPMENT. MAINTAIN BALANCED LOADING ON ALL PIPES IN THE SYSTEM DURING ALL SUCH OPERATIONS.

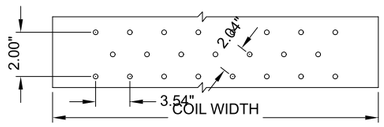
OTHER ALTERNATE BACKFILL MATERIAL MAY BE ALLOWED DEPENDING ON SITE SPECIFIC CONDITIONS. REFER TO TYPICAL BACKFILL DETAIL FOR MATERIAL REQUIRED.

2 2/3" x 1/2" CORRUGATION - STEEL AND ALUMINUM CMP EDGE SPACING EQUAL ON BOTH SIDES



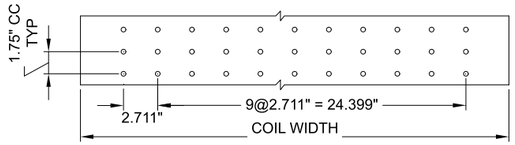
OPEN AREA = 3.76 SQ IN/SQ FT

3" x 1" CORRUGATION - STEEL AND ALUMINUM CMP (COIL PROVIDED FROM CONTECH LANTANA, FL PLANT)



OPEN AREA = 4.16 SQ IN/SQ FT

5" x 1" CORRUGATION - STEEL ONLY
EDGE SPACING EQUAL ON BOTH SIDES



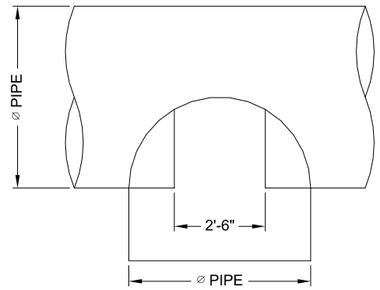
OPEN AREA = 3.33 SQ IN/SQ FT

NOTES:

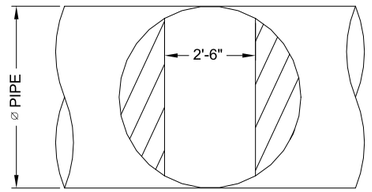
1. PERFORATIONS MEET AASHTO AND ASTM SPECIFICATIONS.
2. PERFORATION OPEN AREA PER SQUARE FOOT OF PIPE IS BASED ON THE NOMINAL DIAMETER AND LENGTH OF PIPE.
3. ALL DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES.
4. ALL HOLES ⌀3/8".

TYPICAL PERFORATION DETAIL

SCALE: N.T.S.



PLAN

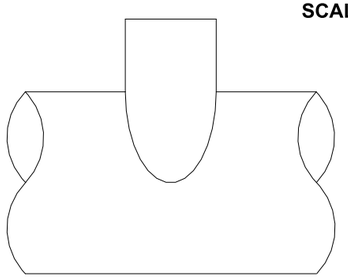


FRONT

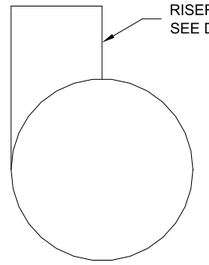
TYPICAL MANWAY DETAIL

SCALE: N.T.S.

NOTE:
MANWAY DETAIL APPLICABLE FOR CMP SYSTEMS WITH DIAMETERS 48" AND LARGER. MANWAYS MAY BE REQUIRED ON SMALLER SYSTEMS DEPENDING ON ACTUAL SITE SPECIFIC CONDITIONS.



ELEVATION

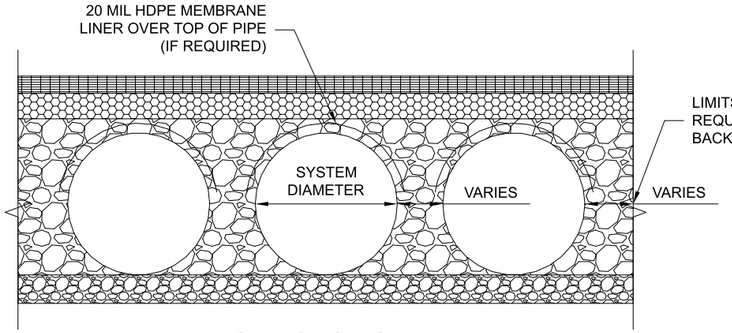


END

NOTE:
LADDERS ARE OPTIONAL AND ARE NOT REQUIRED FOR ALL SYSTEMS.

TYPICAL RISER DETAIL

SCALE: N.T.S.



TYPICAL SECTION VIEW

LINER OVER ROWS
SCALE: N.T.S.

NOTE: IF SALTING AGENTS FOR SNOW AND ICE REMOVAL ARE USED ON OR NEAR THE PROJECT, AN HDPE MEMBRANE LINER IS RECOMMENDED WITH THE SYSTEM. THE IMPERMEABLE LINER IS INTENDED TO HELP PROTECT THE SYSTEM FROM THE POTENTIAL ADVERSE EFFECTS THAT MAY RESULT FROM A CHANGE IN THE SURROUNDING ENVIRONMENT OVER A PERIOD OF TIME. PLEASE REFER TO THE CORRUGATED METAL PIPE DETENTION DESIGN GUIDE FOR ADDITIONAL INFORMATION.

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CONTECH CMP DETENTION SYSTEMS
CONTECH DYODS DRAWING

DYO13634 2020-326 HCC V
2020-326 HCC V 144" CMP #1
Hesperia, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
2860	13634	2/21/2022
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: D2		

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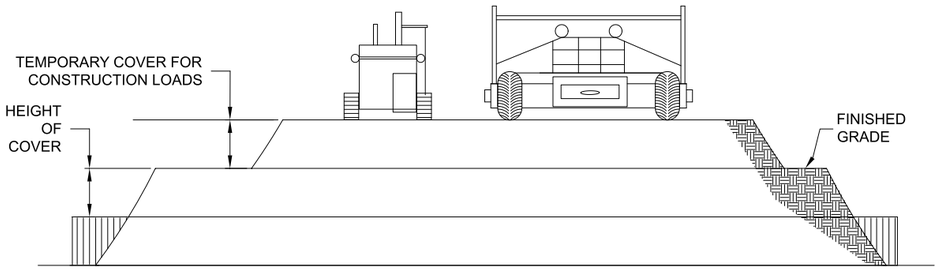


CONSTRUCTION LOADS

FOR TEMPORARY CONSTRUCTION VEHICLE LOADS, AN EXTRA AMOUNT OF COMPACTED COVER MAY BE REQUIRED OVER THE TOP OF THE PIPE. THE HEIGHT-OF-COVER SHALL MEET THE MINIMUM REQUIREMENTS SHOWN IN THE TABLE BELOW. THE USE OF HEAVY CONSTRUCTION EQUIPMENT NECESSITATES GREATER PROTECTION FOR THE PIPE THAN FINISHED GRADE COVER MINIMUMS FOR NORMAL HIGHWAY TRAFFIC.

PIPE SPAN, INCHES	AXLE LOADS (kips)			
	18-50	50-75	75-110	110-150
	MINIMUM COVER (FT)			
12-42	2.0	2.5	3.0	3.0
48-72	3.0	3.0	3.5	4.0
78-120	3.0	3.5	4.0	4.0
126-144	3.5	4.0	4.5	4.5

*MINIMUM COVER MAY VARY, DEPENDING ON LOCAL CONDITIONS. THE CONTRACTOR MUST PROVIDE THE ADDITIONAL COVER REQUIRED TO AVOID DAMAGE TO THE PIPE. MINIMUM COVER IS MEASURED FROM THE TOP OF THE PIPE TO THE TOP OF THE MAINTAINED CONSTRUCTION ROADWAY SURFACE.

CONSTRUCTION LOADING DIAGRAM

SCALE: N.T.S.

SPECIFICATION FOR DESIGNED DETENTION SYSTEM:

SCOPE
THIS SPECIFICATION COVERS THE MANUFACTURE AND INSTALLATION OF THE DESIGNED DETENTION SYSTEM DETAILED IN THE PROJECT PLANS.

MATERIAL
THE MATERIAL SHALL CONFORM TO THE APPLICABLE REQUIREMENTS LISTED BELOW:

ALUMINIZED TYPE 2 STEEL COILS SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF AASHTO M-274 OR ASTM A-92.

THE GALVANIZED STEEL COILS SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF AASHTO M-218 OR ASTM A-929.

THE POLYMER COATED STEEL COILS SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF AASHTO M-246 OR ASTM A-742.

THE ALUMINUM COILS SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF AASHTO M-197 OR ASTM B-744.

CONSTRUCTION LOADS
CONSTRUCTION LOADS MAY BE HIGHER THAN FINAL LOADS. FOLLOW THE MANUFACTURER'S OR NCSPA GUIDELINES.

PIPE
THE PIPE SHALL BE MANUFACTURED IN ACCORDANCE TO THE APPLICABLE REQUIREMENTS LISTED BELOW:

ALUMINIZED TYPE 2: AASHTO M-36 OR ASTM A-760

GALVANIZED: AASHTO M-36 OR ASTM A-760

POLYMER COATED: AASHTO M-245 OR ASTM A-762

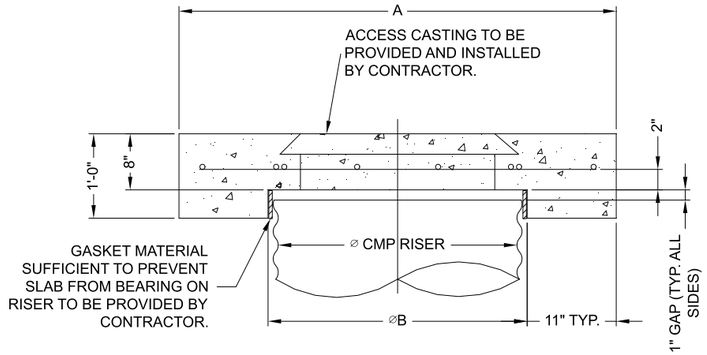
ALUMINUM: AASHTO M-196 OR ASTM B-745

HANDLING AND ASSEMBLY
SHALL BE IN ACCORDANCE WITH NCSP'S (NATIONAL CORRUGATED STEEL PIPE ASSOCIATION) FOR ALUMINIZED TYPE 2, GALVANIZED OR POLYMER COATED STEEL. SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS FOR ALUMINUM PIPE.

INSTALLATION
SHALL BE IN ACCORDANCE WITH AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, SECTION 26, DIVISION II DIVISION II OR ASTM A-798 (FOR ALUMINIZED TYPE 2, GALVANIZED OR POLYMER COATED STEEL) OR ASTM B-788 (FOR ALUMINUM PIPE) AND IN CONFORMANCE WITH THE PROJECT PLANS AND SPECIFICATIONS. IF THERE ARE ANY INCONSISTENCIES OR CONFLICTS THE CONTRACTOR SHOULD DISCUSS AND RESOLVE WITH THE SITE ENGINEER.

IT IS ALWAYS THE RESPONSIBILITY OF THE CONTRACTOR TO FOLLOW OSHA GUIDELINES FOR SAFE PRACTICES.

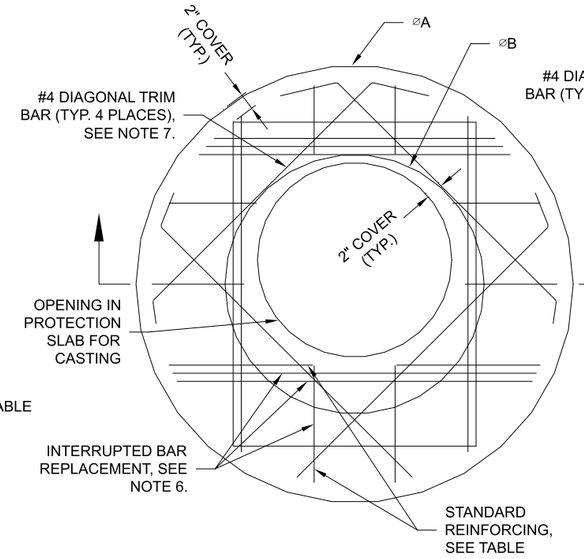
NOTE:
THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.



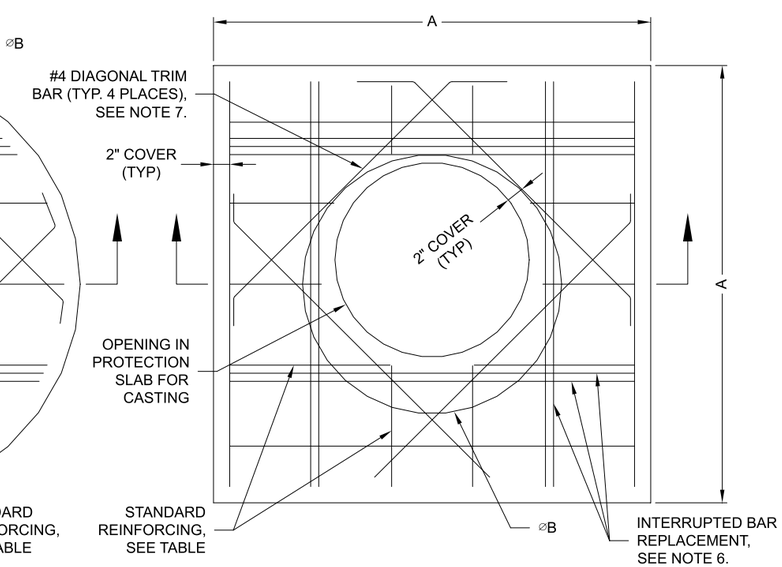
SECTION VIEW

REINFORCING TABLE				
⌀ CMP RISER	A	⌀ B	REINFORCING	**BEARING PRESSURE (PSF)
24"	⌀ 4' 4'X4'	26"	#5 @ 12" OCEW #5 @ 12" OCEW	2,410 1,780
30"	⌀ 4'-6" 4'-6" X 4'-6"	32"	#5 @ 12" OCEW #5 @ 12" OCEW	2,120 1,530
36"	⌀ 5' 5' X 5'	38"	#5 @ 10" OCEW #5 @ 10" OCEW	1,890 1,350
42"	⌀ 5'-6" 5'-6" X 5'-6"	44"	#5 @ 10" OCEW #5 @ 9" OCEW	1,720 1,210
48"	⌀ 6' 6' X 6'	50"	#5 @ 9" OCEW #5 @ 8" OCEW	1,600 1,100

** ASSUMED SOIL BEARING CAPACITY



ROUND OPTION PLAN VIEW



SQUARE OPTION PLAN VIEW

NOTES:

1. DESIGN IN ACCORDANCE WITH AASHTO, 17th EDITION.
2. DESIGN LOAD HS25.
3. EARTH COVER = 1' MAX.
4. CONCRETE STRENGTH = 3,500 psi
5. REINFORCING STEEL = ASTM A615, GRADE 60.
6. PROVIDE ADDITIONAL REINFORCING AROUND OPENINGS EQUAL TO THE BARS INTERRUPTED, HALF EACH SIDE. ADDITIONAL BARS TO BE IN THE SAME PLANE.
7. TRIM OPENING WITH DIAGONAL #4 BARS, EXTEND BARS A MINIMUM OF 12" BEYOND OPENING, BEND BARS AS REQUIRED TO MAINTAIN BAR COVER.
8. PROTECTION SLAB AND ALL MATERIALS TO BE PROVIDED AND INSTALLED BY CONTRACTOR.
9. DETAIL DESIGN BY DELTA ENGINEERING, BINGHAMTON, NY.

MANHOLE CAP DETAIL

SCALE: N.T.S.

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CONTECH CMP DETENTION SYSTEMS
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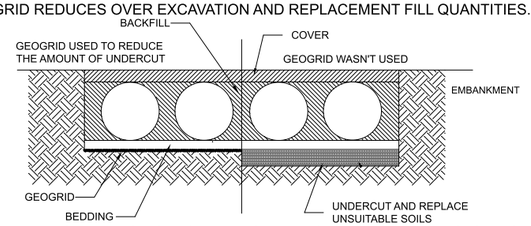
CMP DETENTION INSTALLATION GUIDE

PROPER INSTALLATION OF A FLEXIBLE UNDERGROUND DETENTION SYSTEM WILL ENSURE LONG-TERM PERFORMANCE. THE CONFIGURATION OF THESE SYSTEMS OFTEN REQUIRES SPECIAL CONSTRUCTION PRACTICES THAT DIFFER FROM CONVENTIONAL FLEXIBLE PIPE CONSTRUCTION. CONTECH ENGINEERED SOLUTIONS STRONGLY SUGGESTS SCHEDULING A PRE-CONSTRUCTION MEETING WITH YOUR LOCAL SALES ENGINEER TO DETERMINE IF ADDITIONAL MEASURES, NOT COVERED IN THIS GUIDE, ARE APPROPRIATE FOR YOUR SITE.

FOUNDATION

CONSTRUCT A FOUNDATION THAT CAN SUPPORT THE DESIGN LOADING APPLIED BY THE PIPE AND ADJACENT BACKFILL WEIGHT AS WELL AS MAINTAIN ITS INTEGRITY DURING CONSTRUCTION.

IF SOFT OR UNSUITABLE SOILS ARE ENCOUNTERED, REMOVE THE POOR SOILS DOWN TO A SUITABLE DEPTH AND THEN BUILD UP TO THE APPROPRIATE ELEVATION WITH A COMPETENT BACKFILL MATERIAL. THE STRUCTURAL FILL MATERIAL GRADATION SHOULD NOT ALLOW THE MIGRATION OF FINES, WHICH CAN CAUSE SETTLEMENT OF THE DETENTION SYSTEM OR PAVEMENT ABOVE. IF THE STRUCTURAL FILL MATERIAL IS NOT COMPATIBLE WITH THE UNDERLYING SOILS AN ENGINEERING FABRIC SHOULD BE USED AS A SEPARATOR. IN SOME CASES, USING A STIFF REINFORCING GEOGRID REDUCES OVER EXCAVATION AND REPLACEMENT FILL QUANTITIES.

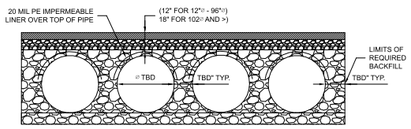


GRADE THE FOUNDATION SUBGRADE TO A UNIFORM OR SLIGHTLY SLOPING GRADE. IF THE SUBGRADE IS CLAY OR RELATIVELY NON-POROUS AND THE CONSTRUCTION SEQUENCE WILL LAST FOR AN EXTENDED PERIOD OF TIME, IT IS BEST TO SLOPE THE GRADE TO ONE END OF THE SYSTEM. THIS WILL ALLOW EXCESS WATER TO DRAIN QUICKLY, PREVENTING SATURATION OF THE SUBGRADE.

GEOMEMBRANE BARRIER

A SITE'S RESISTIVITY MAY CHANGE OVER TIME WHEN VARIOUS TYPES OF SALTING AGENTS ARE USED, SUCH AS ROAD SALTS FOR DEICING AGENTS. IF SALTING AGENTS ARE USED ON OR NEAR THE PROJECT SITE, A GEOMEMBRANE BARRIER IS RECOMMENDED WITH THE SYSTEM. THE GEOMEMBRANE LINER IS INTENDED TO HELP PROTECT THE SYSTEM FROM THE POTENTIAL ADVERSE EFFECTS THAT MAY RESULT FROM THE USE OF SUCH AGENTS INCLUDING PREMATURE CORROSION AND REDUCED ACTUAL SERVICE LIFE.

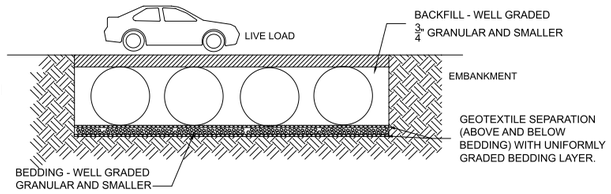
THE PROJECT'S ENGINEER OF RECORD IS TO EVALUATE WHETHER SALTING AGENTS WILL BE USED ON OR NEAR THE PROJECT SITE, AND USE HIS/HER BEST JUDGEMENT TO DETERMINE IF ANY ADDITIONAL PROTECTIVE MEASURES ARE REQUIRED. BELOW IS A TYPICAL DETAIL SHOWING THE PLACEMENT OF A GEOMEMBRANE BARRIER FOR PROJECTS WHERE SALTING AGENTS ARE USED ON OR NEAR THE PROJECT SITE.



IN-SITU TRENCH WALL

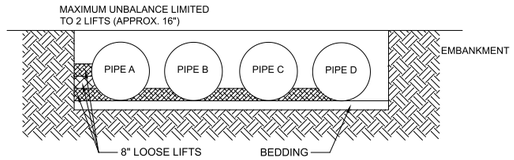
IF EXCAVATION IS REQUIRED, THE TRENCH WALL NEEDS TO BE CAPABLE OF SUPPORTING THE LOAD THAT THE PIPE SHEDS AS THE SYSTEM IS LOADED. IF SOILS ARE NOT CAPABLE OF SUPPORTING THESE LOADS, THE PIPE CAN DEFLECT. PERFORM A SIMPLE SOIL PRESSURE CHECK USING THE APPLIED LOADS TO DETERMINE THE LIMITS OF EXCAVATION BEYOND THE SPRING LINE OF THE OUTER MOST PIPES.

IN MOST CASES THE REQUIREMENTS FOR A SAFE WORK ENVIRONMENT AND PROPER BACKFILL PLACEMENT AND COMPACTION TAKE CARE OF THIS CONCERN.



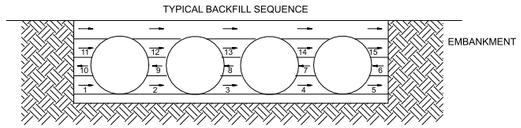
BACKFILL PLACEMENT

MATERIAL SHALL BE WORKED INTO THE PIPE HAUNCHES BY MEANS OF SHOVEL-SLICING, RODDING, AIR TAMPER, VIBRATORY ROD, OR OTHER EFFECTIVE METHODS.

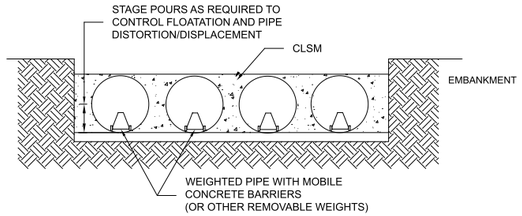


IF AASHTO T99 PROCEDURES ARE DETERMINED INFEASIBLE BY THE GEOTECHNICAL ENGINEER OF RECORD, COMPACTION IS CONSIDERED ADEQUATE WHEN NO FURTHER YIELDING OF THE MATERIAL IS OBSERVED UNDER THE COMPACTOR, OR UNDER FOOT, AND THE GEOTECHNICAL ENGINEER OF RECORD (OR REPRESENTATIVE THEREOF) IS SATISFIED WITH THE LEVEL OF COMPACTION.

FOR LARGE SYSTEMS, CONVEYOR SYSTEMS, BACKHOES WITH LONG REACHES OR DRAGLINES WITH STONE BUCKETS MAY BE USED TO PLACE BACKFILL. ONCE MINIMUM COVER FOR CONSTRUCTION LOADING ACROSS THE ENTIRE WIDTH OF THE SYSTEM IS REACHED, ADVANCE THE EQUIPMENT TO THE END OF THE RECENTLY PLACED FILL, AND BEGIN THE SEQUENCE AGAIN UNTIL THE SYSTEM IS COMPLETELY BACKFILLED. THIS TYPE OF CONSTRUCTION SEQUENCE PROVIDES ROOM FOR STOCKPILED BACKFILL DIRECTLY BEHIND THE BACKHOE, AS WELL AS THE MOVEMENT OF CONSTRUCTION TRAFFIC. MATERIAL STOCKPILES ON TOP OF THE BACKFILLED DETENTION SYSTEM SHOULD BE LIMITED TO 8- TO 10-FEET HIGH AND MUST PROVIDE BALANCED LOADING ACROSS ALL BARRELS. TO DETERMINE THE PROPER COVER OVER THE PIPES TO ALLOW THE MOVEMENT OF CONSTRUCTION EQUIPMENT SEE TABLE 1, OR CONTACT YOUR LOCAL CONTECH SALES ENGINEER.



WHEN FLOWABLE FILL IS USED, YOU MUST PREVENT PIPE FLOATATION. TYPICALLY, SMALL LIFTS ARE PLACED BETWEEN THE PIPES AND THEN ALLOWED TO SET-UP PRIOR TO THE PLACEMENT OF THE NEXT LIFT. THE ALLOWABLE THICKNESS OF THE CLSM LIFT IS A FUNCTION OF A PROPER BALANCE BETWEEN THE UPLIFT FORCE OF THE CLSM, THE OPPOSING WEIGHT OF THE PIPE, AND THE EFFECT OF OTHER RESTRAINING MEASURES. THE PIPE CAN CARRY LIMITED FLUID PRESSURE WITHOUT PIPE DISTORTION OR DISPLACEMENT, WHICH ALSO AFFECTS THE CLSM LIFT THICKNESS. YOUR LOCAL CONTECH SALES ENGINEER CAN HELP DETERMINE THE PROPER LIFT THICKNESS.

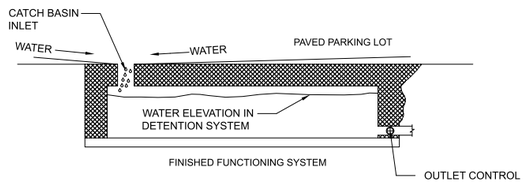


CONSTRUCTION LOADING

TYPICALLY, THE MINIMUM COVER SPECIFIED FOR A PROJECT ASSUMES H-20 LIVE LOAD. BECAUSE CONSTRUCTION LOADS OFTEN EXCEED DESIGN LIVE LOADS, INCREASED TEMPORARY MINIMUM COVER REQUIREMENTS ARE NECESSARY. SINCE CONSTRUCTION EQUIPMENT VARIES FROM JOB TO JOB, IT IS BEST TO ADDRESS EQUIPMENT SPECIFIC MINIMUM COVER REQUIREMENTS WITH YOUR LOCAL CONTECH SALES ENGINEER DURING YOUR PRE-CONSTRUCTION MEETING.

ADDITIONAL CONSIDERATIONS

BECAUSE MOST SYSTEMS ARE CONSTRUCTED BELOW-GRADE, RAINFALL CAN RAPIDLY FILL THE EXCAVATION; POTENTIALLY CAUSING FLOATATION AND MOVEMENT OF THE PREVIOUSLY PLACED PIPES. TO HELP MITIGATE POTENTIAL PROBLEMS, IT IS BEST TO START THE INSTALLATION AT THE DOWNSTREAM END WITH THE OUTLET ALREADY CONSTRUCTED TO ALLOW A ROUTE FOR THE WATER TO ESCAPE. TEMPORARY DIVERSION MEASURES MAY BE REQUIRED FOR HIGH FLOWS DUE TO THE RESTRICTED NATURE OF THE OUTLET PIPE.



CMP DETENTION SYSTEM INSPECTION AND MAINTENANCE

UNDERGROUND STORMWATER DETENTION AND INFILTRATION SYSTEMS MUST BE INSPECTED AND MAINTAINED AT REGULAR INTERVALS FOR PURPOSES OF PERFORMANCE AND LONGEVITY.

INSPECTION

INSPECTION IS THE KEY TO EFFECTIVE MAINTENANCE OF CMP DETENTION SYSTEMS AND IS EASILY PERFORMED. CONTECH RECOMMENDS ONGOING, ANNUAL INSPECTIONS. SITES WITH HIGH TRASH LOAD OR SMALL OUTLET CONTROL ORIFICES MAY NEED MORE FREQUENT INSPECTIONS. THE RATE AT WHICH THE SYSTEM COLLECTS POLLUTANTS WILL DEPEND MORE ON SITE SPECIFIC ACTIVITIES RATHER THAN THE SIZE OR CONFIGURATION OF THE SYSTEM.

INSPECTIONS SHOULD BE PERFORMED MORE OFTEN IN EQUIPMENT WASHDOWN AREAS, IN CLIMATES WHERE SANDING AND/OR SALTING OPERATIONS TAKE PLACE, AND IN OTHER VARIOUS INSTANCES IN WHICH ONE WOULD EXPECT HIGHER ACCUMULATIONS OF SEDIMENT OR ABRASIVE/ CORROSIVE CONDITIONS. A RECORD OF EACH INSPECTION IS TO BE MAINTAINED FOR THE LIFE OF THE SYSTEM

MAINTENANCE

CMP DETENTION SYSTEMS SHOULD BE CLEANED WHEN AN INSPECTION REVEALS ACCUMULATED SEDIMENT OR TRASH IS CLOGGING THE DISCHARGE ORIFICE.

ACCUMULATED SEDIMENT AND TRASH CAN TYPICALLY BE EVACUATED THROUGH THE MANHOLE OVER THE OUTLET ORIFICE. IF MAINTENANCE IS NOT PERFORMED AS RECOMMENDED, SEDIMENT AND TRASH MAY ACCUMULATE IN FRONT OF THE OUTLET ORIFICE. MANHOLE COVERS SHOULD BE SECURELY SEATED FOLLOWING CLEANING ACTIVITIES. CONTECH SUGGESTS THAT ALL SYSTEMS BE DESIGNED WITH AN ACCESS/INSPECTION MANHOLE SITUATED AT OR NEAR THE INLET AND THE OUTLET ORIFICE. SHOULD IT BE NECESSARY TO GET INSIDE THE SYSTEM TO PERFORM MAINTENANCE ACTIVITIES, ALL APPROPRIATE PRECAUTIONS REGARDING CONFINED SPACE ENTRY AND OSHA REGULATIONS SHOULD BE FOLLOWED.

ANNUAL INSPECTIONS ARE BEST PRACTICE FOR ALL UNDERGROUND SYSTEMS. DURING THIS INSPECTION, IF EVIDENCE OF SALTING/DE-ICING AGENTS IS OBSERVED WITHIN THE SYSTEM, IT IS BEST PRACTICE FOR THE SYSTEM TO BE RINSED, INCLUDING ABOVE THE SPRING LINE SOON AFTER THE SPRING THAW AS PART OF THE MAINTENANCE PROGRAM FOR THE SYSTEM.

MAINTAINING AN UNDERGROUND DETENTION OR INFILTRATION SYSTEM IS EASIEST WHEN THERE IS NO FLOW ENTERING THE SYSTEM. FOR THIS REASON, IT IS A GOOD IDEA TO SCHEDULE THE CLEANOUT DURING DRY WEATHER.

THE FOREGOING INSPECTION AND MAINTENANCE EFFORTS HELP ENSURE UNDERGROUND PIPE SYSTEMS USED FOR STORMWATER STORAGE CONTINUE TO FUNCTION AS INTENDED BY IDENTIFYING RECOMMENDED REGULAR INSPECTION AND MAINTENANCE PRACTICES. INSPECTION AND MAINTENANCE RELATED TO THE STRUCTURAL INTEGRITY OF THE PIPE OR THE SOUNDNESS OF PIPE JOINT CONNECTIONS IS BEYOND THE SCOPE OF THIS GUIDE.

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CONTECH CMP DETENTION SYSTEMS

CONTECH **DYODS** DRAWING

DYO13634 2020-326 HCC V
2020-326 HCC V 144" CMP #1
Hesperia, CA
DETENTION SYSTEM

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CHECKED: DYO	APPROVED: DYO	
SHEET NO.: D4		

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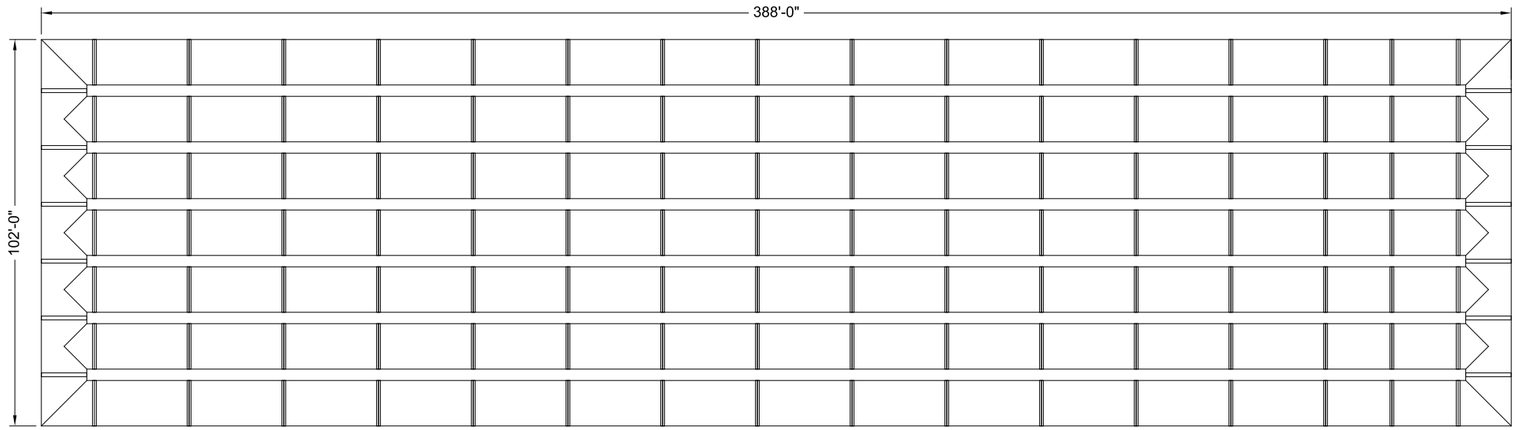
PROJECT SUMMARY

CALCULATION DETAILS
- LOADING = HS20 & HS25
- APPROX. LINEAR FOOTAGE = 2,752 lf.

STORAGE SUMMARY
- STORAGE VOLUME REQUIRED = 407,457 cf.
- PIPE STORAGE VOLUME = 311,244 cf.
- BACKFILL STORAGE VOLUME = 96,773 cf.
- TOTAL STORAGE PROVIDED = 408,016 cf.

PIPE DETAILS
- DIAMETER = 144 IN.
- CORRUGATION = 5x1
- GAGE = 14
- COATING = ALT2
- WALL TYPE = Perforated
- BARRELL SPACING = 36 IN.

BACKFILL DETAILS
- WIDTH AT ENDS = 36 IN.
- ABOVE PIPE = 6 IN.
- WIDTH AT SIDES = 36 IN.
- BELOW PIPE = 6 IN.



NOTES

- ALL RISER AND STUB DIMENSIONS ARE TO CENTERLINE. ALL ELEVATIONS, DIMENSIONS, AND LOCATIONS OF RISERS AND INLETS, SHALL BE VERIFIED BY THE ENGINEER OF RECORD PRIOR TO RELEASING FOR FABRICATION.
- ALL FITTINGS AND REINFORCEMENT COMPLY WITH ASTM A998.
- ALL RISERS AND STUBS ARE $2\frac{2}{3}$" x $\frac{1}{2}$" CORRUGATION AND 16 GAGE UNLESS OTHERWISE NOTED.
- RISERS TO BE FIELD TRIMMED TO GRADE.
- QUANTITY OF PIPE SHOWN DOES NOT PROVIDE EXTRA PIPE FOR CONNECTING THE SYSTEM TO EXISTING PIPE OR DRAINAGE STRUCTURES. OUR SYSTEM AS DETAILED PROVIDES NOMINAL INLET AND/OR OUTLET PIPE STUB FOR CONNECTION TO EXISTING DRAINAGE FACILITIES. IF ADDITIONAL PIPE IS NEEDED IT IS THE RESPONSIBILITY OF THE CONTRACTOR.
- BAND TYPE TO BE DETERMINED UPON FINAL DESIGN.
- THE PROJECT SUMMARY IS REFLECTIVE OF THE DYODS DESIGN, QUANTITIES ARE APPROX. AND SHOULD BE VERIFIED UPON FINAL DESIGN AND APPROVAL. FOR EXAMPLE, TOTAL EXCAVATION DOES NOT CONSIDER ALL VARIABLES SUCH AS SHORING AND ONLY ACCOUNTS FOR MATERIAL WITHIN THE ESTIMATED EXCAVATION FOOTPRINT.
- THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.

ASSEMBLY
SCALE: 1" = 40'

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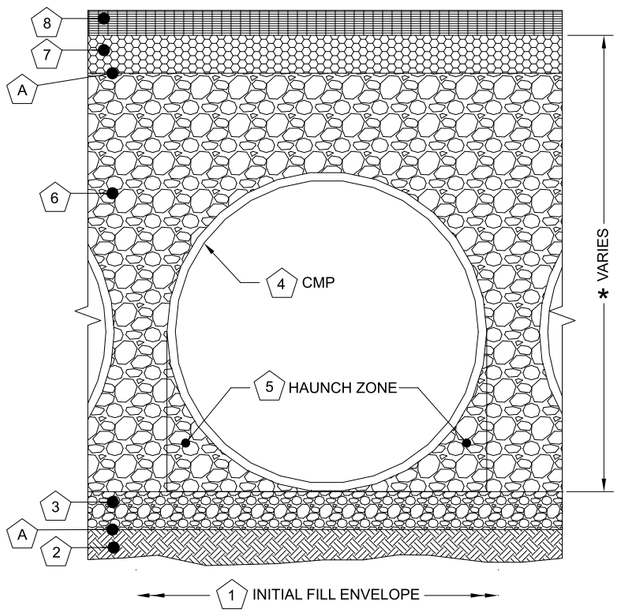
CONTECH® CMP DETENTION SYSTEMS
CONTECH **DYODS** DRAWING

DYO13635 2020-326 HCC V
2020-326 HCC V 144" CMP #2
Hesperia, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
2860	13635	2/21/2022
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: D1		



Infiltration Systems - CMP Infiltration & CMP Perforated Drainage Pipe			
Material Location	Description	Material Designation	Designation
8 Rigid or Flexible Pavement (if applicable)			
7 Road Base (if applicable			
A Geotextile Layer	Non-Woven Geotextile	CONTECH C-40 or C-45	Engineer Decision for consideration to prevent soil migration into varying soil types. Wrap the trench only.
6 Backfill	Infiltration pipe systems have a pipe perforation sized of 3/8" diameter. An open graded, free draining stone, with a particle size of ½" – 2 ½" diameter is recommended.	AASHTO M 145-A-1 or AASHTO M 43 - 3, 4	Material shall be worked into the pipe haunches by means of shovel-slicing, rodding, air-tamper, vibratory rod, or other effective methods. Compaction of all placed fill material is necessary and shall be considered adequate when no further yielding of the material is observed under the compactor, or under foot, and the Project Engineer or his representative is satisfied with the level of compaction"
3 Bedding Stone	Well graded granular bedding material w/maximum particle size of 3"	AASHTO M43 - 3,357,4,467, 5, 56, 57	For soil aggregates larger than 3/8" a dedicated bedding layer is not required for CMP. Pipe may be placed on the trench bottom comprised of native suitable well graded & granular material. For Arch pipes it is recommended to be shaped to a relatively flat bottom or fine-grade the foundation to a slight v-shape. Soil aggregates less than 3/8" and unsuitable material should be over-excavated and re-placed with a 4"-6" layer of well graded & granular stone per the material designation.
A Geotextile Layer	None	None	Contech does not recommend geotextiles be placed under the invert of Infiltration systems due to the propensity for geotextiles to clog over time.
* Note: The listed AASHTO designations are for gradation only. The stone must also be angular and clean.			

1 MINIMUM WIDTH DEPENDS ON SITE CONDITIONS AND ENGINEERING JUDGEMENT.

FOUNDATION/BEDDING PREPARATION

2 PRIOR TO PLACING THE BEDDING, THE FOUNDATION MUST BE CONSTRUCTED TO A UNIFORM AND STABLE GRADE. IN THE EVENT THAT UNSUITABLE FOUNDATION MATERIALS ARE ENCOUNTERED DURING EXCAVATION, THEY SHALL BE REMOVED AND BROUGHT BACK TO THE GRADE WITH A FILL MATERIAL AS APPROVED BY THE ENGINEER.

5 HAUNCH ZONE MATERIAL SHALL BE PLACED AND UNIFORMLY COMPACTED WITHOUT SOFT SPOTS.

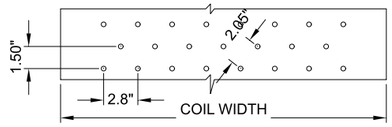
BACKFILL

MATERIAL SHALL BE PLACED IN 8"-10" MAXIMUM LIFTS. INADEQUATE COMPACTION CAN LEAD TO EXCESSIVE DEFLECTIONS WITHIN THE SYSTEM AND SETTLEMENT OF THE SOILS OVER THE SYSTEM. BACKFILL SHALL BE PLACED SUCH THAT THERE IS NO MORE THAN A TWO-LIFT DIFFERENTIAL BETWEEN THE SIDES OF ANY PIPE IN THE SYSTEM AT ALL TIMES DURING THE BACKFILL PROCESS. BACKFILL SHALL BE ADVANCED ALONG THE LENGTH OF THE SYSTEM AT THE SAME RATE TO AVOID DIFFERENTIAL LOADING ON ANY PIPES IN THE SYSTEM.

EQUIPMENT USED TO PLACE AND COMPACT THE BACKFILL SHALL BE OF A SIZE AND TYPE SO AS NOT TO DISTORT, DAMAGE, OR DISPLACE THE PIPE. ATTENTION MUST BE GIVEN TO PROVIDING ADEQUATE MINIMUM COVER FOR SUCH EQUIPMENT. MAINTAIN BALANCED LOADING ON ALL PIPES IN THE SYSTEM DURING ALL SUCH OPERATIONS.

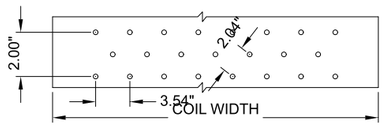
OTHER ALTERNATE BACKFILL MATERIAL MAY BE ALLOWED DEPENDING ON SITE SPECIFIC CONDITIONS. REFER TO TYPICAL BACKFILL DETAIL FOR MATERIAL REQUIRED.

2 2/3" x 1/2" CORRUGATION - STEEL AND ALUMINUM CMP EDGE SPACING EQUAL ON BOTH SIDES



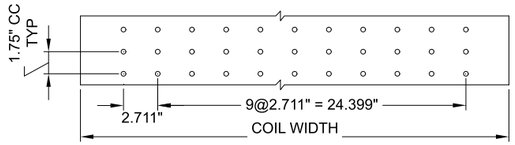
OPEN AREA = 3.76 SQ IN/SQ FT

3" x 1" CORRUGATION - STEEL AND ALUMINUM CMP (COIL PROVIDED FROM CONTECH LANTANA, FL PLANT)



OPEN AREA = 4.16 SQ IN/SQ FT

5" x 1" CORRUGATION - STEEL ONLY
EDGE SPACING EQUAL ON BOTH SIDES



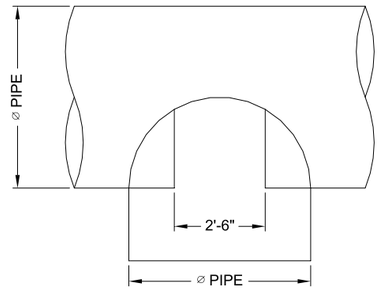
OPEN AREA = 3.33 SQ IN/SQ FT

NOTES:

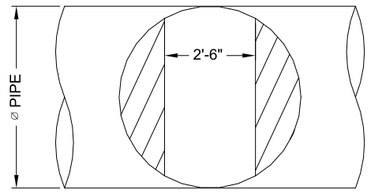
1. PERFORATIONS MEET AASHTO AND ASTM SPECIFICATIONS.
2. PERFORATION OPEN AREA PER SQUARE FOOT OF PIPE IS BASED ON THE NOMINAL DIAMETER AND LENGTH OF PIPE.
3. ALL DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES.
4. ALL HOLES ⌀3/8".

TYPICAL PERFORATION DETAIL

SCALE: N.T.S.



PLAN

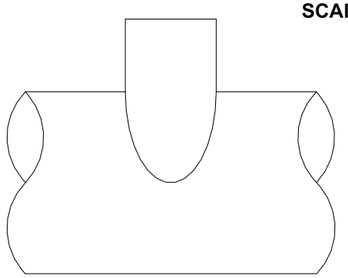


FRONT

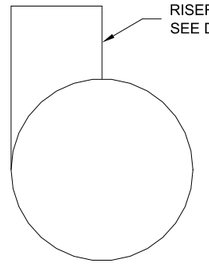
TYPICAL MANWAY DETAIL

SCALE: N.T.S.

NOTE:
MANWAY DETAIL APPLICABLE FOR CMP SYSTEMS WITH DIAMETERS 48" AND LARGER. MANWAYS MAY BE REQUIRED ON SMALLER SYSTEMS DEPENDING ON ACTUAL SITE SPECIFIC CONDITIONS.



ELEVATION

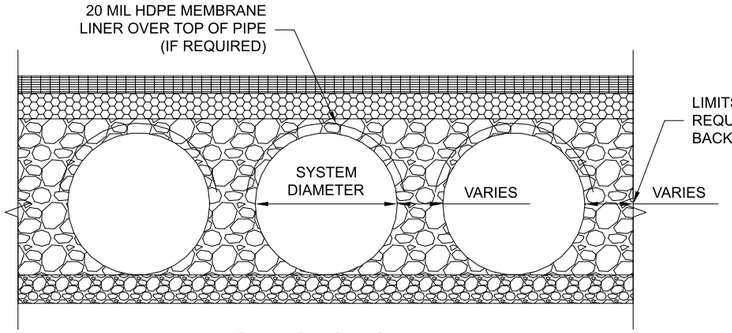


END

NOTE:
LADDERS ARE OPTIONAL AND ARE NOT REQUIRED FOR ALL SYSTEMS.

TYPICAL RISER DETAIL

SCALE: N.T.S.



TYPICAL SECTION VIEW

LINER OVER ROWS
SCALE: N.T.S.

NOTE: IF SALTING AGENTS FOR SNOW AND ICE REMOVAL ARE USED ON OR NEAR THE PROJECT, AN HDPE MEMBRANE LINER IS RECOMMENDED WITH THE SYSTEM. THE IMPERMEABLE LINER IS INTENDED TO HELP PROTECT THE SYSTEM FROM THE POTENTIAL ADVERSE EFFECTS THAT MAY RESULT FROM A CHANGE IN THE SURROUNDING ENVIRONMENT OVER A PERIOD OF TIME. PLEASE REFER TO THE CORRUGATED METAL PIPE DETENTION DESIGN GUIDE FOR ADDITIONAL INFORMATION.

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CONTECH CMP DETENTION SYSTEMS
CONTECH DYODS DRAWING

DYO13635 2020-326 HCC V
2020-326 HCC V 144" CMP #2
Hesperia, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
2860	13635	2/21/2022
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: D2		

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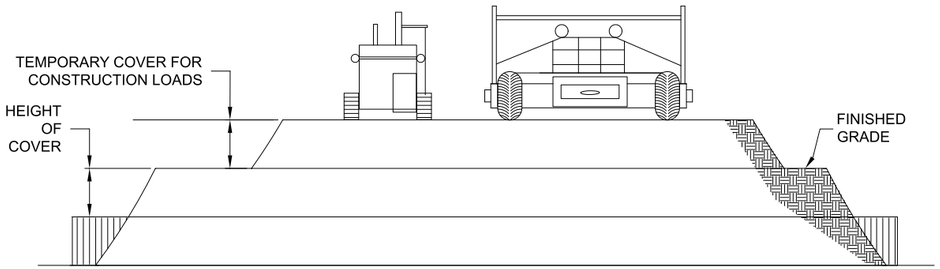

CONSTRUCTION LOADS

FOR TEMPORARY CONSTRUCTION VEHICLE LOADS, AN EXTRA AMOUNT OF COMPACTED COVER MAY BE REQUIRED OVER THE TOP OF THE PIPE. THE HEIGHT-OF-COVER SHALL MEET THE MINIMUM REQUIREMENTS SHOWN IN THE TABLE BELOW. THE USE OF HEAVY CONSTRUCTION EQUIPMENT NECESSITATES GREATER PROTECTION FOR THE PIPE THAN FINISHED GRADE COVER MINIMUMS FOR NORMAL HIGHWAY TRAFFIC.

PIPE SPAN, INCHES	AXLE LOADS (kips)			
	18-50	50-75	75-110	110-150
	MINIMUM COVER (FT)			
12-42	2.0	2.5	3.0	3.0
48-72	3.0	3.0	3.5	4.0
78-120	3.0	3.5	4.0	4.0
126-144	3.5	4.0	4.5	4.5

*MINIMUM COVER MAY VARY, DEPENDING ON LOCAL CONDITIONS. THE CONTRACTOR MUST PROVIDE THE ADDITIONAL COVER REQUIRED TO AVOID DAMAGE TO THE PIPE. MINIMUM COVER IS MEASURED FROM THE TOP OF THE PIPE TO THE TOP OF THE MAINTAINED CONSTRUCTION ROADWAY SURFACE.

CONSTRUCTION LOADING DIAGRAM

SCALE: N.T.S.

SPECIFICATION FOR DESIGNED DETENTION SYSTEM:

SCOPE
THIS SPECIFICATION COVERS THE MANUFACTURE AND INSTALLATION OF THE DESIGNED DETENTION SYSTEM DETAILED IN THE PROJECT PLANS.

MATERIAL
THE MATERIAL SHALL CONFORM TO THE APPLICABLE REQUIREMENTS LISTED BELOW:

ALUMINIZED TYPE 2 STEEL COILS SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF AASHTO M-274 OR ASTM A-92.

THE GALVANIZED STEEL COILS SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF AASHTO M-218 OR ASTM A-929.

THE POLYMER COATED STEEL COILS SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF AASHTO M-246 OR ASTM A-742.

THE ALUMINUM COILS SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF AASHTO M-197 OR ASTM B-744.

CONSTRUCTION LOADS
CONSTRUCTION LOADS MAY BE HIGHER THAN FINAL LOADS. FOLLOW THE MANUFACTURER'S OR NCSPA GUIDELINES.

PIPE
THE PIPE SHALL BE MANUFACTURED IN ACCORDANCE TO THE APPLICABLE REQUIREMENTS LISTED BELOW:

ALUMINIZED TYPE 2: AASHTO M-36 OR ASTM A-760

GALVANIZED: AASHTO M-36 OR ASTM A-760

POLYMER COATED: AASHTO M-245 OR ASTM A-762

ALUMINUM: AASHTO M-196 OR ASTM B-745

HANDLING AND ASSEMBLY
SHALL BE IN ACCORDANCE WITH NCSP'S (NATIONAL CORRUGATED STEEL PIPE ASSOCIATION) FOR ALUMINIZED TYPE 2, GALVANIZED OR POLYMER COATED STEEL. SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS FOR ALUMINUM PIPE.

INSTALLATION
SHALL BE IN ACCORDANCE WITH AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, SECTION 26, DIVISION II DIVISION II OR ASTM A-798 (FOR ALUMINIZED TYPE 2, GALVANIZED OR POLYMER COATED STEEL) OR ASTM B-788 (FOR ALUMINUM PIPE) AND IN CONFORMANCE WITH THE PROJECT PLANS AND SPECIFICATIONS. IF THERE ARE ANY INCONSISTENCIES OR CONFLICTS THE CONTRACTOR SHOULD DISCUSS AND RESOLVE WITH THE SITE ENGINEER.

IT IS ALWAYS THE RESPONSIBILITY OF THE CONTRACTOR TO FOLLOW OSHA GUIDELINES FOR SAFE PRACTICES.

NOTE:
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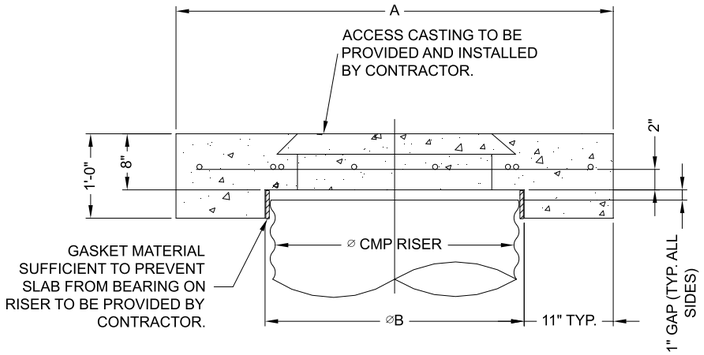
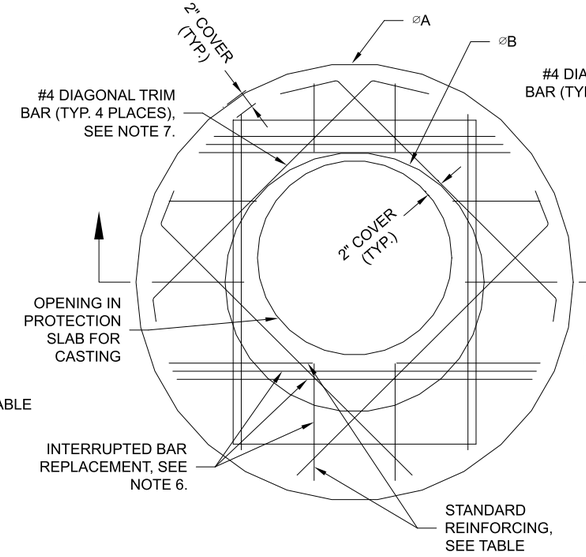


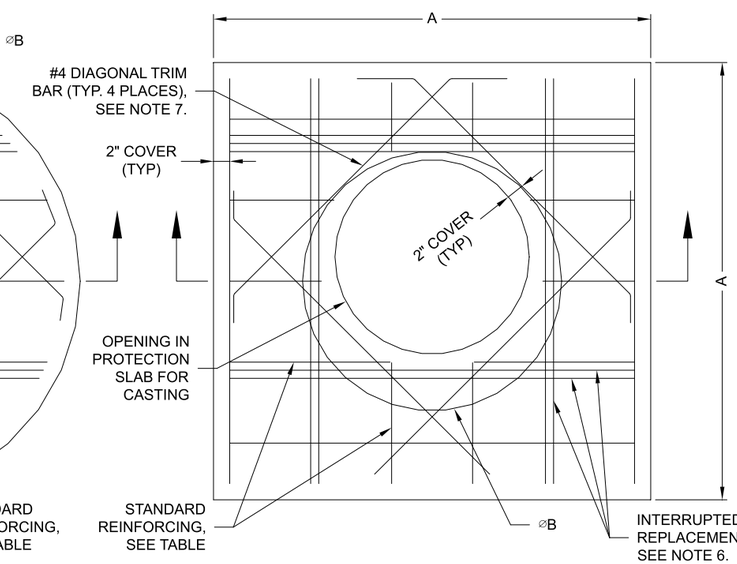
SECTION VIEW

REINFORCING TABLE				
⌀ CMP RISER	A	⌀ B	REINFORCING	**BEARING PRESSURE (PSF)
24"	⌀ 4' 4'X4'	26"	#5 @ 12" OCEW #5 @ 12" OCEW	2,410 1,780
30"	⌀ 4'-6" 4'-6" X 4'-6"	32"	#5 @ 12" OCEW #5 @ 12" OCEW	2,120 1,530
36"	⌀ 5' 5' X 5'	38"	#5 @ 10" OCEW #5 @ 10" OCEW	1,890 1,350
42"	⌀ 5'-6" 5'-6" X 5'-6"	44"	#5 @ 10" OCEW #5 @ 9" OCEW	1,720 1,210
48"	⌀ 6' 6' X 6'	50"	#5 @ 9" OCEW #5 @ 8" OCEW	1,600 1,100

** ASSUMED SOIL BEARING CAPACITY



ROUND OPTION PLAN VIEW



SQUARE OPTION PLAN VIEW

NOTES:

1. DESIGN IN ACCORDANCE WITH AASHTO, 17th EDITION.
2. DESIGN LOAD HS25.
3. EARTH COVER = 1' MAX.
4. CONCRETE STRENGTH = 3,500 psi
5. REINFORCING STEEL = ASTM A615, GRADE 60.
6. PROVIDE ADDITIONAL REINFORCING AROUND OPENINGS EQUAL TO THE BARS INTERRUPTED, HALF EACH SIDE. ADDITIONAL BARS TO BE IN THE SAME PLANE.
7. TRIM OPENING WITH DIAGONAL #4 BARS, EXTEND BARS A MINIMUM OF 12" BEYOND OPENING, BEND BARS AS REQUIRED TO MAINTAIN BAR COVER.
8. PROTECTION SLAB AND ALL MATERIALS TO BE PROVIDED AND INSTALLED BY CONTRACTOR.
9. DETAIL DESIGN BY DELTA ENGINEERING, BINGHAMTON, NY.

MANHOLE CAP DETAIL

SCALE: N.T.S.

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CONTECH CMP DETENTION SYSTEMS
CONTECH DYODS DRAWING

DYO13635 2020-326 HCC V
2020-326 HCC V 144" CMP #2
Hesperia, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
2860	13635	2/21/2022
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: D3		

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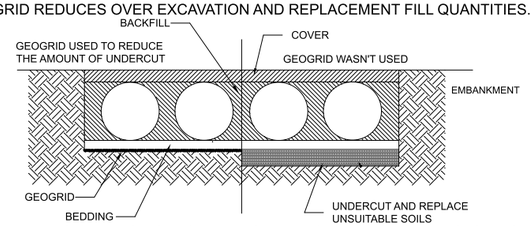
CMP DETENTION INSTALLATION GUIDE

PROPER INSTALLATION OF A FLEXIBLE UNDERGROUND DETENTION SYSTEM WILL ENSURE LONG-TERM PERFORMANCE. THE CONFIGURATION OF THESE SYSTEMS OFTEN REQUIRES SPECIAL CONSTRUCTION PRACTICES THAT DIFFER FROM CONVENTIONAL FLEXIBLE PIPE CONSTRUCTION. CONTECH ENGINEERED SOLUTIONS STRONGLY SUGGESTS SCHEDULING A PRE-CONSTRUCTION MEETING WITH YOUR LOCAL SALES ENGINEER TO DETERMINE IF ADDITIONAL MEASURES, NOT COVERED IN THIS GUIDE, ARE APPROPRIATE FOR YOUR SITE.

FOUNDATION

CONSTRUCT A FOUNDATION THAT CAN SUPPORT THE DESIGN LOADING APPLIED BY THE PIPE AND ADJACENT BACKFILL WEIGHT AS WELL AS MAINTAIN ITS INTEGRITY DURING CONSTRUCTION.

IF SOFT OR UNSUITABLE SOILS ARE ENCOUNTERED, REMOVE THE POOR SOILS DOWN TO A SUITABLE DEPTH AND THEN BUILD UP TO THE APPROPRIATE ELEVATION WITH A COMPETENT BACKFILL MATERIAL. THE STRUCTURAL FILL MATERIAL GRADATION SHOULD NOT ALLOW THE MIGRATION OF FINES, WHICH CAN CAUSE SETTLEMENT OF THE DETENTION SYSTEM OR PAVEMENT ABOVE. IF THE STRUCTURAL FILL MATERIAL IS NOT COMPATIBLE WITH THE UNDERLYING SOILS AN ENGINEERING FABRIC SHOULD BE USED AS A SEPARATOR. IN SOME CASES, USING A STIFF REINFORCING GEOGRID REDUCES OVER EXCAVATION AND REPLACEMENT FILL QUANTITIES.

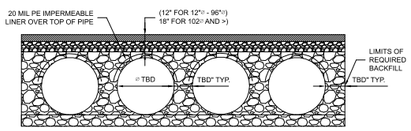


GRADE THE FOUNDATION SUBGRADE TO A UNIFORM OR SLIGHTLY SLOPING GRADE. IF THE SUBGRADE IS CLAY OR RELATIVELY NON-POROUS AND THE CONSTRUCTION SEQUENCE WILL LAST FOR AN EXTENDED PERIOD OF TIME, IT IS BEST TO SLOPE THE GRADE TO ONE END OF THE SYSTEM. THIS WILL ALLOW EXCESS WATER TO DRAIN QUICKLY, PREVENTING SATURATION OF THE SUBGRADE.

GEOMEMBRANE BARRIER

A SITE'S RESISTIVITY MAY CHANGE OVER TIME WHEN VARIOUS TYPES OF SALTING AGENTS ARE USED, SUCH AS ROAD SALTS FOR DEICING AGENTS. IF SALTING AGENTS ARE USED ON OR NEAR THE PROJECT SITE, A GEOMEMBRANE BARRIER IS RECOMMENDED WITH THE SYSTEM. THE GEOMEMBRANE LINER IS INTENDED TO HELP PROTECT THE SYSTEM FROM THE POTENTIAL ADVERSE EFFECTS THAT MAY RESULT FROM THE USE OF SUCH AGENTS INCLUDING PREMATURE CORROSION AND REDUCED ACTUAL SERVICE LIFE.

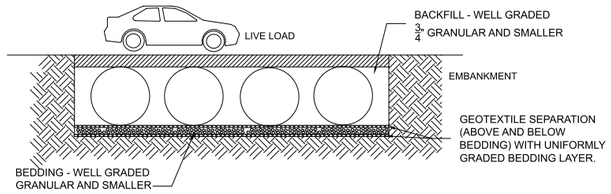
THE PROJECT'S ENGINEER OF RECORD IS TO EVALUATE WHETHER SALTING AGENTS WILL BE USED ON OR NEAR THE PROJECT SITE, AND USE HIS/HER BEST JUDGEMENT TO DETERMINE IF ANY ADDITIONAL PROTECTIVE MEASURES ARE REQUIRED. BELOW IS A TYPICAL DETAIL SHOWING THE PLACEMENT OF A GEOMEMBRANE BARRIER FOR PROJECTS WHERE SALTING AGENTS ARE USED ON OR NEAR THE PROJECT SITE.



IN-SITU TRENCH WALL

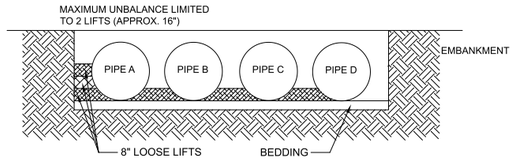
IF EXCAVATION IS REQUIRED, THE TRENCH WALL NEEDS TO BE CAPABLE OF SUPPORTING THE LOAD THAT THE PIPE SHEDS AS THE SYSTEM IS LOADED. IF SOILS ARE NOT CAPABLE OF SUPPORTING THESE LOADS, THE PIPE CAN DEFLECT. PERFORM A SIMPLE SOIL PRESSURE CHECK USING THE APPLIED LOADS TO DETERMINE THE LIMITS OF EXCAVATION BEYOND THE SPRING LINE OF THE OUTER MOST PIPES.

IN MOST CASES THE REQUIREMENTS FOR A SAFE WORK ENVIRONMENT AND PROPER BACKFILL PLACEMENT AND COMPACTION TAKE CARE OF THIS CONCERN.



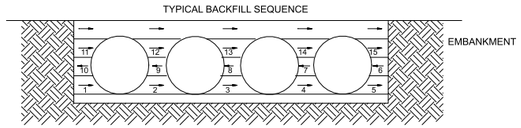
BACKFILL PLACEMENT

MATERIAL SHALL BE WORKED INTO THE PIPE HAUNCHES BY MEANS OF SHOVEL-SLICING, RODDING, AIR TAMPER, VIBRATORY ROD, OR OTHER EFFECTIVE METHODS.

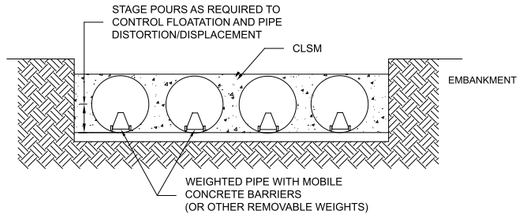


IF AASHTO T99 PROCEDURES ARE DETERMINED INFEASIBLE BY THE GEOTECHNICAL ENGINEER OF RECORD, COMPACTION IS CONSIDERED ADEQUATE WHEN NO FURTHER YIELDING OF THE MATERIAL IS OBSERVED UNDER THE COMPACTOR, OR UNDER FOOT, AND THE GEOTECHNICAL ENGINEER OF RECORD (OR REPRESENTATIVE THEREOF) IS SATISFIED WITH THE LEVEL OF COMPACTION.

FOR LARGE SYSTEMS, CONVEYOR SYSTEMS, BACKHOES WITH LONG REACHES OR DRAGLINES WITH STONE BUCKETS MAY BE USED TO PLACE BACKFILL. ONCE MINIMUM COVER FOR CONSTRUCTION LOADING ACROSS THE ENTIRE WIDTH OF THE SYSTEM IS REACHED, ADVANCE THE EQUIPMENT TO THE END OF THE RECENTLY PLACED FILL, AND BEGIN THE SEQUENCE AGAIN UNTIL THE SYSTEM IS COMPLETELY BACKFILLED. THIS TYPE OF CONSTRUCTION SEQUENCE PROVIDES ROOM FOR STOCKPILED BACKFILL DIRECTLY BEHIND THE BACKHOE, AS WELL AS THE MOVEMENT OF CONSTRUCTION TRAFFIC. MATERIAL STOCKPILES ON TOP OF THE BACKFILLED DETENTION SYSTEM SHOULD BE LIMITED TO 8- TO 10-FEET HIGH AND MUST PROVIDE BALANCED LOADING ACROSS ALL BARRELS. TO DETERMINE THE PROPER COVER OVER THE PIPES TO ALLOW THE MOVEMENT OF CONSTRUCTION EQUIPMENT SEE TABLE 1, OR CONTACT YOUR LOCAL CONTECH SALES ENGINEER.



WHEN FLOWABLE FILL IS USED, YOU MUST PREVENT PIPE FLOATATION. TYPICALLY, SMALL LIFTS ARE PLACED BETWEEN THE PIPES AND THEN ALLOWED TO SET-UP PRIOR TO THE PLACEMENT OF THE NEXT LIFT. THE ALLOWABLE THICKNESS OF THE CLSM LIFT IS A FUNCTION OF A PROPER BALANCE BETWEEN THE UPLIFT FORCE OF THE CLSM, THE OPPOSING WEIGHT OF THE PIPE, AND THE EFFECT OF OTHER RESTRAINING MEASURES. THE PIPE CAN CARRY LIMITED FLUID PRESSURE WITHOUT PIPE DISTORTION OR DISPLACEMENT, WHICH ALSO AFFECTS THE CLSM LIFT THICKNESS. YOUR LOCAL CONTECH SALES ENGINEER CAN HELP DETERMINE THE PROPER LIFT THICKNESS.

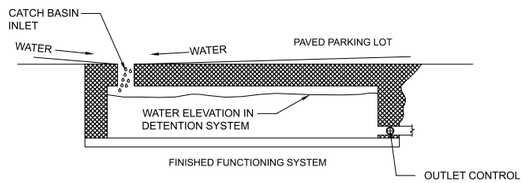


CONSTRUCTION LOADING

TYPICALLY, THE MINIMUM COVER SPECIFIED FOR A PROJECT ASSUMES H-20 LIVE LOAD. BECAUSE CONSTRUCTION LOADS OFTEN EXCEED DESIGN LIVE LOADS, INCREASED TEMPORARY MINIMUM COVER REQUIREMENTS ARE NECESSARY. SINCE CONSTRUCTION EQUIPMENT VARIES FROM JOB TO JOB, IT IS BEST TO ADDRESS EQUIPMENT SPECIFIC MINIMUM COVER REQUIREMENTS WITH YOUR LOCAL CONTECH SALES ENGINEER DURING YOUR PRE-CONSTRUCTION MEETING.

ADDITIONAL CONSIDERATIONS

BECAUSE MOST SYSTEMS ARE CONSTRUCTED BELOW-GRADE, RAINFALL CAN RAPIDLY FILL THE EXCAVATION; POTENTIALLY CAUSING FLOATATION AND MOVEMENT OF THE PREVIOUSLY PLACED PIPES. TO HELP MITIGATE POTENTIAL PROBLEMS, IT IS BEST TO START THE INSTALLATION AT THE DOWNSTREAM END WITH THE OUTLET ALREADY CONSTRUCTED TO ALLOW A ROUTE FOR THE WATER TO ESCAPE. TEMPORARY DIVERSION MEASURES MAY BE REQUIRED FOR HIGH FLOWS DUE TO THE RESTRICTED NATURE OF THE OUTLET PIPE.



CMP DETENTION SYSTEM INSPECTION AND MAINTENANCE

UNDERGROUND STORMWATER DETENTION AND INFILTRATION SYSTEMS MUST BE INSPECTED AND MAINTAINED AT REGULAR INTERVALS FOR PURPOSES OF PERFORMANCE AND LONGEVITY.

INSPECTION

INSPECTION IS THE KEY TO EFFECTIVE MAINTENANCE OF CMP DETENTION SYSTEMS AND IS EASILY PERFORMED. CONTECH RECOMMENDS ONGOING, ANNUAL INSPECTIONS. SITES WITH HIGH TRASH LOAD OR SMALL OUTLET CONTROL ORIFICES MAY NEED MORE FREQUENT INSPECTIONS. THE RATE AT WHICH THE SYSTEM COLLECTS POLLUTANTS WILL DEPEND MORE ON SITE SPECIFIC ACTIVITIES RATHER THAN THE SIZE OR CONFIGURATION OF THE SYSTEM.

INSPECTIONS SHOULD BE PERFORMED MORE OFTEN IN EQUIPMENT WASHDOWN AREAS, IN CLIMATES WHERE SANDING AND/OR SALTING OPERATIONS TAKE PLACE, AND IN OTHER VARIOUS INSTANCES IN WHICH ONE WOULD EXPECT HIGHER ACCUMULATIONS OF SEDIMENT OR ABRASIVE/ CORROSIVE CONDITIONS. A RECORD OF EACH INSPECTION IS TO BE MAINTAINED FOR THE LIFE OF THE SYSTEM

MAINTENANCE

CMP DETENTION SYSTEMS SHOULD BE CLEANED WHEN AN INSPECTION REVEALS ACCUMULATED SEDIMENT OR TRASH IS CLOGGING THE DISCHARGE ORIFICE.

ACCUMULATED SEDIMENT AND TRASH CAN TYPICALLY BE EVACUATED THROUGH THE MANHOLE OVER THE OUTLET ORIFICE. IF MAINTENANCE IS NOT PERFORMED AS RECOMMENDED, SEDIMENT AND TRASH MAY ACCUMULATE IN FRONT OF THE OUTLET ORIFICE. MANHOLE COVERS SHOULD BE SECURELY SEATED FOLLOWING CLEANING ACTIVITIES. CONTECH SUGGESTS THAT ALL SYSTEMS BE DESIGNED WITH AN ACCESS/INSPECTION MANHOLE SITUATED AT OR NEAR THE INLET AND THE OUTLET ORIFICE. SHOULD IT BE NECESSARY TO GET INSIDE THE SYSTEM TO PERFORM MAINTENANCE ACTIVITIES, ALL APPROPRIATE PRECAUTIONS REGARDING CONFINED SPACE ENTRY AND OSHA REGULATIONS SHOULD BE FOLLOWED.

ANNUAL INSPECTIONS ARE BEST PRACTICE FOR ALL UNDERGROUND SYSTEMS. DURING THIS INSPECTION, IF EVIDENCE OF SALTING/DE-ICING AGENTS IS OBSERVED WITHIN THE SYSTEM, IT IS BEST PRACTICE FOR THE SYSTEM TO BE RINSED, INCLUDING ABOVE THE SPRING LINE SOON AFTER THE SPRING THAW AS PART OF THE MAINTENANCE PROGRAM FOR THE SYSTEM.

MAINTAINING AN UNDERGROUND DETENTION OR INFILTRATION SYSTEM IS EASIEST WHEN THERE IS NO FLOW ENTERING THE SYSTEM. FOR THIS REASON, IT IS A GOOD IDEA TO SCHEDULE THE CLEANOUT DURING DRY WEATHER.

THE FOREGOING INSPECTION AND MAINTENANCE EFFORTS HELP ENSURE UNDERGROUND PIPE SYSTEMS USED FOR STORMWATER STORAGE CONTINUE TO FUNCTION AS INTENDED BY IDENTIFYING RECOMMENDED REGULAR INSPECTION AND MAINTENANCE PRACTICES. INSPECTION AND MAINTENANCE RELATED TO THE STRUCTURAL INTEGRITY OF THE PIPE OR THE SOUNDNESS OF PIPE JOINT CONNECTIONS IS BEYOND THE SCOPE OF THIS GUIDE.

C:\EXPORTS\TEMPLATES\CMP_V5.DWG 10/18/2019 10:02 AM

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CONTECH CMP DETENTION SYSTEMS
CONTECH DYODS DRAWING

DYO13635 2020-326 HCC V
2020-326 HCC V 144" CMP #2
Hesperia, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
2860	13635	2/21/2022
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: D4		

SECTION 6.1: ATTACHMENT B.2

Baffle Box

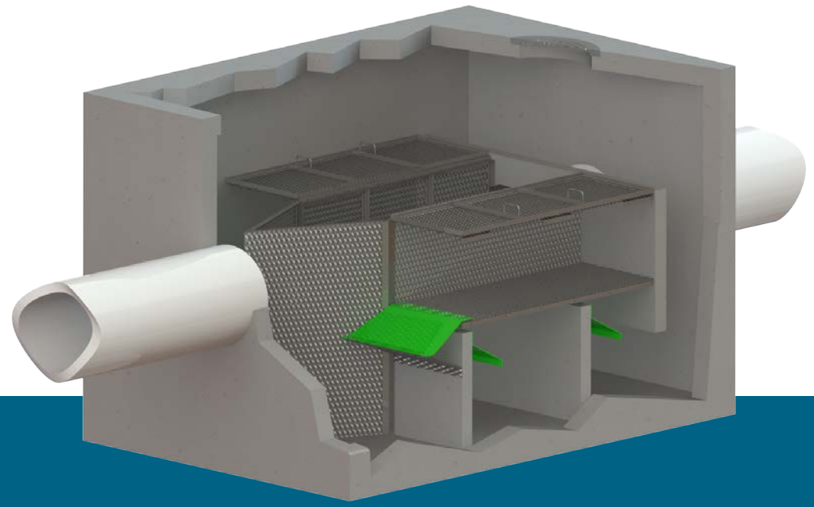
OVERVIEW

The Bio Clean Debris Separating Baffle Box (DSBB) is an advanced stormwater treatment system utilizing non-clogging screening and hydrodynamic separation to capture pollutants.

The non-clogging screening system stores trash and debris in a dry state, suspended above the sedimentation chambers, minimizing nutrient leaching, bacterial growth, bad odors, and allows for easier cleaning.

The DSBB's triple-chambered design provides higher removals of total suspended solids over a wide range of particle sizes, including the finest particles. Fine sediments carry large amounts of heavy metals, nutrients, and other harmful pollutants. The deflector shields ensure no scouring of captured sediments during high flow. This feature allows the system to be installed in-line, thus eliminating the need for diversion structures. The oil skimmer and hydrocarbon booms trap oil.

The DSBB is a widely accepted stormwater treatment solution among civil engineers, municipalities, and developers nationwide.



PERFORMANCE

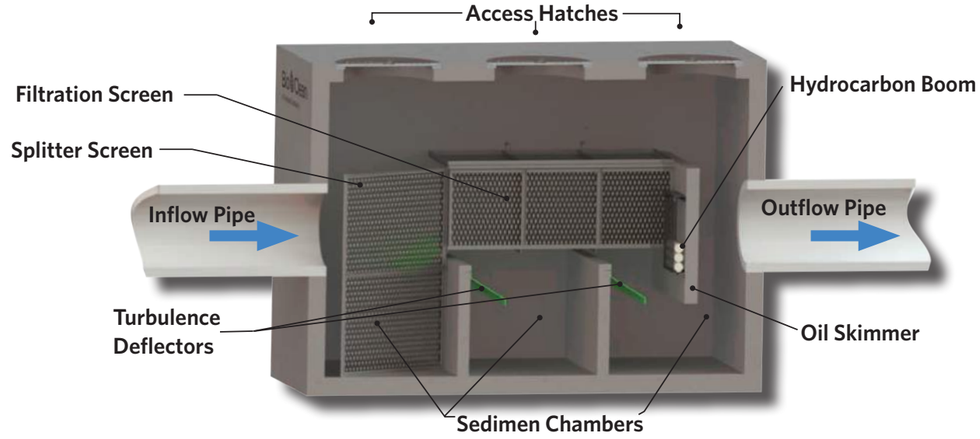
100% REMOVAL OF TRASH AND DEBRIS

- MEETS FULL CAPTURE REQUIREMENTS

ADVANTAGES

- DUAL-STAGE TREATMENT (SCREENING AND SEPARATION)
- ENHANCED 3-CHAMBERED SEPARATION
- SEPARATES TRASH AND DEBRIS FROM SEDIMENT AND WATER
- EASILY INSTALLED IN-LINE (LOW HEAD LOSS)

OPERATION



- **Splitter Screen** – Directs flows to the filtration screens and provides additional screen flow capacity. Non-clogging for continuous maintenance-free treatment.
- **Filtration Screen** – Collects and stores trash, debris, organics, and oxygen demanding substances above standing water in a dry state.
- **Turbulence Deflectors** – Prevent resuspension of captured pollutants.
- **Sediment Chambers** – Maximizes TSS removal and eliminates scouring during extreme flow rates.
- **Skimmer and Boom** – Collects hydrocarbons and controls flow velocity which improves removal efficiency.

SPECIFICATIONS

MODEL #	SURFACE LOADING AREA (sq.ft.)	STORAGE CAPACITY (cu. ft.)
DSBB-4-6	26	48
DSBB-4-8	32	70
DSBB-5-10	50	104
DSBB-6-12	72	149
DSBB-8-12	96	209
DSBB-8-14	112	244
DSBB-10-14	140	307
DSBB-11-16	176	470
DSBB-11-24	264	832
DSBB-11-34	374	1190

Filtration screens full sediment chambers 50% full.

SECTION 6.2

CD
(Prepared in Final Engineering)

SECTION 6.3

O&M Plans
Maintenance Agreements for BMP
(Prepared in Final Engineering)

SECTION 6.4: ATTACHMENT A

Education Materials
(Prepared in Final Engineering)

SECTION 6.4: ATTACHMENT B

Preliminary WQMP
(Prepared in Final Engineering)

SECTION 6.4: ATTACHMENT C

Geotechnical Report
(Prepared in Final Engineering)

SECTION 6.5: Calculations

WAP Report
Precipitation Data
Hydrologic Soil Map
10-Year Rational Method
10-Year Unit Hydrograph Method
10-Year Basin Analysis

SECTION 6.5: Attachment A

WAP Report
Precipitation Data
Hydrologic Soil Map

WQMP Project Report

County of San Bernardino Stormwater Program

Santa Ana River Watershed Geodatabase

Wednesday, November 25, 2020

Note: The information provided in this report and on the Stormwater Geodatabase for the County of San Bernardino Stormwater Program is intended to provide basic guidance in the preparation of the applicant's Water Quality Management Plan (WQMP) and should not be relied upon without independent verification.

Project Site Parcel Number (s):	306447107, 306461119, 306457111, 306461111, 306461139, 306462101, 306461130, 306461115, 306462102, 306463104, 306448114, 306461121, 306461120, 306462103, 306461108, 306461109, 306461113, 306463102, 306448112, 306461118, 306447104, 306461124, 306448113, 306461134, 306458103, 306457112, 306461137, 306463103, 306463101, 306463105, 306448116, 306447105, 306444101, 306460105, 306461135, 306461129, 306461138, 306461107, 306460107, 306461136, 306463107, 306457113, 306461114, 306458105, 306459113, 306460104, 306460106, 306448118, 306461140, 306461122
Project Site Acreage:	420.76
HCOC Exempt Area:	No
Closest Receiving Waters: (Applicant to verify based on local drainage facilities and topography.)	**System Number** - **Facility Name** - Oro Grande Wash **Owner** - SBCFCD
Closest channel segment's susceptibility to Hydromodification:	EHM
Highest downstream hydromodification susceptibility:	NULL
Is this drainage segment subject to TMDLs?	No
Are there downstream drainage segments subject to TMDLs?	No
Is this drainage segment a 303d listed stream?	No
Are there 303d listed streams downstream?	No
Are there unlined downstream waterbodies?	No
Project Site Onsite Soil Group(s):	A, B
Environmentally Sensitive Areas within 200':	DESERT TORTOISE HABITAT CAT 3
Groundwater Depth (FT):	No data available
Parcels with potential septic tanks within 1000':	Yes
Known Groundwater Contamination Plumes within 1000':	No
Studies and Reports Related to Project Site:	

NOAA Atlas 14, Volume 6, Version 2
Location name: Hesperia, California, USA*
Latitude: 34.4159°, Longitude: -117.3904°
Elevation: 3607.01 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	0.087 (0.072-0.106)	0.124 (0.102-0.151)	0.172 (0.142-0.211)	0.212 (0.173-0.262)	0.267 (0.211-0.341)	0.310 (0.240-0.404)	0.354 (0.267-0.473)	0.400 (0.294-0.550)	0.464 (0.327-0.665)	0.514 (0.350-0.762)
10-min	0.125 (0.103-0.152)	0.177 (0.147-0.217)	0.247 (0.203-0.302)	0.304 (0.248-0.375)	0.383 (0.303-0.489)	0.444 (0.344-0.579)	0.507 (0.383-0.678)	0.573 (0.421-0.788)	0.664 (0.468-0.953)	0.736 (0.501-1.09)
15-min	0.151 (0.125-0.184)	0.214 (0.177-0.262)	0.298 (0.246-0.366)	0.367 (0.300-0.454)	0.463 (0.366-0.591)	0.537 (0.416-0.700)	0.613 (0.463-0.820)	0.693 (0.509-0.953)	0.804 (0.566-1.15)	0.890 (0.606-1.32)
30-min	0.228 (0.189-0.278)	0.324 (0.268-0.396)	0.451 (0.371-0.552)	0.555 (0.454-0.686)	0.699 (0.553-0.893)	0.811 (0.628-1.06)	0.927 (0.700-1.24)	1.05 (0.769-1.44)	1.21 (0.855-1.74)	1.35 (0.915-2.00)
60-min	0.323 (0.267-0.394)	0.458 (0.379-0.560)	0.637 (0.525-0.781)	0.785 (0.642-0.970)	0.989 (0.782-1.26)	1.15 (0.888-1.50)	1.31 (0.990-1.75)	1.48 (1.09-2.04)	1.72 (1.21-2.46)	1.90 (1.30-2.82)
2-hr	0.473 (0.391-0.577)	0.641 (0.530-0.784)	0.869 (0.716-1.07)	1.06 (0.867-1.31)	1.33 (1.05-1.70)	1.54 (1.19-2.01)	1.76 (1.33-2.36)	2.00 (1.47-2.75)	2.33 (1.64-3.34)	2.59 (1.76-3.85)
3-hr	0.596 (0.494-0.728)	0.797 (0.659-0.974)	1.07 (0.882-1.31)	1.30 (1.06-1.61)	1.63 (1.29-2.08)	1.89 (1.46-2.46)	2.16 (1.63-2.89)	2.46 (1.81-3.38)	2.87 (2.02-4.12)	3.21 (2.19-4.77)
6-hr	0.849 (0.702-1.04)	1.12 (0.929-1.37)	1.50 (1.24-1.84)	1.82 (1.49-2.25)	2.28 (1.81-2.92)	2.66 (2.06-3.47)	3.05 (2.31-4.08)	3.48 (2.56-4.79)	4.10 (2.89-5.87)	4.60 (3.13-6.83)
12-hr	1.11 (0.918-1.35)	1.51 (1.24-1.84)	2.05 (1.69-2.51)	2.51 (2.05-3.10)	3.17 (2.51-4.06)	3.71 (2.87-4.84)	4.28 (3.23-5.72)	4.90 (3.60-6.73)	5.78 (4.07-8.29)	6.51 (4.43-9.66)
24-hr	1.50 (1.33-1.73)	2.11 (1.87-2.43)	2.93 (2.59-3.39)	3.63 (3.18-4.24)	4.64 (3.93-5.58)	5.45 (4.52-6.70)	6.31 (5.11-7.94)	7.23 (5.70-9.37)	8.56 (6.47-11.6)	9.65 (7.05-13.5)
2-day	1.73 (1.54-2.00)	2.43 (2.15-2.80)	3.40 (3.00-3.93)	4.23 (3.70-4.93)	5.43 (4.60-6.54)	6.41 (5.32-7.88)	7.46 (6.04-9.40)	8.61 (6.78-11.1)	10.3 (7.76-13.9)	11.6 (8.50-16.3)
3-day	1.86 (1.65-2.14)	2.61 (2.31-3.00)	3.65 (3.22-4.21)	4.55 (3.98-5.30)	5.86 (4.96-7.05)	6.94 (5.76-8.53)	8.10 (6.56-10.2)	9.37 (7.38-12.1)	11.2 (8.49-15.2)	12.8 (9.33-17.8)
4-day	2.00 (1.78-2.31)	2.81 (2.49-3.24)	3.93 (3.47-4.54)	4.91 (4.30-5.72)	6.33 (5.36-7.62)	7.50 (6.22-9.22)	8.76 (7.10-11.0)	10.1 (7.99-13.1)	12.2 (9.20-16.4)	13.9 (10.1-19.4)
7-day	2.25 (1.99-2.59)	3.13 (2.77-3.61)	4.36 (3.85-5.04)	5.42 (4.75-6.32)	6.97 (5.90-8.39)	8.24 (6.84-10.1)	9.62 (7.79-12.1)	11.1 (8.76-14.4)	13.3 (10.1-18.0)	15.1 (11.1-21.2)
10-day	2.40 (2.13-2.77)	3.34 (2.95-3.85)	4.63 (4.09-5.35)	5.75 (5.04-6.70)	7.37 (6.25-8.88)	8.71 (7.23-10.7)	10.1 (8.22-12.8)	11.7 (9.24-15.2)	14.0 (10.6-18.9)	15.9 (11.6-22.2)
20-day	2.89 (2.56-3.32)	3.99 (3.53-4.60)	5.52 (4.87-6.38)	6.84 (5.99-7.97)	8.74 (7.41-10.5)	10.3 (8.56-12.7)	12.0 (9.72-15.1)	13.8 (10.9-17.9)	16.5 (12.5-22.3)	18.8 (13.7-26.3)
30-day	3.40 (3.02-3.92)	4.68 (4.14-5.40)	6.45 (5.69-7.45)	7.96 (6.98-9.28)	10.2 (8.61-12.2)	12.0 (9.93-14.7)	13.9 (11.3-17.5)	16.1 (12.7-20.8)	19.2 (14.5-25.9)	21.8 (15.9-30.5)
45-day	4.06 (3.60-4.67)	5.51 (4.88-6.35)	7.51 (6.63-8.68)	9.24 (8.09-10.8)	11.7 (9.95-14.1)	13.8 (11.4-17.0)	16.0 (13.0-20.2)	18.5 (14.6-23.9)	22.1 (16.7-29.8)	25.1 (18.4-35.1)
60-day	4.63 (4.11-5.33)	6.19 (5.48-7.14)	8.34 (7.37-9.64)	10.2 (8.93-11.9)	12.9 (10.9-15.5)	15.1 (12.5-18.6)	17.5 (14.2-22.0)	20.2 (15.9-26.1)	24.1 (18.2-32.6)	27.5 (20.1-38.4)

[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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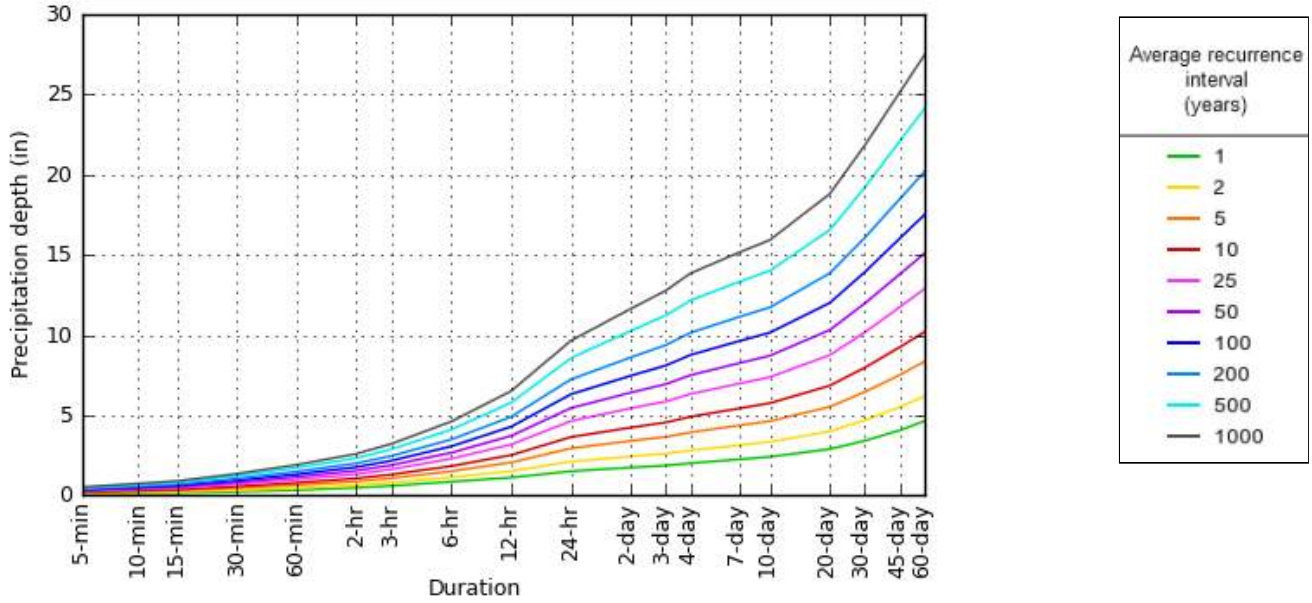
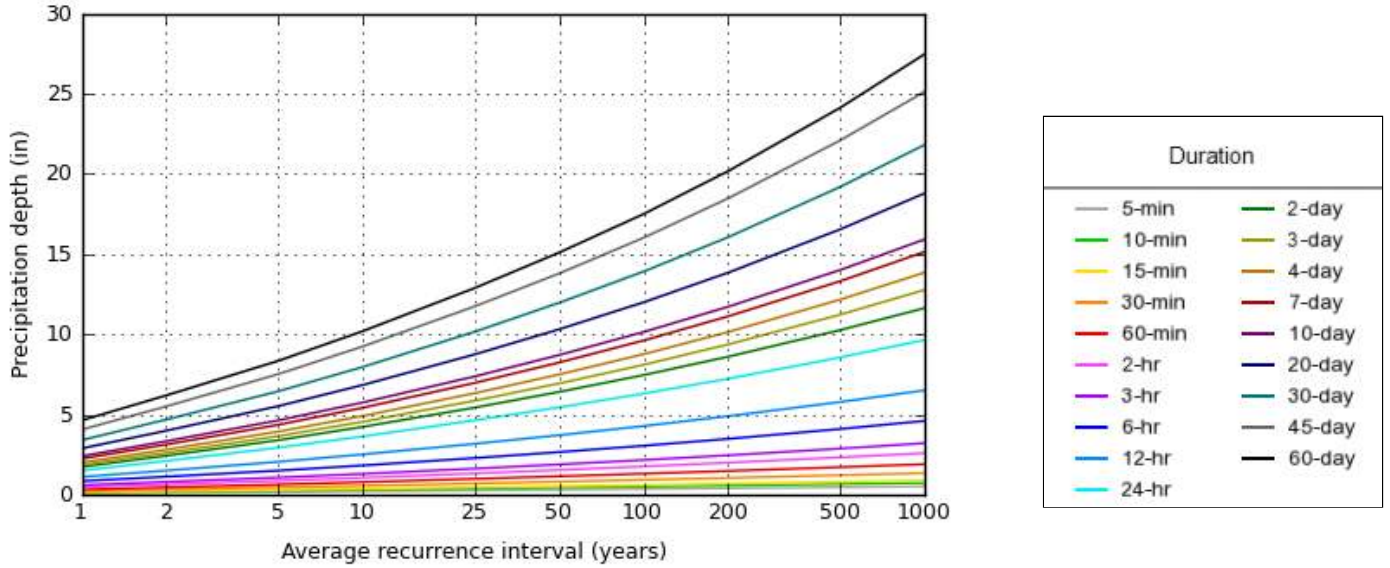
PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 34.4159°, Longitude: -117.3904°





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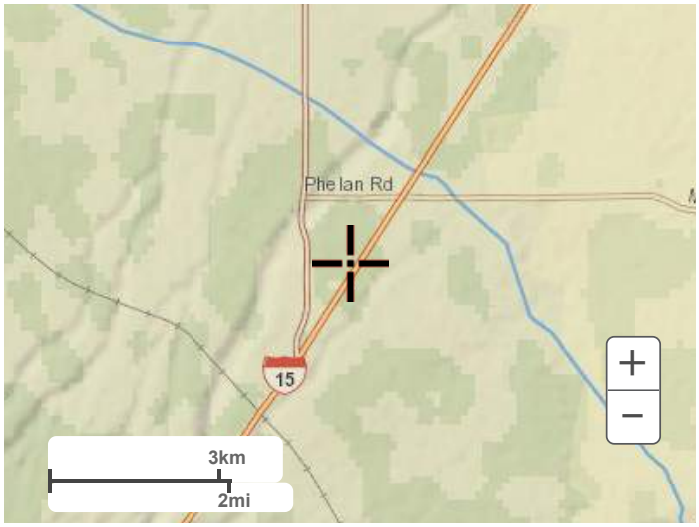
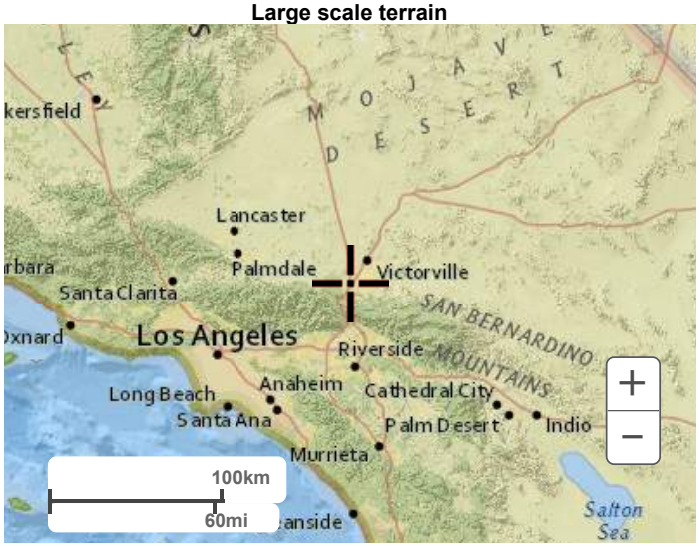
Maps & aerials

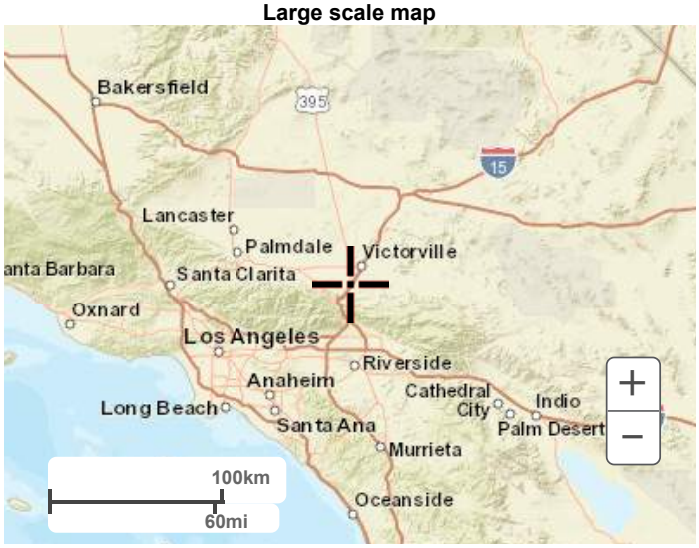
Small scale terrain



Large scale terrain



Large scale map



Large scale aerial

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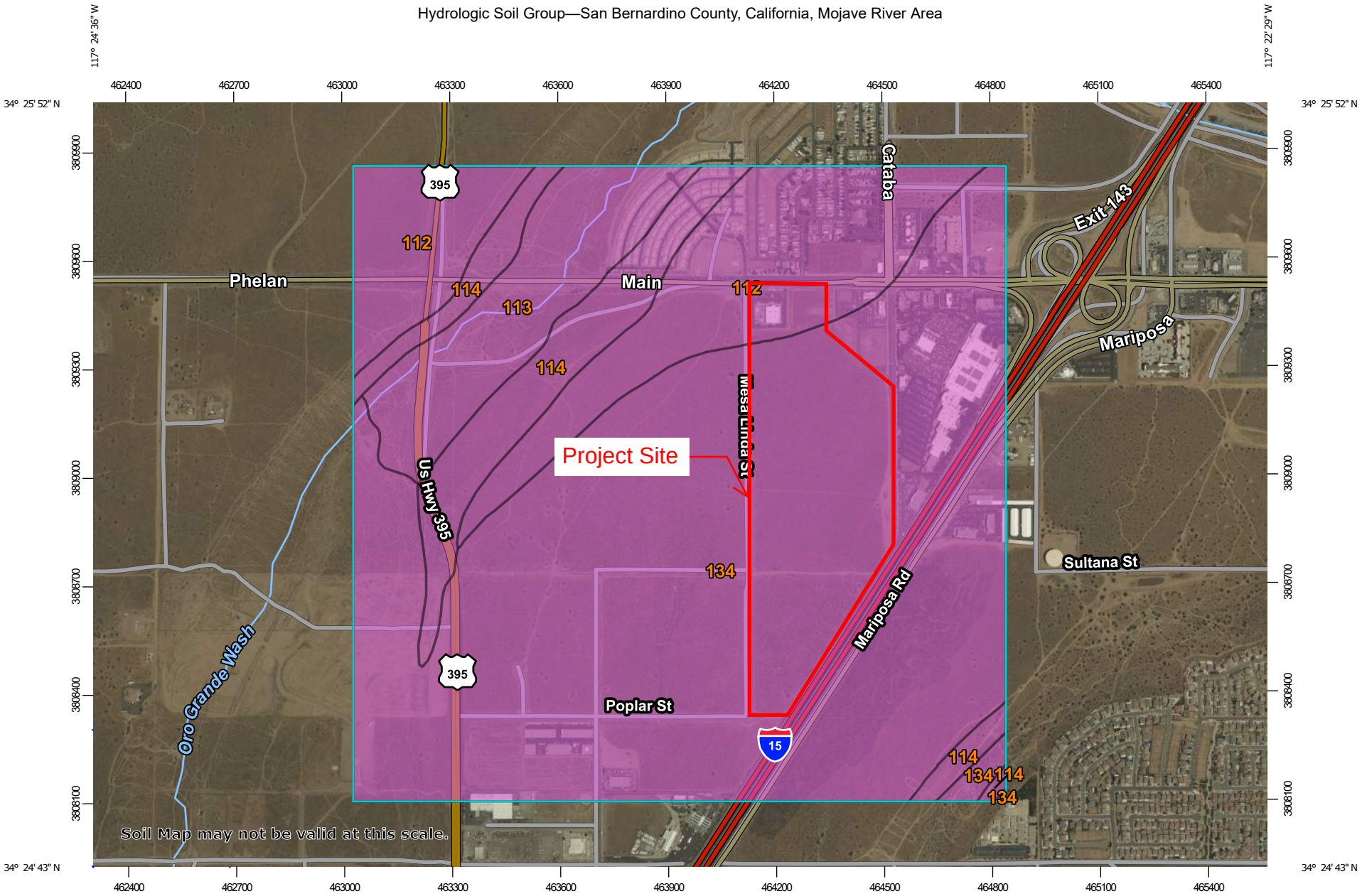
US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer



Map Scale: 1:14,900 if printed on A landscape (11" x 8.5") sheet.

N

0 200 400 800 1200 Meters

0 500 1000 2000 3000 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: San Bernardino County, California, Mojave River Area
Survey Area Data: Version 12, May 27, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 26, 2019—Jul 8, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
112	CAJON SAND, 0 TO 2 PERCENT SLOPES	A	137.5	17.4%
113	CAJON SAND, 2 TO 9 PERCENT SLOPES	A	65.4	8.3%
114	CAJON SAND, 9 TO 15 PERCENT SLOPES	A	66.7	8.4%
134	HESPERIA LOAMY FINE SAND, 2 TO 5 PERCENT SLOPES	A	521.5	65.9%
Totals for Area of Interest			**791.1**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

SECTION 6.5: Attachment B.1

10-Year Rational Method 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: 12/03/20

2020-326 HCC V
PRE-DEVELOPMENT CONDITIONS
RATIONAL METHOD - 10 YEAR STORM
DA A

Program License Serial Number 6277

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.785 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 1.100 to Point/Station 1.200
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
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) = 67.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.578(In/Hr)
Initial subarea data:
Initial area flow distance = 795.710(Ft.)
Top (of initial area) elevation = 3603.050(Ft.)
Bottom (of initial area) elevation = 3587.160(Ft.)
Difference in elevation = 15.890(Ft.)
Slope = 0.01997 s(%)= 2.00
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 16.611 min.
Rainfall intensity = 1.929(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.630
Subarea runoff = 10.806(CFS)

```
Total initial stream area =        8.890(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.578(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.200 to Point/Station        1.300
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.213(Ft.), Average velocity =   2.473(Ft/s)
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              0.30
        2             50.00              0.00
        3            100.00              0.30
Manning's 'N' friction factor =   0.020
------------------------------------------------------------------
Sub-Channel flow  =     18.696(CFS)
  '     '        flow top width =     70.994(Ft.)
  '     '    velocity=    2.473(Ft/s)
  '     '        area =      7.560(Sq.Ft)
  '     '        Froude number =     1.335

Upstream point elevation =  3587.160(Ft.)
Downstream point elevation =  3542.420(Ft.)
Flow length =  2038.410(Ft.)
Travel time  =   13.74 min.
Time of concentration =   30.35 min.
Depth of flow =   0.213(Ft.)
Average velocity =   2.473(Ft/s)
Total irregular channel flow =    18.696(CFS)
Irregular channel normal depth above invert elev. =   0.213(Ft.)
Average velocity of channel(s) =   2.473(Ft/s)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
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)  = 67.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.578(In/Hr)
Rainfall intensity =      1.265(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.489
Subarea runoff =     15.724(CFS) for   34.040(Ac.)
Total runoff =     26.530(CFS)
Effective area this stream =       42.93(Ac.)
```

Total Study Area (Main Stream No. 1) = 42.93(Ac.)
Area averaged Fm value = 0.578(In/Hr)
Depth of flow = 0.243(Ft.), Average velocity = 2.699(Ft/s)
End of computations, Total Study Area = 42.93 (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) = 1.000
Area averaged SCS curve number = 67.0

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: 11/29/20

2020-326 HCC V
PRE-DEVELOPMENT CONDITIONS
RATIONAL METHOD - 10 YEAR STORM
DA B

Program License Serial Number 6277

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.785 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 2.100 to Point/Station 2.200
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
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) = 67.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.578(In/Hr)
Initial subarea data:
Initial area flow distance = 334.940(Ft.)
Top (of initial area) elevation = 3574.000(Ft.)
Bottom (of initial area) elevation = 3566.010(Ft.)
Difference in elevation = 7.990(Ft.)
Slope = 0.02386 s(%)= 2.39
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 11.340 min.
Rainfall intensity = 2.520(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.693
Subarea runoff = 7.757(CFS)

```
Total initial stream area =        4.440(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.578(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.200 to Point/Station        2.300
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.193(Ft.), Average velocity =   2.299(Ft/s)
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              0.35
        2             50.00              0.00
        3            100.00              0.35
Manning's 'N' friction factor =   0.020
------------------------------------------------------------------
Sub-Channel flow  =     12.258(CFS)
  '     '        flow top width =     55.196(Ft.)
  '     '    velocity=    2.299(Ft/s)
  '     '        area =      5.332(Sq.Ft)
  '     '        Froude number =     1.304

Upstream point elevation =  3566.010(Ft.)
Downstream point elevation =  3545.120(Ft.)
Flow length =   966.880(Ft.)
Travel time  =    7.01 min.
Time of concentration =   18.35 min.
Depth of flow =   0.193(Ft.)
Average velocity =   2.299(Ft/s)
Total irregular channel flow =    12.258(CFS)
Irregular channel normal depth above invert elev. =   0.193(Ft.)
Average velocity of channel(s) =   2.299(Ft/s)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
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)  = 67.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.578(In/Hr)
Rainfall intensity =      1.799(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.611
Subarea runoff =      8.942(CFS) for   10.760(Ac.)
Total runoff =     16.699(CFS)
Effective area this stream =       15.20(Ac.)
```

Total Study Area (Main Stream No. 1) = 15.20(Ac.)
Area averaged Fm value = 0.578(In/Hr)
Depth of flow = 0.217(Ft.), Average velocity = 2.484(Ft/s)
End of computations, Total Study Area = 15.20 (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) = 1.000
Area averaged SCS curve number = 67.0

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: 11/29/20

2020-326 HCC V
PRE-DEVELOPMENT CONDITIONS
RATIONAL METHOD - 10 YEAR STORM
DA C

Program License Serial Number 6277

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.785 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 3.100 to Point/Station 3.200
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
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) = 67.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.578(In/Hr)
Initial subarea data:
Initial area flow distance = 519.560(Ft.)
Top (of initial area) elevation = 3566.000(Ft.)
Bottom (of initial area) elevation = 3553.310(Ft.)
Difference in elevation = 12.690(Ft.)
Slope = 0.02442 s(%)= 2.44
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 13.454 min.
Rainfall intensity = 2.236(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.667
Subarea runoff = 2.327(CFS)

```
Total initial stream area =        1.560(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.578(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.200 to Point/Station        3.300
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.109(Ft.), Average velocity =   1.580(Ft/s)
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              0.30
        2             50.00              0.00
        3            100.00              0.30
Manning's 'N' friction factor =   0.020
------------------------------------------------------------------
Sub-Channel flow  =      3.103(CFS)
  '     '        flow top width =     36.184(Ft.)
  '     '    velocity=    1.580(Ft/s)
  '     '        area =      1.964(Sq.Ft)
  '     '        Froude number =     1.195

Upstream point elevation =  3553.310(Ft.)
Downstream point elevation =  3547.370(Ft.)
Flow length =   269.850(Ft.)
Travel time  =    2.85 min.
Time of concentration =   16.30 min.
Depth of flow =   0.109(Ft.)
Average velocity =   1.580(Ft/s)
Total irregular channel flow =     3.103(CFS)
Irregular channel normal depth above invert elev. =   0.109(Ft.)
Average velocity of channel(s) =   1.580(Ft/s)
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
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)  = 67.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.578(In/Hr)
Rainfall intensity =      1.955(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.634
Subarea runoff =      1.501(CFS) for    1.530(Ac.)
Total runoff =      3.827(CFS)
Effective area this stream =        3.09(Ac.)
```

Total Study Area (Main Stream No. 1) = 3.09(Ac.)
Area averaged Fm value = 0.578(In/Hr)
Depth of flow = 0.117(Ft.), Average velocity = 1.665(Ft/s)
End of computations, Total Study Area = 3.09 (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) = 1.000
Area averaged SCS curve number = 67.0

SECTION 6.5: Attachment B.2

10-Year Rational Method 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: 12/06/20

2020-326 HCC V
POST-DEVELOPMENT CONDITIONS
RATIONAL METHOD - 10 YEAR STORM
DA A

Program License Serial Number 6277

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.785 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 1.100 to Point/Station 1.200
**** 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
Pervious ratio(Ap) = 0.2700 Max loss rate(Fm)= 0.264(In/Hr)
Initial subarea data:
Initial area flow distance = 541.690(Ft.)
Top (of initial area) elevation = 3579.900(Ft.)
Bottom (of initial area) elevation = 3565.090(Ft.)
Difference in elevation = 14.810(Ft.)
Slope = 0.02734 s(%)= 2.73
TC = k(0.341)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 8.690 min.
Rainfall intensity = 3.036(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.822
Subarea runoff = 17.587(CFS)
Total initial stream area = 7.050(Ac.)
Pervious area fraction = 0.270
Initial area Fm value = 0.264(In/Hr)

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.200 to Point/Station        2.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  3561.090(Ft.)
Downstream point/station elevation =  3558.170(Ft.)
Pipe length  =   584.04(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    17.587(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    17.587(CFS)
Normal flow depth in pipe =   18.33(In.)
Flow top width inside pipe =   25.21(In.)
Critical Depth =   17.57(In.)
Pipe flow velocity =      6.12(Ft/s)
Travel time through pipe =    1.59 min.
Time of concentration (TC) =    10.28 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.300 to Point/Station        2.300
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      7.050(Ac.)
Runoff from this stream =     17.587(CFS)
Time of concentration =   10.28 min.
Rainfall intensity =     2.699(In/Hr)
Area averaged loss rate (Fm) =    0.2640(In/Hr)
Area averaged Pervious ratio (Ap) = 0.2700


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.100 to Point/Station        2.200
**** 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
Pervious ratio(Ap) = 0.3100     Max loss rate(Fm)=     0.303(In/Hr)
Initial subarea data:
Initial area flow distance =  1000.000(Ft.)
Top (of initial area) elevation =  3600.940(Ft.)
Bottom (of initial area) elevation =  3563.660(Ft.)
Difference in elevation =    37.280(Ft.)
Slope =    0.03728  s(%)=       3.73
TC = k(0.351)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.739 min.
Rainfall intensity =      2.618(In/Hr) for a    10.0 year storm
```

```
Effective runoff coefficient used for area (Q=KCIA) is C = 0.796
Subarea runoff =      5.437(CFS)
Total initial stream area =        2.610(Ac.)
Pervious area fraction = 0.310
Initial area Fm value =    0.303(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.200 to Point/Station        2.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  3558.220(Ft.)
Downstream point/station elevation =  3558.170(Ft.)
Pipe length  =    10.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     5.437(CFS)
Nearest computed pipe diameter  =     18.00(In.)
Calculated individual pipe flow  =     5.437(CFS)
Normal flow depth in pipe =   11.44(In.)
Flow top width inside pipe =   17.33(In.)
Critical Depth =   10.79(In.)
Pipe flow velocity =      4.59(Ft/s)
Travel time through pipe =    0.04 min.
Time of concentration (TC) =    10.77 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.300 to Point/Station        2.300
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      2.610(Ac.)
Runoff from this stream =      5.437(CFS)
Time of concentration =   10.77 min.
Rainfall intensity =     2.611(In/Hr)
Area averaged loss rate (Fm) =    0.3031(In/Hr)
Area averaged Pervious ratio (Ap) = 0.3100
Summary of stream data:

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


1     17.59     7.050     10.28    0.264      2.699
2      5.44     2.610     10.77    0.303      2.611
Qmax(1) =
           1.000 *    1.000 *    17.587) +
           1.038 *    0.954 *     5.437) + =      22.971
Qmax(2) =
           0.964 *    1.000 *    17.587) +
           1.000 *    1.000 *     5.437) + =      22.392
```

```
Total of 2 streams to confluence:
Flow rates before confluence point:
      17.587       5.437
Maximum flow rates at confluence using above data:
       22.971       22.392
Area of streams before confluence:
        7.050        2.610
Effective area values after confluence:
        9.540        9.660
Results of confluence:
Total flow rate =     22.971(CFS)
Time of concentration =    10.279 min.
Effective stream area after confluence =      9.540(Ac.)
Study area average Pervious fraction(Ap) =  0.281
Study area average soil loss rate(Fm) =    0.275(In/Hr)
Study area total (this main stream) =       9.66(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.300 to Point/Station        3.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  3558.170(Ft.)
Downstream point/station elevation =  3552.860(Ft.)
Pipe length  =  1062.43(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    22.971(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    22.971(CFS)
Normal flow depth in pipe =   20.16(In.)
Flow top width inside pipe =   28.17(In.)
Critical Depth =   19.57(In.)
Pipe flow velocity =      6.55(Ft/s)
Travel time through pipe =    2.70 min.
Time of concentration (TC) =    12.98 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.300 to Point/Station        3.300
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      9.540(Ac.)
Runoff from this stream =     22.971(CFS)
Time of concentration =   12.98 min.
Rainfall intensity =     2.292(In/Hr)
Area averaged loss rate (Fm) =    0.2746(In/Hr)
Area averaged Pervious ratio (Ap) = 0.2808
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.100 to Point/Station        3.200
**** 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
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.098(In/Hr)
Initial subarea data:
Initial area flow distance =  1000.000(Ft.)
Top (of initial area) elevation =  3570.000(Ft.)
Bottom (of initial area) elevation =  3558.220(Ft.)
Difference in elevation =    11.780(Ft.)
Slope =    0.01178  s(%)=       1.18
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.712 min.
Rainfall intensity =      2.463(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.864
Subarea runoff =     25.867(CFS)
Total initial stream area =       12.150(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.098(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.200 to Point/Station        3.200
**** SUBAREA FLOW ADDITION ****
_____________________________________________________________________________
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
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.098(In/Hr)
Time of concentration =    11.71 min.
Rainfall intensity =      2.463(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.864
Subarea runoff =     27.017(CFS) for   12.690(Ac.)
Total runoff =     52.884(CFS)
Effective area this stream =       24.84(Ac.)
Total Study Area (Main Stream No. 1) =       34.50(Ac.)
Area averaged Fm value =    0.098(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
```

```
Process from Point/Station        3.200 to Point/Station        3.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
------------------------------------------------------------------------
Upstream point/station elevation =  3553.420(Ft.)
Downstream point/station elevation =  3552.860(Ft.)
Pipe length  =   111.97(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    52.884(CFS)
Nearest computed pipe diameter  =     39.00(In.)
Calculated individual pipe flow  =    52.884(CFS)
Normal flow depth in pipe =   29.06(In.)
Flow top width inside pipe =   33.99(In.)
Critical Depth =   27.88(In.)
Pipe flow velocity =      7.97(Ft/s)
Travel time through pipe =    0.23 min.
Time of concentration (TC) =    11.95 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.300 to Point/Station        3.300
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 2
Stream flow area =     24.840(Ac.)
Runoff from this stream =     52.884(CFS)
Time of concentration =   11.95 min.
Rainfall intensity =     2.429(In/Hr)
Area averaged loss rate (Fm) =    0.0978(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     22.97     9.540     12.98    0.275      2.292
2     52.88    24.840     11.95    0.098      2.429
Qmax(1) =
           1.000 *    1.000 *    22.971) +
           0.941 *    1.000 *    52.884) + =      72.741
Qmax(2) =
           1.068 *    0.920 *    22.971) +
           1.000 *    1.000 *    52.884) + =      75.462

Total of 2 streams to confluence:
Flow rates before confluence point:
      22.971      52.884
Maximum flow rates at confluence using above data:
       72.741       75.462
Area of streams before confluence:
        9.540       24.840
```

```
Effective area values after confluence:
       34.380       33.619
Results of confluence:
Total flow rate =     75.462(CFS)
Time of concentration =    11.946 min.
Effective stream area after confluence =     33.619(Ac.)
Study area average Pervious fraction(Ap) =  0.150
Study area average soil loss rate(Fm) =    0.147(In/Hr)
Study area total (this main stream) =      34.38(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.300 to Point/Station        3.400
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  3552.860(Ft.)
Downstream point/station elevation =  3549.380(Ft.)
Pipe length  =   695.90(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    75.462(CFS)
Nearest computed pipe diameter  =     45.00(In.)
Calculated individual pipe flow  =    75.462(CFS)
Normal flow depth in pipe =   32.81(In.)
Flow top width inside pipe =   40.00(In.)
Critical Depth =   32.10(In.)
Pipe flow velocity =      8.74(Ft/s)
Travel time through pipe =    1.33 min.
Time of concentration (TC) =    13.27 min.
End of computations, Total Study Area =           34.50 (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) = 0.151
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: 12/06/20

2020-326 HCC V
POST-DEVELOPMENT CONDITIONS
RATIONAL METHOD - 10 YEAR STORM
DA B

Program License Serial Number 6277

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.785 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 4.100 to Point/Station 4.200
**** 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
Pervious ratio(Ap) = 0.1000 Max loss rate(Fm)= 0.098(In/Hr)
Initial subarea data:
Initial area flow distance = 425.600(Ft.)
Top (of initial area) elevation = 3570.000(Ft.)
Bottom (of initial area) elevation = 3564.860(Ft.)
Difference in elevation = 5.140(Ft.)
Slope = 0.01208 s(%)= 1.21
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 8.281 min.
Rainfall intensity = 3.140(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.872
Subarea runoff = 4.928(CFS)

```
Total initial stream area =        1.800(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.098(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        4.200 to Point/Station        4.200
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________________
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
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.098(In/Hr)
Time of concentration =     8.28 min.
Rainfall intensity =      3.140(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.872
Subarea runoff =     57.743(CFS) for   21.090(Ac.)
Total runoff =     62.671(CFS)
Effective area this stream =       22.89(Ac.)
Total Study Area (Main Stream No. 1) =       22.89(Ac.)
Area averaged Fm value =    0.098(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        4.200 to Point/Station        5.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
______________________________________________________________________________
Upstream point/station elevation =  3560.860(Ft.)
Downstream point/station elevation =  3551.510(Ft.)
Pipe length  =  1869.51(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    62.671(CFS)
Nearest computed pipe diameter  =     42.00(In.)
Calculated individual pipe flow  =    62.671(CFS)
Normal flow depth in pipe =   30.61(In.)
Flow top width inside pipe =   37.34(In.)
Critical Depth =   29.76(In.)
Pipe flow velocity =      8.35(Ft/s)
Travel time through pipe =    3.73 min.
Time of concentration (TC) =    12.01 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.300 to Point/Station        5.300
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
```

```
Stream flow area =     22.890(Ac.)
Runoff from this stream =     62.671(CFS)
Time of concentration =   12.01 min.
Rainfall intensity =     2.420(In/Hr)
Area averaged loss rate (Fm) =    0.0978(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.100 to Point/Station        5.200
**** 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
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.098(In/Hr)
Initial subarea data:
Initial area flow distance =   390.280(Ft.)
Top (of initial area) elevation =  3569.160(Ft.)
Bottom (of initial area) elevation =  3560.630(Ft.)
Difference in elevation =     8.530(Ft.)
Slope =    0.02186  s(%)=       2.19
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    7.104 min.
Rainfall intensity =      3.496(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.875
Subarea runoff =     11.682(CFS)
Total initial stream area =        3.820(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.098(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.200 to Point/Station        5.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  3553.130(Ft.)
Downstream point/station elevation =  3551.510(Ft.)
Pipe length  =   323.11(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    11.682(CFS)
Nearest computed pipe diameter  =     24.00(In.)
Calculated individual pipe flow  =    11.682(CFS)
Normal flow depth in pipe =   15.21(In.)
Flow top width inside pipe =   23.12(In.)
Critical Depth =   14.72(In.)
Pipe flow velocity =      5.56(Ft/s)
Travel time through pipe =    0.97 min.
```

```
Time of concentration (TC) =     8.07 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.300 to Point/Station        5.300
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      3.820(Ac.)
Runoff from this stream =     11.682(CFS)
Time of concentration =    8.07 min.
Rainfall intensity =     3.197(In/Hr)
Area averaged loss rate (Fm) =    0.0978(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     62.67    22.890     12.01    0.098      2.420
2     11.68     3.820      8.07    0.098      3.197
Qmax(1) =
           1.000 *    1.000 *    62.671) +
           0.749 *    1.000 *    11.682) + =      71.424
Qmax(2) =
           1.335 *    0.672 *    62.671) +
           1.000 *    1.000 *    11.682) + =      67.873

Total of 2 streams to confluence:
Flow rates before confluence point:
      62.671      11.682
Maximum flow rates at confluence using above data:
       71.424       67.873
Area of streams before confluence:
       22.890        3.820
Effective area values after confluence:
       26.710       19.199
Results of confluence:
Total flow rate =     71.424(CFS)
Time of concentration =    12.014 min.
Effective stream area after confluence =     26.710(Ac.)
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.098(In/Hr)
Study area total (this main stream) =      26.71(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.300 to Point/Station        5.400
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
```

Upstream point/station elevation = 3551.510(Ft.)
Downstream point/station elevation = 3550.990(Ft.)
Pipe length = 105.12(Ft.) Manning's N = 0.013
No. of pipes = 1 Required pipe flow = 71.424(CFS)
Nearest computed pipe diameter = 45.00(In.)
Calculated individual pipe flow = 71.424(CFS)
Normal flow depth in pipe = 31.59(In.)
Flow top width inside pipe = 41.16(In.)
Critical Depth = 31.25(In.)
Pipe flow velocity = 8.63(Ft/s)
Travel time through pipe = 0.20 min.
Time of concentration (TC) = 12.22 min.
End of computations, Total Study Area = 26.71 (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

SECTION 6.5: Attachment C.1

10-Year Unit Hydrograph Pre-Development Conditions

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

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Study date 12/03/20

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

Program License Serial Number 6277

2020-326 HCC V
PRE-DEVELOPMENT CONDITIONS
UNIT HYDROGRAPH - 10 YEAR STORM
DA A

Storm Event Year = 10

Antecedent Moisture Condition = 2

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 10		
42.92	1	0.79
Rainfall data for year 2		
42.92	6	1.12
Rainfall data for year 2		
42.92	24	2.11
Rainfall data for year 100		

```
            42.92            1            1.31
------------------------------------------------------------------------
Rainfall data for year 100
            42.92            6            3.05
------------------------------------------------------------------------
Rainfall data for year 100
            42.92           24            6.31
------------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

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


SCS curve  SCS curve     Area     Area     Fp(Fig C6)    Ap      Fm
No.(AMCII) NO.(AMC 2)    (Ac.)    Fraction     (In/Hr)  (dec.)   (In/Hr)
 67.0      67.0         42.92      1.000     0.578    1.000    0.578

Area-averaged adjusted loss rate Fm (In/Hr) =  0.578

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

Area       Area          SCS CN    SCS CN      S     Pervious
 (Ac.)      Fract         (AMC2)    (AMC2)           Yield Fr
    42.92   1.000         67.0      67.0       4.93     0.273

Area-averaged catchment yield fraction, Y =  0.273
Area-averaged low loss fraction, Yb =  0.727
User entry of time of concentration  =   0.506 (hours)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watershed area =      42.92(Ac.)
Catchment Lag time =   0.405 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 20.5863
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.578(In/Hr)
Average low loss rate fraction (Yb) = 0.727 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall =  0.372(In)
Computed peak 30-minute rainfall =  0.638(In)
Specified peak 1-hour rainfall =  0.785(In)
Computed peak 3-hour rainfall =  1.356(In)
Specified peak 6-hour rainfall =  1.914(In)
Specified peak 24-hour rainfall =  3.838(In)


Rainfall depth area reduction factors:
Using a total area of      42.92(Ac.) (Ref: fig. E-4)

5-minute factor = 0.998     Adjusted rainfall =  0.372(In)
30-minute factor = 0.998    Adjusted rainfall =  0.636(In)
```

1-hour factor = 0.998 Adjusted rainfall = 0.783(In)
3-hour factor = 1.000 Adjusted rainfall = 1.355(In)
6-hour factor = 1.000 Adjusted rainfall = 1.914(In)
24-hour factor = 1.000 Adjusted rainfall = 3.838(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 = 519.06 (CFS))	
1	1.033	5.361
2	4.725	19.163
3	12.013	37.833
4	28.066	83.324
5	45.124	88.541
6	56.476	58.923
7	63.994	39.026
8	69.530	28.736
9	73.935	22.863
10	77.525	18.632
11	80.431	15.087
12	82.868	12.649
13	85.001	11.071
14	86.912	9.920
15	88.543	8.463
16	89.843	6.752
17	91.022	6.116
18	92.092	5.558
19	93.055	4.998
20	93.930	4.538
21	94.649	3.732
22	95.347	3.625
23	95.943	3.094
24	96.478	2.778
25	96.972	2.562
26	97.349	1.959
27	97.713	1.889
28	97.961	1.288
29	98.167	1.069
30	98.388	1.147
31	98.635	1.280
32	98.882	1.282
33	99.129	1.282
34	99.376	1.282
35	99.564	0.977
36	99.693	0.668
37	99.821	0.668

38	100.000	0.334

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.3717	0.3717
2	0.4577	0.0859
3	0.5169	0.0592
4	0.5635	0.0466
5	0.6025	0.0390
6	0.6363	0.0339
7	0.6665	0.0301
8	0.6937	0.0272
9	0.7186	0.0249
10	0.7417	0.0231
11	0.7632	0.0215
12	0.7834	0.0202
13	0.8153	0.0319
14	0.8461	0.0307
15	0.8757	0.0296
16	0.9044	0.0287
17	0.9321	0.0278
18	0.9591	0.0270
19	0.9853	0.0262
20	1.0109	0.0255
21	1.0358	0.0249
22	1.0601	0.0243
23	1.0839	0.0238
24	1.1072	0.0233
25	1.1300	0.0228
26	1.1523	0.0223
27	1.1742	0.0219
28	1.1957	0.0215
29	1.2168	0.0211
30	1.2376	0.0208
31	1.2580	0.0204
32	1.2781	0.0201
33	1.2979	0.0198
34	1.3174	0.0195
35	1.3366	0.0192
36	1.3555	0.0189
37	1.3741	0.0186
38	1.3924	0.0184
39	1.4106	0.0181
40	1.4284	0.0179
41	1.4461	0.0177
42	1.4635	0.0174
43	1.4808	0.0172
44	1.4978	0.0170
45	1.5147	0.0168
46	1.5313	0.0167

47	1.5478	0.0165
48	1.5641	0.0163
49	1.5802	0.0161
50	1.5962	0.0160
51	1.6120	0.0158
52	1.6277	0.0157
53	1.6432	0.0155
54	1.6585	0.0154
55	1.6737	0.0152
56	1.6888	0.0151
57	1.7037	0.0149
58	1.7185	0.0148
59	1.7332	0.0147
60	1.7478	0.0146
61	1.7622	0.0144
62	1.7765	0.0143
63	1.7907	0.0142
64	1.8048	0.0141
65	1.8188	0.0140
66	1.8327	0.0139
67	1.8464	0.0138
68	1.8601	0.0137
69	1.8737	0.0136
70	1.8871	0.0135
71	1.9005	0.0134
72	1.9138	0.0133
73	1.9271	0.0133
74	1.9403	0.0132
75	1.9534	0.0131
76	1.9664	0.0130
77	1.9794	0.0129
78	1.9922	0.0129
79	2.0050	0.0128
80	2.0177	0.0127
81	2.0303	0.0126
82	2.0429	0.0125
83	2.0553	0.0125
84	2.0677	0.0124
85	2.0800	0.0123
86	2.0923	0.0122
87	2.1045	0.0122
88	2.1166	0.0121
89	2.1286	0.0120
90	2.1406	0.0120
91	2.1525	0.0119
92	2.1643	0.0118
93	2.1761	0.0118
94	2.1878	0.0117
95	2.1994	0.0117
96	2.2110	0.0116

97	2.2226	0.0115
98	2.2340	0.0115
99	2.2455	0.0114
100	2.2568	0.0114
101	2.2681	0.0113
102	2.2794	0.0112
103	2.2905	0.0112
104	2.3017	0.0111
105	2.3128	0.0111
106	2.3238	0.0110
107	2.3348	0.0110
108	2.3457	0.0109
109	2.3566	0.0109
110	2.3674	0.0108
111	2.3782	0.0108
112	2.3889	0.0107
113	2.3996	0.0107
114	2.4102	0.0106
115	2.4208	0.0106
116	2.4314	0.0105
117	2.4418	0.0105
118	2.4523	0.0105
119	2.4627	0.0104
120	2.4731	0.0104
121	2.4834	0.0103
122	2.4937	0.0103
123	2.5039	0.0102
124	2.5141	0.0102
125	2.5243	0.0102
126	2.5344	0.0101
127	2.5445	0.0101
128	2.5545	0.0100
129	2.5645	0.0100
130	2.5745	0.0100
131	2.5844	0.0099
132	2.5943	0.0099
133	2.6041	0.0098
134	2.6139	0.0098
135	2.6237	0.0098
136	2.6334	0.0097
137	2.6431	0.0097
138	2.6528	0.0097
139	2.6624	0.0096
140	2.6720	0.0096
141	2.6816	0.0096
142	2.6911	0.0095
143	2.7006	0.0095
144	2.7101	0.0095
145	2.7195	0.0094
146	2.7289	0.0094

147	2.7383	0.0094
148	2.7476	0.0093
149	2.7569	0.0093
150	2.7662	0.0093
151	2.7754	0.0092
152	2.7846	0.0092
153	2.7938	0.0092
154	2.8029	0.0092
155	2.8121	0.0091
156	2.8212	0.0091
157	2.8302	0.0091
158	2.8393	0.0090
159	2.8483	0.0090
160	2.8572	0.0090
161	2.8662	0.0089
162	2.8751	0.0089
163	2.8840	0.0089
164	2.8929	0.0089
165	2.9017	0.0088
166	2.9105	0.0088
167	2.9193	0.0088
168	2.9281	0.0088
169	2.9368	0.0087
170	2.9455	0.0087
171	2.9542	0.0087
172	2.9629	0.0087
173	2.9715	0.0086
174	2.9801	0.0086
175	2.9887	0.0086
176	2.9972	0.0086
177	3.0058	0.0085
178	3.0143	0.0085
179	3.0228	0.0085
180	3.0312	0.0085
181	3.0397	0.0084
182	3.0481	0.0084
183	3.0565	0.0084
184	3.0649	0.0084
185	3.0732	0.0083
186	3.0815	0.0083
187	3.0898	0.0083
188	3.0981	0.0083
189	3.1064	0.0083
190	3.1146	0.0082
191	3.1228	0.0082
192	3.1310	0.0082
193	3.1392	0.0082
194	3.1474	0.0082
195	3.1555	0.0081
196	3.1636	0.0081

197	3.1717	0.0081
198	3.1798	0.0081
199	3.1878	0.0081
200	3.1959	0.0080
201	3.2039	0.0080
202	3.2119	0.0080
203	3.2198	0.0080
204	3.2278	0.0080
205	3.2357	0.0079
206	3.2436	0.0079
207	3.2515	0.0079
208	3.2594	0.0079
209	3.2672	0.0079
210	3.2751	0.0078
211	3.2829	0.0078
212	3.2907	0.0078
213	3.2985	0.0078
214	3.3062	0.0078
215	3.3140	0.0077
216	3.3217	0.0077
217	3.3294	0.0077
218	3.3371	0.0077
219	3.3448	0.0077
220	3.3525	0.0077
221	3.3601	0.0076
222	3.3677	0.0076
223	3.3753	0.0076
224	3.3829	0.0076
225	3.3905	0.0076
226	3.3980	0.0076
227	3.4056	0.0075
228	3.4131	0.0075
229	3.4206	0.0075
230	3.4281	0.0075
231	3.4356	0.0075
232	3.4430	0.0075
233	3.4505	0.0074
234	3.4579	0.0074
235	3.4653	0.0074
236	3.4727	0.0074
237	3.4801	0.0074
238	3.4874	0.0074
239	3.4948	0.0073
240	3.5021	0.0073
241	3.5094	0.0073
242	3.5167	0.0073
243	3.5240	0.0073
244	3.5313	0.0073
245	3.5385	0.0073
246	3.5458	0.0072

247	3.5530	0.0072
248	3.5602	0.0072
249	3.5674	0.0072
250	3.5746	0.0072
251	3.5818	0.0072
252	3.5889	0.0072
253	3.5961	0.0071
254	3.6032	0.0071
255	3.6103	0.0071
256	3.6174	0.0071
257	3.6245	0.0071
258	3.6316	0.0071
259	3.6386	0.0071
260	3.6457	0.0070
261	3.6527	0.0070
262	3.6597	0.0070
263	3.6667	0.0070
264	3.6737	0.0070
265	3.6807	0.0070
266	3.6877	0.0070
267	3.6946	0.0070
268	3.7015	0.0069
269	3.7085	0.0069
270	3.7154	0.0069
271	3.7223	0.0069
272	3.7292	0.0069
273	3.7360	0.0069
274	3.7429	0.0069
275	3.7498	0.0069
276	3.7566	0.0068
277	3.7634	0.0068
278	3.7702	0.0068
279	3.7770	0.0068
280	3.7838	0.0068
281	3.7906	0.0068
282	3.7974	0.0068
283	3.8041	0.0068
284	3.8109	0.0067
285	3.8176	0.0067
286	3.8243	0.0067
287	3.8310	0.0067
288	3.8377	0.0067

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0067	0.0049	0.0018
2	0.0067	0.0049	0.0018
3	0.0067	0.0049	0.0018

4	0.0067	0.0049	0.0018
5	0.0068	0.0049	0.0018
6	0.0068	0.0049	0.0018
7	0.0068	0.0049	0.0019
8	0.0068	0.0050	0.0019
9	0.0068	0.0050	0.0019
10	0.0069	0.0050	0.0019
11	0.0069	0.0050	0.0019
12	0.0069	0.0050	0.0019
13	0.0069	0.0050	0.0019
14	0.0069	0.0050	0.0019
15	0.0070	0.0051	0.0019
16	0.0070	0.0051	0.0019
17	0.0070	0.0051	0.0019
18	0.0070	0.0051	0.0019
19	0.0070	0.0051	0.0019
20	0.0070	0.0051	0.0019
21	0.0071	0.0051	0.0019
22	0.0071	0.0052	0.0019
23	0.0071	0.0052	0.0019
24	0.0071	0.0052	0.0019
25	0.0072	0.0052	0.0020
26	0.0072	0.0052	0.0020
27	0.0072	0.0052	0.0020
28	0.0072	0.0052	0.0020
29	0.0072	0.0053	0.0020
30	0.0073	0.0053	0.0020
31	0.0073	0.0053	0.0020
32	0.0073	0.0053	0.0020
33	0.0073	0.0053	0.0020
34	0.0073	0.0053	0.0020
35	0.0074	0.0054	0.0020
36	0.0074	0.0054	0.0020
37	0.0074	0.0054	0.0020
38	0.0074	0.0054	0.0020
39	0.0075	0.0054	0.0020
40	0.0075	0.0054	0.0020
41	0.0075	0.0055	0.0021
42	0.0075	0.0055	0.0021
43	0.0076	0.0055	0.0021
44	0.0076	0.0055	0.0021
45	0.0076	0.0055	0.0021
46	0.0076	0.0056	0.0021
47	0.0077	0.0056	0.0021
48	0.0077	0.0056	0.0021
49	0.0077	0.0056	0.0021
50	0.0077	0.0056	0.0021
51	0.0078	0.0057	0.0021
52	0.0078	0.0057	0.0021
53	0.0078	0.0057	0.0021

54	0.0079	0.0057	0.0021
55	0.0079	0.0057	0.0022
56	0.0079	0.0058	0.0022
57	0.0080	0.0058	0.0022
58	0.0080	0.0058	0.0022
59	0.0080	0.0058	0.0022
60	0.0080	0.0058	0.0022
61	0.0081	0.0059	0.0022
62	0.0081	0.0059	0.0022
63	0.0081	0.0059	0.0022
64	0.0082	0.0059	0.0022
65	0.0082	0.0060	0.0022
66	0.0082	0.0060	0.0022
67	0.0083	0.0060	0.0023
68	0.0083	0.0060	0.0023
69	0.0083	0.0061	0.0023
70	0.0083	0.0061	0.0023
71	0.0084	0.0061	0.0023
72	0.0084	0.0061	0.0023
73	0.0085	0.0062	0.0023
74	0.0085	0.0062	0.0023
75	0.0085	0.0062	0.0023
76	0.0086	0.0062	0.0023
77	0.0086	0.0063	0.0023
78	0.0086	0.0063	0.0024
79	0.0087	0.0063	0.0024
80	0.0087	0.0063	0.0024
81	0.0088	0.0064	0.0024
82	0.0088	0.0064	0.0024
83	0.0088	0.0064	0.0024
84	0.0089	0.0064	0.0024
85	0.0089	0.0065	0.0024
86	0.0089	0.0065	0.0024
87	0.0090	0.0066	0.0025
88	0.0090	0.0066	0.0025
89	0.0091	0.0066	0.0025
90	0.0091	0.0066	0.0025
91	0.0092	0.0067	0.0025
92	0.0092	0.0067	0.0025
93	0.0093	0.0067	0.0025
94	0.0093	0.0068	0.0025
95	0.0094	0.0068	0.0026
96	0.0094	0.0068	0.0026
97	0.0095	0.0069	0.0026
98	0.0095	0.0069	0.0026
99	0.0096	0.0070	0.0026
100	0.0096	0.0070	0.0026
101	0.0097	0.0070	0.0026
102	0.0097	0.0071	0.0026
103	0.0098	0.0071	0.0027

104	0.0098	0.0071	0.0027
105	0.0099	0.0072	0.0027
106	0.0099	0.0072	0.0027
107	0.0100	0.0073	0.0027
108	0.0100	0.0073	0.0027
109	0.0101	0.0074	0.0028
110	0.0102	0.0074	0.0028
111	0.0102	0.0074	0.0028
112	0.0103	0.0075	0.0028
113	0.0104	0.0075	0.0028
114	0.0104	0.0076	0.0028
115	0.0105	0.0076	0.0029
116	0.0105	0.0077	0.0029
117	0.0106	0.0077	0.0029
118	0.0107	0.0078	0.0029
119	0.0108	0.0078	0.0029
120	0.0108	0.0079	0.0030
121	0.0109	0.0079	0.0030
122	0.0110	0.0080	0.0030
123	0.0111	0.0081	0.0030
124	0.0111	0.0081	0.0030
125	0.0112	0.0082	0.0031
126	0.0113	0.0082	0.0031
127	0.0114	0.0083	0.0031
128	0.0115	0.0083	0.0031
129	0.0116	0.0084	0.0032
130	0.0117	0.0085	0.0032
131	0.0118	0.0086	0.0032
132	0.0118	0.0086	0.0032
133	0.0120	0.0087	0.0033
134	0.0120	0.0088	0.0033
135	0.0122	0.0089	0.0033
136	0.0122	0.0089	0.0033
137	0.0124	0.0090	0.0034
138	0.0125	0.0091	0.0034
139	0.0126	0.0092	0.0034
140	0.0127	0.0092	0.0035
141	0.0129	0.0094	0.0035
142	0.0129	0.0094	0.0035
143	0.0131	0.0095	0.0036
144	0.0132	0.0096	0.0036
145	0.0133	0.0097	0.0036
146	0.0134	0.0097	0.0036
147	0.0136	0.0099	0.0037
148	0.0137	0.0099	0.0037
149	0.0139	0.0101	0.0038
150	0.0140	0.0102	0.0038
151	0.0142	0.0103	0.0039
152	0.0143	0.0104	0.0039
153	0.0146	0.0106	0.0040

154	0.0147	0.0107	0.0040
155	0.0149	0.0109	0.0041
156	0.0151	0.0110	0.0041
157	0.0154	0.0112	0.0042
158	0.0155	0.0113	0.0042
159	0.0158	0.0115	0.0043
160	0.0160	0.0116	0.0044
161	0.0163	0.0119	0.0044
162	0.0165	0.0120	0.0045
163	0.0168	0.0123	0.0046
164	0.0170	0.0124	0.0046
165	0.0174	0.0127	0.0048
166	0.0177	0.0128	0.0048
167	0.0181	0.0132	0.0049
168	0.0184	0.0134	0.0050
169	0.0189	0.0138	0.0052
170	0.0192	0.0140	0.0052
171	0.0198	0.0144	0.0054
172	0.0201	0.0146	0.0055
173	0.0208	0.0151	0.0057
174	0.0211	0.0154	0.0058
175	0.0219	0.0159	0.0060
176	0.0223	0.0162	0.0061
177	0.0233	0.0169	0.0063
178	0.0238	0.0173	0.0065
179	0.0249	0.0181	0.0068
180	0.0255	0.0186	0.0070
181	0.0270	0.0196	0.0074
182	0.0278	0.0202	0.0076
183	0.0296	0.0216	0.0081
184	0.0307	0.0223	0.0084
185	0.0202	0.0147	0.0055
186	0.0215	0.0156	0.0059
187	0.0249	0.0181	0.0068
188	0.0272	0.0198	0.0074
189	0.0339	0.0246	0.0092
190	0.0390	0.0284	0.0106
191	0.0592	0.0431	0.0161
192	0.0859	0.0482	0.0377
193	0.3717	0.0482	0.3235
194	0.0466	0.0339	0.0127
195	0.0301	0.0219	0.0082
196	0.0231	0.0168	0.0063
197	0.0319	0.0232	0.0087
198	0.0287	0.0208	0.0078
199	0.0262	0.0191	0.0072
200	0.0243	0.0177	0.0066
201	0.0228	0.0166	0.0062
202	0.0215	0.0156	0.0059
203	0.0204	0.0149	0.0056

204	0.0195	0.0142	0.0053
205	0.0186	0.0135	0.0051
206	0.0179	0.0130	0.0049
207	0.0172	0.0125	0.0047
208	0.0167	0.0121	0.0045
209	0.0161	0.0117	0.0044
210	0.0157	0.0114	0.0043
211	0.0152	0.0111	0.0041
212	0.0148	0.0108	0.0040
213	0.0144	0.0105	0.0039
214	0.0141	0.0102	0.0038
215	0.0138	0.0100	0.0038
216	0.0135	0.0098	0.0037
217	0.0133	0.0097	0.0036
218	0.0130	0.0095	0.0036
219	0.0128	0.0093	0.0035
220	0.0125	0.0091	0.0034
221	0.0123	0.0090	0.0034
222	0.0121	0.0088	0.0033
223	0.0119	0.0087	0.0032
224	0.0117	0.0085	0.0032
225	0.0115	0.0084	0.0031
226	0.0114	0.0083	0.0031
227	0.0112	0.0081	0.0031
228	0.0110	0.0080	0.0030
229	0.0109	0.0079	0.0030
230	0.0107	0.0078	0.0029
231	0.0106	0.0077	0.0029
232	0.0105	0.0076	0.0028
233	0.0103	0.0075	0.0028
234	0.0102	0.0074	0.0028
235	0.0101	0.0073	0.0027
236	0.0100	0.0072	0.0027
237	0.0098	0.0072	0.0027
238	0.0097	0.0071	0.0027
239	0.0096	0.0070	0.0026
240	0.0095	0.0069	0.0026
241	0.0094	0.0069	0.0026
242	0.0093	0.0068	0.0025
243	0.0092	0.0067	0.0025
244	0.0092	0.0067	0.0025
245	0.0091	0.0066	0.0025
246	0.0090	0.0065	0.0024
247	0.0089	0.0065	0.0024
248	0.0088	0.0064	0.0024
249	0.0087	0.0064	0.0024
250	0.0087	0.0063	0.0024
251	0.0086	0.0062	0.0023
252	0.0085	0.0062	0.0023
253	0.0084	0.0061	0.0023

254	0.0084	0.0061	0.0023
255	0.0083	0.0060	0.0023
256	0.0082	0.0060	0.0022
257	0.0082	0.0059	0.0022
258	0.0081	0.0059	0.0022
259	0.0081	0.0059	0.0022
260	0.0080	0.0058	0.0022
261	0.0079	0.0058	0.0022
262	0.0079	0.0057	0.0021
263	0.0078	0.0057	0.0021
264	0.0078	0.0056	0.0021
265	0.0077	0.0056	0.0021
266	0.0077	0.0056	0.0021
267	0.0076	0.0055	0.0021
268	0.0076	0.0055	0.0021
269	0.0075	0.0055	0.0020
270	0.0075	0.0054	0.0020
271	0.0074	0.0054	0.0020
272	0.0074	0.0054	0.0020
273	0.0073	0.0053	0.0020
274	0.0073	0.0053	0.0020
275	0.0072	0.0053	0.0020
276	0.0072	0.0052	0.0020
277	0.0071	0.0052	0.0019
278	0.0071	0.0052	0.0019
279	0.0071	0.0051	0.0019
280	0.0070	0.0051	0.0019
281	0.0070	0.0051	0.0019
282	0.0069	0.0050	0.0019
283	0.0069	0.0050	0.0019
284	0.0069	0.0050	0.0019
285	0.0068	0.0050	0.0019
286	0.0068	0.0049	0.0019
287	0.0068	0.0049	0.0018
288	0.0067	0.0049	0.0018

Total soil rain loss = 2.55(In)
Total effective rainfall = 1.28(In)
Peak flow rate in flood hydrograph = 34.45(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 10.0 20.0 30.0 40.0

0+ 5	0.0001	0.01	Q				
0+10	0.0004	0.04	Q				
0+15	0.0012	0.11	Q				
0+20	0.0030	0.27	Q				
0+25	0.0059	0.43	Q				
0+30	0.0096	0.54	Q				
0+35	0.0138	0.61	Q				
0+40	0.0184	0.66	Q				
0+45	0.0233	0.71	Q				
0+50	0.0284	0.74	Q				
0+55	0.0337	0.77	Q				
1+ 0	0.0392	0.80	Q				
1+ 5	0.0449	0.82	Q				
1+10	0.0506	0.84	Q				
1+15	0.0566	0.86	Q				
1+20	0.0626	0.87	Q				
1+25	0.0687	0.89	Q				
1+30	0.0749	0.90	Q				
1+35	0.0811	0.91	Q				
1+40	0.0875	0.92	Q				
1+45	0.0939	0.93	Q				
1+50	0.1004	0.94	Q				
1+55	0.1069	0.95	Q				
2+ 0	0.1135	0.96	Q				
2+ 5	0.1201	0.96	QV				
2+10	0.1268	0.97	QV				
2+15	0.1335	0.98	QV				
2+20	0.1403	0.98	QV				
2+25	0.1471	0.99	QV				
2+30	0.1539	0.99	QV				
2+35	0.1607	1.00	QV				
2+40	0.1676	1.00	|Q				
2+45	0.1746	1.01	|Q				
2+50	0.1815	1.01	|Q				
2+55	0.1885	1.02	|Q				
3+ 0	0.1956	1.02	|Q				
3+ 5	0.2026	1.03	|Q				
3+10	0.2097	1.03	|Q				
3+15	0.2168	1.03	|Q				
3+20	0.2240	1.04	|Q				
3+25	0.2311	1.04	|QV				
3+30	0.2383	1.04	|QV				
3+35	0.2455	1.05	|QV				
3+40	0.2527	1.05	|QV				
3+45	0.2600	1.05	|QV				
3+50	0.2673	1.06	|QV				
3+55	0.2746	1.06	|QV				
4+ 0	0.2819	1.06	|QV				
4+ 5	0.2892	1.07	|QV				
4+10	0.2966	1.07	|QV				

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4+15       0.3040      1.07  |QV       |         |         |         |
4+20       0.3114      1.08  |QV       |         |         |         |
4+25       0.3188      1.08  |QV       |         |         |         |
4+30       0.3263      1.08  |QV       |         |         |         |
4+35       0.3338      1.09  |QV       |         |         |         |
4+40       0.3413      1.09  |QV       |         |         |         |
4+45       0.3489      1.10  |Q V      |         |         |         |
4+50       0.3564      1.10  |Q V      |         |         |         |
4+55       0.3640      1.10  |Q V      |         |         |         |
5+ 0       0.3717      1.11  |Q V      |         |         |         |
5+ 5       0.3793      1.11  |Q V      |         |         |         |
5+10       0.3870      1.12  |Q V      |         |         |         |
5+15       0.3947      1.12  |Q V      |         |         |         |
5+20       0.4024      1.12  |Q V      |         |         |         |
5+25       0.4102      1.13  |Q V      |         |         |         |
5+30       0.4180      1.13  |Q V      |         |         |         |
5+35       0.4258      1.14  |Q V      |         |         |         |
5+40       0.4337      1.14  |Q V      |         |         |         |
5+45       0.4416      1.14  |Q V      |         |         |         |
5+50       0.4495      1.15  |Q V      |         |         |         |
5+55       0.4574      1.15  |Q V      |         |         |         |
6+ 0       0.4654      1.16  |Q  V     |         |         |         |
6+ 5       0.4734      1.16  |Q  V     |         |         |         |
6+10       0.4814      1.17  |Q  V     |         |         |         |
6+15       0.4895      1.17  |Q  V     |         |         |         |
6+20       0.4976      1.18  |Q  V     |         |         |         |
6+25       0.5057      1.18  |Q  V     |         |         |         |
6+30       0.5139      1.19  |Q  V     |         |         |         |
6+35       0.5221      1.19  |Q  V     |         |         |         |
6+40       0.5303      1.20  |Q  V     |         |         |         |
6+45       0.5386      1.20  |Q  V     |         |         |         |
6+50       0.5469      1.21  |Q  V     |         |         |         |
6+55       0.5553      1.21  |Q  V     |         |         |         |
7+ 0       0.5636      1.22  |Q  V     |         |         |         |
7+ 5       0.5720      1.22  |Q  V     |         |         |         |
7+10       0.5805      1.23  |Q   V    |         |         |         |
7+15       0.5890      1.23  |Q   V    |         |         |         |
7+20       0.5975      1.24  |Q   V    |         |         |         |
7+25       0.6061      1.24  |Q   V    |         |         |         |
7+30       0.6147      1.25  |Q   V    |         |         |         |
7+35       0.6233      1.25  |Q   V    |         |         |         |
7+40       0.6320      1.26  |Q   V    |         |         |         |
7+45       0.6407      1.27  |Q   V    |         |         |         |
7+50       0.6495      1.27  |Q   V    |         |         |         |
7+55       0.6583      1.28  |Q   V    |         |         |         |
8+ 0       0.6671      1.28  |Q   V    |         |         |         |
8+ 5       0.6760      1.29  |Q   V    |         |         |         |
8+10       0.6850      1.30  |Q   V    |         |         |         |
8+15       0.6939      1.30  |Q    V   |         |         |         |
8+20       0.7030      1.31  |Q    V   |         |         |         |
```
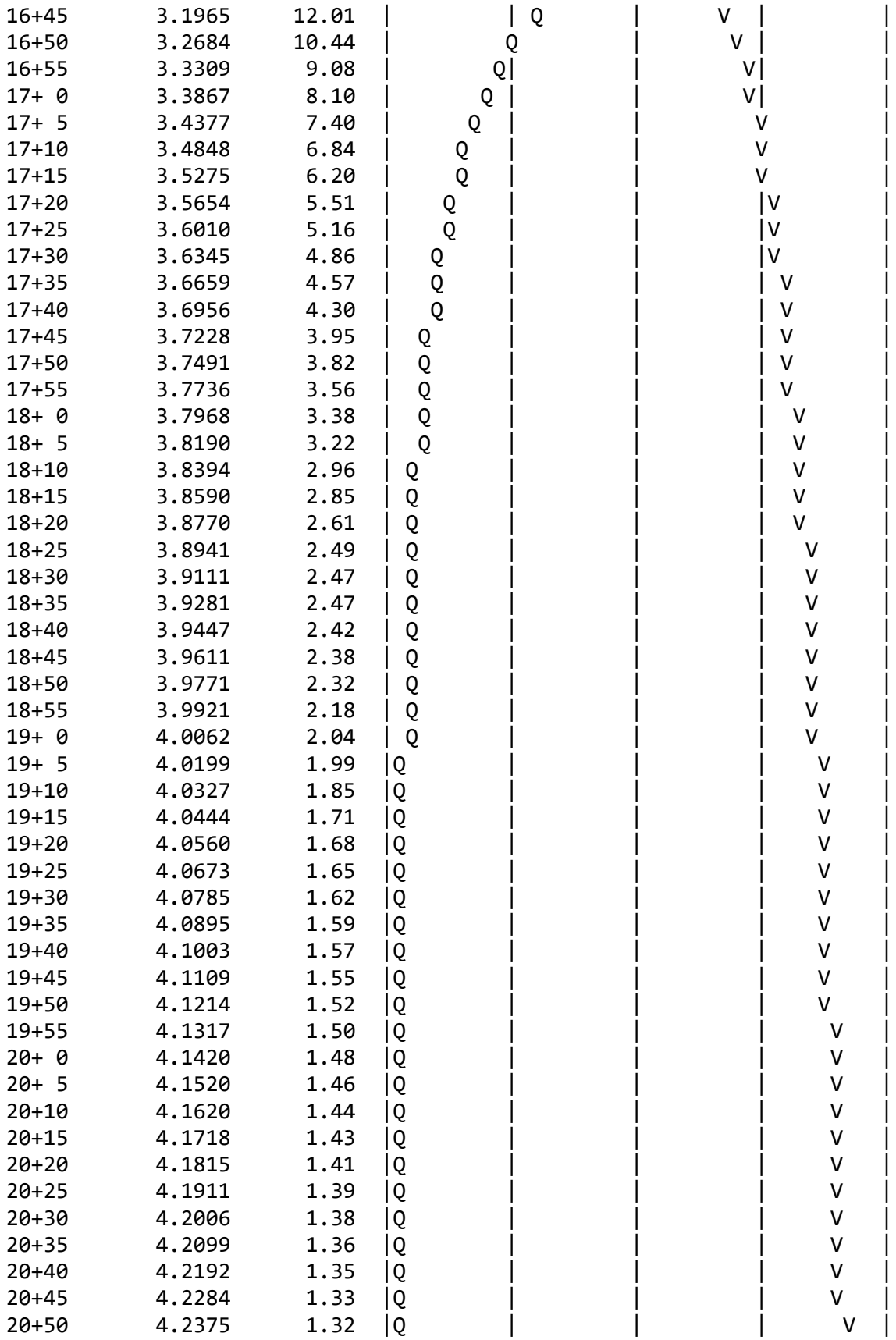

8+25	0.7120	1.32	Q V				
8+30	0.7211	1.32	Q V				
8+35	0.7303	1.33	Q V				
8+40	0.7395	1.34	Q V				
8+45	0.7488	1.34	Q V				
8+50	0.7581	1.35	Q V				
8+55	0.7674	1.36	Q V				
9+ 0	0.7768	1.37	Q V				
9+ 5	0.7863	1.37	Q V				
9+10	0.7958	1.38	Q V				
9+15	0.8054	1.39	Q V				
9+20	0.8150	1.40	Q V				
9+25	0.8247	1.40	Q V				
9+30	0.8344	1.41	Q V				
9+35	0.8442	1.42	Q V				
9+40	0.8540	1.43	Q V				
9+45	0.8639	1.44	Q V				
9+50	0.8739	1.45	Q V				
9+55	0.8839	1.46	Q V				
10+ 0	0.8940	1.47	Q V				
10+ 5	0.9042	1.47	Q V				
10+10	0.9144	1.48	Q V				
10+15	0.9247	1.49	Q V				
10+20	0.9350	1.50	Q V				
10+25	0.9455	1.51	Q V				
10+30	0.9560	1.52	Q V				
10+35	0.9665	1.53	Q V				
10+40	0.9772	1.54	Q V				
10+45	0.9879	1.56	Q V				
10+50	0.9987	1.57	Q V				
10+55	1.0095	1.58	Q V				
11+ 0	1.0205	1.59	Q V				
11+ 5	1.0315	1.60	Q V				
11+10	1.0426	1.61	Q V				
11+15	1.0538	1.63	Q V				
11+20	1.0651	1.64	Q V				
11+25	1.0765	1.65	Q V				
11+30	1.0880	1.67	Q V				
11+35	1.0995	1.68	Q V				
11+40	1.1112	1.69	Q V				
11+45	1.1230	1.71	Q V				
11+50	1.1348	1.72	Q V				
11+55	1.1468	1.74	Q V				
12+ 0	1.1589	1.75	Q V				
12+ 5	1.1711	1.77	Q V				
12+10	1.1833	1.79	Q V				
12+15	1.1958	1.80	Q V				
12+20	1.2083	1.82	Q V				
12+25	1.2209	1.83	Q V				
12+30	1.2336	1.85	Q V				

```
12+35       1.2464      1.87  |Q        V         |         |          |
12+40       1.2594      1.88  |Q        V         |         |          |
12+45       1.2725      1.90  |Q        |V        |         |          |
12+50       1.2858      1.92  |Q        |V        |         |          |
12+55       1.2992      1.95  |Q        |V        |         |          |
13+ 0       1.3128      1.97  |Q        |V        |         |          |
13+ 5       1.3265      1.99  |Q        |V        |         |          |
13+10       1.3403      2.02  | Q       |V        |         |          |
13+15       1.3544      2.04  | Q       |V        |         |          |
13+20       1.3686      2.07  | Q       |V        |         |          |
13+25       1.3830      2.09  | Q       | V       |         |          |
13+30       1.3976      2.12  | Q       | V       |         |          |
13+35       1.4125      2.15  | Q       | V       |         |          |
13+40       1.4275      2.18  | Q       | V       |         |          |
13+45       1.4427      2.21  | Q       | V       |         |          |
13+50       1.4582      2.25  | Q       | V       |         |          |
13+55       1.4739      2.28  | Q       | V       |         |          |
14+ 0       1.4899      2.32  | Q       |  V      |         |          |
14+ 5       1.5061      2.36  | Q       |  V      |         |          |
14+10       1.5226      2.40  | Q       |  V      |         |          |
14+15       1.5395      2.44  | Q       |  V      |         |          |
14+20       1.5566      2.49  | Q       |  V      |         |          |
14+25       1.5741      2.54  | Q       |  V      |         |          |
14+30       1.5919      2.59  | Q       |  V      |         |          |
14+35       1.6102      2.65  | Q       |   V     |         |          |
14+40       1.6288      2.71  | Q       |   V     |         |          |
14+45       1.6479      2.77  | Q       |   V     |         |          |
14+50       1.6674      2.84  | Q       |   V     |         |          |
14+55       1.6874      2.91  | Q       |   V     |         |          |
15+ 0       1.7080      2.99  | Q       |   V     |         |          |
15+ 5       1.7292      3.07  |  Q      |    V    |         |          |
15+10       1.7510      3.17  |  Q      |    V    |         |          |
15+15       1.7736      3.27  |  Q      |    V    |         |          |
15+20       1.7969      3.39  |  Q      |    V    |         |          |
15+25       1.8210      3.50  |  Q      |    V    |         |          |
15+30       1.8457      3.58  |  Q      |     V   |         |          |
15+35       1.8705      3.61  |  Q      |     V   |         |          |
15+40       1.8947      3.51  |  Q      |     V   |         |          |
15+45       1.9182      3.41  |  Q      |     V   |         |          |
15+50       1.9421      3.48  |  Q      |     V   |         |          |
15+55       1.9676      3.69  |  Q      |      V  |         |          |
16+ 0       1.9965      4.20  |   Q     |      V  |         |          |
16+ 5       2.0425      6.68  |     Q   |      V  |         |          |
16+10       2.1253     12.03  |         | Q     V |         |          |
16+15       2.2584     19.33  |         |        Q|         |          |
16+20       2.4902     33.65  |         |         |V        |  Q       |
16+25       2.7274     34.45  |         |         |  V      |   Q      |
16+30       2.8958     24.44  |         |         |   QV    |          |
16+35       3.0170     17.60  |         |      Q  |     V   |          |
16+40       3.1138     14.06  |         |   Q     |      V  |          |
```



```
  20+55       4.2465      1.31  |Q        |         |         |      V  |
  21+ 0       4.2554      1.29  |Q        |         |         |      V  |
  21+ 5       4.2642      1.28  |Q        |         |         |      V  |
  21+10       4.2729      1.27  |Q        |         |         |      V  |
  21+15       4.2815      1.26  |Q        |         |         |      V  |
  21+20       4.2901      1.24  |Q        |         |         |      V  |
  21+25       4.2986      1.23  |Q        |         |         |      V  |
  21+30       4.3070      1.22  |Q        |         |         |      V  |
  21+35       4.3154      1.21  |Q        |         |         |      V  |
  21+40       4.3236      1.20  |Q        |         |         |      V  |
  21+45       4.3318      1.19  |Q        |         |         |      V  |
  21+50       4.3400      1.18  |Q        |         |         |      V  |
  21+55       4.3480      1.17  |Q        |         |         |      V  |
  22+ 0       4.3560      1.16  |Q        |         |         |       V |
  22+ 5       4.3640      1.15  |Q        |         |         |       V |
  22+10       4.3718      1.14  |Q        |         |         |       V |
  22+15       4.3797      1.14  |Q        |         |         |       V |
  22+20       4.3874      1.13  |Q        |         |         |       V |
  22+25       4.3951      1.12  |Q        |         |         |       V |
  22+30       4.4028      1.11  |Q        |         |         |       V |
  22+35       4.4104      1.10  |Q        |         |         |       V |
  22+40       4.4179      1.09  |Q        |         |         |       V |
  22+45       4.4254      1.09  |Q        |         |         |       V |
  22+50       4.4328      1.08  |Q        |         |         |       V |
  22+55       4.4402      1.07  |Q        |         |         |       V |
  23+ 0       4.4476      1.07  |Q        |         |         |       V |
  23+ 5       4.4548      1.06  |Q        |         |         |       V |
  23+10       4.4621      1.05  |Q        |         |         |       V |
  23+15       4.4693      1.04  |Q        |         |         |        V|
  23+20       4.4764      1.04  |Q        |         |         |        V|
  23+25       4.4835      1.03  |Q        |         |         |        V|
  23+30       4.4906      1.03  |Q        |         |         |        V|
  23+35       4.4976      1.02  |Q        |         |         |        V|
  23+40       4.5046      1.01  |Q        |         |         |        V|
  23+45       4.5115      1.01  |Q        |         |         |        V|
  23+50       4.5184      1.00  |Q        |         |         |        V|
  23+55       4.5253      1.00  Q         |         |         |        V|
  24+ 0       4.5321      0.99  Q         |         |         |        V|
  24+ 5       4.5388      0.97  Q         |         |         |        V|
  24+10       4.5452      0.93  Q         |         |         |        V|
  24+15       4.5511      0.86  Q         |         |         |        V|
  24+20       4.5560      0.70  Q         |         |         |        V|
  24+25       4.5597      0.54  Q         |         |         |        V|
  24+30       4.5626      0.43  Q         |         |         |        V|
-------------------------------------------------------------------------
```

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

Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2004, Version 7.0

Study date 11/29/20

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

Program License Serial Number 6277

2020-326 HCC V
PRE-DEVELOPMENT CONDITIONS
UNIT HYDROGRAPH - 10 YEAR STORM
DA B

Storm Event Year = 10

Antecedent Moisture Condition = 2

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 10		
15.20	1	0.79
Rainfall data for year 2		
15.20	6	1.12
Rainfall data for year 2		
15.20	24	2.11
Rainfall data for year 100		

```
            15.20            1            1.31
------------------------------------------------------------------------
Rainfall data for year 100
            15.20            6            3.05
------------------------------------------------------------------------
Rainfall data for year 100
            15.20           24            6.31
------------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

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


SCS curve  SCS curve     Area     Area     Fp(Fig C6)    Ap      Fm
No.(AMCII) NO.(AMC 2)    (Ac.)    Fraction     (In/Hr)  (dec.)   (In/Hr)
 67.0      67.0         15.20      1.000     0.578    1.000    0.578

Area-averaged adjusted loss rate Fm (In/Hr) =  0.578

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

Area       Area          SCS CN    SCS CN      S     Pervious
 (Ac.)      Fract         (AMC2)    (AMC2)           Yield Fr
    15.20   1.000         67.0      67.0       4.93     0.273

Area-averaged catchment yield fraction, Y =  0.273
Area-averaged low loss fraction, Yb =  0.727
User entry of time of concentration  =   0.306 (hours)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watershed area =      15.20(Ac.)
Catchment Lag time =   0.245 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 34.0414
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.578(In/Hr)
Average low loss rate fraction (Yb) = 0.727 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall =  0.372(In)
Computed peak 30-minute rainfall =  0.638(In)
Specified peak 1-hour rainfall =  0.785(In)
Computed peak 3-hour rainfall =  1.356(In)
Specified peak 6-hour rainfall =  1.914(In)
Specified peak 24-hour rainfall =  3.838(In)


Rainfall depth area reduction factors:
Using a total area of      15.20(Ac.) (Ref: fig. E-4)

5-minute factor = 0.999     Adjusted rainfall =  0.372(In)
30-minute factor = 0.999    Adjusted rainfall =  0.637(In)
```

1-hour factor = 0.999 Adjusted rainfall = 0.784(In)
3-hour factor = 1.000 Adjusted rainfall = 1.356(In)
6-hour factor = 1.000 Adjusted rainfall = 1.914(In)
24-hour factor = 1.000 Adjusted rainfall = 3.838(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 = 183.82 (CFS))	
1	2.139	3.932
2	12.508	19.061
3	39.144	48.963
4	58.705	35.957
5	69.161	19.221
6	76.101	12.758
7	81.045	9.088
8	84.786	6.876
9	87.835	5.605
10	90.090	4.145
11	91.946	3.413
12	93.514	2.883
13	94.768	2.304
14	95.842	1.975
15	96.720	1.615
16	97.398	1.245
17	97.913	0.948
18	98.262	0.641
19	98.657	0.726
20	99.066	0.751
21	99.456	0.717
22	99.699	0.448
23	100.000	0.224

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.3722	0.3722
2	0.4583	0.0860
3	0.5175	0.0593
4	0.5642	0.0467
5	0.6032	0.0391
6	0.6372	0.0339
7	0.6673	0.0302
8	0.6946	0.0273
9	0.7196	0.0250
10	0.7427	0.0231
11	0.7642	0.0215

12	0.7844	0.0202
13	0.8163	0.0319
14	0.8470	0.0307
15	0.8766	0.0296
16	0.9053	0.0286
17	0.9330	0.0277
18	0.9600	0.0269
19	0.9862	0.0262
20	1.0117	0.0255
21	1.0366	0.0249
22	1.0608	0.0243
23	1.0846	0.0237
24	1.1078	0.0232
25	1.1306	0.0228
26	1.1529	0.0223
27	1.1748	0.0219
28	1.1962	0.0215
29	1.2173	0.0211
30	1.2380	0.0207
31	1.2584	0.0204
32	1.2785	0.0201
33	1.2982	0.0197
34	1.3177	0.0194
35	1.3368	0.0192
36	1.3557	0.0189
37	1.3743	0.0186
38	1.3927	0.0184
39	1.4108	0.0181
40	1.4287	0.0179
41	1.4463	0.0177
42	1.4638	0.0174
43	1.4810	0.0172
44	1.4980	0.0170
45	1.5149	0.0168
46	1.5315	0.0167
47	1.5480	0.0165
48	1.5643	0.0163
49	1.5804	0.0161
50	1.5964	0.0160
51	1.6122	0.0158
52	1.6279	0.0156
53	1.6434	0.0155
54	1.6587	0.0154
55	1.6739	0.0152
56	1.6890	0.0151
57	1.7039	0.0149
58	1.7187	0.0148
59	1.7334	0.0147
60	1.7480	0.0146
61	1.7624	0.0144

62	1.7767	0.0143
63	1.7909	0.0142
64	1.8050	0.0141
65	1.8190	0.0140
66	1.8328	0.0139
67	1.8466	0.0138
68	1.8603	0.0137
69	1.8738	0.0136
70	1.8873	0.0135
71	1.9007	0.0134
72	1.9139	0.0133
73	1.9272	0.0133
74	1.9404	0.0132
75	1.9535	0.0131
76	1.9666	0.0130
77	1.9795	0.0129
78	1.9924	0.0129
79	2.0052	0.0128
80	2.0179	0.0127
81	2.0305	0.0126
82	2.0430	0.0125
83	2.0555	0.0125
84	2.0679	0.0124
85	2.0802	0.0123
86	2.0924	0.0122
87	2.1046	0.0122
88	2.1167	0.0121
89	2.1288	0.0120
90	2.1407	0.0120
91	2.1526	0.0119
92	2.1645	0.0118
93	2.1763	0.0118
94	2.1880	0.0117
95	2.1996	0.0117
96	2.2112	0.0116
97	2.2227	0.0115
98	2.2342	0.0115
99	2.2456	0.0114
100	2.2570	0.0114
101	2.2683	0.0113
102	2.2795	0.0112
103	2.2907	0.0112
104	2.3018	0.0111
105	2.3129	0.0111
106	2.3240	0.0110
107	2.3349	0.0110
108	2.3459	0.0109
109	2.3567	0.0109
110	2.3676	0.0108
111	2.3783	0.0108

112	2.3891	0.0107
113	2.3998	0.0107
114	2.4104	0.0106
115	2.4210	0.0106
116	2.4315	0.0105
117	2.4420	0.0105
118	2.4525	0.0105
119	2.4629	0.0104
120	2.4732	0.0104
121	2.4836	0.0103
122	2.4938	0.0103
123	2.5041	0.0102
124	2.5143	0.0102
125	2.5244	0.0102
126	2.5346	0.0101
127	2.5446	0.0101
128	2.5547	0.0100
129	2.5647	0.0100
130	2.5746	0.0100
131	2.5845	0.0099
132	2.5944	0.0099
133	2.6043	0.0098
134	2.6141	0.0098
135	2.6239	0.0098
136	2.6336	0.0097
137	2.6433	0.0097
138	2.6530	0.0097
139	2.6626	0.0096
140	2.6722	0.0096
141	2.6817	0.0096
142	2.6913	0.0095
143	2.7008	0.0095
144	2.7102	0.0095
145	2.7197	0.0094
146	2.7291	0.0094
147	2.7384	0.0094
148	2.7478	0.0093
149	2.7571	0.0093
150	2.7663	0.0093
151	2.7756	0.0092
152	2.7848	0.0092
153	2.7940	0.0092
154	2.8031	0.0092
155	2.8122	0.0091
156	2.8213	0.0091
157	2.8304	0.0091
158	2.8394	0.0090
159	2.8484	0.0090
160	2.8574	0.0090
161	2.8663	0.0089

162	2.8753	0.0089
163	2.8842	0.0089
164	2.8930	0.0089
165	2.9019	0.0088
166	2.9107	0.0088
167	2.9195	0.0088
168	2.9282	0.0088
169	2.9370	0.0087
170	2.9457	0.0087
171	2.9544	0.0087
172	2.9630	0.0087
173	2.9717	0.0086
174	2.9803	0.0086
175	2.9888	0.0086
176	2.9974	0.0086
177	3.0059	0.0085
178	3.0144	0.0085
179	3.0229	0.0085
180	3.0314	0.0085
181	3.0398	0.0084
182	3.0483	0.0084
183	3.0567	0.0084
184	3.0650	0.0084
185	3.0734	0.0083
186	3.0817	0.0083
187	3.0900	0.0083
188	3.0983	0.0083
189	3.1065	0.0083
190	3.1148	0.0082
191	3.1230	0.0082
192	3.1312	0.0082
193	3.1394	0.0082
194	3.1475	0.0082
195	3.1557	0.0081
196	3.1638	0.0081
197	3.1719	0.0081
198	3.1799	0.0081
199	3.1880	0.0081
200	3.1960	0.0080
201	3.2040	0.0080
202	3.2120	0.0080
203	3.2200	0.0080
204	3.2279	0.0080
205	3.2359	0.0079
206	3.2438	0.0079
207	3.2517	0.0079
208	3.2595	0.0079
209	3.2674	0.0079
210	3.2752	0.0078
211	3.2831	0.0078

212	3.2909	0.0078
213	3.2986	0.0078
214	3.3064	0.0078
215	3.3141	0.0077
216	3.3219	0.0077
217	3.3296	0.0077
218	3.3373	0.0077
219	3.3449	0.0077
220	3.3526	0.0077
221	3.3602	0.0076
222	3.3679	0.0076
223	3.3755	0.0076
224	3.3831	0.0076
225	3.3906	0.0076
226	3.3982	0.0076
227	3.4057	0.0075
228	3.4132	0.0075
229	3.4208	0.0075
230	3.4282	0.0075
231	3.4357	0.0075
232	3.4432	0.0075
233	3.4506	0.0074
234	3.4580	0.0074
235	3.4654	0.0074
236	3.4728	0.0074
237	3.4802	0.0074
238	3.4876	0.0074
239	3.4949	0.0073
240	3.5023	0.0073
241	3.5096	0.0073
242	3.5169	0.0073
243	3.5242	0.0073
244	3.5314	0.0073
245	3.5387	0.0073
246	3.5459	0.0072
247	3.5532	0.0072
248	3.5604	0.0072
249	3.5676	0.0072
250	3.5747	0.0072
251	3.5819	0.0072
252	3.5891	0.0072
253	3.5962	0.0071
254	3.6033	0.0071
255	3.6105	0.0071
256	3.6176	0.0071
257	3.6246	0.0071
258	3.6317	0.0071
259	3.6388	0.0071
260	3.6458	0.0070
261	3.6528	0.0070

262	3.6599	0.0070
263	3.6669	0.0070
264	3.6739	0.0070
265	3.6808	0.0070
266	3.6878	0.0070
267	3.6947	0.0070
268	3.7017	0.0069
269	3.7086	0.0069
270	3.7155	0.0069
271	3.7224	0.0069
272	3.7293	0.0069
273	3.7362	0.0069
274	3.7430	0.0069
275	3.7499	0.0068
276	3.7567	0.0068
277	3.7636	0.0068
278	3.7704	0.0068
279	3.7772	0.0068
280	3.7840	0.0068
281	3.7907	0.0068
282	3.7975	0.0068
283	3.8043	0.0068
284	3.8110	0.0067
285	3.8177	0.0067
286	3.8244	0.0067
287	3.8311	0.0067
288	3.8378	0.0067

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0067	0.0049	0.0018
2	0.0067	0.0049	0.0018
3	0.0067	0.0049	0.0018
4	0.0067	0.0049	0.0018
5	0.0068	0.0049	0.0018
6	0.0068	0.0049	0.0018
7	0.0068	0.0049	0.0019
8	0.0068	0.0050	0.0019
9	0.0068	0.0050	0.0019
10	0.0068	0.0050	0.0019
11	0.0069	0.0050	0.0019
12	0.0069	0.0050	0.0019
13	0.0069	0.0050	0.0019
14	0.0069	0.0050	0.0019
15	0.0070	0.0051	0.0019
16	0.0070	0.0051	0.0019
17	0.0070	0.0051	0.0019
18	0.0070	0.0051	0.0019

19	0.0070	0.0051	0.0019
20	0.0070	0.0051	0.0019
21	0.0071	0.0051	0.0019
22	0.0071	0.0052	0.0019
23	0.0071	0.0052	0.0019
24	0.0071	0.0052	0.0019
25	0.0072	0.0052	0.0020
26	0.0072	0.0052	0.0020
27	0.0072	0.0052	0.0020
28	0.0072	0.0052	0.0020
29	0.0072	0.0053	0.0020
30	0.0073	0.0053	0.0020
31	0.0073	0.0053	0.0020
32	0.0073	0.0053	0.0020
33	0.0073	0.0053	0.0020
34	0.0073	0.0053	0.0020
35	0.0074	0.0054	0.0020
36	0.0074	0.0054	0.0020
37	0.0074	0.0054	0.0020
38	0.0074	0.0054	0.0020
39	0.0075	0.0054	0.0020
40	0.0075	0.0054	0.0020
41	0.0075	0.0055	0.0021
42	0.0075	0.0055	0.0021
43	0.0076	0.0055	0.0021
44	0.0076	0.0055	0.0021
45	0.0076	0.0055	0.0021
46	0.0076	0.0056	0.0021
47	0.0077	0.0056	0.0021
48	0.0077	0.0056	0.0021
49	0.0077	0.0056	0.0021
50	0.0077	0.0056	0.0021
51	0.0078	0.0057	0.0021
52	0.0078	0.0057	0.0021
53	0.0078	0.0057	0.0021
54	0.0079	0.0057	0.0021
55	0.0079	0.0057	0.0022
56	0.0079	0.0058	0.0022
57	0.0080	0.0058	0.0022
58	0.0080	0.0058	0.0022
59	0.0080	0.0058	0.0022
60	0.0080	0.0058	0.0022
61	0.0081	0.0059	0.0022
62	0.0081	0.0059	0.0022
63	0.0081	0.0059	0.0022
64	0.0082	0.0059	0.0022
65	0.0082	0.0060	0.0022
66	0.0082	0.0060	0.0022
67	0.0083	0.0060	0.0023
68	0.0083	0.0060	0.0023

69	0.0083	0.0061	0.0023
70	0.0083	0.0061	0.0023
71	0.0084	0.0061	0.0023
72	0.0084	0.0061	0.0023
73	0.0085	0.0062	0.0023
74	0.0085	0.0062	0.0023
75	0.0085	0.0062	0.0023
76	0.0086	0.0062	0.0023
77	0.0086	0.0063	0.0023
78	0.0086	0.0063	0.0024
79	0.0087	0.0063	0.0024
80	0.0087	0.0063	0.0024
81	0.0088	0.0064	0.0024
82	0.0088	0.0064	0.0024
83	0.0088	0.0064	0.0024
84	0.0089	0.0064	0.0024
85	0.0089	0.0065	0.0024
86	0.0089	0.0065	0.0024
87	0.0090	0.0066	0.0025
88	0.0090	0.0066	0.0025
89	0.0091	0.0066	0.0025
90	0.0091	0.0066	0.0025
91	0.0092	0.0067	0.0025
92	0.0092	0.0067	0.0025
93	0.0093	0.0067	0.0025
94	0.0093	0.0068	0.0025
95	0.0094	0.0068	0.0026
96	0.0094	0.0068	0.0026
97	0.0095	0.0069	0.0026
98	0.0095	0.0069	0.0026
99	0.0096	0.0070	0.0026
100	0.0096	0.0070	0.0026
101	0.0097	0.0070	0.0026
102	0.0097	0.0071	0.0026
103	0.0098	0.0071	0.0027
104	0.0098	0.0071	0.0027
105	0.0099	0.0072	0.0027
106	0.0099	0.0072	0.0027
107	0.0100	0.0073	0.0027
108	0.0100	0.0073	0.0027
109	0.0101	0.0074	0.0028
110	0.0102	0.0074	0.0028
111	0.0102	0.0074	0.0028
112	0.0103	0.0075	0.0028
113	0.0104	0.0075	0.0028
114	0.0104	0.0076	0.0028
115	0.0105	0.0076	0.0029
116	0.0105	0.0077	0.0029
117	0.0106	0.0077	0.0029
118	0.0107	0.0078	0.0029

119	0.0108	0.0078	0.0029
120	0.0108	0.0079	0.0030
121	0.0109	0.0079	0.0030
122	0.0110	0.0080	0.0030
123	0.0111	0.0081	0.0030
124	0.0111	0.0081	0.0030
125	0.0112	0.0082	0.0031
126	0.0113	0.0082	0.0031
127	0.0114	0.0083	0.0031
128	0.0115	0.0083	0.0031
129	0.0116	0.0084	0.0032
130	0.0117	0.0085	0.0032
131	0.0118	0.0086	0.0032
132	0.0118	0.0086	0.0032
133	0.0120	0.0087	0.0033
134	0.0120	0.0088	0.0033
135	0.0122	0.0089	0.0033
136	0.0122	0.0089	0.0033
137	0.0124	0.0090	0.0034
138	0.0125	0.0091	0.0034
139	0.0126	0.0092	0.0034
140	0.0127	0.0092	0.0035
141	0.0129	0.0094	0.0035
142	0.0129	0.0094	0.0035
143	0.0131	0.0095	0.0036
144	0.0132	0.0096	0.0036
145	0.0133	0.0097	0.0036
146	0.0134	0.0097	0.0036
147	0.0136	0.0099	0.0037
148	0.0137	0.0099	0.0037
149	0.0139	0.0101	0.0038
150	0.0140	0.0102	0.0038
151	0.0142	0.0103	0.0039
152	0.0143	0.0104	0.0039
153	0.0146	0.0106	0.0040
154	0.0147	0.0107	0.0040
155	0.0149	0.0109	0.0041
156	0.0151	0.0110	0.0041
157	0.0154	0.0112	0.0042
158	0.0155	0.0113	0.0042
159	0.0158	0.0115	0.0043
160	0.0160	0.0116	0.0044
161	0.0163	0.0119	0.0044
162	0.0165	0.0120	0.0045
163	0.0168	0.0123	0.0046
164	0.0170	0.0124	0.0046
165	0.0174	0.0127	0.0048
166	0.0177	0.0128	0.0048
167	0.0181	0.0132	0.0049
168	0.0184	0.0134	0.0050

169	0.0189	0.0137	0.0051
170	0.0192	0.0139	0.0052
171	0.0197	0.0144	0.0054
172	0.0201	0.0146	0.0055
173	0.0207	0.0151	0.0057
174	0.0211	0.0153	0.0057
175	0.0219	0.0159	0.0060
176	0.0223	0.0162	0.0061
177	0.0232	0.0169	0.0063
178	0.0237	0.0173	0.0065
179	0.0249	0.0181	0.0068
180	0.0255	0.0186	0.0070
181	0.0269	0.0196	0.0073
182	0.0277	0.0202	0.0076
183	0.0296	0.0215	0.0081
184	0.0307	0.0223	0.0084
185	0.0202	0.0147	0.0055
186	0.0215	0.0157	0.0059
187	0.0250	0.0182	0.0068
188	0.0273	0.0198	0.0074
189	0.0339	0.0247	0.0092
190	0.0391	0.0284	0.0106
191	0.0593	0.0431	0.0162
192	0.0860	0.0482	0.0378
193	0.3722	0.0482	0.3240
194	0.0467	0.0339	0.0127
195	0.0302	0.0219	0.0082
196	0.0231	0.0168	0.0063
197	0.0319	0.0232	0.0087
198	0.0286	0.0208	0.0078
199	0.0262	0.0191	0.0071
200	0.0243	0.0177	0.0066
201	0.0228	0.0165	0.0062
202	0.0215	0.0156	0.0059
203	0.0204	0.0148	0.0056
204	0.0194	0.0141	0.0053
205	0.0186	0.0135	0.0051
206	0.0179	0.0130	0.0049
207	0.0172	0.0125	0.0047
208	0.0167	0.0121	0.0045
209	0.0161	0.0117	0.0044
210	0.0156	0.0114	0.0043
211	0.0152	0.0111	0.0041
212	0.0148	0.0108	0.0040
213	0.0144	0.0105	0.0039
214	0.0141	0.0102	0.0038
215	0.0138	0.0100	0.0038
216	0.0135	0.0098	0.0037
217	0.0133	0.0097	0.0036
218	0.0130	0.0095	0.0036

219	0.0128	0.0093	0.0035
220	0.0125	0.0091	0.0034
221	0.0123	0.0090	0.0034
222	0.0121	0.0088	0.0033
223	0.0119	0.0087	0.0032
224	0.0117	0.0085	0.0032
225	0.0115	0.0084	0.0031
226	0.0114	0.0083	0.0031
227	0.0112	0.0081	0.0031
228	0.0110	0.0080	0.0030
229	0.0109	0.0079	0.0030
230	0.0107	0.0078	0.0029
231	0.0106	0.0077	0.0029
232	0.0105	0.0076	0.0028
233	0.0103	0.0075	0.0028
234	0.0102	0.0074	0.0028
235	0.0101	0.0073	0.0027
236	0.0100	0.0072	0.0027
237	0.0098	0.0072	0.0027
238	0.0097	0.0071	0.0027
239	0.0096	0.0070	0.0026
240	0.0095	0.0069	0.0026
241	0.0094	0.0069	0.0026
242	0.0093	0.0068	0.0025
243	0.0092	0.0067	0.0025
244	0.0092	0.0067	0.0025
245	0.0091	0.0066	0.0025
246	0.0090	0.0065	0.0024
247	0.0089	0.0065	0.0024
248	0.0088	0.0064	0.0024
249	0.0087	0.0064	0.0024
250	0.0087	0.0063	0.0024
251	0.0086	0.0062	0.0023
252	0.0085	0.0062	0.0023
253	0.0084	0.0061	0.0023
254	0.0084	0.0061	0.0023
255	0.0083	0.0060	0.0023
256	0.0082	0.0060	0.0022
257	0.0082	0.0059	0.0022
258	0.0081	0.0059	0.0022
259	0.0081	0.0059	0.0022
260	0.0080	0.0058	0.0022
261	0.0079	0.0058	0.0022
262	0.0079	0.0057	0.0021
263	0.0078	0.0057	0.0021
264	0.0078	0.0056	0.0021
265	0.0077	0.0056	0.0021
266	0.0077	0.0056	0.0021
267	0.0076	0.0055	0.0021
268	0.0076	0.0055	0.0021

269	0.0075	0.0055	0.0020
270	0.0075	0.0054	0.0020
271	0.0074	0.0054	0.0020
272	0.0074	0.0054	0.0020
273	0.0073	0.0053	0.0020
274	0.0073	0.0053	0.0020
275	0.0072	0.0053	0.0020
276	0.0072	0.0052	0.0020
277	0.0071	0.0052	0.0019
278	0.0071	0.0052	0.0019
279	0.0071	0.0051	0.0019
280	0.0070	0.0051	0.0019
281	0.0070	0.0051	0.0019
282	0.0069	0.0050	0.0019
283	0.0069	0.0050	0.0019
284	0.0069	0.0050	0.0019
285	0.0068	0.0050	0.0019
286	0.0068	0.0049	0.0019
287	0.0068	0.0049	0.0018
288	0.0067	0.0049	0.0018

Total soil rain loss = 2.55(In)
Total effective rainfall = 1.28(In)
Peak flow rate in flood hydrograph = 18.27(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	0.04	Q	|	|	|	|
0+15	0.0012	0.13	Q	|	|	|	|
0+20	0.0026	0.20	Q	|	|	|	|
0+25	0.0042	0.23	Q	|	|	|	|
0+30	0.0060	0.26	Q	|	|	|	|
0+35	0.0079	0.27	Q	|	|	|	|
0+40	0.0098	0.29	Q	|	|	|	|
0+45	0.0119	0.30	Q	|	|	|	|
0+50	0.0140	0.31	Q	|	|	|	|
0+55	0.0162	0.31	Q	|	|	|	|
1+ 0	0.0184	0.32	Q	|	|	|	|
1+ 5	0.0206	0.32	Q	|	|	|	|
1+10	0.0229	0.33	Q	|	|	|	|
1+15	0.0252	0.33	Q	|	|	|	|

1+20	0.0275	0.34	Q	|	|	|	|
1+25	0.0298	0.34	Q	|	|	|	|
1+30	0.0322	0.34	Q	|	|	|	|
1+35	0.0345	0.34	Q	|	|	|	|
1+40	0.0369	0.35	Q	|	|	|	|
1+45	0.0393	0.35	Q	|	|	|	|
1+50	0.0417	0.35	QV	|	|	|	|
1+55	0.0441	0.35	QV	|	|	|	|
2+ 0	0.0466	0.35	QV	|	|	|	|
2+ 5	0.0490	0.35	QV	|	|	|	|
2+10	0.0514	0.35	QV	|	|	|	|
2+15	0.0539	0.36	QV	|	|	|	|
2+20	0.0563	0.36	QV	|	|	|	|
2+25	0.0588	0.36	QV	|	|	|	|
2+30	0.0613	0.36	QV	|	|	|	|
2+35	0.0638	0.36	QV	|	|	|	|
2+40	0.0662	0.36	QV	|	|	|	|
2+45	0.0687	0.36	QV	|	|	|	|
2+50	0.0712	0.36	QV	|	|	|	|
2+55	0.0737	0.36	QV	|	|	|	|
3+ 0	0.0763	0.37	QV	|	|	|	|
3+ 5	0.0788	0.37	QV	|	|	|	|
3+10	0.0813	0.37	Q V	|	|	|	|
3+15	0.0838	0.37	Q V	|	|	|	|
3+20	0.0864	0.37	Q V	|	|	|	|
3+25	0.0889	0.37	Q V	|	|	|	|
3+30	0.0915	0.37	Q V	|	|	|	|
3+35	0.0941	0.37	Q V	|	|	|	|
3+40	0.0967	0.37	Q V	|	|	|	|
3+45	0.0992	0.38	Q V	|	|	|	|
3+50	0.1018	0.38	Q V	|	|	|	|
3+55	0.1045	0.38	Q V	|	|	|	|
4+ 0	0.1071	0.38	Q V	|	|	|	|
4+ 5	0.1097	0.38	Q V	|	|	|	|
4+10	0.1123	0.38	Q V	|	|	|	|
4+15	0.1150	0.38	Q V	|	|	|	|
4+20	0.1176	0.38	Q V	|	|	|	|
4+25	0.1203	0.39	Q V	|	|	|	|
4+30	0.1229	0.39	Q V	|	|	|	|
4+35	0.1256	0.39	Q V	|	|	|	|
4+40	0.1283	0.39	Q V	|	|	|	|
4+45	0.1310	0.39	Q V	|	|	|	|
4+50	0.1337	0.39	Q V	|	|	|	|
4+55	0.1364	0.39	Q V	|	|	|	|
5+ 0	0.1391	0.40	Q V	|	|	|	|
5+ 5	0.1419	0.40	Q V	|	|	|	|
5+10	0.1446	0.40	Q V	|	|	|	|
5+15	0.1474	0.40	Q V	|	|	|	|
5+20	0.1501	0.40	Q V	|	|	|	|
5+25	0.1529	0.40	Q V	|	|	|	|

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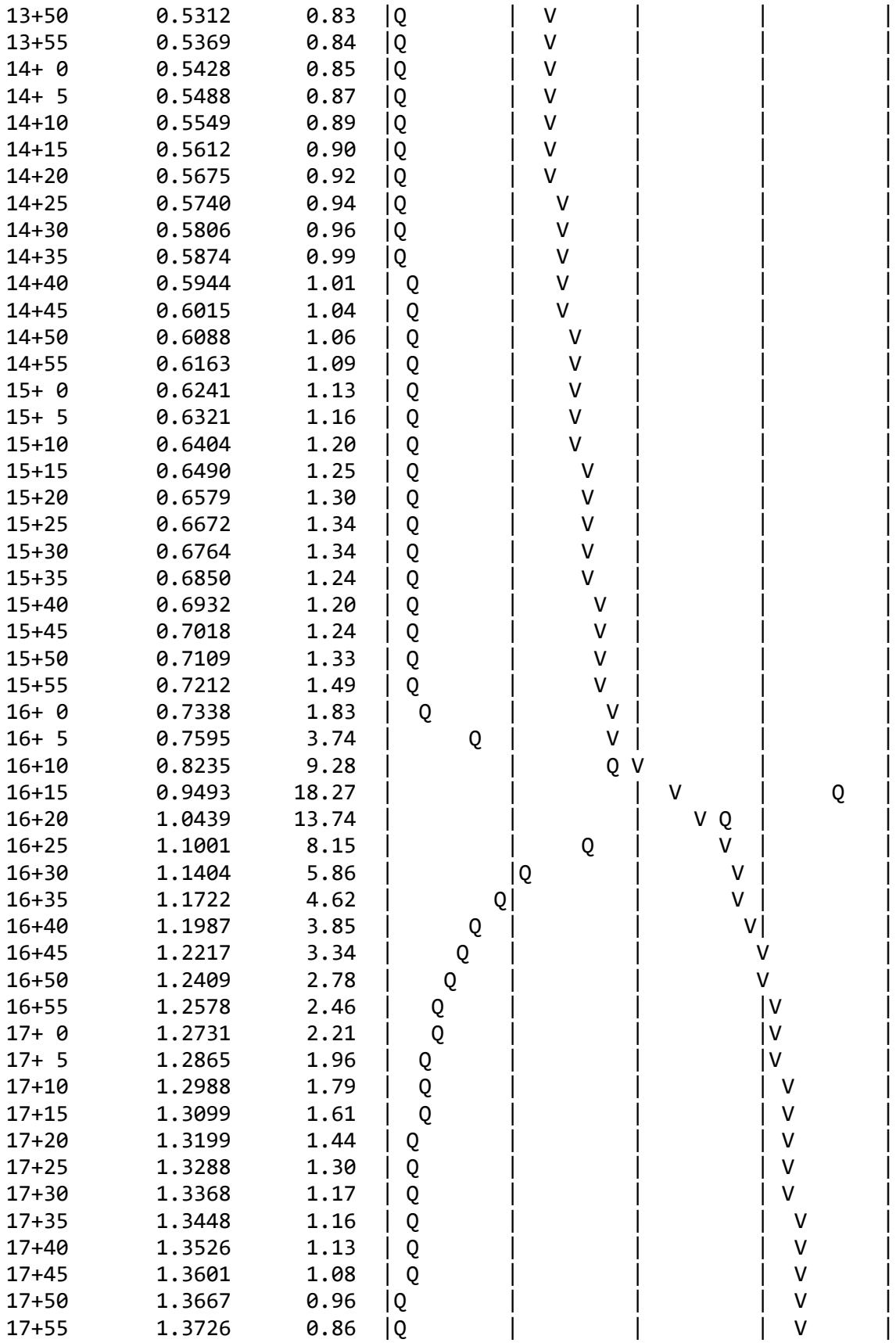
5+30       0.1557      0.40  Q  V      |          |          |          |
5+35       0.1585      0.41  Q  V      |          |          |          |
5+40       0.1613      0.41  Q  V      |          |          |          |
5+45       0.1641      0.41  Q   V     |          |          |          |
5+50       0.1670      0.41  Q   V     |          |          |          |
5+55       0.1698      0.41  Q   V     |          |          |          |
6+ 0       0.1727      0.41  Q   V     |          |          |          |
6+ 5       0.1755      0.42  Q   V     |          |          |          |
6+10       0.1784      0.42  Q   V     |          |          |          |
6+15       0.1813      0.42  Q   V     |          |          |          |
6+20       0.1842      0.42  Q   V     |          |          |          |
6+25       0.1871      0.42  Q   V     |          |          |          |
6+30       0.1900      0.42  Q   V     |          |          |          |
6+35       0.1930      0.43  Q   V     |          |          |          |
6+40       0.1959      0.43  Q   V     |          |          |          |
6+45       0.1989      0.43  Q   V     |          |          |          |
6+50       0.2018      0.43  Q   V     |          |          |          |
6+55       0.2048      0.43  Q    V    |          |          |          |
7+ 0       0.2078      0.44  Q    V    |          |          |          |
7+ 5       0.2108      0.44  Q    V    |          |          |          |
7+10       0.2139      0.44  Q    V    |          |          |          |
7+15       0.2169      0.44  Q    V    |          |          |          |
7+20       0.2200      0.44  Q    V    |          |          |          |
7+25       0.2230      0.45  Q    V    |          |          |          |
7+30       0.2261      0.45  Q    V    |          |          |          |
7+35       0.2292      0.45  Q    V    |          |          |          |
7+40       0.2323      0.45  Q    V    |          |          |          |
7+45       0.2354      0.45  Q    V    |          |          |          |
7+50       0.2386      0.46  Q    V    |          |          |          |
7+55       0.2417      0.46  Q    V    |          |          |          |
8+ 0       0.2449      0.46  Q     V   |          |          |          |
8+ 5       0.2481      0.46  Q     V   |          |          |          |
8+10       0.2513      0.47  Q     V   |          |          |          |
8+15       0.2545      0.47  Q     V   |          |          |          |
8+20       0.2578      0.47  Q     V   |          |          |          |
8+25       0.2610      0.47  Q     V   |          |          |          |
8+30       0.2643      0.47  Q     V   |          |          |          |
8+35       0.2676      0.48  Q     V   |          |          |          |
8+40       0.2709      0.48  Q     V   |          |          |          |
8+45       0.2742      0.48  Q     V   |          |          |          |
8+50       0.2775      0.49  Q     V   |          |          |          |
8+55       0.2809      0.49  Q     V   |          |          |          |
9+ 0       0.2843      0.49  Q      V  |          |          |          |
9+ 5       0.2877      0.49  Q      V  |          |          |          |
9+10       0.2911      0.50  Q      V  |          |          |          |
9+15       0.2945      0.50  Q      V  |          |          |          |
9+20       0.2980      0.50  |Q     V  |          |          |          |
9+25       0.3015      0.50  |Q     V  |          |          |          |
9+30       0.3050      0.51  |Q     V  |          |          |          |
9+35       0.3085      0.51  |Q     V  |          |          |          |
```

```
 9+40       0.3120      0.51  |Q     V  |          |          |          |
 9+45       0.3156      0.52  |Q     V  |          |          |          |
 9+50       0.3192      0.52  |Q     V  |          |          |          |
 9+55       0.3228      0.52  |Q     V  |          |          |          |
10+ 0       0.3264      0.53  |Q      V |          |          |          |
10+ 5       0.3301      0.53  |Q      V |          |          |          |
10+10       0.3338      0.53  |Q      V |          |          |          |
10+15       0.3375      0.54  |Q      V |          |          |          |
10+20       0.3412      0.54  |Q      V |          |          |          |
10+25       0.3449      0.55  |Q      V |          |          |          |
10+30       0.3487      0.55  |Q      V |          |          |          |
10+35       0.3525      0.55  |Q      V |          |          |          |
10+40       0.3564      0.56  |Q      V |          |          |          |
10+45       0.3602      0.56  |Q      V |          |          |          |
10+50       0.3641      0.57  |Q      V |          |          |          |
10+55       0.3680      0.57  |Q       V|          |          |          |
11+ 0       0.3720      0.57  |Q       V|          |          |          |
11+ 5       0.3760      0.58  |Q       V|          |          |          |
11+10       0.3800      0.58  |Q       V|          |          |          |
11+15       0.3840      0.59  |Q       V|          |          |          |
11+20       0.3881      0.59  |Q       V|          |          |          |
11+25       0.3922      0.60  |Q       V|          |          |          |
11+30       0.3964      0.60  |Q       V|          |          |          |
11+35       0.4006      0.61  |Q       V|          |          |          |
11+40       0.4048      0.61  |Q       V|          |          |          |
11+45       0.4090      0.62  |Q        V          |          |          |
11+50       0.4133      0.62  |Q        V          |          |          |
11+55       0.4177      0.63  |Q        V          |          |          |
12+ 0       0.4221      0.64  |Q        V          |          |          |
12+ 5       0.4265      0.64  |Q        V          |          |          |
12+10       0.4309      0.65  |Q        V          |          |          |
12+15       0.4354      0.65  |Q        V          |          |          |
12+20       0.4399      0.66  |Q        V          |          |          |
12+25       0.4445      0.66  |Q        V          |          |          |
12+30       0.4491      0.67  |Q         |V         |          |          |
12+35       0.4538      0.68  |Q         |V         |          |          |
12+40       0.4585      0.68  |Q         |V         |          |          |
12+45       0.4633      0.69  |Q         |V         |          |          |
12+50       0.4681      0.70  |Q         |V         |          |          |
12+55       0.4730      0.71  |Q         |V         |          |          |
13+ 0       0.4779      0.72  |Q         |V         |          |          |
13+ 5       0.4829      0.73  |Q         |V         |          |          |
13+10       0.4880      0.74  |Q         | V        |          |          |
13+15       0.4931      0.75  |Q         | V        |          |          |
13+20       0.4983      0.76  |Q         | V        |          |          |
13+25       0.5036      0.77  |Q         | V        |          |          |
13+30       0.5089      0.78  |Q         | V        |          |          |
13+35       0.5144      0.79  |Q         | V        |          |          |
13+40       0.5199      0.80  |Q         | V        |          |          |
13+45       0.5255      0.81  |Q         | V        |          |          |
```



18+ 0	1.3779	0.77	Q			V	
18+ 5	1.3830	0.74	Q			V	
18+10	1.3880	0.73	Q			V	
18+15	1.3929	0.71	Q			V	
18+20	1.3977	0.69	Q			V	
18+25	1.4024	0.68	Q			V	
18+30	1.4069	0.66	Q			V	
18+35	1.4114	0.65	Q			V	
18+40	1.4158	0.64	Q			V	
18+45	1.4201	0.62	Q			V	
18+50	1.4243	0.61	Q			V	
18+55	1.4285	0.60	Q			V	
19+ 0	1.4325	0.59	Q			V	
19+ 5	1.4366	0.58	Q			V	
19+10	1.4405	0.57	Q			V	
19+15	1.4444	0.57	Q			V	
19+20	1.4482	0.56	Q			V	
19+25	1.4520	0.55	Q			V	
19+30	1.4558	0.54	Q			V	
19+35	1.4594	0.53	Q			V	
19+40	1.4631	0.53	Q			V	
19+45	1.4667	0.52	Q			V	
19+50	1.4702	0.51	Q			V	
19+55	1.4737	0.51	Q			V	
20+ 0	1.4772	0.50	Q			V	
20+ 5	1.4806	0.50	Q			V	
20+10	1.4839	0.49	Q			V	
20+15	1.4873	0.48	Q			V	
20+20	1.4906	0.48	Q			V	
20+25	1.4939	0.47	Q			V	
20+30	1.4971	0.47	Q			V	
20+35	1.5003	0.46	Q			V	
20+40	1.5035	0.46	Q			V	
20+45	1.5066	0.46	Q			V	
20+50	1.5097	0.45	Q			V	
20+55	1.5128	0.45	Q			V	
21+ 0	1.5158	0.44	Q			V	
21+ 5	1.5189	0.44	Q			V	
21+10	1.5219	0.44	Q			V	
21+15	1.5248	0.43	Q			V	
21+20	1.5278	0.43	Q			V	
21+25	1.5307	0.42	Q			V	
21+30	1.5336	0.42	Q			V	
21+35	1.5365	0.42	Q			V	
21+40	1.5393	0.41	Q			V	
21+45	1.5421	0.41	Q			V	
21+50	1.5450	0.41	Q			V	
21+55	1.5477	0.40	Q			V	
22+ 0	1.5505	0.40	Q			V	
22+ 5	1.5532	0.40	Q			V	

22+10	1.5560	0.40	Q	|	|	|	V |
22+15	1.5587	0.39	Q	|	|	|	V |
22+20	1.5614	0.39	Q	|	|	|	V |
22+25	1.5640	0.39	Q	|	|	|	V |
22+30	1.5667	0.38	Q	|	|	|	V |
22+35	1.5693	0.38	Q	|	|	|	V |
22+40	1.5719	0.38	Q	|	|	|	V |
22+45	1.5745	0.38	Q	|	|	|	V |
22+50	1.5771	0.37	Q	|	|	|	V |
22+55	1.5796	0.37	Q	|	|	|	V |
23+ 0	1.5822	0.37	Q	|	|	|	V|
23+ 5	1.5847	0.37	Q	|	|	|	V|
23+10	1.5872	0.36	Q	|	|	|	V|
23+15	1.5897	0.36	Q	|	|	|	V|
23+20	1.5922	0.36	Q	|	|	|	V|
23+25	1.5947	0.36	Q	|	|	|	V|
23+30	1.5971	0.36	Q	|	|	|	V|
23+35	1.5996	0.35	Q	|	|	|	V|
23+40	1.6020	0.35	Q	|	|	|	V|
23+45	1.6044	0.35	Q	|	|	|	V|
23+50	1.6068	0.35	Q	|	|	|	V|
23+55	1.6092	0.35	Q	|	|	|	V|
24+ 0	1.6115	0.34	Q	|	|	|	V|
24+ 5	1.6138	0.34	Q	|	|	|	V|
24+10	1.6159	0.30	Q	|	|	|	V|
24+15	1.6173	0.21	Q	|	|	|	V|
24+20	1.6183	0.14	Q	|	|	|	V|
24+25	1.6190	0.11	Q	|	|	|	V|
24+30	1.6196	0.08	Q	|	|	|	V|

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

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Study date 11/29/20

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

Program License Serial Number 6277

2020-326 HCC V
PRE-DEVELOPMENT CONDITIONS
UNIT HYDROGRAPH - 10 YEAR STORM
DA C

Storm Event Year = 10

Antecedent Moisture Condition = 2

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 10		
3.09	1	0.79
Rainfall data for year 2		
3.09	6	1.12
Rainfall data for year 2		
3.09	24	2.11

Rainfall data for year 100

```
             3.09            1           1.31
------------------------------------------------------------------------
Rainfall data for year 100
             3.09            6           3.05
------------------------------------------------------------------------
Rainfall data for year 100
             3.09           24           6.31
------------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

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


SCS curve  SCS curve     Area     Area     Fp(Fig C6)    Ap      Fm
No.(AMCII) NO.(AMC 2)    (Ac.)    Fraction     (In/Hr)  (dec.)   (In/Hr)
 67.0      67.0          3.09      1.000     0.578    1.000    0.578

Area-averaged adjusted loss rate Fm (In/Hr) =  0.578

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

Area       Area          SCS CN    SCS CN      S     Pervious
 (Ac.)      Fract         (AMC2)    (AMC2)           Yield Fr
     3.09   1.000         67.0      67.0       4.93     0.273

Area-averaged catchment yield fraction, Y =  0.273
Area-averaged low loss fraction, Yb =  0.727
User entry of time of concentration  =   0.272 (hours)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watershed area =       3.09(Ac.)
Catchment Lag time =   0.218 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 38.2966
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.578(In/Hr)
Average low loss rate fraction (Yb) = 0.727 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall =  0.372(In)
Computed peak 30-minute rainfall =  0.638(In)
Specified peak 1-hour rainfall =  0.785(In)
Computed peak 3-hour rainfall =  1.356(In)
Specified peak 6-hour rainfall =  1.914(In)
Specified peak 24-hour rainfall =  3.838(In)


Rainfall depth area reduction factors:
Using a total area of       3.09(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000     Adjusted rainfall =  0.372(In)
30-minute factor = 1.000    Adjusted rainfall =  0.638(In)
```

1-hour factor = 1.000 Adjusted rainfall = 0.785(In)
3-hour factor = 1.000 Adjusted rainfall = 1.356(In)
6-hour factor = 1.000 Adjusted rainfall = 1.914(In)
24-hour factor = 1.000 Adjusted rainfall = 3.838(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 = 37.37 (CFS))	
1	2.566	0.959
2	16.799	5.319
3	46.582	11.130
4	63.866	6.459
5	73.335	3.538
6	79.662	2.364
7	84.133	1.671
8	87.657	1.317
9	90.211	0.954
10	92.257	0.765
11	93.934	0.627
12	95.264	0.497
13	96.346	0.404
14	97.206	0.321
15	97.833	0.234
16	98.240	0.152
17	98.683	0.165
18	99.142	0.172
19	99.545	0.150
20	99.792	0.093
21	100.000	0.078

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.3724	0.3724
2	0.4585	0.0861
3	0.5178	0.0593
4	0.5645	0.0467
5	0.6036	0.0391
6	0.6375	0.0339
7	0.6677	0.0302
8	0.6950	0.0273
9	0.7200	0.0250
10	0.7431	0.0231
11	0.7647	0.0216
12	0.7849	0.0202
13	0.8168	0.0319

14	0.8475	0.0307
15	0.8770	0.0296
16	0.9057	0.0286
17	0.9334	0.0277
18	0.9603	0.0269
19	0.9865	0.0262
20	1.0120	0.0255
21	1.0369	0.0249
22	1.0612	0.0243
23	1.0849	0.0237
24	1.1081	0.0232
25	1.1308	0.0227
26	1.1531	0.0223
27	1.1750	0.0219
28	1.1964	0.0215
29	1.2175	0.0211
30	1.2382	0.0207
31	1.2586	0.0204
32	1.2786	0.0200
33	1.2984	0.0197
34	1.3178	0.0194
35	1.3369	0.0191
36	1.3558	0.0189
37	1.3744	0.0186
38	1.3928	0.0184
39	1.4109	0.0181
40	1.4288	0.0179
41	1.4464	0.0177
42	1.4639	0.0174
43	1.4811	0.0172
44	1.4981	0.0170
45	1.5150	0.0168
46	1.5316	0.0167
47	1.5481	0.0165
48	1.5644	0.0163
49	1.5805	0.0161
50	1.5965	0.0160
51	1.6123	0.0158
52	1.6279	0.0156
53	1.6434	0.0155
54	1.6588	0.0154
55	1.6740	0.0152
56	1.6891	0.0151
57	1.7040	0.0149
58	1.7188	0.0148
59	1.7335	0.0147
60	1.7480	0.0146
61	1.7625	0.0144
62	1.7768	0.0143
63	1.7910	0.0142

64	1.8051	0.0141
65	1.8191	0.0140
66	1.8329	0.0139
67	1.8467	0.0138
68	1.8603	0.0137
69	1.8739	0.0136
70	1.8874	0.0135
71	1.9007	0.0134
72	1.9140	0.0133
73	1.9273	0.0133
74	1.9405	0.0132
75	1.9536	0.0131
76	1.9666	0.0130
77	1.9796	0.0129
78	1.9925	0.0129
79	2.0052	0.0128
80	2.0179	0.0127
81	2.0305	0.0126
82	2.0431	0.0125
83	2.0556	0.0125
84	2.0679	0.0124
85	2.0803	0.0123
86	2.0925	0.0122
87	2.1047	0.0122
88	2.1168	0.0121
89	2.1288	0.0120
90	2.1408	0.0120
91	2.1527	0.0119
92	2.1646	0.0118
93	2.1763	0.0118
94	2.1880	0.0117
95	2.1997	0.0117
96	2.2113	0.0116
97	2.2228	0.0115
98	2.2343	0.0115
99	2.2457	0.0114
100	2.2571	0.0114
101	2.2683	0.0113
102	2.2796	0.0112
103	2.2908	0.0112
104	2.3019	0.0111
105	2.3130	0.0111
106	2.3240	0.0110
107	2.3350	0.0110
108	2.3459	0.0109
109	2.3568	0.0109
110	2.3676	0.0108
111	2.3784	0.0108
112	2.3891	0.0107
113	2.3998	0.0107

114	2.4105	0.0106
115	2.4210	0.0106
116	2.4316	0.0105
117	2.4421	0.0105
118	2.4525	0.0105
119	2.4629	0.0104
120	2.4733	0.0104
121	2.4836	0.0103
122	2.4939	0.0103
123	2.5042	0.0102
124	2.5144	0.0102
125	2.5245	0.0102
126	2.5346	0.0101
127	2.5447	0.0101
128	2.5547	0.0100
129	2.5647	0.0100
130	2.5747	0.0100
131	2.5846	0.0099
132	2.5945	0.0099
133	2.6043	0.0098
134	2.6142	0.0098
135	2.6239	0.0098
136	2.6337	0.0097
137	2.6434	0.0097
138	2.6530	0.0097
139	2.6627	0.0096
140	2.6723	0.0096
141	2.6818	0.0096
142	2.6913	0.0095
143	2.7008	0.0095
144	2.7103	0.0095
145	2.7197	0.0094
146	2.7291	0.0094
147	2.7385	0.0094
148	2.7478	0.0093
149	2.7571	0.0093
150	2.7664	0.0093
151	2.7756	0.0092
152	2.7849	0.0092
153	2.7940	0.0092
154	2.8032	0.0091
155	2.8123	0.0091
156	2.8214	0.0091
157	2.8305	0.0091
158	2.8395	0.0090
159	2.8485	0.0090
160	2.8575	0.0090
161	2.8664	0.0089
162	2.8753	0.0089
163	2.8842	0.0089

164	2.8931	0.0089
165	2.9019	0.0088
166	2.9108	0.0088
167	2.9195	0.0088
168	2.9283	0.0088
169	2.9370	0.0087
170	2.9457	0.0087
171	2.9544	0.0087
172	2.9631	0.0087
173	2.9717	0.0086
174	2.9803	0.0086
175	2.9889	0.0086
176	2.9975	0.0086
177	3.0060	0.0085
178	3.0145	0.0085
179	3.0230	0.0085
180	3.0315	0.0085
181	3.0399	0.0084
182	3.0483	0.0084
183	3.0567	0.0084
184	3.0651	0.0084
185	3.0734	0.0083
186	3.0818	0.0083
187	3.0901	0.0083
188	3.0984	0.0083
189	3.1066	0.0083
190	3.1149	0.0082
191	3.1231	0.0082
192	3.1313	0.0082
193	3.1394	0.0082
194	3.1476	0.0082
195	3.1557	0.0081
196	3.1638	0.0081
197	3.1719	0.0081
198	3.1800	0.0081
199	3.1880	0.0081
200	3.1961	0.0080
201	3.2041	0.0080
202	3.2121	0.0080
203	3.2200	0.0080
204	3.2280	0.0080
205	3.2359	0.0079
206	3.2438	0.0079
207	3.2517	0.0079
208	3.2596	0.0079
209	3.2675	0.0079
210	3.2753	0.0078
211	3.2831	0.0078
212	3.2909	0.0078
213	3.2987	0.0078

214	3.3065	0.0078
215	3.3142	0.0077
216	3.3219	0.0077
217	3.3296	0.0077
218	3.3373	0.0077
219	3.3450	0.0077
220	3.3527	0.0077
221	3.3603	0.0076
222	3.3679	0.0076
223	3.3755	0.0076
224	3.3831	0.0076
225	3.3907	0.0076
226	3.3983	0.0076
227	3.4058	0.0075
228	3.4133	0.0075
229	3.4208	0.0075
230	3.4283	0.0075
231	3.4358	0.0075
232	3.4432	0.0075
233	3.4507	0.0074
234	3.4581	0.0074
235	3.4655	0.0074
236	3.4729	0.0074
237	3.4803	0.0074
238	3.4876	0.0074
239	3.4950	0.0073
240	3.5023	0.0073
241	3.5096	0.0073
242	3.5169	0.0073
243	3.5242	0.0073
244	3.5315	0.0073
245	3.5387	0.0073
246	3.5460	0.0072
247	3.5532	0.0072
248	3.5604	0.0072
249	3.5676	0.0072
250	3.5748	0.0072
251	3.5820	0.0072
252	3.5891	0.0072
253	3.5963	0.0071
254	3.6034	0.0071
255	3.6105	0.0071
256	3.6176	0.0071
257	3.6247	0.0071
258	3.6318	0.0071
259	3.6388	0.0071
260	3.6459	0.0070
261	3.6529	0.0070
262	3.6599	0.0070
263	3.6669	0.0070

264	3.6739	0.0070
265	3.6809	0.0070
266	3.6879	0.0070
267	3.6948	0.0070
268	3.7017	0.0069
269	3.7087	0.0069
270	3.7156	0.0069
271	3.7225	0.0069
272	3.7294	0.0069
273	3.7362	0.0069
274	3.7431	0.0069
275	3.7500	0.0068
276	3.7568	0.0068
277	3.7636	0.0068
278	3.7704	0.0068
279	3.7772	0.0068
280	3.7840	0.0068
281	3.7908	0.0068
282	3.7976	0.0068
283	3.8043	0.0068
284	3.8111	0.0067
285	3.8178	0.0067
286	3.8245	0.0067
287	3.8312	0.0067
288	3.8379	0.0067

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0067	0.0049	0.0018
2	0.0067	0.0049	0.0018
3	0.0067	0.0049	0.0018
4	0.0067	0.0049	0.0018
5	0.0068	0.0049	0.0018
6	0.0068	0.0049	0.0018
7	0.0068	0.0049	0.0019
8	0.0068	0.0050	0.0019
9	0.0068	0.0050	0.0019
10	0.0068	0.0050	0.0019
11	0.0069	0.0050	0.0019
12	0.0069	0.0050	0.0019
13	0.0069	0.0050	0.0019
14	0.0069	0.0050	0.0019
15	0.0070	0.0051	0.0019
16	0.0070	0.0051	0.0019
17	0.0070	0.0051	0.0019
18	0.0070	0.0051	0.0019
19	0.0070	0.0051	0.0019
20	0.0070	0.0051	0.0019

21	0.0071	0.0051	0.0019
22	0.0071	0.0052	0.0019
23	0.0071	0.0052	0.0019
24	0.0071	0.0052	0.0019
25	0.0072	0.0052	0.0020
26	0.0072	0.0052	0.0020
27	0.0072	0.0052	0.0020
28	0.0072	0.0052	0.0020
29	0.0072	0.0053	0.0020
30	0.0073	0.0053	0.0020
31	0.0073	0.0053	0.0020
32	0.0073	0.0053	0.0020
33	0.0073	0.0053	0.0020
34	0.0073	0.0053	0.0020
35	0.0074	0.0054	0.0020
36	0.0074	0.0054	0.0020
37	0.0074	0.0054	0.0020
38	0.0074	0.0054	0.0020
39	0.0075	0.0054	0.0020
40	0.0075	0.0054	0.0020
41	0.0075	0.0055	0.0021
42	0.0075	0.0055	0.0021
43	0.0076	0.0055	0.0021
44	0.0076	0.0055	0.0021
45	0.0076	0.0055	0.0021
46	0.0076	0.0056	0.0021
47	0.0077	0.0056	0.0021
48	0.0077	0.0056	0.0021
49	0.0077	0.0056	0.0021
50	0.0077	0.0056	0.0021
51	0.0078	0.0057	0.0021
52	0.0078	0.0057	0.0021
53	0.0078	0.0057	0.0021
54	0.0079	0.0057	0.0021
55	0.0079	0.0057	0.0022
56	0.0079	0.0058	0.0022
57	0.0080	0.0058	0.0022
58	0.0080	0.0058	0.0022
59	0.0080	0.0058	0.0022
60	0.0080	0.0058	0.0022
61	0.0081	0.0059	0.0022
62	0.0081	0.0059	0.0022
63	0.0081	0.0059	0.0022
64	0.0082	0.0059	0.0022
65	0.0082	0.0060	0.0022
66	0.0082	0.0060	0.0022
67	0.0083	0.0060	0.0023
68	0.0083	0.0060	0.0023
69	0.0083	0.0061	0.0023
70	0.0083	0.0061	0.0023

71	0.0084	0.0061	0.0023
72	0.0084	0.0061	0.0023
73	0.0085	0.0062	0.0023
74	0.0085	0.0062	0.0023
75	0.0085	0.0062	0.0023
76	0.0086	0.0062	0.0023
77	0.0086	0.0063	0.0023
78	0.0086	0.0063	0.0024
79	0.0087	0.0063	0.0024
80	0.0087	0.0063	0.0024
81	0.0088	0.0064	0.0024
82	0.0088	0.0064	0.0024
83	0.0088	0.0064	0.0024
84	0.0089	0.0064	0.0024
85	0.0089	0.0065	0.0024
86	0.0089	0.0065	0.0024
87	0.0090	0.0065	0.0025
88	0.0090	0.0066	0.0025
89	0.0091	0.0066	0.0025
90	0.0091	0.0066	0.0025
91	0.0092	0.0067	0.0025
92	0.0092	0.0067	0.0025
93	0.0093	0.0067	0.0025
94	0.0093	0.0068	0.0025
95	0.0094	0.0068	0.0026
96	0.0094	0.0068	0.0026
97	0.0095	0.0069	0.0026
98	0.0095	0.0069	0.0026
99	0.0096	0.0070	0.0026
100	0.0096	0.0070	0.0026
101	0.0097	0.0070	0.0026
102	0.0097	0.0071	0.0026
103	0.0098	0.0071	0.0027
104	0.0098	0.0071	0.0027
105	0.0099	0.0072	0.0027
106	0.0099	0.0072	0.0027
107	0.0100	0.0073	0.0027
108	0.0100	0.0073	0.0027
109	0.0101	0.0074	0.0028
110	0.0102	0.0074	0.0028
111	0.0102	0.0074	0.0028
112	0.0103	0.0075	0.0028
113	0.0104	0.0075	0.0028
114	0.0104	0.0076	0.0028
115	0.0105	0.0076	0.0029
116	0.0105	0.0077	0.0029
117	0.0106	0.0077	0.0029
118	0.0107	0.0078	0.0029
119	0.0108	0.0078	0.0029
120	0.0108	0.0079	0.0030

121	0.0109	0.0079	0.0030
122	0.0110	0.0080	0.0030
123	0.0111	0.0081	0.0030
124	0.0111	0.0081	0.0030
125	0.0112	0.0082	0.0031
126	0.0113	0.0082	0.0031
127	0.0114	0.0083	0.0031
128	0.0115	0.0083	0.0031
129	0.0116	0.0084	0.0032
130	0.0117	0.0085	0.0032
131	0.0118	0.0086	0.0032
132	0.0118	0.0086	0.0032
133	0.0120	0.0087	0.0033
134	0.0120	0.0088	0.0033
135	0.0122	0.0089	0.0033
136	0.0122	0.0089	0.0033
137	0.0124	0.0090	0.0034
138	0.0125	0.0091	0.0034
139	0.0126	0.0092	0.0034
140	0.0127	0.0092	0.0035
141	0.0129	0.0094	0.0035
142	0.0129	0.0094	0.0035
143	0.0131	0.0095	0.0036
144	0.0132	0.0096	0.0036
145	0.0133	0.0097	0.0036
146	0.0134	0.0097	0.0036
147	0.0136	0.0099	0.0037
148	0.0137	0.0099	0.0037
149	0.0139	0.0101	0.0038
150	0.0140	0.0102	0.0038
151	0.0142	0.0103	0.0039
152	0.0143	0.0104	0.0039
153	0.0146	0.0106	0.0040
154	0.0147	0.0107	0.0040
155	0.0149	0.0109	0.0041
156	0.0151	0.0110	0.0041
157	0.0154	0.0112	0.0042
158	0.0155	0.0113	0.0042
159	0.0158	0.0115	0.0043
160	0.0160	0.0116	0.0044
161	0.0163	0.0119	0.0044
162	0.0165	0.0120	0.0045
163	0.0168	0.0122	0.0046
164	0.0170	0.0124	0.0046
165	0.0174	0.0127	0.0048
166	0.0177	0.0128	0.0048
167	0.0181	0.0132	0.0049
168	0.0184	0.0134	0.0050
169	0.0189	0.0137	0.0051
170	0.0191	0.0139	0.0052

171	0.0197	0.0143	0.0054
172	0.0200	0.0146	0.0055
173	0.0207	0.0151	0.0056
174	0.0211	0.0153	0.0057
175	0.0219	0.0159	0.0060
176	0.0223	0.0162	0.0061
177	0.0232	0.0169	0.0063
178	0.0237	0.0173	0.0065
179	0.0249	0.0181	0.0068
180	0.0255	0.0185	0.0070
181	0.0269	0.0196	0.0073
182	0.0277	0.0202	0.0076
183	0.0296	0.0215	0.0081
184	0.0307	0.0223	0.0084
185	0.0202	0.0147	0.0055
186	0.0216	0.0157	0.0059
187	0.0250	0.0182	0.0068
188	0.0273	0.0199	0.0074
189	0.0339	0.0247	0.0093
190	0.0391	0.0284	0.0107
191	0.0593	0.0431	0.0162
192	0.0861	0.0482	0.0379
193	0.3724	0.0482	0.3242
194	0.0467	0.0340	0.0127
195	0.0302	0.0219	0.0082
196	0.0231	0.0168	0.0063
197	0.0319	0.0232	0.0087
198	0.0286	0.0208	0.0078
199	0.0262	0.0190	0.0071
200	0.0243	0.0177	0.0066
201	0.0227	0.0165	0.0062
202	0.0215	0.0156	0.0058
203	0.0204	0.0148	0.0056
204	0.0194	0.0141	0.0053
205	0.0186	0.0135	0.0051
206	0.0179	0.0130	0.0049
207	0.0172	0.0125	0.0047
208	0.0167	0.0121	0.0045
209	0.0161	0.0117	0.0044
210	0.0156	0.0114	0.0043
211	0.0152	0.0111	0.0041
212	0.0148	0.0108	0.0040
213	0.0144	0.0105	0.0039
214	0.0141	0.0102	0.0038
215	0.0138	0.0100	0.0038
216	0.0135	0.0098	0.0037
217	0.0133	0.0097	0.0036
218	0.0130	0.0095	0.0036
219	0.0128	0.0093	0.0035
220	0.0125	0.0091	0.0034

221	0.0123	0.0090	0.0034
222	0.0121	0.0088	0.0033
223	0.0119	0.0087	0.0032
224	0.0117	0.0085	0.0032
225	0.0115	0.0084	0.0031
226	0.0114	0.0083	0.0031
227	0.0112	0.0081	0.0031
228	0.0110	0.0080	0.0030
229	0.0109	0.0079	0.0030
230	0.0107	0.0078	0.0029
231	0.0106	0.0077	0.0029
232	0.0105	0.0076	0.0028
233	0.0103	0.0075	0.0028
234	0.0102	0.0074	0.0028
235	0.0101	0.0073	0.0027
236	0.0100	0.0072	0.0027
237	0.0098	0.0072	0.0027
238	0.0097	0.0071	0.0027
239	0.0096	0.0070	0.0026
240	0.0095	0.0069	0.0026
241	0.0094	0.0069	0.0026
242	0.0093	0.0068	0.0025
243	0.0092	0.0067	0.0025
244	0.0091	0.0067	0.0025
245	0.0091	0.0066	0.0025
246	0.0090	0.0065	0.0024
247	0.0089	0.0065	0.0024
248	0.0088	0.0064	0.0024
249	0.0087	0.0064	0.0024
250	0.0087	0.0063	0.0024
251	0.0086	0.0062	0.0023
252	0.0085	0.0062	0.0023
253	0.0084	0.0061	0.0023
254	0.0084	0.0061	0.0023
255	0.0083	0.0060	0.0023
256	0.0082	0.0060	0.0022
257	0.0082	0.0059	0.0022
258	0.0081	0.0059	0.0022
259	0.0081	0.0059	0.0022
260	0.0080	0.0058	0.0022
261	0.0079	0.0058	0.0022
262	0.0079	0.0057	0.0021
263	0.0078	0.0057	0.0021
264	0.0078	0.0056	0.0021
265	0.0077	0.0056	0.0021
266	0.0077	0.0056	0.0021
267	0.0076	0.0055	0.0021
268	0.0076	0.0055	0.0021
269	0.0075	0.0055	0.0020
270	0.0075	0.0054	0.0020

271	0.0074	0.0054	0.0020
272	0.0074	0.0054	0.0020
273	0.0073	0.0053	0.0020
274	0.0073	0.0053	0.0020
275	0.0072	0.0053	0.0020
276	0.0072	0.0052	0.0020
277	0.0071	0.0052	0.0019
278	0.0071	0.0052	0.0019
279	0.0071	0.0051	0.0019
280	0.0070	0.0051	0.0019
281	0.0070	0.0051	0.0019
282	0.0069	0.0050	0.0019
283	0.0069	0.0050	0.0019
284	0.0069	0.0050	0.0019
285	0.0068	0.0050	0.0019
286	0.0068	0.0049	0.0019
287	0.0068	0.0049	0.0018
288	0.0067	0.0049	0.0018

Total soil rain loss = 2.55(In)
Total effective rainfall = 1.28(In)
Peak flow rate in flood hydrograph = 4.07(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

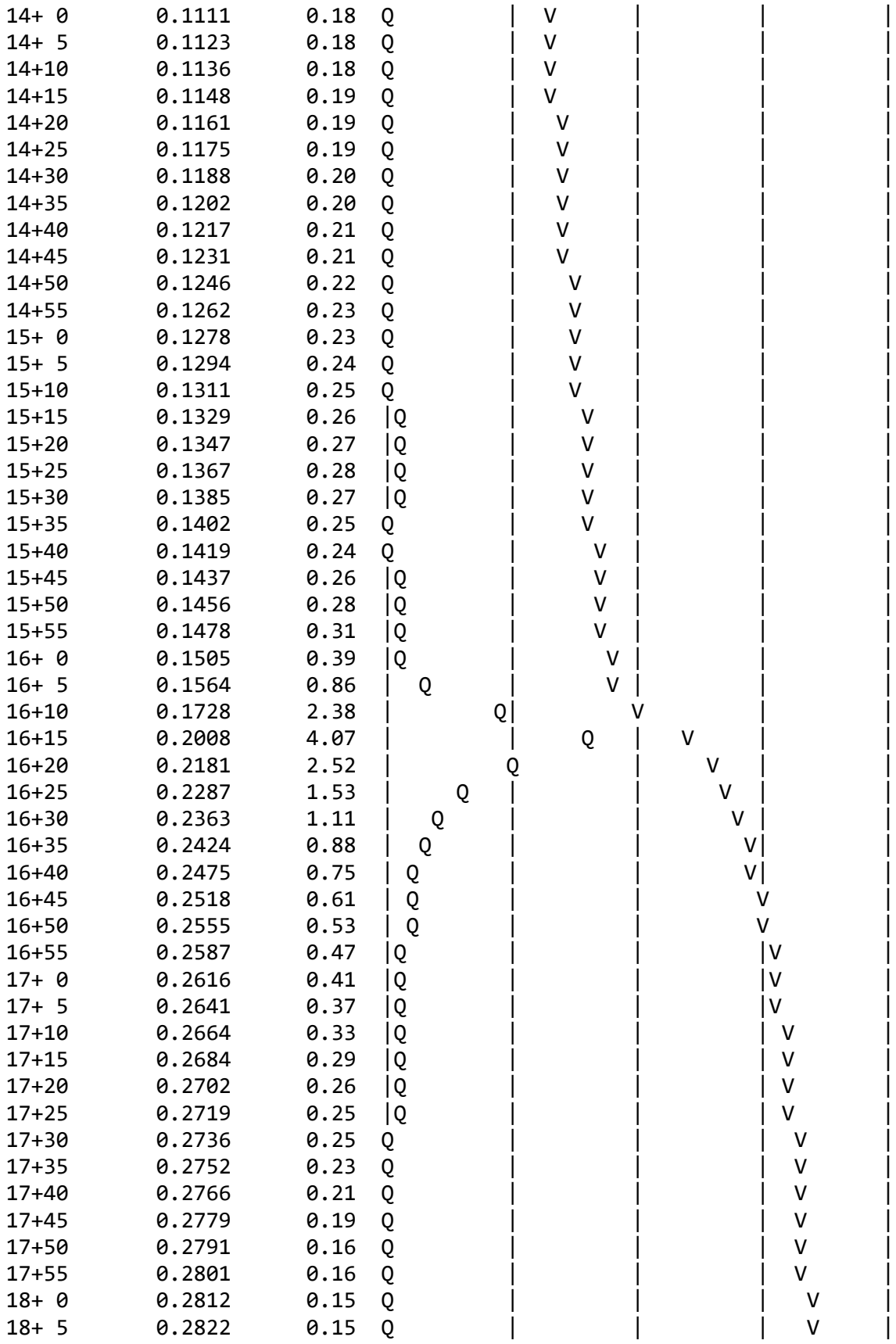
Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2.5	5.0	7.5	10.0
0+ 5	0.0000	0.00	Q	|	|	|	|
0+10	0.0001	0.01	Q	|	|	|	|
0+15	0.0003	0.03	Q	|	|	|	|
0+20	0.0006	0.04	Q	|	|	|	|
0+25	0.0010	0.05	Q	|	|	|	|
0+30	0.0013	0.05	Q	|	|	|	|
0+35	0.0017	0.06	Q	|	|	|	|
0+40	0.0021	0.06	Q	|	|	|	|
0+45	0.0026	0.06	Q	|	|	|	|
0+50	0.0030	0.06	Q	|	|	|	|
0+55	0.0035	0.07	Q	|	|	|	|
1+ 0	0.0039	0.07	Q	|	|	|	|
1+ 5	0.0044	0.07	Q	|	|	|	|
1+10	0.0049	0.07	Q	|	|	|	|
1+15	0.0053	0.07	Q	|	|	|	|
1+20	0.0058	0.07	Q	|	|	|	|
1+25	0.0063	0.07	Q	|	|	|	|

1+30	0.0068	0.07	Q	|	|	|	|
1+35	0.0072	0.07	Q	|	|	|	|
1+40	0.0077	0.07	Q	|	|	|	|
1+45	0.0082	0.07	Q	|	|	|	|
1+50	0.0087	0.07	QV	|	|	|	|
1+55	0.0092	0.07	QV	|	|	|	|
2+ 0	0.0097	0.07	QV	|	|	|	|
2+ 5	0.0102	0.07	QV	|	|	|	|
2+10	0.0107	0.07	QV	|	|	|	|
2+15	0.0112	0.07	QV	|	|	|	|
2+20	0.0117	0.07	QV	|	|	|	|
2+25	0.0122	0.07	QV	|	|	|	|
2+30	0.0127	0.07	QV	|	|	|	|
2+35	0.0132	0.07	QV	|	|	|	|
2+40	0.0137	0.07	QV	|	|	|	|
2+45	0.0142	0.07	QV	|	|	|	|
2+50	0.0147	0.07	QV	|	|	|	|
2+55	0.0152	0.07	QV	|	|	|	|
3+ 0	0.0158	0.07	QV	|	|	|	|
3+ 5	0.0163	0.07	QV	|	|	|	|
3+10	0.0168	0.07	Q V	|	|	|	|
3+15	0.0173	0.08	Q V	|	|	|	|
3+20	0.0178	0.08	Q V	|	|	|	|
3+25	0.0183	0.08	Q V	|	|	|	|
3+30	0.0189	0.08	Q V	|	|	|	|
3+35	0.0194	0.08	Q V	|	|	|	|
3+40	0.0199	0.08	Q V	|	|	|	|
3+45	0.0204	0.08	Q V	|	|	|	|
3+50	0.0210	0.08	Q V	|	|	|	|
3+55	0.0215	0.08	Q V	|	|	|	|
4+ 0	0.0220	0.08	Q V	|	|	|	|
4+ 5	0.0226	0.08	Q V	|	|	|	|
4+10	0.0231	0.08	Q V	|	|	|	|
4+15	0.0237	0.08	Q V	|	|	|	|
4+20	0.0242	0.08	Q V	|	|	|	|
4+25	0.0247	0.08	Q V	|	|	|	|
4+30	0.0253	0.08	Q V	|	|	|	|
4+35	0.0258	0.08	Q V	|	|	|	|
4+40	0.0264	0.08	Q V	|	|	|	|
4+45	0.0269	0.08	Q V	|	|	|	|
4+50	0.0275	0.08	Q V	|	|	|	|
4+55	0.0280	0.08	Q V	|	|	|	|
5+ 0	0.0286	0.08	Q V	|	|	|	|
5+ 5	0.0291	0.08	Q V	|	|	|	|
5+10	0.0297	0.08	Q V	|	|	|	|
5+15	0.0303	0.08	Q V	|	|	|	|
5+20	0.0308	0.08	Q V	|	|	|	|
5+25	0.0314	0.08	Q V	|	|	|	|
5+30	0.0320	0.08	Q V	|	|	|	|
5+35	0.0325	0.08	Q V	|	|	|	|

5+40	0.0331	0.08	Q	V				
5+45	0.0337	0.08	Q	V				
5+50	0.0343	0.08	Q	V				
5+55	0.0348	0.08	Q	V				
6+ 0	0.0354	0.08	Q	V				
6+ 5	0.0360	0.08	Q	V				
6+10	0.0366	0.09	Q	V				
6+15	0.0372	0.09	Q	V				
6+20	0.0378	0.09	Q	V				
6+25	0.0384	0.09	Q	V				
6+30	0.0390	0.09	Q	V				
6+35	0.0396	0.09	Q	V				
6+40	0.0402	0.09	Q	V				
6+45	0.0408	0.09	Q	V				
6+50	0.0414	0.09	Q	V				
6+55	0.0420	0.09	Q	V				
7+ 0	0.0426	0.09	Q	V				
7+ 5	0.0432	0.09	Q	V				
7+10	0.0438	0.09	Q	V				
7+15	0.0444	0.09	Q	V				
7+20	0.0451	0.09	Q	V				
7+25	0.0457	0.09	Q	V				
7+30	0.0463	0.09	Q	V				
7+35	0.0470	0.09	Q	V				
7+40	0.0476	0.09	Q	V				
7+45	0.0482	0.09	Q	V				
7+50	0.0489	0.09	Q	V				
7+55	0.0495	0.09	Q	V				
8+ 0	0.0502	0.09	Q	V				
8+ 5	0.0508	0.09	Q	V				
8+10	0.0515	0.09	Q	V				
8+15	0.0521	0.10	Q	V				
8+20	0.0528	0.10	Q	V				
8+25	0.0535	0.10	Q	V				
8+30	0.0541	0.10	Q	V				
8+35	0.0548	0.10	Q	V				
8+40	0.0555	0.10	Q	V				
8+45	0.0561	0.10	Q	V				
8+50	0.0568	0.10	Q	V				
8+55	0.0575	0.10	Q	V				
9+ 0	0.0582	0.10	Q	V				
9+ 5	0.0589	0.10	Q	V				
9+10	0.0596	0.10	Q	V				
9+15	0.0603	0.10	Q	V				
9+20	0.0610	0.10	Q	V				
9+25	0.0617	0.10	Q	V				
9+30	0.0624	0.10	Q	V				
9+35	0.0631	0.10	Q	V				
9+40	0.0639	0.10	Q	V				
9+45	0.0646	0.11	Q	V				

```
 9+50       0.0653      0.11  Q      V  |          |          |          |
 9+55       0.0661      0.11  Q      V  |          |          |          |
10+ 0       0.0668      0.11  Q       V |          |          |          |
10+ 5       0.0676      0.11  Q       V |          |          |          |
10+10       0.0683      0.11  Q       V |          |          |          |
10+15       0.0691      0.11  Q       V |          |          |          |
10+20       0.0698      0.11  Q       V |          |          |          |
10+25       0.0706      0.11  Q       V |          |          |          |
10+30       0.0714      0.11  Q       V |          |          |          |
10+35       0.0721      0.11  Q       V |          |          |          |
10+40       0.0729      0.11  Q       V |          |          |          |
10+45       0.0737      0.11  Q       V |          |          |          |
10+50       0.0745      0.12  Q        V|          |          |          |
10+55       0.0753      0.12  Q        V|          |          |          |
11+ 0       0.0761      0.12  Q        V|          |          |          |
11+ 5       0.0769      0.12  Q        V|          |          |          |
11+10       0.0778      0.12  Q        V|          |          |          |
11+15       0.0786      0.12  Q        V|          |          |          |
11+20       0.0794      0.12  Q        V|          |          |          |
11+25       0.0803      0.12  Q        V|          |          |          |
11+30       0.0811      0.12  Q        V|          |          |          |
11+35       0.0820      0.12  Q        V|          |          |          |
11+40       0.0828      0.13  Q         V          |          |          |
11+45       0.0837      0.13  Q         V          |          |          |
11+50       0.0846      0.13  Q         V          |          |          |
11+55       0.0855      0.13  Q         V          |          |          |
12+ 0       0.0863      0.13  Q         V          |          |          |
12+ 5       0.0873      0.13  Q         V          |          |          |
12+10       0.0882      0.13  Q         V          |          |          |
12+15       0.0891      0.13  Q         V          |          |          |
12+20       0.0900      0.13  Q         V          |          |          |
12+25       0.0909      0.14  Q         |V         |          |          |
12+30       0.0919      0.14  Q         |V         |          |          |
12+35       0.0928      0.14  Q         |V         |          |          |
12+40       0.0938      0.14  Q         |V         |          |          |
12+45       0.0948      0.14  Q         |V         |          |          |
12+50       0.0958      0.14  Q         |V         |          |          |
12+55       0.0968      0.15  Q         |V         |          |          |
13+ 0       0.0978      0.15  Q         |V         |          |          |
13+ 5       0.0988      0.15  Q         |V         |          |          |
13+10       0.0998      0.15  Q         | V        |          |          |
13+15       0.1009      0.15  Q         | V        |          |          |
13+20       0.1019      0.15  Q         | V        |          |          |
13+25       0.1030      0.16  Q         | V        |          |          |
13+30       0.1041      0.16  Q         | V        |          |          |
13+35       0.1052      0.16  Q         | V        |          |          |
13+40       0.1064      0.16  Q         | V        |          |          |
13+45       0.1075      0.17  Q         |  V       |          |          |
13+50       0.1087      0.17  Q         |  V       |          |          |
13+55       0.1099      0.17  Q         |  V       |          |          |
```



18+10	0.2832	0.15	Q	|	|	| V	|
18+15	0.2842	0.14	Q	|	|	| V	|
18+20	0.2852	0.14	Q	|	|	| V	|
18+25	0.2861	0.14	Q	|	|	| V	|
18+30	0.2870	0.13	Q	|	|	| V	|
18+35	0.2879	0.13	Q	|	|	| V	|
18+40	0.2888	0.13	Q	|	|	| V	|
18+45	0.2897	0.13	Q	|	|	| V	|
18+50	0.2905	0.12	Q	|	|	| V	|
18+55	0.2914	0.12	Q	|	|	| V	|
19+ 0	0.2922	0.12	Q	|	|	| V	|
19+ 5	0.2930	0.12	Q	|	|	| V	|
19+10	0.2938	0.12	Q	|	|	| V	|
19+15	0.2946	0.11	Q	|	|	| V	|
19+20	0.2954	0.11	Q	|	|	| V	|
19+25	0.2961	0.11	Q	|	|	| V	|
19+30	0.2969	0.11	Q	|	|	| V	|
19+35	0.2976	0.11	Q	|	|	| V	|
19+40	0.2984	0.11	Q	|	|	| V	|
19+45	0.2991	0.11	Q	|	|	| V	|
19+50	0.2998	0.10	Q	|	|	| V	|
19+55	0.3005	0.10	Q	|	|	| V	|
20+ 0	0.3012	0.10	Q	|	|	| V	|
20+ 5	0.3019	0.10	Q	|	|	| V	|
20+10	0.3026	0.10	Q	|	|	| V	|
20+15	0.3033	0.10	Q	|	|	| V	|
20+20	0.3039	0.10	Q	|	|	| V	|
20+25	0.3046	0.10	Q	|	|	| V	|
20+30	0.3052	0.10	Q	|	|	| V	|
20+35	0.3059	0.09	Q	|	|	| V	|
20+40	0.3065	0.09	Q	|	|	| V	|
20+45	0.3072	0.09	Q	|	|	| V	|
20+50	0.3078	0.09	Q	|	|	| V	|
20+55	0.3084	0.09	Q	|	|	| V	|
21+ 0	0.3090	0.09	Q	|	|	| V	|
21+ 5	0.3097	0.09	Q	|	|	| V	|
21+10	0.3103	0.09	Q	|	|	| V	|
21+15	0.3109	0.09	Q	|	|	| V	|
21+20	0.3115	0.09	Q	|	|	| V	|
21+25	0.3121	0.09	Q	|	|	| V	|
21+30	0.3126	0.09	Q	|	|	| V	|
21+35	0.3132	0.08	Q	|	|	| V	|
21+40	0.3138	0.08	Q	|	|	| V	|
21+45	0.3144	0.08	Q	|	|	| V	|
21+50	0.3150	0.08	Q	|	|	| V	|
21+55	0.3155	0.08	Q	|	|	| V	|
22+ 0	0.3161	0.08	Q	|	|	| V	|
22+ 5	0.3166	0.08	Q	|	|	| V	|
22+10	0.3172	0.08	Q	|	|	| V	|
22+15	0.3177	0.08	Q	|	|	| V	|

```
   22+20       0.3183      0.08  Q          |          |          |        V |
   22+25       0.3188      0.08  Q          |          |          |        V |
   22+30       0.3194      0.08  Q          |          |          |        V |
   22+35       0.3199      0.08  Q          |          |          |        V |
   22+40       0.3204      0.08  Q          |          |          |        V |
   22+45       0.3209      0.08  Q          |          |          |        V |
   22+50       0.3215      0.08  Q          |          |          |        V |
   22+55       0.3220      0.08  Q          |          |          |        V |
   23+ 0       0.3225      0.07  Q          |          |          |         V|
   23+ 5       0.3230      0.07  Q          |          |          |         V|
   23+10       0.3235      0.07  Q          |          |          |         V|
   23+15       0.3240      0.07  Q          |          |          |         V|
   23+20       0.3245      0.07  Q          |          |          |         V|
   23+25       0.3250      0.07  Q          |          |          |         V|
   23+30       0.3255      0.07  Q          |          |          |         V|
   23+35       0.3260      0.07  Q          |          |          |         V|
   23+40       0.3265      0.07  Q          |          |          |         V|
   23+45       0.3270      0.07  Q          |          |          |         V|
   23+50       0.3275      0.07  Q          |          |          |         V|
   23+55       0.3280      0.07  Q          |          |          |         V|
   24+ 0       0.3285      0.07  Q          |          |          |         V|
   24+ 5       0.3289      0.07  Q          |          |          |         V|
   24+10       0.3293      0.06  Q          |          |          |         V|
   24+15       0.3296      0.04  Q          |          |          |         V|
   24+20       0.3298      0.03  Q          |          |          |         V|
   24+25       0.3299      0.02  Q          |          |          |         V|
   24+30       0.3300      0.01  Q          |          |          |         V|
-------------------------------------------------------------------------
```

SECTION 6.5: Attachment C.2

10-Year Unit Hydrograph Post-Development Conditions

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

Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2004, Version 7.0

Study date 12/06/20

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

Program License Serial Number 6277

2020-326 HCC V
POST-DEVELOPMENT CONDITIONS
UNIT HYDROGRAPH - 10 YEAR STORM
DA A

Storm Event Year = 10

Antecedent Moisture Condition = 2

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 10		
34.50	1	0.79
Rainfall data for year 2		
34.50	6	1.12
Rainfall data for year 2		
34.50	24	2.11
Rainfall data for year 100		

```
            34.50            1            1.31
------------------------------------------------------------------------
Rainfall data for year 100
            34.50            6            3.05
------------------------------------------------------------------------
Rainfall data for year 100
            34.50           24            6.31
------------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

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


SCS curve  SCS curve     Area     Area     Fp(Fig C6)    Ap      Fm
No.(AMCII) NO.(AMC 2)    (Ac.)    Fraction     (In/Hr)  (dec.)   (In/Hr)
 32.0      32.0         34.50      1.000     0.978    0.150    0.147

Area-averaged adjusted loss rate Fm (In/Hr) =  0.147

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

Area       Area          SCS CN    SCS CN      S     Pervious
 (Ac.)      Fract         (AMC2)    (AMC2)           Yield Fr
     5.17   0.150         32.0      32.0      19.19     0.000
    29.32   0.850         98.0      98.0       0.20     0.939

Area-averaged catchment yield fraction, Y =  0.798
Area-averaged low loss fraction, Yb =  0.202
User entry of time of concentration  =   0.221 (hours)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watershed area =      34.50(Ac.)
Catchment Lag time =   0.177 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 47.1342
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.147(In/Hr)
Average low loss rate fraction (Yb) = 0.202 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall =  0.372(In)
Computed peak 30-minute rainfall =  0.638(In)
Specified peak 1-hour rainfall =  0.785(In)
Computed peak 3-hour rainfall =  1.356(In)
Specified peak 6-hour rainfall =  1.914(In)
Specified peak 24-hour rainfall =  3.838(In)


Rainfall depth area reduction factors:
Using a total area of      34.50(Ac.) (Ref: fig. E-4)

5-minute factor = 0.998     Adjusted rainfall =  0.372(In)
```

30-minute factor = 0.998 Adjusted rainfall = 0.637(In)
1-hour factor = 0.998 Adjusted rainfall = 0.784(In)
3-hour factor = 1.000 Adjusted rainfall = 1.356(In)
6-hour factor = 1.000 Adjusted rainfall = 1.914(In)
24-hour factor = 1.000 Adjusted rainfall = 3.838(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 = 417.23 (CFS))	
1	3.594	14.997
2	27.120	98.157
3	57.814	128.068
4	71.740	58.101
5	79.819	33.708
6	85.150	22.246
7	89.019	16.139
8	91.734	11.330
9	93.866	8.896
10	95.486	6.758
11	96.739	5.228
12	97.636	3.744
13	98.195	2.333
14	98.736	2.255
15	99.298	2.347
16	99.691	1.639
17	100.000	1.289

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.3719	0.3719
2	0.4578	0.0860
3	0.5171	0.0592
4	0.5637	0.0466
5	0.6027	0.0390
6	0.6366	0.0339
7	0.6667	0.0301
8	0.6940	0.0273
9	0.7189	0.0250
10	0.7420	0.0231
11	0.7635	0.0215
12	0.7837	0.0202
13	0.8156	0.0319
14	0.8464	0.0307
15	0.8760	0.0296
16	0.9046	0.0287

17	0.9324	0.0278
18	0.9594	0.0270
19	0.9856	0.0262
20	1.0111	0.0255
21	1.0360	0.0249
22	1.0604	0.0243
23	1.0841	0.0238
24	1.1074	0.0233
25	1.1302	0.0228
26	1.1525	0.0223
27	1.1744	0.0219
28	1.1959	0.0215
29	1.2170	0.0211
30	1.2377	0.0208
31	1.2581	0.0204
32	1.2782	0.0201
33	1.2980	0.0198
34	1.3175	0.0195
35	1.3366	0.0192
36	1.3555	0.0189
37	1.3742	0.0186
38	1.3925	0.0184
39	1.4106	0.0181
40	1.4285	0.0179
41	1.4462	0.0177
42	1.4636	0.0174
43	1.4808	0.0172
44	1.4979	0.0170
45	1.5147	0.0168
46	1.5314	0.0167
47	1.5479	0.0165
48	1.5642	0.0163
49	1.5803	0.0161
50	1.5963	0.0160
51	1.6121	0.0158
52	1.6277	0.0157
53	1.6432	0.0155
54	1.6586	0.0154
55	1.6738	0.0152
56	1.6889	0.0151
57	1.7038	0.0149
58	1.7186	0.0148
59	1.7333	0.0147
60	1.7478	0.0146
61	1.7623	0.0144
62	1.7766	0.0143
63	1.7908	0.0142
64	1.8049	0.0141
65	1.8189	0.0140
66	1.8327	0.0139

67	1.8465	0.0138
68	1.8601	0.0137
69	1.8737	0.0136
70	1.8872	0.0135
71	1.9005	0.0134
72	1.9138	0.0133
73	1.9271	0.0133
74	1.9403	0.0132
75	1.9534	0.0131
76	1.9665	0.0130
77	1.9794	0.0129
78	1.9923	0.0129
79	2.0050	0.0128
80	2.0177	0.0127
81	2.0304	0.0126
82	2.0429	0.0125
83	2.0554	0.0125
84	2.0678	0.0124
85	2.0801	0.0123
86	2.0923	0.0122
87	2.1045	0.0122
88	2.1166	0.0121
89	2.1286	0.0120
90	2.1406	0.0120
91	2.1525	0.0119
92	2.1644	0.0118
93	2.1761	0.0118
94	2.1878	0.0117
95	2.1995	0.0117
96	2.2111	0.0116
97	2.2226	0.0115
98	2.2341	0.0115
99	2.2455	0.0114
100	2.2569	0.0114
101	2.2682	0.0113
102	2.2794	0.0112
103	2.2906	0.0112
104	2.3017	0.0111
105	2.3128	0.0111
106	2.3238	0.0110
107	2.3348	0.0110
108	2.3457	0.0109
109	2.3566	0.0109
110	2.3674	0.0108
111	2.3782	0.0108
112	2.3890	0.0107
113	2.3996	0.0107
114	2.4103	0.0106
115	2.4209	0.0106
116	2.4314	0.0105

117	2.4419	0.0105
118	2.4524	0.0105
119	2.4628	0.0104
120	2.4731	0.0104
121	2.4834	0.0103
122	2.4937	0.0103
123	2.5040	0.0102
124	2.5142	0.0102
125	2.5243	0.0102
126	2.5344	0.0101
127	2.5445	0.0101
128	2.5545	0.0100
129	2.5645	0.0100
130	2.5745	0.0100
131	2.5844	0.0099
132	2.5943	0.0099
133	2.6042	0.0098
134	2.6140	0.0098
135	2.6237	0.0098
136	2.6335	0.0097
137	2.6432	0.0097
138	2.6528	0.0097
139	2.6625	0.0096
140	2.6721	0.0096
141	2.6816	0.0096
142	2.6912	0.0095
143	2.7007	0.0095
144	2.7101	0.0095
145	2.7195	0.0094
146	2.7289	0.0094
147	2.7383	0.0094
148	2.7476	0.0093
149	2.7569	0.0093
150	2.7662	0.0093
151	2.7755	0.0092
152	2.7847	0.0092
153	2.7938	0.0092
154	2.8030	0.0092
155	2.8121	0.0091
156	2.8212	0.0091
157	2.8303	0.0091
158	2.8393	0.0090
159	2.8483	0.0090
160	2.8573	0.0090
161	2.8662	0.0089
162	2.8752	0.0089
163	2.8841	0.0089
164	2.8929	0.0089
165	2.9018	0.0088
166	2.9106	0.0088

167	2.9194	0.0088
168	2.9281	0.0088
169	2.9369	0.0087
170	2.9456	0.0087
171	2.9542	0.0087
172	2.9629	0.0087
173	2.9715	0.0086
174	2.9801	0.0086
175	2.9887	0.0086
176	2.9973	0.0086
177	3.0058	0.0085
178	3.0143	0.0085
179	3.0228	0.0085
180	3.0313	0.0085
181	3.0397	0.0084
182	3.0481	0.0084
183	3.0565	0.0084
184	3.0649	0.0084
185	3.0733	0.0083
186	3.0816	0.0083
187	3.0899	0.0083
188	3.0982	0.0083
189	3.1064	0.0083
190	3.1147	0.0082
191	3.1229	0.0082
192	3.1311	0.0082
193	3.1393	0.0082
194	3.1474	0.0082
195	3.1555	0.0081
196	3.1637	0.0081
197	3.1718	0.0081
198	3.1798	0.0081
199	3.1879	0.0081
200	3.1959	0.0080
201	3.2039	0.0080
202	3.2119	0.0080
203	3.2199	0.0080
204	3.2278	0.0080
205	3.2358	0.0079
206	3.2437	0.0079
207	3.2516	0.0079
208	3.2594	0.0079
209	3.2673	0.0079
210	3.2751	0.0078
211	3.2829	0.0078
212	3.2907	0.0078
213	3.2985	0.0078
214	3.3063	0.0078
215	3.3140	0.0077
216	3.3218	0.0077

217	3.3295	0.0077
218	3.3372	0.0077
219	3.3448	0.0077
220	3.3525	0.0077
221	3.3601	0.0076
222	3.3678	0.0076
223	3.3754	0.0076
224	3.3830	0.0076
225	3.3905	0.0076
226	3.3981	0.0076
227	3.4056	0.0075
228	3.4131	0.0075
229	3.4206	0.0075
230	3.4281	0.0075
231	3.4356	0.0075
232	3.4431	0.0075
233	3.4505	0.0074
234	3.4579	0.0074
235	3.4653	0.0074
236	3.4727	0.0074
237	3.4801	0.0074
238	3.4875	0.0074
239	3.4948	0.0073
240	3.5022	0.0073
241	3.5095	0.0073
242	3.5168	0.0073
243	3.5241	0.0073
244	3.5313	0.0073
245	3.5386	0.0073
246	3.5458	0.0072
247	3.5531	0.0072
248	3.5603	0.0072
249	3.5675	0.0072
250	3.5746	0.0072
251	3.5818	0.0072
252	3.5890	0.0072
253	3.5961	0.0071
254	3.6032	0.0071
255	3.6104	0.0071
256	3.6175	0.0071
257	3.6245	0.0071
258	3.6316	0.0071
259	3.6387	0.0071
260	3.6457	0.0070
261	3.6527	0.0070
262	3.6598	0.0070
263	3.6668	0.0070
264	3.6738	0.0070
265	3.6807	0.0070
266	3.6877	0.0070

267	3.6946	0.0070
268	3.7016	0.0069
269	3.7085	0.0069
270	3.7154	0.0069
271	3.7223	0.0069
272	3.7292	0.0069
273	3.7361	0.0069
274	3.7430	0.0069
275	3.7498	0.0069
276	3.7566	0.0068
277	3.7635	0.0068
278	3.7703	0.0068
279	3.7771	0.0068
280	3.7839	0.0068
281	3.7906	0.0068
282	3.7974	0.0068
283	3.8042	0.0068
284	3.8109	0.0067
285	3.8176	0.0067
286	3.8243	0.0067
287	3.8311	0.0067
288	3.8377	0.0067

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0067	0.0014	0.0053
2	0.0067	0.0014	0.0054
3	0.0067	0.0014	0.0054
4	0.0067	0.0014	0.0054
5	0.0068	0.0014	0.0054
6	0.0068	0.0014	0.0054
7	0.0068	0.0014	0.0054
8	0.0068	0.0014	0.0054
9	0.0068	0.0014	0.0055
10	0.0069	0.0014	0.0055
11	0.0069	0.0014	0.0055
12	0.0069	0.0014	0.0055
13	0.0069	0.0014	0.0055
14	0.0069	0.0014	0.0055
15	0.0070	0.0014	0.0055
16	0.0070	0.0014	0.0056
17	0.0070	0.0014	0.0056
18	0.0070	0.0014	0.0056
19	0.0070	0.0014	0.0056
20	0.0070	0.0014	0.0056
21	0.0071	0.0014	0.0056
22	0.0071	0.0014	0.0057
23	0.0071	0.0014	0.0057

24	0.0071	0.0014	0.0057
25	0.0072	0.0014	0.0057
26	0.0072	0.0014	0.0057
27	0.0072	0.0015	0.0057
28	0.0072	0.0015	0.0058
29	0.0072	0.0015	0.0058
30	0.0073	0.0015	0.0058
31	0.0073	0.0015	0.0058
32	0.0073	0.0015	0.0058
33	0.0073	0.0015	0.0059
34	0.0073	0.0015	0.0059
35	0.0074	0.0015	0.0059
36	0.0074	0.0015	0.0059
37	0.0074	0.0015	0.0059
38	0.0074	0.0015	0.0059
39	0.0075	0.0015	0.0060
40	0.0075	0.0015	0.0060
41	0.0075	0.0015	0.0060
42	0.0075	0.0015	0.0060
43	0.0076	0.0015	0.0060
44	0.0076	0.0015	0.0061
45	0.0076	0.0015	0.0061
46	0.0076	0.0015	0.0061
47	0.0077	0.0015	0.0061
48	0.0077	0.0016	0.0061
49	0.0077	0.0016	0.0062
50	0.0077	0.0016	0.0062
51	0.0078	0.0016	0.0062
52	0.0078	0.0016	0.0062
53	0.0078	0.0016	0.0063
54	0.0079	0.0016	0.0063
55	0.0079	0.0016	0.0063
56	0.0079	0.0016	0.0063
57	0.0080	0.0016	0.0063
58	0.0080	0.0016	0.0064
59	0.0080	0.0016	0.0064
60	0.0080	0.0016	0.0064
61	0.0081	0.0016	0.0064
62	0.0081	0.0016	0.0065
63	0.0081	0.0016	0.0065
64	0.0082	0.0016	0.0065
65	0.0082	0.0017	0.0065
66	0.0082	0.0017	0.0066
67	0.0083	0.0017	0.0066
68	0.0083	0.0017	0.0066
69	0.0083	0.0017	0.0066
70	0.0083	0.0017	0.0067
71	0.0084	0.0017	0.0067
72	0.0084	0.0017	0.0067
73	0.0085	0.0017	0.0068

74	0.0085	0.0017	0.0068
75	0.0085	0.0017	0.0068
76	0.0086	0.0017	0.0068
77	0.0086	0.0017	0.0069
78	0.0086	0.0017	0.0069
79	0.0087	0.0018	0.0069
80	0.0087	0.0018	0.0070
81	0.0088	0.0018	0.0070
82	0.0088	0.0018	0.0070
83	0.0088	0.0018	0.0071
84	0.0089	0.0018	0.0071
85	0.0089	0.0018	0.0071
86	0.0089	0.0018	0.0071
87	0.0090	0.0018	0.0072
88	0.0090	0.0018	0.0072
89	0.0091	0.0018	0.0073
90	0.0091	0.0018	0.0073
91	0.0092	0.0019	0.0073
92	0.0092	0.0019	0.0074
93	0.0093	0.0019	0.0074
94	0.0093	0.0019	0.0074
95	0.0094	0.0019	0.0075
96	0.0094	0.0019	0.0075
97	0.0095	0.0019	0.0076
98	0.0095	0.0019	0.0076
99	0.0096	0.0019	0.0076
100	0.0096	0.0019	0.0077
101	0.0097	0.0020	0.0077
102	0.0097	0.0020	0.0077
103	0.0098	0.0020	0.0078
104	0.0098	0.0020	0.0078
105	0.0099	0.0020	0.0079
106	0.0099	0.0020	0.0079
107	0.0100	0.0020	0.0080
108	0.0100	0.0020	0.0080
109	0.0101	0.0020	0.0081
110	0.0102	0.0021	0.0081
111	0.0102	0.0021	0.0082
112	0.0103	0.0021	0.0082
113	0.0104	0.0021	0.0083
114	0.0104	0.0021	0.0083
115	0.0105	0.0021	0.0084
116	0.0105	0.0021	0.0084
117	0.0106	0.0021	0.0085
118	0.0107	0.0022	0.0085
119	0.0108	0.0022	0.0086
120	0.0108	0.0022	0.0086
121	0.0109	0.0022	0.0087
122	0.0110	0.0022	0.0088
123	0.0111	0.0022	0.0088

124	0.0111	0.0022	0.0089
125	0.0112	0.0023	0.0090
126	0.0113	0.0023	0.0090
127	0.0114	0.0023	0.0091
128	0.0115	0.0023	0.0092
129	0.0116	0.0023	0.0092
130	0.0117	0.0024	0.0093
131	0.0118	0.0024	0.0094
132	0.0118	0.0024	0.0094
133	0.0120	0.0024	0.0096
134	0.0120	0.0024	0.0096
135	0.0122	0.0025	0.0097
136	0.0122	0.0025	0.0098
137	0.0124	0.0025	0.0099
138	0.0125	0.0025	0.0099
139	0.0126	0.0025	0.0101
140	0.0127	0.0026	0.0101
141	0.0129	0.0026	0.0103
142	0.0129	0.0026	0.0103
143	0.0131	0.0026	0.0105
144	0.0132	0.0027	0.0105
145	0.0133	0.0027	0.0106
146	0.0134	0.0027	0.0107
147	0.0136	0.0027	0.0108
148	0.0137	0.0028	0.0109
149	0.0139	0.0028	0.0111
150	0.0140	0.0028	0.0112
151	0.0142	0.0029	0.0113
152	0.0143	0.0029	0.0114
153	0.0146	0.0029	0.0116
154	0.0147	0.0030	0.0117
155	0.0149	0.0030	0.0119
156	0.0151	0.0030	0.0120
157	0.0154	0.0031	0.0123
158	0.0155	0.0031	0.0124
159	0.0158	0.0032	0.0126
160	0.0160	0.0032	0.0127
161	0.0163	0.0033	0.0130
162	0.0165	0.0033	0.0131
163	0.0168	0.0034	0.0134
164	0.0170	0.0034	0.0136
165	0.0174	0.0035	0.0139
166	0.0177	0.0036	0.0141
167	0.0181	0.0037	0.0145
168	0.0184	0.0037	0.0146
169	0.0189	0.0038	0.0151
170	0.0192	0.0039	0.0153
171	0.0198	0.0040	0.0158
172	0.0201	0.0041	0.0160
173	0.0208	0.0042	0.0166

174	0.0211	0.0043	0.0168
175	0.0219	0.0044	0.0175
176	0.0223	0.0045	0.0178
177	0.0233	0.0047	0.0186
178	0.0238	0.0048	0.0190
179	0.0249	0.0050	0.0199
180	0.0255	0.0052	0.0204
181	0.0270	0.0054	0.0215
182	0.0278	0.0056	0.0222
183	0.0296	0.0060	0.0236
184	0.0307	0.0062	0.0245
185	0.0202	0.0041	0.0161
186	0.0215	0.0043	0.0172
187	0.0250	0.0050	0.0199
188	0.0273	0.0055	0.0217
189	0.0339	0.0068	0.0270
190	0.0390	0.0079	0.0311
191	0.0592	0.0120	0.0473
192	0.0860	0.0122	0.0737
193	0.3719	0.0122	0.3597
194	0.0466	0.0094	0.0372
195	0.0301	0.0061	0.0240
196	0.0231	0.0047	0.0184
197	0.0319	0.0064	0.0255
198	0.0287	0.0058	0.0229
199	0.0262	0.0053	0.0209
200	0.0243	0.0049	0.0194
201	0.0228	0.0046	0.0182
202	0.0215	0.0043	0.0172
203	0.0204	0.0041	0.0163
204	0.0195	0.0039	0.0155
205	0.0186	0.0038	0.0148
206	0.0179	0.0036	0.0143
207	0.0172	0.0035	0.0138
208	0.0167	0.0034	0.0133
209	0.0161	0.0033	0.0129
210	0.0157	0.0032	0.0125
211	0.0152	0.0031	0.0121
212	0.0148	0.0030	0.0118
213	0.0144	0.0029	0.0115
214	0.0141	0.0028	0.0112
215	0.0138	0.0028	0.0110
216	0.0135	0.0027	0.0107
217	0.0133	0.0027	0.0106
218	0.0130	0.0026	0.0104
219	0.0128	0.0026	0.0102
220	0.0125	0.0025	0.0100
221	0.0123	0.0025	0.0098
222	0.0121	0.0024	0.0097
223	0.0119	0.0024	0.0095

224	0.0117	0.0024	0.0093
225	0.0115	0.0023	0.0092
226	0.0114	0.0023	0.0091
227	0.0112	0.0023	0.0089
228	0.0110	0.0022	0.0088
229	0.0109	0.0022	0.0087
230	0.0107	0.0022	0.0086
231	0.0106	0.0021	0.0085
232	0.0105	0.0021	0.0083
233	0.0103	0.0021	0.0082
234	0.0102	0.0021	0.0081
235	0.0101	0.0020	0.0080
236	0.0100	0.0020	0.0079
237	0.0098	0.0020	0.0079
238	0.0097	0.0020	0.0078
239	0.0096	0.0019	0.0077
240	0.0095	0.0019	0.0076
241	0.0094	0.0019	0.0075
242	0.0093	0.0019	0.0074
243	0.0092	0.0019	0.0074
244	0.0092	0.0018	0.0073
245	0.0091	0.0018	0.0072
246	0.0090	0.0018	0.0072
247	0.0089	0.0018	0.0071
248	0.0088	0.0018	0.0070
249	0.0087	0.0018	0.0070
250	0.0087	0.0017	0.0069
251	0.0086	0.0017	0.0069
252	0.0085	0.0017	0.0068
253	0.0084	0.0017	0.0067
254	0.0084	0.0017	0.0067
255	0.0083	0.0017	0.0066
256	0.0082	0.0017	0.0066
257	0.0082	0.0017	0.0065
258	0.0081	0.0016	0.0065
259	0.0081	0.0016	0.0064
260	0.0080	0.0016	0.0064
261	0.0079	0.0016	0.0063
262	0.0079	0.0016	0.0063
263	0.0078	0.0016	0.0062
264	0.0078	0.0016	0.0062
265	0.0077	0.0016	0.0062
266	0.0077	0.0015	0.0061
267	0.0076	0.0015	0.0061
268	0.0076	0.0015	0.0060
269	0.0075	0.0015	0.0060
270	0.0075	0.0015	0.0060
271	0.0074	0.0015	0.0059
272	0.0074	0.0015	0.0059
273	0.0073	0.0015	0.0058

274	0.0073	0.0015	0.0058
275	0.0072	0.0015	0.0058
276	0.0072	0.0015	0.0057
277	0.0071	0.0014	0.0057
278	0.0071	0.0014	0.0057
279	0.0071	0.0014	0.0056
280	0.0070	0.0014	0.0056
281	0.0070	0.0014	0.0056
282	0.0069	0.0014	0.0055
283	0.0069	0.0014	0.0055
284	0.0069	0.0014	0.0055
285	0.0068	0.0014	0.0054
286	0.0068	0.0014	0.0054
287	0.0068	0.0014	0.0054
288	0.0067	0.0014	0.0054

Total soil rain loss = 0.71(In)
Total effective rainfall = 3.13(In)
Peak flow rate in flood hydrograph = 58.01(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	15.0	30.0	45.0	60.0
0+ 5	0.0006	0.08	Q	|	|	|	|
0+10	0.0047	0.60	Q	|	|	|	|
0+15	0.0136	1.29	Q	|	|	|	|
0+20	0.0246	1.60	VQ	|	|	|	|
0+25	0.0370	1.79	VQ	|	|	|	|
0+30	0.0501	1.91	VQ	|	|	|	|
0+35	0.0639	2.00	VQ	|	|	|	|
0+40	0.0782	2.07	VQ	|	|	|	|
0+45	0.0928	2.12	VQ	|	|	|	|
0+50	0.1077	2.16	VQ	|	|	|	|
0+55	0.1228	2.20	VQ	|	|	|	|
1+ 0	0.1381	2.22	VQ	|	|	|	|
1+ 5	0.1535	2.24	VQ	|	|	|	|
1+10	0.1691	2.26	VQ	|	|	|	|
1+15	0.1848	2.28	VQ	|	|	|	|
1+20	0.2006	2.29	VQ	|	|	|	|
1+25	0.2165	2.31	VQ	|	|	|	|
1+30	0.2324	2.31	|Q	|	|	|	|
1+35	0.2484	2.32	|Q	|	|	|	|
1+40	0.2644	2.33	|Q	|	|	|	|

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1+45       0.2805      2.33  |Q         |          |          |          |
1+50       0.2966      2.34  |Q         |          |          |          |
1+55       0.3127      2.35  |Q         |          |          |          |
2+ 0       0.3289      2.35  |Q         |          |          |          |
2+ 5       0.3452      2.36  |Q         |          |          |          |
2+10       0.3615      2.37  |Q         |          |          |          |
2+15       0.3778      2.37  |Q         |          |          |          |
2+20       0.3942      2.38  |Q         |          |          |          |
2+25       0.4107      2.39  |Q         |          |          |          |
2+30       0.4272      2.39  |Q         |          |          |          |
2+35       0.4437      2.40  |Q         |          |          |          |
2+40       0.4603      2.41  |QV        |          |          |          |
2+45       0.4769      2.42  |QV        |          |          |          |
2+50       0.4936      2.42  |QV        |          |          |          |
2+55       0.5104      2.43  |QV        |          |          |          |
3+ 0       0.5272      2.44  |QV        |          |          |          |
3+ 5       0.5440      2.45  |QV        |          |          |          |
3+10       0.5609      2.45  |QV        |          |          |          |
3+15       0.5779      2.46  |QV        |          |          |          |
3+20       0.5949      2.47  |QV        |          |          |          |
3+25       0.6120      2.48  |QV        |          |          |          |
3+30       0.6291      2.49  |QV        |          |          |          |
3+35       0.6463      2.49  |QV        |          |          |          |
3+40       0.6635      2.50  |QV        |          |          |          |
3+45       0.6808      2.51  |Q V       |          |          |          |
3+50       0.6981      2.52  |Q V       |          |          |          |
3+55       0.7155      2.53  |Q V       |          |          |          |
4+ 0       0.7330      2.54  |Q V       |          |          |          |
4+ 5       0.7505      2.54  |Q V       |          |          |          |
4+10       0.7681      2.55  |Q V       |          |          |          |
4+15       0.7858      2.56  |Q V       |          |          |          |
4+20       0.8035      2.57  |Q V       |          |          |          |
4+25       0.8212      2.58  |Q V       |          |          |          |
4+30       0.8391      2.59  |Q V       |          |          |          |
4+35       0.8570      2.60  |Q V       |          |          |          |
4+40       0.8749      2.61  |Q V       |          |          |          |
4+45       0.8929      2.62  |Q V       |          |          |          |
4+50       0.9110      2.63  |Q  V      |          |          |          |
4+55       0.9292      2.64  |Q  V      |          |          |          |
5+ 0       0.9474      2.64  |Q  V      |          |          |          |
5+ 5       0.9657      2.65  |Q  V      |          |          |          |
5+10       0.9840      2.66  |Q  V      |          |          |          |
5+15       1.0024      2.67  |Q  V      |          |          |          |
5+20       1.0209      2.68  |Q  V      |          |          |          |
5+25       1.0395      2.69  |Q  V      |          |          |          |
5+30       1.0581      2.71  |Q  V      |          |          |          |
5+35       1.0768      2.72  |Q  V      |          |          |          |
5+40       1.0956      2.73  |Q  V      |          |          |          |
5+45       1.1144      2.74  |Q  V      |          |          |          |
5+50       1.1334      2.75  |Q   V     |          |          |          |
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5+55	1.1524	2.76	Q V			
6+ 0	1.1714	2.77	Q V			
6+ 5	1.1906	2.78	Q V			
6+10	1.2098	2.79	Q V			
6+15	1.2291	2.80	Q V			
6+20	1.2485	2.82	Q V			
6+25	1.2680	2.83	Q V			
6+30	1.2875	2.84	Q V			
6+35	1.3072	2.85	Q V			
6+40	1.3269	2.86	Q V			
6+45	1.3467	2.88	Q V			
6+50	1.3666	2.89	Q V			
6+55	1.3866	2.90	Q V			
7+ 0	1.4066	2.91	Q V			
7+ 5	1.4268	2.93	Q V			
7+10	1.4470	2.94	Q V			
7+15	1.4674	2.95	Q V			
7+20	1.4878	2.97	Q V			
7+25	1.5083	2.98	Q V			
7+30	1.5290	2.99	Q V			
7+35	1.5497	3.01	Q V			
7+40	1.5705	3.02	Q V			
7+45	1.5914	3.04	Q V			
7+50	1.6125	3.05	Q V			
7+55	1.6336	3.07	Q V			
8+ 0	1.6548	3.08	Q V			
8+ 5	1.6762	3.10	Q V			
8+10	1.6976	3.11	Q V			
8+15	1.7192	3.13	Q V			
8+20	1.7409	3.15	Q V			
8+25	1.7626	3.16	Q V			
8+30	1.7845	3.18	Q V			
8+35	1.8066	3.20	Q V			
8+40	1.8287	3.21	Q V			
8+45	1.8509	3.23	Q V			
8+50	1.8733	3.25	Q V			
8+55	1.8958	3.27	Q V			
9+ 0	1.9185	3.29	Q V			
9+ 5	1.9412	3.31	Q V			
9+10	1.9641	3.32	Q V			
9+15	1.9871	3.34	Q V			
9+20	2.0103	3.36	Q V			
9+25	2.0336	3.38	Q V			
9+30	2.0571	3.40	Q V			
9+35	2.0806	3.43	Q V			
9+40	2.1044	3.45	Q V			
9+45	2.1283	3.47	Q V			
9+50	2.1523	3.49	Q V			
9+55	2.1765	3.51	Q V			
10+ 0	2.2008	3.54	Q V			

```
10+ 5       2.2254      3.56  | Q      V|         |         |         |
10+10       2.2500      3.58  | Q       V         |         |         |
10+15       2.2749      3.61  | Q       V         |         |         |
10+20       2.2999      3.63  | Q       V         |         |         |
10+25       2.3251      3.66  | Q       V         |         |         |
10+30       2.3505      3.68  | Q       V         |         |         |
10+35       2.3760      3.71  | Q       V         |         |         |
10+40       2.4018      3.74  | Q       V         |         |         |
10+45       2.4277      3.77  | Q       V         |         |         |
10+50       2.4538      3.79  | Q       V         |         |         |
10+55       2.4801      3.82  | Q       |V         |         |         |
11+ 0       2.5067      3.85  | Q       |V         |         |         |
11+ 5       2.5334      3.88  | Q       |V         |         |         |
11+10       2.5604      3.91  | Q       |V         |         |         |
11+15       2.5875      3.95  | Q       |V         |         |         |
11+20       2.6150      3.98  | Q       |V         |         |         |
11+25       2.6426      4.01  | Q       |V         |         |         |
11+30       2.6705      4.05  | Q       |V         |         |         |
11+35       2.6986      4.08  | Q       |V         |         |         |
11+40       2.7269      4.12  | Q       | V        |         |         |
11+45       2.7556      4.16  | Q       | V        |         |         |
11+50       2.7844      4.19  | Q       | V        |         |         |
11+55       2.8136      4.23  | Q       | V        |         |         |
12+ 0       2.8430      4.27  | Q       | V        |         |         |
12+ 5       2.8727      4.31  | Q       | V        |         |         |
12+10       2.9027      4.35  | Q       | V        |         |         |
12+15       2.9329      4.38  | Q       |  V       |         |         |
12+20       2.9633      4.42  | Q       |  V       |         |         |
12+25       2.9941      4.47  | Q       |  V       |         |         |
12+30       3.0251      4.51  |  Q      |  V       |         |         |
12+35       3.0565      4.56  |  Q      |  V       |         |         |
12+40       3.0883      4.61  |  Q      |  V       |         |         |
12+45       3.1204      4.66  |  Q      |  V       |         |         |
12+50       3.1529      4.72  |  Q      |   V      |         |         |
12+55       3.1858      4.78  |  Q      |   V      |         |         |
13+ 0       3.2191      4.84  |  Q      |   V      |         |         |
13+ 5       3.2529      4.90  |  Q      |   V      |         |         |
13+10       3.2871      4.96  |  Q      |   V      |         |         |
13+15       3.3217      5.03  |  Q      |   V      |         |         |
13+20       3.3568      5.10  |  Q      |   V      |         |         |
13+25       3.3925      5.17  |  Q      |    V     |         |         |
13+30       3.4286      5.25  |  Q      |    V     |         |         |
13+35       3.4653      5.33  |  Q      |    V     |         |         |
13+40       3.5026      5.41  |  Q      |    V     |         |         |
13+45       3.5405      5.50  |  Q      |    V     |         |         |
13+50       3.5791      5.59  |  Q      |    V     |         |         |
13+55       3.6183      5.69  |  Q      |     V    |         |         |
14+ 0       3.6582      5.79  |  Q      |     V    |         |         |
14+ 5       3.6988      5.90  |  Q      |     V    |         |         |
14+10       3.7403      6.02  |   Q     |     V    |         |         |
```

14+15	3.7827	6.15	Q	V			
14+20	3.8259	6.28	Q	V			
14+25	3.8701	6.42	Q	V			
14+30	3.9153	6.57	Q	V			
14+35	3.9616	6.73	Q	V			
14+40	4.0091	6.90	Q	V			
14+45	4.0579	7.08	Q	V			
14+50	4.1081	7.28	Q	V			
14+55	4.1597	7.50	Q	V			
15+ 0	4.2130	7.74	Q	V			
15+ 5	4.2681	8.00	Q	V			
15+10	4.3253	8.30	Q	V			
15+15	4.3847	8.63	Q	V			
15+20	4.4467	9.00	Q	V			
15+25	4.5106	9.27	Q	V			
15+30	4.5708	8.74	Q	V			
15+35	4.6257	7.97	Q	V			
15+40	4.6810	8.02	Q	V			
15+45	4.7394	8.49	Q	V			
15+50	4.8039	9.37	Q	V			
15+55	4.8784	10.82	Q	V			
16+ 0	4.9728	13.71	Q	V			
16+ 5	5.1320	23.12	Q	V			
16+10	5.4830	50.96	V	Q			
16+15	5.8825	58.01	V	Q			
16+20	6.1122	33.35	Q	V			
16+25	6.2711	23.08	Q	V			
16+30	6.3981	18.43	Q	V			
16+35	6.5098	16.22	Q	V			
16+40	6.6063	14.02	Q	V			
16+45	6.6926	12.53	Q	V			
16+50	6.7698	11.21	Q	V			
16+55	6.8397	10.14	Q	V			
17+ 0	6.9028	9.15	Q	V			
17+ 5	6.9598	8.29	Q	V			
17+10	7.0142	7.89	Q	V			
17+15	7.0663	7.56	Q	V			
17+20	7.1145	7.01	Q	V			
17+25	7.1597	6.56	Q	V			
17+30	7.2003	5.90	Q	V			
17+35	7.2394	5.68	Q	V			
17+40	7.2772	5.49	Q	V			
17+45	7.3138	5.32	Q	V			
17+50	7.3494	5.16	Q	V			
17+55	7.3838	5.01	Q	V			
18+ 0	7.4174	4.87	Q	V			
18+ 5	7.4501	4.75	Q	V			
18+10	7.4821	4.65	Q	V			
18+15	7.5135	4.55	Q	V			
18+20	7.5442	4.46	Q	V			

```
18+25       7.5743      4.37  | Q       |         |         |  V      |
18+30       7.6038      4.28  | Q       |         |         |  V      |
18+35       7.6327      4.20  | Q       |         |         |  V      |
18+40       7.6612      4.13  | Q       |         |         |   V     |
18+45       7.6891      4.06  | Q       |         |         |   V     |
18+50       7.7166      3.99  | Q       |         |         |   V     |
18+55       7.7436      3.92  | Q       |         |         |   V     |
19+ 0       7.7702      3.86  | Q       |         |         |   V     |
19+ 5       7.7963      3.80  | Q       |         |         |   V     |
19+10       7.8221      3.74  | Q       |         |         |   V     |
19+15       7.8475      3.69  | Q       |         |         |   V     |
19+20       7.8726      3.64  | Q       |         |         |    V    |
19+25       7.8973      3.59  | Q       |         |         |    V    |
19+30       7.9217      3.54  | Q       |         |         |    V    |
19+35       7.9457      3.49  | Q       |         |         |    V    |
19+40       7.9695      3.45  | Q       |         |         |    V    |
19+45       7.9930      3.41  | Q       |         |         |    V    |
19+50       8.0162      3.37  | Q       |         |         |    V    |
19+55       8.0391      3.33  | Q       |         |         |    V    |
20+ 0       8.0617      3.29  | Q       |         |         |    V    |
20+ 5       8.0841      3.25  | Q       |         |         |    V    |
20+10       8.1063      3.22  | Q       |         |         |     V   |
20+15       8.1282      3.18  | Q       |         |         |     V   |
20+20       8.1499      3.15  | Q       |         |         |     V   |
20+25       8.1714      3.12  | Q       |         |         |     V   |
20+30       8.1926      3.09  | Q       |         |         |     V   |
20+35       8.2137      3.05  | Q       |         |         |     V   |
20+40       8.2345      3.03  | Q       |         |         |     V   |
20+45       8.2551      3.00  |Q        |         |         |     V   |
20+50       8.2756      2.97  |Q        |         |         |     V   |
20+55       8.2958      2.94  |Q        |         |         |     V   |
21+ 0       8.3159      2.92  |Q        |         |         |     V   |
21+ 5       8.3358      2.89  |Q        |         |         |      V  |
21+10       8.3555      2.86  |Q        |         |         |      V  |
21+15       8.3751      2.84  |Q        |         |         |      V  |
21+20       8.3945      2.82  |Q        |         |         |      V  |
21+25       8.4137      2.79  |Q        |         |         |      V  |
21+30       8.4328      2.77  |Q        |         |         |      V  |
21+35       8.4517      2.75  |Q        |         |         |      V  |
21+40       8.4705      2.73  |Q        |         |         |      V  |
21+45       8.4892      2.71  |Q        |         |         |      V  |
21+50       8.5077      2.69  |Q        |         |         |      V  |
21+55       8.5260      2.67  |Q        |         |         |      V  |
22+ 0       8.5442      2.65  |Q        |         |         |      V  |
22+ 5       8.5623      2.63  |Q        |         |         |       V |
22+10       8.5803      2.61  |Q        |         |         |       V |
22+15       8.5981      2.59  |Q        |         |         |       V |
22+20       8.6158      2.57  |Q        |         |         |       V |
22+25       8.6334      2.55  |Q        |         |         |       V |
22+30       8.6509      2.54  |Q        |         |         |       V |
```

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   22+35       8.6682      2.52  |Q        |         |         |       V |
   22+40       8.6855      2.50  |Q        |         |         |       V |
   22+45       8.7026      2.49  |Q        |         |         |       V |
   22+50       8.7196      2.47  |Q        |         |         |       V |
   22+55       8.7365      2.45  |Q        |         |         |       V |
   23+ 0       8.7533      2.44  |Q        |         |         |       V |
   23+ 5       8.7700      2.42  |Q        |         |         |       V |
   23+10       8.7866      2.41  |Q        |         |         |        V|
   23+15       8.8031      2.40  |Q        |         |         |        V|
   23+20       8.8195      2.38  |Q        |         |         |        V|
   23+25       8.8358      2.37  |Q        |         |         |        V|
   23+30       8.8520      2.35  |Q        |         |         |        V|
   23+35       8.8681      2.34  |Q        |         |         |        V|
   23+40       8.8841      2.33  |Q        |         |         |        V|
   23+45       8.9001      2.31  |Q        |         |         |        V|
   23+50       8.9159      2.30  |Q        |         |         |        V|
   23+55       8.9317      2.29  |Q        |         |         |        V|
   24+ 0       8.9473      2.28  |Q        |         |         |        V|
   24+ 5       8.9624      2.18  |Q        |         |         |        V|
   24+10       8.9737      1.65  |Q        |         |         |        V|
   24+15       8.9803      0.96  Q         |         |         |        V|
   24+20       8.9847      0.64  Q         |         |         |        V|
   24+25       8.9879      0.46  Q         |         |         |        V|
   24+30       8.9902      0.34  Q         |         |         |        V|
-------------------------------------------------------------------------
```

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

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Study date 12/06/20

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

Program License Serial Number 6277

2020-326 HCC V
POST-DEVELOPMENT CONDITIONS
UNIT HYDROGRAPH - 10 YEAR STORM
DA B

Storm Event Year = 10

Antecedent Moisture Condition = 2

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 10		
26.71	1	0.79
Rainfall data for year 2		
26.71	6	1.12
Rainfall data for year 2		
26.71	24	2.11
Rainfall data for year 100		

```
            26.71            1           1.31
------------------------------------------------------------------------
Rainfall data for year 100
            26.71            6           3.05
------------------------------------------------------------------------
Rainfall data for year 100
            26.71           24           6.31
------------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

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


SCS curve  SCS curve     Area     Area     Fp(Fig C6)    Ap      Fm
No.(AMCII) NO.(AMC 2)    (Ac.)    Fraction     (In/Hr)  (dec.)   (In/Hr)
 32.0      32.0         26.71      1.000     0.978    0.140    0.137

Area-averaged adjusted loss rate Fm (In/Hr) =  0.137

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

Area       Area          SCS CN    SCS CN      S     Pervious
 (Ac.)      Fract         (AMC2)    (AMC2)           Yield Fr
     3.74   0.140         32.0      32.0      19.19     0.000
    22.97   0.860         98.0      98.0       0.20     0.939

Area-averaged catchment yield fraction, Y =  0.807
Area-averaged low loss fraction, Yb =  0.193
User entry of time of concentration  =   0.204 (hours)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watershed area =      26.71(Ac.)
Catchment Lag time =   0.163 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 51.0621
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.137(In/Hr)
Average low loss rate fraction (Yb) = 0.193 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall =  0.372(In)
Computed peak 30-minute rainfall =  0.638(In)
Specified peak 1-hour rainfall =  0.785(In)
Computed peak 3-hour rainfall =  1.356(In)
Specified peak 6-hour rainfall =  1.914(In)
Specified peak 24-hour rainfall =  3.838(In)


Rainfall depth area reduction factors:
Using a total area of      26.71(Ac.) (Ref: fig. E-4)

5-minute factor = 0.999     Adjusted rainfall =  0.372(In)
```

30-minute factor = 0.999 Adjusted rainfall = 0.637(In)
1-hour factor = 0.999 Adjusted rainfall = 0.784(In)
3-hour factor = 1.000 Adjusted rainfall = 1.356(In)
6-hour factor = 1.000 Adjusted rainfall = 1.914(In)
24-hour factor = 1.000 Adjusted rainfall = 3.838(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 = 323.02 (CFS))	
1	4.106	13.262
2	31.755	89.315
3	61.498	96.076
4	74.480	41.935
5	82.012	24.329
6	87.099	16.432
7	90.569	11.209
8	93.131	8.278
9	95.050	6.197
10	96.503	4.696
11	97.540	3.348
12	98.175	2.052
13	98.759	1.886
14	99.360	1.939
15	99.753	1.269
16	100.000	0.799

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.3720	0.3720
2	0.4580	0.0860
3	0.5173	0.0592
4	0.5639	0.0466
5	0.6029	0.0390
6	0.6368	0.0339
7	0.6670	0.0301
8	0.6942	0.0273
9	0.7192	0.0250
10	0.7423	0.0231
11	0.7638	0.0215
12	0.7840	0.0202
13	0.8159	0.0319
14	0.8466	0.0307
15	0.8763	0.0296
16	0.9049	0.0286
17	0.9327	0.0278

18	0.9596	0.0270
19	0.9858	0.0262
20	1.0113	0.0255
21	1.0362	0.0249
22	1.0606	0.0243
23	1.0843	0.0238
24	1.1076	0.0232
25	1.1303	0.0228
26	1.1526	0.0223
27	1.1745	0.0219
28	1.1960	0.0215
29	1.2171	0.0211
30	1.2379	0.0207
31	1.2583	0.0204
32	1.2783	0.0201
33	1.2981	0.0198
34	1.3175	0.0195
35	1.3367	0.0192
36	1.3556	0.0189
37	1.3742	0.0186
38	1.3926	0.0184
39	1.4107	0.0181
40	1.4286	0.0179
41	1.4462	0.0177
42	1.4637	0.0174
43	1.4809	0.0172
44	1.4979	0.0170
45	1.5148	0.0168
46	1.5314	0.0167
47	1.5479	0.0165
48	1.5642	0.0163
49	1.5803	0.0161
50	1.5963	0.0160
51	1.6121	0.0158
52	1.6278	0.0157
53	1.6433	0.0155
54	1.6586	0.0154
55	1.6738	0.0152
56	1.6889	0.0151
57	1.7038	0.0149
58	1.7187	0.0148
59	1.7333	0.0147
60	1.7479	0.0146
61	1.7623	0.0144
62	1.7766	0.0143
63	1.7908	0.0142
64	1.8049	0.0141
65	1.8189	0.0140
66	1.8328	0.0139
67	1.8465	0.0138

68	1.8602	0.0137
69	1.8738	0.0136
70	1.8872	0.0135
71	1.9006	0.0134
72	1.9139	0.0133
73	1.9272	0.0133
74	1.9404	0.0132
75	1.9535	0.0131
76	1.9665	0.0130
77	1.9794	0.0129
78	1.9923	0.0129
79	2.0051	0.0128
80	2.0178	0.0127
81	2.0304	0.0126
82	2.0429	0.0125
83	2.0554	0.0125
84	2.0678	0.0124
85	2.0801	0.0123
86	2.0924	0.0122
87	2.1045	0.0122
88	2.1167	0.0121
89	2.1287	0.0120
90	2.1407	0.0120
91	2.1526	0.0119
92	2.1644	0.0118
93	2.1762	0.0118
94	2.1879	0.0117
95	2.1995	0.0117
96	2.2111	0.0116
97	2.2227	0.0115
98	2.2341	0.0115
99	2.2456	0.0114
100	2.2569	0.0114
101	2.2682	0.0113
102	2.2795	0.0112
103	2.2906	0.0112
104	2.3018	0.0111
105	2.3129	0.0111
106	2.3239	0.0110
107	2.3349	0.0110
108	2.3458	0.0109
109	2.3567	0.0109
110	2.3675	0.0108
111	2.3783	0.0108
112	2.3890	0.0107
113	2.3997	0.0107
114	2.4103	0.0106
115	2.4209	0.0106
116	2.4314	0.0105
117	2.4419	0.0105

118	2.4524	0.0105
119	2.4628	0.0104
120	2.4732	0.0104
121	2.4835	0.0103
122	2.4938	0.0103
123	2.5040	0.0102
124	2.5142	0.0102
125	2.5244	0.0102
126	2.5345	0.0101
127	2.5446	0.0101
128	2.5546	0.0100
129	2.5646	0.0100
130	2.5746	0.0100
131	2.5845	0.0099
132	2.5944	0.0099
133	2.6042	0.0098
134	2.6140	0.0098
135	2.6238	0.0098
136	2.6335	0.0097
137	2.6432	0.0097
138	2.6529	0.0097
139	2.6625	0.0096
140	2.6721	0.0096
141	2.6817	0.0096
142	2.6912	0.0095
143	2.7007	0.0095
144	2.7102	0.0095
145	2.7196	0.0094
146	2.7290	0.0094
147	2.7384	0.0094
148	2.7477	0.0093
149	2.7570	0.0093
150	2.7663	0.0093
151	2.7755	0.0092
152	2.7847	0.0092
153	2.7939	0.0092
154	2.8030	0.0092
155	2.8122	0.0091
156	2.8213	0.0091
157	2.8303	0.0091
158	2.8393	0.0090
159	2.8484	0.0090
160	2.8573	0.0090
161	2.8663	0.0089
162	2.8752	0.0089
163	2.8841	0.0089
164	2.8930	0.0089
165	2.9018	0.0088
166	2.9106	0.0088
167	2.9194	0.0088

168	2.9282	0.0088
169	2.9369	0.0087
170	2.9456	0.0087
171	2.9543	0.0087
172	2.9630	0.0087
173	2.9716	0.0086
174	2.9802	0.0086
175	2.9888	0.0086
176	2.9973	0.0086
177	3.0059	0.0085
178	3.0144	0.0085
179	3.0229	0.0085
180	3.0313	0.0085
181	3.0398	0.0084
182	3.0482	0.0084
183	3.0566	0.0084
184	3.0650	0.0084
185	3.0733	0.0083
186	3.0816	0.0083
187	3.0899	0.0083
188	3.0982	0.0083
189	3.1065	0.0083
190	3.1147	0.0082
191	3.1229	0.0082
192	3.1311	0.0082
193	3.1393	0.0082
194	3.1475	0.0082
195	3.1556	0.0081
196	3.1637	0.0081
197	3.1718	0.0081
198	3.1799	0.0081
199	3.1879	0.0081
200	3.1959	0.0080
201	3.2040	0.0080
202	3.2119	0.0080
203	3.2199	0.0080
204	3.2279	0.0080
205	3.2358	0.0079
206	3.2437	0.0079
207	3.2516	0.0079
208	3.2595	0.0079
209	3.2673	0.0079
210	3.2752	0.0078
211	3.2830	0.0078
212	3.2908	0.0078
213	3.2986	0.0078
214	3.3063	0.0078
215	3.3141	0.0077
216	3.3218	0.0077
217	3.3295	0.0077

218	3.3372	0.0077
219	3.3449	0.0077
220	3.3525	0.0077
221	3.3602	0.0076
222	3.3678	0.0076
223	3.3754	0.0076
224	3.3830	0.0076
225	3.3906	0.0076
226	3.3981	0.0076
227	3.4057	0.0075
228	3.4132	0.0075
229	3.4207	0.0075
230	3.4282	0.0075
231	3.4357	0.0075
232	3.4431	0.0075
233	3.4505	0.0074
234	3.4580	0.0074
235	3.4654	0.0074
236	3.4728	0.0074
237	3.4802	0.0074
238	3.4875	0.0074
239	3.4949	0.0073
240	3.5022	0.0073
241	3.5095	0.0073
242	3.5168	0.0073
243	3.5241	0.0073
244	3.5314	0.0073
245	3.5386	0.0073
246	3.5459	0.0072
247	3.5531	0.0072
248	3.5603	0.0072
249	3.5675	0.0072
250	3.5747	0.0072
251	3.5819	0.0072
252	3.5890	0.0072
253	3.5962	0.0071
254	3.6033	0.0071
255	3.6104	0.0071
256	3.6175	0.0071
257	3.6246	0.0071
258	3.6316	0.0071
259	3.6387	0.0071
260	3.6458	0.0070
261	3.6528	0.0070
262	3.6598	0.0070
263	3.6668	0.0070
264	3.6738	0.0070
265	3.6808	0.0070
266	3.6877	0.0070
267	3.6947	0.0070

268	3.7016	0.0069
269	3.7086	0.0069
270	3.7155	0.0069
271	3.7224	0.0069
272	3.7293	0.0069
273	3.7361	0.0069
274	3.7430	0.0069
275	3.7498	0.0068
276	3.7567	0.0068
277	3.7635	0.0068
278	3.7703	0.0068
279	3.7771	0.0068
280	3.7839	0.0068
281	3.7907	0.0068
282	3.7974	0.0068
283	3.8042	0.0068
284	3.8109	0.0067
285	3.8177	0.0067
286	3.8244	0.0067
287	3.8311	0.0067
288	3.8378	0.0067

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0067	0.0013	0.0054
2	0.0067	0.0013	0.0054
3	0.0067	0.0013	0.0054
4	0.0067	0.0013	0.0054
5	0.0068	0.0013	0.0055
6	0.0068	0.0013	0.0055
7	0.0068	0.0013	0.0055
8	0.0068	0.0013	0.0055
9	0.0068	0.0013	0.0055
10	0.0068	0.0013	0.0055
11	0.0069	0.0013	0.0056
12	0.0069	0.0013	0.0056
13	0.0069	0.0013	0.0056
14	0.0069	0.0013	0.0056
15	0.0070	0.0013	0.0056
16	0.0070	0.0013	0.0056
17	0.0070	0.0013	0.0056
18	0.0070	0.0013	0.0057
19	0.0070	0.0014	0.0057
20	0.0070	0.0014	0.0057
21	0.0071	0.0014	0.0057
22	0.0071	0.0014	0.0057
23	0.0071	0.0014	0.0057
24	0.0071	0.0014	0.0058

25	0.0072	0.0014	0.0058
26	0.0072	0.0014	0.0058
27	0.0072	0.0014	0.0058
28	0.0072	0.0014	0.0058
29	0.0072	0.0014	0.0058
30	0.0073	0.0014	0.0059
31	0.0073	0.0014	0.0059
32	0.0073	0.0014	0.0059
33	0.0073	0.0014	0.0059
34	0.0073	0.0014	0.0059
35	0.0074	0.0014	0.0060
36	0.0074	0.0014	0.0060
37	0.0074	0.0014	0.0060
38	0.0074	0.0014	0.0060
39	0.0075	0.0014	0.0060
40	0.0075	0.0014	0.0060
41	0.0075	0.0014	0.0061
42	0.0075	0.0015	0.0061
43	0.0076	0.0015	0.0061
44	0.0076	0.0015	0.0061
45	0.0076	0.0015	0.0062
46	0.0076	0.0015	0.0062
47	0.0077	0.0015	0.0062
48	0.0077	0.0015	0.0062
49	0.0077	0.0015	0.0062
50	0.0077	0.0015	0.0063
51	0.0078	0.0015	0.0063
52	0.0078	0.0015	0.0063
53	0.0078	0.0015	0.0063
54	0.0079	0.0015	0.0063
55	0.0079	0.0015	0.0064
56	0.0079	0.0015	0.0064
57	0.0080	0.0015	0.0064
58	0.0080	0.0015	0.0064
59	0.0080	0.0015	0.0065
60	0.0080	0.0015	0.0065
61	0.0081	0.0016	0.0065
62	0.0081	0.0016	0.0065
63	0.0081	0.0016	0.0066
64	0.0082	0.0016	0.0066
65	0.0082	0.0016	0.0066
66	0.0082	0.0016	0.0066
67	0.0083	0.0016	0.0067
68	0.0083	0.0016	0.0067
69	0.0083	0.0016	0.0067
70	0.0083	0.0016	0.0067
71	0.0084	0.0016	0.0068
72	0.0084	0.0016	0.0068
73	0.0085	0.0016	0.0068
74	0.0085	0.0016	0.0069

75	0.0085	0.0016	0.0069
76	0.0086	0.0016	0.0069
77	0.0086	0.0017	0.0070
78	0.0086	0.0017	0.0070
79	0.0087	0.0017	0.0070
80	0.0087	0.0017	0.0070
81	0.0088	0.0017	0.0071
82	0.0088	0.0017	0.0071
83	0.0088	0.0017	0.0071
84	0.0089	0.0017	0.0072
85	0.0089	0.0017	0.0072
86	0.0089	0.0017	0.0072
87	0.0090	0.0017	0.0073
88	0.0090	0.0017	0.0073
89	0.0091	0.0018	0.0073
90	0.0091	0.0018	0.0074
91	0.0092	0.0018	0.0074
92	0.0092	0.0018	0.0074
93	0.0093	0.0018	0.0075
94	0.0093	0.0018	0.0075
95	0.0094	0.0018	0.0076
96	0.0094	0.0018	0.0076
97	0.0095	0.0018	0.0076
98	0.0095	0.0018	0.0077
99	0.0096	0.0018	0.0077
100	0.0096	0.0018	0.0077
101	0.0097	0.0019	0.0078
102	0.0097	0.0019	0.0078
103	0.0098	0.0019	0.0079
104	0.0098	0.0019	0.0079
105	0.0099	0.0019	0.0080
106	0.0099	0.0019	0.0080
107	0.0100	0.0019	0.0081
108	0.0100	0.0019	0.0081
109	0.0101	0.0019	0.0082
110	0.0102	0.0020	0.0082
111	0.0102	0.0020	0.0083
112	0.0103	0.0020	0.0083
113	0.0104	0.0020	0.0084
114	0.0104	0.0020	0.0084
115	0.0105	0.0020	0.0085
116	0.0105	0.0020	0.0085
117	0.0106	0.0020	0.0086
118	0.0107	0.0021	0.0086
119	0.0108	0.0021	0.0087
120	0.0108	0.0021	0.0087
121	0.0109	0.0021	0.0088
122	0.0110	0.0021	0.0089
123	0.0111	0.0021	0.0089
124	0.0111	0.0021	0.0090

125	0.0112	0.0022	0.0091
126	0.0113	0.0022	0.0091
127	0.0114	0.0022	0.0092
128	0.0115	0.0022	0.0093
129	0.0116	0.0022	0.0094
130	0.0117	0.0022	0.0094
131	0.0118	0.0023	0.0095
132	0.0118	0.0023	0.0096
133	0.0120	0.0023	0.0097
134	0.0120	0.0023	0.0097
135	0.0122	0.0023	0.0098
136	0.0122	0.0024	0.0099
137	0.0124	0.0024	0.0100
138	0.0125	0.0024	0.0101
139	0.0126	0.0024	0.0102
140	0.0127	0.0024	0.0103
141	0.0129	0.0025	0.0104
142	0.0129	0.0025	0.0105
143	0.0131	0.0025	0.0106
144	0.0132	0.0025	0.0107
145	0.0133	0.0026	0.0107
146	0.0134	0.0026	0.0108
147	0.0136	0.0026	0.0109
148	0.0137	0.0026	0.0110
149	0.0139	0.0027	0.0112
150	0.0140	0.0027	0.0113
151	0.0142	0.0027	0.0115
152	0.0143	0.0028	0.0116
153	0.0146	0.0028	0.0118
154	0.0147	0.0028	0.0119
155	0.0149	0.0029	0.0121
156	0.0151	0.0029	0.0122
157	0.0154	0.0030	0.0124
158	0.0155	0.0030	0.0125
159	0.0158	0.0030	0.0128
160	0.0160	0.0031	0.0129
161	0.0163	0.0031	0.0132
162	0.0165	0.0032	0.0133
163	0.0168	0.0032	0.0136
164	0.0170	0.0033	0.0138
165	0.0174	0.0034	0.0141
166	0.0177	0.0034	0.0143
167	0.0181	0.0035	0.0146
168	0.0184	0.0035	0.0148
169	0.0189	0.0036	0.0153
170	0.0192	0.0037	0.0155
171	0.0198	0.0038	0.0160
172	0.0201	0.0039	0.0162
173	0.0207	0.0040	0.0167
174	0.0211	0.0041	0.0170

175	0.0219	0.0042	0.0177
176	0.0223	0.0043	0.0180
177	0.0232	0.0045	0.0188
178	0.0238	0.0046	0.0192
179	0.0249	0.0048	0.0201
180	0.0255	0.0049	0.0206
181	0.0270	0.0052	0.0218
182	0.0278	0.0053	0.0224
183	0.0296	0.0057	0.0239
184	0.0307	0.0059	0.0248
185	0.0202	0.0039	0.0163
186	0.0215	0.0041	0.0174
187	0.0250	0.0048	0.0202
188	0.0273	0.0052	0.0220
189	0.0339	0.0065	0.0274
190	0.0390	0.0075	0.0315
191	0.0592	0.0114	0.0478
192	0.0860	0.0114	0.0746
193	0.3720	0.0114	0.3606
194	0.0466	0.0090	0.0376
195	0.0301	0.0058	0.0243
196	0.0231	0.0044	0.0186
197	0.0319	0.0061	0.0258
198	0.0286	0.0055	0.0231
199	0.0262	0.0050	0.0212
200	0.0243	0.0047	0.0196
201	0.0228	0.0044	0.0184
202	0.0215	0.0041	0.0173
203	0.0204	0.0039	0.0165
204	0.0195	0.0037	0.0157
205	0.0186	0.0036	0.0150
206	0.0179	0.0034	0.0144
207	0.0172	0.0033	0.0139
208	0.0167	0.0032	0.0134
209	0.0161	0.0031	0.0130
210	0.0157	0.0030	0.0126
211	0.0152	0.0029	0.0123
212	0.0148	0.0029	0.0120
213	0.0144	0.0028	0.0117
214	0.0141	0.0027	0.0114
215	0.0138	0.0027	0.0111
216	0.0135	0.0026	0.0109
217	0.0133	0.0026	0.0107
218	0.0130	0.0025	0.0105
219	0.0128	0.0025	0.0103
220	0.0125	0.0024	0.0101
221	0.0123	0.0024	0.0099
222	0.0121	0.0023	0.0098
223	0.0119	0.0023	0.0096
224	0.0117	0.0023	0.0095

225	0.0115	0.0022	0.0093
226	0.0114	0.0022	0.0092
227	0.0112	0.0022	0.0090
228	0.0110	0.0021	0.0089
229	0.0109	0.0021	0.0088
230	0.0107	0.0021	0.0087
231	0.0106	0.0020	0.0085
232	0.0105	0.0020	0.0084
233	0.0103	0.0020	0.0083
234	0.0102	0.0020	0.0082
235	0.0101	0.0019	0.0081
236	0.0100	0.0019	0.0080
237	0.0098	0.0019	0.0080
238	0.0097	0.0019	0.0079
239	0.0096	0.0019	0.0078
240	0.0095	0.0018	0.0077
241	0.0094	0.0018	0.0076
242	0.0093	0.0018	0.0075
243	0.0092	0.0018	0.0075
244	0.0092	0.0018	0.0074
245	0.0091	0.0017	0.0073
246	0.0090	0.0017	0.0072
247	0.0089	0.0017	0.0072
248	0.0088	0.0017	0.0071
249	0.0087	0.0017	0.0071
250	0.0087	0.0017	0.0070
251	0.0086	0.0017	0.0069
252	0.0085	0.0016	0.0069
253	0.0084	0.0016	0.0068
254	0.0084	0.0016	0.0068
255	0.0083	0.0016	0.0067
256	0.0082	0.0016	0.0067
257	0.0082	0.0016	0.0066
258	0.0081	0.0016	0.0065
259	0.0081	0.0016	0.0065
260	0.0080	0.0015	0.0065
261	0.0079	0.0015	0.0064
262	0.0079	0.0015	0.0064
263	0.0078	0.0015	0.0063
264	0.0078	0.0015	0.0063
265	0.0077	0.0015	0.0062
266	0.0077	0.0015	0.0062
267	0.0076	0.0015	0.0061
268	0.0076	0.0015	0.0061
269	0.0075	0.0014	0.0061
270	0.0075	0.0014	0.0060
271	0.0074	0.0014	0.0060
272	0.0074	0.0014	0.0059
273	0.0073	0.0014	0.0059
274	0.0073	0.0014	0.0059

275	0.0072	0.0014	0.0058
276	0.0072	0.0014	0.0058
277	0.0071	0.0014	0.0058
278	0.0071	0.0014	0.0057
279	0.0071	0.0014	0.0057
280	0.0070	0.0014	0.0057
281	0.0070	0.0013	0.0056
282	0.0069	0.0013	0.0056
283	0.0069	0.0013	0.0056
284	0.0069	0.0013	0.0055
285	0.0068	0.0013	0.0055
286	0.0068	0.0013	0.0055
287	0.0068	0.0013	0.0055
288	0.0067	0.0013	0.0054

Total soil rain loss = 0.67(In)
Total effective rainfall = 3.16(In)
Peak flow rate in flood hydrograph = 44.08(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	12.5	25.0	37.5	50.0
0+ 5	0.0005	0.07	Q	|	|	|	|
0+10	0.0043	0.55	Q	|	|	|	|
0+15	0.0117	1.07	Q	|	|	|	|
0+20	0.0207	1.30	VQ	|	|	|	|
0+25	0.0306	1.44	VQ	|	|	|	|
0+30	0.0412	1.53	VQ	|	|	|	|
0+35	0.0522	1.60	VQ	|	|	|	|
0+40	0.0635	1.65	VQ	|	|	|	|
0+45	0.0751	1.68	VQ	|	|	|	|
0+50	0.0869	1.71	VQ	|	|	|	|
0+55	0.0988	1.74	VQ	|	|	|	|
1+ 0	0.1109	1.75	VQ	|	|	|	|
1+ 5	0.1231	1.77	VQ	|	|	|	|
1+10	0.1353	1.78	VQ	|	|	|	|
1+15	0.1477	1.79	VQ	|	|	|	|
1+20	0.1601	1.80	VQ	|	|	|	|
1+25	0.1725	1.81	VQ	|	|	|	|
1+30	0.1850	1.81	|Q	|	|	|	|
1+35	0.1976	1.82	|Q	|	|	|	|
1+40	0.2101	1.82	|Q	|	|	|	|
1+45	0.2227	1.83	|Q	|	|	|	|

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1+50       0.2353      1.83  |Q         |          |          |          |
1+55       0.2480      1.84  |Q         |          |          |          |
2+ 0       0.2607      1.84  |Q         |          |          |          |
2+ 5       0.2734      1.85  |Q         |          |          |          |
2+10       0.2862      1.86  |Q         |          |          |          |
2+15       0.2990      1.86  |Q         |          |          |          |
2+20       0.3119      1.87  |Q         |          |          |          |
2+25       0.3248      1.87  |Q         |          |          |          |
2+30       0.3377      1.88  |Q         |          |          |          |
2+35       0.3507      1.88  |Q         |          |          |          |
2+40       0.3637      1.89  |QV        |          |          |          |
2+45       0.3767      1.89  |QV        |          |          |          |
2+50       0.3898      1.90  |QV        |          |          |          |
2+55       0.4029      1.91  |QV        |          |          |          |
3+ 0       0.4161      1.91  |QV        |          |          |          |
3+ 5       0.4293      1.92  |QV        |          |          |          |
3+10       0.4426      1.92  |QV        |          |          |          |
3+15       0.4559      1.93  |QV        |          |          |          |
3+20       0.4692      1.94  |QV        |          |          |          |
3+25       0.4826      1.94  |QV        |          |          |          |
3+30       0.4960      1.95  |QV        |          |          |          |
3+35       0.5095      1.96  |QV        |          |          |          |
3+40       0.5230      1.96  |QV        |          |          |          |
3+45       0.5365      1.97  |Q V       |          |          |          |
3+50       0.5501      1.97  |Q V       |          |          |          |
3+55       0.5638      1.98  |Q V       |          |          |          |
4+ 0       0.5775      1.99  |Q V       |          |          |          |
4+ 5       0.5912      1.99  |Q V       |          |          |          |
4+10       0.6050      2.00  |Q V       |          |          |          |
4+15       0.6188      2.01  |Q V       |          |          |          |
4+20       0.6327      2.02  |Q V       |          |          |          |
4+25       0.6466      2.02  |Q V       |          |          |          |
4+30       0.6606      2.03  |Q V       |          |          |          |
4+35       0.6746      2.04  |Q V       |          |          |          |
4+40       0.6887      2.04  |Q V       |          |          |          |
4+45       0.7028      2.05  |Q V       |          |          |          |
4+50       0.7170      2.06  |Q  V      |          |          |          |
4+55       0.7312      2.07  |Q  V      |          |          |          |
5+ 0       0.7455      2.07  |Q  V      |          |          |          |
5+ 5       0.7598      2.08  |Q  V      |          |          |          |
5+10       0.7742      2.09  |Q  V      |          |          |          |
5+15       0.7887      2.10  |Q  V      |          |          |          |
5+20       0.8032      2.10  |Q  V      |          |          |          |
5+25       0.8177      2.11  |Q  V      |          |          |          |
5+30       0.8323      2.12  |Q  V      |          |          |          |
5+35       0.8470      2.13  |Q  V      |          |          |          |
5+40       0.8617      2.14  |Q  V      |          |          |          |
5+45       0.8765      2.15  |Q  V      |          |          |          |
5+50       0.8913      2.15  |Q   V     |          |          |          |
5+55       0.9062      2.16  |Q   V     |          |          |          |
```

6+ 0	0.9212	2.17	Q V			
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6+20	0.9816	2.21	Q V			
6+25	0.9969	2.22	Q V			
6+30	1.0122	2.23	Q V			
6+35	1.0276	2.24	Q V			
6+40	1.0431	2.25	Q V			
6+45	1.0586	2.25	Q V			
6+50	1.0742	2.26	Q V			
6+55	1.0899	2.27	Q V			
7+ 0	1.1056	2.28	Q V			
7+ 5	1.1214	2.30	Q V			
7+10	1.1373	2.31	Q V			
7+15	1.1532	2.32	Q V			
7+20	1.1692	2.33	Q V			
7+25	1.1853	2.34	Q V			
7+30	1.2015	2.35	Q V			
7+35	1.2178	2.36	Q V			
7+40	1.2341	2.37	Q V			
7+45	1.2505	2.38	Q V			
7+50	1.2670	2.39	Q V			
7+55	1.2836	2.41	Q V			
8+ 0	1.3002	2.42	Q V			
8+ 5	1.3170	2.43	Q V			
8+10	1.3338	2.44	Q V			
8+15	1.3507	2.45	Q V			
8+20	1.3677	2.47	Q V			
8+25	1.3848	2.48	Q V			
8+30	1.4019	2.49	Q V			
8+35	1.4192	2.51	Q V			
8+40	1.4366	2.52	Q V			
8+45	1.4540	2.53	Q V			
8+50	1.4716	2.55	Q V			
8+55	1.4892	2.56	Q V			
9+ 0	1.5070	2.58	Q V			
9+ 5	1.5248	2.59	Q V			
9+10	1.5428	2.61	Q V			
9+15	1.5609	2.62	Q V			
9+20	1.5790	2.64	Q V			
9+25	1.5973	2.65	Q V			
9+30	1.6157	2.67	Q V			
9+35	1.6342	2.69	Q V			
9+40	1.6528	2.70	Q V			
9+45	1.6716	2.72	Q V			
9+50	1.6904	2.74	Q V			
9+55	1.7094	2.76	Q V			
10+ 0	1.7285	2.77	Q V			
10+ 5	1.7477	2.79	Q V			

10+10	1.7671	2.81	Q	V			
10+15	1.7866	2.83	Q	V			
10+20	1.8062	2.85	Q	V			
10+25	1.8260	2.87	Q	V			
10+30	1.8459	2.89	Q	V			
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10+40	1.8861	2.93	Q	V			
10+45	1.9065	2.95	Q	V			
10+50	1.9270	2.98	Q	V			
10+55	1.9476	3.00	Q	V			
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11+10	2.0106	3.07	Q	V			
11+15	2.0319	3.10	Q	V			
11+20	2.0534	3.12	Q	V			
11+25	2.0751	3.15	Q	V			
11+30	2.0970	3.18	Q	V			
11+35	2.1191	3.20	Q	V			
11+40	2.1413	3.23	Q	V			
11+45	2.1638	3.26	Q	V			
11+50	2.1865	3.29	Q	V			
11+55	2.2093	3.32	Q	V			
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12+ 5	2.2558	3.39	Q	V			
12+10	2.2793	3.41	Q	V			
12+15	2.3030	3.44	Q	V			
12+20	2.3269	3.47	Q	V			
12+25	2.3510	3.51	Q	V			
12+30	2.3754	3.54	Q	V			
12+35	2.4000	3.58	Q	V			
12+40	2.4250	3.62	Q	V			
12+45	2.4502	3.66	Q	V			
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12+55	2.5016	3.75	Q	V			
13+ 0	2.5277	3.80	Q	V			
13+ 5	2.5542	3.85	Q	V			
13+10	2.5811	3.90	Q	V			
13+15	2.6083	3.95	Q	V			
13+20	2.6359	4.01	Q	V			
13+25	2.6639	4.07	Q	V			
13+30	2.6923	4.13	Q	V			
13+35	2.7212	4.19	Q	V			
13+40	2.7505	4.26	Q	V			
13+45	2.7803	4.33	Q	V			
13+50	2.8106	4.40	Q	V			
13+55	2.8414	4.48	Q	V			
14+ 0	2.8728	4.56	Q	V			
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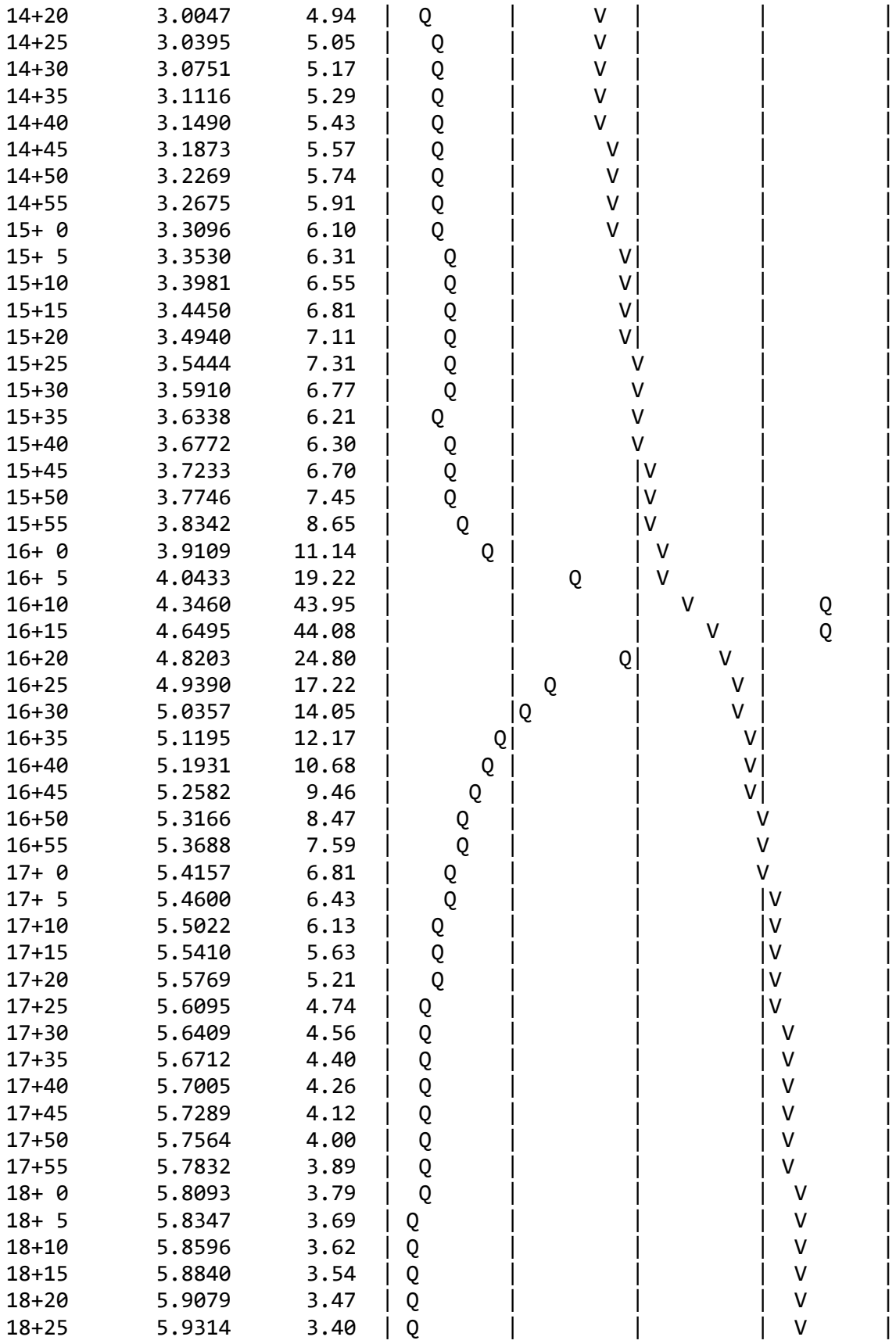
14+10	2.9374	4.74	Q	V			
14+15	2.9707	4.84	Q	V			



18+30	5.9543	3.34	Q			V	
18+35	5.9769	3.28	Q			V	
18+40	5.9991	3.22	Q			V	
18+45	6.0208	3.16	Q			V	
18+50	6.0423	3.11	Q			V	
18+55	6.0633	3.06	Q			V	
19+ 0	6.0841	3.01	Q			V	
19+ 5	6.1045	2.96	Q			V	
19+10	6.1246	2.92	Q			V	
19+15	6.1444	2.88	Q			V	
19+20	6.1640	2.84	Q			V	
19+25	6.1833	2.80	Q			V	
19+30	6.2023	2.76	Q			V	
19+35	6.2211	2.73	Q			V	
19+40	6.2396	2.69	Q			V	
19+45	6.2580	2.66	Q			V	
19+50	6.2761	2.63	Q			V	
19+55	6.2940	2.60	Q			V	
20+ 0	6.3117	2.57	Q			V	
20+ 5	6.3291	2.54	Q			V	
20+10	6.3465	2.51	Q			V	
20+15	6.3636	2.49	Q			V	
20+20	6.3805	2.46	Q			V	
20+25	6.3973	2.43	Q			V	
20+30	6.4139	2.41	Q			V	
20+35	6.4303	2.39	Q			V	
20+40	6.4466	2.36	Q			V	
20+45	6.4627	2.34	Q			V	
20+50	6.4787	2.32	Q			V	
20+55	6.4945	2.30	Q			V	
21+ 0	6.5102	2.28	Q			V	
21+ 5	6.5258	2.26	Q			V	
21+10	6.5412	2.24	Q			V	
21+15	6.5565	2.22	Q			V	
21+20	6.5716	2.20	Q			V	
21+25	6.5867	2.18	Q			V	
21+30	6.6016	2.17	Q			V	
21+35	6.6164	2.15	Q			V	
21+40	6.6311	2.13	Q			V	
21+45	6.6456	2.12	Q			V	
21+50	6.6601	2.10	Q			V	
21+55	6.6745	2.08	Q			V	
22+ 0	6.6887	2.07	Q			V	
22+ 5	6.7028	2.05	Q			V	
22+10	6.7169	2.04	Q			V	
22+15	6.7308	2.02	Q			V	
22+20	6.7447	2.01	Q			V	
22+25	6.7584	2.00	Q			V	
22+30	6.7721	1.98	Q			V	
22+35	6.7857	1.97	Q			V	

```
   22+40       6.7991      1.96  |Q        |         |         |       V |
   22+45       6.8125      1.94  |Q        |         |         |       V |
   22+50       6.8258      1.93  |Q        |         |         |       V |
   22+55       6.8391      1.92  |Q        |         |         |       V |
   23+ 0       6.8522      1.91  |Q        |         |         |       V |
   23+ 5       6.8653      1.90  |Q        |         |         |        V|
   23+10       6.8782      1.88  |Q        |         |         |        V|
   23+15       6.8911      1.87  |Q        |         |         |        V|
   23+20       6.9040      1.86  |Q        |         |         |        V|
   23+25       6.9167      1.85  |Q        |         |         |        V|
   23+30       6.9294      1.84  |Q        |         |         |        V|
   23+35       6.9420      1.83  |Q        |         |         |        V|
   23+40       6.9545      1.82  |Q        |         |         |        V|
   23+45       6.9670      1.81  |Q        |         |         |        V|
   23+50       6.9794      1.80  |Q        |         |         |        V|
   23+55       6.9917      1.79  |Q        |         |         |        V|
   24+ 0       7.0040      1.78  |Q        |         |         |        V|
   24+ 5       7.0157      1.70  |Q        |         |         |        V|
   24+10       7.0240      1.21  Q         |         |         |        V|
   24+15       7.0287      0.68  Q         |         |         |        V|
   24+20       7.0318      0.45  Q         |         |         |        V|
   24+25       7.0340      0.32  Q         |         |         |        V|
   24+30       7.0356      0.23  Q         |         |         |        V|
-------------------------------------------------------------------------
```

SECTION 6.5: Attachment D

Basin Summary Table

Basin Requirements		
Storm Event	**Max Flow Allowed (CFS)**	**Required Retention (CF)**
10-Year	54.40	378,172
100-Year	70.26*	378,172

Basin Summary			
Drainage Area	**10-Year Max Flow (CFS)**	**100-Year Max Flow (CFS)**	**Provided Onsite Retention (CF)**
DA A (Basin 1 and CMP)	0.00	0.00	682,561
DA B (Basin 2 and CMP)	0.00	0.00	532,814
Total	0.00	0.00	1,215,376

Note: * Calculated Using Data for 25-Year Storm Event

Basin 1 (DA A)						
Elevation (ft)	**Surface Area (SF)**	**Depth (ft)**	**Basin Volume (CF)**	**CMP Volume (CF)**	**Volume (ac-ft)**	**Outflow (cfs)**
3541*	10,268	0	14,375	481,775	11.39	0.00
3542	11,752	1	25,376	481,775	11.64	0.00
3543	13,304	2	37,896	481,775	11.93	0.00
3544	14,919	3	52,000	481,775	12.25	0.00
3545	16,597	4	67,750	481,775	12.62	0.00
3546	18,342	5	85,212	481,775	13.02	0.00
3547	20,159	6	104,455	481,775	13.46	0.00
3548	22,053	7	125,554	481,775	13.94	0.00
3549	24,026	8	148,587	481,775	14.47	0.00
3550	26,084	9	173,635	481,775	15.05	0.00
3551**	28,233	10	200,786	481,775	15.67	0.00
3552***	30,519	11	230,155	481,775	16.34	0.00

Requirements		
Storm Event	**Max Flow (CFS)**	**Required Retention (CF)**
10-Year	54.40	378,172
100-Year	70.26****	378,172

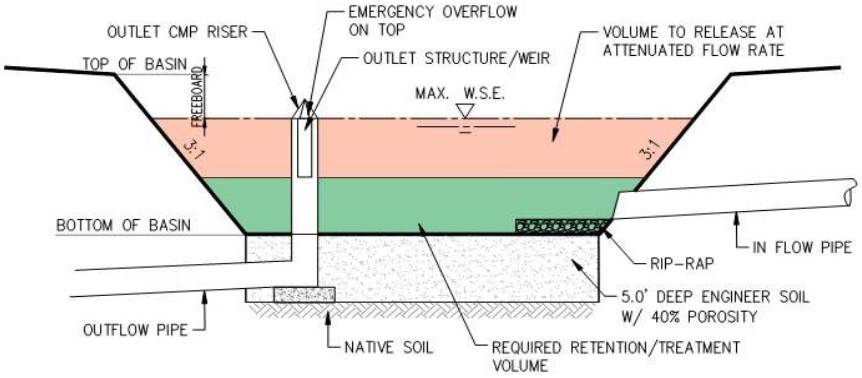
Summary Table			
Storm Event	**Storm Volume (CF)**	**Volume Retained (CF)**	**Max Flow Out (CFS)**
10-Year	389,744	682,561	0.00
100-Year	681,862	682,561	0.00

Note: * Bottom of Basin w/ 4.0' of Engineered Soil with 35% Porosity

** Retention Volume/Weir Crest Elevation

*** Top of Basin

**** Calculated Using Data for 25-Year Storm Event



INFILTRATION/DETENTION BASIN DETAIL

N.T.S

Basin 2 and Underground CMP (DA B)						
Elevation (ft)	**Surface Area (SF)**	**Depth (ft)**	**Volume (CF)**	**CMP Volume**	**Volume (ac-ft)**	**Outflow (cfs)**
3536*	8,334	0	11,668	408,016	9.63	0.00
3537	11,674	1	21,626	408,016	9.86	0.00
3538	15,131	2	34,991	408,016	10.17	0.00
3539	18,703	3	51,876	408,016	10.56	0.00
3540	22,391	4	72,396	408,016	11.03	0.00
3541	26,196	5	96,665	408,016	11.59	0.00
3542**	30,117	6	124,798	408,016	12.23	0.00
3543***	34,154	7	156,912	408,016	12.97	0.00

Requirements		
Storm Event	**Max Flow (CFS)**	**Required Retention (CF)**
10-Year	54.40	378,172
100-Year	70.26****	378,172

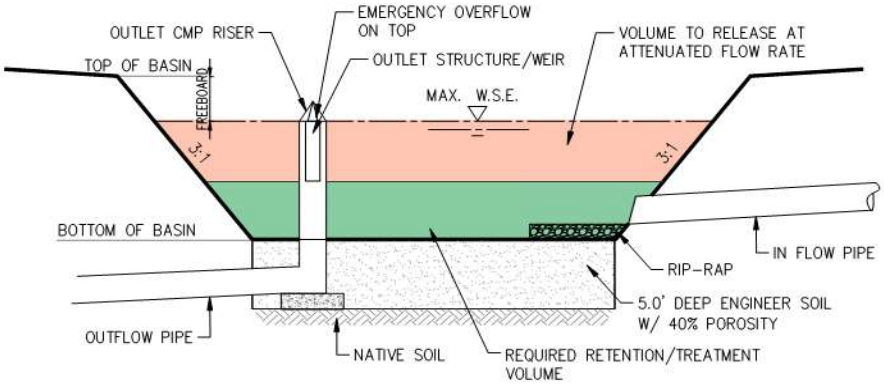
Summary Table			
Storm Event	**Storm Volume (CF)**	**Volume Retained (CF)**	**Max Flow Out (CFS)**
10-Year	305,094	532,814	0.00
100-Year	532,255	532,814	0.00

Note: * Bottom of Basin w/ 4.0' of Engineered Soil with 35% Porosity

** Retention Volume/Weir Crest Elevation

*** Top of Basin

**** Calculated Using Data for 25-Year Storm Event



INFILTRATION/DETENTION BASIN DETAIL

N.T.S

Building 2 Preliminary Water Quality Management Plan

MOJAVE RIVER WATERSHED

Preliminary Water Quality Management Plan

For:

I-15 Industrial Park Building 2

Prepared for:

Covington Group Inc.

14180 Dallas Parkway, Suite 730

Dallas, TX 75254

(866) 878-1499

Prepared by:

WestLAND Group

4150 Concours, Suite 100

Ontario, CA 91764

(909) 989-9789

Submittal Date: 02/17/2022

Revision No. and Date: Insert No and Current Revision Date

Revision No. and Date: Insert No and Current Revision Date

Revision No. and Date: Insert No and Current Revision Date

Revision No. and Date: Insert No and Current Revision Date

Revision No. and Date: Insert No and Current Revision Date

Final Approval Date:_____

Project Owner's Certification

This Mojave River Watershed Water Quality Management Plan (WQMP) has been prepared for Covington Group Inc. by WestLAND Group. The WQMP is intended to comply with the requirements of the City of Hesperia and the Phase II Small MS4 General Permit for the Mojave River Watershed. The undersigned, while it owns the subject property, is responsible for the implementation of the provisions of this plan and will ensure that this plan is amended as appropriate to reflect up-to-date conditions on the site consistent with the Phase II Small MS4 Permit and the intent of San Bernardino County (unincorporated areas of Phelan, Oak Hills, Spring Valley Lake and Victorville) and the incorporated cities of Hesperia and Victorville and the Town of Apple Valley. Once the undersigned transfers its interest in the property, its successors in interest and the city/county/town shall be notified of the transfer. The new owner will be informed of its responsibility under this WQMP. A copy of the approved WQMP shall be available on the subject site in perpetuity.

"I certify under a penalty of law that the provisions (implementation, operation, maintenance, and funding) of the WQMP have been accepted and that the plan will be transferred to future successors."

Project Data			
Permit/Application Number(s):		Grading Permit Number(s):	
Tract/Parcel Map Number(s):		Building Permit Number(s):	
CUP, SUP, and/or APN (Specify Lot Numbers if Portions of Tract):			

Owner's Signature			
Owner Name:			
Title			
Company			
Address			
Email			
Telephone #			
Signature		Date	

Preparer's Certification

Project Data			
Permit/Application Number(s):		Grading Permit Number(s):	
Tract/Parcel Map Number(s):		Building Permit Number(s):	
CUP, SUP, and/or APN (Specify Lot Numbers if Portions of Tract):			

"The selection, sizing and design of stormwater treatment and other stormwater quality and quantity control measures in this plan were prepared under my oversight and meet the requirements of the California State Water Resources Control Board Order No. 2013-0001-DWQ.

Engineer: Glenn Chung, PE QSD		PE Stamp Below
Title	Executive Vice President/Principal	
Company	Westland Group, Inc.	
Address	4150 Concours, Suite 100, Ontario CA 91764	
Email	gchung@westlandgroup.net	
Telephone #	(909) 989-9789	
Signature		
Date		

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Section 6.4: Attachment C - Geotechnical Report
Section 6.5: Calculations

Section I – Introduction

This WQMP template has been prepared specifically for the Phase II Small MS4 General Permit in the Mojave River Watershed. This location is within the jurisdiction of the Lahontan Regional Water Quality Control Board (LRWQCB). This document should not be confused with the WQMP template for the Santa Ana Phase I area of San Bernardino County.

WQMP preparers must refer to the MS4 Permit for the Mojave Watershed WQMP template and Technical Guidance (TGD) document found at: http://cms.sbcounty.gov/dpw/Land/NPDES.aspx to find pertinent arid region and Mojave River Watershed specific references and requirements.

Section 1 Discretionary Permit(s)

Form 1-1 Project Information

Project Name	I-15 Industrial Park Building 2				
Project Owner Contact Name:	Brandon Gallup				
Mailing Address:	14180 Dallas Parkway, Suite 730 Dallas, TX 75254	E-mail Address:		Telephone:	(866) 878-1499
Permit/Application Number(s):		Tract/Parcel Map Number(s):			
Additional Information/ Comments:					
Description of Project:	The project site is located Southwest of the intersection between Interstate Highway 15 and Main Street. The entire I-15 Industrial Park Building 2 measures approximately 36.32 acres and is intended to be developed into an industrial/commercial complex. The project site is currently vacant, undeveloped land with poor coverage. The soils have a hydrologic soil group classification of "A", and the site topography shows that stormwater runoff sheet flows to the northeast where it will naturally evaporate and infiltrate into the soil. See the exhibit for the Pre-Development conditions in Appendix A for more information. The proposed site for Phase I is considered an industrial development and intends to develop approximately 36.32 acres into one industrial building, parking areas, loading areas, drive aisles, and landscape areas. Stormwater runoff will be collected by nearby catch basins and conveyed to the proposed underground basin via a storm drain system. Prior to entering the underground basin, runoff will first be pretreated via filter inserts placed in the catch basins. Further downstream within the storm drain system, the runoff will be further pretreated via a baffle box. After pretreatment, runoff is released into the underground CMP infiltration system where it will collect and infiltrate into the soil. The basins are sized and designed to prevent flooding from a 100-year storm while also accommodating the required retention volume for water quality purposes. The site proposes one underground CMP infiltration system and to better understand the post-development conditions, the site has been divided into three drainage areas that convey runoff to the basin at their respective connection points. The basin is required to prevent flooding from a 100-year storm while also accommodating the required retention volume for water quality purposes. For this project, the basins are designed to capture the entire volume generated from a 100-year storm even meaning that no runoff will be discharged off site. For more information, please refer to the exhibit for the post-development conditions in Section 6.1.				

Provide summary of Conceptual WQMP conditions (if previously submitted and approved). Attach complete copy.	N/A

Section 2 Project Description

2.1 Project Information

The WQMP shall provide the information listed below. The information provided for Conceptual/ Preliminary WQMP should give sufficient detail to identify the major proposed site design and LID BMPs and other anticipated water quality features that impact site planning. Final Project WQMP must specifically identify all BMP incorporated into the final site design and provide other detailed information as described herein.

The purpose of this information is to help determine the applicable development category, pollutants of concern, watershed description, and long term maintenance responsibilities for the project, and any applicable water quality credits. This information will be used in conjunction with the information in Section 3, Site Description, to establish the performance criteria and to select the LID BMP or other BMP for the project or other alternative programs that the project will participate in, which are described in Section 4.

2.1.1 Project Sizing Categorization

If the Project is greater than 5,000 square feet, and not on the excluded list as found on Section 1.4 of the TGD, the Project is a Regulated Development Project.

If the Project is creating and/or replacing greater than 2,500 square feet but less than 5,000 square feet of impervious surface area, then it is considered a Site Design Only project. This criterion is applicable to all development types including detached single family homes that create and/or replace greater than 2,500 square feet of impervious area and are not part of a larger plan of development.

Form 2.1-1 Description of Proposed Project

1 Regulated Development Project Category (Select all that apply):

☒ #1 New development involving the creation of 5,000 ft^2 or more of impervious surface collectively over entire site	☐ #2 Significant re-development involving the addition or replacement of 5,000 ft^2 or more of impervious surface on an already developed site	☐ #3 Road Project – any road, sidewalk, or bicycle lane project that creates greater than 5,000 square feet of contiguous impervious surface	☐ #4 LUPs – linear underground/overhead projects that has a discrete location with 5,000 sq. ft. or more new constructed impervious surface

☐ Site Design Only (Project Total Square Feet > 2,500 but < 5,000 sq.ft.) *Will require source control Site Design Measures. Use the "PCMP" Template. Do not use this WQMP Template.*

2 Project Area (ft2):	1,581,902	**3** Number of Dwelling Units:		**4** SIC Code:	

5 Is Project going to be phased? Yes ☐ No ☒ *If yes, ensure that the WQMP evaluates each phase as a distinct DA, requiring LID BMPs to address runoff at time of completion.*

2.2 Property Ownership/Management

Describe the ownership/management of all portions of the project and site. State whether any infrastructure will transfer to public agencies (City, County, Caltrans, etc.) after project completion. State if a homeowners or property owners association will be formed and be responsible for the long-term maintenance of project stormwater facilities. Describe any lot-level stormwater features that will be the responsibility of individual property owners.

Form 2.2-1 Property Ownership/Management

Describe property ownership/management responsible for long-term maintenance of WQMP stormwater facilities:

Maintenance of the WQMP facilities will be the sole responsibility of the property owner:

Covington Capital, LLC
14180 Dallas Parkway, Suite 730
Dallas, TX 75254
Contact: Brandon Gallup
Phone: (866) 878-1499

The owner may choose to contract the appropriate employers for the maintenance of stormwater to whom will provide the proper equipment if the current owners to not have the proper equipment and/or knowledge to do so.

Any future property owner(s) whom will succeed Hesperia Commerce Center IV as the entity responsible for long term maintenance.

No infrastructure will be transferred to a public agency after completion. Refer to Section 5 of this WQMP report for detailed maintenance activities.

2.3 Potential Stormwater Pollutants

Best Management Practices (BMP) measures for pollutant generating activities and sources shall be designed consistent with recommendations from the CASQA Stormwater BMP Handbook for New Development and Redevelopment (or an equivalent manual). Pollutant generating activities must be considered when determining the overall pollutants of concern for the Project as presented in Form 2.3-1.

Determine and describe expected stormwater pollutants of concern based on land uses and site activities (refer to Table 3-2 in the TGD for WQMP).

Form 2.3-1 Pollutants of Concern

Pollutant	Please check: E=Expected, N=Not Expected		Additional Information and Comments
Pathogens (Bacterial / Virus)	E ☒	N ☐	Wild Bird and Pet Waste, Garbage
Nutrients - Phosphorous	E ☒	N ☐	Fertilizers, Food Waste, & Garbage
Nutrients - Nitrogen	E ☒	N ☐	Fertilizer & Waste
Noxious Aquatic Plants	E ☐	N ☒	The proposed development does not include any areas where water will be standing long enough to allow the growth of aquatic plants.
Sediment	E ☒	N ☐	Driveways, Rooftops, Sidewalks, Paved areas & landscape
Metals	E ☒	N ☐	Cars, Trucks & Parking Areas
Oil and Grease	E ☒	N ☐	Leaking Vehicles & Parking Areas
Trash/Debris	E ☒	N ☐	Poorly managed Trash Container & Parking area
Pesticides / Herbicides	E ☒	N ☐	Landscape Area
Organic Compounds	E ☒	N ☐	Cars & Trucks
Other:	E ☐	N ☐	
Other:	E ☐	N ☐	
Other:	E ☐	N ☐	

Section 3 Site and Watershed Description

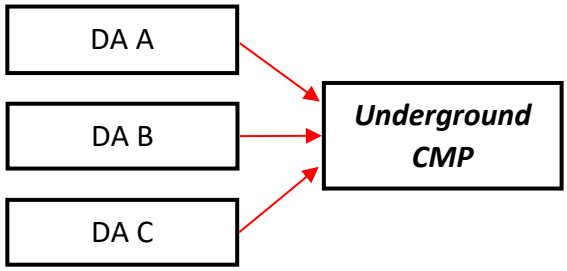
Describe the project site conditions that will facilitate the selection of BMPs through an analysis of the physical conditions and limitations of the site and its receiving waters. Identify distinct drainage areas (DA) that collect flow from a portion of the site and describe how runoff from each DA (and sub-watershed Drainage Management Areas (DMAs)) is conveyed to the site outlet(s). Refer to Section 3.2 in the TGD for WQMP. The form below is provided as an example. Then complete Forms 3.2 and 3.3 for each DA on the project site. ***If the project has more than one drainage area for stormwater management, then complete additional versions of these forms for each DA / outlet. A map presenting the DMAs must be included as an appendix to the WQMP document.***

Form 3-1 Site Location and Hydrologic Features

Site coordinates *take GPS measurement at approximate center of site*	Latitude 34.4176°	Longitude -117.3971°	Thomas Bros Map page 4475

1 San Bernardino County climatic region: ☒ Desert

2 Does the site have more than one drainage area (DA): Yes☒ No☐ *If no, proceed to Form 3-2. If yes, then use this form to show a conceptual schematic describing DMAs and hydrologic feature connecting DMAs to the site outlet(s). An example is provided below that can be modified for proposed project or a drawing clearly showing DMA and flow routing may be attached*



Conveyance	Briefly describe on-site drainage features to convey runoff that is not retained within a DMA
DA1 DMA C flows to DA1 DMA A	*Ex. Bioretention overflow to vegetated bioswale with 4' bottom width, 5:1 side slopes and bed slope of 0.01. Conveys runoff for 1000' through DMA 1 to existing catch basin on SE corner of property*
DA A to Underground CMP	Runoff sheet flows into the nearest catch basin and routed into the underground CMP detention system. Once the underground detention system is filled, runoff will then be routed and discharged through curbface via parkway culvert.
DA B to Underground CMP	Runoff sheet flows into the nearest catch basin and routed into the underground CMP detention system. Once the underground detention system is filled, runoff will then be routed and discharged through curbface via parkway culvert.
DA C to Underground CMP	Runoff sheet flows into the nearest catch basin and routed into the underground CMP detention system. Once the underground detention system is filled, runoff will then be routed and discharged through curbface via parkway culvert

Form 3-2 Existing Hydrologic Characteristics for Drainage Area 1

For Drainage Area 1's sub-watershed DMA, provide the following characteristics	DA A	DA B	DA C	
1 DMA drainage area (ft^2)	1,087,094	455,185	39,622	
2 Existing site impervious area (ft^2)	0	0	0	
3 Antecedent moisture condition *For desert areas, use http://www.sbcounty.gov/dpw/floodcontrol/pdf/20100412_map.pdf*	AMC II	AMC II	AMC II	
4 Hydrologic soil group *Refer to County Hydrology Manual Addendum for Arid Regions – http://www.sbcounty.gov/dpw/floodcontrol/pdf/20100412_addendum.pdf*	A	A	A	
5 Longest flowpath length (ft)	1,375	1,150	789	
6 Longest flowpath slope (ft/ft)	0.0201	0.0206	0.0182	
7 Current land cover type(s) *Select from Fig C-3 of Hydrology Manual*	Barren (Undeveloped)	Barren (Undeveloped)	Barren (Undeveloped)	
8 Pre-developed pervious area condition: *Based on the extent of wet season vegetated cover good >75%; Fair 50-75%; Poor <50%* ***Attach photos of site to support rating***	Poor	Poor	Poor	

Form 3-3 Watershed Description for Drainage Area

Receiving waters Refer to SWRCB site: http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml	Mojave River (Mojave Forks Reservoir outlet to Upper Narrows) Deep Creek (San Bernardino County) Oro Grande Wash Owner: SBCFCD
Applicable TMDLs *http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml*	**Mojave River (Mojave Forks Reservoir outlet to Upper Narrows)** N/A **Deep Creek (San Bernardino County)** N/A **Oro Grande Wash** N/A
303(d) listed impairments *http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml*	**Mojave River (Mojave Forks Reservoir outlet to Upper Narrows)** Fluoride **Deep Creek (San Bernardino County)** N/A **Oro Grande Wash** N/A
Environmentally Sensitive Areas (ESA) *Refer to Watershed Mapping Tool –* *http://sbcounty.permitrack.com/WAP*	**Environmentally Sensitive Areas within 200':** DESERT TORTOISE HABITAT CAT 3
Hydromodification Assessment	☒ Yes *Complete Hydromodification Assessment. Include Forms 4.2-2 through Form 4.2-5 and Hydromodification BMP Form 4.3-9 in submittal* ☐ No

Section 4 Best Management Practices (BMP)

4.1 Source Control BMPs and Site Design BMP Measures

The information and data in this section are required for both Regulated Development and Site Design Only Projects. Source Control BMPs and Site Design BMP Measures are the basis of site-specific pollution management.

4.1.1 Source Control BMPs

Non-structural and structural source control BMP are required to be incorporated into all new development and significant redevelopment projects. Form 4.1-1 and 4.1-2 are used to describe specific source control BMPs used in the WQMP or to explain why a certain BMP is not applicable. Table 7-3 of the TGD for WQMP provides a list of applicable source control BMP for projects with specific types of potential pollutant sources or activities. The source control BMP in this table must be implemented for projects with these specific types of potential pollutant sources or activities.

The preparers of this WQMP have reviewed the source control BMP requirements for new development and significant redevelopment projects. The preparers have also reviewed the specific BMP required for project as specified in Forms 4.1-1 and 4.1-2. All applicable non-structural and structural source control BMP shall be implemented in the project.

The identified list of source control BMPs correspond to the CASQA Stormwater BMP Handbook for New Development and Redevelopment.

Form 4.1-1 Non-Structural Source Control BMPs

Identifier	Name	Check One		Describe BMP Implementation OR, if not applicable, state reason
		Included	Not Applicable	
N1	Education of Property Owners, Tenants and Occupants on Stormwater BMPs	☒	☐	The current owner/developer and future owners and their POA shall be familiar with the contents of this WQMP and County & City ordinances and brochures and furnish copies of these documents to all future property owners.
N2	Activity Restrictions	☒	☐	Property owners and their tenants or occupants shall not be allowed to discharge chemicals, chemical residues, wastewater or other prohibited discharges listed in the City stormwater Ordinance, to the outside, paved areas of the site; or store chemicals or other pollutant sources in a non-spill contained or covered facilities as stipulated in the CC&Rs.
N3	Landscape Management BMPs	☒	☐	The POA and their landscape maintenance contractor shall inspect the irrigation system plant health and erosion problems after each landscape procedure and shall report all repairs and problems to the POA. All routine landscaping maintenance.
N4	BMP Maintenance	☒	☐	The POA shall inspect for standing water in the water retention/infiltration basins, 48 hours after storm events. BMP maintenance shall be performed per the schedule in Form 5-1, as needed to restore free drainage.
N5	Title 22 CCR Compliance (How development will comply)	☒	☐	The POA will file appropriate hazardous material disclosures, if any storage is conducted, and must comply with all Title 22 CCR, Chapter 29 regulations.
N6	Local Water Quality Ordinances	☒	☐	The POA shall ensure that all maintenance activities at the site comply with the City of Hesperia's Stormwater Ordinance, through the implementation of BMPs.
N7	Spill Contingency Plan	☒	☐	Building operators shall prepare specific plans based on materials on site for the cleanup of spills. Plans shall mandate stock piling of cleanup materials, notification of agencies, disposal, documentation, ect.
N8	Underground Storage Tank Compliance	☐	☒	There are no underground storage tanks at this site.
N9	Hazardous Materials Disclosure Compliance	☐	☒	The current owner and the future POA shall prohibit the storage of hazardous materials.

Form 4.1-1 Non-Structural Source Control BMPs

Identifier	Name	Check One		Describe BMP Implementation OR, if not applicable, state reason
		Included	Not Applicable	
N10	Uniform Fire Code Implementation	☒	☐	The current owners or the future POA shall require all fire code requirements to be implemented at this project site.
N11	Litter/Debris Control Program	☒	☐	The property owners, POA and their contractor shall pick up litter and sweep and clean the existing trash enclosure weekly. The trash enclosure is designed to divert all flows around the dumpsters and shall be roofed. The HOA shall contract with a refuse company to have the dumpsters emptied on a weekly basis, at a minimum.
N12	Employee Training	☒	☐	The POA shall require all maintenance contractors to train their employees in stormwater BMP implementation.
N13	Housekeeping of Loading Docks	☒	☐	Dock areas shall be swept regularly with litter control and cleanup procedures eliminating the use of water.
N14	Catch Basin Inspection Program	☒	☐	The on-site catch basins shall be inspected monthly during the rainy season (October-May) and before and after each storm to ensure proper operation. The HOA shall contract with a qualified landscape contractor to inspect and clean out accumulation of trash, litter and sediment and check for evidence of illegal dumping of waste materials into on-site drains.
N15	Vacuum Sweeping of Private Streets and Parking Lots	☒	☐	The paved areas and common open areas of the project site shall be swept and cleaned weekly by the POA's contractor
N16	Other Non-structural Measures for Public Agency Projects	☐	☒	This development is not part of a Public Agency Project.
N17	Comply with all other applicable NPDES permits	☒	☐	The developer of this site shall comply with all BMP implementation requirements of the City of Hesperia for Stormwater discharges during construction of this project and shall file for a permit coverage under the Statewide General Construction Stormwater Permit, prior to beginning construction/grading activities at this site. Following occupancy, owners, tenants, and POA shall comply with SB County MS4 Permit requirements, enforced by the City of Hesperia.

Form 4.1-2 Structural Source Control BMPs

Identifier	Name	Check One		Describe BMP Implementation OR, If not applicable, state reason
		Included	Not Applicable	
S1	Provide storm drain system stencilling and signage (CASQA New Development BMP Handbook SD-13)	☒	☐	A painted message "No Dumping-Drains to River" shall be placed on each catch basin by developer. The message shall be inspected annually & repainted as necessary by the POA.
S2	Design and construct outdoor material storage areas to reduce pollution introduction (CASQA New Development BMP Handbook SD-34)	☐	☒	This development does not include the storage of materials outdoors.
S3	Design and construct trash and waste storage areas to reduce pollution introduction (CASQA New Development BMP Handbook SD-32)	☒	☐	Stormwater flows are diverted away from the trash enclosure. All dumpsters shall have working lids which shall be kept closed, at all times. Trash enclosure shall comply with CASQA SD-32 and shall have doors and a solid roof.
S4	Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control (Statewide Model Landscape Ordinance; CASQA New Development BMP Handbook SD-12)	☒	☐	The irrigation system will include devices to prevent low head drainage, overspray and run off through the use of pressure regulating devices, check valves, rain shutoff valves, flow sensors, pressure drop sensors, proper spacing, low precipitation emission devices and ET or weather-based controllers. Landscape and irrigation shall be consistent with the State Model Water Efficient landscape Ordinance and the City of Ontario landscape Development Standards. Plants installed will be arranged according to similar hydrozones and meet the required water budget for the site. Shade trees shall be used to intercept rainwater and reduce heat gain on paving.
S5	Finish grade of landscaped areas at a minimum of 1-2 inches below top of curb, sidewalk, or pavement	☒	☐	All landscaped areas shall comply with depressed grading requirements by finish grading to a minimum of 1" below pavement grades or top-of-curb.
S6	Protect slopes and channels and provide energy dissipation (CASQA New Development BMP Handbook SD-10)	☒	☐	All slopes shall be hard lined, rip-rapped or vegetated to provide erosion protection and prevent sediment transport
S7	Covered dock areas (CASQA New Development BMP Handbook SD-31)	☐	☒	Unloading of truck trailers at docks will occur under cover of the building. It is not feasible to cover the entire loading area as it would be cost prohibitive. Project will incorporate dock high rollup doors and sweeping activities at the outside of the building.
S8	Covered maintenance bays with spill containment plans (CASQA New Development BMP Handbook SD-31)	☐	☒	Maintenance bays are not proposed as a part of this development, and no maintenance activities will be allowed on site.

S9	Vehicle wash areas with spill containment plans (CASQA New Development BMP Handbook SD-33)	☐	☒	Vehicle wash areas are not provided as part of this development.
S10	Covered outdoor processing areas (CASQA New Development BMP Handbook SD-36)	☐	☒	Outdoor processing is not associated with the proposed development.

Form 4.1-2 Structural Source Control BMPs

Identifier	Name	Check One		Describe BMP Implementation OR, If not applicable, state reason
		Included	Not Applicable	
S11	Equipment wash areas with spill containment plans (CASQA New Development BMP Handbook SD-33)	☐	☒	Outdoor equipment is not associated with the proposed development.
S12	Fueling areas (CASQA New Development BMP Handbook SD-30)	☐	☒	Fueling areas are not included as part of this development.
S13	Hillside landscaping (CASQA New Development BMP Handbook SD-10)	☐	☒	No hillsides will require re-vegetation as part of the proposed development.
S14	Wash water control for food preparation areas	☐	☒	The proposed development does not include food preparation areas.
S15	Community car wash racks (CASQA New Development BMP Handbook SD-33)	☐	☒	The proposed development does not include community car wash areas

4.1.2 Site Design BMPs

As part of the planning phase of a project, the site design practices associated with new LID requirements in the Phase II Small MS4 Permit must be considered. Site design BMP measures can result in smaller Design Capture Volume (DCV) to be managed by both LID and hydromodification control BMPs by reducing runoff generation.

As is stated in the Permit, it is necessary to evaluate site conditions such as soil type(s), existing vegetation and flow paths will influence the overall site design.

Describe site design and drainage plan including:

- A narrative of site design practices utilized or rationale for not using practices
- A narrative of how site plan incorporates preventive site design practices
- Include an attached Site Plan layout which shows how preventative site design practices are included in WQMP

Refer to Section 5.2 of the TGD for WQMP for more details.

Form 4.1-3 Site Design Practices Checklist

Site Design Practices *If yes, explain how preventative site design practice is addressed in project site plan. If no, other LID BMPs must be selected to meet targets*
Minimize impervious areas: Yes ☒ No ☐ Explanation: Impervious areas will be minimized to the maximum extent practicable. The proposed development requires large areas for loading docks and building foot prints.
Maximize natural infiltration capacity; Including improvement and maintenance of soil: Yes ☒ No ☐ Explanation: All pervious areas will be below adjacent impervious areas to maximize natural infiltration, and the project site utilizes subsurface infiltration basins.
Preserve existing drainage patterns and time of concentration: Yes ☐ No ☒ Explanation: Post-development has different travel distance, surface roughness and time concentration from the existing condition.
Disconnect impervious areas. Including rerouting of rooftop drainage pipes to drain stormwater to storage or infiltration BMPs instead of to storm drain : Yes ☒ No ☐ Explanation: Most areas are run through landscape areas prior to entering the storm drain system. Roof area will be conveyed through adjacent landscaping, where feasible.
Use of Porous Pavement.: Yes ☐ No ☒ Explanation: The project does not propose areas with porous pavement.
Protect existing vegetation and sensitive areas: Yes ☐ No ☒ Explanation: Native vegetation has been mostly removed by agricultural activities, and the existing undeveloped area will not be preserved.
Re-vegetate disturbed areas. Including planting and preservation of drought tolerant vegetation. : Yes ☒ No ☐ Explanation: Any areas that are disturbed will be stabilized prior to project completion.

Minimize unnecessary compaction in stormwater retention/infiltration basin/trench areas: Yes ☒ No ☐ Explanation: Landscaping areas will be staked off after rough grading has been completed to prevent excessive compaction, the areas in which the subsurface basins are to be constructed will minimize compaction.
Utilize naturalized/rock-lined drainage swales in place of underground piping or imperviously lined swales: Yes ☐ No ☒ Explanation: The project does not incorporate naturalized/ rock-lined drainage swales in place of underground piping.
Stake off areas that will be used for landscaping to minimize compaction during construction : Yes ☒ No ☐ Explanation: Landscaping areas will be staked off after rough grading has been completed to prevent excessive compaction.
Use of Rain Barrels and Cisterns, Including the use of on-site water collection systems.: Yes ☐ No ☒ Explanation: The project does not incorporate rain barrels and cisterns.
Stream Setbacks. Includes a specified distance from an adjacent steam: : Yes ☐ No ☒ Explanation: There are no streams adjacent to the property.

It is noted that, in the Phase II Small MS4 Permit, site design elements for green roofs and vegetative swales are required. Due to the local climatology in the Mojave River Watershed, proactive measures are taken to maximize the amount of drought tolerant vegetation. It is not practical in this region to have green roofs or vegetative swales. As part of site design the project proponent should utilize locally recommended vegetation types for landscaping. Typical landscaping recommendations are found in following local references:

San Bernardino County Special Districts:

Guide to High Desert Landscaping -
http://www.specialdistricts.org/Modules/ShowDocument.aspx?documentid=795

Recommended High-Desert Plants -
http://www.specialdistricts.org/modules/showdocument.aspx?documentid=553

Mojave Water Agency:

Desert Ranch: http://www.mojavewater.org/files/desertranchgardenprototype.pdf

Summertree: http://www.mojavewater.org/files/Summertree-Native-Plant-Brochure.pdf

Thornless Garden: http://www.mojavewater.org/files/thornlessgardenprototype.pdf

Mediterranean Garden: http://www.mojavewater.org/files/mediterraneangardenprototype.pdf

Lush and Efficient Garden: http://www.mojavewater.org/files/lushandefficientgardenprototype.pdf

Alliance for Water Awareness and Conservation (AWAC) outdoor tips – http://hdawac.org/save-outdoors.html

4.2 Treatment BMPs

After implementation and design of both Source Control BMPs and Site Design BMP measures, any remaining runoff from impervious DMAs must be directed to one or more on-site, treatment BMPs (LID or biotreatment) designed to infiltrate, evaportranspire, and/or bioretain the amount of runoff specified in Permit Section E.12.e (ii)(c) Numeric Sizing Criteria for Storm Water Retention and Treatment.

4.2.1 Project Specific Hydrology Characterization

The purpose of this section of the Project WQMP is to establish targets for post-development hydrology based on performance criteria specified in Section E.12.e.ii.c and Section E.12.f of the Phase II Small MS4 Permit. These targets include runoff volume for water quality control (referred to as LID design capture volume), and runoff volume, time of concentration, and peak runoff for protection from hydromodification.

If the project has more than one outlet for stormwater runoff, then complete additional versions of these forms for each DA / outlet.

It is noted that in the Phase II Small MS4 Permit jurisdictions, the LID BMP Design Capture Volume criteria is based on the 2-year rain event. The hydromodification performance criterion is based on the 10-year rain event.

Methods applied in the following forms include:

- For LID BMP Design Capture Volume (DCV), San Bernardino County requires use of the P_6 method (Form 4.2-1) For pre- and post-development hydrologic calculation, San Bernardino County requires the use of the Rational Method (San Bernardino County Hydrology Manual Section D). Forms 4.2-2 through Form 4.2-5 calculate hydrologic variables including runoff volume, time of concentration, and peak runoff from the project site pre- and post-development using the Hydrology Manual Rational Method approach. For projects greater than 640 acres (1.0 mi^2), the Rational Method and these forms should not be used. For such projects, the Unit Hydrograph Method (San Bernardino County Hydrology Manual Section E) shall be applied for hydrologic calculations for hydromodification performance criteria.

Refer to Section 4 in the TGD for WQMP for detailed guidance and instructions.

Form 4.2-1 LID BMP Performance Criteria for Design Capture Volume (DA 1)		
[1] Project area DA 1 (ft^2): 1,582,064	[2] Imperviousness after applying preventative site design practices (Imp%): 87	[3] Runoff Coefficient (Rc): _0.69 *$R_c = 0.858(Imp\%)^{\wedge 3}-0.78(Imp\%)^{\wedge 2}+0.774(Imp\%)+0.04$*
[4] Determine 1-hour rainfall depth for a 2-year return period $P_{2yr\text{-}1hr}$ (in): 0.463 http://hdsc.nws.noaa.gov/hdsc/pfds/sa/sca_pfds.html		
[5] Compute P_6, Mean 6-hr Precipitation (inches): 0.57 *P_6 = Item 4 *C_1, where C_1 is a function of site climatic region specified in Form 3-1 Item 1 (Desert = 1.2371)*		
[6] Drawdown Rate *Use 48 hours as the default condition. Selection and use of the 24 hour drawdown time condition is subject to approval by the local jurisdiction. The necessary BMP footprint is a function of drawdown time. While shorter drawdown times reduce the performance criteria for LID BMP design capture volume, the depth of water that can be stored is also reduced.*		24-hrs ☐ 48-hrs ☒
[7] Compute design capture volume, DCV (ft^3): 101,718 *DCV = 1/12 * [Item 1* Item 3 *Item 5 * C_2], where C_2 is a function of drawdown rate (24-hr = 1.582; 48-hr = 1.963)* *Compute separate DCV for each outlet from the project site per schematic drawn in Form 3-1 Item 2*		

Form 4.2-2 Summary of Hydromodification Assessment (Entire Site)

Is the change in post- and pre- condition flows captured on-site? : Yes ☒ No ☐

If "Yes", then complete Hydromodification assessment of site hydrology for 10yr storm event using Forms 4.2-3 through 4.2-5 and insert results below *(Forms 4.2-3 through 4.2-5 may be replaced by computer software analysis based on the San Bernardino County Hydrology Manual- Addendum 1)*

If "No," then proceed to Section 4.3 BMP Selection and Sizing

Condition	Runoff Volume (ft^3)	Time of Concentration (min)	Peak Runoff (cfs)
Pre-developed	**1** 173,526 *Form 4.2-3 Item 12*	**2** 18.19 *Form 4.2-4 Item 13*	**3** 40.21 *Form 4.2-5 Item 10*
Post-developed	**4** 474,081 *Form 4.2-3 Item 13*	**5** 14.11 *Form 4.2-4 Item 14*	**6** 80.15 *Form 4.2-5 Item 14*
Difference	**7** *300,555* *Item 4 – Item 1*	**8** *4.08* *Item 2 – Item 5*	**9** *39.94* *Item 6 – Item 3*
Difference (as % of pre-developed)	**10** *173%* *Item 7 / Item 1*	**11** *22%* *Item 8 / Item 2*	**12** *99%* *Item 9 / Item 3*

Civil D is a computer software analysis that that can be utilized to assess HCOC and replace Forms 4.2-3 through 4.2-5. The methodology for the program is based off of the San Bernardino County Hydrology Manual. An HCOC summary is provided on Pg. 4-11 and the calculations can be found in Section 6.5.

HCOC Calculation Summary Table	
	10-Year, 24-Hour Runoff Volume (CF)
Pre-Development Condition	173,526
Post-Development Condition	474,081
HCOC Required Volume *0.95*(Post-Development) – Pre-Development*	276,851
DCV *Form 4.2-1*	101,718
Notes	Since the HCOC Required Volume is greater than the DCV, the HCOC volume will be used for the BMP design

4.3 BMP Selection and Sizing

Complete the following forms for each project site DA to document that the proposed treatment (LID/Bioretention) BMPs conform to the project DCV developed to meet performance criteria specified in the Phase II Small MS4 Permit (WQMP Template Section 4.2). For the LID DCV, the forms are ordered according to hierarchy of BMP selection as required by the Phase II Small MS4 Permit (see Section 5.3 in the TGD for WQMP). The forms compute the following for on-site LID BMP:

- Site Design Measures (Form 4.3-2)
- Retention and Infiltration BMPs (Form 4.3-3) or
- Biotreatment BMPs (Form 4.3-4).

> Please note that the selected BMPs may also be used as dual purpose for on-site, hydromodification mitigation and management.

At the end of each form, additional fields facilitate the determination of the extent of mitigation provided by the specific BMP category, allowing for use of the next category of BMP in the hierarchy, if necessary.

The first step in the analysis, using Section 5.3.2 of the TGD for WQMP, is to complete Forms 4.3-1 and 4.3-3) to determine if retention and infiltration BMPs are infeasible for the project. For each feasibility criterion in Form 4.3-1, if the answer is "Yes," provide all study findings that includes relevant calculations, maps, data sources, etc. used to make the determination of infeasibility.

Next, complete Form 4.3-2 to determine the feasibility of applicable Site Design BMPs, and, if their implementation is feasible, the extent of mitigation of the DCV.

If no site constraints exist that would limit the type of BMP to be implemented in a DA, evaluate the use of combinations of LID BMPs, including all applicable Site Design BMPs to maximize on-site retention of the DCV. If no combination of BMP can mitigate the entire DCV, implement the single BMP type, or combination of BMP types, that maximizes on-site retention of the DCV within the minimum effective area.

If the combination of site design, retention and/or infiltration BMPs is unable to mitigate the entire DCV, then the remainder of the volume-based performance criteria that cannot be achieved with site design, retention and/or infiltration BMPs must be managed through biotreatment BMPs. If biotreatment BMPs are used, then they must be sized to provide equivalent effectiveness based on Template Section 4.3.4.

4.3.1 Exceptions to Requirements for Bioretention Facilities

Contingent on a demonstration that use of bioretention or a facility of equivalent effectiveness is infeasible, other types of biotreatment or media filters (such as tree-box-type biofilters or in-vault media filters) may be used for the following categories of Regulated Projects:

1) Projects creating or replacing an acre or less of impervious area, and located in a designated pedestrian-oriented commercial district (i.e., smart growth projects), and having at least 85% of the entire project site covered by permanent structures;

2) Facilities receiving runoff solely from existing (pre-project) impervious areas; and

3) Historic sites, structures or landscapes that cannot alter their original configuration in order to maintain their historic integrity.

Form 4.3-1 Infiltration BMP Feasibility (DA 1)

Feasibility Criterion – Complete evaluation for each DA on the Project Site

[1] Would infiltration BMP pose significant risk for groundwater related concerns? Yes ☐ No ☒
Refer to Section 5.3.2.1 of the TGD for WQMP

If Yes, Provide basis: (attach)

[2] Would installation of infiltration BMP significantly increase the risk of geotechnical hazards? Yes ☐ No ☒
(Yes, if the answer to any of the following questions is yes, as established by a geotechnical expert):

- The location is less than 50 feet away from slopes steeper than 15 percent
- The location is less than ten feet from building foundations or an alternative setback.
- A study certified by a geotechnical professional or an available watershed study determines that stormwater infiltration would result in significantly increased risks of geotechnical hazards.

If Yes, Provide basis: (attach)

[3] Would infiltration of runoff on a Project site violate downstream water rights? Yes ☐ No ☒

If Yes, Provide basis: (attach)

[4] Is proposed infiltration facility located on hydrologic soil group (HSG) D soils or does the site geotechnical investigation indicate presence of soil characteristics, which support categorization as D soils? Yes ☐ No ☒

If Yes, Provide basis: (attach)

[5] Is the design infiltration rate, after accounting for safety factor of 2.0, below proposed facility less than 0.3 in/hr (accounting for soil amendments)? Yes ☐ No ☒

If Yes, Provide basis: (attach)

[6] Would on-site infiltration or reduction of runoff over pre-developed conditions be partially or fully inconsistent with watershed management strategies as defined in the WAP, or impair beneficial uses? Yes ☐ No ☒
See Section 3.5 of the TGD for WQMP and WAP

If Yes, Provide basis: (attach)

[7] Any answer from Item 1 through Item 3 is "Yes": Yes ☐ No ☒
If yes, infiltration of any volume is not feasible onsite. Proceed to Form 4.3-4, Selection and Evaluation of Biotreatment BMP.
If no, then proceed to Item 8 below.

[8] Any answer from Item 4 through Item 6 is "Yes": Yes ☐ No ☒
If yes, infiltration is permissible but is not required to be considered. Proceed to Form 4.3-2, Site Design BMP.
If no, then proceed to Item 9, below.

[9] All answers to Item 1 through Item 6 are "No":
Infiltration of the full DCV is potentially feasible, LID infiltration BMP must be designed to infiltrate the full DCV to the MEP.
Proceed to Form 4.3-2, Site Design BMPs.

4.3.2 Site Design BMP

Section E.12.e. of the Small Phase II MS4 Permit emphasizes the use of LID preventative measures; and the use of Site Design Measures reduces the portion of the DCV that must be addressed in downstream BMPs. Therefore, all applicable Site Design Measures shall be provided except where they are mutually exclusive with each other, or with other BMPs. Mutual exclusivity may result from overlapping BMP footprints such that either would be potentially feasible by itself, but both could not be implemented. Please note that while there are no numeric standards regarding the use of Site Design BMPs. If a project cannot feasibly meet BMP sizing requirements or cannot fully address hydromodification, feasibility of all applicable Site Design BMPs must be part of demonstrating that the BMP system has been designed to retain the maximum feasible portion of the DCV. Complete Form 4.3-2 to identify and calculate estimated retention volume from implementing site design BMP. Refer to Section 5.4 in the TGD for more detailed guidance.

Form 4.3-2 Site Design BMPs (DA 1)

1 Implementation of Impervious Area Dispersion BMP (i.e. routing runoff from impervious to pervious areas), excluding impervious areas planned for routing to on-lot infiltration BMP: Yes ☐ No ☒ *If yes, complete Items 2-5; If no, proceed to Item 6*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
2 Total impervious area draining to pervious area (ft^2)			
3 Ratio of pervious area receiving runoff to impervious area			
4 Retention volume achieved from impervious area dispersion (ft^3) *V = Item2 * Item 3 * (0.5/12), assuming retention of 0.5 inches of runoff*			
5 Sum of retention volume achieved from impervious area dispersion (ft^3):		$V_{retention}$ *=Sum of Item 4 for all BMPs*	
6 Implementation of Localized On-lot Infiltration BMPs (e.g. on-lot rain gardens): Yes ☐ No ☒ *If yes, complete Items 7-13 for aggregate of all on-lot infiltration BMP in each DA; If no, proceed to Item 14*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
7 Ponding surface area (ft^2)			
8 Ponding depth (ft) (min. 0.5 ft.)			
9 Surface area of amended soil/gravel (ft^2)			
10 Average depth of amended soil/gravel (ft) (min. 1 ft.)			
11 Average porosity of amended soil/gravel			
12 Retention volume achieved from on-lot infiltration (ft^3) $V_{retention}$ *= (Item 7 *Item 8) + (Item 9 * Item 10 * Item 11)*			

13 Runoff volume retention from on-lot infiltration (ft^3):	*$V_{retention}$ =Sum of Item 12 for all BMPs*

Form 4.3-2 cont. Site Design BMPs (DA 1)

14 Implementation of Street Trees: Yes ☐ No ☒ *If yes, complete Items 14-18. If no, proceed to Item 19*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
15 Number of Street Trees			
16 Average canopy cover over impervious area (ft^2)			
17 Runoff volume retention from street trees (ft^3) *$V_{retention}$ = Item 15 * Item 16 * (0.05/12) assume runoff retention of 0.05 inches*			
18 Runoff volume retention from street tree BMPs (ft^3):	*$V_{retention}$ = Sum of Item 17 for all BMPs*		
19 Total Retention Volume from Site Design BMPs:	*Sum of Items 5, 13 and 18*		

4.3.3 Infiltration BMPs

Use Form 4.3-3 to compute on-site retention of runoff from proposed retention and infiltration BMPs. Volume retention estimates are sensitive to the percolation rate used, which determines the amount of runoff that can be infiltrated within the specified drawdown time. The infiltration safety factor reduces field measured percolation to account for potential inaccuracy associated with field measurements, declining BMP performance over time, and compaction during construction. Appendix C of the TGD for WQMP provides guidance on estimating an appropriate safety factor to use in Form 4.3-3.

If site constraints limit the use of BMPs to a single type and implementation of retention and infiltration BMPs mitigate no more than 40% of the DCV, then they are considered infeasible and the Project Proponent may evaluate the effectiveness of BMPs lower in the LID hierarchy of use (Section 5.5 of the TGD for WQMP)

If implementation of infiltrations BMPs is feasible as determined using Form 4.3-1, then LID infiltration BMPs shall be implemented to the MEP (section 4.1 of the TGD for WQMP).

4.3.3.1 Allowed Variations for Special Site Conditions

The bioretention system design parameters of this Section may be adjusted for the following special site conditions:

1) Facilities located within 10 feet of structures or other potential geotechnical hazards established by the geotechnical expert for the project may incorporate an impervious cutoff wall between the bioretention facility and the structure or other geotechnical hazard.

2) Facilities with documented high concentrations of pollutants in underlying soil or groundwater, facilities located where infiltration could contribute to a geotechnical hazard, and facilities located on elevated plazas or other structures may incorporate an impervious liner and may locate the underdrain discharge at the bottom of the subsurface drainage/storage layer (this configuration is commonly known as a “flow-through planter”).

3) Facilities located in areas of high groundwater, highly infiltrative soils or where connection of underdrain to a surface drain or to a subsurface storm drain are infeasible, may omit the underdrain.

4) Facilities serving high-risk areas such as fueling stations, truck stops, auto repairs, and heavy industrial sites may be required to provide adequate pretreatment to address pollutants of concern unless these high-risk areas are isolated from storm water runoff or bioretention areas with no chance of spill migration.

Form 4.3-3 Infiltration LID BMP - including underground BMPs (DA 1)

1 Remaining LID DCV not met by site design BMP (ft^3): 101,718 *V_{unmet} = Form 4.2-1 Item 7 - Form 4.3-2 Item19*

BMP Type *Use columns to the right to compute runoff volume retention from proposed infiltration BMP (select BMP from Table 5-4 in TGD for WQMP) - Use additional forms for more BMPs*	DA 1 DMA ABC BMP Type Underground CMP	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
2 Infiltration rate of underlying soils (in/hr) *See Section 5.4.2 and Appendix C of the TGD for WQMP for minimum requirements for assessment methods*	7.8		
3 Infiltration safety factor *See TGD Section 5.4.2 and Appendix D*	2		
4 Design percolation rate (in/hr) *P_{design} = Item 2 / Item 3*	3.90		
5 Ponded water drawdown time (hr) *Copy Item 6 in Form 4.2-1*	48		
6 Maximum ponding depth (ft) *BMP specific, see Table 5-4 of the TGD for WQMP for BMP design details*	12		
7 Ponding Depth (ft) *d_{BMP} = Minimum of (1/12*Item 4*Item 5) or Item 6*	12		
8 Infiltrating surface area, SA_{BMP} (ft^2) *the lesser of the area needed for infiltration of full DCV or minimum space requirements from Table 5.7 of the TGD for WQMP*	81,444		
9 Amended soil depth, d_{media} (ft) *Only included in certain BMP types, see Table 5-4 in the TGD for WQMP for reference to BMP design details*	N/A		
10 Amended soil porosity	N/A		
11 Gravel depth, d_{media} (ft) *Only included in certain BMP types, see Table 5-4 of the TGD for WQMP for BMP design details*	0.5		
12 Gravel porosity	0.40		
13 Duration of storm as basin is filling (hrs) *Typical ~ 3hrs*	N/A		
14 Above Ground Retention Volume (ft^3) *$V_{retention}$ = Item 8 * [Item7 + (Item 9 * Item 10) + (Item 11 * Item 12) + (Item 13 * (Item 4 / 12))]*	N/A		
15 Underground Retention Volume (ft^3) *Volume determined using manufacturer's specifications and calculations*	825,511		

16 Total Retention Volume from LID Infiltration BMPs: 825,511 *(Sum of Items 14 and 15 for all infiltration BMP included in plan)*

17 Fraction of DCV achieved with infiltration BMP: 812% *Retention% = Item 16 / Form 4.2-1 Item 7*

18 Is full LID DCV retained onsite with combination of hydrologic source control and LID retention/infiltration BMPs? Yes ☒ No ☐

If yes, demonstrate conformance using Form 4.3-10; If no, then reduce Item 3, Factor of Safety to 2.0 and increase Item 8, Infiltrating Surface Area, such that the portion of the site area used for retention and infiltration BMPs equals or exceeds the minimum effective area thresholds (Table 5-7 of the TGD for WQMP) for the applicable category of development and repeat all above calculations.

4.3.4 Biotreatment BMP

Biotreatment BMPs may be considered if the full LID DCV cannot be met by maximizing retention and infiltration. A key consideration when using biotreatment BMP is the effectiveness of the proposed BMP in addressing the pollutants of concern for the project (see Table 5-5 of the TGD for WQMP).

Use Form 4.3-4 to summarize the potential for volume based and/or flow based biotreatment options to biotreat the remaining unmet LID DCV. Biotreatment computations are included as follows:

- Use Form 4.3-5 to compute biotreatment in small volume based biotreatment BMP (e.g. bioretention w/underdrains);
- Use Form 4.3-6 to compute biotreatment in large volume based biotreatment BMP (e.g. constructed wetlands);
- Use Form 4.3-7 to compute sizing criteria for flow-based biotreatment BMP (e.g. bioswales)

Form 4.3-4 Selection and Evaluation of Biotreatment BMP (DA 1)

1 Remaining LID DCV not met by site design , or infiltration, BMP for potential biotreatment (ft^3): *Form 4.2-1 Item 7 - Form 4.3-2 Item 19 – Form 4.3-3 Item 16*	List pollutants of concern *Copy from Form 2.3-1.*	
2 Biotreatment BMP Selected *(Select biotreatment BMP(s) necessary to ensure all pollutants of concern are addressed through Unit Operations and Processes, described in Table 5-5 of the TGD for WQMP)*	Volume-based biotreatment *Use Forms 4.3-5 and 4.3-6 to compute treated volume*	Flow-based biotreatment *Use Form 4.3-7 to compute treated flow*
	☐ Bioretention with underdrain ☐ Planter box with underdrain ☐ Constructed wetlands ☐ Wet extended detention ☐ Dry extended detention	☐ Vegetated swale ☐ Vegetated filter strip ☐ Proprietary biotreatment
3 Volume biotreated in volume based biotreatment BMP (ft^3): *Form 4.3-5 Item 15 + Form 4.3-6 Item 13*	**4** Compute remaining LID DCV with implementation of volume based biotreatment BMP (ft^3): *Item 1 – Item 3*	**5** Remaining fraction of LID DCV for sizing flow based biotreatment BMP: % *Item 4 / Item 1*
6 Flow-based biotreatment BMP capacity provided (cfs): *Use Figure 5-2 of the TGD for WQMP to determine flow capacity required to provide biotreatment of remaining percentage of unmet LID DCV (Item 5), for the project's precipitation zone (Form 3-1 Item 1)*		
7 Metrics for MEP determination: • Provided a WQMP with the portion of site area used for suite of LID BMP equal to minimum thresholds in Table 5-7 of the TGD for WQMP for the proposed category of development: ☐ *If maximized on-site retention BMPs is feasible for partial capture, then LID BMP implementation must be optimized to retain and infiltrate the maximum portion of the DCV possible within the prescribed minimum effective area. The remaining portion of the DCV shall then be mitigated using biotreatment BMP.*		

4.3.5 Conformance Summary

Complete Form 4.3-8 to demonstrate how on-site LID DCV is met with proposed site design, infiltration, and/or biotreatment BMP. The bottom line of the form is used to describe the basis for infeasibility determination for on-site LID BMP to achieve full LID DCV, and provides methods for computing remaining volume to be addressed in an alternative compliance plan. If the project has more than one outlet, then complete additional versions of this form for each outlet.

Form 4.3-8 Conformance Summary and Alternative Compliance Volume Estimate (DA 1)

1 Total LID DCV for the Project DA-1 (ft^3): 101,718 *Copy Item 7 in Form 4.2-1*

2 On-site retention with site design BMP (ft^3): 0 *Copy Item18 in Form 4.3-2*

3 On-site retention with LID infiltration BMP (ft^3): 825,511 *Copy Item 16 in Form 4.3-3*

4 On-site biotreatment with volume based biotreatment BMP (ft^3): 0 *Copy Item 3 in Form 4.3-4*

5 Flow capacity provided by flow based biotreatment BMP (cfs): 0 *Copy Item 6 in Form 4.3-4*

6 LID BMP performance criteria are achieved if answer to any of the following is "Yes":

- Full retention of LID DCV with site design or infiltration BMP: Yes ☒ No ☐
  If yes, sum of Items 2, 3, and 4 is greater than Item 1
- Combination of on-site retention BMPs for a portion of the LID DCV and volume-based biotreatment BMP that address all pollutants of concern for the remaining LID DCV: Yes ☐ No ☒
  If yes, a) sum of Items 2, 3, 4, and 5 is greater than Item 1, and Items 2, 3 and 4 are maximized; or b) Item 6 is greater than Form 4.3--5 Item 6 and Items 2, 3 and 4 are maximized
- On-site retention and infiltration is determined to be infeasible; therefore biotreatment BMP provides biotreatment for all pollutants of concern for full LID DCV: Yes ☐ No ☒
  If yes, Form 4.3-1 Items 7 and 8 were both checked yes

7 If the LID DCV is not achieved by any of these means, then the project may be allowed to develop an alternative compliance plan. Check box that describes the scenario which caused the need for alternative compliance:

- Combination of Site Design, retention and infiltration, , and biotreatment BMPs provide less than full LID DCV capture: ☐
  Checked yes if Form 4.3-4 Item 7is checked yes, Form 4.3-4 Item 6 is zero, and sum of Items 2, 3, 4, and 5 is less than Item 1. If so, apply water quality credits and calculate volume for alternative compliance, V_{alt} *= (Item 1 – Item 2 – Item 3 – Item 4 – Item 5) * (100 - Form 2.4-1 Item 2)%*

- Facilities, or a combination of facilities, of a different design than in Section E.12.e.(ii)(f) may be permitted if all of the following Phase II Small MS4 General Permit 2013-0001-DWQ 55 February 5, 2013 measures of equivalent effectiveness are demonstrated:
  1) Equal or greater amount of runoff infiltrated or evapotranspired; ☐
  2) Equal or lower pollutant concentrations in runoff that is discharged after biotreatment; ☐
  3) Equal or greater protection against shock loadings and spills; ☐
  4) Equal or greater accessibility and ease of inspection and maintenance. ☐

4.3.6 Hydromodification Control BMP

Use Form 4.3-9 to compute the remaining runoff volume retention, after Site Design BMPs are implemented, needed to address hydromodification, and the increase in time of concentration and decrease in peak runoff necessary to meet targets for protection of waterbodies with a potential hydromodification. Describe the proposed hydromodification treatment control BMP. Section 5.6 of the TGD for WQMP provides additional details on selection and evaluation of hydromodification control BMP.

Form 4.3-9 Hydromodification Control BMPs (DA 1)

1 Volume reduction needed for hydromodification performance criteria (ft^3): 276,851 *(Form 4.2-2 Item 4 * 0.95) – Form 4.2-2 Item 1*	**2** On-site retention with site design and infiltration, BMP (ft^3): 825,511 *Sum of Form 4.3-8 Items 2, 3, and 4. Evaluate option to increase implementation of on-site retention in Forms 4.3-2, 4.3-3, and 4.3-4 in excess of LID DCV toward achieving hydromodification volume reduction*
3 Remaining volume for hydromodification volume capture (ft^3): 0 *Item 1 – Item 2*	**4** Volume capture provided by incorporating additional on-site BMPs (ft^3): N/A

5 Is Form 4.2-2 Item 11 less than or equal to 5%: Yes ☐ No ☒

If yes, hydromodification performance criteria is achieved. If no, select one or more mitigation options below:

- Demonstrate increase in time of concentration achieved by proposed LID site design, LID BMP, and additional on-site BMP ☒
- Increase time of concentration by preserving pre-developed flow path and/or increase travel time by reducing slope and increasing cross-sectional area and roughness for proposed on-site conveyance facilities ☐

6 Form 4.2-2 Item 12 less than or equal to 5%: Yes ☐ No ☒

If yes, hydromodification performance criteria is achieved. If no, select one or more mitigation options below:

- Demonstrate reduction in peak runoff achieved by proposed LID site design, LID BMPs, and additional on-site retention BMPs ☒

Since there was no remaining volume necessary for HCOC mitigation, additional on-site BMPs are not necessary for this project. Basin design and analysis has been implemented to show the decrease in the peak runoff and increase in the time of concentration. The table on the following page provides a summary of the volumes, time of concentration, and peak runoff after taking into account the BMPs. See Section 6.5 for calculations and basin analysis for the 10-year storm.

HCOC Calculation Summary Table			
	10-Year Time of Concentration (Min)	10-Year Peak Runoff (cfs)	10-Year, 24-Hour Runoff Volume (CF)
Pre-Development Condition	18.19	40.21	173,526
Post-Development Condition without BMPs	14.11	80.15	474,081
HCOC Requirement *0.95*(Post-Development) – Pre-Development*	3.17 (Additional time that must be provided)	35.93 (Runoff reduction)	276,851 (Required Retention)
Notes	The basin retains the entire water quality volume before releasing runoff offsite.	To comply with HCOC requirements, the allowable flow rate for a 10-year storm is (change) 80.15 - 40.21 = 35.93 cfs	To comply with HCOC requirements, 276,851 CF will need to be retained onsite. The proposed BMPs will retain a total of 825,511 CF prior to discharging excess runoff.

4.4 Alternative Compliance Plan (if applicable)

Describe an alternative compliance plan (if applicable) for projects not fully able to infiltrate, or biotreat the DCV via on-site LID practices. A project proponent must develop an alternative compliance plan to address the remainder of the LID DCV. Depending on project type some projects may qualify for water quality credits that can be applied to reduce the DCV that must be treated prior to development of an alternative compliance plan (see Form 2.4-1, Water Quality Credits). Form 4.3-9 Item 8 includes instructions on how to apply water quality credits when computing the DCV that must be met through alternative compliance.

Alternative Designs — Facilities, or a combination of facilities, of a different design than in Permit Section E.12.e.(ii)(f) may be permitted if all of the following measures of equivalent effectiveness are demonstrated:

1) Equal or greater amount of runoff infiltrated or evapotranspired;

2) Equal or lower pollutant concentrations in runoff that is discharged after biotreatment;

3) Equal or greater protection against shock loadings and spills;

4) Equal or greater accessibility and ease of inspection and maintenance.

The Project Proponent will need to obtain written approval for an alternative design from the Lahontan Regional Water Board Executive Officer (see Section 6 of the TGD for WQMP).

Section 5 Inspection and Maintenance Responsibility for Post Construction BMP

All BMPs included as part of the project WQMP are required to be maintained through regular scheduled inspection and maintenance (refer to Section 8, Post Construction BMP Requirements, in the TGD for WQMP). Fully complete Form 5-1 summarizing all BMP included in the WQMP. Attach additional forms as needed. The WQMP shall also include a detailed Operation and Maintenance Plan for all BMP and a Maintenance Agreement. The Maintenance Agreement must also be attached to the WQMP.

Note that at time of Project construction completion, the Maintenance Agreement must be completed, signed, notarized and submitted to the County Stormwater Department

Form 5-1 BMP Inspection and Maintenance (use additional forms as necessary)

BMP	Reponsible Party(s)	Inspection/ Maintenance Activities Required	Minimum Frequency of Activities
Onsite storm drain catch basins and piping	Property Owner	Onsite catch basins shall be inspected quarterly for debris buildup and evidence of illegal dumping and shall be cleaned whenever debris/sediment accumulates. Removal can be accomplished by vac-truck or other equally effective method.	Quarterly
Hydrodynamic Separator	Property Owner	Visual inspection and debris removed quarterly per manufactures recommendations	Quarterly
Underground Infiltration System	Property Owner	Regular inspections of system to observe sediment build up and infiltration capacity. Cleaning of accumulated trash, debris, and sediment as determined by inspections. Cleaning is recommended during dry weather. See manufacturer recommendations for additional maintenance activities.	Monthly and within 48 hours following a significant storm event to verify there is no standing water in the chambers.
Landscape Maintenance	Property Owner	Maintain landscape area vegetation, slope protection and grades, adjacent to hardscape and prevent discharges of landscape maintenance waste into storm drains.	Weekly
Litter Control	Property Owner	Maintain roofed waste collection areas and vacuum-sweep drive aisles and parking areas to remove potential stormwater contamination	Weekly/Monthly

		before anticipated storm events.	
Anti-Dumping Stenciling & Signage	Property Owner	Visual inspection and replacement of damaged or illegible stenciling and signage over on-site catch basins	Annually
Irrigation System	Property Owner	Check and repair the irrigation system. Verify there are no leaks or runoff from landscaped areas. Adjust irrigation heads and system run times as necessary to percent overwater of vegetation, overspray or run-off from landscape areas and to ensure the health and aesthetic quality of the landscape.	Weekly
Loading Docks	Property Owner	Sweep and clear debris from dock areas to remove potential stormwater contaminates prior to anticipated storms.	Weekly
Catch Basin Filter Inserts	Property Owner	Visual inspect filter for debris buildup. Removal can be accomplished by vac-truck or other equally effective method. See manufacturer recommendations for additional maintenance activities.	Quarterly and within 48 hours following a significant storm event

Section 6 WQMP Attachments

6.1. Site Plan and Drainage Plan

Include a site plan and drainage plan sheet set containing the following minimum information:

- Project location
- Site boundary
- Land uses and land covers, as applicable
- Suitability/feasibility constraints
- Structural Source Control BMP locations
- Site Design Hydrologic Source Control BMP locations
- LID BMP details
- Drainage delineations and flow information
- Drainage connections

6.2 Electronic Data Submittal

Minimum requirements include submittal of PDF exhibits in addition to hard copies. Format must not require specialized software to open. If the local jurisdiction requires specialized electronic document formats (as described in their Local Implementation Plan), this section will describe the contents (e.g., layering, nomenclature, geo-referencing, etc.) of these documents so that they may be interpreted efficiently and accurately.

6.3 Post Construction

Attach all O&M Plans and Maintenance Agreements for BMP to the WQMP.

6.4 Other Supporting Documentation

- BMP Educational Materials
- Activity Restriction – C,C&R's & Lease Agreements

SECTION 6.1: ATTACHMENT A

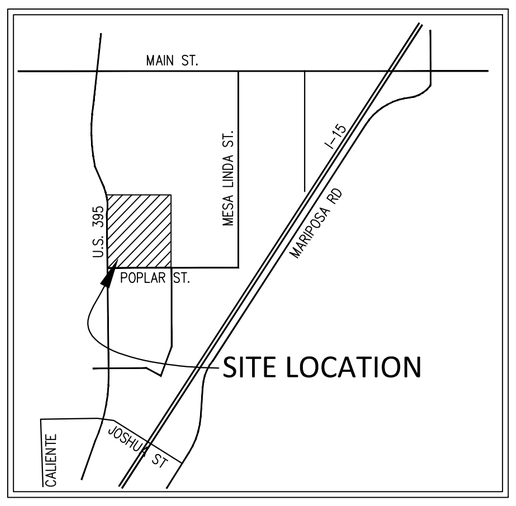
Project Site Boundary
Pre-Development Condition PWQMP Exhibit
Post-Development Condition PWQMP Exhibit

CITY OF HESPERIA

PWQMP EXHIBIT

FOR

I-15 INDUSTRIAL PARK BUILDING 2



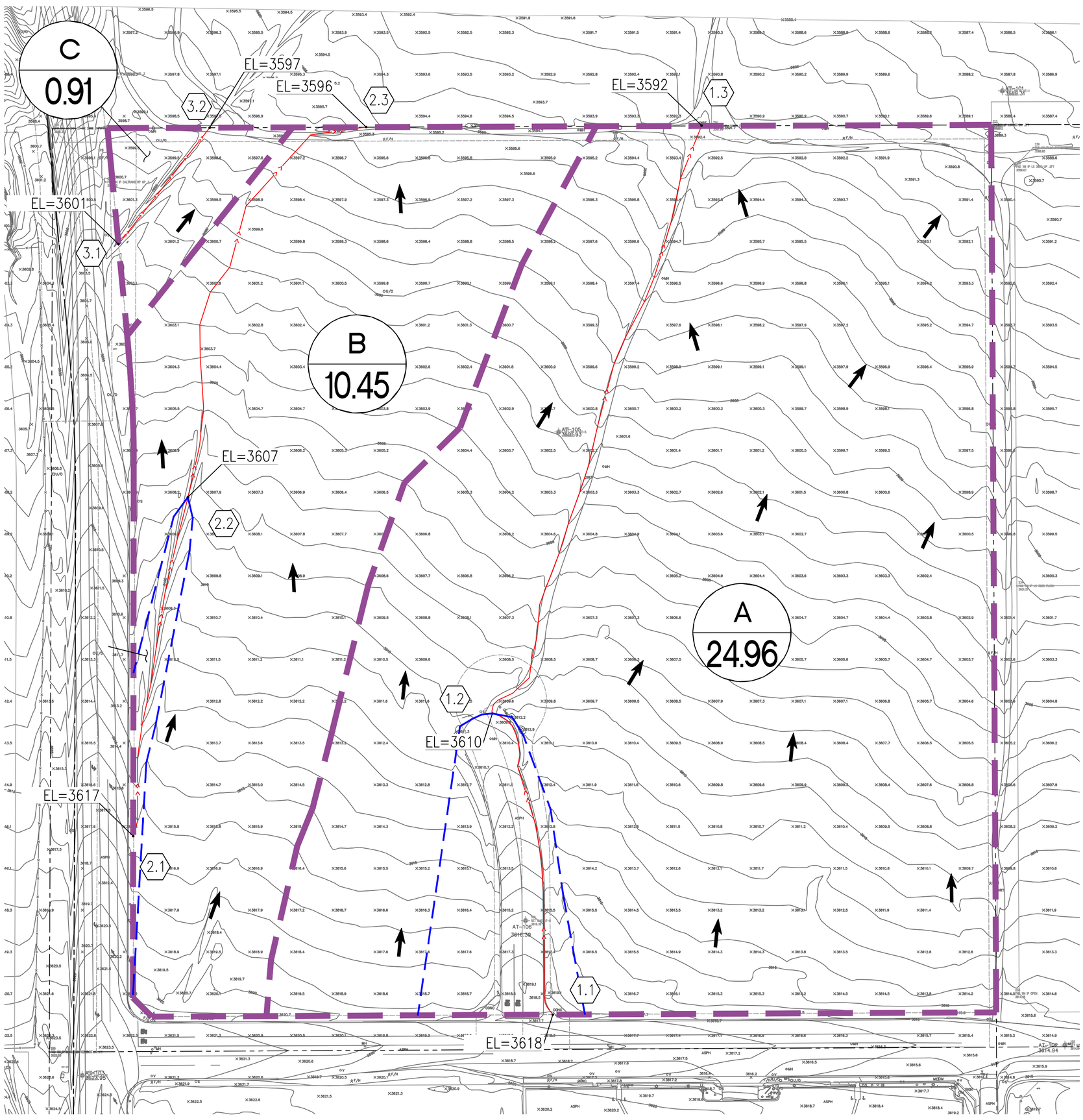
VICINITY MAP

NOT TO SCALE

HYDROLOGY INFORMATION

SITE AREA:	36.32 ACRE	
SOIL GROUP:	A	(NRCS WEB SOIL SURVEY)
IMPERVIOUS:	0%	
ISOHYETALS:	1.32"	(100-YEAR 1 HOUR)
	0.793"	(10-YEAR 1 HOUR)
CN NUMBER:	67	(SOIL GROUP A)
FREQUENCY:	100 YEAR	
	10 YEAR	

METHOD: SAN BERNARDINO COUNTY HYDROLOGY MANUAL



LEGEND:

- SUB DRAINAGE AREA BOUNDARY
- DRAINAGE AREA BOUNDARY
- FLOW PATH
- PROPOSED FLOW DIRECTION ARROW
- X / XXX — DRAINAGE AREA DESIGNATION / AREA (AC)

HYDROLOGY SUMMARY

DRAINAGE AREA No.	TRIBUTARY AREA (AC)	IMPERVIOUS RATIO	10-YEAR VOLUME (CF)	100-YEAR VOLUME (CF)	25-YEAR PEAK FLOW (CFS)
A	24.96	0.00	173,526	738,233	40.52
B	10.45	0.00			16.70
C	0.91	0.00			2.40
TOTAL	36.32	0.00			59.61

100' 0' 50' 100'

SCALE: 1" = 100'

PREPARED BY:

WestLAND Group, Inc. Land Surveyors • Civil Engineers • GIS

4150 CONCOURS, ONTARIO, CA 91764

PHONE: (909) 989-9789 FAX: (909) 989-9660

JOB NO: 2020-326

I-15 INDUSTRIAL PARK BUILDING 2

PRE-DEVELOPMENT PWQMP EXHIBIT

CITY OF HESPERIA

DATE: FEB 2021

SHEET 1 OF 1

PLOTTED: 2020\2020-281 HESPERIA COMMERCE CENTER 4 - CONNTION GROUP, INC. - MARK MILAKOVICH\04 ENGINEERING\LD\REPORTS\PWQMP\1_EXHIBITS\2020-281_PWQMP_PREDEVELOPED1.DWG (03-11-21 9:51:32AM)
Plotted by: marcus.gabovenier

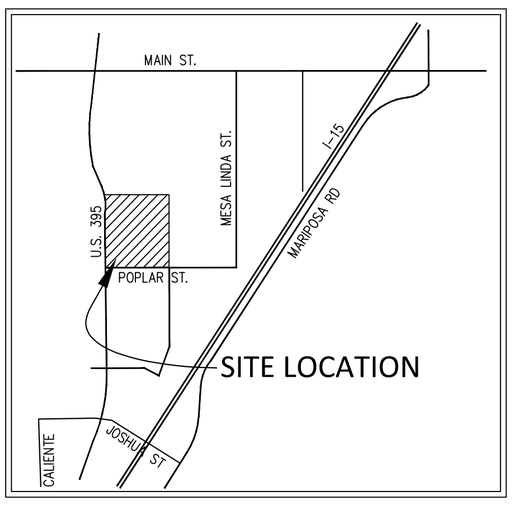
03/11/2021

CITY OF HESPERIA

PWQMP EXHIBIT

FOR

I-15 INDUSTRIAL PARK BUILDING 2



VICINITY MAP
NOT TO SCALE

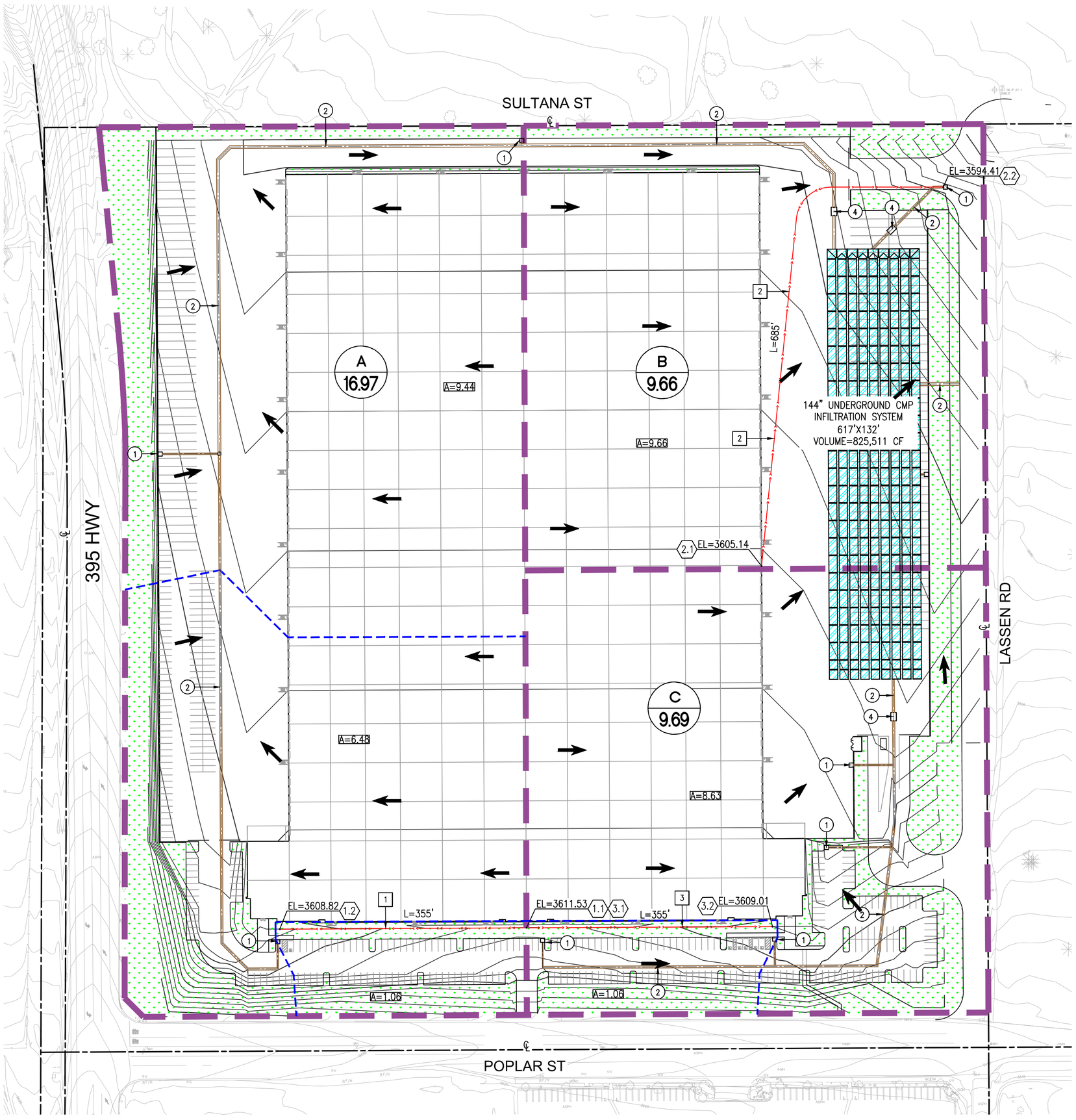
HYDROLOGY INFORMATION

SITE AREA:	36.32 ACRE	
SOIL GROUP:	A	(NRCS WEB SOIL SURVEY)
IMPERVIOUS:	88%	
ISOHYETALS:	1.32"	(100-YEAR 1 HOUR)
	0.793"	(10-YEAR 1 HOUR)
CN NUMBER:	32	(SOIL GROUP A)
FREQUENCY:	100 YEAR	
	10 YEAR	

METHOD: SAN BERNARDINO COUNTY HYDROLOGY MANUAL

LEGEND:

- DETENTION BASIN
- SUB DRAINAGE AREA BOUNDARY
- DRAINAGE AREA BOUNDARY
- FLOW PATH
- STORM DRAIN
- PROPOSED FLOW DIRECTION ARROW
- X / X.XX — DRAINAGE AREA DESIGNATION / AREA (AC)



DRAINAGE NOTES:

1. PROPOSED CATCH BASIN WITH FILTER INSERT
2. PROPOSED STORM DRAIN PIPE PRIVATE MAINTAINED
3. PROPOSED BMP – UNDERGROUND DETENTION BASIN
4. PROPOSED BMP – BAFFLE BOX

HYDROLOGY SUMMARY

DRAINAGE AREA No.	TRIBUTARY AREA (AC)	IMPERVIOUS RATIO	RUNOFF COEFFICIENT	DCV (CF)	HYDROMODIFICATION VOLUME TO RETAIN (CF)	100-YEAR VOLUME (CF)	TOTAL RETENTION VOLUME (CF)
A	16.97	0.84	0.64	–	276,851	825,488	825,511 (UNDERGROUND 144" CMP)
B	9.66	0.94	0.79	–			
C	9.69	0.85	0.67	–			
TOTAL	36.32	0.88	0.69	101,718			

100' 0' 50' 100'
SCALE: 1" = 100'

PREPARED BY:
WestLAND Group, Inc. Land Surveyors • Civil Engineers • GIS
4150 CONCOURS, ONTARIO, CA 91764
PHONE: (909) 989-9789 FAX: (909) 989-9660
JOB NO: 2020-281

I-15 INDUSTRIAL PARK BUILDING 2
POST-DEVELOPED PWQMP EXHIBIT
CITY OF HESPERIA

DATE: MAR 2022
SHEET 1 OF 1

D:\USER_2020\2020-281 HESPERIA COMMERCE CENTER 4 - CONNTON GROUP, INC. - MARK MEANOR\CAD\04 ENGINEERING\LD\REPORTS\PWQMP\LI_EXHIBITS\2020-281_PWQMP_POSTDEVELOPED.DWG (03-10-22 8:16:37PM)
Plotted by: tomh/tlee
03/10/2022

SECTION 6.2

CD
(Prepared in Final Engineering)

SECTION 6.3

O&M Plans
Maintenance Agreements for BMP
(Prepared in Final Engineering)

SECTION 6.4: ATTACHMENT A

Education Materials
(Prepared in Final Engineering)

SECTION 6.4: ATTACHMENT B

Preliminary WQMP
(Prepared in Final Engineering)

SECTION 6.4: ATTACHMENT C

Geotechnical Report
(Prepared in Final Engineering)

SECTION 6.5: Calculations

Precipitation Data
Hydrologic Soil Map
10-Year Rational Method
10-Year Unit Hydrograph Method
10-Year Basin Analysis

SECTION 6.5: Attachment A

Precipitation Data
Hydrologic Soil Map

NOAA Atlas 14, Volume 6, Version 2
Location name: Hesperia, California, USA*
Latitude: 34.4176°, Longitude: -117.3971°
Elevation: m/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	0.088 (0.073-0.107)	0.125 (0.103-0.152)	0.173 (0.143-0.212)	0.213 (0.175-0.264)	0.269 (0.212-0.343)	0.312 (0.241-0.407)	0.356 (0.269-0.476)	0.403 (0.296-0.554)	0.467 (0.329-0.669)	0.517 (0.352-0.768)
10-min	0.126 (0.104-0.154)	0.179 (0.148-0.218)	0.248 (0.205-0.304)	0.306 (0.250-0.378)	0.385 (0.305-0.492)	0.447 (0.346-0.583)	0.511 (0.386-0.683)	0.577 (0.424-0.794)	0.669 (0.471-0.959)	0.741 (0.505-1.10)
15-min	0.152 (0.126-0.186)	0.216 (0.179-0.264)	0.300 (0.248-0.368)	0.370 (0.302-0.457)	0.466 (0.368-0.595)	0.541 (0.419-0.705)	0.618 (0.467-0.826)	0.698 (0.513-0.960)	0.809 (0.570-1.16)	0.897 (0.610-1.33)
30-min	0.230 (0.190-0.280)	0.326 (0.269-0.398)	0.453 (0.374-0.555)	0.558 (0.456-0.689)	0.703 (0.556-0.897)	0.815 (0.631-1.06)	0.932 (0.704-1.25)	1.05 (0.773-1.45)	1.22 (0.860-1.75)	1.35 (0.921-2.01)
60-min	0.326 (0.270-0.398)	0.463 (0.383-0.566)	0.644 (0.531-0.789)	0.793 (0.648-0.979)	0.998 (0.789-1.27)	1.16 (0.897-1.51)	1.32 (1.00-1.77)	1.50 (1.10-2.06)	1.73 (1.22-2.49)	1.92 (1.31-2.85)
2-hr	0.480 (0.397-0.585)	0.651 (0.538-0.795)	0.882 (0.727-1.08)	1.08 (0.879-1.33)	1.35 (1.07-1.72)	1.56 (1.21-2.04)	1.79 (1.35-2.39)	2.03 (1.49-2.79)	2.36 (1.66-3.38)	2.63 (1.79-3.90)
3-hr	0.606 (0.501-0.739)	0.810 (0.669-0.989)	1.09 (0.896-1.33)	1.32 (1.08-1.63)	1.65 (1.31-2.11)	1.92 (1.48-2.50)	2.20 (1.66-2.94)	2.49 (1.83-3.43)	2.92 (2.05-4.18)	3.26 (2.22-4.84)
6-hr	0.864 (0.715-1.06)	1.15 (0.947-1.40)	1.53 (1.26-1.87)	1.86 (1.52-2.30)	2.33 (1.84-2.97)	2.71 (2.09-3.53)	3.11 (2.35-4.16)	3.54 (2.60-4.87)	4.17 (2.94-5.97)	4.68 (3.19-6.95)
12-hr	1.13 (0.937-1.38)	1.54 (1.27-1.88)	2.09 (1.73-2.56)	2.56 (2.10-3.17)	3.24 (2.56-4.14)	3.78 (2.93-4.94)	4.36 (3.30-5.83)	4.99 (3.67-6.86)	5.89 (4.15-8.44)	6.63 (4.51-9.84)
24-hr	1.54 (1.36-1.77)	2.15 (1.90-2.48)	2.99 (2.64-3.46)	3.71 (3.25-4.32)	4.72 (4.00-5.69)	5.55 (4.60-6.82)	6.42 (5.20-8.09)	7.36 (5.80-9.53)	8.71 (6.58-11.8)	9.81 (7.17-13.7)
2-day	1.78 (1.58-2.05)	2.49 (2.21-2.87)	3.48 (3.08-4.03)	4.33 (3.80-5.05)	5.56 (4.71-6.70)	6.57 (5.45-8.07)	7.64 (6.19-9.63)	8.81 (6.94-11.4)	10.5 (7.94-14.2)	11.9 (8.70-16.6)
3-day	1.91 (1.69-2.20)	2.67 (2.37-3.08)	3.74 (3.30-4.32)	4.66 (4.09-5.44)	6.01 (5.09-7.24)	7.12 (5.91-8.75)	8.31 (6.73-10.5)	9.61 (7.57-12.5)	11.5 (8.70-15.5)	13.1 (9.57-18.3)
4-day	2.06 (1.82-2.37)	2.88 (2.55-3.33)	4.04 (3.56-4.67)	5.04 (4.41-5.87)	6.49 (5.50-7.82)	7.70 (6.39-9.47)	9.00 (7.29-11.3)	10.4 (8.21-13.5)	12.5 (9.45-16.9)	14.2 (10.4-19.9)
7-day	2.31 (2.05-2.66)	3.22 (2.85-3.71)	4.48 (3.96-5.18)	5.58 (4.88-6.50)	7.17 (6.08-8.63)	8.48 (7.04-10.4)	9.90 (8.02-12.5)	11.5 (9.02-14.8)	13.7 (10.4-18.5)	15.6 (11.4-21.8)
10-day	2.47 (2.19-2.85)	3.43 (3.04-3.96)	4.77 (4.21-5.51)	5.92 (5.18-6.90)	7.59 (6.43-9.14)	8.97 (7.44-11.0)	10.5 (8.47-13.2)	12.1 (9.52-15.6)	14.4 (10.9-19.5)	16.4 (12.0-22.9)
20-day	2.97 (2.63-3.41)	4.10 (3.63-4.73)	5.68 (5.01-6.56)	7.04 (6.16-8.20)	9.00 (7.62-10.8)	10.6 (8.81-13.0)	12.4 (10.0-15.6)	14.3 (11.2-18.5)	17.0 (12.9-23.0)	19.4 (14.2-27.1)
30-day	3.50 (3.10-4.03)	4.82 (4.26-5.55)	6.63 (5.86-7.66)	8.20 (7.18-9.55)	10.5 (8.86-12.6)	12.3 (10.2-15.1)	14.3 (11.6-18.1)	16.5 (13.0-21.4)	19.8 (15.0-26.7)	22.5 (16.4-31.4)
45-day	4.18 (3.70-4.81)	5.67 (5.02-6.54)	7.74 (6.83-8.94)	9.52 (8.33-11.1)	12.1 (10.2-14.6)	14.2 (11.8-17.5)	16.5 (13.4-20.8)	19.0 (15.0-24.7)	22.8 (17.2-30.7)	25.9 (18.9-36.2)
60-day	4.77 (4.23-5.49)	6.38 (5.65-7.35)	8.59 (7.59-9.93)	10.5 (9.20-12.2)	13.3 (11.2-16.0)	15.5 (12.9-19.1)	18.0 (14.6-22.7)	20.8 (16.4-26.9)	24.9 (18.8-33.6)	28.3 (20.7-39.6)

[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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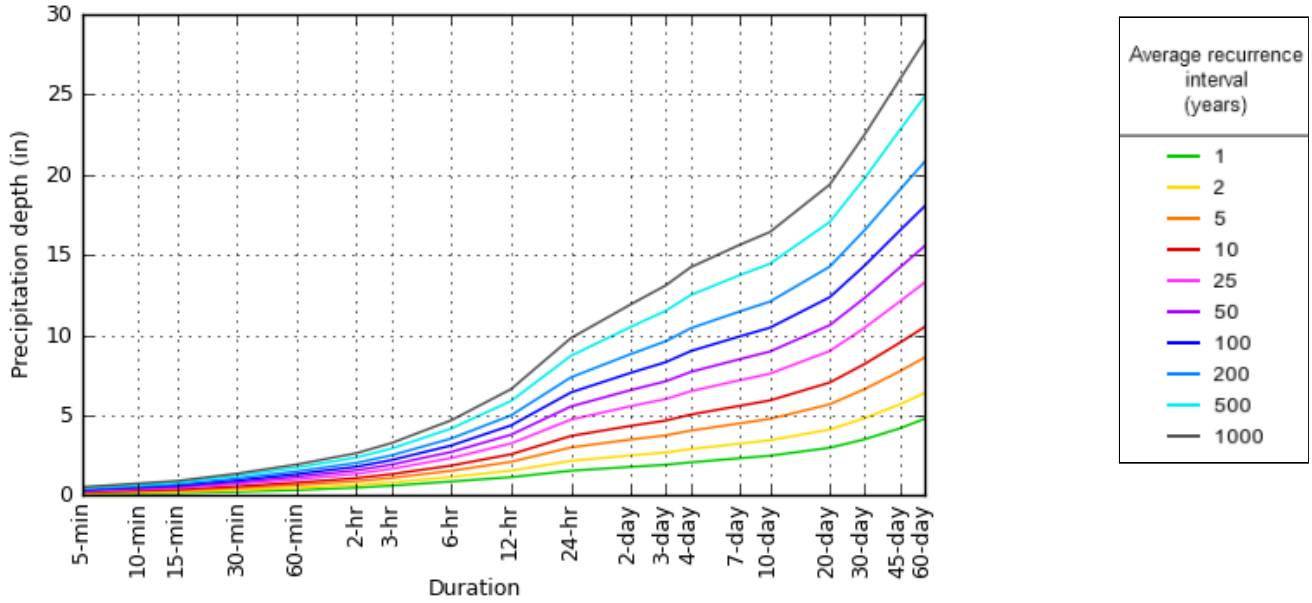
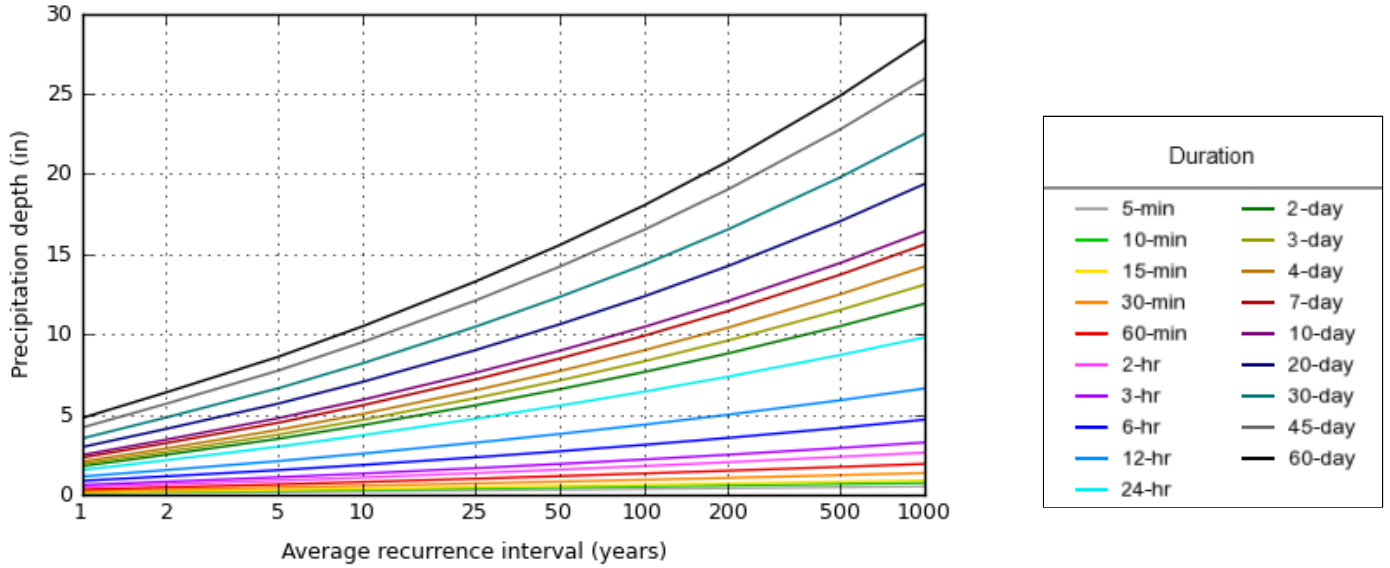
PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 34.4176°, Longitude: -117.3971°





NOAA Atlas 14, Volume 6, Version 2

Created (GMT): Fri Feb 19 15:26:39 2021

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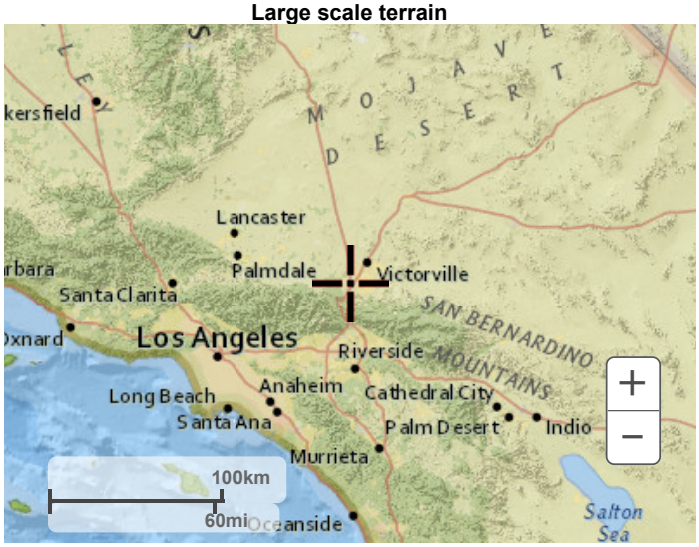
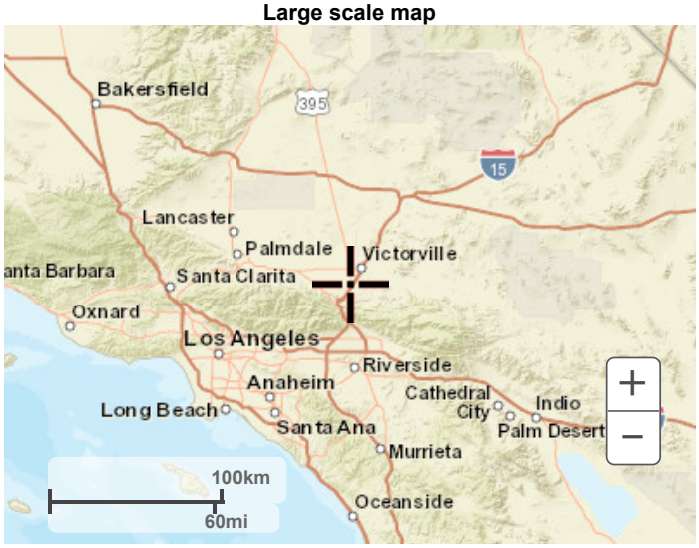
Maps & aerials

Small scale terrain

Large scale terrain



Large scale map



Large scale aerial

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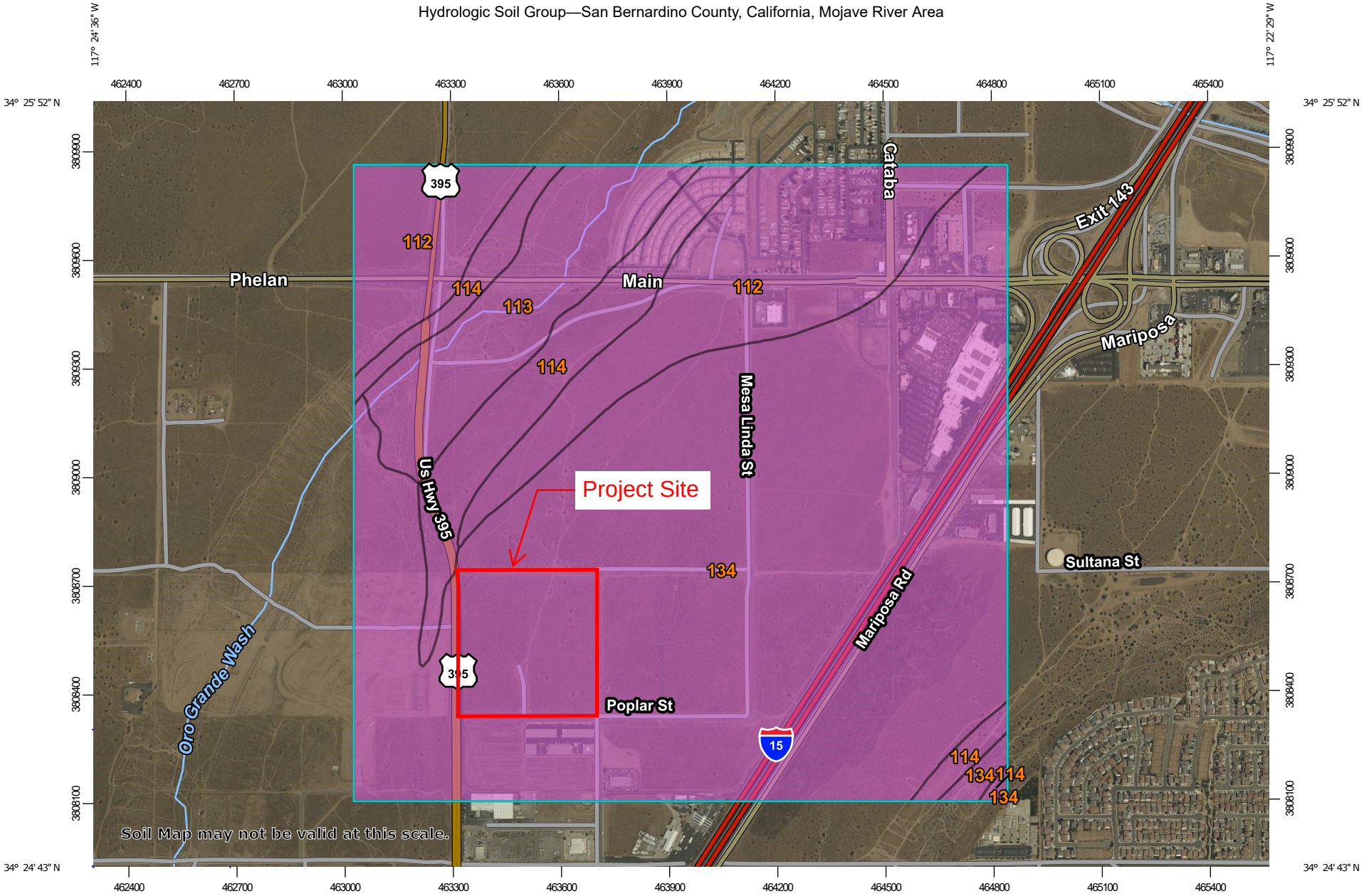
US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer



Map Scale: 1:14,900 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 200 400 800 1200

Feet: 0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: San Bernardino County, California, Mojave River Area
Survey Area Data: Version 12, May 27, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 26, 2019—Jul 8, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
112	CAJON SAND, 0 TO 2 PERCENT SLOPES	A	137.5	17.4%
113	CAJON SAND, 2 TO 9 PERCENT SLOPES	A	65.4	8.3%
114	CAJON SAND, 9 TO 15 PERCENT SLOPES	A	66.7	8.4%
134	HESPERIA LOAMY FINE SAND, 2 TO 5 PERCENT SLOPES	A	521.5	65.9%
Totals for Area of Interest			**791.1**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

SECTION 6.5: Attachment B.1

10-Year Rational Method 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: 02/25/21

HCC IV PRE DEVELOPED CONDITIONS
10 YR SUB AREA A
MGUBBAREINER 2021-02-24

Program License Serial Number 6277

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.793 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 1.100 to Point/Station 1.200
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
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) = 67.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.578(In/Hr)
Initial subarea data:
Initial area flow distance = 460.000(Ft.)
Top (of initial area) elevation = 3618.000(Ft.)
Bottom (of initial area) elevation = 3610.000(Ft.)
Difference in elevation = 8.000(Ft.)
Slope = 0.01739 s(%)= 1.74
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 13.715 min.
Rainfall intensity = 2.228(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.666
Subarea runoff = 2.450(CFS)

```
Total initial stream area =        1.650(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.578(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.200 to Point/Station        1.300
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.261(Ft.), Average velocity =   3.692(Ft/s)
!!Warning: Water is above left or right bank elevations
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              0.10
        2             10.00              0.00
        3             20.00              0.10
Manning's 'N' friction factor =   0.020
------------------------------------------------------------------
Sub-Channel flow  =     15.572(CFS)
  '     '        flow top width =     20.000(Ft.)
  '     '    velocity=    3.692(Ft/s)
  '     '        area =      4.218(Sq.Ft)
  '     '        Froude number =     1.417

Upstream point elevation =  3610.000(Ft.)
Downstream point elevation =  3592.000(Ft.)
Flow length =   915.000(Ft.)
Travel time  =    4.13 min.
Time of concentration =   17.85 min.
Depth of flow =   0.261(Ft.)
Average velocity =   3.692(Ft/s)
Total irregular channel flow =    15.572(CFS)
Irregular channel normal depth above invert elev. =   0.261(Ft.)
Average velocity of channel(s) =   3.692(Ft/s)
!!Warning: Water is above left or right bank elevations
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
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)  = 67.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.578(In/Hr)
Rainfall intensity =      1.853(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.619
Subarea runoff =     26.188(CFS) for   23.310(Ac.)
Total runoff =     28.638(CFS)
```

Effective area this stream = 24.96(Ac.)
Total Study Area (Main Stream No. 1) = 24.96(Ac.)
Area averaged Fm value = 0.578(In/Hr)
Depth of flow = 0.354(Ft.), Average velocity = 4.711(Ft/s)
!!Warning: Water is above left or right bank elevations
End of computations, Total Study Area = 24.96 (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) = 1.000
Area averaged SCS curve number = 67.0

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: 02/25/21

HCC IV PRE DEVELOPED CONDITIONS
10 YR SUB AREA B
MGUBBAREINER 2021-02-24

Program License Serial Number 6277

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.793 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 2.100 to Point/Station 2.200
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
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) = 67.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.578(In/Hr)
Initial subarea data:
Initial area flow distance = 495.000(Ft.)
Top (of initial area) elevation = 3617.000(Ft.)
Bottom (of initial area) elevation = 3607.000(Ft.)
Difference in elevation = 10.000(Ft.)
Slope = 0.02020 s(%)= 2.02
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 13.706 min.
Rainfall intensity = 2.229(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.667
Subarea runoff = 0.565(CFS)

```
Total initial stream area =        0.380(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.578(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.200 to Point/Station        2.300
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
________________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.177(Ft.), Average velocity =   2.437(Ft/s)
!!Warning: Water is above left or right bank elevations
        ******* Irregular Channel Data ***********
------------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              0.10
        2             10.00              0.00
        3             20.00              0.10
Manning's 'N' friction factor =   0.020
------------------------------------------------------------------
Sub-Channel flow  =      6.208(CFS)
  '     '        flow top width =     20.000(Ft.)
  '     '    velocity=    2.437(Ft/s)
  '     '        area =      2.547(Sq.Ft)
  '     '        Froude number =     1.204

Upstream point elevation =  3607.000(Ft.)
Downstream point elevation =  3596.000(Ft.)
Flow length =   655.000(Ft.)
Travel time  =    4.48 min.
Time of concentration =   18.19 min.
Depth of flow =   0.177(Ft.)
Average velocity =   2.437(Ft/s)
Total irregular channel flow =     6.208(CFS)
Irregular channel normal depth above invert elev. =   0.177(Ft.)
Average velocity of channel(s) =   2.437(Ft/s)
!!Warning: Water is above left or right bank elevations
 Adding area flow to channel
UNDEVELOPED (poor cover) subarea
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)  = 67.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.578(In/Hr)
Rainfall intensity =      1.829(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.615
Subarea runoff =     11.196(CFS) for   10.070(Ac.)
Total runoff =     11.761(CFS)
```

Effective area this stream = 10.45(Ac.)
Total Study Area (Main Stream No. 1) = 10.45(Ac.)
Area averaged Fm value = 0.578(In/Hr)
Depth of flow = 0.237(Ft.), Average velocity = 3.147(Ft/s)
!!Warning: Water is above left or right bank elevations
End of computations, Total Study Area = 10.45 (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) = 1.000
Area averaged SCS curve number = 67.0

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: 02/25/21

HCC IV PRE DEVELOPED CONDITIONS
10 YR SUB AREA C
MGUBBAREINER 2021-02-24

Program License Serial Number 6277

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.793 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 3.100 to Point/Station 3.200
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
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) = 67.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.578(In/Hr)
Initial subarea data:
Initial area flow distance = 215.000(Ft.)
Top (of initial area) elevation = 3601.000(Ft.)
Bottom (of initial area) elevation = 3597.000(Ft.)
Difference in elevation = 4.000(Ft.)
Slope = 0.01860 s(%)= 1.86
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 9.982 min.
Rainfall intensity = 2.783(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.713
Subarea runoff = 1.806(CFS)

Total initial stream area = 0.910(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.578(In/Hr)
End of computations, Total Study Area = 0.91 (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) = 1.000
Area averaged SCS curve number = 67.0

SECTION 6.5: Attachment B.2

10-Year Rational Method 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: 02/25/21

HCC IV POST DEVELOPED CONDITION
10 YR SUB AREA A
MGUBBAREINER 2021-02-24

Program License Serial Number 6277

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.793 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 1.100 to Point/Station 1.200
**** 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
Pervious ratio(Ap) = 0.1000 Max loss rate(Fm)= 0.098(In/Hr)
Initial subarea data:
Initial area flow distance = 355.000(Ft.)
Top (of initial area) elevation = 3611.530(Ft.)
Bottom (of initial area) elevation = 3608.820(Ft.)
Difference in elevation = 2.710(Ft.)
Slope = 0.00763 s(%)= 0.76
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 8.441 min.
Rainfall intensity = 3.130(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.872
Subarea runoff = 2.892(CFS)

```
Total initial stream area =        1.060(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.098(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.200 to Point/Station        1.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  3608.820(Ft.)
Downstream point/station elevation =  3603.570(Ft.)
Pipe length  =   660.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.892(CFS)
Nearest computed pipe diameter  =     12.00(In.)
Calculated individual pipe flow  =     2.892(CFS)
Normal flow depth in pipe =    8.99(In.)
Flow top width inside pipe =   10.41(In.)
Critical Depth =    8.75(In.)
Pipe flow velocity =      4.59(Ft/s)
Travel time through pipe =    2.40 min.
Time of concentration (TC) =    10.84 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.200 to Point/Station        1.300
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      1.060(Ac.)
Runoff from this stream =      2.892(CFS)
Time of concentration =   10.84 min.
Rainfall intensity =     2.627(In/Hr)
Area averaged loss rate (Fm) =    0.0978(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.400 to Point/Station        1.300
**** 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
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.098(In/Hr)
Initial subarea data:
Initial area flow distance =   470.000(Ft.)
Top (of initial area) elevation =  3607.510(Ft.)
Bottom (of initial area) elevation =  3603.570(Ft.)
```

```
Difference in elevation =     3.940(Ft.)
Slope =    0.00838  s(%)=       0.84
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    9.269 min.
Rainfall intensity =      2.931(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.870
Subarea runoff =     16.525(CFS)
Total initial stream area =        6.480(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.098(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.400 to Point/Station        1.300
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      6.480(Ac.)
Runoff from this stream =     16.525(CFS)
Time of concentration =    9.27 min.
Rainfall intensity =     2.931(In/Hr)
Area averaged loss rate (Fm) =    0.0978(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      2.89     1.060     10.84    0.098      2.627
2     16.52     6.480      9.27    0.098      2.931
Qmax(1) =
           1.000 *    1.000 *     2.892) +
           0.893 *    1.000 *    16.525) + =      17.642
Qmax(2) =
           1.120 *    0.855 *     2.892) +
           1.000 *    1.000 *    16.525) + =      19.296

Total of 2 streams to confluence:
Flow rates before confluence point:
       2.892      16.525
Maximum flow rates at confluence using above data:
       17.642       19.296
Area of streams before confluence:
        1.060        6.480
Effective area values after confluence:
        7.540        7.386
Results of confluence:
Total flow rate =     19.296(CFS)
Time of concentration =     9.269 min.
Effective stream area after confluence =      7.386(Ac.)
```

```
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.098(In/Hr)
Study area total (this main stream) =       7.54(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.300 to Point/Station        1.500
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  3603.570(Ft.)
Downstream point/station elevation =  3599.010(Ft.)
Pipe length  =  1035.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    19.296(CFS)
Nearest computed pipe diameter  =     27.00(In.)
Calculated individual pipe flow  =    19.296(CFS)
Normal flow depth in pipe =   20.77(In.)
Flow top width inside pipe =   22.76(In.)
Critical Depth =   18.44(In.)
Pipe flow velocity =      5.88(Ft/s)
Travel time through pipe =    2.93 min.
Time of concentration (TC) =    12.20 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.300 to Point/Station        1.500
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      7.386(Ac.)
Runoff from this stream =     19.296(CFS)
Time of concentration =   12.20 min.
Rainfall intensity =     2.418(In/Hr)
Area averaged loss rate (Fm) =    0.0978(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.600 to Point/Station        1.500
**** 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
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.098(In/Hr)
Initial subarea data:
Initial area flow distance =  1000.000(Ft.)
Top (of initial area) elevation =  3605.640(Ft.)
Bottom (of initial area) elevation =  3599.010(Ft.)
```

```
Difference in elevation =     6.630(Ft.)
Slope =    0.00663  s(%)=       0.66
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   13.139 min.
Rainfall intensity =      2.296(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.862
Subarea runoff =     18.676(CFS)
Total initial stream area =        9.440(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.098(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.600 to Point/Station        1.500
**** CONFLUENCE OF MINOR STREAMS ****
________________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      9.440(Ac.)
Runoff from this stream =     18.676(CFS)
Time of concentration =   13.14 min.
Rainfall intensity =     2.296(In/Hr)
Area averaged loss rate (Fm) =    0.0978(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     19.30     7.386     12.20    0.098      2.418
2     18.68     9.440     13.14    0.098      2.296
Qmax(1) =
           1.000 *    1.000 *    19.296) +
           1.055 *    0.929 *    18.676) + =      37.604
Qmax(2) =
           0.948 *    1.000 *    19.296) +
           1.000 *    1.000 *    18.676) + =      36.959

Total of 2 streams to confluence:
Flow rates before confluence point:
      19.296      18.676
Maximum flow rates at confluence using above data:
       37.604       36.959
Area of streams before confluence:
        7.386        9.440
Effective area values after confluence:
       16.154       16.826
Results of confluence:
Total flow rate =     37.604(CFS)
Time of concentration =    12.204 min.
Effective stream area after confluence =     16.154(Ac.)
```

```
Study area average Pervious fraction(Ap) =  0.100
Study area average soil loss rate(Fm) =    0.098(In/Hr)
Study area total (this main stream) =      16.83(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        1.500 to Point/Station        1.700
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  3599.010(Ft.)
Downstream point/station elevation =  3598.250(Ft.)
Pipe length  =   520.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    37.604(CFS)
Nearest computed pipe diameter  =     42.00(In.)
Calculated individual pipe flow  =    37.604(CFS)
Normal flow depth in pipe =   33.61(In.)
Flow top width inside pipe =   33.59(In.)
Critical Depth =   22.87(In.)
Pipe flow velocity =      4.56(Ft/s)
Travel time through pipe =    1.90 min.
Time of concentration (TC) =    14.11 min.
End of computations, Total Study Area =           16.98 (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: 02/25/21

HCC IV POST DEVELOPED CONDITION
10 YR SUB AREA B
MGUBBAREINER 2021-02-24

Program License Serial Number 6277

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.793 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 2.100 to Point/Station 2.200
**** 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
Pervious ratio(Ap) = 0.1000 Max loss rate(Fm)= 0.098(In/Hr)
Initial subarea data:
Initial area flow distance = 685.000(Ft.)
Top (of initial area) elevation = 3605.140(Ft.)
Bottom (of initial area) elevation = 3594.010(Ft.)
Difference in elevation = 11.130(Ft.)
Slope = 0.01625 s(%)= 1.62
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 9.440 min.
Rainfall intensity = 2.894(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.870
Subarea runoff = 24.310(CFS)

```
Total initial stream area =        9.660(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.098(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        2.200 to Point/Station        2.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  3594.010(Ft.)
Downstream point/station elevation =  3593.260(Ft.)
Pipe length  =   150.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =    24.310(CFS)
Nearest computed pipe diameter  =     30.00(In.)
Calculated individual pipe flow  =    24.310(CFS)
Normal flow depth in pipe =   21.02(In.)
Flow top width inside pipe =   27.47(In.)
Critical Depth =   20.13(In.)
Pipe flow velocity =      6.62(Ft/s)
Travel time through pipe =    0.38 min.
Time of concentration (TC) =     9.82 min.
End of computations, Total Study Area =            9.66 (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: 02/25/21

HCC IV POST DEVELOPED CONDITION
10 YR SUB AREA C
MGUBBAREINER 2012-02-24

Program License Serial Number 6277

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

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 0.793 (In.)
Slope used for rainfall intensity curve b = 0.7000
Soil antecedent moisture condition (AMC) = 2

++

Process from Point/Station 3.100 to Point/Station 3.200
**** 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
Pervious ratio(Ap) = 0.1000 Max loss rate(Fm)= 0.098(In/Hr)
Initial subarea data:
Initial area flow distance = 785.000(Ft.)
Top (of initial area) elevation = 3611.530(Ft.)
Bottom (of initial area) elevation = 3609.010(Ft.)
Difference in elevation = 2.520(Ft.)
Slope = 0.00321 s(%)= 0.32
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 13.788 min.
Rainfall intensity = 2.220(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.860
Subarea runoff = 2.024(CFS)

```
Total initial stream area =        1.060(Ac.)
Pervious area fraction = 0.100
Initial area Fm value =    0.098(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.200 to Point/Station        3.300
**** PIPEFLOW TRAVEL TIME (Program estimated size) ****
________________________________________________________________________
Upstream point/station elevation =  3609.010(Ft.)
Downstream point/station elevation =  3601.010(Ft.)
Pipe length  =   150.00(Ft.)   Manning's N = 0.013
No. of pipes = 1  Required pipe flow  =     2.024(CFS)
Nearest computed pipe diameter  =      9.00(In.)
Calculated individual pipe flow  =     2.024(CFS)
Normal flow depth in pipe =    4.66(In.)
Flow top width inside pipe =    8.99(In.)
Critical Depth =    7.74(In.)
Pipe flow velocity =      8.77(Ft/s)
Travel time through pipe =    0.28 min.
Time of concentration (TC) =    14.07 min.


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        3.200 to Point/Station        3.300
**** SUBAREA FLOW ADDITION ****
________________________________________________________________________
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
Pervious ratio(Ap) = 0.1000     Max loss rate(Fm)=     0.098(In/Hr)
Time of concentration =    14.07 min.
Rainfall intensity =      2.188(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.860
Subarea runoff =     16.207(CFS) for    8.630(Ac.)
Total runoff =     18.231(CFS)
Effective area this stream =        9.69(Ac.)
Total Study Area (Main Stream No. 1) =        9.69(Ac.)
Area averaged Fm value =    0.098(In/Hr)
End of computations, Total Study Area =            9.69 (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
```

SECTION 6.5: Attachment C.1

10-Year Unit Hydrograph Pre-Development Conditions

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

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Study date 02/25/21

++

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

Program License Serial Number 6277

HCC IV PRE DEVELOPED CONDITIONS
10 YR UNIT HYDROGRAPH
MGUBBAREINER 2021-02-25

Storm Event Year = 10

Antecedent Moisture Condition = 2

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 10		
36.32	1	0.79
Rainfall data for year 2		
36.32	6	1.15
Rainfall data for year 2		
36.32	24	2.15
Rainfall data for year 100		
36.32	1	1.32

```
------------------------------------------------------------------------
Rainfall data for year 100
           36.32           6           3.11
------------------------------------------------------------------------
Rainfall data for year 100
           36.32          24           6.42
------------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

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


SCS curve  SCS curve     Area     Area     Fp(Fig C6)    Ap      Fm
No.(AMCII) NO.(AMC 2)    (Ac.)    Fraction     (In/Hr)  (dec.)   (In/Hr)
 67.0      67.0         36.32      1.000     0.578    1.000    0.578

Area-averaged adjusted loss rate Fm (In/Hr) =  0.578

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

Area       Area          SCS CN    SCS CN      S     Pervious
 (Ac.)      Fract         (AMC2)    (AMC2)           Yield Fr
    36.32   1.000         67.0      67.0       4.93     0.278

Area-averaged catchment yield fraction, Y =  0.278
Area-averaged low loss fraction, Yb =  0.722
User entry of time of concentration  =   0.300 (hours)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watershed area =      36.32(Ac.)
Catchment Lag time =   0.240 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 34.7222
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.578(In/Hr)
Average low loss rate fraction (Yb) = 0.722 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall =  0.376(In)
Computed peak 30-minute rainfall =  0.644(In)
Specified peak 1-hour rainfall =  0.793(In)
Computed peak 3-hour rainfall =  1.380(In)
Specified peak 6-hour rainfall =  1.956(In)
Specified peak 24-hour rainfall =  3.907(In)


Rainfall depth area reduction factors:
Using a total area of      36.32(Ac.) (Ref: fig. E-4)

5-minute factor = 0.998     Adjusted rainfall =  0.376(In)
30-minute factor = 0.998    Adjusted rainfall =  0.643(In)
1-hour factor = 0.998       Adjusted rainfall =  0.792(In)
3-hour factor = 1.000       Adjusted rainfall =  1.379(In)
```

6-hour factor = 1.000 Adjusted rainfall = 1.956(In)
24-hour factor = 1.000 Adjusted rainfall = 3.907(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 = 439.25 (CFS))	
1	2.206	9.688
2	13.132	47.992
3	40.437	119.937
4	59.629	84.302
5	69.886	45.053
6	76.724	30.037
7	81.579	21.323
8	85.290	16.300
9	88.266	13.073
10	90.463	9.651
11	92.296	8.052
12	93.829	6.734
13	95.057	5.391
14	96.088	4.528
15	96.940	3.746
16	97.584	2.827
17	98.029	1.956
18	98.394	1.604
19	98.808	1.818
20	99.225	1.830
21	99.571	1.521
22	99.791	0.964
23	100.000	0.919

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.3756	0.3756
2	0.4625	0.0868
3	0.5223	0.0598
4	0.5694	0.0471
5	0.6088	0.0394
6	0.6430	0.0342
7	0.6735	0.0304
8	0.7010	0.0275
9	0.7262	0.0252
10	0.7495	0.0233
11	0.7713	0.0217
12	0.7916	0.0204
13	0.8243	0.0327
14	0.8558	0.0315

15	0.8861	0.0304
16	0.9155	0.0294
17	0.9440	0.0285
18	0.9717	0.0277
19	0.9986	0.0269
20	1.0248	0.0262
21	1.0504	0.0256
22	1.0754	0.0250
23	1.0998	0.0244
24	1.1237	0.0239
25	1.1471	0.0234
26	1.1701	0.0230
27	1.1926	0.0225
28	1.2147	0.0221
29	1.2365	0.0217
30	1.2578	0.0214
31	1.2789	0.0210
32	1.2995	0.0207
33	1.3199	0.0204
34	1.3400	0.0201
35	1.3597	0.0198
36	1.3792	0.0195
37	1.3984	0.0192
38	1.4174	0.0189
39	1.4360	0.0187
40	1.4545	0.0184
41	1.4727	0.0182
42	1.4907	0.0180
43	1.5085	0.0178
44	1.5261	0.0176
45	1.5435	0.0174
46	1.5607	0.0172
47	1.5777	0.0170
48	1.5945	0.0168
49	1.6112	0.0167
50	1.6277	0.0165
51	1.6440	0.0163
52	1.6602	0.0162
53	1.6762	0.0160
54	1.6921	0.0159
55	1.7078	0.0157
56	1.7234	0.0156
57	1.7388	0.0154
58	1.7541	0.0153
59	1.7693	0.0152
60	1.7844	0.0151
61	1.7993	0.0149
62	1.8141	0.0148
63	1.8288	0.0147
64	1.8434	0.0146
65	1.8578	0.0145

66	1.8722	0.0144
67	1.8864	0.0142
68	1.9006	0.0141
69	1.9146	0.0140
70	1.9286	0.0139
71	1.9424	0.0138
72	1.9561	0.0137
73	1.9696	0.0135
74	1.9831	0.0134
75	1.9964	0.0133
76	2.0096	0.0132
77	2.0228	0.0132
78	2.0358	0.0131
79	2.0488	0.0130
80	2.0617	0.0129
81	2.0745	0.0128
82	2.0873	0.0127
83	2.0999	0.0127
84	2.1125	0.0126
85	2.1250	0.0125
86	2.1375	0.0124
87	2.1498	0.0124
88	2.1621	0.0123
89	2.1744	0.0122
90	2.1865	0.0122
91	2.1986	0.0121
92	2.2106	0.0120
93	2.2226	0.0120
94	2.2345	0.0119
95	2.2463	0.0118
96	2.2581	0.0118
97	2.2698	0.0117
98	2.2814	0.0116
99	2.2930	0.0116
100	2.3045	0.0115
101	2.3160	0.0115
102	2.3274	0.0114
103	2.3388	0.0114
104	2.3501	0.0113
105	2.3613	0.0112
106	2.3725	0.0112
107	2.3837	0.0111
108	2.3947	0.0111
109	2.4058	0.0110
110	2.4168	0.0110
111	2.4277	0.0109
112	2.4386	0.0109
113	2.4494	0.0108
114	2.4602	0.0108
115	2.4710	0.0107
116	2.4817	0.0107

117	2.4923	0.0107
118	2.5029	0.0106
119	2.5135	0.0106
120	2.5240	0.0105
121	2.5345	0.0105
122	2.5449	0.0104
123	2.5553	0.0104
124	2.5656	0.0103
125	2.5759	0.0103
126	2.5862	0.0103
127	2.5964	0.0102
128	2.6066	0.0102
129	2.6167	0.0101
130	2.6268	0.0101
131	2.6369	0.0101
132	2.6469	0.0100
133	2.6569	0.0100
134	2.6669	0.0099
135	2.6768	0.0099
136	2.6866	0.0099
137	2.6965	0.0098
138	2.7063	0.0098
139	2.7161	0.0098
140	2.7258	0.0097
141	2.7355	0.0097
142	2.7451	0.0097
143	2.7548	0.0096
144	2.7644	0.0096
145	2.7739	0.0096
146	2.7835	0.0095
147	2.7930	0.0095
148	2.8024	0.0095
149	2.8118	0.0094
150	2.8212	0.0094
151	2.8306	0.0094
152	2.8400	0.0093
153	2.8493	0.0093
154	2.8585	0.0093
155	2.8678	0.0092
156	2.8770	0.0092
157	2.8862	0.0092
158	2.8953	0.0092
159	2.9045	0.0091
160	2.9136	0.0091
161	2.9226	0.0091
162	2.9317	0.0090
163	2.9407	0.0090
164	2.9497	0.0090
165	2.9587	0.0090
166	2.9676	0.0089
167	2.9765	0.0089

168	2.9854	0.0089
169	2.9942	0.0089
170	3.0030	0.0088
171	3.0119	0.0088
172	3.0206	0.0088
173	3.0294	0.0087
174	3.0381	0.0087
175	3.0468	0.0087
176	3.0555	0.0087
177	3.0641	0.0086
178	3.0727	0.0086
179	3.0813	0.0086
180	3.0899	0.0086
181	3.0985	0.0086
182	3.1070	0.0085
183	3.1155	0.0085
184	3.1240	0.0085
185	3.1325	0.0085
186	3.1409	0.0084
187	3.1493	0.0084
188	3.1577	0.0084
189	3.1661	0.0084
190	3.1744	0.0083
191	3.1827	0.0083
192	3.1910	0.0083
193	3.1993	0.0083
194	3.2076	0.0083
195	3.2158	0.0082
196	3.2240	0.0082
197	3.2322	0.0082
198	3.2404	0.0082
199	3.2486	0.0082
200	3.2567	0.0081
201	3.2648	0.0081
202	3.2729	0.0081
203	3.2810	0.0081
204	3.2890	0.0081
205	3.2971	0.0080
206	3.3051	0.0080
207	3.3131	0.0080
208	3.3211	0.0080
209	3.3290	0.0080
210	3.3370	0.0079
211	3.3449	0.0079
212	3.3528	0.0079
213	3.3607	0.0079
214	3.3685	0.0079
215	3.3764	0.0078
216	3.3842	0.0078
217	3.3920	0.0078
218	3.3998	0.0078

219	3.4076	0.0078
220	3.4153	0.0078
221	3.4231	0.0077
222	3.4308	0.0077
223	3.4385	0.0077
224	3.4462	0.0077
225	3.4538	0.0077
226	3.4615	0.0077
227	3.4691	0.0076
228	3.4767	0.0076
229	3.4843	0.0076
230	3.4919	0.0076
231	3.4995	0.0076
232	3.5070	0.0076
233	3.5146	0.0075
234	3.5221	0.0075
235	3.5296	0.0075
236	3.5371	0.0075
237	3.5445	0.0075
238	3.5520	0.0075
239	3.5594	0.0074
240	3.5669	0.0074
241	3.5743	0.0074
242	3.5817	0.0074
243	3.5890	0.0074
244	3.5964	0.0074
245	3.6037	0.0073
246	3.6111	0.0073
247	3.6184	0.0073
248	3.6257	0.0073
249	3.6330	0.0073
250	3.6402	0.0073
251	3.6475	0.0073
252	3.6547	0.0072
253	3.6620	0.0072
254	3.6692	0.0072
255	3.6764	0.0072
256	3.6836	0.0072
257	3.6907	0.0072
258	3.6979	0.0072
259	3.7051	0.0071
260	3.7122	0.0071
261	3.7193	0.0071
262	3.7264	0.0071
263	3.7335	0.0071
264	3.7406	0.0071
265	3.7476	0.0071
266	3.7547	0.0070
267	3.7617	0.0070
268	3.7687	0.0070
269	3.7757	0.0070

270	3.7827	0.0070
271	3.7897	0.0070
272	3.7967	0.0070
273	3.8037	0.0070
274	3.8106	0.0069
275	3.8175	0.0069
276	3.8245	0.0069
277	3.8314	0.0069
278	3.8383	0.0069
279	3.8451	0.0069
280	3.8520	0.0069
281	3.8589	0.0069
282	3.8657	0.0068
283	3.8725	0.0068
284	3.8794	0.0068
285	3.8862	0.0068
286	3.8930	0.0068
287	3.8998	0.0068
288	3.9065	0.0068

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0068	0.0049	0.0019
2	0.0068	0.0049	0.0019
3	0.0068	0.0049	0.0019
4	0.0068	0.0049	0.0019
5	0.0068	0.0049	0.0019
6	0.0069	0.0049	0.0019
7	0.0069	0.0050	0.0019
8	0.0069	0.0050	0.0019
9	0.0069	0.0050	0.0019
10	0.0069	0.0050	0.0019
11	0.0070	0.0050	0.0019
12	0.0070	0.0050	0.0019
13	0.0070	0.0050	0.0019
14	0.0070	0.0051	0.0020
15	0.0070	0.0051	0.0020
16	0.0070	0.0051	0.0020
17	0.0071	0.0051	0.0020
18	0.0071	0.0051	0.0020
19	0.0071	0.0051	0.0020
20	0.0071	0.0051	0.0020
21	0.0072	0.0052	0.0020
22	0.0072	0.0052	0.0020
23	0.0072	0.0052	0.0020
24	0.0072	0.0052	0.0020
25	0.0072	0.0052	0.0020
26	0.0073	0.0052	0.0020
27	0.0073	0.0053	0.0020

28	0.0073	0.0053	0.0020
29	0.0073	0.0053	0.0020
30	0.0073	0.0053	0.0020
31	0.0074	0.0053	0.0021
32	0.0074	0.0053	0.0021
33	0.0074	0.0054	0.0021
34	0.0074	0.0054	0.0021
35	0.0075	0.0054	0.0021
36	0.0075	0.0054	0.0021
37	0.0075	0.0054	0.0021
38	0.0075	0.0054	0.0021
39	0.0076	0.0055	0.0021
40	0.0076	0.0055	0.0021
41	0.0076	0.0055	0.0021
42	0.0076	0.0055	0.0021
43	0.0077	0.0055	0.0021
44	0.0077	0.0055	0.0021
45	0.0077	0.0056	0.0021
46	0.0077	0.0056	0.0022
47	0.0078	0.0056	0.0022
48	0.0078	0.0056	0.0022
49	0.0078	0.0056	0.0022
50	0.0078	0.0057	0.0022
51	0.0079	0.0057	0.0022
52	0.0079	0.0057	0.0022
53	0.0079	0.0057	0.0022
54	0.0080	0.0057	0.0022
55	0.0080	0.0058	0.0022
56	0.0080	0.0058	0.0022
57	0.0081	0.0058	0.0022
58	0.0081	0.0058	0.0022
59	0.0081	0.0059	0.0023
60	0.0081	0.0059	0.0023
61	0.0082	0.0059	0.0023
62	0.0082	0.0059	0.0023
63	0.0082	0.0059	0.0023
64	0.0083	0.0060	0.0023
65	0.0083	0.0060	0.0023
66	0.0083	0.0060	0.0023
67	0.0084	0.0060	0.0023
68	0.0084	0.0061	0.0023
69	0.0084	0.0061	0.0023
70	0.0085	0.0061	0.0024
71	0.0085	0.0061	0.0024
72	0.0085	0.0062	0.0024
73	0.0086	0.0062	0.0024
74	0.0086	0.0062	0.0024
75	0.0086	0.0062	0.0024
76	0.0087	0.0063	0.0024
77	0.0087	0.0063	0.0024
78	0.0087	0.0063	0.0024

79	0.0088	0.0064	0.0025
80	0.0088	0.0064	0.0025
81	0.0089	0.0064	0.0025
82	0.0089	0.0064	0.0025
83	0.0090	0.0065	0.0025
84	0.0090	0.0065	0.0025
85	0.0090	0.0065	0.0025
86	0.0091	0.0065	0.0025
87	0.0091	0.0066	0.0025
88	0.0092	0.0066	0.0025
89	0.0092	0.0067	0.0026
90	0.0092	0.0067	0.0026
91	0.0093	0.0067	0.0026
92	0.0093	0.0067	0.0026
93	0.0094	0.0068	0.0026
94	0.0094	0.0068	0.0026
95	0.0095	0.0069	0.0026
96	0.0095	0.0069	0.0027
97	0.0096	0.0069	0.0027
98	0.0096	0.0069	0.0027
99	0.0097	0.0070	0.0027
100	0.0097	0.0070	0.0027
101	0.0098	0.0071	0.0027
102	0.0098	0.0071	0.0027
103	0.0099	0.0072	0.0028
104	0.0099	0.0072	0.0028
105	0.0100	0.0072	0.0028
106	0.0101	0.0073	0.0028
107	0.0101	0.0073	0.0028
108	0.0102	0.0073	0.0028
109	0.0103	0.0074	0.0029
110	0.0103	0.0074	0.0029
111	0.0104	0.0075	0.0029
112	0.0104	0.0075	0.0029
113	0.0105	0.0076	0.0029
114	0.0106	0.0076	0.0029
115	0.0107	0.0077	0.0030
116	0.0107	0.0077	0.0030
117	0.0108	0.0078	0.0030
118	0.0108	0.0078	0.0030
119	0.0109	0.0079	0.0030
120	0.0110	0.0079	0.0031
121	0.0111	0.0080	0.0031
122	0.0111	0.0080	0.0031
123	0.0112	0.0081	0.0031
124	0.0113	0.0082	0.0031
125	0.0114	0.0082	0.0032
126	0.0115	0.0083	0.0032
127	0.0116	0.0084	0.0032
128	0.0116	0.0084	0.0032
129	0.0118	0.0085	0.0033

130	0.0118	0.0085	0.0033
131	0.0120	0.0086	0.0033
132	0.0120	0.0087	0.0033
133	0.0122	0.0088	0.0034
134	0.0122	0.0088	0.0034
135	0.0124	0.0089	0.0034
136	0.0124	0.0090	0.0035
137	0.0126	0.0091	0.0035
138	0.0127	0.0091	0.0035
139	0.0128	0.0092	0.0036
140	0.0129	0.0093	0.0036
141	0.0131	0.0094	0.0036
142	0.0132	0.0095	0.0037
143	0.0133	0.0096	0.0037
144	0.0134	0.0097	0.0037
145	0.0137	0.0099	0.0038
146	0.0138	0.0100	0.0039
147	0.0140	0.0101	0.0039
148	0.0141	0.0102	0.0039
149	0.0144	0.0104	0.0040
150	0.0145	0.0104	0.0040
151	0.0147	0.0106	0.0041
152	0.0148	0.0107	0.0041
153	0.0151	0.0109	0.0042
154	0.0152	0.0110	0.0042
155	0.0154	0.0111	0.0043
156	0.0156	0.0112	0.0043
157	0.0159	0.0115	0.0044
158	0.0160	0.0116	0.0045
159	0.0163	0.0118	0.0045
160	0.0165	0.0119	0.0046
161	0.0168	0.0121	0.0047
162	0.0170	0.0123	0.0047
163	0.0174	0.0125	0.0048
164	0.0176	0.0127	0.0049
165	0.0180	0.0130	0.0050
166	0.0182	0.0131	0.0051
167	0.0187	0.0135	0.0052
168	0.0189	0.0137	0.0053
169	0.0195	0.0141	0.0054
170	0.0198	0.0143	0.0055
171	0.0204	0.0147	0.0057
172	0.0207	0.0149	0.0058
173	0.0214	0.0154	0.0059
174	0.0217	0.0157	0.0061
175	0.0225	0.0163	0.0063
176	0.0230	0.0166	0.0064
177	0.0239	0.0173	0.0067
178	0.0244	0.0176	0.0068
179	0.0256	0.0185	0.0071
180	0.0262	0.0189	0.0073

181	0.0277	0.0200	0.0077
182	0.0285	0.0206	0.0079
183	0.0304	0.0219	0.0085
184	0.0315	0.0227	0.0088
185	0.0204	0.0147	0.0057
186	0.0217	0.0157	0.0061
187	0.0252	0.0182	0.0070
188	0.0275	0.0199	0.0077
189	0.0342	0.0247	0.0095
190	0.0394	0.0284	0.0110
191	0.0598	0.0432	0.0167
192	0.0868	0.0482	0.0386
193	0.3756	0.0482	0.3275
194	0.0471	0.0340	0.0131
195	0.0304	0.0220	0.0085
196	0.0233	0.0168	0.0065
197	0.0327	0.0236	0.0091
198	0.0294	0.0212	0.0082
199	0.0269	0.0194	0.0075
200	0.0250	0.0180	0.0070
201	0.0234	0.0169	0.0065
202	0.0221	0.0160	0.0062
203	0.0210	0.0152	0.0059
204	0.0201	0.0145	0.0056
205	0.0192	0.0138	0.0053
206	0.0184	0.0133	0.0051
207	0.0178	0.0128	0.0050
208	0.0172	0.0124	0.0048
209	0.0167	0.0120	0.0046
210	0.0162	0.0117	0.0045
211	0.0157	0.0113	0.0044
212	0.0153	0.0110	0.0043
213	0.0149	0.0108	0.0042
214	0.0146	0.0105	0.0041
215	0.0142	0.0103	0.0040
216	0.0139	0.0101	0.0039
217	0.0135	0.0097	0.0038
218	0.0132	0.0096	0.0037
219	0.0130	0.0094	0.0036
220	0.0127	0.0092	0.0035
221	0.0125	0.0090	0.0035
222	0.0123	0.0089	0.0034
223	0.0121	0.0087	0.0034
224	0.0119	0.0086	0.0033
225	0.0117	0.0084	0.0033
226	0.0115	0.0083	0.0032
227	0.0114	0.0082	0.0032
228	0.0112	0.0081	0.0031
229	0.0110	0.0080	0.0031
230	0.0109	0.0079	0.0030
231	0.0107	0.0078	0.0030

232	0.0106	0.0077	0.0030
233	0.0105	0.0076	0.0029
234	0.0103	0.0075	0.0029
235	0.0102	0.0074	0.0028
236	0.0101	0.0073	0.0028
237	0.0100	0.0072	0.0028
238	0.0099	0.0071	0.0027
239	0.0098	0.0070	0.0027
240	0.0097	0.0070	0.0027
241	0.0096	0.0069	0.0027
242	0.0095	0.0068	0.0026
243	0.0094	0.0068	0.0026
244	0.0093	0.0067	0.0026
245	0.0092	0.0066	0.0026
246	0.0091	0.0066	0.0025
247	0.0090	0.0065	0.0025
248	0.0089	0.0064	0.0025
249	0.0089	0.0064	0.0025
250	0.0088	0.0063	0.0024
251	0.0087	0.0063	0.0024
252	0.0086	0.0062	0.0024
253	0.0086	0.0062	0.0024
254	0.0085	0.0061	0.0024
255	0.0084	0.0061	0.0023
256	0.0083	0.0060	0.0023
257	0.0083	0.0060	0.0023
258	0.0082	0.0059	0.0023
259	0.0082	0.0059	0.0023
260	0.0081	0.0058	0.0023
261	0.0080	0.0058	0.0022
262	0.0080	0.0058	0.0022
263	0.0079	0.0057	0.0022
264	0.0079	0.0057	0.0022
265	0.0078	0.0056	0.0022
266	0.0078	0.0056	0.0022
267	0.0077	0.0056	0.0021
268	0.0077	0.0055	0.0021
269	0.0076	0.0055	0.0021
270	0.0076	0.0054	0.0021
271	0.0075	0.0054	0.0021
272	0.0075	0.0054	0.0021
273	0.0074	0.0053	0.0021
274	0.0074	0.0053	0.0020
275	0.0073	0.0053	0.0020
276	0.0073	0.0052	0.0020
277	0.0072	0.0052	0.0020
278	0.0072	0.0052	0.0020
279	0.0071	0.0052	0.0020
280	0.0071	0.0051	0.0020
281	0.0071	0.0051	0.0020
282	0.0070	0.0051	0.0020

283	0.0070	0.0050	0.0019
284	0.0069	0.0050	0.0019
285	0.0069	0.0050	0.0019
286	0.0069	0.0050	0.0019
287	0.0068	0.0049	0.0019
288	0.0068	0.0049	0.0019

Total soil rain loss = 2.58(In)
Total effective rainfall = 1.33(In)
Peak flow rate in flood hydrograph = 45.11(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	12.5	25.0	37.5	50.0
0+ 5	0.0001	0.02	Q				
0+10	0.0009	0.11	Q				
0+15	0.0032	0.34	Q				
0+20	0.0066	0.50	Q				
0+25	0.0106	0.58	Q				
0+30	0.0150	0.64	Q				
0+35	0.0197	0.68	Q				
0+40	0.0246	0.71	Q				
0+45	0.0297	0.74	Q				
0+50	0.0349	0.76	Q				
0+55	0.0403	0.78	Q				
1+ 0	0.0458	0.79	Q				
1+ 5	0.0513	0.80	Q				
1+10	0.0569	0.82	Q				
1+15	0.0626	0.83	Q				
1+20	0.0683	0.83	Q				
1+25	0.0741	0.84	Q				
1+30	0.0799	0.84	Q				
1+35	0.0858	0.85	Q				
1+40	0.0917	0.86	Q				
1+45	0.0976	0.86	Q				
1+50	0.1036	0.87	QV				
1+55	0.1096	0.87	QV				
2+ 0	0.1156	0.87	QV				
2+ 5	0.1216	0.87	QV				
2+10	0.1276	0.88	QV				
2+15	0.1337	0.88	QV				
2+20	0.1398	0.88	QV				
2+25	0.1459	0.88	QV				
2+30	0.1520	0.89	QV				

2+35	0.1581	0.89	QV	|	|	|	|
2+40	0.1642	0.89	QV	|	|	|	|
2+45	0.1704	0.90	QV	|	|	|	|
2+50	0.1766	0.90	QV	|	|	|	|
2+55	0.1828	0.90	QV	|	|	|	|
3+ 0	0.1890	0.90	QV	|	|	|	|
3+ 5	0.1953	0.91	QV	|	|	|	|
3+10	0.2015	0.91	Q V	|	|	|	|
3+15	0.2078	0.91	Q V	|	|	|	|
3+20	0.2141	0.92	Q V	|	|	|	|
3+25	0.2205	0.92	Q V	|	|	|	|
3+30	0.2268	0.92	Q V	|	|	|	|
3+35	0.2332	0.92	Q V	|	|	|	|
3+40	0.2396	0.93	Q V	|	|	|	|
3+45	0.2460	0.93	Q V	|	|	|	|
3+50	0.2524	0.93	Q V	|	|	|	|
3+55	0.2588	0.94	Q V	|	|	|	|
4+ 0	0.2653	0.94	Q V	|	|	|	|
4+ 5	0.2718	0.94	Q V	|	|	|	|
4+10	0.2783	0.95	Q V	|	|	|	|
4+15	0.2849	0.95	Q V	|	|	|	|
4+20	0.2914	0.95	Q V	|	|	|	|
4+25	0.2980	0.96	Q V	|	|	|	|
4+30	0.3046	0.96	Q V	|	|	|	|
4+35	0.3112	0.96	Q V	|	|	|	|
4+40	0.3179	0.97	Q V	|	|	|	|
4+45	0.3246	0.97	Q V	|	|	|	|
4+50	0.3313	0.97	Q V	|	|	|	|
4+55	0.3380	0.98	Q V	|	|	|	|
5+ 0	0.3448	0.98	Q V	|	|	|	|
5+ 5	0.3515	0.98	Q V	|	|	|	|
5+10	0.3583	0.99	Q V	|	|	|	|
5+15	0.3652	0.99	Q V	|	|	|	|
5+20	0.3720	0.99	Q V	|	|	|	|
5+25	0.3789	1.00	Q V	|	|	|	|
5+30	0.3858	1.00	Q V	|	|	|	|
5+35	0.3927	1.01	Q V	|	|	|	|
5+40	0.3997	1.01	Q V	|	|	|	|
5+45	0.4067	1.01	Q V	|	|	|	|
5+50	0.4137	1.02	Q V	|	|	|	|
5+55	0.4207	1.02	Q V	|	|	|	|
6+ 0	0.4278	1.03	Q V	|	|	|	|
6+ 5	0.4349	1.03	Q V	|	|	|	|
6+10	0.4420	1.03	Q V	|	|	|	|
6+15	0.4492	1.04	Q V	|	|	|	|
6+20	0.4563	1.04	Q V	|	|	|	|
6+25	0.4636	1.05	Q V	|	|	|	|
6+30	0.4708	1.05	Q V	|	|	|	|
6+35	0.4781	1.06	Q V	|	|	|	|
6+40	0.4854	1.06	Q V	|	|	|	|
6+45	0.4927	1.07	Q V	|	|	|	|

6+50	0.5001	1.07	Q	V	|	|	|
6+55	0.5075	1.07	Q	V	|	|	|
7+ 0	0.5149	1.08	Q	V	|	|	|
7+ 5	0.5224	1.08	Q	V	|	|	|
7+10	0.5299	1.09	Q	V	|	|	|
7+15	0.5374	1.09	Q	V	|	|	|
7+20	0.5450	1.10	Q	V	|	|	|
7+25	0.5526	1.10	Q	V	|	|	|
7+30	0.5602	1.11	Q	V	|	|	|
7+35	0.5679	1.11	Q	V	|	|	|
7+40	0.5756	1.12	Q	V	|	|	|
7+45	0.5834	1.13	Q	V	|	|	|
7+50	0.5912	1.13	Q	V	|	|	|
7+55	0.5990	1.14	Q	V	|	|	|
8+ 0	0.6069	1.14	Q	V	|	|	|
8+ 5	0.6148	1.15	Q	V	|	|	|
8+10	0.6227	1.15	Q	V	|	|	|
8+15	0.6307	1.16	Q	V	|	|	|
8+20	0.6387	1.17	Q	V	|	|	|
8+25	0.6468	1.17	Q	V	|	|	|
8+30	0.6549	1.18	Q	V	|	|	|
8+35	0.6631	1.18	Q	V	|	|	|
8+40	0.6713	1.19	Q	V	|	|	|
8+45	0.6795	1.20	Q	V	|	|	|
8+50	0.6878	1.20	Q	V	|	|	|
8+55	0.6961	1.21	Q	V	|	|	|
9+ 0	0.7045	1.22	Q	V	|	|	|
9+ 5	0.7129	1.22	Q	V	|	|	|
9+10	0.7214	1.23	Q	V	|	|	|
9+15	0.7299	1.24	Q	V	|	|	|
9+20	0.7385	1.25	Q	V	|	|	|
9+25	0.7471	1.25	|Q	V	|	|	|
9+30	0.7558	1.26	|Q	V	|	|	|
9+35	0.7645	1.27	|Q	V	|	|	|
9+40	0.7733	1.28	|Q	V	|	|	|
9+45	0.7822	1.28	|Q	V	|	|	|
9+50	0.7911	1.29	|Q	V	|	|	|
9+55	0.8000	1.30	|Q	V	|	|	|
10+ 0	0.8090	1.31	|Q	V	|	|	|
10+ 5	0.8181	1.32	|Q	V	|	|	|
10+10	0.8272	1.33	|Q	V	|	|	|
10+15	0.8364	1.34	|Q	V	|	|	|
10+20	0.8457	1.34	|Q	V	|	|	|
10+25	0.8550	1.35	|Q	V	|	|	|
10+30	0.8644	1.36	|Q	V	|	|	|
10+35	0.8738	1.37	|Q	V	|	|	|
10+40	0.8834	1.38	|Q	V	|	|	|
10+45	0.8930	1.39	|Q	V	|	|	|
10+50	0.9026	1.40	|Q	V|		|	|
10+55	0.9124	1.41	|Q	V|		|	|
11+ 0	0.9222	1.42	|Q	V|		|	|

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11+ 5       0.9321      1.44  |Q       V|         |         |         |
11+10       0.9420      1.45  |Q       V|         |         |         |
11+15       0.9521      1.46  |Q       V|         |         |         |
11+20       0.9622      1.47  |Q       V|         |         |         |
11+25       0.9724      1.48  |Q       V|         |         |         |
11+30       0.9827      1.50  |Q       V|         |         |         |
11+35       0.9931      1.51  |Q       V|         |         |         |
11+40       1.0036      1.52  |Q        V         |         |         |
11+45       1.0142      1.54  |Q        V         |         |         |
11+50       1.0248      1.55  |Q        V         |         |         |
11+55       1.0356      1.56  |Q        V         |         |         |
12+ 0       1.0465      1.58  |Q        V         |         |         |
12+ 5       1.0575      1.59  |Q        V         |         |         |
12+10       1.0686      1.61  |Q        V         |         |         |
12+15       1.0798      1.63  |Q        V         |         |         |
12+20       1.0912      1.65  |Q        V         |         |         |
12+25       1.1027      1.67  |Q        |V        |         |         |
12+30       1.1144      1.69  |Q        |V        |         |         |
12+35       1.1261      1.71  |Q        |V        |         |         |
12+40       1.1380      1.73  |Q        |V        |         |         |
12+45       1.1501      1.75  |Q        |V        |         |         |
12+50       1.1623      1.77  |Q        |V        |         |         |
12+55       1.1746      1.79  |Q        |V        |         |         |
13+ 0       1.1871      1.81  |Q        |V        |         |         |
13+ 5       1.1997      1.84  |Q        |V        |         |         |
13+10       1.2125      1.86  |Q        | V       |         |         |
13+15       1.2255      1.88  |Q        | V       |         |         |
13+20       1.2387      1.91  |Q        | V       |         |         |
13+25       1.2520      1.94  |Q        | V       |         |         |
13+30       1.2655      1.96  |Q        | V       |         |         |
13+35       1.2792      1.99  |Q        | V       |         |         |
13+40       1.2932      2.02  |Q        | V       |         |         |
13+45       1.3073      2.05  |Q        |  V      |         |         |
13+50       1.3217      2.09  |Q        |  V      |         |         |
13+55       1.3363      2.12  |Q        |  V      |         |         |
14+ 0       1.3512      2.16  |Q        |  V      |         |         |
14+ 5       1.3663      2.20  |Q        |  V      |         |         |
14+10       1.3817      2.24  |Q        |  V      |         |         |
14+15       1.3974      2.28  |Q        |  V      |         |         |
14+20       1.4135      2.33  |Q        |   V     |         |         |
14+25       1.4299      2.38  |Q        |   V     |         |         |
14+30       1.4466      2.43  |Q        |   V     |         |         |
14+35       1.4637      2.49  |Q        |   V     |         |         |
14+40       1.4813      2.55  | Q       |   V     |         |         |
14+45       1.4993      2.61  | Q       |   V     |         |         |
14+50       1.5177      2.68  | Q       |    V    |         |         |
14+55       1.5367      2.76  | Q       |    V    |         |         |
15+ 0       1.5562      2.84  | Q       |    V    |         |         |
15+ 5       1.5764      2.93  | Q       |    V    |         |         |
15+10       1.5973      3.03  | Q       |    V    |         |         |
15+15       1.6189      3.14  | Q       |     V   |         |         |
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15+20       1.6414      3.27  | Q       |     V   |         |          |
15+25       1.6647      3.38  | Q       |     V   |         |          |
15+30       1.6878      3.35  | Q       |     V   |         |          |
15+35       1.7091      3.09  | Q       |      V  |         |          |
15+40       1.7296      2.98  | Q       |      V  |         |          |
15+45       1.7509      3.08  | Q       |      V  |         |          |
15+50       1.7736      3.30  | Q       |      V  |         |          |
15+55       1.7991      3.71  | Q       |      V  |         |          |
16+ 0       1.8306      4.56  |  Q      |       V |         |          |
16+ 5       1.8948      9.32  |      Q  |       V |         |          |
16+10       2.0559     23.39  |         |       Q V         |          |
16+15       2.3665     45.11  |         |         |  V      |     Q    |
16+20       2.5920     32.74  |         |         |    VQ   |          |
16+25       2.7260     19.46  |         |    Q    |      V  |          |
16+30       2.8229     14.07  |         |Q        |       V |          |
16+35       2.8996     11.13  |       Q |         |       V |          |
16+40       2.9640      9.35  |      Q  |         |        V|          |
16+45       3.0195      8.06  |     Q   |         |         V          |
16+50       3.0659      6.74  |    Q    |         |         V          |
16+55       3.1073      6.01  |   Q     |         |         |V         |
17+ 0       3.1445      5.39  |   Q     |         |         |V         |
17+ 5       3.1774      4.79  |  Q      |         |         |V         |
17+10       3.2074      4.35  |  Q      |         |         | V        |
17+15       3.2346      3.95  |  Q      |         |         | V        |
17+20       3.2588      3.52  | Q       |         |         | V        |
17+25       3.2804      3.13  | Q       |         |         | V        |
17+30       3.3006      2.93  | Q       |         |         | V        |
17+35       3.3206      2.91  | Q       |         |         |  V       |
17+40       3.3401      2.83  | Q       |         |         |  V       |
17+45       3.3583      2.64  | Q       |         |         |  V       |
17+50       3.3747      2.39  |Q        |         |         |  V       |
17+55       3.3904      2.28  |Q        |         |         |  V       |
18+ 0       3.4038      1.93  |Q        |         |         |  V       |
18+ 5       3.4167      1.88  |Q        |         |         |   V      |
18+10       3.4293      1.83  |Q        |         |         |   V      |
18+15       3.4415      1.78  |Q        |         |         |   V      |
18+20       3.4535      1.73  |Q        |         |         |   V      |
18+25       3.4651      1.69  |Q        |         |         |   V      |
18+30       3.4765      1.65  |Q        |         |         |   V      |
18+35       3.4876      1.62  |Q        |         |         |   V      |
18+40       3.4985      1.58  |Q        |         |         |   V      |
18+45       3.5092      1.55  |Q        |         |         |    V     |
18+50       3.5198      1.53  |Q        |         |         |    V     |
18+55       3.5301      1.50  |Q        |         |         |    V     |
19+ 0       3.5402      1.47  |Q        |         |         |    V     |
19+ 5       3.5502      1.45  |Q        |         |         |    V     |
19+10       3.5600      1.43  |Q        |         |         |    V     |
19+15       3.5697      1.40  |Q        |         |         |    V     |
19+20       3.5792      1.38  |Q        |         |         |    V     |
19+25       3.5886      1.36  |Q        |         |         |    V     |
19+30       3.5978      1.34  |Q        |         |         |    V     |
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19+35	3.6069	1.32	|Q	|	|	|	V |
19+40	3.6160	1.31	|Q	|	|	|	V |
19+45	3.6248	1.29	|Q	|	|	|	V |
19+50	3.6336	1.27	|Q	|	|	|	V |
19+55	3.6423	1.26	|Q	|	|	|	V |
20+ 0	3.6508	1.24	Q	|	|	|	V |
20+ 5	3.6593	1.23	Q	|	|	|	V |
20+10	3.6677	1.22	Q	|	|	|	V |
20+15	3.6760	1.20	Q	|	|	|	V |
20+20	3.6841	1.19	Q	|	|	|	V |
20+25	3.6922	1.18	Q	|	|	|	V |
20+30	3.7003	1.16	Q	|	|	|	V |
20+35	3.7082	1.15	Q	|	|	|	V |
20+40	3.7160	1.14	Q	|	|	|	V |
20+45	3.7238	1.13	Q	|	|	|	V |
20+50	3.7315	1.12	Q	|	|	|	V |
20+55	3.7391	1.11	Q	|	|	|	V |
21+ 0	3.7467	1.10	Q	|	|	|	V |
21+ 5	3.7542	1.09	Q	|	|	|	V |
21+10	3.7616	1.08	Q	|	|	|	V |
21+15	3.7690	1.07	Q	|	|	|	V |
21+20	3.7763	1.06	Q	|	|	|	V |
21+25	3.7835	1.05	Q	|	|	|	V |
21+30	3.7907	1.04	Q	|	|	|	V |
21+35	3.7978	1.03	Q	|	|	|	V |
21+40	3.8048	1.02	Q	|	|	|	V |
21+45	3.8118	1.02	Q	|	|	|	V |
21+50	3.8188	1.01	Q	|	|	|	V |
21+55	3.8257	1.00	Q	|	|	|	V |
22+ 0	3.8325	0.99	Q	|	|	|	V |
22+ 5	3.8393	0.99	Q	|	|	|	V |
22+10	3.8460	0.98	Q	|	|	|	V |
22+15	3.8527	0.97	Q	|	|	|	V |
22+20	3.8594	0.96	Q	|	|	|	V |
22+25	3.8660	0.96	Q	|	|	|	V |
22+30	3.8725	0.95	Q	|	|	|	V |
22+35	3.8790	0.94	Q	|	|	|	V |
22+40	3.8855	0.94	Q	|	|	|	V |
22+45	3.8919	0.93	Q	|	|	|	V |
22+50	3.8983	0.93	Q	|	|	|	V |
22+55	3.9046	0.92	Q	|	|	|	V |
23+ 0	3.9109	0.91	Q	|	|	|	V|
23+ 5	3.9172	0.91	Q	|	|	|	V|
23+10	3.9234	0.90	Q	|	|	|	V|
23+15	3.9296	0.90	Q	|	|	|	V|
23+20	3.9357	0.89	Q	|	|	|	V|
23+25	3.9418	0.89	Q	|	|	|	V|
23+30	3.9479	0.88	Q	|	|	|	V|
23+35	3.9539	0.88	Q	|	|	|	V|
23+40	3.9599	0.87	Q	|	|	|	V|
23+45	3.9659	0.87	Q	|	|	|	V|

```
   23+50       3.9718      0.86  Q         |          |          |         V|
   23+55       3.9777      0.86  Q         |          |          |         V|
   24+ 0       3.9836      0.85  Q         |          |          |         V|
   24+ 5       3.9893      0.83  Q         |          |          |         V|
   24+10       3.9943      0.73  Q         |          |          |         V|
   24+15       3.9978      0.50  Q         |          |          |         V|
   24+20       4.0002      0.34  Q         |          |          |         V|
   24+25       4.0019      0.26  Q         |          |          |         V|
   24+30       4.0033      0.20  Q         |          |          |         V|
   24+35       4.0044      0.16  Q         |          |          |         V|
   24+40       4.0052      0.12  Q         |          |          |         V|
   24+45       4.0059      0.10  Q         |          |          |         V|
   24+50       4.0065      0.08  Q         |          |          |         V|
   24+55       4.0069      0.07  Q         |          |          |         V|
   25+ 0       4.0073      0.05  Q         |          |          |         V|
   25+ 5       4.0076      0.04  Q         |          |          |         V|
   25+10       4.0078      0.03  Q         |          |          |         V|
   25+15       4.0080      0.03  Q         |          |          |         V|
   25+20       4.0081      0.02  Q         |          |          |         V|
   25+25       4.0082      0.02  Q         |          |          |         V|
   25+30       4.0083      0.01  Q         |          |          |         V|
   25+35       4.0084      0.01  Q         |          |          |         V|
   25+40       4.0084      0.01  Q         |          |          |         V|
   25+45       4.0084      0.00  Q         |          |          |         V|
   25+50       4.0085      0.00  Q         |          |          |          V
-------------------------------------------------------------------------
```

SECTION 6.5: Attachment C.2

10-Year Unit Hydrograph Post-Development Conditions

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

Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2004, Version 7.0

Study date 02/25/21

++

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

Program License Serial Number 6277

HCC IV POST DEVELOPED CONDITION
10 YR
MGUBBAREINER 2021-02-25

Storm Event Year = 10

Antecedent Moisture Condition = 2

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 10		
36.32	1	0.79
Rainfall data for year 2		
36.32	6	1.15
Rainfall data for year 2		
36.32	24	2.15
Rainfall data for year 100		
36.32	1	1.32

```
------------------------------------------------------------------------
Rainfall data for year 100
            36.32            6           3.11
------------------------------------------------------------------------
Rainfall data for year 100
            36.32           24           6.42
------------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

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


SCS curve  SCS curve     Area     Area     Fp(Fig C6)    Ap      Fm
No.(AMCII) NO.(AMC 2)    (Ac.)    Fraction     (In/Hr)  (dec.)   (In/Hr)
 90.0      90.0         36.32      1.000     0.192    0.123    0.024

Area-averaged adjusted loss rate Fm (In/Hr) =  0.024

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

Area       Area          SCS CN    SCS CN      S     Pervious
 (Ac.)      Fract         (AMC2)    (AMC2)           Yield Fr
     4.47   0.123         90.0      90.0       1.11     0.725
    31.85   0.877         98.0      98.0       0.20     0.940

Area-averaged catchment yield fraction, Y =  0.913
Area-averaged low loss fraction, Yb =  0.087
User entry of time of concentration  =   0.235 (hours)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watershed area =      36.32(Ac.)
Catchment Lag time =   0.188 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 44.3262
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.024(In/Hr)
Average low loss rate fraction (Yb) = 0.087 (decimal)
DESERT S-Graph Selected
Computed peak 5-minute rainfall =  0.376(In)
Computed peak 30-minute rainfall =  0.644(In)
Specified peak 1-hour rainfall =  0.793(In)
Computed peak 3-hour rainfall =  1.380(In)
Specified peak 6-hour rainfall =  1.956(In)
Specified peak 24-hour rainfall =  3.907(In)


Rainfall depth area reduction factors:
Using a total area of      36.32(Ac.) (Ref: fig. E-4)

5-minute factor = 0.998     Adjusted rainfall =  0.376(In)
30-minute factor = 0.998    Adjusted rainfall =  0.643(In)
1-hour factor = 0.998       Adjusted rainfall =  0.792(In)
```

3-hour factor = 1.000 Adjusted rainfall = 1.379(In)
6-hour factor = 1.000 Adjusted rainfall = 1.956(In)
24-hour factor = 1.000 Adjusted rainfall = 3.907(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 = 439.25 (CFS))	
1	3.248	14.265
2	23.770	90.142
3	54.755	136.100
4	69.544	64.962
5	78.011	37.191
6	83.592	24.514
7	87.711	18.092
8	90.605	12.713
9	92.859	9.900
10	94.617	7.722
11	95.997	6.060
12	97.062	4.676
13	97.811	3.293
14	98.294	2.119
15	98.813	2.280
16	99.339	2.312
17	99.696	1.568
18	100.000	1.335

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.3756	0.3756
2	0.4625	0.0868
3	0.5223	0.0598
4	0.5694	0.0471
5	0.6088	0.0394
6	0.6430	0.0342
7	0.6735	0.0304
8	0.7010	0.0275
9	0.7262	0.0252
10	0.7495	0.0233
11	0.7713	0.0217
12	0.7916	0.0204
13	0.8243	0.0327
14	0.8558	0.0315
15	0.8861	0.0304
16	0.9155	0.0294
17	0.9440	0.0285
18	0.9717	0.0277

19	0.9986	0.0269
20	1.0248	0.0262
21	1.0504	0.0256
22	1.0754	0.0250
23	1.0998	0.0244
24	1.1237	0.0239
25	1.1471	0.0234
26	1.1701	0.0230
27	1.1926	0.0225
28	1.2147	0.0221
29	1.2365	0.0217
30	1.2578	0.0214
31	1.2789	0.0210
32	1.2995	0.0207
33	1.3199	0.0204
34	1.3400	0.0201
35	1.3597	0.0198
36	1.3792	0.0195
37	1.3984	0.0192
38	1.4174	0.0189
39	1.4360	0.0187
40	1.4545	0.0184
41	1.4727	0.0182
42	1.4907	0.0180
43	1.5085	0.0178
44	1.5261	0.0176
45	1.5435	0.0174
46	1.5607	0.0172
47	1.5777	0.0170
48	1.5945	0.0168
49	1.6112	0.0167
50	1.6277	0.0165
51	1.6440	0.0163
52	1.6602	0.0162
53	1.6762	0.0160
54	1.6921	0.0159
55	1.7078	0.0157
56	1.7234	0.0156
57	1.7388	0.0154
58	1.7541	0.0153
59	1.7693	0.0152
60	1.7844	0.0151
61	1.7993	0.0149
62	1.8141	0.0148
63	1.8288	0.0147
64	1.8434	0.0146
65	1.8578	0.0145
66	1.8722	0.0144
67	1.8864	0.0142
68	1.9006	0.0141
69	1.9146	0.0140

70	1.9286	0.0139
71	1.9424	0.0138
72	1.9561	0.0137
73	1.9696	0.0135
74	1.9831	0.0134
75	1.9964	0.0133
76	2.0096	0.0132
77	2.0228	0.0132
78	2.0358	0.0131
79	2.0488	0.0130
80	2.0617	0.0129
81	2.0745	0.0128
82	2.0873	0.0127
83	2.0999	0.0127
84	2.1125	0.0126
85	2.1250	0.0125
86	2.1375	0.0124
87	2.1498	0.0124
88	2.1621	0.0123
89	2.1744	0.0122
90	2.1865	0.0122
91	2.1986	0.0121
92	2.2106	0.0120
93	2.2226	0.0120
94	2.2345	0.0119
95	2.2463	0.0118
96	2.2581	0.0118
97	2.2698	0.0117
98	2.2814	0.0116
99	2.2930	0.0116
100	2.3045	0.0115
101	2.3160	0.0115
102	2.3274	0.0114
103	2.3388	0.0114
104	2.3501	0.0113
105	2.3613	0.0112
106	2.3725	0.0112
107	2.3837	0.0111
108	2.3947	0.0111
109	2.4058	0.0110
110	2.4168	0.0110
111	2.4277	0.0109
112	2.4386	0.0109
113	2.4494	0.0108
114	2.4602	0.0108
115	2.4710	0.0107
116	2.4817	0.0107
117	2.4923	0.0107
118	2.5029	0.0106
119	2.5135	0.0106
120	2.5240	0.0105

121	2.5345	0.0105
122	2.5449	0.0104
123	2.5553	0.0104
124	2.5656	0.0103
125	2.5759	0.0103
126	2.5862	0.0103
127	2.5964	0.0102
128	2.6066	0.0102
129	2.6167	0.0101
130	2.6268	0.0101
131	2.6369	0.0101
132	2.6469	0.0100
133	2.6569	0.0100
134	2.6669	0.0099
135	2.6768	0.0099
136	2.6866	0.0099
137	2.6965	0.0098
138	2.7063	0.0098
139	2.7161	0.0098
140	2.7258	0.0097
141	2.7355	0.0097
142	2.7451	0.0097
143	2.7548	0.0096
144	2.7644	0.0096
145	2.7739	0.0096
146	2.7835	0.0095
147	2.7930	0.0095
148	2.8024	0.0095
149	2.8118	0.0094
150	2.8212	0.0094
151	2.8306	0.0094
152	2.8400	0.0093
153	2.8493	0.0093
154	2.8585	0.0093
155	2.8678	0.0092
156	2.8770	0.0092
157	2.8862	0.0092
158	2.8953	0.0092
159	2.9045	0.0091
160	2.9136	0.0091
161	2.9226	0.0091
162	2.9317	0.0090
163	2.9407	0.0090
164	2.9497	0.0090
165	2.9587	0.0090
166	2.9676	0.0089
167	2.9765	0.0089
168	2.9854	0.0089
169	2.9942	0.0089
170	3.0030	0.0088
171	3.0119	0.0088

172	3.0206	0.0088
173	3.0294	0.0087
174	3.0381	0.0087
175	3.0468	0.0087
176	3.0555	0.0087
177	3.0641	0.0086
178	3.0727	0.0086
179	3.0813	0.0086
180	3.0899	0.0086
181	3.0985	0.0086
182	3.1070	0.0085
183	3.1155	0.0085
184	3.1240	0.0085
185	3.1325	0.0085
186	3.1409	0.0084
187	3.1493	0.0084
188	3.1577	0.0084
189	3.1661	0.0084
190	3.1744	0.0083
191	3.1827	0.0083
192	3.1910	0.0083
193	3.1993	0.0083
194	3.2076	0.0083
195	3.2158	0.0082
196	3.2240	0.0082
197	3.2322	0.0082
198	3.2404	0.0082
199	3.2486	0.0082
200	3.2567	0.0081
201	3.2648	0.0081
202	3.2729	0.0081
203	3.2810	0.0081
204	3.2890	0.0081
205	3.2971	0.0080
206	3.3051	0.0080
207	3.3131	0.0080
208	3.3211	0.0080
209	3.3290	0.0080
210	3.3370	0.0079
211	3.3449	0.0079
212	3.3528	0.0079
213	3.3607	0.0079
214	3.3685	0.0079
215	3.3764	0.0078
216	3.3842	0.0078
217	3.3920	0.0078
218	3.3998	0.0078
219	3.4076	0.0078
220	3.4153	0.0078
221	3.4231	0.0077
222	3.4308	0.0077

223	3.4385	0.0077
224	3.4462	0.0077
225	3.4538	0.0077
226	3.4615	0.0077
227	3.4691	0.0076
228	3.4767	0.0076
229	3.4843	0.0076
230	3.4919	0.0076
231	3.4995	0.0076
232	3.5070	0.0076
233	3.5146	0.0075
234	3.5221	0.0075
235	3.5296	0.0075
236	3.5371	0.0075
237	3.5445	0.0075
238	3.5520	0.0075
239	3.5594	0.0074
240	3.5669	0.0074
241	3.5743	0.0074
242	3.5817	0.0074
243	3.5890	0.0074
244	3.5964	0.0074
245	3.6037	0.0073
246	3.6111	0.0073
247	3.6184	0.0073
248	3.6257	0.0073
249	3.6330	0.0073
250	3.6402	0.0073
251	3.6475	0.0073
252	3.6547	0.0072
253	3.6620	0.0072
254	3.6692	0.0072
255	3.6764	0.0072
256	3.6836	0.0072
257	3.6907	0.0072
258	3.6979	0.0072
259	3.7051	0.0071
260	3.7122	0.0071
261	3.7193	0.0071
262	3.7264	0.0071
263	3.7335	0.0071
264	3.7406	0.0071
265	3.7476	0.0071
266	3.7547	0.0070
267	3.7617	0.0070
268	3.7687	0.0070
269	3.7757	0.0070
270	3.7827	0.0070
271	3.7897	0.0070
272	3.7967	0.0070
273	3.8037	0.0070

274	3.8106	0.0069
275	3.8175	0.0069
276	3.8245	0.0069
277	3.8314	0.0069
278	3.8383	0.0069
279	3.8451	0.0069
280	3.8520	0.0069
281	3.8589	0.0069
282	3.8657	0.0068
283	3.8725	0.0068
284	3.8794	0.0068
285	3.8862	0.0068
286	3.8930	0.0068
287	3.8998	0.0068
288	3.9065	0.0068

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0068	0.0006	0.0062
2	0.0068	0.0006	0.0062
3	0.0068	0.0006	0.0062
4	0.0068	0.0006	0.0062
5	0.0068	0.0006	0.0063
6	0.0069	0.0006	0.0063
7	0.0069	0.0006	0.0063
8	0.0069	0.0006	0.0063
9	0.0069	0.0006	0.0063
10	0.0069	0.0006	0.0063
11	0.0070	0.0006	0.0064
12	0.0070	0.0006	0.0064
13	0.0070	0.0006	0.0064
14	0.0070	0.0006	0.0064
15	0.0070	0.0006	0.0064
16	0.0070	0.0006	0.0064
17	0.0071	0.0006	0.0065
18	0.0071	0.0006	0.0065
19	0.0071	0.0006	0.0065
20	0.0071	0.0006	0.0065
21	0.0072	0.0006	0.0065
22	0.0072	0.0006	0.0066
23	0.0072	0.0006	0.0066
24	0.0072	0.0006	0.0066
25	0.0072	0.0006	0.0066
26	0.0073	0.0006	0.0066
27	0.0073	0.0006	0.0067
28	0.0073	0.0006	0.0067
29	0.0073	0.0006	0.0067
30	0.0073	0.0006	0.0067
31	0.0074	0.0006	0.0067

32	0.0074	0.0006	0.0068
33	0.0074	0.0006	0.0068
34	0.0074	0.0006	0.0068
35	0.0075	0.0006	0.0068
36	0.0075	0.0006	0.0068
37	0.0075	0.0007	0.0069
38	0.0075	0.0007	0.0069
39	0.0076	0.0007	0.0069
40	0.0076	0.0007	0.0069
41	0.0076	0.0007	0.0070
42	0.0076	0.0007	0.0070
43	0.0077	0.0007	0.0070
44	0.0077	0.0007	0.0070
45	0.0077	0.0007	0.0071
46	0.0077	0.0007	0.0071
47	0.0078	0.0007	0.0071
48	0.0078	0.0007	0.0071
49	0.0078	0.0007	0.0071
50	0.0078	0.0007	0.0072
51	0.0079	0.0007	0.0072
52	0.0079	0.0007	0.0072
53	0.0079	0.0007	0.0073
54	0.0080	0.0007	0.0073
55	0.0080	0.0007	0.0073
56	0.0080	0.0007	0.0073
57	0.0081	0.0007	0.0074
58	0.0081	0.0007	0.0074
59	0.0081	0.0007	0.0074
60	0.0081	0.0007	0.0074
61	0.0082	0.0007	0.0075
62	0.0082	0.0007	0.0075
63	0.0082	0.0007	0.0075
64	0.0083	0.0007	0.0075
65	0.0083	0.0007	0.0076
66	0.0083	0.0007	0.0076
67	0.0084	0.0007	0.0076
68	0.0084	0.0007	0.0077
69	0.0084	0.0007	0.0077
70	0.0085	0.0007	0.0077
71	0.0085	0.0007	0.0078
72	0.0085	0.0007	0.0078
73	0.0086	0.0007	0.0078
74	0.0086	0.0007	0.0079
75	0.0086	0.0007	0.0079
76	0.0087	0.0008	0.0079
77	0.0087	0.0008	0.0080
78	0.0087	0.0008	0.0080
79	0.0088	0.0008	0.0080
80	0.0088	0.0008	0.0081
81	0.0089	0.0008	0.0081
82	0.0089	0.0008	0.0081

83	0.0090	0.0008	0.0082
84	0.0090	0.0008	0.0082
85	0.0090	0.0008	0.0083
86	0.0091	0.0008	0.0083
87	0.0091	0.0008	0.0083
88	0.0092	0.0008	0.0084
89	0.0092	0.0008	0.0084
90	0.0092	0.0008	0.0084
91	0.0093	0.0008	0.0085
92	0.0093	0.0008	0.0085
93	0.0094	0.0008	0.0086
94	0.0094	0.0008	0.0086
95	0.0095	0.0008	0.0087
96	0.0095	0.0008	0.0087
97	0.0096	0.0008	0.0088
98	0.0096	0.0008	0.0088
99	0.0097	0.0008	0.0089
100	0.0097	0.0008	0.0089
101	0.0098	0.0008	0.0090
102	0.0098	0.0009	0.0090
103	0.0099	0.0009	0.0091
104	0.0099	0.0009	0.0091
105	0.0100	0.0009	0.0092
106	0.0101	0.0009	0.0092
107	0.0101	0.0009	0.0093
108	0.0102	0.0009	0.0093
109	0.0103	0.0009	0.0094
110	0.0103	0.0009	0.0094
111	0.0104	0.0009	0.0095
112	0.0104	0.0009	0.0095
113	0.0105	0.0009	0.0096
114	0.0106	0.0009	0.0096
115	0.0107	0.0009	0.0097
116	0.0107	0.0009	0.0098
117	0.0108	0.0009	0.0099
118	0.0108	0.0009	0.0099
119	0.0109	0.0009	0.0100
120	0.0110	0.0010	0.0100
121	0.0111	0.0010	0.0101
122	0.0111	0.0010	0.0102
123	0.0112	0.0010	0.0103
124	0.0113	0.0010	0.0103
125	0.0114	0.0010	0.0104
126	0.0115	0.0010	0.0105
127	0.0116	0.0010	0.0106
128	0.0116	0.0010	0.0106
129	0.0118	0.0010	0.0107
130	0.0118	0.0010	0.0108
131	0.0120	0.0010	0.0109
132	0.0120	0.0010	0.0110
133	0.0122	0.0011	0.0111

134	0.0122	0.0011	0.0112
135	0.0124	0.0011	0.0113
136	0.0124	0.0011	0.0114
137	0.0126	0.0011	0.0115
138	0.0127	0.0011	0.0116
139	0.0128	0.0011	0.0117
140	0.0129	0.0011	0.0118
141	0.0131	0.0011	0.0119
142	0.0132	0.0011	0.0120
143	0.0133	0.0012	0.0122
144	0.0134	0.0012	0.0123
145	0.0137	0.0012	0.0126
146	0.0138	0.0012	0.0126
147	0.0140	0.0012	0.0128
148	0.0141	0.0012	0.0129
149	0.0144	0.0012	0.0131
150	0.0145	0.0013	0.0132
151	0.0147	0.0013	0.0134
152	0.0148	0.0013	0.0135
153	0.0151	0.0013	0.0138
154	0.0152	0.0013	0.0139
155	0.0154	0.0013	0.0141
156	0.0156	0.0013	0.0142
157	0.0159	0.0014	0.0145
158	0.0160	0.0014	0.0146
159	0.0163	0.0014	0.0149
160	0.0165	0.0014	0.0151
161	0.0168	0.0015	0.0154
162	0.0170	0.0015	0.0155
163	0.0174	0.0015	0.0159
164	0.0176	0.0015	0.0161
165	0.0180	0.0016	0.0164
166	0.0182	0.0016	0.0166
167	0.0187	0.0016	0.0171
168	0.0189	0.0016	0.0173
169	0.0195	0.0017	0.0178
170	0.0198	0.0017	0.0181
171	0.0204	0.0018	0.0186
172	0.0207	0.0018	0.0189
173	0.0214	0.0018	0.0195
174	0.0217	0.0019	0.0199
175	0.0225	0.0020	0.0206
176	0.0230	0.0020	0.0210
177	0.0239	0.0020	0.0219
178	0.0244	0.0020	0.0225
179	0.0256	0.0020	0.0236
180	0.0262	0.0020	0.0243
181	0.0277	0.0020	0.0257
182	0.0285	0.0020	0.0265
183	0.0304	0.0020	0.0284
184	0.0315	0.0020	0.0295

185	0.0204	0.0018	0.0186
186	0.0217	0.0019	0.0199
187	0.0252	0.0020	0.0232
188	0.0275	0.0020	0.0256
189	0.0342	0.0020	0.0323
190	0.0394	0.0020	0.0374
191	0.0598	0.0020	0.0578
192	0.0868	0.0020	0.0849
193	0.3756	0.0020	0.3737
194	0.0471	0.0020	0.0451
195	0.0304	0.0020	0.0285
196	0.0233	0.0020	0.0213
197	0.0327	0.0020	0.0307
198	0.0294	0.0020	0.0274
199	0.0269	0.0020	0.0249
200	0.0250	0.0020	0.0230
201	0.0234	0.0020	0.0215
202	0.0221	0.0019	0.0202
203	0.0210	0.0018	0.0192
204	0.0201	0.0017	0.0183
205	0.0192	0.0017	0.0175
206	0.0184	0.0016	0.0168
207	0.0178	0.0015	0.0162
208	0.0172	0.0015	0.0157
209	0.0167	0.0014	0.0152
210	0.0162	0.0014	0.0148
211	0.0157	0.0014	0.0144
212	0.0153	0.0013	0.0140
213	0.0149	0.0013	0.0136
214	0.0146	0.0013	0.0133
215	0.0142	0.0012	0.0130
216	0.0139	0.0012	0.0127
217	0.0135	0.0012	0.0123
218	0.0132	0.0011	0.0121
219	0.0130	0.0011	0.0119
220	0.0127	0.0011	0.0116
221	0.0125	0.0011	0.0114
222	0.0123	0.0011	0.0112
223	0.0121	0.0010	0.0110
224	0.0119	0.0010	0.0109
225	0.0117	0.0010	0.0107
226	0.0115	0.0010	0.0105
227	0.0114	0.0010	0.0104
228	0.0112	0.0010	0.0102
229	0.0110	0.0010	0.0101
230	0.0109	0.0009	0.0099
231	0.0107	0.0009	0.0098
232	0.0106	0.0009	0.0097
233	0.0105	0.0009	0.0096
234	0.0103	0.0009	0.0094
235	0.0102	0.0009	0.0093

236	0.0101	0.0009	0.0092
237	0.0100	0.0009	0.0091
238	0.0099	0.0009	0.0090
239	0.0098	0.0008	0.0089
240	0.0097	0.0008	0.0088
241	0.0096	0.0008	0.0087
242	0.0095	0.0008	0.0086
243	0.0094	0.0008	0.0086
244	0.0093	0.0008	0.0085
245	0.0092	0.0008	0.0084
246	0.0091	0.0008	0.0083
247	0.0090	0.0008	0.0082
248	0.0089	0.0008	0.0082
249	0.0089	0.0008	0.0081
250	0.0088	0.0008	0.0080
251	0.0087	0.0008	0.0079
252	0.0086	0.0007	0.0079
253	0.0086	0.0007	0.0078
254	0.0085	0.0007	0.0077
255	0.0084	0.0007	0.0077
256	0.0083	0.0007	0.0076
257	0.0083	0.0007	0.0076
258	0.0082	0.0007	0.0075
259	0.0082	0.0007	0.0074
260	0.0081	0.0007	0.0074
261	0.0080	0.0007	0.0073
262	0.0080	0.0007	0.0073
263	0.0079	0.0007	0.0072
264	0.0079	0.0007	0.0072
265	0.0078	0.0007	0.0071
266	0.0078	0.0007	0.0071
267	0.0077	0.0007	0.0070
268	0.0077	0.0007	0.0070
269	0.0076	0.0007	0.0069
270	0.0076	0.0007	0.0069
271	0.0075	0.0006	0.0069
272	0.0075	0.0006	0.0068
273	0.0074	0.0006	0.0068
274	0.0074	0.0006	0.0067
275	0.0073	0.0006	0.0067
276	0.0073	0.0006	0.0066
277	0.0072	0.0006	0.0066
278	0.0072	0.0006	0.0066
279	0.0071	0.0006	0.0065
280	0.0071	0.0006	0.0065
281	0.0071	0.0006	0.0065
282	0.0070	0.0006	0.0064
283	0.0070	0.0006	0.0064
284	0.0069	0.0006	0.0063
285	0.0069	0.0006	0.0063
286	0.0069	0.0006	0.0063

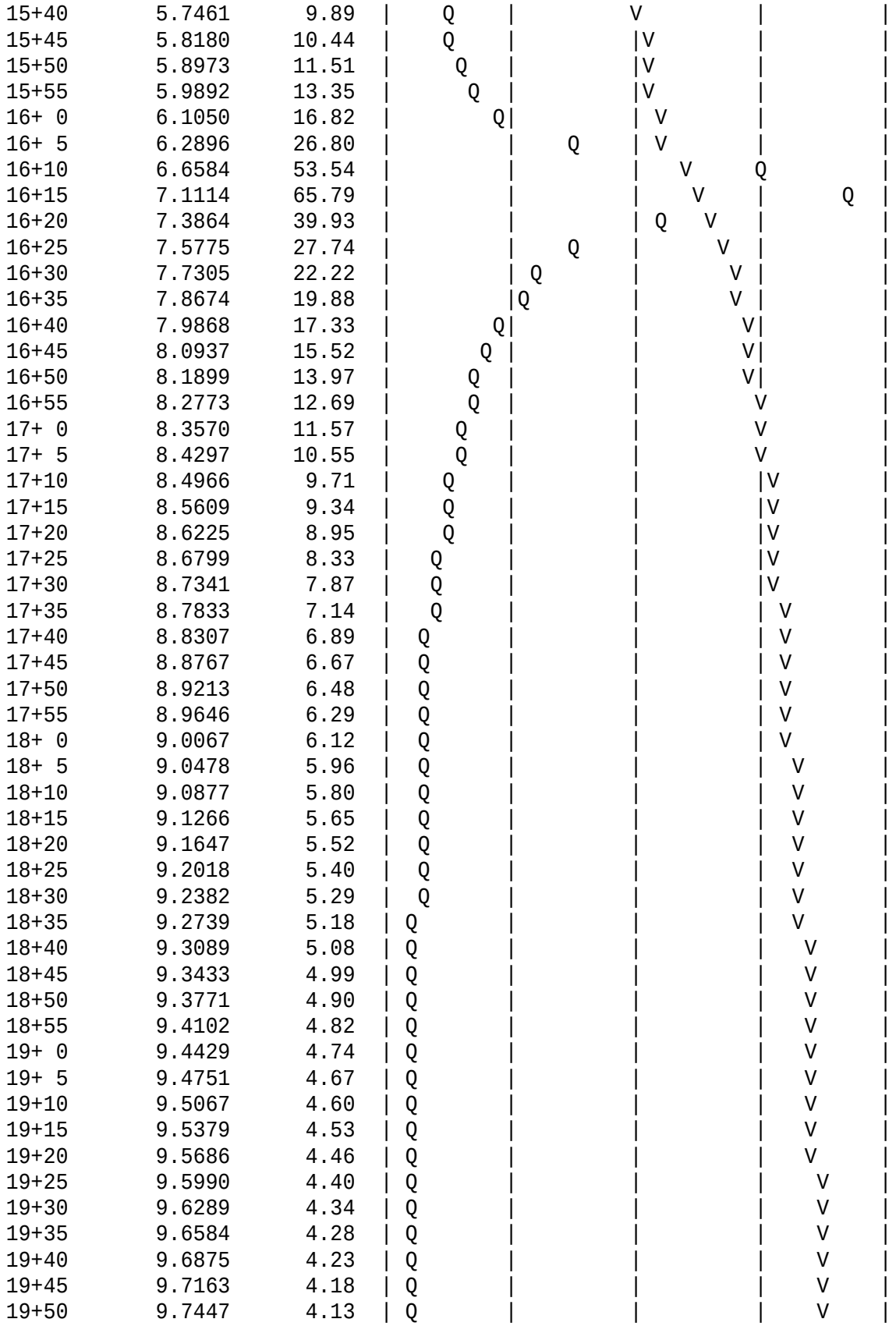
```
287              0.0068           0.0006              0.0062
288              0.0068           0.0006              0.0062
-------------------------------------------------------------------
-------------------------------------------------------------------
Total soil rain loss =      0.29(In)
Total effective rainfall =      3.62(In)
Peak flow rate in flood hydrograph =     65.79(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       17.5      35.0      52.5      70.0
-------------------------------------------------------------------
  0+ 5       0.0006      0.09  Q         |         |         |         |
  0+10       0.0051      0.65  Q         |         |         |         |
  0+15       0.0153      1.49  Q         |         |         |         |
  0+20       0.0284      1.90  VQ        |         |         |         |
  0+25       0.0430      2.13  VQ        |         |         |         |
  0+30       0.0588      2.29  VQ        |         |         |         |
  0+35       0.0754      2.41  VQ        |         |         |         |
  0+40       0.0925      2.49  VQ        |         |         |         |
  0+45       0.1101      2.56  VQ        |         |         |         |
  0+50       0.1281      2.61  VQ        |         |         |         |
  0+55       0.1464      2.66  VQ        |         |         |         |
  1+ 0       0.1650      2.69  VQ        |         |         |         |
  1+ 5       0.1837      2.72  VQ        |         |         |         |
  1+10       0.2026      2.74  VQ        |         |         |         |
  1+15       0.2216      2.76  VQ        |         |         |         |
  1+20       0.2408      2.79  VQ        |         |         |         |
  1+25       0.2601      2.80  VQ        |         |         |         |
  1+30       0.2795      2.82  |Q        |         |         |         |
  1+35       0.2990      2.83  |Q        |         |         |         |
  1+40       0.3185      2.84  |Q        |         |         |         |
  1+45       0.3381      2.84  |Q        |         |         |         |
  1+50       0.3578      2.85  |Q        |         |         |         |
  1+55       0.3775      2.86  |Q        |         |         |         |
  2+ 0       0.3972      2.87  |Q        |         |         |         |
  2+ 5       0.4170      2.88  |Q        |         |         |         |
  2+10       0.4369      2.88  |Q        |         |         |         |
  2+15       0.4568      2.89  |Q        |         |         |         |
  2+20       0.4768      2.90  |Q        |         |         |         |
  2+25       0.4969      2.91  |Q        |         |         |         |
  2+30       0.5170      2.92  |Q        |         |         |         |
  2+35       0.5371      2.93  |Q        |         |         |         |
  2+40       0.5574      2.94  |QV       |         |         |         |
  2+45       0.5777      2.95  |QV       |         |         |         |
  2+50       0.5980      2.96  |QV       |         |         |         |
```

2+55	0.6184	2.96	QV			
3+ 0	0.6389	2.97	QV			
3+ 5	0.6595	2.98	QV			
3+10	0.6801	2.99	QV			
3+15	0.7007	3.00	QV			
3+20	0.7215	3.01	QV			
3+25	0.7423	3.02	QV			
3+30	0.7632	3.03	QV			
3+35	0.7841	3.04	QV			
3+40	0.8051	3.05	QV			
3+45	0.8262	3.06	Q V			
3+50	0.8474	3.07	Q V			
3+55	0.8686	3.08	Q V			
4+ 0	0.8899	3.09	Q V			
4+ 5	0.9113	3.10	Q V			
4+10	0.9327	3.11	Q V			
4+15	0.9542	3.12	Q V			
4+20	0.9758	3.13	Q V			
4+25	0.9975	3.15	Q V			
4+30	1.0192	3.16	Q V			
4+35	1.0410	3.17	Q V			
4+40	1.0629	3.18	Q V			
4+45	1.0849	3.19	Q V			
4+50	1.1070	3.20	Q V			
4+55	1.1291	3.21	Q V			
5+ 0	1.1513	3.23	Q V			
5+ 5	1.1736	3.24	Q V			
5+10	1.1960	3.25	Q V			
5+15	1.2185	3.26	Q V			
5+20	1.2410	3.27	Q V			
5+25	1.2637	3.29	Q V			
5+30	1.2864	3.30	Q V			
5+35	1.3092	3.31	Q V			
5+40	1.3321	3.33	Q V			
5+45	1.3551	3.34	Q V			
5+50	1.3782	3.35	Q V			
5+55	1.4014	3.37	Q V			
6+ 0	1.4246	3.38	Q V			
6+ 5	1.4480	3.39	Q V			
6+10	1.4715	3.41	Q V			
6+15	1.4950	3.42	Q V			
6+20	1.5187	3.43	Q V			
6+25	1.5424	3.45	Q V			
6+30	1.5663	3.46	Q V			
6+35	1.5902	3.48	Q V			
6+40	1.6143	3.49	Q V			
6+45	1.6385	3.51	Q V			
6+50	1.6627	3.52	Q V			
6+55	1.6871	3.54	Q V			
7+ 0	1.7116	3.56	Q V			
7+ 5	1.7362	3.57	Q V			

7+10	1.7609	3.59	Q	V			
7+15	1.7857	3.60	Q	V			
7+20	1.8107	3.62	Q	V			
7+25	1.8357	3.64	Q	V			
7+30	1.8609	3.65	Q	V			
7+35	1.8862	3.67	Q	V			
7+40	1.9116	3.69	Q	V			
7+45	1.9371	3.71	Q	V			
7+50	1.9628	3.73	Q	V			
7+55	1.9886	3.74	Q	V			
8+ 0	2.0145	3.76	Q	V			
8+ 5	2.0405	3.78	Q	V			
8+10	2.0667	3.80	Q	V			
8+15	2.0930	3.82	Q	V			
8+20	2.1195	3.84	Q	V			
8+25	2.1461	3.86	Q	V			
8+30	2.1728	3.88	Q	V			
8+35	2.1997	3.90	Q	V			
8+40	2.2267	3.92	Q	V			
8+45	2.2539	3.95	Q	V			
8+50	2.2812	3.97	Q	V			
8+55	2.3087	3.99	Q	V			
9+ 0	2.3363	4.01	Q	V			
9+ 5	2.3641	4.04	Q	V			
9+10	2.3920	4.06	Q	V			
9+15	2.4202	4.08	Q	V			
9+20	2.4484	4.11	Q	V			
9+25	2.4769	4.13	Q	V			
9+30	2.5055	4.16	Q	V			
9+35	2.5343	4.18	Q	V			
9+40	2.5633	4.21	Q	V			
9+45	2.5925	4.23	Q	V			
9+50	2.6218	4.26	Q	V			
9+55	2.6513	4.29	Q	V			
10+ 0	2.6811	4.32	Q	V			
10+ 5	2.7110	4.35	Q	V			
10+10	2.7411	4.38	Q	V			
10+15	2.7715	4.41	Q	V			
10+20	2.8020	4.44	Q	V			
10+25	2.8328	4.47	Q	V			
10+30	2.8638	4.50	Q	V			
10+35	2.8950	4.53	Q	V			
10+40	2.9264	4.56	Q	V			
10+45	2.9581	4.60	Q	V			
10+50	2.9900	4.63	Q	V			
10+55	3.0222	4.67	Q	V			
11+ 0	3.0546	4.71	Q	V			
11+ 5	3.0873	4.74	Q	V			
11+10	3.1202	4.78	Q	V			
11+15	3.1534	4.82	Q	V			
11+20	3.1869	4.86	Q	V			

11+25	3.2206	4.90	Q	V			
11+30	3.2547	4.94	Q	V			
11+35	3.2890	4.99	Q	V			
11+40	3.3237	5.03	Q	V			
11+45	3.3586	5.08	Q	V			
11+50	3.3939	5.12	Q	V			
11+55	3.4295	5.17	Q	V			
12+ 0	3.4655	5.22	Q	V			
12+ 5	3.5018	5.28	Q	V			
12+10	3.5386	5.34	Q	V			
12+15	3.5759	5.41	Q	V			
12+20	3.6136	5.47	Q	V			
12+25	3.6517	5.54	Q	V			
12+30	3.6903	5.60	Q	V			
12+35	3.7293	5.66	Q	V			
12+40	3.7688	5.73	Q	V			
12+45	3.8087	5.80	Q	V			
12+50	3.8491	5.87	Q	V			
12+55	3.8900	5.94	Q	V			
13+ 0	3.9314	6.01	Q	V			
13+ 5	3.9733	6.09	Q	V			
13+10	4.0158	6.17	Q	V			
13+15	4.0588	6.25	Q	V			
13+20	4.1025	6.34	Q	V			
13+25	4.1467	6.43	Q	V			
13+30	4.1916	6.52	Q	V			
13+35	4.2372	6.62	Q	V			
13+40	4.2835	6.72	Q	V			
13+45	4.3305	6.83	Q	V			
13+50	4.3783	6.94	Q	V			
13+55	4.4269	7.06	Q	V			
14+ 0	4.4764	7.18	Q	V			
14+ 5	4.5267	7.32	Q	V			
14+10	4.5781	7.46	Q	V			
14+15	4.6305	7.61	Q	V			
14+20	4.6840	7.77	Q	V			
14+25	4.7387	7.94	Q	V			
14+30	4.7946	8.12	Q	V			
14+35	4.8519	8.31	Q	V			
14+40	4.9106	8.52	Q	V			
14+45	4.9708	8.75	Q	V			
14+50	5.0327	9.00	Q	V			
14+55	5.0967	9.28	Q	V			
15+ 0	5.1627	9.59	Q	V			
15+ 5	5.2311	9.94	Q	V			
15+10	5.3022	10.32	Q	V			
15+15	5.3762	10.75	Q	V			
15+20	5.4536	11.24	Q	V			
15+25	5.5335	11.61	Q	V			
15+30	5.6095	11.03	Q	V			
15+35	5.6780	9.94	Q	V			



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19+55       9.7728      4.08  | Q       |         |         |    V    |
20+ 0       9.8005      4.03  | Q       |         |         |    V    |
20+ 5       9.8280      3.98  | Q       |         |         |    V    |
20+10       9.8551      3.94  | Q       |         |         |     V   |
20+15       9.8819      3.90  | Q       |         |         |     V   |
20+20       9.9085      3.86  | Q       |         |         |     V   |
20+25       9.9348      3.82  | Q       |         |         |     V   |
20+30       9.9608      3.78  | Q       |         |         |     V   |
20+35       9.9866      3.74  | Q       |         |         |     V   |
20+40      10.0121      3.70  | Q       |         |         |     V   |
20+45      10.0373      3.67  | Q       |         |         |     V   |
20+50      10.0623      3.63  | Q       |         |         |     V   |
20+55      10.0871      3.60  | Q       |         |         |     V   |
21+ 0      10.1117      3.57  | Q       |         |         |     V   |
21+ 5      10.1361      3.54  | Q       |         |         |      V  |
21+10      10.1602      3.50  | Q       |         |         |      V  |
21+15      10.1841      3.47  |Q        |         |         |      V  |
21+20      10.2078      3.44  |Q        |         |         |      V  |
21+25      10.2314      3.42  |Q        |         |         |      V  |
21+30      10.2547      3.39  |Q        |         |         |      V  |
21+35      10.2779      3.36  |Q        |         |         |      V  |
21+40      10.3008      3.33  |Q        |         |         |      V  |
21+45      10.3236      3.31  |Q        |         |         |      V  |
21+50      10.3462      3.28  |Q        |         |         |      V  |
21+55      10.3687      3.26  |Q        |         |         |      V  |
22+ 0      10.3909      3.23  |Q        |         |         |      V  |
22+ 5      10.4130      3.21  |Q        |         |         |       V |
22+10      10.4350      3.19  |Q        |         |         |       V |
22+15      10.4568      3.16  |Q        |         |         |       V |
22+20      10.4784      3.14  |Q        |         |         |       V |
22+25      10.4999      3.12  |Q        |         |         |       V |
22+30      10.5213      3.10  |Q        |         |         |       V |
22+35      10.5425      3.08  |Q        |         |         |       V |
22+40      10.5635      3.06  |Q        |         |         |       V |
22+45      10.5845      3.04  |Q        |         |         |       V |
22+50      10.6052      3.02  |Q        |         |         |       V |
22+55      10.6259      3.00  |Q        |         |         |       V |
23+ 0      10.6464      2.98  |Q        |         |         |       V |
23+ 5      10.6668      2.96  |Q        |         |         |       V |
23+10      10.6871      2.94  |Q        |         |         |        V|
23+15      10.7072      2.93  |Q        |         |         |        V|
23+20      10.7273      2.91  |Q        |         |         |        V|
23+25      10.7472      2.89  |Q        |         |         |        V|
23+30      10.7670      2.87  |Q        |         |         |        V|
23+35      10.7866      2.86  |Q        |         |         |        V|
23+40      10.8062      2.84  |Q        |         |         |        V|
23+45      10.8257      2.82  |Q        |         |         |        V|
23+50      10.8450      2.81  |Q        |         |         |        V|
23+55      10.8642      2.79  |Q        |         |         |        V|
24+ 0      10.8834      2.78  |Q        |         |         |        V|
24+ 5      10.9018      2.67  |Q        |         |         |        V|
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   24+10      10.9163      2.10  |Q        |         |         |        V|
   24+15      10.9249      1.25  Q         |         |         |        V|
   24+20      10.9307      0.84  Q         |         |         |        V|
   24+25      10.9349      0.61  Q         |         |         |        V|
   24+30      10.9380      0.45  Q         |         |         |        V|
   24+35      10.9404      0.34  Q         |         |         |        V|
   24+40      10.9422      0.26  Q         |         |         |        V|
   24+45      10.9435      0.20  Q         |         |         |        V|
   24+50      10.9445      0.15  Q         |         |         |        V|
   24+55      10.9453      0.11  Q         |         |         |        V|
   25+ 0      10.9459      0.08  Q         |         |         |        V|
   25+ 5      10.9463      0.06  Q         |         |         |        V|
   25+10      10.9466      0.05  Q         |         |         |        V|
   25+15      10.9468      0.03  Q         |         |         |        V|
   25+20      10.9470      0.02  Q         |         |         |        V|
   25+25      10.9470      0.01  Q         |         |         |        V|
-------------------------------------------------------------------------
```