Appendix F Preliminary Drainage Report

Appendix

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raSmith

CREATIVITY BEYOND ENGINEERING

Preliminary Drainage Report

for

Colton Giant RV
1301 E. Santo Antonio Drive,
Colton, CA 91766
RASN Project No. 3210043

Date: December 20, 2021

Preliminary Drainage Report
(Hydrology Report)

FOR

Colton Giant RV

1301 E. Santo Antonio Drive,
Colton, CA 91766

Prepared for:

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Preparation Date
December 20, 2021

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Section II. Executive Summary

The project has been designed to meet current requirements for all new storm drain proposed for the project site with new infrastructure sized to meet the 100-year peak flows. The existing system has also been analyzed with the intent to reduce post-development 100-year Volume to match existing conditions.

Section III. Project Description

The existing site is 6.50 acres and bound to the south by Santo Antonio Drive, to the west by Mount Vernon Avenue, to the east by Centrepointe Apartments, and to the north by the Reche Canyon Channel. The existing site is mostly undeveloped but is rough graded (slopes from 1%-3%) and generally slopes from northeast to southwest, with the low point of the site near the intersection of Santo Antonio Drive and Mount Vernon Avenue.

There is an existing water line (within a public easement) that runs along the northerly property line. There is also an existing parking easement, and parking lot for the easterly apartment complex, located at the northeast corner of the site. This parking area is not a part of the proposed project and will be protected in place. There is also an existing well house with electrical service (within easements) near the southeast corner of the project. These are also to be protected in place and are not a part of the project.

The development generally consists of one new building (RV Sales with service bays), with associated concrete RV Circulation and Display Areas. The vast majority of the site will be an AC Pavement parking lot for RV Parking. There are vehicular parking spaces proposed along Santo Antonio Drive. The outside of the project contains new landscaping designed by the Landscape Architect for the project.

Generally, the site maintains the existing drainage patterns with a series of new valley gutters that convey the project runoff to the proposed infiltration basin, which is located at the southwest corner (low point) of the project site. The infiltration basin is designed to infiltrate the design storm event, with any overflow discharging to the existing street flowline in Santo Antonio Drive.

The Northeast corner of the site is developed with an existing parking lot and parking easement. Drainage from this lot drains Easterly and does not drain onto the project site. The total hydrologic area for this report excludes this parking lot area. See Attachment B for the Hydrology Exhibits.

There is no HOA or POA associated with the new development.

Section IV. Methodology

A Hydrologic and Hydraulic analysis was performed based on a 100-year storm event per the San Bernardino County Hydrology Manual (August 1986).

Per Section D of the San Bernardino County Hydrology Manual the Rational Method was utilized to determine the peak flows and size the proposed storm drain infrastructure (Section D, Page D-1).

$$Q=CIA$$

Where:

Q = peak discharge in cubic feet per second (cfs)

C = a runoff coefficient representing the ration of runoff depth to rainfall depth (dimensionless)

I = the time-averaged rainfall intensity for a storm duration equation to the time of concentration (in/hr)

A = Drainage Area (acres)

The initial time of concentration (critical duration) for each subarea was estimated using the nomograph depicted in Figure D-1. See Attachment F for more information. Using the time of concentration the rainfall intensity “I” was determined using Figure D-3 of the Manual. To create the Intensity Duration Curve it is required to determine the Area Averaged 1-hour point rainfall for the 100-year storm event. This was determined to be 1.14” via the available “NOAA Atlas 2, Precipitation-Frequency Atlas of the Western United States” Rainfall data for the property. This is discussed in Section D.4 of the Manual. See Attachments D and G for the NOAA Rainfall Data and Intensity Duration Curves Calculation Sheet respectively. A slope of 0.60 was used since the project is located with the Southwest portion of San Bernardino County.

The maximum loss rate (F_m) was determined using section C.6.5 of the Manual using the equation:

$$F_m = a_p * F_p \text{ where:}$$

F_m = the maximum loss rate (in/hr)

A_p = Fraction of Pervious Area

F_p = Infiltration rate of the site (in/hr)

The infiltration rate of the site was determined to be 5.4 in/hr via the Geotechnical Report prepared by C.Y. Geotech, Inc. dated January 31, 2020. A factor of safety of 3 was applied resulting in an Fp value of 1.8 in/hr used for the calculations.

The maximum loss rate factors into the Rational Method equation providing:

$$Q = 0.9 * (I-Fm) * A$$

The entire site soil classification is hydrologic soil Type A per NCRS mapping. See Attachment E. This confirms the desirable infiltration rate provided in the Geotechnical Report.

Hydrologic calculations were performed using a spreadsheet based on the San Bernardino County Hydrology Manual. The hydrology calculations for proposed and existing conditions may be found within the hydrology calculations section of this report. See attachment C for more information.

Section V. Existing Conditions

The existing site is 6.50 acres and bound to the south by Santo Antonio Drive, to the west by Mount Vernon Avenue, to the east by Centrepointe Apartments, and to the north by the Reche Canyon Channel. 6.19 acres has been used for the drainage area because there is an existing parking lot to the Northeast of the site which is in an easement that does not drain onto the existing/ or proposed site. Removing this from the 6.5 total acres leaves 6.19 acres of drainage area. The existing site is mostly undeveloped but is rough graded (slopes from 1%-3%) and generally slopes from northeast to southwest, with the low point of the site near the intersection of Santo Antonio Drive and Mount Vernon Avenue.

For the purposes of this Drainage Study, the existing hydrologic area includes the Areas in the WQMP that drain to the proposed infiltration basin. Please see summary below:

Table 1: *Existing Hydrologic Area*

Existing Hydrologic Area		
Total (sf)	269,637	Percent
Pervious (sf)	266,941	99.0%
Impervious (sf)	2,696	1.0%

Section VI. Proposed Conditions

Generally, the site maintains the existing drainage patterns with a series of new valley gutters that convey the project runoff to the proposed infiltration basin, which is located at the southwest corner (low point) of the project site. The infiltration basin is designed to infiltrate the design storm event, with any overflow discharging to the existing street flowline in Santo Antonio Drive. See Attachment B for the Hydrology Exhibits.

There are no Public Right-of-Way Improvements associated with the proposed redevelopment other than 2 driveway closures and 2 new driveway entrances.

Table 2: *Proposed Hydrologic Area*

Proposed Hydrologic Area		
Total (sf)	269,637	Percent
Pervious (sf)	26,964	10.0%
Impervious (sf)	242,673	90.0%

Section VII. Hydrologic and Hydraulic Results

Hydrologic calculations were performed using a spreadsheet based on the San Bernardino County Hydrology Manual Methodology as discussed in Section IV. The hydrologic and hydraulic calculations for the existing and proposed conditions may be found within Attachment C of this Report.

The initial time of concentration (critical duration) for each subarea was estimated using the nomograph depicted in Figure D-1.

As there is no existing storm drain infrastructure, the existing site generally flows to the Southwest corner of the property corresponding to a time of concentration of 19 minutes in the existing condition.

The proposed condition has one (1) subarea to determine the peak flow. The initial time of concentration was determined to be 12.75 minutes per the Hydrology Manual. The proposed condition flows to the proposed infiltration basin and ultimately through 4 overflow inlets sized for storm events greater than the 85th percentile event that was analyzed within the separate WQMP Report. The overflows then discharge through the existing curb and to the existing flowline in Santo Antonio Drive.

It should be noted that the post-development Q100 value provided in the subsequent sections is a conservative value based on sheet flow and overflow pipe travel times only. It does not take into account the additional time to fill the infiltration basin completely.

Per Section D.3 of the Hydrology Manual, the time of concentration for an initial subarea is estimated via the nomograph of Figure D-1 (12.75 minutes). The time of concentration for the curb outlets is computed by adding to the initial Tc, the time required for the computed peak flow to travel through the curb outlet structures.

To compute the travel time within the curb outlet runs, Manning's Equation was used to determine the velocity of each pipe:

Manning Equation:

$$Q = VA \qquad V = \frac{k}{n}\left(\frac{A}{P}\right)^{2/3} S^{1/2}$$

Where k = 1.49
A = Flow Area of the Pipe (sf)
P = Wetted Perimeter (ft)

Q = Discharge Flow Rate (cfs)
S = Slope (ft/ft)
V = Velocity (ft/s)

The travel time can be found by dividing the pipe length by the velocity and multiplying the value by 60 to get the travel time in minutes:

Tt (min) = [pipe length (ft)] / [velocity (ft/s) * 60 (sec/min)]

Another important aspect of the design is to size the curb outlets to accommodate the runoff from the 100-year peak flows. Using the Manning's Equation above, the peak flows (Q) for the 100-year storm were calculated for the proposed subarea. The pipes were designed to bypass the capacity of the peak flows whilst maintaining a minimum velocity of at least 2.5 ft/s. As shown in the tabular analysis, the proposed storm drain conveyance system has the capacity to bypass the 100-year rainfall and thus prevent any ponding on the project site by utilizing 4 Curb outlets that are 4"H x 42"W.

Table 3: *Summary of Results*

Hydrologic Summary	Area (sf)	Tc (min)	Intensity (in/hr)	Peak Flow, Q (cfs)	Change %
Existing Site	269,637	19.00	2.09	1.72	705.2%
Proposed Site	269,637	12.83	2.66	13.82	

The proposed peak flows were increased in the redeveloped condition. As such, a Unit Hydrograph analysis was performed using CivilD and Section E of the Hydrology Manual. See section VIII below.

Section VIII. Unit Hydrograph Analysis

Hydrologic Calculations were performed using a spreadsheet based on the Hydrology Manual and Methodology as discussed above. The project is exempt from Hydromod per the WQMP report and attachment I. The results of the Unit Hydrographs are depicted as summarized below:

As depicted in the Table in section VII, the post-development condition increases the Q100 from the pre-development condition. As such further analysis is required. The proposed infiltration basin is sized for the water quality volume. However, the basin also provides volume storage to aide in reducing the post-development runoff volume to match the existing volume. A Unit Hydrograph for the pre and post developed condition was modeled using CivilD per section E of the Hydrology Manual. As such, the 3, 6, and 24-hour duration storms for the 100-year event were analyzed to determine if the bioretention basin is sufficiently sized to reduce the runoff volume to match the pre-development condition. The rainfall depth for the 100-yr 3-hr, 6-hr, and 24-hr storms was determined to be 1.93, 2.66, and 4.78 respectively. This rainfall information was determined via NOAA Atlas 14 show in Attachment D. The Runoff Index for existing was found to be 78 (Natural Covers – Barren – Soil Group A), and for proposed to be 32 (Urban Covers – Residential or Commercial Landscaping) via Figure C-3 of the Hydrology Manual. See Attachment H. The Unit Hydrograph Outputs are included in Attachments J through O. A Summary of applicable results is provided below:

Unit Hydrograph Analysis	Runnoff Volume (cf)		
	100-Yr, 3-hr	100-yr, 6-hr	100-yr, 24 hr
Pre-Development Runnoff Volume (cf)	37,488	51,340	90,849
Post-Development Runnoff Volume (cf)	39,104	53,636	95,070
Excess Volume (cf)	1,616	2,296	4,221
Bioretention Basin Volume (cf)	27,306	27,306	27,306
Adjusted Post-Development Runoff Volume (cf)	11,798	26,330	67,764
Percent Existing	31.5%	51.3%	74.6%

As determined via Unit Hydrograph Analysis, the proposed infiltration basins sufficiently reduce the post-condition runoff volume to less than the existing condition. Thus the proposed development satisfies the requirements of the County of San Bernardino as outlined in the San Bernardino County Hydrology Manual.

Volume was calculated based off of the CivilD Unit Hydrograph Output shown in attachments J-O which give a volume in Acre-Feet. Volumes in the table above were calculated by taking the largest volume (the last volume listed in each output file) and multiplying by 43,560 Square Feet to convert the number from Acre-Feet to Cubic Feet.

Section IX. List of Attachments

Attachment A: Vicinity Map
Attachment B: Ex. & Pr. Hydrologic Maps
Attachment C: Hydrology Spreadsheet (Rational Method)
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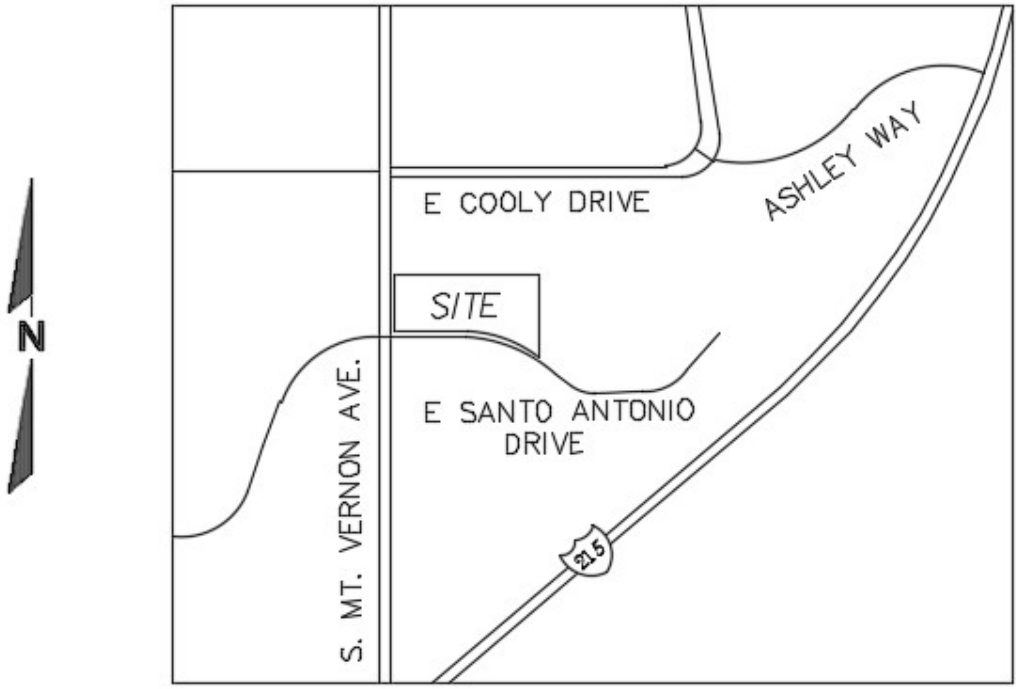
Attachment O: Post-Development Unit Hydrograph (24-Hr)

Attachment A: Vicinity Map

PROJECT VICINITY MAP



Attachment B: Ex. & Pr. Hydrologic Maps

ELEVATION = 942.22

PROPERTY LINE

10' PUBLIC WATER EASEMENT

10" WATER PER AS-BUILT 7414

RIGHT OF WAY LINE

12" WATER PER AS-BUILT 7414

18" VCP PER AS-BUILT 2271

MT. VERNON AVENUE

LONGEST PATH OF TRAVEL = 648'

62.67' PARKING EASEMENT

PROPERTY LINE

ELEVATION = 937.72

100' PUBLIC WATER EASEMENT

8.5' POTENTIAL RIGHT OF WAY DEDICATION PER ALTA

10' ELECTRICAL EASEMENT

10" WATER PER AS-BUILT 7414

RIGHT OF WAY LINE

UNKNOWN PIPE SIZE (PER SURVEY)

SANTO ANTONIO DRIVE

SITE CONDITIONS SUMMARY:

PROJECT SITE =	6.19 ACRES
WATERSHED =	SANTA ANA
INFILTRATION RATE (GEOTECH B-9) =	5.4 IN/HR
GROUNDWATER (GEOTECH) =	>30' DEEP
HYDROLOGIC SOIL GROUP =	A
INFILTRATION IS FEASIBLE	

LEGEND:

- DRAINAGE MANAGEMENT AREA
- LONGEST FLOW PATH
- 938 EXISTING CONTOURS
- SURFACE FLOW DIRECTION
- LANDSCAPE

N

GRAPHIC SCALE
15 0 15 30 60
(IN FEET)

DESCRIPTION	DATE

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Mount Pleasant, WI | Naperville, IL | Irvine, CA

COLTON GIANT RV
1301 E SANTO ANTONIO DRIVE, COLTON, CA 91766

EXISTING HYDROLOGY EXHIBIT

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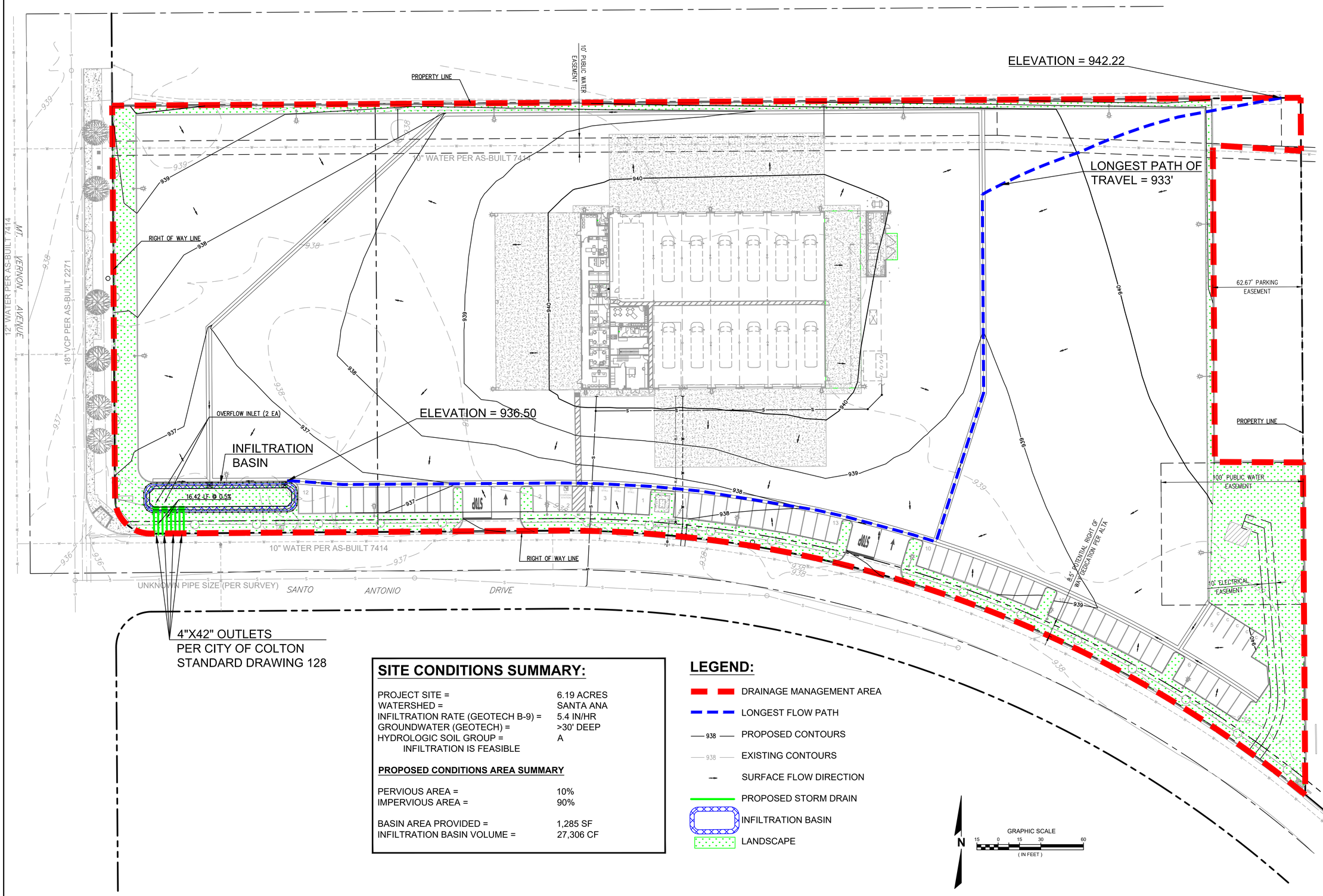
R.A. Smith, Inc.

DATE: 12/17/21
SCALE: 1" = 30'
JOB NO. 3210043
PROJECT MANAGER: COLBY J. NENNIG
DESIGNED BY: CJN
CHECKED BY: RMK

SHEET NUMBER
EX-01



SITE CONDITIONS SUMMARY:

PROJECT SITE =	6.19 ACRES
WATERSHED =	SANTA ANA
INFILTRATION RATE (GEOTECH B-9) =	5.4 IN/HR
GROUNDWATER (GEOTECH) =	>30' DEEP
HYDROLOGIC SOIL GROUP =	A
INFILTRATION IS FEASIBLE	

PROPOSED CONDITIONS AREA SUMMARY

PERVIOUS AREA =	10%
IMPERVIOUS AREA =	90%
BASIN AREA PROVIDED =	1,285 SF
INFILTRATION BASIN VOLUME =	27,306 CF

LEGEND:

- DRAINAGE MANAGEMENT AREA
- LONGEST FLOW PATH
- 938 PROPOSED CONTOURS
- 938 EXISTING CONTOURS
- SURFACE FLOW DIRECTION
- PROPOSED STORM DRAIN
- INFILTRATION BASIN
- LANDSCAPE

N

GRAPHIC SCALE
15 0 15 30 60
(IN FEET)

DESCRIPTION | DATE

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COLTON GIANT RV
1301 E SANTO ANTONIO DRIVE, COLTON, CA 91766

PROPOSED HYDROLOGY EXHIBIT

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R.A. Smith, Inc.

DATE: 12/17/21
SCALE: 1" = 30'
JOB NO. 3210043
PROJECT MANAGER: COLBY J. NENNIG
DESIGNED BY: CJN
CHECKED BY: RMK

SHEET NUMBER
PR-01

Attachment C: Hydrology Spreadsheet (Rational Method)

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JOB NAME: COLTON GIANT RV

JOB NO: 3210043

HYDROLOGIC CALCULATIONS

ADAPTED FROM SAN BERNARDINO COUNTY HYDROLOGY MANUAL																			JHR		12/16/2021	
SAN BERNARDINO COUNTY																						
HYDROLOGY MANUAL		1.14	100-YEAR, 1-HOUR POINT RAINFALL				0.6	INTENSITY-DURATION SLOPE											PAGE	1	OF 1	
													SHEET FLOW			PIPE HYDRAULICS						
NAME/CONCENTRATION	DRAINAGE AREA NAME	AREA	AREA (ACRES)		SOIL	Fp	Tt	Ai	TC	I	Fm	Q(TOTAL)	FLOW PATH	SLOPE	HYDRAULICS AND	PIPE				SLOPE	n	VEL.
POINT		SF	SUBAREA	TOTAL	TYPE	IN/HR	MIN	%	MIN	IN/HR	IN/HR	CFS	LENGTH (FT)	FT/FT	NOTES	H (IN)	W (IN)	PIPE QTY	LENGTH	FT/FT		FPS
SHEET FLOW	EXISTING SITE	269,637	6.19	6.19	A	1.80		1.0%	19.00	2.09	1.78	1.72	648	0.007								
SHEET FLOW	PROPOSED SITE	269,637	6.19	6.19	A	1.80		90.0%	12.75	2.66	0.18	13.82	933	0.006	Q=13.82CAP=16.23							
							0.079								OK	4	42	4	16.42	0.005	0.013	3.5
PROPOSED OVERFLOW	PROPOSED SITE	-	-	6.19	A	1.80		90.0%	12.83	2.66	0.18	13.82	-	-								

Attachment D: NOAA Rainfall Data

NOAA Atlas 14, Volume 6, Version 2
Location name: Colton, California, USA*
Latitude: 34.0521°, Longitude: -117.3092°
Elevation: 938.57 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	0.096 (0.080-0.117)	0.124 (0.103-0.151)	0.161 (0.134-0.197)	0.192 (0.158-0.236)	0.234 (0.186-0.297)	0.267 (0.207-0.346)	0.300 (0.228-0.400)	0.335 (0.247-0.460)	0.383 (0.271-0.549)	0.421 (0.287-0.625)
10-min	0.138 (0.115-0.168)	0.178 (0.148-0.216)	0.231 (0.192-0.282)	0.275 (0.226-0.338)	0.335 (0.267-0.426)	0.382 (0.297-0.496)	0.430 (0.327-0.573)	0.481 (0.354-0.659)	0.550 (0.388-0.786)	0.604 (0.411-0.895)
15-min	0.167 (0.139-0.203)	0.216 (0.179-0.262)	0.280 (0.232-0.341)	0.333 (0.274-0.409)	0.406 (0.322-0.516)	0.462 (0.360-0.600)	0.521 (0.395-0.693)	0.581 (0.428-0.797)	0.665 (0.469-0.951)	0.730 (0.498-1.08)
30-min	0.252 (0.210-0.305)	0.325 (0.270-0.395)	0.422 (0.350-0.514)	0.502 (0.413-0.616)	0.612 (0.486-0.777)	0.697 (0.542-0.905)	0.785 (0.595-1.05)	0.876 (0.646-1.20)	1.00 (0.707-1.43)	1.10 (0.750-1.63)
60-min	0.367 (0.306-0.445)	0.473 (0.394-0.574)	0.614 (0.510-0.748)	0.730 (0.601-0.897)	0.890 (0.708-1.13)	1.01 (0.789-1.32)	1.14 (0.867-1.52)	1.28 (0.940-1.75)	1.46 (1.03-2.09)	1.60 (1.09-2.38)
2-hr	0.524 (0.437-0.636)	0.671 (0.558-0.815)	0.865 (0.717-1.05)	1.02 (0.842-1.26)	1.24 (0.987-1.58)	1.41 (1.10-1.83)	1.58 (1.20-2.11)	1.76 (1.30-2.42)	2.01 (1.42-2.87)	2.20 (1.50-3.26)
3-hr	0.645 (0.537-0.782)	0.823 (0.685-1.00)	1.06 (0.878-1.29)	1.25 (1.03-1.54)	1.52 (1.20-1.93)	1.72 (1.34-2.23)	1.93 (1.46-2.57)	2.14 (1.58-2.94)	2.44 (1.72-3.49)	2.67 (1.82-3.96)
6-hr	0.900 (0.750-1.09)	1.15 (0.954-1.39)	1.47 (1.22-1.79)	1.74 (1.43-2.13)	2.10 (1.67-2.67)	2.38 (1.85-3.09)	2.66 (2.02-3.55)	2.96 (2.18-4.05)	3.36 (2.37-4.80)	3.67 (2.50-5.44)
12-hr	1.19 (0.993-1.45)	1.52 (1.27-1.85)	1.96 (1.63-2.38)	2.31 (1.90-2.84)	2.79 (2.22-3.55)	3.16 (2.46-4.11)	3.54 (2.68-4.71)	3.92 (2.89-5.37)	4.44 (3.14-6.35)	4.85 (3.30-7.18)
24-hr	1.58 (1.40-1.83)	2.04 (1.81-2.36)	2.64 (2.33-3.05)	3.12 (2.73-3.64)	3.77 (3.20-4.55)	4.27 (3.55-5.26)	4.78 (3.87-6.02)	5.30 (4.18-6.86)	6.00 (4.54-8.09)	6.54 (4.78-9.12)
2-day	1.92 (1.70-2.21)	2.51 (2.22-2.90)	3.29 (2.90-3.81)	3.93 (3.43-4.58)	4.79 (4.05-5.77)	5.45 (4.52-6.70)	6.12 (4.96-7.71)	6.82 (5.37-8.82)	7.76 (5.87-10.5)	8.49 (6.21-11.8)
3-day	2.05 (1.81-2.36)	2.72 (2.41-3.14)	3.62 (3.19-4.18)	4.35 (3.81-5.08)	5.36 (4.54-6.46)	6.14 (5.10-7.55)	6.94 (5.63-8.75)	7.78 (6.13-10.1)	8.91 (6.75-12.0)	9.81 (7.17-13.7)
4-day	2.19 (1.94-2.52)	2.94 (2.60-3.39)	3.94 (3.47-4.56)	4.76 (4.17-5.56)	5.90 (5.00-7.11)	6.79 (5.63-8.35)	7.70 (6.24-9.70)	8.66 (6.82-11.2)	9.97 (7.54-13.4)	11.0 (8.05-15.3)
7-day	2.52 (2.23-2.90)	3.41 (3.02-3.94)	4.61 (4.06-5.33)	5.60 (4.90-6.53)	6.97 (5.90-8.40)	8.04 (6.67-9.89)	9.15 (7.41-11.5)	10.3 (8.12-13.3)	11.9 (9.00-16.0)	13.2 (9.62-18.3)
10-day	2.73 (2.42-3.15)	3.73 (3.29-4.30)	5.06 (4.46-5.85)	6.16 (5.39-7.19)	7.70 (6.52-9.28)	8.90 (7.39-10.9)	10.1 (8.22-12.8)	11.4 (9.02-14.8)	13.2 (10.0-17.9)	14.7 (10.7-20.5)
20-day	3.32 (2.94-3.82)	4.57 (4.04-5.27)	6.26 (5.52-7.24)	7.67 (6.71-8.95)	9.64 (8.17-11.6)	11.2 (9.29-13.8)	12.8 (10.4-16.1)	14.5 (11.4-18.8)	16.9 (12.8-22.8)	18.8 (13.7-26.2)
30-day	3.93 (3.48-4.53)	5.43 (4.80-6.27)	7.46 (6.58-8.63)	9.16 (8.01-10.7)	11.5 (9.78-13.9)	13.4 (11.1-16.5)	15.4 (12.5-19.4)	17.5 (13.8-22.6)	20.4 (15.4-27.5)	22.7 (16.6-31.7)
45-day	4.70 (4.16-5.42)	6.48 (5.73-7.48)	8.89 (7.84-10.3)	10.9 (9.56-12.7)	13.8 (11.7-16.6)	16.1 (13.3-19.8)	18.4 (14.9-23.2)	21.0 (16.5-27.1)	24.5 (18.5-33.0)	27.3 (20.0-38.1)
60-day	5.49 (4.86-6.33)	7.52 (6.65-8.68)	10.3 (9.07-11.9)	12.6 (11.0-14.7)	15.9 (13.5-19.2)	18.5 (15.4-22.8)	21.3 (17.2-26.8)	24.2 (19.1-31.3)	28.3 (21.4-38.1)	31.6 (23.1-44.1)

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

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

Please refer to NOAA Atlas 14 document for more information.

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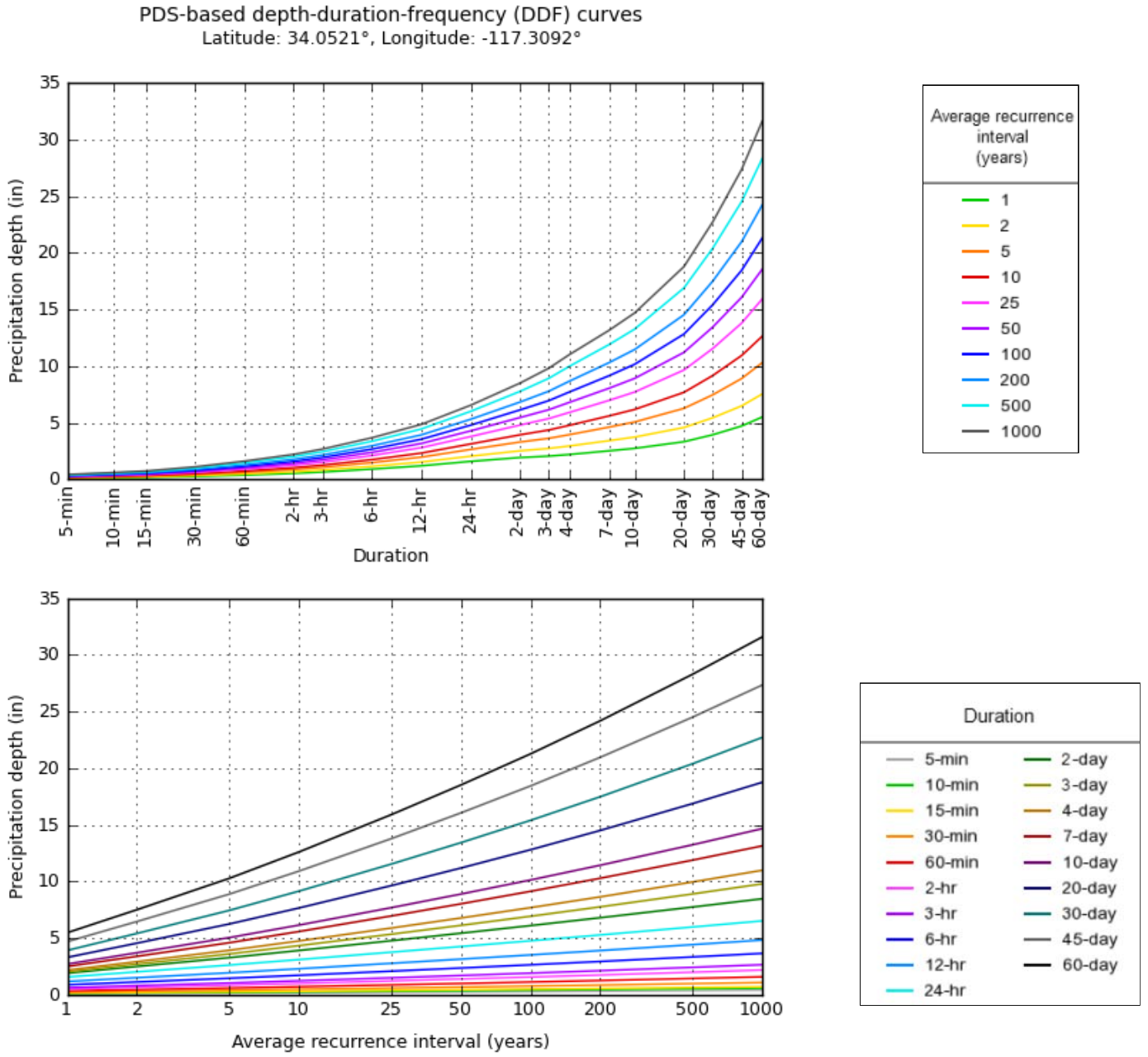
PF graphical



NOAA Atlas 14, Volume 6, Version 2

Created (GMT): Thu Feb 18 19:56:39 2021

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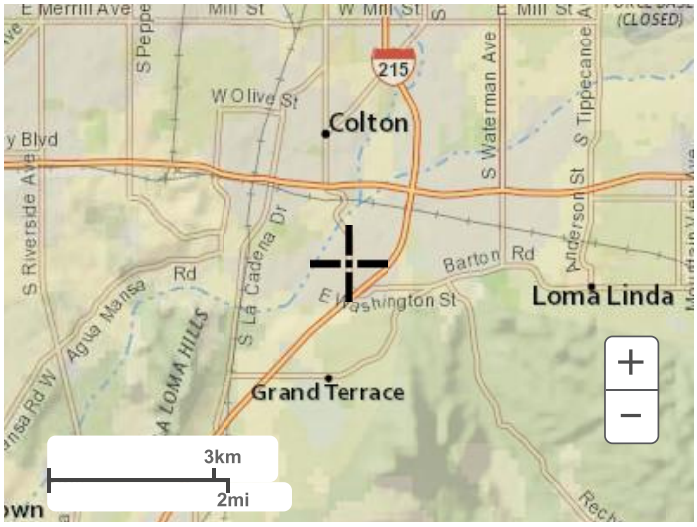
Maps & aerials

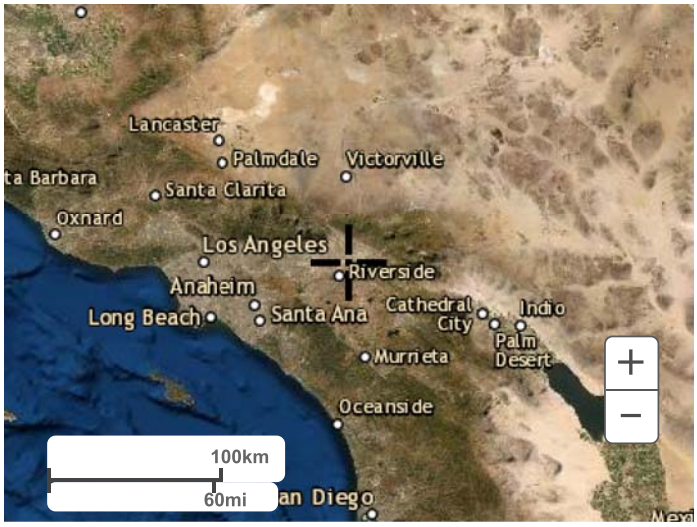
Small scale terrain



Large scale terrain

Large scale map

Large scale aerial



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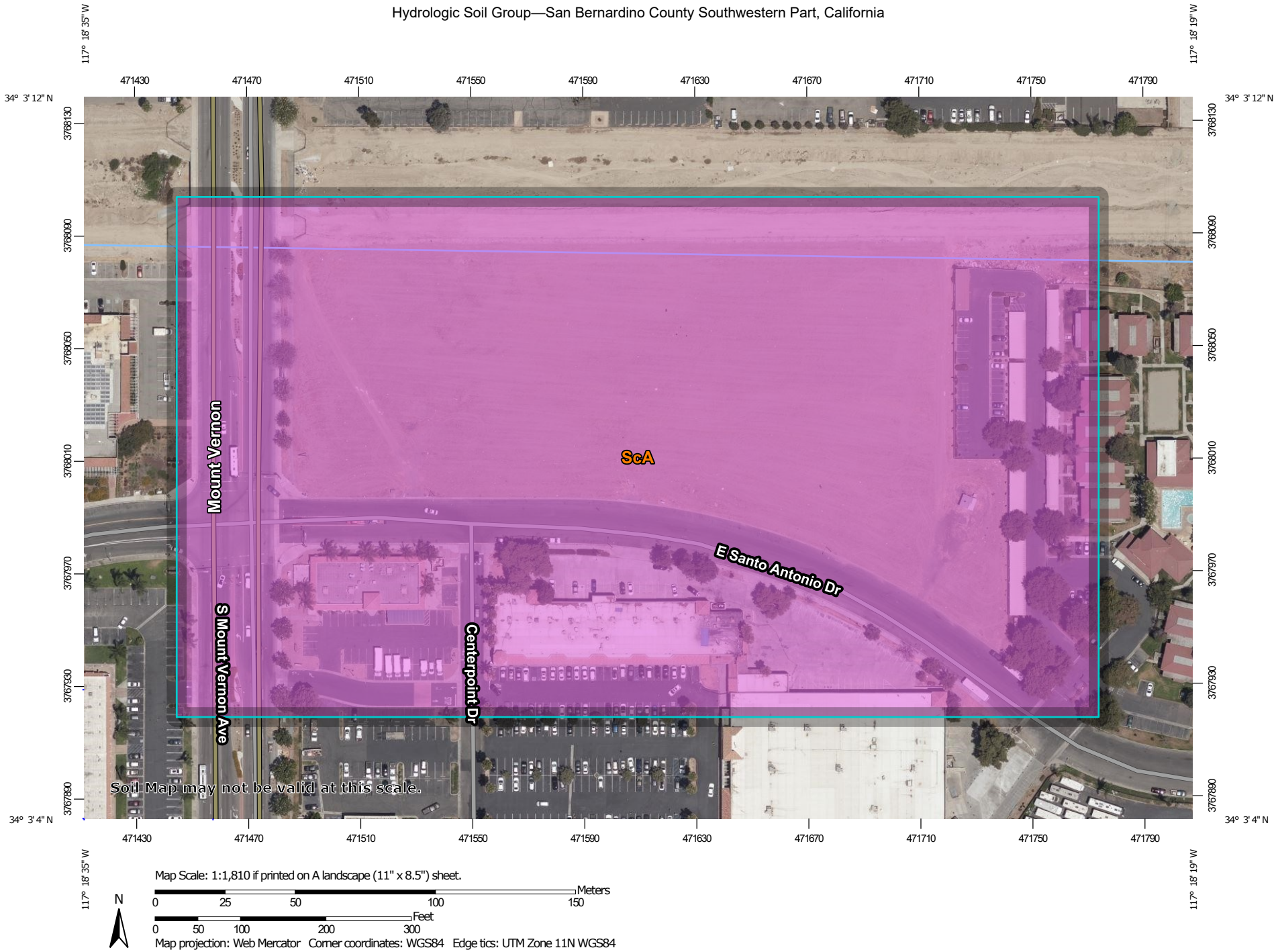
US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

Attachment E: Hydrologic Soil Group Map



Map Scale: 1:1,810 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 25 50 100 150

Feet: 0 50 100 200 300

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 Southwestern Part, California
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: Apr 1, 2018—Jun 30, 2018

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
ScA	San Emigdio fine sandy loam, 0 to 2 percent slopes	A	15.1	100.0%
Totals for Area of Interest			**15.1**	**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

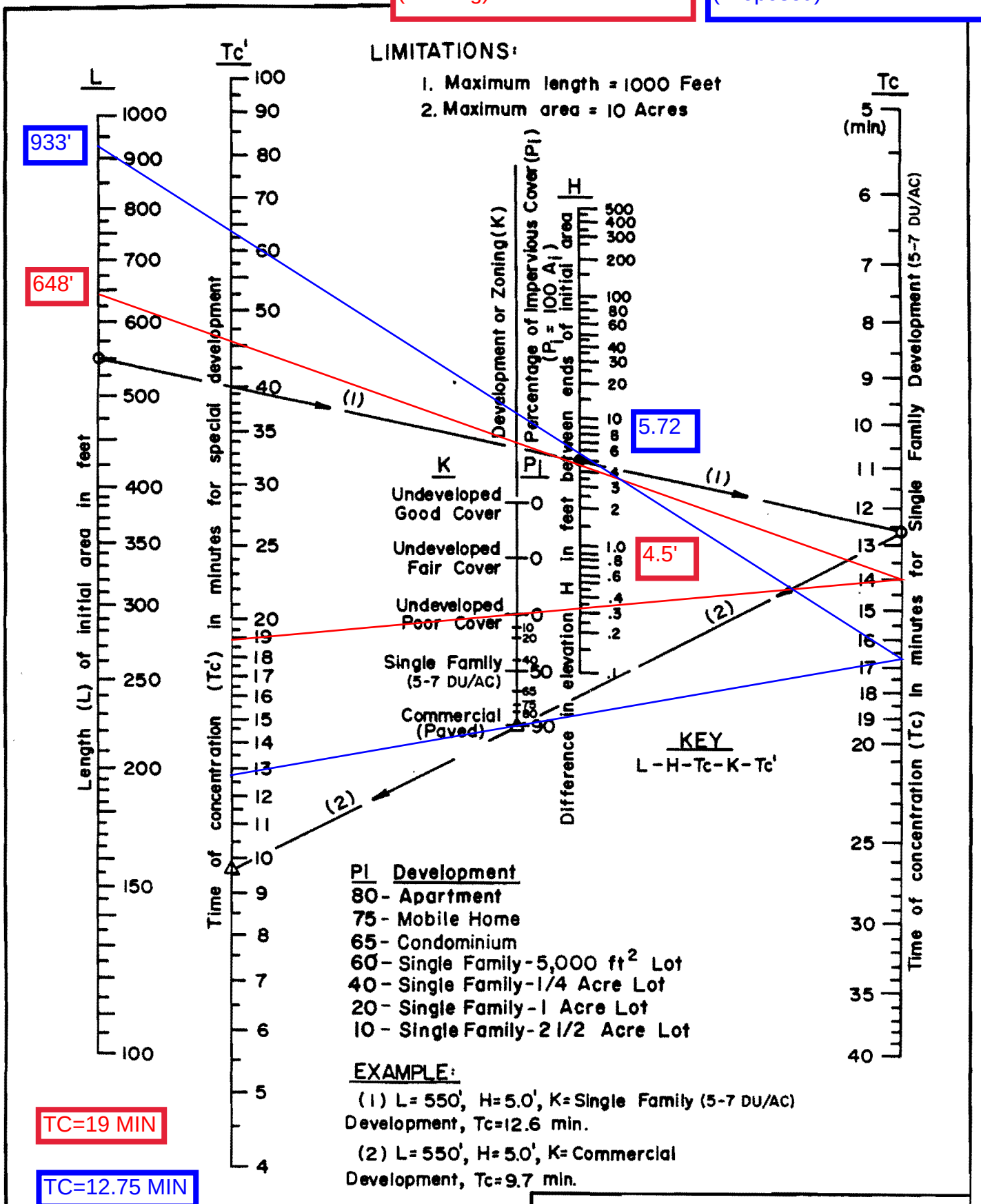
Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Attachment F: Nomograph (Figure D-1)

Initial Time of Concentration (Existing)

Initial Time of Concentration (Proposed)

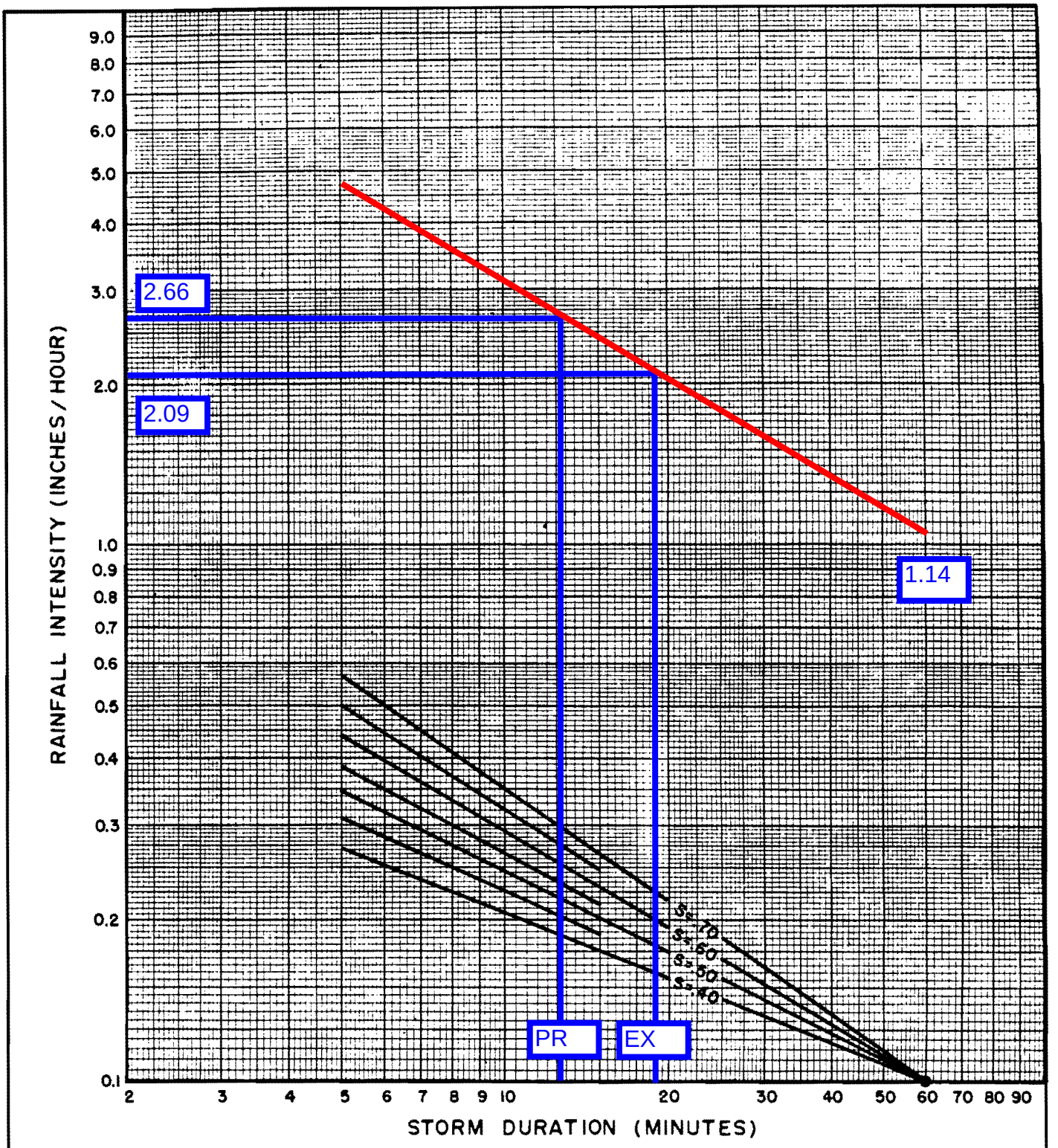


SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

TIME OF CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA

Figure D-1

Attachment G: Intensity-Duration Curves
(Figure D-3)



DESIGN STORM FREQUENCY = 100 YEARS

ONE HOUR POINT RAINFALL = 1.14 INCHES

LOG-LOG SLOPE = 0.60

PROJECT LOCATION = COLTON

SAN BERNARDINO COUNTY

HYDROLOGY MANUAL

INTENSITY - DURATION CURVES CALCULATION SHEET

FIGURE D-3

Attachment H: AMC II Curve Numbers
(Figure C-3)

Curve (1) Numbers of Hydrologic Soil-Cover Complexes For Pervious Areas-AMC II

Cover Type (3)	Quality of Cover (2)	Soil Group A	B	C	D
NATURAL COVERS -					
EXISTING					
Barren (Rockland, eroded and graded land)		78	86	91	93
Chaparral, Broadleaf (Manzonita, ceanothus and scrub oak)	Poor	53	70	80	85
	Fair	40	63	75	81
	Good	31	57	71	78
Chaparral, Narrowleaf (Chamise and redshank)	Poor	71	82	88	91
	Fair	55	72	81	86
Grass, Annual or Perennial	Poor	67	78	86	89
	Fair	50	69	79	84
	Good	38	61	74	80
Meadows or Cienegas (Areas with seasonally high water table, principal vegetation is sod forming grass)	Poor	63	77	85	88
	Fair	51	70	80	84
	Good	30	58	71	78
Open Brush (Soft wood shrubs - buckwheat, sage, etc.)	Poor	62	76	84	88
	Fair	46	66	77	83
	Good	41	63	75	81
Woodland (Coniferous or broadleaf trees predominate. Canopy density is at least 50 percent.)	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	25	55	70	77
Woodland, Grass (Coniferous or broadleaf trees with canopy density from 20 to 50 percent)	Poor	57	73	82	86
	Fair	44	65	77	82
	Good	33	58	72	79
URBAN COVERS - PROPOSED					
Residential or Commercial Landscaping (Lawn, shrubs, etc.)	Good	32	56	69	75
Turf (Irrigated and mowed grass)	Poor	58	74	83	87
	Fair	44	65	77	82
	Good	33	58	72	79
AGRICULTURAL COVERS -					
Fallow (Land plowed but not tilled or seeded)		77	86	91	94

SAN BERNARDINO COUNTY

HYDROLOGY MANUAL

CURVE NUMBERS FOR PERVIOUS AREAS

Figure C-3 (1 of 2)

Curve (1) Numbers of Hydrologic Soil-Cover Complexes For Pervious Areas-AMC II

Cover Type (3)	Quality of Cover (2)	Soil Group A	B	C	D
AGRICULTURAL COVERS (Continued)					
Legumes, Close Seeded (Alfalfa, sweetclover, timothy, etc.)	Poor	66	77	85	89
	Good	58	72	81	85
Orchards, Evergreen (Citrus, avocados, etc.)	Poor	57	73	82	86
	Fair	44	65	77	82
	Good	33	58	72	79
Pasture, Dryland (Annual grasses)	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Pasture, Irrigated (Legumes and perennial grass)	Poor	58	74	83	87
	Fair	44	65	77	82
	Good	33	58	72	79
Row Crops (Field crops - tomatoes, sugar beets, etc.)	Poor	72	81	88	91
	Good	67	78	85	89
Small grain (Wheat, oats, barley, etc.)	Poor	65	76	84	88
	Good	63	75	83	87

Notes:

1. All curve numbers are for Antecedent Moisture Condition (AMC) II.
2. Quality of cover definitions:

   Poor-Heavily grazed, regularly burned areas, or areas of high burn potential. Less than 50 percent of the ground surface is protected by plant cover or brush and tree canopy.

   Fair-Moderate cover with 50 percent to 75 percent of the ground surface protected.

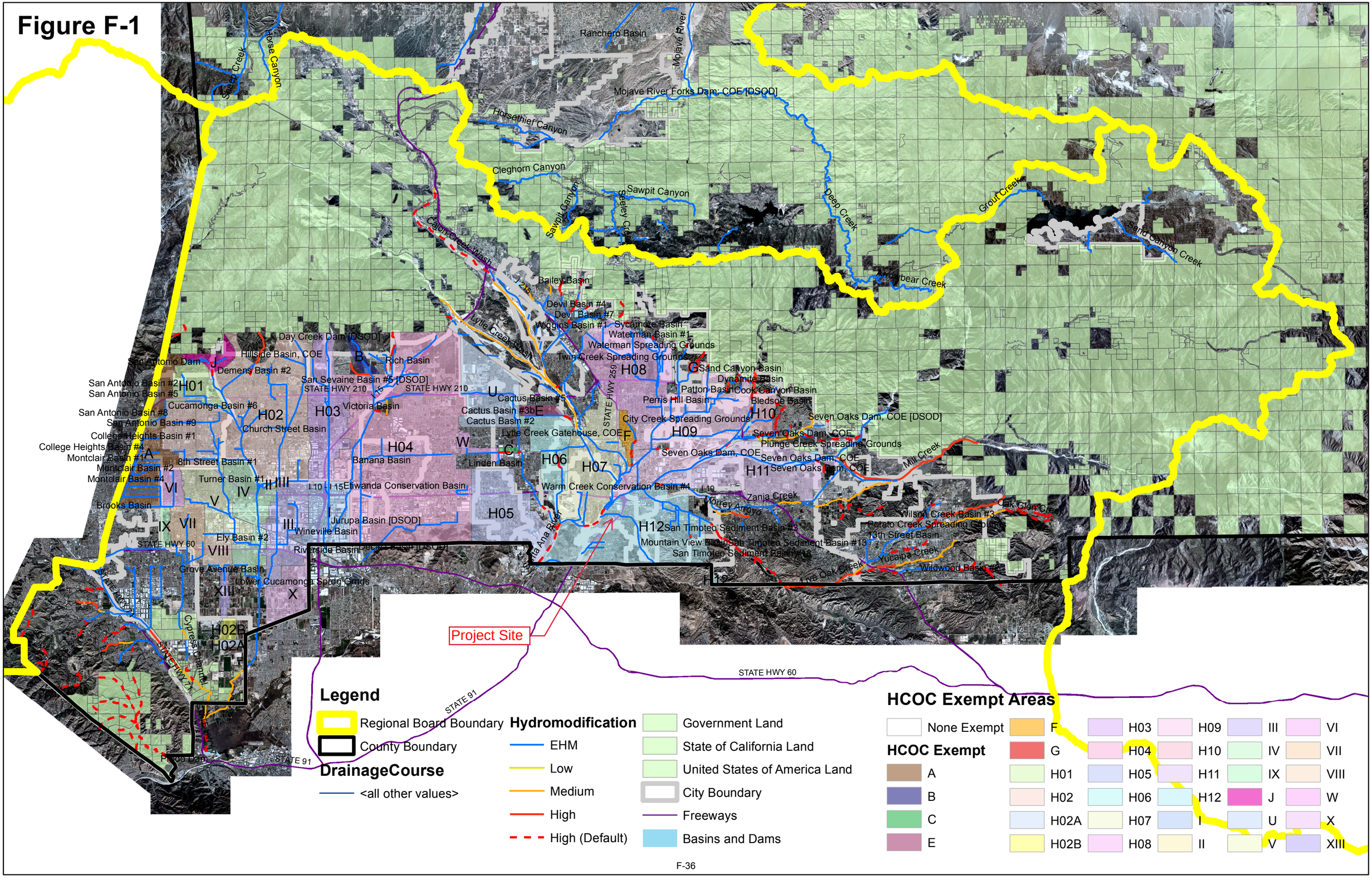
   Good-Heavy or dense cover with more than 75 percent of the ground surface protected.
3. See Figure C-2 for definition of cover types.

SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

CURVE NUMBERS FOR PERVIOUS AREAS

Attachment I: HCOC Exemption Criteria and Map (Figure F-1)

Figure F-1



Legend

- Regional Board Boundary
- County Boundary

DrainageCourse

- <all other values>

Hydromodification

- EHM
- Low
- Medium
- High
- High (Default)

- Government Land
- State of California Land
- United States of America Land
- City Boundary
- Freeways
- Basins and Dams

HCOC Exempt Areas

- None Exempt

HCOC Exempt

A, B, C, E, F, G, H01, H02, H02A, H02B, H03, H04, H05, H06, H07, H08, H09, H10, H11, H12, I, II, III, IV, V, VI, VII, VIII, IX, J, U, W, X, XIII

Hydromodification

A.1 Hydrologic Conditions of Concern (HCOC) Analysis

HCOC Exemption:

1. **Sump Condition:** All downstream conveyance channel to an adequate sump (for example, Prado Dam, Santa Ana River, or other Lake, Reservoir or naturally erosion resistant feature) that will receive runoff from the project are engineered and regularly maintained to ensure design flow capacity; no sensitive stream habitat areas will be adversely affected; or are not identified on the Co-Permittees Hydromodification Sensitivity Maps.

2. **Pre = Post**: The runoff flow rate, volume and velocity for the post-development condition of the Priority Development Project do not exceed the pre-development (i.e, naturally occurring condition for the 2-year, 24-hour rainfall event utilizing latest San Bernardino County Hydrology Manual.

    a. Submit a substantiated hydrologic analysis to justify your request.

3. **Diversion to Storage Area**: The drainage areas that divert to water storage areas which are considered as control/release point and utilized for water conservation.

    a. See Appendix F for the HCOC Exemption Map and the on-line Watershed Geodatabase (http://sbcounty.permitrack.com/wap) for reference.

4. **Less than One Acre**: The Priority Development Project disturbs less than one acre. The Co-permittee has the discretion to require a Project Specific WQMP to address HCOCs on projects less than one acre on a case by case basis. The project disturbs less than one acre and is not part of a common plan of development.

5. **Built Out Area**: The contributing watershed area to which the project discharges has a developed area percentage greater than 90 percent.

    a. See Appendix F for the HCOC Exemption Map and the on-line Watershed Geodatabase (http://sbcounty.permitrack.com/wap) for reference.

Summary of HCOC Exempted Area

	HCOC Exemption reasoning				
	1	2	3	4	5
Area					
A			X		X
B			X		
C					X
E			X		
F					X
G			X		X
H01	X		X		
H02	X		X		
H02A	X		X		
H02B			X		
H03			X		
H04	X		X		
H05	X				
H06			X		
H07	X				
H08	X		X		
H09	X				
H10	X		X		
H11	X		X		
H12	X				
J			X		
U			X		
W			X		
I			X		
II			X		
III					X
IV			X		X
V			X*		
VI					X
VII					X
VIII			X		
IX					X
X			X		
XIII			X		

*Detention/Conservation Basin

Attachment J: Pre-Development Unit Hydrograph (3-Hr)

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 - 2018, Version 9.0

Study date 12/20/21

++

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

Program License Serial Number 6458

Existing 100 Year 3 Hr Event

Storm Event Year = 100

Antecedent Moisture Condition = 3

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 100		
6.19	1	1.14
Rainfall data for year 100		
6.19	6	2.66
Rainfall data for year 100		
6.19	24	4.78

++

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

SCS curve No.(AMCII)	SCS curve NO.(AMC 3)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
78.0	92.8	6.19	1.000	0.140	0.990	0.139

Area-averaged adjusted loss rate Fm (In/Hr) = 0.139

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

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC3)	S	Pervious Yield Fr
6.13	0.990	78.0	92.8	0.78	0.829
0.06	0.010	98.0	98.0	0.20	0.951

Area-averaged catchment yield fraction, Y = 0.830
Area-averaged low loss fraction, Yb = 0.170
User entry of time of concentration = 0.317 (hours)
++
Watershed area = 6.19(Ac.)
Catchment Lag time = 0.253 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 32.9017
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.139(In/Hr)
Average low loss rate fraction (Yb) = 0.170 (decimal)
VALLEY UNDEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.422(In)
Computed peak 30-minute rainfall = 0.864(In)
Specified peak 1-hour rainfall = 1.140(In)
Computed peak 3-hour rainfall = 1.917(In)
Specified peak 6-hour rainfall = 2.660(In)
Specified peak 24-hour rainfall = 4.780(In)

Rainfall depth area reduction factors:
Using a total area of 6.19(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.422(In)
30-minute factor = 1.000 Adjusted rainfall = 0.864(In)
1-hour factor = 1.000 Adjusted rainfall = 1.140(In)
3-hour factor = 1.000 Adjusted rainfall = 1.917(In)
6-hour factor = 1.000 Adjusted rainfall = 2.660(In)
24-hour factor = 1.000 Adjusted rainfall = 4.780(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 = 74.86 (CFS))

1	3.290	2.463
2	15.867	9.415
3	37.249	16.006
4	57.428	15.107
5	68.719	8.452
6	75.145	4.810
7	79.652	3.374
8	83.144	2.615
9	86.002	2.139
10	88.251	1.684
11	90.194	1.454
12	91.748	1.164
13	93.056	0.979
14	94.110	0.789
15	95.112	0.750
16	96.014	0.675
17	96.738	0.542
18	97.364	0.469
19	97.918	0.415
20	98.378	0.345
21	98.745	0.274
22	99.074	0.246
23	99.403	0.246
24	99.732	0.246
25	100.000	0.201

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.4218	0.4218
2	0.5566	0.1348
3	0.6546	0.0980
4	0.7344	0.0798
5	0.8030	0.0686
6	0.8637	0.0607
7	0.9186	0.0549
8	0.9690	0.0504
9	1.0158	0.0467
10	1.0595	0.0437
11	1.1007	0.0412
12	1.1397	0.0390
13	1.1837	0.0440
14	1.2259	0.0422
15	1.2666	0.0407
16	1.3058	0.0393
17	1.3438	0.0380
18	1.3807	0.0368
19	1.4164	0.0358
20	1.4512	0.0348
21	1.4851	0.0339
22	1.5182	0.0330
23	1.5504	0.0323

24	1.5820	0.0315
25	1.6128	0.0309
26	1.6430	0.0302
27	1.6726	0.0296
28	1.7017	0.0290
29	1.7302	0.0285
30	1.7581	0.0280
31	1.7856	0.0275
32	1.8126	0.0270
33	1.8392	0.0266
34	1.8654	0.0262
35	1.8911	0.0258
36	1.9165	0.0254

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0254	0.0043	0.0211
2	0.0258	0.0044	0.0214
3	0.0266	0.0045	0.0221
4	0.0270	0.0046	0.0224
5	0.0280	0.0048	0.0232
6	0.0285	0.0048	0.0236
7	0.0296	0.0050	0.0246
8	0.0302	0.0051	0.0251
9	0.0315	0.0054	0.0262
10	0.0323	0.0055	0.0268
11	0.0339	0.0058	0.0281
12	0.0348	0.0059	0.0289
13	0.0368	0.0063	0.0306
14	0.0380	0.0065	0.0315
15	0.0407	0.0069	0.0338
16	0.0422	0.0072	0.0350
17	0.0390	0.0066	0.0323
18	0.0412	0.0070	0.0342
19	0.0467	0.0080	0.0388
20	0.0504	0.0086	0.0418
21	0.0607	0.0103	0.0504
22	0.0686	0.0116	0.0570
23	0.0980	0.0116	0.0864
24	0.1348	0.0116	0.1232
25	0.4218	0.0116	0.4102
26	0.0798	0.0116	0.0683
27	0.0549	0.0094	0.0456
28	0.0437	0.0074	0.0363
29	0.0440	0.0075	0.0365
30	0.0393	0.0067	0.0326
31	0.0358	0.0061	0.0297
32	0.0330	0.0056	0.0274
33	0.0309	0.0053	0.0256
34	0.0290	0.0049	0.0241
35	0.0275	0.0047	0.0228

```
 36              0.0262          0.0045              0.0217
-------------------------------------------------------------------
-------------------------------------------------------------------
Total soil rain loss =      0.25(In)
Total effective rainfall =      1.67(In)
Peak flow rate in flood hydrograph =     10.87(CFS)
-------------------------------------------------------------------
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                    3 - 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       0.0004      0.05  Q         |         |         |         |
  0+10       0.0021      0.25  Q         |         |         |         |
  0+15       0.0062      0.59  VQ        |         |         |         |
  0+20       0.0125      0.92  VQ        |         |         |         |
  0+25       0.0203      1.12  V Q       |         |         |         |
  0+30       0.0289      1.25  |VQ       |         |         |         |
  0+35       0.0382      1.35  |VQ       |         |         |         |
  0+40       0.0481      1.44  | Q       |         |         |         |
  0+45       0.0587      1.53  | VQ      |         |         |         |
  0+50       0.0698      1.61  |  Q      |         |         |         |
  0+55       0.0814      1.69  |  Q      |         |         |         |
  1+ 0       0.0936      1.77  |  QV     |         |         |         |
  1+ 5       0.1064      1.85  |  QV     |         |         |         |
  1+10       0.1197      1.94  |  Q V    |         |         |         |
  1+15       0.1337      2.03  |   Q V   |         |         |         |
  1+20       0.1484      2.13  |   Q V   |         |         |         |
  1+25       0.1638      2.23  |   Q  V  |         |         |         |
  1+30       0.1797      2.30  |   Q   V |         |         |         |
  1+35       0.1959      2.36  |   Q    V|         |         |         |
  1+40       0.2127      2.44  |   Q    V|         |         |         |
  1+45       0.2307      2.60  |    Q    V         |         |         |
  1+50       0.2503      2.85  |    Q    |V        |         |         |
  1+55       0.2725      3.23  |     Q   | V       |         |         |
  2+ 0       0.2994      3.90  |      Q  |  V      |         |         |
  2+ 5       0.3382      5.64  |         |Q   V    |         |         |
  2+10       0.3979      8.66  |         |      QV |         |         |
  2+15       0.4727     10.87  |         |         |Q        |         |
  2+20       0.5417     10.02  |         |         Q    V    |         |
  2+25       0.5910      7.15  |         |   Q     |      V  |         |
  2+30       0.6281      5.39  |         Q         |        V|         |
  2+35       0.6593      4.54  |        Q|         |         V         |
  2+40       0.6870      4.01  |       Q |         |         |V        |
  2+45       0.7118      3.61  |      Q  |         |         |  V      |
  2+50       0.7342      3.25  |     Q   |         |         |   V     |
  2+55       0.7547      2.98  |    Q    |         |         |    V    |
  3+ 0       0.7734      2.72  |    Q    |         |         |    V    |
  3+ 5       0.7904      2.47  |   Q     |         |         |     V   |
```

```
    3+10       0.8049      2.09  |   Q     |          |          |      V  |
    3+15       0.8162      1.65  |  Q      |          |          |      V  |
    3+20       0.8247      1.23  | Q       |          |          |       V |
    3+25       0.8313      0.96  |Q        |          |          |       V |
    3+30       0.8367      0.79  |Q        |          |          |       V |
    3+35       0.8412      0.66  |Q        |          |          |        V|
    3+40       0.8450      0.55  |Q        |          |          |        V|
    3+45       0.8482      0.46  Q         |          |          |        V|
    3+50       0.8509      0.39  Q         |          |          |        V|
    3+55       0.8532      0.34  Q         |          |          |        V|
    4+ 0       0.8552      0.29  Q         |          |          |        V|
    4+ 5       0.8568      0.23  Q         |          |          |        V|
    4+10       0.8577      0.13  Q         |          |          |        V|
    4+15       0.8584      0.10  Q         |          |          |        V|
    4+20       0.8590      0.08  Q         |          |          |        V|
    4+25       0.8594      0.06  Q         |          |          |        V|
    4+30       0.8598      0.05  Q         |          |          |        V|
    4+35       0.8600      0.04  Q         |          |          |        V|
    4+40       0.8602      0.03  Q         |          |          |        V|
    4+45       0.8604      0.02  Q         |          |          |        V|
    4+50       0.8605      0.02  Q         |          |          |        V|
    4+55       0.8605      0.01  Q         |          |          |        V|
    5+ 0       0.8606      0.00  Q         |          |          |         V
-------------------------------------------------------------------------
```

Attachment K: Pre-Development Unit Hydrograph (6-Hr)

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 - 2018, Version 9.0

Study date 12/20/21

++

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

Program License Serial Number 6458

Existing 100 Year 6 Hour Event

Storm Event Year = 100

Antecedent Moisture Condition = 3

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 100		
6.19	1	1.14
Rainfall data for year 100		
6.19	6	2.66
Rainfall data for year 100		
6.19	24	4.78

++

```
        ******** 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          6.19      1.000     0.140    0.990    0.139

        Area-averaged adjusted loss rate Fm (In/Hr) =  0.139

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

        Area       Area          SCS CN    SCS CN      S     Pervious
         (Ac.)      Fract         (AMC2)    (AMC3)           Yield Fr
             6.13   0.990         78.0      92.8       0.78     0.829
             0.06   0.010         98.0      98.0       0.20     0.951

        Area-averaged catchment yield fraction, Y =  0.830
        Area-averaged low loss fraction, Yb =  0.170
        User entry of time of concentration  =   0.317 (hours)
        ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
        Watershed area =       6.19(Ac.)
        Catchment Lag time =   0.253 hours
        Unit interval =   5.000 minutes
        Unit interval percentage of lag time = 32.9017
        Hydrograph baseflow =     0.00(CFS)
        Average maximum watershed loss rate(Fm) =  0.139(In/Hr)
        Average low loss rate fraction (Yb) = 0.170 (decimal)
        VALLEY UNDEVELOPED S-Graph Selected
        Computed peak 5-minute rainfall =  0.422(In)
        Computed peak 30-minute rainfall =  0.864(In)
        Specified peak 1-hour rainfall =  1.140(In)
        Computed peak 3-hour rainfall =  1.917(In)
        Specified peak 6-hour rainfall =  2.660(In)
        Specified peak 24-hour rainfall =  4.780(In)


        Rainfall depth area reduction factors:
        Using a total area of       6.19(Ac.) (Ref: fig. E-4)

        5-minute factor = 1.000     Adjusted rainfall =  0.422(In)
        30-minute factor = 1.000    Adjusted rainfall =  0.864(In)
        1-hour factor = 1.000       Adjusted rainfall =  1.140(In)
        3-hour factor = 1.000       Adjusted rainfall =  1.917(In)
        6-hour factor = 1.000       Adjusted rainfall =  2.660(In)
        24-hour factor = 1.000      Adjusted rainfall =  4.780(In)
        ---------------------------------------------------------------------

                              U n i t  H y d r o g r a p h
        +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
        Interval          'S' Graph          Unit Hydrograph
        Number            Mean values             ((CFS))
        ---------------------------------------------------------------------
```

(K = 74.86 (CFS))

1	3.290	2.463
2	15.867	9.415
3	37.249	16.006
4	57.428	15.107
5	68.719	8.452
6	75.145	4.810
7	79.652	3.374
8	83.144	2.615
9	86.002	2.139
10	88.251	1.684
11	90.194	1.454
12	91.748	1.164
13	93.056	0.979
14	94.110	0.789
15	95.112	0.750
16	96.014	0.675
17	96.738	0.542
18	97.364	0.469
19	97.918	0.415
20	98.378	0.345
21	98.745	0.274
22	99.074	0.246
23	99.403	0.246
24	99.732	0.246
25	100.000	0.201

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.4218	0.4218
2	0.5566	0.1348
3	0.6546	0.0980
4	0.7344	0.0798
5	0.8030	0.0686
6	0.8637	0.0607
7	0.9186	0.0549
8	0.9690	0.0504
9	1.0158	0.0467
10	1.0595	0.0437
11	1.1007	0.0412
12	1.1397	0.0390
13	1.1837	0.0440
14	1.2259	0.0422
15	1.2666	0.0407
16	1.3058	0.0393
17	1.3438	0.0380
18	1.3807	0.0368
19	1.4164	0.0358
20	1.4512	0.0348
21	1.4851	0.0339
22	1.5182	0.0330
23	1.5504	0.0323

24	1.5820	0.0315	
25	1.6128	0.0309	
26	1.6430	0.0302	
27	1.6726	0.0296	
28	1.7017	0.0290	
29	1.7302	0.0285	
30	1.7581	0.0280	
31	1.7856	0.0275	
32	1.8126	0.0270	
33	1.8392	0.0266	
34	1.8654	0.0262	
35	1.8911	0.0258	
36	1.9165	0.0254	
37	1.9415	0.0250	
38	1.9662	0.0246	
39	1.9905	0.0243	
40	2.0144	0.0240	
41	2.0381	0.0237	
42	2.0614	0.0234	
43	2.0845	0.0231	
44	2.1073	0.0228	
45	2.1298	0.0225	
46	2.1521	0.0223	
47	2.1741	0.0220	
48	2.1958	0.0218	
49	2.2173	0.0215	
50	2.2386	0.0213	
51	2.2597	0.0211	
52	2.2805	0.0208	
53	2.3012	0.0206	
54	2.3216	0.0204	
55	2.3418	0.0202	
56	2.3619	0.0200	
57	2.3817	0.0199	
58	2.4014	0.0197	
59	2.4209	0.0195	
60	2.4402	0.0193	
61	2.4594	0.0191	
62	2.4783	0.0190	
63	2.4972	0.0188	
64	2.5158	0.0187	
65	2.5344	0.0185	
66	2.5527	0.0184	
67	2.5709	0.0182	
68	2.5890	0.0181	
69	2.6069	0.0179	
70	2.6247	0.0178	
71	2.6424	0.0177	
72	2.6599	0.0175	

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)

1	0.0175	0.0030	0.0146
2	0.0177	0.0030	0.0147
3	0.0179	0.0031	0.0149
4	0.0181	0.0031	0.0150
5	0.0184	0.0031	0.0152
6	0.0185	0.0032	0.0154
7	0.0188	0.0032	0.0156
8	0.0190	0.0032	0.0158
9	0.0193	0.0033	0.0160
10	0.0195	0.0033	0.0162
11	0.0199	0.0034	0.0165
12	0.0200	0.0034	0.0166
13	0.0204	0.0035	0.0170
14	0.0206	0.0035	0.0171
15	0.0211	0.0036	0.0175
16	0.0213	0.0036	0.0177
17	0.0218	0.0037	0.0181
18	0.0220	0.0037	0.0183
19	0.0225	0.0038	0.0187
20	0.0228	0.0039	0.0189
21	0.0234	0.0040	0.0194
22	0.0237	0.0040	0.0196
23	0.0243	0.0041	0.0202
24	0.0246	0.0042	0.0204
25	0.0254	0.0043	0.0211
26	0.0258	0.0044	0.0214
27	0.0266	0.0045	0.0221
28	0.0270	0.0046	0.0224
29	0.0280	0.0048	0.0232
30	0.0285	0.0048	0.0236
31	0.0296	0.0050	0.0246
32	0.0302	0.0051	0.0251
33	0.0315	0.0054	0.0262
34	0.0323	0.0055	0.0268
35	0.0339	0.0058	0.0281
36	0.0348	0.0059	0.0289
37	0.0368	0.0063	0.0306
38	0.0380	0.0065	0.0315
39	0.0407	0.0069	0.0338
40	0.0422	0.0072	0.0350
41	0.0390	0.0066	0.0323
42	0.0412	0.0070	0.0342
43	0.0467	0.0080	0.0388
44	0.0504	0.0086	0.0418
45	0.0607	0.0103	0.0504
46	0.0686	0.0116	0.0570
47	0.0980	0.0116	0.0864
48	0.1348	0.0116	0.1232
49	0.4218	0.0116	0.4102
50	0.0798	0.0116	0.0683
51	0.0549	0.0094	0.0456
52	0.0437	0.0074	0.0363

53	0.0440	0.0075	0.0365
54	0.0393	0.0067	0.0326
55	0.0358	0.0061	0.0297
56	0.0330	0.0056	0.0274
57	0.0309	0.0053	0.0256
58	0.0290	0.0049	0.0241
59	0.0275	0.0047	0.0228
60	0.0262	0.0045	0.0217
61	0.0250	0.0043	0.0207
62	0.0240	0.0041	0.0199
63	0.0231	0.0039	0.0191
64	0.0223	0.0038	0.0185
65	0.0215	0.0037	0.0179
66	0.0208	0.0035	0.0173
67	0.0202	0.0034	0.0168
68	0.0197	0.0033	0.0163
69	0.0191	0.0033	0.0159
70	0.0187	0.0032	0.0155
71	0.0182	0.0031	0.0151
72	0.0178	0.0030	0.0148

Total soil rain loss = 0.37(In)
Total effective rainfall = 2.29(In)
Peak flow rate in flood hydrograph = 10.87(CFS)

++

6 - 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	0.0002	0.04	Q				
0+10	0.0014	0.17	Q				
0+15	0.0042	0.41	Q				
0+20	0.0086	0.63	VQ				
0+25	0.0138	0.76	VQ				
0+30	0.0196	0.84	VQ				
0+35	0.0258	0.90	VQ				
0+40	0.0323	0.95	|Q				
0+45	0.0392	0.99	|Q				
0+50	0.0462	1.03	|VQ				
0+55	0.0536	1.06	|VQ				
1+ 0	0.0611	1.09	| Q				
1+ 5	0.0688	1.12	| Q				
1+10	0.0767	1.15	| Q				
1+15	0.0848	1.18	| Q				
1+20	0.0931	1.20	| QV				
1+25	0.1015	1.23	| QV				
1+30	0.1102	1.25	| QV				

1+35	0.1190	1.28	Q V				
1+40	0.1279	1.30	Q V				
1+45	0.1371	1.33	Q V				
1+50	0.1464	1.36	Q V				
1+55	0.1560	1.38	Q V				
2+ 0	0.1657	1.41	Q V				
2+ 5	0.1756	1.44	Q V				
2+10	0.1857	1.47	Q V				
2+15	0.1961	1.50	Q V				
2+20	0.2066	1.53	Q V				
2+25	0.2174	1.57	Q V				
2+30	0.2285	1.60	Q V				
2+35	0.2398	1.64	Q V				
2+40	0.2514	1.68	Q V				
2+45	0.2633	1.73	Q V				
2+50	0.2755	1.78	Q V				
2+55	0.2881	1.83	Q V				
3+ 0	0.3011	1.89	Q V				
3+ 5	0.3145	1.95	Q V				
3+10	0.3285	2.02	Q V				
3+15	0.3430	2.10	Q V				
3+20	0.3581	2.19	Q V				
3+25	0.3738	2.28	Q V				
3+30	0.3899	2.34	Q V				
3+35	0.4064	2.39	Q V				
3+40	0.4233	2.47	Q V				
3+45	0.4414	2.62	Q V				
3+50	0.4611	2.86	Q V				
3+55	0.4834	3.24	Q V				
4+ 0	0.5103	3.90	Q V				
4+ 5	0.5491	5.64	Q V				
4+10	0.6088	8.66	Q V				
4+15	0.6837	10.87	Q V				
4+20	0.7526	10.02	Q V				
4+25	0.8019	7.15	Q V				
4+30	0.8390	5.39	Q V				
4+35	0.8703	4.54	Q V				
4+40	0.8979	4.01	Q V				
4+45	0.9227	3.61	Q V				
4+50	0.9451	3.25	Q V				
4+55	0.9656	2.98	Q V				
5+ 0	0.9844	2.72	Q V				
5+ 5	1.0017	2.52	Q V				
5+10	1.0178	2.34	Q V				
5+15	1.0331	2.22	Q V				
5+20	1.0475	2.09	Q V				
5+25	1.0609	1.96	Q V				
5+30	1.0737	1.85	Q V				
5+35	1.0858	1.76	Q V				
5+40	1.0972	1.66	Q V				
5+45	1.1081	1.58	Q V				
5+50	1.1185	1.52	Q V				
5+55	1.1286	1.46	Q V				

```
    6+ 0       1.1383      1.41  | Q       |         |         |       V |
    6+ 5       1.1473      1.30  | Q       |         |         |       V |
    6+10       1.1545      1.05  | Q       |         |         |        V|
    6+15       1.1599      0.79  |Q        |         |         |        V|
    6+20       1.1637      0.54  |Q        |         |         |        V|
    6+25       1.1665      0.40  Q         |         |         |        V|
    6+30       1.1687      0.32  Q         |         |         |        V|
    6+35       1.1705      0.26  Q         |         |         |        V|
    6+40       1.1720      0.22  Q         |         |         |        V|
    6+45       1.1732      0.18  Q         |         |         |        V|
    6+50       1.1742      0.15  Q         |         |         |        V|
    6+55       1.1751      0.12  Q         |         |         |        V|
    7+ 0       1.1758      0.10  Q         |         |         |        V|
    7+ 5       1.1764      0.09  Q         |         |         |        V|
    7+10       1.1769      0.07  Q         |         |         |        V|
    7+15       1.1773      0.06  Q         |         |         |        V|
    7+20       1.1776      0.05  Q         |         |         |        V|
    7+25       1.1779      0.04  Q         |         |         |        V|
    7+30       1.1781      0.03  Q         |         |         |        V|
    7+35       1.1782      0.02  Q         |         |         |        V|
    7+40       1.1784      0.02  Q         |         |         |        V|
    7+45       1.1785      0.01  Q         |         |         |        V|
    7+50       1.1785      0.01  Q         |         |         |        V|
    7+55       1.1786      0.01  Q         |         |         |        V|
    8+ 0       1.1786      0.00  Q         |         |         |         V
---------------------------------------------------------------------------
```

Attachment L: Pre-Development Unit Hydrograph (24-Hr)

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 - 2018, Version 9.0

Study date 12/20/21

++

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

Program License Serial Number 6458

Existing 100 Year 24 Hour Event

Storm Event Year = 100

Antecedent Moisture Condition = 3

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 100		
6.19	1	1.14
Rainfall data for year 100		
6.19	6	2.66
Rainfall data for year 100		
6.19	24	4.78

++

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

SCS curve No.(AMCII)	SCS curve NO.(AMC 3)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
78.0	92.8	6.19	1.000	0.140	0.990	0.139

Area-averaged adjusted loss rate Fm (In/Hr) = 0.139

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

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC3)	S	Pervious Yield Fr
6.13	0.990	78.0	92.8	0.78	0.829
0.06	0.010	98.0	98.0	0.20	0.951

Area-averaged catchment yield fraction, Y = 0.830
Area-averaged low loss fraction, Yb = 0.170
User entry of time of concentration = 0.317 (hours)
++
Watershed area = 6.19(Ac.)
Catchment Lag time = 0.253 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 32.9017
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.139(In/Hr)
Average low loss rate fraction (Yb) = 0.170 (decimal)
VALLEY UNDEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.422(In)
Computed peak 30-minute rainfall = 0.864(In)
Specified peak 1-hour rainfall = 1.140(In)
Computed peak 3-hour rainfall = 1.917(In)
Specified peak 6-hour rainfall = 2.660(In)
Specified peak 24-hour rainfall = 4.780(In)

Rainfall depth area reduction factors:
Using a total area of 6.19(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.422(In)
30-minute factor = 1.000 Adjusted rainfall = 0.864(In)
1-hour factor = 1.000 Adjusted rainfall = 1.140(In)
3-hour factor = 1.000 Adjusted rainfall = 1.917(In)
6-hour factor = 1.000 Adjusted rainfall = 2.660(In)
24-hour factor = 1.000 Adjusted rainfall = 4.780(In)

U n i t H y d r o g r a p h
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Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))

(K = 74.86 (CFS))

1	3.290	2.463
2	15.867	9.415
3	37.249	16.006
4	57.428	15.107
5	68.719	8.452
6	75.145	4.810
7	79.652	3.374
8	83.144	2.615
9	86.002	2.139
10	88.251	1.684
11	90.194	1.454
12	91.748	1.164
13	93.056	0.979
14	94.110	0.789
15	95.112	0.750
16	96.014	0.675
17	96.738	0.542
18	97.364	0.469
19	97.918	0.415
20	98.378	0.345
21	98.745	0.274
22	99.074	0.246
23	99.403	0.246
24	99.732	0.246
25	100.000	0.201

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.4218	0.4218
2	0.5566	0.1348
3	0.6546	0.0980
4	0.7344	0.0798
5	0.8030	0.0686
6	0.8637	0.0607
7	0.9186	0.0549
8	0.9690	0.0504
9	1.0158	0.0467
10	1.0595	0.0437
11	1.1007	0.0412
12	1.1397	0.0390
13	1.1837	0.0440
14	1.2259	0.0422
15	1.2666	0.0407
16	1.3058	0.0393
17	1.3438	0.0380
18	1.3807	0.0368
19	1.4164	0.0358
20	1.4512	0.0348
21	1.4851	0.0339
22	1.5182	0.0330
23	1.5504	0.0323

24	1.5820	0.0315
25	1.6128	0.0309
26	1.6430	0.0302
27	1.6726	0.0296
28	1.7017	0.0290
29	1.7302	0.0285
30	1.7581	0.0280
31	1.7856	0.0275
32	1.8126	0.0270
33	1.8392	0.0266
34	1.8654	0.0262
35	1.8911	0.0258
36	1.9165	0.0254
37	1.9415	0.0250
38	1.9662	0.0246
39	1.9905	0.0243
40	2.0144	0.0240
41	2.0381	0.0237
42	2.0614	0.0234
43	2.0845	0.0231
44	2.1073	0.0228
45	2.1298	0.0225
46	2.1521	0.0223
47	2.1741	0.0220
48	2.1958	0.0218
49	2.2173	0.0215
50	2.2386	0.0213
51	2.2597	0.0211
52	2.2805	0.0208
53	2.3012	0.0206
54	2.3216	0.0204
55	2.3418	0.0202
56	2.3619	0.0200
57	2.3817	0.0199
58	2.4014	0.0197
59	2.4209	0.0195
60	2.4402	0.0193
61	2.4594	0.0191
62	2.4783	0.0190
63	2.4972	0.0188
64	2.5158	0.0187
65	2.5344	0.0185
66	2.5527	0.0184
67	2.5709	0.0182
68	2.5890	0.0181
69	2.6069	0.0179
70	2.6247	0.0178
71	2.6424	0.0177
72	2.6599	0.0175
73	2.6755	0.0156
74	2.6909	0.0154
75	2.7063	0.0153
76	2.7215	0.0152

77	2.7365	0.0151
78	2.7515	0.0150
79	2.7664	0.0149
80	2.7811	0.0148
81	2.7958	0.0146
82	2.8103	0.0145
83	2.8247	0.0144
84	2.8391	0.0143
85	2.8533	0.0142
86	2.8675	0.0141
87	2.8815	0.0141
88	2.8955	0.0140
89	2.9093	0.0139
90	2.9231	0.0138
91	2.9368	0.0137
92	2.9504	0.0136
93	2.9639	0.0135
94	2.9774	0.0134
95	2.9907	0.0134
96	3.0040	0.0133
97	3.0172	0.0132
98	3.0303	0.0131
99	3.0433	0.0130
100	3.0563	0.0130
101	3.0692	0.0129
102	3.0820	0.0128
103	3.0947	0.0127
104	3.1074	0.0127
105	3.1200	0.0126
106	3.1325	0.0125
107	3.1450	0.0125
108	3.1574	0.0124
109	3.1697	0.0123
110	3.1820	0.0123
111	3.1942	0.0122
112	3.2063	0.0121
113	3.2184	0.0121
114	3.2304	0.0120
115	3.2423	0.0120
116	3.2542	0.0119
117	3.2660	0.0118
118	3.2778	0.0118
119	3.2895	0.0117
120	3.3012	0.0117
121	3.3128	0.0116
122	3.3243	0.0115
123	3.3358	0.0115
124	3.3473	0.0114
125	3.3587	0.0114
126	3.3700	0.0113
127	3.3813	0.0113
128	3.3925	0.0112
129	3.4037	0.0112

130	3.4148	0.0111
131	3.4259	0.0111
132	3.4369	0.0110
133	3.4479	0.0110
134	3.4589	0.0109
135	3.4698	0.0109
136	3.4806	0.0108
137	3.4914	0.0108
138	3.5021	0.0108
139	3.5129	0.0107
140	3.5235	0.0107
141	3.5341	0.0106
142	3.5447	0.0106
143	3.5552	0.0105
144	3.5657	0.0105
145	3.5762	0.0104
146	3.5866	0.0104
147	3.5970	0.0104
148	3.6073	0.0103
149	3.6176	0.0103
150	3.6278	0.0102
151	3.6380	0.0102
152	3.6482	0.0102
153	3.6583	0.0101
154	3.6684	0.0101
155	3.6785	0.0101
156	3.6885	0.0100
157	3.6984	0.0100
158	3.7084	0.0099
159	3.7183	0.0099
160	3.7282	0.0099
161	3.7380	0.0098
162	3.7478	0.0098
163	3.7576	0.0098
164	3.7673	0.0097
165	3.7770	0.0097
166	3.7866	0.0097
167	3.7963	0.0096
168	3.8059	0.0096
169	3.8154	0.0096
170	3.8250	0.0095
171	3.8345	0.0095
172	3.8439	0.0095
173	3.8534	0.0094
174	3.8628	0.0094
175	3.8721	0.0094
176	3.8815	0.0093
177	3.8908	0.0093
178	3.9001	0.0093
179	3.9093	0.0092
180	3.9185	0.0092
181	3.9277	0.0092
182	3.9369	0.0092

183	3.9460	0.0091
184	3.9551	0.0091
185	3.9642	0.0091
186	3.9732	0.0090
187	3.9822	0.0090
188	3.9912	0.0090
189	4.0002	0.0090
190	4.0091	0.0089
191	4.0180	0.0089
192	4.0269	0.0089
193	4.0358	0.0089
194	4.0446	0.0088
195	4.0534	0.0088
196	4.0622	0.0088
197	4.0709	0.0087
198	4.0797	0.0087
199	4.0884	0.0087
200	4.0970	0.0087
201	4.1057	0.0086
202	4.1143	0.0086
203	4.1229	0.0086
204	4.1315	0.0086
205	4.1400	0.0086
206	4.1486	0.0085
207	4.1571	0.0085
208	4.1655	0.0085
209	4.1740	0.0085
210	4.1824	0.0084
211	4.1908	0.0084
212	4.1992	0.0084
213	4.2076	0.0084
214	4.2159	0.0083
215	4.2242	0.0083
216	4.2325	0.0083
217	4.2408	0.0083
218	4.2491	0.0083
219	4.2573	0.0082
220	4.2655	0.0082
221	4.2737	0.0082
222	4.2818	0.0082
223	4.2900	0.0081
224	4.2981	0.0081
225	4.3062	0.0081
226	4.3143	0.0081
227	4.3224	0.0081
228	4.3304	0.0080
229	4.3384	0.0080
230	4.3464	0.0080
231	4.3544	0.0080
232	4.3624	0.0080
233	4.3703	0.0079
234	4.3782	0.0079
235	4.3861	0.0079

236	4.3940	0.0079
237	4.4019	0.0079
238	4.4097	0.0078
239	4.4175	0.0078
240	4.4253	0.0078
241	4.4331	0.0078
242	4.4409	0.0078
243	4.4486	0.0077
244	4.4564	0.0077
245	4.4641	0.0077
246	4.4718	0.0077
247	4.4795	0.0077
248	4.4871	0.0077
249	4.4948	0.0076
250	4.5024	0.0076
251	4.5100	0.0076
252	4.5176	0.0076
253	4.5251	0.0076
254	4.5327	0.0076
255	4.5402	0.0075
256	4.5478	0.0075
257	4.5553	0.0075
258	4.5627	0.0075
259	4.5702	0.0075
260	4.5777	0.0075
261	4.5851	0.0074
262	4.5925	0.0074
263	4.5999	0.0074
264	4.6073	0.0074
265	4.6147	0.0074
266	4.6220	0.0074
267	4.6294	0.0073
268	4.6367	0.0073
269	4.6440	0.0073
270	4.6513	0.0073
271	4.6586	0.0073
272	4.6658	0.0073
273	4.6731	0.0072
274	4.6803	0.0072
275	4.6875	0.0072
276	4.6947	0.0072
277	4.7019	0.0072
278	4.7091	0.0072
279	4.7162	0.0072
280	4.7234	0.0071
281	4.7305	0.0071
282	4.7376	0.0071
283	4.7447	0.0071
284	4.7518	0.0071
285	4.7588	0.0071
286	4.7659	0.0071
287	4.7729	0.0070
288	4.7800	0.0070

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0070	0.0012	0.0058
2	0.0070	0.0012	0.0058
3	0.0071	0.0012	0.0059
4	0.0071	0.0012	0.0059
5	0.0071	0.0012	0.0059
6	0.0071	0.0012	0.0059
7	0.0072	0.0012	0.0059
8	0.0072	0.0012	0.0059
9	0.0072	0.0012	0.0060
10	0.0072	0.0012	0.0060
11	0.0072	0.0012	0.0060
12	0.0073	0.0012	0.0060
13	0.0073	0.0012	0.0061
14	0.0073	0.0012	0.0061
15	0.0073	0.0012	0.0061
16	0.0074	0.0013	0.0061
17	0.0074	0.0013	0.0061
18	0.0074	0.0013	0.0061
19	0.0074	0.0013	0.0062
20	0.0075	0.0013	0.0062
21	0.0075	0.0013	0.0062
22	0.0075	0.0013	0.0062
23	0.0075	0.0013	0.0063
24	0.0076	0.0013	0.0063
25	0.0076	0.0013	0.0063
26	0.0076	0.0013	0.0063
27	0.0076	0.0013	0.0063
28	0.0077	0.0013	0.0064
29	0.0077	0.0013	0.0064
30	0.0077	0.0013	0.0064
31	0.0077	0.0013	0.0064
32	0.0078	0.0013	0.0064
33	0.0078	0.0013	0.0065
34	0.0078	0.0013	0.0065
35	0.0079	0.0013	0.0065
36	0.0079	0.0013	0.0065
37	0.0079	0.0013	0.0066
38	0.0079	0.0014	0.0066
39	0.0080	0.0014	0.0066
40	0.0080	0.0014	0.0066
41	0.0080	0.0014	0.0067
42	0.0081	0.0014	0.0067
43	0.0081	0.0014	0.0067
44	0.0081	0.0014	0.0067
45	0.0082	0.0014	0.0068
46	0.0082	0.0014	0.0068
47	0.0082	0.0014	0.0068
48	0.0083	0.0014	0.0068

49	0.0083	0.0014	0.0069
50	0.0083	0.0014	0.0069
51	0.0084	0.0014	0.0069
52	0.0084	0.0014	0.0070
53	0.0084	0.0014	0.0070
54	0.0085	0.0014	0.0070
55	0.0085	0.0014	0.0071
56	0.0085	0.0015	0.0071
57	0.0086	0.0015	0.0071
58	0.0086	0.0015	0.0071
59	0.0086	0.0015	0.0072
60	0.0087	0.0015	0.0072
61	0.0087	0.0015	0.0072
62	0.0087	0.0015	0.0073
63	0.0088	0.0015	0.0073
64	0.0088	0.0015	0.0073
65	0.0089	0.0015	0.0074
66	0.0089	0.0015	0.0074
67	0.0090	0.0015	0.0074
68	0.0090	0.0015	0.0075
69	0.0090	0.0015	0.0075
70	0.0091	0.0015	0.0075
71	0.0091	0.0016	0.0076
72	0.0092	0.0016	0.0076
73	0.0092	0.0016	0.0076
74	0.0092	0.0016	0.0077
75	0.0093	0.0016	0.0077
76	0.0093	0.0016	0.0077
77	0.0094	0.0016	0.0078
78	0.0094	0.0016	0.0078
79	0.0095	0.0016	0.0079
80	0.0095	0.0016	0.0079
81	0.0096	0.0016	0.0080
82	0.0096	0.0016	0.0080
83	0.0097	0.0017	0.0080
84	0.0097	0.0017	0.0081
85	0.0098	0.0017	0.0081
86	0.0098	0.0017	0.0082
87	0.0099	0.0017	0.0082
88	0.0099	0.0017	0.0082
89	0.0100	0.0017	0.0083
90	0.0101	0.0017	0.0083
91	0.0101	0.0017	0.0084
92	0.0102	0.0017	0.0084
93	0.0102	0.0017	0.0085
94	0.0103	0.0018	0.0085
95	0.0104	0.0018	0.0086
96	0.0104	0.0018	0.0086
97	0.0105	0.0018	0.0087
98	0.0105	0.0018	0.0087
99	0.0106	0.0018	0.0088
100	0.0107	0.0018	0.0088
101	0.0108	0.0018	0.0089

102	0.0108	0.0018	0.0090
103	0.0109	0.0019	0.0090
104	0.0109	0.0019	0.0091
105	0.0110	0.0019	0.0092
106	0.0111	0.0019	0.0092
107	0.0112	0.0019	0.0093
108	0.0112	0.0019	0.0093
109	0.0113	0.0019	0.0094
110	0.0114	0.0019	0.0094
111	0.0115	0.0020	0.0095
112	0.0115	0.0020	0.0096
113	0.0117	0.0020	0.0097
114	0.0117	0.0020	0.0097
115	0.0118	0.0020	0.0098
116	0.0119	0.0020	0.0099
117	0.0120	0.0020	0.0100
118	0.0121	0.0021	0.0100
119	0.0122	0.0021	0.0101
120	0.0123	0.0021	0.0102
121	0.0124	0.0021	0.0103
122	0.0125	0.0021	0.0103
123	0.0126	0.0021	0.0105
124	0.0127	0.0022	0.0105
125	0.0128	0.0022	0.0106
126	0.0129	0.0022	0.0107
127	0.0130	0.0022	0.0108
128	0.0131	0.0022	0.0109
129	0.0133	0.0023	0.0110
130	0.0134	0.0023	0.0111
131	0.0135	0.0023	0.0112
132	0.0136	0.0023	0.0113
133	0.0138	0.0023	0.0114
134	0.0139	0.0024	0.0115
135	0.0141	0.0024	0.0117
136	0.0141	0.0024	0.0117
137	0.0143	0.0024	0.0119
138	0.0144	0.0025	0.0120
139	0.0146	0.0025	0.0122
140	0.0148	0.0025	0.0122
141	0.0150	0.0025	0.0124
142	0.0151	0.0026	0.0125
143	0.0153	0.0026	0.0127
144	0.0154	0.0026	0.0128
145	0.0175	0.0030	0.0146
146	0.0177	0.0030	0.0147
147	0.0179	0.0031	0.0149
148	0.0181	0.0031	0.0150
149	0.0184	0.0031	0.0152
150	0.0185	0.0032	0.0154
151	0.0188	0.0032	0.0156
152	0.0190	0.0032	0.0158
153	0.0193	0.0033	0.0160
154	0.0195	0.0033	0.0162

155	0.0199	0.0034	0.0165
156	0.0200	0.0034	0.0166
157	0.0204	0.0035	0.0170
158	0.0206	0.0035	0.0171
159	0.0211	0.0036	0.0175
160	0.0213	0.0036	0.0177
161	0.0218	0.0037	0.0181
162	0.0220	0.0037	0.0183
163	0.0225	0.0038	0.0187
164	0.0228	0.0039	0.0189
165	0.0234	0.0040	0.0194
166	0.0237	0.0040	0.0196
167	0.0243	0.0041	0.0202
168	0.0246	0.0042	0.0204
169	0.0254	0.0043	0.0211
170	0.0258	0.0044	0.0214
171	0.0266	0.0045	0.0221
172	0.0270	0.0046	0.0224
173	0.0280	0.0048	0.0232
174	0.0285	0.0048	0.0236
175	0.0296	0.0050	0.0246
176	0.0302	0.0051	0.0251
177	0.0315	0.0054	0.0262
178	0.0323	0.0055	0.0268
179	0.0339	0.0058	0.0281
180	0.0348	0.0059	0.0289
181	0.0368	0.0063	0.0306
182	0.0380	0.0065	0.0315
183	0.0407	0.0069	0.0338
184	0.0422	0.0072	0.0350
185	0.0390	0.0066	0.0323
186	0.0412	0.0070	0.0342
187	0.0467	0.0080	0.0388
188	0.0504	0.0086	0.0418
189	0.0607	0.0103	0.0504
190	0.0686	0.0116	0.0570
191	0.0980	0.0116	0.0864
192	0.1348	0.0116	0.1232
193	0.4218	0.0116	0.4102
194	0.0798	0.0116	0.0683
195	0.0549	0.0094	0.0456
196	0.0437	0.0074	0.0363
197	0.0440	0.0075	0.0365
198	0.0393	0.0067	0.0326
199	0.0358	0.0061	0.0297
200	0.0330	0.0056	0.0274
201	0.0309	0.0053	0.0256
202	0.0290	0.0049	0.0241
203	0.0275	0.0047	0.0228
204	0.0262	0.0045	0.0217
205	0.0250	0.0043	0.0207
206	0.0240	0.0041	0.0199
207	0.0231	0.0039	0.0191

208	0.0223	0.0038	0.0185
209	0.0215	0.0037	0.0179
210	0.0208	0.0035	0.0173
211	0.0202	0.0034	0.0168
212	0.0197	0.0033	0.0163
213	0.0191	0.0033	0.0159
214	0.0187	0.0032	0.0155
215	0.0182	0.0031	0.0151
216	0.0178	0.0030	0.0148
217	0.0156	0.0026	0.0129
218	0.0152	0.0026	0.0126
219	0.0149	0.0025	0.0123
220	0.0145	0.0025	0.0121
221	0.0142	0.0024	0.0118
222	0.0140	0.0024	0.0116
223	0.0137	0.0023	0.0114
224	0.0134	0.0023	0.0111
225	0.0132	0.0022	0.0109
226	0.0130	0.0022	0.0108
227	0.0127	0.0022	0.0106
228	0.0125	0.0021	0.0104
229	0.0123	0.0021	0.0102
230	0.0121	0.0021	0.0101
231	0.0120	0.0020	0.0099
232	0.0118	0.0020	0.0098
233	0.0116	0.0020	0.0096
234	0.0114	0.0019	0.0095
235	0.0113	0.0019	0.0094
236	0.0111	0.0019	0.0092
237	0.0110	0.0019	0.0091
238	0.0108	0.0018	0.0090
239	0.0107	0.0018	0.0089
240	0.0106	0.0018	0.0088
241	0.0104	0.0018	0.0087
242	0.0103	0.0018	0.0086
243	0.0102	0.0017	0.0085
244	0.0101	0.0017	0.0084
245	0.0100	0.0017	0.0083
246	0.0099	0.0017	0.0082
247	0.0098	0.0017	0.0081
248	0.0097	0.0016	0.0080
249	0.0096	0.0016	0.0079
250	0.0095	0.0016	0.0079
251	0.0094	0.0016	0.0078
252	0.0093	0.0016	0.0077
253	0.0092	0.0016	0.0076
254	0.0091	0.0015	0.0076
255	0.0090	0.0015	0.0075
256	0.0089	0.0015	0.0074
257	0.0089	0.0015	0.0073
258	0.0088	0.0015	0.0073
259	0.0087	0.0015	0.0072
260	0.0086	0.0015	0.0072

261	0.0086	0.0015	0.0071
262	0.0085	0.0014	0.0070
263	0.0084	0.0014	0.0070
264	0.0083	0.0014	0.0069
265	0.0083	0.0014	0.0069
266	0.0082	0.0014	0.0068
267	0.0081	0.0014	0.0068
268	0.0081	0.0014	0.0067
269	0.0080	0.0014	0.0067
270	0.0080	0.0014	0.0066
271	0.0079	0.0013	0.0066
272	0.0078	0.0013	0.0065
273	0.0078	0.0013	0.0065
274	0.0077	0.0013	0.0064
275	0.0077	0.0013	0.0064
276	0.0076	0.0013	0.0063
277	0.0076	0.0013	0.0063
278	0.0075	0.0013	0.0062
279	0.0075	0.0013	0.0062
280	0.0074	0.0013	0.0062
281	0.0074	0.0013	0.0061
282	0.0073	0.0012	0.0061
283	0.0073	0.0012	0.0060
284	0.0072	0.0012	0.0060
285	0.0072	0.0012	0.0060
286	0.0071	0.0012	0.0059
287	0.0071	0.0012	0.0059
288	0.0071	0.0012	0.0059

Total soil rain loss = 0.73(In)
Total effective rainfall = 4.05(In)
Peak flow rate in flood hydrograph = 10.87(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	0.0001	0.01	Q	|	|	|	|
0+10	0.0006	0.07	Q	|	|	|	|
0+15	0.0017	0.16	Q	|	|	|	|
0+20	0.0034	0.25	Q	|	|	|	|
0+25	0.0055	0.30	Q	|	|	|	|
0+30	0.0078	0.33	Q	|	|	|	|
0+35	0.0102	0.35	Q	|	|	|	|
0+40	0.0127	0.37	Q	|	|	|	|
0+45	0.0153	0.38	Q	|	|	|	|
0+50	0.0180	0.39	Q	|	|	|	|

0+55	0.0208	0.40	Q	|	|	|	|
1+ 0	0.0236	0.41	Q	|	|	|	|
1+ 5	0.0265	0.42	Q	|	|	|	|
1+10	0.0294	0.42	Q	|	|	|	|
1+15	0.0323	0.43	Q	|	|	|	|
1+20	0.0353	0.43	Q	|	|	|	|
1+25	0.0383	0.44	Q	|	|	|	|
1+30	0.0414	0.44	Q	|	|	|	|
1+35	0.0445	0.45	Q	|	|	|	|
1+40	0.0476	0.45	Q	|	|	|	|
1+45	0.0507	0.45	Q	|	|	|	|
1+50	0.0538	0.46	QV	|	|	|	|
1+55	0.0570	0.46	QV	|	|	|	|
2+ 0	0.0601	0.46	QV	|	|	|	|
2+ 5	0.0633	0.46	QV	|	|	|	|
2+10	0.0665	0.47	QV	|	|	|	|
2+15	0.0698	0.47	QV	|	|	|	|
2+20	0.0730	0.47	QV	|	|	|	|
2+25	0.0762	0.47	QV	|	|	|	|
2+30	0.0795	0.47	QV	|	|	|	|
2+35	0.0827	0.47	QV	|	|	|	|
2+40	0.0860	0.48	QV	|	|	|	|
2+45	0.0893	0.48	QV	|	|	|	|
2+50	0.0926	0.48	QV	|	|	|	|
2+55	0.0959	0.48	QV	|	|	|	|
3+ 0	0.0992	0.48	QV	|	|	|	|
3+ 5	0.1025	0.48	QV	|	|	|	|
3+10	0.1059	0.49	Q V	|	|	|	|
3+15	0.1092	0.49	Q V	|	|	|	|
3+20	0.1126	0.49	Q V	|	|	|	|
3+25	0.1160	0.49	Q V	|	|	|	|
3+30	0.1194	0.49	Q V	|	|	|	|
3+35	0.1228	0.49	Q V	|	|	|	|
3+40	0.1262	0.50	Q V	|	|	|	|
3+45	0.1296	0.50	Q V	|	|	|	|
3+50	0.1331	0.50	|QV	|	|	|	|
3+55	0.1365	0.50	|QV	|	|	|	|
4+ 0	0.1400	0.50	|QV	|	|	|	|
4+ 5	0.1435	0.51	|QV	|	|	|	|
4+10	0.1470	0.51	|QV	|	|	|	|
4+15	0.1505	0.51	|QV	|	|	|	|
4+20	0.1540	0.51	|QV	|	|	|	|
4+25	0.1576	0.51	|Q V	|	|	|	|
4+30	0.1611	0.52	|Q V	|	|	|	|
4+35	0.1647	0.52	|Q V	|	|	|	|
4+40	0.1683	0.52	|Q V	|	|	|	|
4+45	0.1719	0.52	|Q V	|	|	|	|
4+50	0.1755	0.52	|Q V	|	|	|	|
4+55	0.1791	0.53	|Q V	|	|	|	|
5+ 0	0.1828	0.53	|Q V	|	|	|	|
5+ 5	0.1864	0.53	|Q V	|	|	|	|
5+10	0.1901	0.53	|Q V	|	|	|	|
5+15	0.1938	0.54	|Q V	|	|	|	|

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5+20       0.1975      0.54  |Q V      |          |          |          |
5+25       0.2012      0.54  |Q V      |          |          |          |
5+30       0.2049      0.54  |Q V      |          |          |          |
5+35       0.2087      0.55  |Q  V     |          |          |          |
5+40       0.2125      0.55  |Q  V     |          |          |          |
5+45       0.2163      0.55  |Q  V     |          |          |          |
5+50       0.2201      0.55  |Q  V     |          |          |          |
5+55       0.2239      0.56  |Q  V     |          |          |          |
6+ 0       0.2277      0.56  |Q  V     |          |          |          |
6+ 5       0.2316      0.56  |Q  V     |          |          |          |
6+10       0.2355      0.56  |Q  V     |          |          |          |
6+15       0.2394      0.57  |Q  V     |          |          |          |
6+20       0.2433      0.57  |Q  V     |          |          |          |
6+25       0.2472      0.57  |Q  V     |          |          |          |
6+30       0.2512      0.57  |Q  V     |          |          |          |
6+35       0.2551      0.58  |Q  V     |          |          |          |
6+40       0.2591      0.58  |Q  V     |          |          |          |
6+45       0.2631      0.58  |Q   V    |          |          |          |
6+50       0.2672      0.59  |Q   V    |          |          |          |
6+55       0.2712      0.59  |Q   V    |          |          |          |
7+ 0       0.2753      0.59  |Q   V    |          |          |          |
7+ 5       0.2794      0.59  |Q   V    |          |          |          |
7+10       0.2835      0.60  |Q   V    |          |          |          |
7+15       0.2876      0.60  |Q   V    |          |          |          |
7+20       0.2918      0.60  |Q   V    |          |          |          |
7+25       0.2959      0.61  |Q   V    |          |          |          |
7+30       0.3002      0.61  |Q   V    |          |          |          |
7+35       0.3044      0.61  |Q   V    |          |          |          |
7+40       0.3086      0.62  |Q   V    |          |          |          |
7+45       0.3129      0.62  |Q    V   |          |          |          |
7+50       0.3172      0.62  |Q    V   |          |          |          |
7+55       0.3215      0.63  |Q    V   |          |          |          |
8+ 0       0.3258      0.63  |Q    V   |          |          |          |
8+ 5       0.3302      0.63  |Q    V   |          |          |          |
8+10       0.3346      0.64  |Q    V   |          |          |          |
8+15       0.3390      0.64  |Q    V   |          |          |          |
8+20       0.3435      0.65  |Q    V   |          |          |          |
8+25       0.3479      0.65  |Q    V   |          |          |          |
8+30       0.3524      0.65  |Q    V   |          |          |          |
8+35       0.3570      0.66  |Q    V   |          |          |          |
8+40       0.3615      0.66  |Q    V   |          |          |          |
8+45       0.3661      0.67  |Q     V  |          |          |          |
8+50       0.3707      0.67  |Q     V  |          |          |          |
8+55       0.3754      0.67  |Q     V  |          |          |          |
9+ 0       0.3800      0.68  |Q     V  |          |          |          |
9+ 5       0.3847      0.68  |Q     V  |          |          |          |
9+10       0.3895      0.69  |Q     V  |          |          |          |
9+15       0.3942      0.69  |Q     V  |          |          |          |
9+20       0.3990      0.70  |Q     V  |          |          |          |
9+25       0.4039      0.70  |Q     V  |          |          |          |
9+30       0.4087      0.71  |Q     V  |          |          |          |
9+35       0.4136      0.71  |Q     V  |          |          |          |
9+40       0.4185      0.72  |Q      V |          |          |          |
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9+45	0.4235	0.72	Q	V			
9+50	0.4285	0.73	Q	V			
9+55	0.4336	0.73	Q	V			
10+ 0	0.4386	0.74	Q	V			
10+ 5	0.4437	0.74	Q	V			
10+10	0.4489	0.75	Q	V			
10+15	0.4541	0.75	Q	V			
10+20	0.4593	0.76	Q	V			
10+25	0.4646	0.77	Q	V			
10+30	0.4699	0.77	Q	V			
10+35	0.4753	0.78	Q	V			
10+40	0.4807	0.79	Q	V			
10+45	0.4862	0.79	Q	V			
10+50	0.4917	0.80	Q	V			
10+55	0.4972	0.81	Q	V			
11+ 0	0.5028	0.81	Q	V			
11+ 5	0.5085	0.82	Q	V			
11+10	0.5142	0.83	Q	V			
11+15	0.5199	0.84	Q	V			
11+20	0.5257	0.84	Q	V			
11+25	0.5316	0.85	Q	V			
11+30	0.5375	0.86	Q	V			
11+35	0.5435	0.87	Q	V			
11+40	0.5495	0.88	Q	V			
11+45	0.5556	0.89	Q	V			
11+50	0.5618	0.90	Q	V			
11+55	0.5680	0.90	Q	V			
12+ 0	0.5743	0.91	Q	V			
12+ 5	0.5807	0.93	Q	V			
12+10	0.5873	0.95	Q	V			
12+15	0.5941	0.99	Q	V			
12+20	0.6012	1.02	Q	V			
12+25	0.6084	1.05	Q	V			
12+30	0.6157	1.07	Q	V			
12+35	0.6232	1.08	Q	V			
12+40	0.6308	1.10	Q	V			
12+45	0.6385	1.12	Q	V			
12+50	0.6463	1.13	Q	V			
12+55	0.6542	1.15	Q	V			
13+ 0	0.6623	1.17	Q	V			
13+ 5	0.6704	1.19	Q	V			
13+10	0.6787	1.20	Q	V			
13+15	0.6871	1.22	Q	V			
13+20	0.6957	1.24	Q	V			
13+25	0.7043	1.26	Q	V			
13+30	0.7131	1.28	Q	V			
13+35	0.7221	1.30	Q	V			
13+40	0.7311	1.32	Q	V			
13+45	0.7404	1.34	Q	V			
13+50	0.7498	1.36	Q	V			
13+55	0.7593	1.39	Q	V			
14+ 0	0.7691	1.41	Q	V			
14+ 5	0.7790	1.44	Q	V			

14+10	0.7891	1.47	Q	V			
14+15	0.7995	1.50	Q	V			
14+20	0.8100	1.53	Q	V			
14+25	0.8208	1.57	Q	V			
14+30	0.8319	1.60	Q	V			
14+35	0.8432	1.64	Q	V			
14+40	0.8547	1.68	Q	V			
14+45	0.8666	1.73	Q	V			
14+50	0.8789	1.78	Q	V			
14+55	0.8915	1.83	Q	V			
15+ 0	0.9045	1.89	Q	V			
15+ 5	0.9179	1.95	Q	V			
15+10	0.9319	2.02	Q	V			
15+15	0.9464	2.10	Q	V			
15+20	0.9615	2.19	Q	V			
15+25	0.9772	2.28	Q	V			
15+30	0.9933	2.34	Q	V			
15+35	1.0097	2.39	Q	V			
15+40	1.0267	2.47	Q	V			
15+45	1.0448	2.62	Q	V			
15+50	1.0645	2.86	Q	V			
15+55	1.0868	3.24	Q	V			
16+ 0	1.1137	3.90	Q	V			
16+ 5	1.1525	5.64	Q	V			
16+10	1.2122	8.66	Q	V			
16+15	1.2871	10.87	Q	V			
16+20	1.3560	10.02	Q	V			
16+25	1.4053	7.15	Q	V			
16+30	1.4424	5.39	Q	V			
16+35	1.4737	4.54	Q	V			
16+40	1.5013	4.01	Q	V			
16+45	1.5261	3.61	Q	V			
16+50	1.5485	3.25	Q	V			
16+55	1.5690	2.98	Q	V			
17+ 0	1.5878	2.72	Q	V			
17+ 5	1.6051	2.52	Q	V			
17+10	1.6212	2.34	Q	V			
17+15	1.6365	2.22	Q	V			
17+20	1.6509	2.09	Q	V			
17+25	1.6643	1.96	Q	V			
17+30	1.6771	1.85	Q	V			
17+35	1.6892	1.76	Q	V			
17+40	1.7006	1.66	Q	V			
17+45	1.7115	1.58	Q	V			
17+50	1.7219	1.52	Q	V			
17+55	1.7320	1.46	Q	V			
18+ 0	1.7417	1.41	Q	V			
18+ 5	1.7509	1.33	Q	V			
18+10	1.7592	1.21	Q	V			
18+15	1.7671	1.14	Q	V			
18+20	1.7745	1.09	Q	V			
18+25	1.7817	1.04	Q	V			
18+30	1.7887	1.01	Q	V			

18+35	1.7954	0.98	Q				V
18+40	1.8020	0.95	Q				V
18+45	1.8083	0.93	Q				V
18+50	1.8146	0.90	Q				V
18+55	1.8207	0.88	Q				V
19+ 0	1.8266	0.86	Q				V
19+ 5	1.8324	0.85	Q				V
19+10	1.8382	0.83	Q				V
19+15	1.8438	0.81	Q				V
19+20	1.8493	0.80	Q				V
19+25	1.8546	0.78	Q				V
19+30	1.8600	0.77	Q				V
19+35	1.8652	0.76	Q				V
19+40	1.8703	0.74	Q				V
19+45	1.8753	0.73	Q				V
19+50	1.8803	0.72	Q				V
19+55	1.8852	0.71	Q				V
20+ 0	1.8901	0.70	Q				V
20+ 5	1.8948	0.69	Q				V
20+10	1.8995	0.68	Q				V
20+15	1.9041	0.67	Q				V
20+20	1.9087	0.66	Q				V
20+25	1.9132	0.66	Q				V
20+30	1.9177	0.65	Q				V
20+35	1.9221	0.64	Q				V
20+40	1.9265	0.63	Q				V
20+45	1.9308	0.63	Q				V
20+50	1.9351	0.62	Q				V
20+55	1.9393	0.61	Q				V
21+ 0	1.9435	0.61	Q				V
21+ 5	1.9476	0.60	Q				V
21+10	1.9517	0.59	Q				V
21+15	1.9557	0.59	Q				V
21+20	1.9597	0.58	Q				V
21+25	1.9637	0.58	Q				V
21+30	1.9676	0.57	Q				V
21+35	1.9715	0.56	Q				V
21+40	1.9754	0.56	Q				V
21+45	1.9792	0.55	Q				V
21+50	1.9829	0.55	Q				V
21+55	1.9867	0.54	Q				V
22+ 0	1.9904	0.54	Q				V
22+ 5	1.9941	0.53	Q				V
22+10	1.9978	0.53	Q				V
22+15	2.0014	0.53	Q				V
22+20	2.0050	0.52	Q				V
22+25	2.0085	0.52	Q				V
22+30	2.0121	0.51	Q				V
22+35	2.0156	0.51	Q				V
22+40	2.0190	0.51	Q				V
22+45	2.0225	0.50	Q				V
22+50	2.0259	0.50	Q				V
22+55	2.0293	0.49	Q				V

23+ 0	2.0327	0.49	Q	|	|	|	V |
23+ 5	2.0360	0.49	Q	|	|	|	V|
23+10	2.0394	0.48	Q	|	|	|	V|
23+15	2.0427	0.48	Q	|	|	|	V|
23+20	2.0460	0.48	Q	|	|	|	V|
23+25	2.0492	0.47	Q	|	|	|	V|
23+30	2.0524	0.47	Q	|	|	|	V|
23+35	2.0557	0.47	Q	|	|	|	V|
23+40	2.0588	0.46	Q	|	|	|	V|
23+45	2.0620	0.46	Q	|	|	|	V|
23+50	2.0652	0.46	Q	|	|	|	V|
23+55	2.0683	0.45	Q	|	|	|	V|
24+ 0	2.0714	0.45	Q	|	|	|	V|
24+ 5	2.0744	0.43	Q	|	|	|	V|
24+10	2.0770	0.38	Q	|	|	|	V|
24+15	2.0789	0.28	Q	|	|	|	V|
24+20	2.0802	0.19	Q	|	|	|	V|
24+25	2.0812	0.14	Q	|	|	|	V|
24+30	2.0820	0.11	Q	|	|	|	V|
24+35	2.0826	0.09	Q	|	|	|	V|
24+40	2.0831	0.08	Q	|	|	|	V|
24+45	2.0836	0.06	Q	|	|	|	V|
24+50	2.0839	0.05	Q	|	|	|	V|
24+55	2.0842	0.04	Q	|	|	|	V|
25+ 0	2.0845	0.04	Q	|	|	|	V|
25+ 5	2.0847	0.03	Q	|	|	|	V|
25+10	2.0849	0.03	Q	|	|	|	V|
25+15	2.0850	0.02	Q	|	|	|	V|
25+20	2.0852	0.02	Q	|	|	|	V|
25+25	2.0853	0.01	Q	|	|	|	V|
25+30	2.0853	0.01	Q	|	|	|	V|
25+35	2.0854	0.01	Q	|	|	|	V|
25+40	2.0855	0.01	Q	|	|	|	V|
25+45	2.0855	0.01	Q	|	|	|	V|
25+50	2.0855	0.00	Q	|	|	|	V|
25+55	2.0855	0.00	Q	|	|	|	V|
26+ 0	2.0856	0.00	Q	|	|	|	V

Attachment M: Post-Development Unit Hydrograph (3-Hr)

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 12/20/21

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

Program License Serial Number 6458

Proposed 100 Year 3 Hour Event

Storm Event Year = 100

Antecedent Moisture Condition = 3

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 100		
6.19	1	1.14
Rainfall data for year 100		
6.19	6	2.66
Rainfall data for year 100		
6.19	24	4.78

++

```
******** 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          6.19      1.000     0.785    0.100    0.079

Area-averaged adjusted loss rate Fm (In/Hr) =  0.079

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

Area       Area          SCS CN    SCS CN      S     Pervious
 (Ac.)      Fract         (AMC2)    (AMC3)           Yield Fr
     0.62   0.100         32.0      52.0       9.23     0.148
     5.57   0.900         98.0      98.0       0.20     0.951

Area-averaged catchment yield fraction, Y =  0.870
Area-averaged low loss fraction, Yb =  0.130
User entry of time of concentration  =   0.212 (hours)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watershed area =       6.19(Ac.)
Catchment Lag time =   0.170 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 49.0196
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.079(In/Hr)
Average low loss rate fraction (Yb) = 0.130 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall =  0.422(In)
Computed peak 30-minute rainfall =  0.864(In)
Specified peak 1-hour rainfall =  1.140(In)
Computed peak 3-hour rainfall =  1.917(In)
Specified peak 6-hour rainfall =  2.660(In)
Specified peak 24-hour rainfall =  4.780(In)


Rainfall depth area reduction factors:
Using a total area of       6.19(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000     Adjusted rainfall =  0.422(In)
30-minute factor = 1.000    Adjusted rainfall =  0.864(In)
1-hour factor = 1.000       Adjusted rainfall =  1.140(In)
3-hour factor = 1.000       Adjusted rainfall =  1.917(In)
6-hour factor = 1.000       Adjusted rainfall =  2.660(In)
24-hour factor = 1.000      Adjusted rainfall =  4.780(In)
----------------------------------------------------------------------

                        U n i t  H y d r o g r a p h
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Interval          'S' Graph          Unit Hydrograph
Number            Mean values             ((CFS))
----------------------------------------------------------------------
```

(K = 74.86 (CFS))

1	4.408	3.300
2	28.700	18.185
3	67.229	28.843
4	89.075	16.354
5	96.687	5.698
6	98.653	1.472
7	99.534	0.659
8	100.000	0.349

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.4218	0.4218
2	0.5566	0.1348
3	0.6546	0.0980
4	0.7344	0.0798
5	0.8030	0.0686
6	0.8637	0.0607
7	0.9186	0.0549
8	0.9690	0.0504
9	1.0158	0.0467
10	1.0595	0.0437
11	1.1007	0.0412
12	1.1397	0.0390
13	1.1837	0.0440
14	1.2259	0.0422
15	1.2666	0.0407
16	1.3058	0.0393
17	1.3438	0.0380
18	1.3807	0.0368
19	1.4164	0.0358
20	1.4512	0.0348
21	1.4851	0.0339
22	1.5182	0.0330
23	1.5504	0.0323
24	1.5820	0.0315
25	1.6128	0.0309
26	1.6430	0.0302
27	1.6726	0.0296
28	1.7017	0.0290
29	1.7302	0.0285
30	1.7581	0.0280
31	1.7856	0.0275
32	1.8126	0.0270
33	1.8392	0.0266
34	1.8654	0.0262
35	1.8911	0.0258
36	1.9165	0.0254

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)

1	0.0254	0.0033	0.0221
2	0.0258	0.0033	0.0224
3	0.0266	0.0034	0.0231
4	0.0270	0.0035	0.0235
5	0.0280	0.0036	0.0243
6	0.0285	0.0037	0.0248
7	0.0296	0.0038	0.0258
8	0.0302	0.0039	0.0263
9	0.0315	0.0041	0.0274
10	0.0323	0.0042	0.0281
11	0.0339	0.0044	0.0295
12	0.0348	0.0045	0.0303
13	0.0368	0.0048	0.0321
14	0.0380	0.0049	0.0331
15	0.0407	0.0053	0.0354
16	0.0422	0.0055	0.0368
17	0.0390	0.0051	0.0339
18	0.0412	0.0053	0.0358
19	0.0467	0.0061	0.0407
20	0.0504	0.0065	0.0439
21	0.0607	0.0065	0.0542
22	0.0686	0.0065	0.0620
23	0.0980	0.0065	0.0915
24	0.1348	0.0065	0.1282
25	0.4218	0.0065	0.4153
26	0.0798	0.0065	0.0733
27	0.0549	0.0065	0.0484
28	0.0437	0.0057	0.0381
29	0.0440	0.0057	0.0383
30	0.0393	0.0051	0.0342
31	0.0358	0.0046	0.0311
32	0.0330	0.0043	0.0288
33	0.0309	0.0040	0.0268
34	0.0290	0.0038	0.0253
35	0.0275	0.0036	0.0239
36	0.0262	0.0034	0.0228

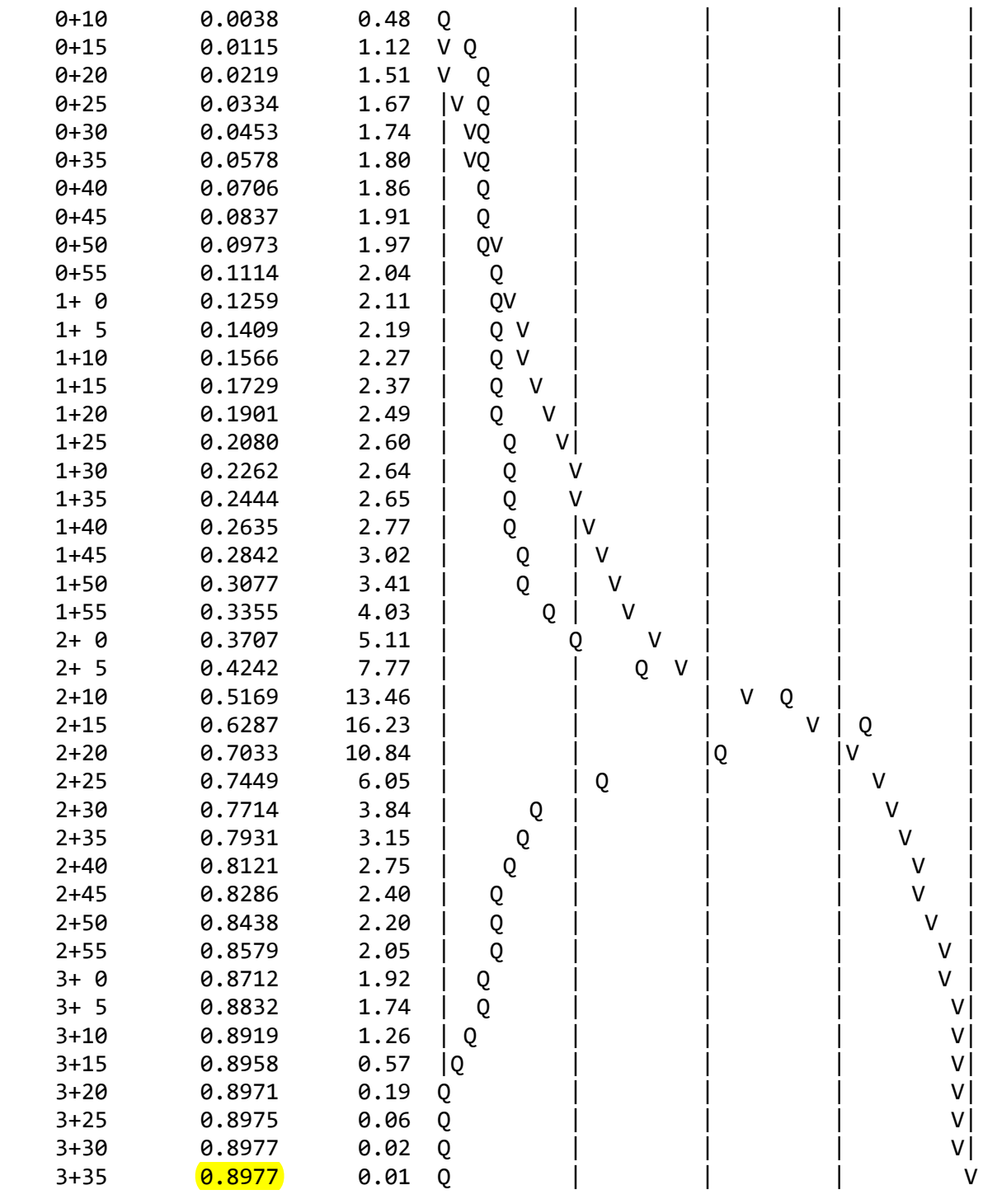
Total soil rain loss = 0.18(In)
Total effective rainfall = 1.74(In)
Peak flow rate in flood hydrograph = 16.23(CFS)

++

3 - 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	0.0005	0.07	Q	|	|	|	|



0+10	0.0038	0.48	
0+15	0.0115	1.12	
0+20	0.0219	1.51	
0+25	0.0334	1.67	
0+30	0.0453	1.74	
0+35	0.0578	1.80	
0+40	0.0706	1.86	
0+45	0.0837	1.91	
0+50	0.0973	1.97	
0+55	0.1114	2.04	
1+ 0	0.1259	2.11	
1+ 5	0.1409	2.19	
1+10	0.1566	2.27	
1+15	0.1729	2.37	
1+20	0.1901	2.49	
1+25	0.2080	2.60	
1+30	0.2262	2.64	
1+35	0.2444	2.65	
1+40	0.2635	2.77	
1+45	0.2842	3.02	
1+50	0.3077	3.41	
1+55	0.3355	4.03	
2+ 0	0.3707	5.11	
2+ 5	0.4242	7.77	
2+10	0.5169	13.46	
2+15	0.6287	16.23	
2+20	0.7033	10.84	
2+25	0.7449	6.05	
2+30	0.7714	3.84	
2+35	0.7931	3.15	
2+40	0.8121	2.75	
2+45	0.8286	2.40	
2+50	0.8438	2.20	
2+55	0.8579	2.05	
3+ 0	0.8712	1.92	
3+ 5	0.8832	1.74	
3+10	0.8919	1.26	
3+15	0.8958	0.57	
3+20	0.8971	0.19	
3+25	0.8975	0.06	
3+30	0.8977	0.02	
3+35	0.8977	0.01	

Attachment N: Post-Development Unit Hydrograph (6-Hr)

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 12/21/21

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

Program License Serial Number 6458

Proposed 100 Year 6 Hour Event

Storm Event Year = 100

Antecedent Moisture Condition = 3

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 100		
6.19	1	1.14
Rainfall data for year 100		
6.19	6	2.66
Rainfall data for year 100		
6.19	24	4.78

++

```
******** 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          6.19      1.000     0.785    0.100    0.079

Area-averaged adjusted loss rate Fm (In/Hr) =  0.079

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

Area       Area          SCS CN    SCS CN      S     Pervious
 (Ac.)      Fract         (AMC2)    (AMC3)           Yield Fr
     0.62   0.100         32.0      52.0       9.23     0.148
     5.57   0.900         98.0      98.0       0.20     0.951

Area-averaged catchment yield fraction, Y =  0.870
Area-averaged low loss fraction, Yb =  0.130
User entry of time of concentration  =   0.212 (hours)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watershed area =       6.19(Ac.)
Catchment Lag time =   0.170 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 49.0196
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.079(In/Hr)
Average low loss rate fraction (Yb) = 0.130 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall =  0.422(In)
Computed peak 30-minute rainfall =  0.864(In)
Specified peak 1-hour rainfall =  1.140(In)
Computed peak 3-hour rainfall =  1.917(In)
Specified peak 6-hour rainfall =  2.660(In)
Specified peak 24-hour rainfall =  4.780(In)


Rainfall depth area reduction factors:
Using a total area of       6.19(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000     Adjusted rainfall =  0.422(In)
30-minute factor = 1.000    Adjusted rainfall =  0.864(In)
1-hour factor = 1.000       Adjusted rainfall =  1.140(In)
3-hour factor = 1.000       Adjusted rainfall =  1.917(In)
6-hour factor = 1.000       Adjusted rainfall =  2.660(In)
24-hour factor = 1.000      Adjusted rainfall =  4.780(In)
----------------------------------------------------------------------

                        U n i t  H y d r o g r a p h
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Interval          'S' Graph          Unit Hydrograph
Number            Mean values             ((CFS))
----------------------------------------------------------------------
```

(K = 74.86 (CFS))

1	4.408	3.300
2	28.700	18.185
3	67.229	28.843
4	89.075	16.354
5	96.687	5.698
6	98.653	1.472
7	99.534	0.659
8	100.000	0.349

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.4218	0.4218
2	0.5566	0.1348
3	0.6546	0.0980
4	0.7344	0.0798
5	0.8030	0.0686
6	0.8637	0.0607
7	0.9186	0.0549
8	0.9690	0.0504
9	1.0158	0.0467
10	1.0595	0.0437
11	1.1007	0.0412
12	1.1397	0.0390
13	1.1837	0.0440
14	1.2259	0.0422
15	1.2666	0.0407
16	1.3058	0.0393
17	1.3438	0.0380
18	1.3807	0.0368
19	1.4164	0.0358
20	1.4512	0.0348
21	1.4851	0.0339
22	1.5182	0.0330
23	1.5504	0.0323
24	1.5820	0.0315
25	1.6128	0.0309
26	1.6430	0.0302
27	1.6726	0.0296
28	1.7017	0.0290
29	1.7302	0.0285
30	1.7581	0.0280
31	1.7856	0.0275
32	1.8126	0.0270
33	1.8392	0.0266
34	1.8654	0.0262
35	1.8911	0.0258
36	1.9165	0.0254
37	1.9415	0.0250
38	1.9662	0.0246
39	1.9905	0.0243
40	2.0144	0.0240

41	2.0381	0.0237
42	2.0614	0.0234
43	2.0845	0.0231
44	2.1073	0.0228
45	2.1298	0.0225
46	2.1521	0.0223
47	2.1741	0.0220
48	2.1958	0.0218
49	2.2173	0.0215
50	2.2386	0.0213
51	2.2597	0.0211
52	2.2805	0.0208
53	2.3012	0.0206
54	2.3216	0.0204
55	2.3418	0.0202
56	2.3619	0.0200
57	2.3817	0.0199
58	2.4014	0.0197
59	2.4209	0.0195
60	2.4402	0.0193
61	2.4594	0.0191
62	2.4783	0.0190
63	2.4972	0.0188
64	2.5158	0.0187
65	2.5344	0.0185
66	2.5527	0.0184
67	2.5709	0.0182
68	2.5890	0.0181
69	2.6069	0.0179
70	2.6247	0.0178
71	2.6424	0.0177
72	2.6599	0.0175

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0175	0.0023	0.0153
2	0.0177	0.0023	0.0154
3	0.0179	0.0023	0.0156
4	0.0181	0.0023	0.0157
5	0.0184	0.0024	0.0160
6	0.0185	0.0024	0.0161
7	0.0188	0.0024	0.0164
8	0.0190	0.0025	0.0165
9	0.0193	0.0025	0.0168
10	0.0195	0.0025	0.0170
11	0.0199	0.0026	0.0173
12	0.0200	0.0026	0.0174
13	0.0204	0.0027	0.0178
14	0.0206	0.0027	0.0180
15	0.0211	0.0027	0.0183
16	0.0213	0.0028	0.0185

17	0.0218	0.0028	0.0189
18	0.0220	0.0029	0.0191
19	0.0225	0.0029	0.0196
20	0.0228	0.0030	0.0198
21	0.0234	0.0030	0.0203
22	0.0237	0.0031	0.0206
23	0.0243	0.0032	0.0211
24	0.0246	0.0032	0.0214
25	0.0254	0.0033	0.0221
26	0.0258	0.0033	0.0224
27	0.0266	0.0034	0.0231
28	0.0270	0.0035	0.0235
29	0.0280	0.0036	0.0243
30	0.0285	0.0037	0.0248
31	0.0296	0.0038	0.0258
32	0.0302	0.0039	0.0263
33	0.0315	0.0041	0.0274
34	0.0323	0.0042	0.0281
35	0.0339	0.0044	0.0295
36	0.0348	0.0045	0.0303
37	0.0368	0.0048	0.0321
38	0.0380	0.0049	0.0331
39	0.0407	0.0053	0.0354
40	0.0422	0.0055	0.0368
41	0.0390	0.0051	0.0339
42	0.0412	0.0053	0.0358
43	0.0467	0.0061	0.0407
44	0.0504	0.0065	0.0439
45	0.0607	0.0065	0.0542
46	0.0686	0.0065	0.0620
47	0.0980	0.0065	0.0915
48	0.1348	0.0065	0.1282
49	0.4218	0.0065	0.4153
50	0.0798	0.0065	0.0733
51	0.0549	0.0065	0.0484
52	0.0437	0.0057	0.0381
53	0.0440	0.0057	0.0383
54	0.0393	0.0051	0.0342
55	0.0358	0.0046	0.0311
56	0.0330	0.0043	0.0288
57	0.0309	0.0040	0.0268
58	0.0290	0.0038	0.0253
59	0.0275	0.0036	0.0239
60	0.0262	0.0034	0.0228
61	0.0250	0.0032	0.0218
62	0.0240	0.0031	0.0209
63	0.0231	0.0030	0.0201
64	0.0223	0.0029	0.0194
65	0.0215	0.0028	0.0187
66	0.0208	0.0027	0.0181
67	0.0202	0.0026	0.0176
68	0.0197	0.0026	0.0171
69	0.0191	0.0025	0.0167

70	0.0187	0.0024	0.0162
71	0.0182	0.0024	0.0159
72	0.0178	0.0023	0.0155

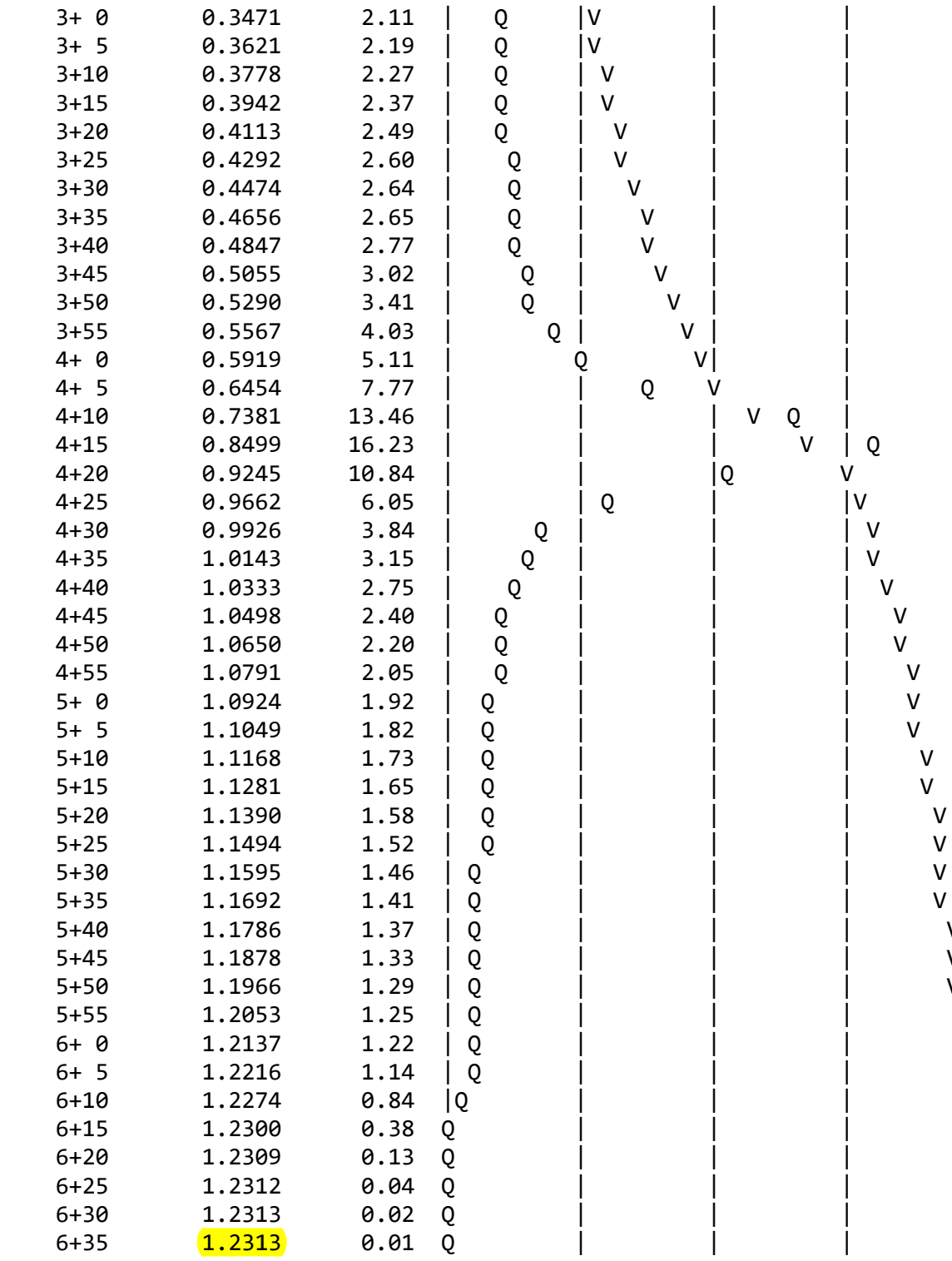
Total soil rain loss = 0.27(In)
Total effective rainfall = 2.39(In)
Peak flow rate in flood hydrograph = 16.23(CFS)

++

6 - 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	0.0003	0.05	Q | | | |
0+10	0.0026	0.33	Q | | | |
0+15	0.0079	0.77	VQ | | | |
0+20	0.0150	1.03	V Q | | | |
0+25	0.0228	1.13	V Q | | | |
0+30	0.0308	1.16	V Q | | | |
0+35	0.0390	1.19	|VQ | | | |
0+40	0.0473	1.21	|VQ | | | |
0+45	0.0557	1.22	|VQ | | | |
0+50	0.0642	1.24	| Q | | | |
0+55	0.0728	1.25	| Q | | | |
1+ 0	0.0816	1.27	| Q | | | |
1+ 5	0.0905	1.29	| Q | | | |
1+10	0.0995	1.31	| QV | | | |
1+15	0.1086	1.33	| QV | | | |
1+20	0.1178	1.35	| QV | | | |
1+25	0.1273	1.37	| Q V | | | |
1+30	0.1368	1.39	| Q V | | | |
1+35	0.1465	1.41	| Q V | | | |
1+40	0.1564	1.43	| Q V | | | |
1+45	0.1665	1.46	| Q V | | | |
1+50	0.1767	1.49	| Q V | | | |
1+55	0.1871	1.51	| Q V | | | |
2+ 0	0.1977	1.54	| Q V | | | |
2+ 5	0.2086	1.57	| Q V | | | |
2+10	0.2196	1.61	| Q V | | | |
2+15	0.2310	1.64	| Q V | | | |
2+20	0.2425	1.68	| Q V | | | |
2+25	0.2544	1.72	| Q V | | | |
2+30	0.2665	1.76	| Q V | | | |
2+35	0.2790	1.81	| Q V| | | |
2+40	0.2918	1.86	| Q V| | | |
2+45	0.3050	1.91	| Q V| | | |
2+50	0.3185	1.97	| Q V | | |
2+55	0.3326	2.04	| Q V | | |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3+ 5 0.3621 2.19
3+10 0.3778 2.27
3+15 0.3942 2.37
3+20 0.4113 2.49
3+25 0.4292 2.60
3+30 0.4474 2.64
3+35 0.4656 2.65
3+40 0.4847 2.77
3+45 0.5055 3.02
3+50 0.5290 3.41
3+55 0.5567 4.03
4+ 0 0.5919 5.11
4+ 5 0.6454 7.77
4+10 0.7381 13.46
4+15 0.8499 16.23
4+20 0.9245 10.84
4+25 0.9662 6.05
4+30 0.9926 3.84
4+35 1.0143 3.15
4+40 1.0333 2.75
4+45 1.0498 2.40
4+50 1.0650 2.20
4+55 1.0791 2.05
5+ 0 1.0924 1.92
5+ 5 1.1049 1.82
5+10 1.1168 1.73
5+15 1.1281 1.65
5+20 1.1390 1.58
5+25 1.1494 1.52
5+30 1.1595 1.46
5+35 1.1692 1.41
5+40 1.1786 1.37
5+45 1.1878 1.33
5+50 1.1966 1.29
5+55 1.2053 1.25
6+ 0 1.2137 1.22
6+ 5 1.2216 1.14
6+10 1.2274 0.84
6+15 1.2300 0.38
6+20 1.2309 0.13
6+25 1.2312 0.04
6+30 1.2313 0.02
6+35 1.2313 0.01

Attachment O: Post-Development Unit Hydrograph (24-Hr)

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 12/20/21

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

Program License Serial Number 6458

Proposed 100 Year 24 Hour Event

Storm Event Year = 100

Antecedent Moisture Condition = 3

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 100		
6.19	1	1.14
Rainfall data for year 100		
6.19	6	2.66
Rainfall data for year 100		
6.19	24	4.78

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

SCS curve No.(AMCII)	SCS curve NO.(AMC 3)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
32.0	52.0	6.19	1.000	0.785	0.100	0.079

Area-averaged adjusted loss rate Fm (In/Hr) = 0.079

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

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC3)	S	Pervious Yield Fr
0.62	0.100	32.0	52.0	9.23	0.148
5.57	0.900	98.0	98.0	0.20	0.951

Area-averaged catchment yield fraction, Y = 0.870
Area-averaged low loss fraction, Yb = 0.130
User entry of time of concentration = 0.212 (hours)
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Watershed area = 6.19(Ac.)
Catchment Lag time = 0.170 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 49.0196
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.079(In/Hr)
Average low loss rate fraction (Yb) = 0.130 (decimal)
VALLEY DEVELOPED S-Graph Selected
Computed peak 5-minute rainfall = 0.422(In)
Computed peak 30-minute rainfall = 0.864(In)
Specified peak 1-hour rainfall = 1.140(In)
Computed peak 3-hour rainfall = 1.917(In)
Specified peak 6-hour rainfall = 2.660(In)
Specified peak 24-hour rainfall = 4.780(In)

Rainfall depth area reduction factors:
Using a total area of 6.19(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.422(In)
30-minute factor = 1.000 Adjusted rainfall = 0.864(In)
1-hour factor = 1.000 Adjusted rainfall = 1.140(In)
3-hour factor = 1.000 Adjusted rainfall = 1.917(In)
6-hour factor = 1.000 Adjusted rainfall = 2.660(In)
24-hour factor = 1.000 Adjusted rainfall = 4.780(In)

U n i t H y d r o g r a p h
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Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))

(K = 74.86 (CFS))

1	4.408	3.300
2	28.700	18.185
3	67.229	28.843
4	89.075	16.354
5	96.687	5.698
6	98.653	1.472
7	99.534	0.659
8	100.000	0.349

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.4218	0.4218
2	0.5566	0.1348
3	0.6546	0.0980
4	0.7344	0.0798
5	0.8030	0.0686
6	0.8637	0.0607
7	0.9186	0.0549
8	0.9690	0.0504
9	1.0158	0.0467
10	1.0595	0.0437
11	1.1007	0.0412
12	1.1397	0.0390
13	1.1837	0.0440
14	1.2259	0.0422
15	1.2666	0.0407
16	1.3058	0.0393
17	1.3438	0.0380
18	1.3807	0.0368
19	1.4164	0.0358
20	1.4512	0.0348
21	1.4851	0.0339
22	1.5182	0.0330
23	1.5504	0.0323
24	1.5820	0.0315
25	1.6128	0.0309
26	1.6430	0.0302
27	1.6726	0.0296
28	1.7017	0.0290
29	1.7302	0.0285
30	1.7581	0.0280
31	1.7856	0.0275
32	1.8126	0.0270
33	1.8392	0.0266
34	1.8654	0.0262
35	1.8911	0.0258
36	1.9165	0.0254
37	1.9415	0.0250
38	1.9662	0.0246
39	1.9905	0.0243
40	2.0144	0.0240

41	2.0381	0.0237
42	2.0614	0.0234
43	2.0845	0.0231
44	2.1073	0.0228
45	2.1298	0.0225
46	2.1521	0.0223
47	2.1741	0.0220
48	2.1958	0.0218
49	2.2173	0.0215
50	2.2386	0.0213
51	2.2597	0.0211
52	2.2805	0.0208
53	2.3012	0.0206
54	2.3216	0.0204
55	2.3418	0.0202
56	2.3619	0.0200
57	2.3817	0.0199
58	2.4014	0.0197
59	2.4209	0.0195
60	2.4402	0.0193
61	2.4594	0.0191
62	2.4783	0.0190
63	2.4972	0.0188
64	2.5158	0.0187
65	2.5344	0.0185
66	2.5527	0.0184
67	2.5709	0.0182
68	2.5890	0.0181
69	2.6069	0.0179
70	2.6247	0.0178
71	2.6424	0.0177
72	2.6599	0.0175
73	2.6755	0.0156
74	2.6909	0.0154
75	2.7063	0.0153
76	2.7215	0.0152
77	2.7365	0.0151
78	2.7515	0.0150
79	2.7664	0.0149
80	2.7811	0.0148
81	2.7958	0.0146
82	2.8103	0.0145
83	2.8247	0.0144
84	2.8391	0.0143
85	2.8533	0.0142
86	2.8675	0.0141
87	2.8815	0.0141
88	2.8955	0.0140
89	2.9093	0.0139
90	2.9231	0.0138
91	2.9368	0.0137
92	2.9504	0.0136
93	2.9639	0.0135

94	2.9774	0.0134
95	2.9907	0.0134
96	3.0040	0.0133
97	3.0172	0.0132
98	3.0303	0.0131
99	3.0433	0.0130
100	3.0563	0.0130
101	3.0692	0.0129
102	3.0820	0.0128
103	3.0947	0.0127
104	3.1074	0.0127
105	3.1200	0.0126
106	3.1325	0.0125
107	3.1450	0.0125
108	3.1574	0.0124
109	3.1697	0.0123
110	3.1820	0.0123
111	3.1942	0.0122
112	3.2063	0.0121
113	3.2184	0.0121
114	3.2304	0.0120
115	3.2423	0.0120
116	3.2542	0.0119
117	3.2660	0.0118
118	3.2778	0.0118
119	3.2895	0.0117
120	3.3012	0.0117
121	3.3128	0.0116
122	3.3243	0.0115
123	3.3358	0.0115
124	3.3473	0.0114
125	3.3587	0.0114
126	3.3700	0.0113
127	3.3813	0.0113
128	3.3925	0.0112
129	3.4037	0.0112
130	3.4148	0.0111
131	3.4259	0.0111
132	3.4369	0.0110
133	3.4479	0.0110
134	3.4589	0.0109
135	3.4698	0.0109
136	3.4806	0.0108
137	3.4914	0.0108
138	3.5021	0.0108
139	3.5129	0.0107
140	3.5235	0.0107
141	3.5341	0.0106
142	3.5447	0.0106
143	3.5552	0.0105
144	3.5657	0.0105
145	3.5762	0.0104
146	3.5866	0.0104

147	3.5970	0.0104
148	3.6073	0.0103
149	3.6176	0.0103
150	3.6278	0.0102
151	3.6380	0.0102
152	3.6482	0.0102
153	3.6583	0.0101
154	3.6684	0.0101
155	3.6785	0.0101
156	3.6885	0.0100
157	3.6984	0.0100
158	3.7084	0.0099
159	3.7183	0.0099
160	3.7282	0.0099
161	3.7380	0.0098
162	3.7478	0.0098
163	3.7576	0.0098
164	3.7673	0.0097
165	3.7770	0.0097
166	3.7866	0.0097
167	3.7963	0.0096
168	3.8059	0.0096
169	3.8154	0.0096
170	3.8250	0.0095
171	3.8345	0.0095
172	3.8439	0.0095
173	3.8534	0.0094
174	3.8628	0.0094
175	3.8721	0.0094
176	3.8815	0.0093
177	3.8908	0.0093
178	3.9001	0.0093
179	3.9093	0.0092
180	3.9185	0.0092
181	3.9277	0.0092
182	3.9369	0.0092
183	3.9460	0.0091
184	3.9551	0.0091
185	3.9642	0.0091
186	3.9732	0.0090
187	3.9822	0.0090
188	3.9912	0.0090
189	4.0002	0.0090
190	4.0091	0.0089
191	4.0180	0.0089
192	4.0269	0.0089
193	4.0358	0.0089
194	4.0446	0.0088
195	4.0534	0.0088
196	4.0622	0.0088
197	4.0709	0.0087
198	4.0797	0.0087
199	4.0884	0.0087

200	4.0970	0.0087
201	4.1057	0.0086
202	4.1143	0.0086
203	4.1229	0.0086
204	4.1315	0.0086
205	4.1400	0.0086
206	4.1486	0.0085
207	4.1571	0.0085
208	4.1655	0.0085
209	4.1740	0.0085
210	4.1824	0.0084
211	4.1908	0.0084
212	4.1992	0.0084
213	4.2076	0.0084
214	4.2159	0.0083
215	4.2242	0.0083
216	4.2325	0.0083
217	4.2408	0.0083
218	4.2491	0.0083
219	4.2573	0.0082
220	4.2655	0.0082
221	4.2737	0.0082
222	4.2818	0.0082
223	4.2900	0.0081
224	4.2981	0.0081
225	4.3062	0.0081
226	4.3143	0.0081
227	4.3224	0.0081
228	4.3304	0.0080
229	4.3384	0.0080
230	4.3464	0.0080
231	4.3544	0.0080
232	4.3624	0.0080
233	4.3703	0.0079
234	4.3782	0.0079
235	4.3861	0.0079
236	4.3940	0.0079
237	4.4019	0.0079
238	4.4097	0.0078
239	4.4175	0.0078
240	4.4253	0.0078
241	4.4331	0.0078
242	4.4409	0.0078
243	4.4486	0.0077
244	4.4564	0.0077
245	4.4641	0.0077
246	4.4718	0.0077
247	4.4795	0.0077
248	4.4871	0.0077
249	4.4948	0.0076
250	4.5024	0.0076
251	4.5100	0.0076
252	4.5176	0.0076

253	4.5251	0.0076
254	4.5327	0.0076
255	4.5402	0.0075
256	4.5478	0.0075
257	4.5553	0.0075
258	4.5627	0.0075
259	4.5702	0.0075
260	4.5777	0.0075
261	4.5851	0.0074
262	4.5925	0.0074
263	4.5999	0.0074
264	4.6073	0.0074
265	4.6147	0.0074
266	4.6220	0.0074
267	4.6294	0.0073
268	4.6367	0.0073
269	4.6440	0.0073
270	4.6513	0.0073
271	4.6586	0.0073
272	4.6658	0.0073
273	4.6731	0.0072
274	4.6803	0.0072
275	4.6875	0.0072
276	4.6947	0.0072
277	4.7019	0.0072
278	4.7091	0.0072
279	4.7162	0.0072
280	4.7234	0.0071
281	4.7305	0.0071
282	4.7376	0.0071
283	4.7447	0.0071
284	4.7518	0.0071
285	4.7588	0.0071
286	4.7659	0.0071
287	4.7729	0.0070
288	4.7800	0.0070

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0070	0.0009	0.0061
2	0.0070	0.0009	0.0061
3	0.0071	0.0009	0.0062
4	0.0071	0.0009	0.0062
5	0.0071	0.0009	0.0062
6	0.0071	0.0009	0.0062
7	0.0072	0.0009	0.0062
8	0.0072	0.0009	0.0062
9	0.0072	0.0009	0.0063
10	0.0072	0.0009	0.0063
11	0.0072	0.0009	0.0063
12	0.0073	0.0009	0.0063

13	0.0073	0.0009	0.0063
14	0.0073	0.0009	0.0064
15	0.0073	0.0010	0.0064
16	0.0074	0.0010	0.0064
17	0.0074	0.0010	0.0064
18	0.0074	0.0010	0.0064
19	0.0074	0.0010	0.0065
20	0.0075	0.0010	0.0065
21	0.0075	0.0010	0.0065
22	0.0075	0.0010	0.0065
23	0.0075	0.0010	0.0066
24	0.0076	0.0010	0.0066
25	0.0076	0.0010	0.0066
26	0.0076	0.0010	0.0066
27	0.0076	0.0010	0.0066
28	0.0077	0.0010	0.0067
29	0.0077	0.0010	0.0067
30	0.0077	0.0010	0.0067
31	0.0077	0.0010	0.0067
32	0.0078	0.0010	0.0068
33	0.0078	0.0010	0.0068
34	0.0078	0.0010	0.0068
35	0.0079	0.0010	0.0068
36	0.0079	0.0010	0.0069
37	0.0079	0.0010	0.0069
38	0.0079	0.0010	0.0069
39	0.0080	0.0010	0.0069
40	0.0080	0.0010	0.0070
41	0.0080	0.0010	0.0070
42	0.0081	0.0010	0.0070
43	0.0081	0.0011	0.0071
44	0.0081	0.0011	0.0071
45	0.0082	0.0011	0.0071
46	0.0082	0.0011	0.0071
47	0.0082	0.0011	0.0072
48	0.0083	0.0011	0.0072
49	0.0083	0.0011	0.0072
50	0.0083	0.0011	0.0072
51	0.0084	0.0011	0.0073
52	0.0084	0.0011	0.0073
53	0.0084	0.0011	0.0073
54	0.0085	0.0011	0.0074
55	0.0085	0.0011	0.0074
56	0.0085	0.0011	0.0074
57	0.0086	0.0011	0.0075
58	0.0086	0.0011	0.0075
59	0.0086	0.0011	0.0075
60	0.0087	0.0011	0.0075
61	0.0087	0.0011	0.0076
62	0.0087	0.0011	0.0076
63	0.0088	0.0011	0.0077
64	0.0088	0.0011	0.0077
65	0.0089	0.0012	0.0077

66	0.0089	0.0012	0.0078
67	0.0090	0.0012	0.0078
68	0.0090	0.0012	0.0078
69	0.0090	0.0012	0.0079
70	0.0091	0.0012	0.0079
71	0.0091	0.0012	0.0079
72	0.0092	0.0012	0.0080
73	0.0092	0.0012	0.0080
74	0.0092	0.0012	0.0080
75	0.0093	0.0012	0.0081
76	0.0093	0.0012	0.0081
77	0.0094	0.0012	0.0082
78	0.0094	0.0012	0.0082
79	0.0095	0.0012	0.0083
80	0.0095	0.0012	0.0083
81	0.0096	0.0012	0.0084
82	0.0096	0.0012	0.0084
83	0.0097	0.0013	0.0084
84	0.0097	0.0013	0.0085
85	0.0098	0.0013	0.0085
86	0.0098	0.0013	0.0086
87	0.0099	0.0013	0.0086
88	0.0099	0.0013	0.0087
89	0.0100	0.0013	0.0087
90	0.0101	0.0013	0.0087
91	0.0101	0.0013	0.0088
92	0.0102	0.0013	0.0088
93	0.0102	0.0013	0.0089
94	0.0103	0.0013	0.0090
95	0.0104	0.0013	0.0090
96	0.0104	0.0014	0.0091
97	0.0105	0.0014	0.0091
98	0.0105	0.0014	0.0092
99	0.0106	0.0014	0.0092
100	0.0107	0.0014	0.0093
101	0.0108	0.0014	0.0094
102	0.0108	0.0014	0.0094
103	0.0109	0.0014	0.0095
104	0.0109	0.0014	0.0095
105	0.0110	0.0014	0.0096
106	0.0111	0.0014	0.0096
107	0.0112	0.0015	0.0097
108	0.0112	0.0015	0.0098
109	0.0113	0.0015	0.0099
110	0.0114	0.0015	0.0099
111	0.0115	0.0015	0.0100
112	0.0115	0.0015	0.0101
113	0.0117	0.0015	0.0101
114	0.0117	0.0015	0.0102
115	0.0118	0.0015	0.0103
116	0.0119	0.0015	0.0103
117	0.0120	0.0016	0.0105
118	0.0121	0.0016	0.0105

119	0.0122	0.0016	0.0106
120	0.0123	0.0016	0.0107
121	0.0124	0.0016	0.0108
122	0.0125	0.0016	0.0108
123	0.0126	0.0016	0.0110
124	0.0127	0.0016	0.0110
125	0.0128	0.0017	0.0111
126	0.0129	0.0017	0.0112
127	0.0130	0.0017	0.0113
128	0.0131	0.0017	0.0114
129	0.0133	0.0017	0.0115
130	0.0134	0.0017	0.0116
131	0.0135	0.0018	0.0118
132	0.0136	0.0018	0.0118
133	0.0138	0.0018	0.0120
134	0.0139	0.0018	0.0121
135	0.0141	0.0018	0.0122
136	0.0141	0.0018	0.0123
137	0.0143	0.0019	0.0125
138	0.0144	0.0019	0.0126
139	0.0146	0.0019	0.0127
140	0.0148	0.0019	0.0128
141	0.0150	0.0019	0.0130
142	0.0151	0.0020	0.0131
143	0.0153	0.0020	0.0133
144	0.0154	0.0020	0.0134
145	0.0175	0.0023	0.0153
146	0.0177	0.0023	0.0154
147	0.0179	0.0023	0.0156
148	0.0181	0.0023	0.0157
149	0.0184	0.0024	0.0160
150	0.0185	0.0024	0.0161
151	0.0188	0.0024	0.0164
152	0.0190	0.0025	0.0165
153	0.0193	0.0025	0.0168
154	0.0195	0.0025	0.0170
155	0.0199	0.0026	0.0173
156	0.0200	0.0026	0.0174
157	0.0204	0.0027	0.0178
158	0.0206	0.0027	0.0180
159	0.0211	0.0027	0.0183
160	0.0213	0.0028	0.0185
161	0.0218	0.0028	0.0189
162	0.0220	0.0029	0.0191
163	0.0225	0.0029	0.0196
164	0.0228	0.0030	0.0198
165	0.0234	0.0030	0.0203
166	0.0237	0.0031	0.0206
167	0.0243	0.0032	0.0211
168	0.0246	0.0032	0.0214
169	0.0254	0.0033	0.0221
170	0.0258	0.0033	0.0224
171	0.0266	0.0034	0.0231

172	0.0270	0.0035	0.0235
173	0.0280	0.0036	0.0243
174	0.0285	0.0037	0.0248
175	0.0296	0.0038	0.0258
176	0.0302	0.0039	0.0263
177	0.0315	0.0041	0.0274
178	0.0323	0.0042	0.0281
179	0.0339	0.0044	0.0295
180	0.0348	0.0045	0.0303
181	0.0368	0.0048	0.0321
182	0.0380	0.0049	0.0331
183	0.0407	0.0053	0.0354
184	0.0422	0.0055	0.0368
185	0.0390	0.0051	0.0339
186	0.0412	0.0053	0.0358
187	0.0467	0.0061	0.0407
188	0.0504	0.0065	0.0439
189	0.0607	0.0065	0.0542
190	0.0686	0.0065	0.0620
191	0.0980	0.0065	0.0915
192	0.1348	0.0065	0.1282
193	0.4218	0.0065	0.4153
194	0.0798	0.0065	0.0733
195	0.0549	0.0065	0.0484
196	0.0437	0.0057	0.0381
197	0.0440	0.0057	0.0383
198	0.0393	0.0051	0.0342
199	0.0358	0.0046	0.0311
200	0.0330	0.0043	0.0288
201	0.0309	0.0040	0.0268
202	0.0290	0.0038	0.0253
203	0.0275	0.0036	0.0239
204	0.0262	0.0034	0.0228
205	0.0250	0.0032	0.0218
206	0.0240	0.0031	0.0209
207	0.0231	0.0030	0.0201
208	0.0223	0.0029	0.0194
209	0.0215	0.0028	0.0187
210	0.0208	0.0027	0.0181
211	0.0202	0.0026	0.0176
212	0.0197	0.0026	0.0171
213	0.0191	0.0025	0.0167
214	0.0187	0.0024	0.0162
215	0.0182	0.0024	0.0159
216	0.0178	0.0023	0.0155
217	0.0156	0.0020	0.0135
218	0.0152	0.0020	0.0132
219	0.0149	0.0019	0.0129
220	0.0145	0.0019	0.0127
221	0.0142	0.0018	0.0124
222	0.0140	0.0018	0.0121
223	0.0137	0.0018	0.0119
224	0.0134	0.0017	0.0117

225	0.0132	0.0017	0.0115
226	0.0130	0.0017	0.0113
227	0.0127	0.0017	0.0111
228	0.0125	0.0016	0.0109
229	0.0123	0.0016	0.0107
230	0.0121	0.0016	0.0106
231	0.0120	0.0016	0.0104
232	0.0118	0.0015	0.0102
233	0.0116	0.0015	0.0101
234	0.0114	0.0015	0.0100
235	0.0113	0.0015	0.0098
236	0.0111	0.0014	0.0097
237	0.0110	0.0014	0.0096
238	0.0108	0.0014	0.0094
239	0.0107	0.0014	0.0093
240	0.0106	0.0014	0.0092
241	0.0104	0.0014	0.0091
242	0.0103	0.0013	0.0090
243	0.0102	0.0013	0.0089
244	0.0101	0.0013	0.0088
245	0.0100	0.0013	0.0087
246	0.0099	0.0013	0.0086
247	0.0098	0.0013	0.0085
248	0.0097	0.0013	0.0084
249	0.0096	0.0012	0.0083
250	0.0095	0.0012	0.0082
251	0.0094	0.0012	0.0082
252	0.0093	0.0012	0.0081
253	0.0092	0.0012	0.0080
254	0.0091	0.0012	0.0079
255	0.0090	0.0012	0.0078
256	0.0089	0.0012	0.0078
257	0.0089	0.0011	0.0077
258	0.0088	0.0011	0.0076
259	0.0087	0.0011	0.0076
260	0.0086	0.0011	0.0075
261	0.0086	0.0011	0.0074
262	0.0085	0.0011	0.0074
263	0.0084	0.0011	0.0073
264	0.0083	0.0011	0.0073
265	0.0083	0.0011	0.0072
266	0.0082	0.0011	0.0071
267	0.0081	0.0011	0.0071
268	0.0081	0.0010	0.0070
269	0.0080	0.0010	0.0070
270	0.0080	0.0010	0.0069
271	0.0079	0.0010	0.0069
272	0.0078	0.0010	0.0068
273	0.0078	0.0010	0.0068
274	0.0077	0.0010	0.0067
275	0.0077	0.0010	0.0067
276	0.0076	0.0010	0.0066
277	0.0076	0.0010	0.0066

278	0.0075	0.0010	0.0065
279	0.0075	0.0010	0.0065
280	0.0074	0.0010	0.0065
281	0.0074	0.0010	0.0064
282	0.0073	0.0009	0.0064
283	0.0073	0.0009	0.0063
284	0.0072	0.0009	0.0063
285	0.0072	0.0009	0.0063
286	0.0071	0.0009	0.0062
287	0.0071	0.0009	0.0062
288	0.0071	0.0009	0.0061

Total soil rain loss = 0.55(In)
Total effective rainfall = 4.23(In)
Peak flow rate in flood hydrograph = 16.23(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	5.0	10.0	15.0	20.0
0+ 5	0.0001	0.02	Q				
0+10	0.0010	0.13	Q				
0+15	0.0032	0.31	Q				
0+20	0.0060	0.41	Q				
0+25	0.0090	0.44	Q				
0+30	0.0122	0.46	Q				
0+35	0.0154	0.46	Q				
0+40	0.0185	0.46	Q				
0+45	0.0218	0.47	Q				
0+50	0.0250	0.47	Q				
0+55	0.0282	0.47	Q				
1+ 0	0.0314	0.47	Q				
1+ 5	0.0347	0.47	Q				
1+10	0.0379	0.47	Q				
1+15	0.0412	0.47	Q				
1+20	0.0445	0.48	Q				
1+25	0.0478	0.48	Q				
1+30	0.0511	0.48	Q				
1+35	0.0544	0.48	Q				
1+40	0.0577	0.48	QV				
1+45	0.0610	0.48	QV				
1+50	0.0644	0.49	QV				
1+55	0.0677	0.49	QV				
2+ 0	0.0711	0.49	QV				
2+ 5	0.0745	0.49	QV				
2+10	0.0779	0.49	QV				
2+15	0.0813	0.49	QV				

2+20	0.0847	0.50	QV	|	|	|	|
2+25	0.0881	0.50	QV	|	|	|	|
2+30	0.0916	0.50	QV	|	|	|	|
2+35	0.0950	0.50	|Q	|	|	|	|
2+40	0.0985	0.50	|Q	|	|	|	|
2+45	0.1019	0.50	|Q	|	|	|	|
2+50	0.1054	0.51	|Q	|	|	|	|
2+55	0.1089	0.51	|Q	|	|	|	|
3+ 0	0.1124	0.51	|QV	|	|	|	|
3+ 5	0.1160	0.51	|QV	|	|	|	|
3+10	0.1195	0.51	|QV	|	|	|	|
3+15	0.1230	0.52	|QV	|	|	|	|
3+20	0.1266	0.52	|QV	|	|	|	|
3+25	0.1302	0.52	|QV	|	|	|	|
3+30	0.1338	0.52	|QV	|	|	|	|
3+35	0.1374	0.52	|QV	|	|	|	|
3+40	0.1410	0.53	|QV	|	|	|	|
3+45	0.1446	0.53	|QV	|	|	|	|
3+50	0.1483	0.53	|QV	|	|	|	|
3+55	0.1519	0.53	|QV	|	|	|	|
4+ 0	0.1556	0.53	|QV	|	|	|	|
4+ 5	0.1593	0.54	|QV	|	|	|	|
4+10	0.1630	0.54	|QV	|	|	|	|
4+15	0.1667	0.54	|Q V	|	|	|	|
4+20	0.1704	0.54	|Q V	|	|	|	|
4+25	0.1742	0.54	|Q V	|	|	|	|
4+30	0.1779	0.55	|Q V	|	|	|	|
4+35	0.1817	0.55	|Q V	|	|	|	|
4+40	0.1855	0.55	|Q V	|	|	|	|
4+45	0.1893	0.55	|Q V	|	|	|	|
4+50	0.1932	0.56	|Q V	|	|	|	|
4+55	0.1970	0.56	|Q V	|	|	|	|
5+ 0	0.2009	0.56	|Q V	|	|	|	|
5+ 5	0.2047	0.56	|Q V	|	|	|	|
5+10	0.2086	0.57	|Q V	|	|	|	|
5+15	0.2125	0.57	|Q V	|	|	|	|
5+20	0.2165	0.57	|Q V	|	|	|	|
5+25	0.2204	0.57	|Q V	|	|	|	|
5+30	0.2244	0.58	|Q V	|	|	|	|
5+35	0.2283	0.58	|Q V	|	|	|	|
5+40	0.2323	0.58	|Q V	|	|	|	|
5+45	0.2364	0.58	|Q V	|	|	|	|
5+50	0.2404	0.59	|Q V	|	|	|	|
5+55	0.2444	0.59	|Q V	|	|	|	|
6+ 0	0.2485	0.59	|Q V	|	|	|	|
6+ 5	0.2526	0.59	|Q V	|	|	|	|
6+10	0.2567	0.60	|Q V	|	|	|	|
6+15	0.2608	0.60	|Q V	|	|	|	|
6+20	0.2650	0.60	|Q V	|	|	|	|
6+25	0.2692	0.61	|Q V	|	|	|	|
6+30	0.2734	0.61	|Q V	|	|	|	|
6+35	0.2776	0.61	|Q V	|	|	|	|
6+40	0.2818	0.61	|Q V	|	|	|	|

6+45	0.2861	0.62	|Q V |	|	|	|
6+50	0.2903	0.62	|Q V |	|	|	|
6+55	0.2946	0.62	|Q V |	|	|	|
7+ 0	0.2990	0.63	|Q V |	|	|	|
7+ 5	0.3033	0.63	|Q V |	|	|	|
7+10	0.3077	0.63	|Q V |	|	|	|
7+15	0.3121	0.64	|Q V |	|	|	|
7+20	0.3165	0.64	|Q V |	|	|	|
7+25	0.3209	0.64	|Q V |	|	|	|
7+30	0.3254	0.65	|Q V |	|	|	|
7+35	0.3298	0.65	|Q V |	|	|	|
7+40	0.3344	0.65	|Q V |	|	|	|
7+45	0.3389	0.66	|Q V |	|	|	|
7+50	0.3435	0.66	|Q V |	|	|	|
7+55	0.3480	0.67	|Q V |	|	|	|
8+ 0	0.3527	0.67	|Q V |	|	|	|
8+ 5	0.3573	0.67	|Q V |	|	|	|
8+10	0.3620	0.68	|Q V |	|	|	|
8+15	0.3667	0.68	|Q V |	|	|	|
8+20	0.3714	0.69	|Q V |	|	|	|
8+25	0.3762	0.69	|Q V |	|	|	|
8+30	0.3809	0.69	|Q V |	|	|	|
8+35	0.3858	0.70	|Q V |	|	|	|
8+40	0.3906	0.70	|Q V |	|	|	|
8+45	0.3955	0.71	|Q V |	|	|	|
8+50	0.4004	0.71	|Q V |	|	|	|
8+55	0.4053	0.72	|Q V |	|	|	|
9+ 0	0.4103	0.72	|Q V |	|	|	|
9+ 5	0.4153	0.73	|Q V |	|	|	|
9+10	0.4203	0.73	|Q V |	|	|	|
9+15	0.4254	0.74	|Q V |	|	|	|
9+20	0.4305	0.74	|Q V |	|	|	|
9+25	0.4357	0.75	|Q V |	|	|	|
9+30	0.4409	0.75	|Q V |	|	|	|
9+35	0.4461	0.76	|Q V |	|	|	|
9+40	0.4513	0.76	|Q V |	|	|	|
9+45	0.4566	0.77	|Q V |	|	|	|
9+50	0.4620	0.77	|Q V |	|	|	|
9+55	0.4673	0.78	|Q V |	|	|	|
10+ 0	0.4728	0.79	|Q V |	|	|	|
10+ 5	0.4782	0.79	|Q V |	|	|	|
10+10	0.4837	0.80	|Q V |	|	|	|
10+15	0.4893	0.81	|Q V |	|	|	|
10+20	0.4949	0.81	|Q V|	|	|	|
10+25	0.5005	0.82	|Q V|	|	|	|
10+30	0.5062	0.83	|Q V|	|	|	|
10+35	0.5119	0.83	|Q V|	|	|	|
10+40	0.5177	0.84	|Q V|	|	|	|
10+45	0.5235	0.85	|Q V|	|	|	|
10+50	0.5294	0.85	|Q V|	|	|	|
10+55	0.5354	0.86	|Q V|	|	|	|
11+ 0	0.5413	0.87	|Q V|	|	|	|
11+ 5	0.5474	0.88	|Q V |	|	|	|

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11+10       0.5535      0.89  |Q        V         |         |         |
11+15       0.5597      0.89  |Q        V         |         |         |
11+20       0.5659      0.90  |Q        V         |         |         |
11+25       0.5722      0.91  |Q        V         |         |         |
11+30       0.5785      0.92  |Q        V         |         |         |
11+35       0.5849      0.93  |Q        V         |         |         |
11+40       0.5914      0.94  |Q        V         |         |         |
11+45       0.5980      0.95  |Q        V         |         |         |
11+50       0.6046      0.96  |Q        |V        |         |         |
11+55       0.6113      0.97  |Q        |V        |         |         |
12+ 0       0.6180      0.98  |Q        |V        |         |         |
12+ 5       0.6249      1.00  |Q        |V        |         |         |
12+10       0.6321      1.04  | Q       |V        |         |         |
12+15       0.6397      1.10  | Q       |V        |         |         |
12+20       0.6475      1.14  | Q       |V        |         |         |
12+25       0.6555      1.16  | Q       | V       |         |         |
12+30       0.6636      1.18  | Q       | V       |         |         |
12+35       0.6718      1.19  | Q       | V       |         |         |
12+40       0.6801      1.21  | Q       | V       |         |         |
12+45       0.6885      1.22  | Q       | V       |         |         |
12+50       0.6971      1.24  | Q       | V       |         |         |
12+55       0.7057      1.25  | Q       | V       |         |         |
13+ 0       0.7144      1.27  | Q       |  V      |         |         |
13+ 5       0.7233      1.29  | Q       |  V      |         |         |
13+10       0.7323      1.31  | Q       |  V      |         |         |
13+15       0.7414      1.33  | Q       |  V      |         |         |
13+20       0.7507      1.35  | Q       |  V      |         |         |
13+25       0.7601      1.37  | Q       |  V      |         |         |
13+30       0.7697      1.39  | Q       |   V     |         |         |
13+35       0.7794      1.41  | Q       |   V     |         |         |
13+40       0.7893      1.43  | Q       |   V     |         |         |
13+45       0.7993      1.46  | Q       |   V     |         |         |
13+50       0.8095      1.49  | Q       |   V     |         |         |
13+55       0.8200      1.51  |  Q      |    V    |         |         |
14+ 0       0.8306      1.54  |  Q      |    V    |         |         |
14+ 5       0.8414      1.57  |  Q      |    V    |         |         |
14+10       0.8525      1.61  |  Q      |    V    |         |         |
14+15       0.8638      1.64  |  Q      |    V    |         |         |
14+20       0.8754      1.68  |  Q      |     V   |         |         |
14+25       0.8872      1.72  |  Q      |     V   |         |         |
14+30       0.8994      1.76  |  Q      |     V   |         |         |
14+35       0.9118      1.81  |  Q      |     V   |         |         |
14+40       0.9246      1.86  |  Q      |     V   |         |         |
14+45       0.9378      1.91  |  Q      |      V  |         |         |
14+50       0.9514      1.97  |  Q      |      V  |         |         |
14+55       0.9654      2.04  |   Q     |      V  |         |         |
15+ 0       0.9799      2.11  |   Q     |      V  |         |         |
15+ 5       0.9950      2.19  |   Q     |       V |         |         |
15+10       1.0107      2.27  |   Q     |       V |         |         |
15+15       1.0270      2.37  |   Q     |       V |         |         |
15+20       1.0442      2.49  |   Q     |        V|         |         |
15+25       1.0621      2.60  |    Q    |        V|         |         |
15+30       1.0802      2.64  |    Q    |        V|         |         |
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15+35	1.0985	2.65	| Q |	| V |	|	|
15+40	1.1175	2.77	| Q |	| V |	|	|
15+45	1.1383	3.02	| Q |	| V |	|	|
15+50	1.1618	3.41	| Q |	| V |	|	|
15+55	1.1896	4.03	| Q |	| V |	|	|
16+ 0	1.2247	5.11	| Q |	| V |	|	|
16+ 5	1.2782	7.77	| Q |	| V |	|	|
16+10	1.3710	13.46	| |	| VQ |	|	|
16+15	1.4827	16.23	| |	| V | Q |	|	|
16+20	1.5574	10.84	| |	| Q V |	|	|
16+25	1.5990	6.05	| Q |	| V |	|	|
16+30	1.6255	3.84	| Q |	| V |	|	|
16+35	1.6472	3.15	| Q |	| V |	|	|
16+40	1.6662	2.75	| Q |	| V |	|	|
16+45	1.6827	2.40	| Q |	| V |	|	|
16+50	1.6979	2.20	| Q |	| V |	|	|
16+55	1.7120	2.05	| Q |	| V |	|	|
17+ 0	1.7252	1.92	| Q |	| V |	|	|
17+ 5	1.7377	1.82	| Q |	| V |	|	|
17+10	1.7496	1.73	| Q |	| V |	|	|
17+15	1.7610	1.65	| Q |	| V |	|	|
17+20	1.7718	1.58	| Q |	| V |	|	|
17+25	1.7823	1.52	| Q |	| V |	|	|
17+30	1.7923	1.46	| Q |	| V |	|	|
17+35	1.8021	1.41	| Q |	| V |	|	|
17+40	1.8115	1.37	| Q |	| V |	|	|
17+45	1.8206	1.33	| Q |	| V |	|	|
17+50	1.8295	1.29	| Q |	| V |	|	|
17+55	1.8381	1.25	| Q |	| V |	|	|
18+ 0	1.8466	1.22	| Q |	| V |	|	|
18+ 5	1.8547	1.19	| Q |	| V |	|	|
18+10	1.8625	1.13	| Q |	| V |	|	|
18+15	1.8698	1.06	| Q |	| V |	|	|
18+20	1.8768	1.01	| Q |	| V |	|	|
18+25	1.8835	0.98	| Q |	| V |	|	|
18+30	1.8900	0.95	| Q |	| V |	|	|
18+35	1.8965	0.93	| Q |	| V |	|	|
18+40	1.9028	0.91	| Q |	| V |	|	|
18+45	1.9089	0.90	| Q |	| V |	|	|
18+50	1.9150	0.88	| Q |	| V |	|	|
18+55	1.9209	0.86	| Q |	| V |	|	|
19+ 0	1.9267	0.85	| Q |	| V |	|	|
19+ 5	1.9325	0.83	| Q |	| V |	|	|
19+10	1.9381	0.82	| Q |	| V |	|	|
19+15	1.9437	0.81	| Q |	| V |	|	|
19+20	1.9491	0.79	| Q |	| V |	|	|
19+25	1.9545	0.78	| Q |	| V |	|	|
19+30	1.9598	0.77	| Q |	| V |	|	|
19+35	1.9650	0.76	| Q |	| V |	|	|
19+40	1.9702	0.75	| Q |	| V |	|	|
19+45	1.9752	0.74	| Q |	| V |	|	|
19+50	1.9802	0.73	| Q |	| V |	|	|
19+55	1.9852	0.72	| Q |	| V |	|	|

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20+ 0       1.9901      0.71  |Q        |         |         |      V   |
20+ 5       1.9949      0.70  |Q        |         |         |      V   |
20+10       1.9996      0.69  |Q        |         |         |      V   |
20+15       2.0043      0.68  |Q        |         |         |      V   |
20+20       2.0090      0.67  |Q        |         |         |      V   |
20+25       2.0136      0.67  |Q        |         |         |      V   |
20+30       2.0181      0.66  |Q        |         |         |      V   |
20+35       2.0226      0.65  |Q        |         |         |       V  |
20+40       2.0270      0.64  |Q        |         |         |       V  |
20+45       2.0314      0.64  |Q        |         |         |       V  |
20+50       2.0358      0.63  |Q        |         |         |       V  |
20+55       2.0401      0.62  |Q        |         |         |       V  |
21+ 0       2.0443      0.62  |Q        |         |         |       V  |
21+ 5       2.0485      0.61  |Q        |         |         |       V  |
21+10       2.0527      0.61  |Q        |         |         |       V  |
21+15       2.0568      0.60  |Q        |         |         |       V  |
21+20       2.0609      0.59  |Q        |         |         |       V  |
21+25       2.0650      0.59  |Q        |         |         |       V  |
21+30       2.0690      0.58  |Q        |         |         |       V  |
21+35       2.0730      0.58  |Q        |         |         |       V  |
21+40       2.0769      0.57  |Q        |         |         |        V |
21+45       2.0808      0.57  |Q        |         |         |        V |
21+50       2.0847      0.56  |Q        |         |         |        V |
21+55       2.0885      0.56  |Q        |         |         |        V |
22+ 0       2.0923      0.55  |Q        |         |         |        V |
22+ 5       2.0961      0.55  |Q        |         |         |        V |
22+10       2.0999      0.54  |Q        |         |         |        V |
22+15       2.1036      0.54  |Q        |         |         |        V |
22+20       2.1073      0.54  |Q        |         |         |        V |
22+25       2.1109      0.53  |Q        |         |         |        V |
22+30       2.1146      0.53  |Q        |         |         |        V |
22+35       2.1182      0.52  |Q        |         |         |        V |
22+40       2.1217      0.52  |Q        |         |         |        V |
22+45       2.1253      0.52  |Q        |         |         |        V |
22+50       2.1288      0.51  |Q        |         |         |         V|
22+55       2.1323      0.51  |Q        |         |         |         V|
23+ 0       2.1358      0.50  |Q        |         |         |         V|
23+ 5       2.1392      0.50  |Q        |         |         |         V|
23+10       2.1427      0.50  Q         |         |         |         V|
23+15       2.1461      0.49  Q         |         |         |         V|
23+20       2.1494      0.49  Q         |         |         |         V|
23+25       2.1528      0.49  Q         |         |         |         V|
23+30       2.1561      0.48  Q         |         |         |         V|
23+35       2.1594      0.48  Q         |         |         |         V|
23+40       2.1627      0.48  Q         |         |         |         V|
23+45       2.1660      0.47  Q         |         |         |         V|
23+50       2.1692      0.47  Q         |         |         |         V|
23+55       2.1725      0.47  Q         |         |         |         V|
24+ 0       2.1757      0.47  Q         |         |         |         V|
24+ 5       2.1787      0.44  Q         |         |         |         V|
24+10       2.1810      0.33  Q         |         |         |         V|
24+15       2.1820      0.15  Q         |         |         |         V|
24+20       2.1824      0.05  Q         |         |         |         V|
```

```
   24+25       2.1825      0.02  Q         |         |         |        V|
   24+30       2.1825      0.01  Q         |         |         |        V|
   24+35       2.1825      0.00  Q         |         |         |         V
-------------------------------------------------------------------------
```