

Preliminary Hydrology Report For Islamic Community Center of Redlands

October 14, 2016

Prepared For:

**Shakil Patel and Associates AIA
25982 Hinckley St
Loma Linda, CA 92354**

Prepared By:

**AEC Moreno
1430 E Cooley Drive, Suite 120
Colton, CA 92324
TEL: (760) 701-2298
EMAIL: hmoreno@aecmoreno.com**

Prepared under the supervision of:

Hector Moreno, P.E. RCE 66015

Discussion

Introduction

Islamic Community Center of Redlands Project comprises an area of approximately 5.3 acres in the City of Redlands in San Bernardino County. The site lies on the Northwest corner of Nevada St and Beaumont Ave.

Purpose

The purpose of this Drainage Report is to determine storm water runoff for the site and the associated tributary areas and show that the retention basin is adequately sized to convey the runoff in a safe manner through the site. The retention basin will be designed according to the San Bernardino County Hydrology Manual.

Criteria

The criteria utilized for hydrologic analysis is the San Bernardino County Hydrology Manual. Civil Cad and Civild computer software were utilized to perform computations. In accordance with San Bernardino County policy, the detention basins analysis utilizes the antecedent moisture content (AMC) of 2. Classification of the soil: type B.

Rainfall Intensities

Rainfall intensities were obtained from the NOAA Atlas 14 Point Precipitation Frequency Estimates, and are attached in the reference section of this report.

Findings

The total of the storm water runoff will be conveyed into a proposed retention basin in the Northwest corner of the lot.

Results

From the rational method, the following results were obtained for the 100 year storm event, 1 hour duration, AMC II.

Predeveloped Condition

The runoff at node 30 is 11.3 cfs.

Developed Condition

The runoff at node 20-70 is 15.8 cfs,

$T_c = 8.10 \text{ minutes} = 0.135 \text{ hrs}$

Lag time = 0.108 hrs.

SCS curve number = 57.8

Pervious area (A_p) = 0.372

Unit Hydrograph, 100 year storm event, 24 hours duration

| Unit Hydrographs 100 year storm | |
|---------------------------------|------------------|
| Duration | Volume (acre ft) |
| 24 hour | 1.50 |

The total volume required is 65,340 ft³, with a foot of freeboard

The volume retained by retention basin is 73,769 cf

Reference Material

NOAA's National Weather Service
Hydrometeorological Design Studies Center
 Precipitation Frequency Data Server (PFDS)



Home Site Map News Organization Search NWS All NOAA Go

General Info

- Homepage
- Current Projects
- FAQ
- Glossary

Precipitation Frequency (PF)

- PF Data Server
- PF in GIS Format
- PF Maps
- Temporal Distr.
- Time Series Data
- PFDS Perform.
- PF Documents

Probable Maximum Precipitation (PMP)

- PMP Documents
- Miscellaneous Publications
- AEP Storm Analysis
- Record Precipitation

Contact Us

- Inquiries
- List-server



NOAA ATLAS 14 POINT PRECIPITATION FREQUENCY ESTIMATES: CA

Data description

Data type: Precipitation depth Units: English Time series type: Partial duration

Select location

1) Manually:

a) By location (decimal degrees, use "-" for S and W): Latitude: Longitude: Submit

b) By station (list of CA stations): Select station

c) By address Search

2) Use map:

a) Select location
 Move crosshair or double click

b) Click on station icon
 Show stations on map

Location information:
 Name: Redlands, California, USA
 Latitude: 34.0381°
 Longitude: -117.2179°
 Elevation: 1246.47 ft**

* Source: ESRI Maps
 ** Source: USGS

POINT PRECIPITATION FREQUENCY (PF) ESTIMATES WITH 90% CONFIDENCE INTERVALS AND SUPPLEMENTARY INFORMATION NOAA Atlas 14, Volume 6, Version 2

PF tabular

PF graphical

Supplementary information

Print page

| PDS-based 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 (0.103-0.150) | 0.160 (0.133-0.195) | 0.190 (0.156-0.233) | 0.231 (0.184-0.294) | 0.263 (0.205-0.342) | 0.296 (0.224-0.394) | 0.330 (0.243-0.453) | 0.377 (0.266-0.539) | 0.413 (0.282-0.613) |
| 10-min | 0.138 (0.115-0.167) | 0.177 (0.147-0.215) | 0.229 (0.190-0.279) | 0.272 (0.224-0.334) | 0.331 (0.263-0.421) | 0.377 (0.293-0.490) | 0.424 (0.322-0.565) | 0.473 (0.349-0.649) | 0.540 (0.381-0.773) | 0.593 (0.404-0.878) |
| 15-min | 0.167 (0.139-0.202) | 0.214 (0.178-0.260) | 0.277 (0.230-0.338) | 0.329 (0.271-0.404) | 0.401 (0.318-0.509) | 0.456 (0.355-0.592) | 0.513 (0.389-0.683) | 0.572 (0.422-0.784) | 0.653 (0.461-0.935) | 0.717 (0.488-1.06) |
| 30-min | 0.246 (0.205-0.298) | 0.316 (0.263-0.384) | 0.409 (0.339-0.498) | 0.486 (0.399-0.596) | 0.591 (0.470-0.751) | 0.673 (0.523-0.874) | 0.757 (0.574-1.01) | 0.844 (0.622-1.16) | 0.963 (0.680-1.38) | 1.06 (0.720-1.57) |
| 60-min | 0.362 (0.301-0.439) | 0.465 (0.387-0.565) | 0.602 (0.499-0.733) | 0.714 (0.588-0.877) | 0.869 (0.691-1.10) | 0.990 (0.770-1.28) | 1.11 (0.844-1.48) | 1.24 (0.915-1.70) | 1.42 (1.00-2.03) | 1.55 (1.06-2.30) |
| 2-hr | 0.515 (0.429-0.624) | 0.659 (0.548-0.801) | 0.850 (0.705-1.04) | 1.01 (0.829-1.24) | 1.22 (0.972-1.55) | 1.39 (1.08-1.81) | 1.56 (1.18-2.08) | 1.74 (1.28-2.38) | 1.98 (1.40-2.84) | 2.17 (1.48-3.22) |
| 3-hr | 0.635 (0.529-0.770) | 0.813 (0.676-0.987) | 1.05 (0.868-1.27) | 1.24 (1.02-1.52) | 1.50 (1.19-1.91) | 1.71 (1.33-2.22) | 1.92 (1.45-2.55) | 2.13 (1.57-2.92) | 2.43 (1.71-3.47) | 2.66 (1.81-3.94) |

PFDS: Contiguous US

| | | | | | | | | | | |
|--------|------------------------------|-----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| 6-hr | 0.896 (0.746-1.09) | 1.15 (0.953-1.39) | 1.48 (1.22-1.80) | 1.75 (1.44-2.14) | 2.11 (1.68-2.69) | 2.40 (1.86-3.11) | 2.69 (2.04-3.58) | 2.98 (2.20-4.09) | 3.39 (2.40-4.85) | 3.71 (2.53-5.50) |
| 12-hr | 1.19 (0.993-1.45) | 1.53 (1.27-1.86) | 1.97 (1.63-2.40) | 2.33 (1.92-2.86) | 2.82 (2.24-3.58) | 3.19 (2.48-4.14) | 3.57 (2.71-4.75) | 3.96 (2.92-5.43) | 4.49 (3.17-6.42) | 4.90 (3.34-7.26) |
| 24-hr | 1.59 (1.41-1.83) | 2.05 (1.81-2.36) | 2.65 (2.34-3.06) | 3.13 (2.74-3.66) | 3.79 (3.21-4.57) | 4.29 (3.56-5.28) | 4.80 (3.89-6.04) | 5.32 (4.19-6.88) | 6.01 (4.55-8.11) | 6.55 (4.79-9.13) |
| 2-day | 1.95 (1.73-2.25) | 2.55 (2.26-2.94) | 3.34 (2.95-3.87) | 3.98 (3.48-4.65) | 4.86 (4.11-5.85) | 5.53 (4.59-6.80) | 6.22 (5.04-7.83) | 6.92 (5.46-8.96) | 7.88 (5.96-10.6) | 8.62 (6.31-12.0) |
| 3-day | 2.10 (1.86-2.42) | 2.78 (2.46-3.21) | 3.70 (3.26-4.28) | 4.45 (3.90-5.19) | 5.50 (4.65-6.62) | 6.31 (5.24-7.76) | 7.15 (5.79-9.00) | 8.02 (6.32-10.4) | 9.23 (6.98-12.4) | 10.2 (7.45-14.2) |
| 4-day | 2.25 (1.99-2.59) | 3.00 (2.66-3.47) | 4.02 (3.55-4.66) | 4.87 (4.26-5.68) | 6.05 (5.13-7.29) | 6.99 (5.80-8.59) | 7.95 (6.44-10.0) | 8.96 (7.07-11.6) | 10.4 (7.85-14.0) | 11.5 (8.40-16.0) |
| 7-day | 2.61 (2.31-3.01) | 3.52 (3.11-4.06) | 4.74 (4.18-5.48) | 5.76 (5.04-6.71) | 7.17 (6.08-8.64) | 8.29 (6.88-10.2) | 9.45 (7.66-11.9) | 10.7 (8.41-13.8) | 12.4 (9.37-16.7) | 13.7 (10.0-19.1) |
| 10-day | 2.85 (2.52-3.28) | 3.85 (3.40-4.44) | 5.20 (4.59-6.02) | 6.33 (5.54-7.38) | 7.91 (6.70-9.53) | 9.15 (7.60-11.3) | 10.4 (8.47-13.2) | 11.8 (9.31-15.3) | 13.7 (10.4-18.5) | 15.2 (11.1-21.2) |
| 20-day | 3.52 (3.11-4.05) | 4.79 (4.24-5.53) | 6.51 (5.75-7.54) | 7.96 (6.97-9.29) | 10.0 (8.46-12.0) | 11.6 (9.63-14.3) | 13.3 (10.8-16.7) | 15.1 (11.9-19.5) | 17.6 (13.3-23.7) | 19.6 (14.3-27.3) |
| 30-day | 4.14 (3.67-4.78) | 5.66 (5.01-6.54) | 7.73 (6.81-8.94) | 9.46 (8.28-11.0) | 11.9 (10.1-14.4) | 13.9 (11.5-17.0) | 15.9 (12.9-20.0) | 18.1 (14.2-23.4) | 21.1 (16.0-28.5) | 23.5 (17.2-32.8) |
| 45-day | 4.96 (4.39-5.71) | 6.78 (5.89-7.82) | 9.25 (8.16-10.7) | 11.3 (9.92-13.2) | 14.3 (12.1-17.2) | 16.7 (13.8-20.5) | 19.1 (15.5-24.1) | 21.8 (17.2-28.2) | 25.5 (19.3-34.3) | 28.4 (20.8-39.7) |
| 60-day | 5.79 (5.13-6.67) | 7.89 (6.98-9.11) | 10.8 (9.49-12.5) | 13.2 (11.5-15.4) | 16.6 (14.1-20.0) | 19.3 (16.0-23.8) | 22.2 (18.0-28.0) | 25.3 (19.9-32.7) | 29.6 (22.4-39.9) | 33.1 (24.2-46.1) |

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.

Estimates from the table in CSV format: [Precipitation frequency estimates](#)

Main Link Categories:
[Home](#) | [OWP\(OHD\)](#)

US Department of Commerce
 National Oceanic and Atmospheric Administration
 National Weather Service
 Office of Water Prediction (OWP)
 1325 East West Highway
 Silver Spring, MD 20910
 Page Author: HDSC webmaster
 Page last modified: August 27, 2014

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Rational Method

100 year storm AMC II Developed Condition

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 11/14/16

Nevada St and Beaumont Islamic Center
Developed Condition
AMC II
100 Year Storm Event

Program License Serial Number 6019

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

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.110 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 2

++++
Process from Point/Station 10.000 to Point/Station 20.000
**** INITIAL AREA EVALUATION ****

COMMERCIAL subarea type
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 56.00
Pervious ratio(Ap) = 0.1000 Max loss rate(Fm)= 0.073(In/Hr)
Initial subarea data:
Initial area flow distance= 522.000(Ft.)
Top (of initial area) elevation = 59.390(Ft.)
Bottom (of initial area) elevation = 48.800(Ft.)
Difference in elevation = 10.590(Ft.)
Slope = 0.02029 s(%)= 2.03
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 8.100 min.
Rainfall intensity = 3.691(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.882
Subarea runoff = 8.204(CFS)
Total initial stream area = 2.520(Ac.)
Pervious area fraction = 0.100
Initial area Fm value = 0.073(In/Hr)

++++

Process from Point/Station 20.000 to Point/Station 20.000
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 1
Stream flow area = 2.520(Ac.)
Runoff from this stream = 8.204(CFS)
Time of concentration = 8.10 min.
Rainfall intensity = 3.691(In/Hr)
Area averaged loss rate (Fm) = 0.0734(In/Hr)
Area averaged Pervious ratio (Ap) = 0.1000

+++++
Process from Point/Station 30.000 to Point/Station 40.000
**** INITIAL AREA EVALUATION ****

RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 56.00
Pervious ratio(Ap) = 0.5000 Max loss rate(Fm)= 0.367(In/Hr)
Initial subarea data:
Initial area flow distance = 131.000(Ft.)
Top (of initial area) elevation = 53.410(Ft.)
Bottom (of initial area) elevation = 52.000(Ft.)
Difference in elevation = 1.410(Ft.)
Slope = 0.01076 s(%)= 1.08
TC = k(0.389)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 6.768 min.
Rainfall intensity = 4.111(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.820
Subarea runoff = 1.179(CFS)
Total initial stream area = 0.350(Ac.)
Pervious area fraction = 0.500
Initial area Fm value = 0.367(In/Hr)

+++++
Process from Point/Station 40.000 to Point/Station 50.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

Estimated mean flow rate at midpoint of channel = 0.000(CFS)
Depth of flow = 0.512(Ft.), Average velocity = 2.754(Ft/s)
***** Irregular Channel Data *****

Information entered for subchannel number 1 :
Point number 'X' coordinate 'Y' coordinate
1 0.00 1.00
2 3.00 0.00
3 6.00 1.00
Manning's 'N' friction factor = 0.025

Sub-Channel flow = 2.169(CFS)
' ' flow top width = 3.074(Ft.)
' ' velocity= 2.754(Ft/s)

' ' area = 0.788(Sq.Ft)
' ' Froude number = 0.959

Upstream point elevation = 52.000(Ft.)
Downstream point elevation = 49.000(Ft.)
Flow length = 212.000(Ft.)
Travel time = 1.28 min.
Time of concentration = 8.05 min.
Depth of flow = 0.512(Ft.)
Average velocity = 2.754(Ft/s)
Total irregular channel flow = 2.169(CFS)
Irregular channel normal depth above invert elev. = 0.512(Ft.)
Average velocity of channel(s) = 2.754(Ft/s)
Adding area flow to channel
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 56.00
Pervious ratio(Ap) = 0.5000 Max loss rate(Fm)= 0.367(In/Hr)
Rainfall intensity = 3.704(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area, (total area with modified
rational method)(Q=KCIA) is C = 0.811
Subarea runoff = 1.884(CFS) for 0.670(Ac.)
Total runoff = 3.064(CFS)
Effective area this stream = 1.02(Ac.)
Total Study Area (Main Stream No. 1) = 3.54(Ac.)
Area averaged Fm value = 0.367(In/Hr)
Depth of flow = 0.583(Ft.), Average velocity = 3.002(Ft/s)

++++
Process from Point/Station 50.000 to Point/Station 60.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

Estimated mean flow rate at midpoint of channel = 0.000(CFS)
Depth of flow = 0.670(Ft.), Average velocity = 2.917(Ft/s)
***** Irregular Channel Data *****

Information entered for subchannel number 1 :
Point number 'X' coordinate 'Y' coordinate
1 0.00 1.00
2 3.00 0.00
3 6.00 1.00
Manning's 'N' friction factor = 0.025

Sub-Channel flow = 3.925(CFS)
' ' flow top width = 4.018(Ft.)
' ' velocity= 2.917(Ft/s)
' ' area = 1.346(Sq.Ft)
' ' Froude number = 0.888

Upstream point elevation = 49.000(Ft.)
Downstream point elevation = 48.000(Ft.)
Flow length = 90.000(Ft.)
Travel time = 0.51 min.

Time of concentration = 8.57 min.
 Depth of flow = 0.670(Ft.)
 Average velocity = 2.917(Ft/s)
 Total irregular channel flow = 3.925(CFS)
 Irregular channel normal depth above invert elev. = 0.670(Ft.)
 Average velocity of channel(s) = 2.917(Ft/s)
 Adding area flow to channel
 RESIDENTIAL(8 - 10 dwl/acre)
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 1.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 0.000
 SCS curve number for soil(AMC 2) = 56.00
 Pervious ratio(Ap) = 0.4000 Max loss rate(Fm)= 0.294(In/Hr)
 Rainfall intensity = 3.569(In/Hr) for a 100.0 year storm
 Effective runoff coefficient used for area, (total area with modified
 rational method)(Q=KCIA) is C = 0.814
 Subarea runoff = 1.645(CFS) for 0.600(Ac.)
 Total runoff = 4.708(CFS)
 Effective area this stream = 1.62(Ac.)
 Total Study Area (Main Stream No. 1) = 4.14(Ac.)
 Area averaged Fm value = 0.340(In/Hr)
 Depth of flow = 0.717(Ft.), Average velocity = 3.053(Ft/s)

++++++
 Process from Point/Station 60.000 to Point/Station 70.000
 **** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

Estimated mean flow rate at midpoint of channel = 0.000(CFS)
 Depth of flow = 0.741(Ft.), Average velocity = 3.184(Ft/s)
 ***** Irregular Channel Data *****

 Information entered for subchannel number 1 :

| Point number | 'X' coordinate | 'Y' coordinate |
|--------------|----------------|----------------|
| 1 | 0.00 | 1.00 |
| 2 | 3.00 | 0.00 |
| 3 | 6.00 | 1.00 |

 Manning's 'N' friction factor = 0.025

Sub-Channel flow = 5.247(CFS)
 ' ' flow top width = 4.447(Ft.)
 ' ' velocity= 3.184(Ft/s)
 ' ' area = 1.648(Sq.Ft)
 ' ' Froude number = 0.922

Upstream point elevation = 48.000(Ft.)
 Downstream point elevation = 46.300(Ft.)
 Flow length = 147.000(Ft.)
 Travel time = 0.77 min.
 Time of concentration = 9.33 min.
 Depth of flow = 0.741(Ft.)
 Average velocity = 3.184(Ft/s)
 Total irregular channel flow = 5.247(CFS)
 Irregular channel normal depth above invert elev. = 0.741(Ft.)
 Average velocity of channel(s) = 3.184(Ft/s)
 Adding area flow to channel

RESIDENTIAL(5 - 7 dwl/acre)
 Decimal fraction soil group A = 0.000
 Decimal fraction soil group B = 1.000
 Decimal fraction soil group C = 0.000
 Decimal fraction soil group D = 0.000
 SCS curve number for soil(AMC 2) = 56.00
 Pervious ratio(Ap) = 0.5000 Max loss rate(Fm)= 0.367(In/Hr)
 Rainfall intensity = 3.390(In/Hr) for a 100.0 year storm
 Effective runoff coefficient used for area, (total area with modified
 rational method)(Q=KCIA) is C = 0.808
 Subarea runoff = 0.990(CFS) for 0.460(Ac.)
 Total runoff = 5.698(CFS)
 Effective area this stream = 2.08(Ac.)
 Total Study Area (Main Stream No. 1) = 4.60(Ac.)
 Area averaged Fm value = 0.346(In/Hr)
 Depth of flow = 0.764(Ft.), Average velocity = 3.250(Ft/s)

++++
 Process from Point/Station 70.000 to Point/Station 20.000
 **** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
 Stream flow area = 2.080(Ac.)
 Runoff from this stream = 5.698(CFS)
 Time of concentration = 9.33 min.
 Rainfall intensity = 3.390(In/Hr)
 Area averaged loss rate (Fm) = 0.3458(In/Hr)
 Area averaged Pervious ratio (Ap) = 0.4712
 Summary of stream data:

| Stream No. | Flow rate (CFS) | Area (Ac.) | TC (min) | Fm (In/Hr) | Rainfall Intensity (In/Hr) |
|------------|-----------------|------------|----------|------------|----------------------------|
| 1 | 8.20 | 2.520 | 8.10 | 0.073 | 3.691 |
| 2 | 5.70 | 2.080 | 9.33 | 0.346 | 3.390 |
| Qmax(1) = | | | | | |
| | 1.000 * | 1.000 * | 8.204) | + | |
| | 1.099 * | 0.868 * | 5.698) | + | 13.638 |
| Qmax(2) = | | | | | |
| | 0.917 * | 1.000 * | 8.204) | + | |
| | 1.000 * | 1.000 * | 5.698) | + | 13.219 |

Total of 2 streams to confluence:
 Flow rates before confluence point:
 8.204 5.698
 Maximum flow rates at confluence using above data:
 13.638 13.219
 Area of streams before confluence:
 2.520 2.080
 Effective area values after confluence:
 4.325 4.600

Results of confluence:
 Total flow rate = 13.638(CFS)
 Time of concentration = 8.100 min.

Effective stream area after confluence = 4.325(Ac.)
Study area average Pervious fraction(Ap) = 0.268
Study area average soil loss rate(Fm) = 0.197(In/Hr)
Study area total (this main stream) = 4.60(Ac.)

++++
Process from Point/Station 70.000 to Point/Station 20.000
**** SUBAREA FLOW ADDITION ****

UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 69.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.548(In/Hr)
Time of concentration = 8.10 min.
Rainfall intensity = 3.691(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area, (total area with modified
rational method) (Q=KCIA) is C = 0.839
Subarea runoff = 2.113(CFS) for 0.760(Ac.)
Total runoff = 15.751(CFS)
Effective area this stream = 5.08(Ac.)
Total Study Area (Main Stream No. 1) = 5.36(Ac.)
Area averaged Fm value = 0.249(In/Hr)
End of computations, Total Study Area = 5.36 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.372
Area averaged SCS curve number = 57.8

Rational Method

100 year storm AMC II Predeveloped condition

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 10/14/16

Islamic Community Center of Redlands
Nevada St
Redlands, CA 92373
100 Year Storm Event, AMC II, Predeveloped Condition

Program License Serial Number 6019

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

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 1.110 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 2

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Process from Point/Station 10.000 to Point/Station 20.000
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 78.00
Pervious ratio(Ap) = 1.0000 Max loss rate(Fm)= 0.404(In/Hr)
Initial subarea data:
Initial area flow distance = 97.000(Ft.)
Top (of initial area) elevation = 54.960(Ft.)
Bottom (of initial area) elevation = 54.000(Ft.)
Difference in elevation = 0.960(Ft.)
Slope = 0.00990 s(%)= 0.99
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 8.237 min.
Rainfall intensity = 3.654(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.801
Subarea runoff = 0.585(CFS)
Total initial stream area = 0.200(Ac.)
Pervious area fraction = 1.000
Initial area Fm value = 0.404(In/Hr)

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Process from Point/Station 20.000 to Point/Station 30.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****

Estimated mean flow rate at midpoint of channel = 0.000 (CFS)
Depth of flow = 0.358 (Ft.), Average velocity = 2.337 (Ft/s)
***** Irregular Channel Data *****

Information entered for subchannel number 1 :
Point number 'X' coordinate 'Y' coordinate
1 0.00 1.00
2 20.00 0.00
3 40.00 1.00
Manning's 'N' friction factor = 0.025

Sub-Channel flow = 5.987 (CFS)
' ' flow top width = 14.316 (Ft.)
' ' velocity = 2.337 (Ft/s)
' ' area = 2.562 (Sq. Ft.)
' ' Froude number = 0.974

Upstream point elevation = 54.000 (Ft.)
Downstream point elevation = 43.020 (Ft.)
Flow length = 715.000 (Ft.)
Travel time = 5.10 min.
Time of concentration = 13.34 min.
Depth of flow = 0.358 (Ft.)
Average velocity = 2.337 (Ft/s)
Total irregular channel flow = 5.987 (CFS)
Irregular channel normal depth above invert elev. = 0.358 (Ft.)
Average velocity of channel (s) = 2.337 (Ft/s)
Adding area flow to channel
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil (AMC 2) = 78.00
Pervious ratio (Ap) = 1.0000 Max loss rate (Fm) = 0.404 (In/Hr)
Rainfall intensity = 2.737 (In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area, (total area with modified
rational method) (Q=KCIA) is C = 0.767
Subarea runoff = 10.711 (CFS) for 5.180 (Ac.)
Total runoff = 11.296 (CFS)
Effective area this stream = 5.38 (Ac.)
Total Study Area (Main Stream No. 1) = 5.38 (Ac.)
Area averaged Fm value = 0.404 (In/Hr)
Depth of flow = 0.454 (Ft.), Average velocity = 2.739 (Ft/s)
End of computations, Total Study Area = 5.38 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction (Ap) = 1.000

Area averaged SCS curve number = 78.0

Unit hydrographs

100 year storm, AMC II, 24 hour duration developed condition

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

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Study date 11/14/16

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

Program License Serial Number 6019

Nevada St and Beaumont Islamic Center
Developed Condition
AMC II
100 Year Storm Event

Storm Event Year = 100

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

| Sub-Area (Ac.) | Duration (hours) | Isohyetal (In) |
|----------------------------|---------------------|-------------------|
| Rainfall data for year 100 | | |
| 5.30 | 1 | 1.11 |

Rainfall data for year 100
5.30 6 2.69

Rainfall data for year 100
5.30 24 4.80

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

SCS curve SCS curve Area Area Fp(Fig C6) Ap Fm

| | | | | | | |
|-------------|-------------|-------|----------|---------|--------|---------|
| No. (AMCII) | NO. (AMC 2) | (Ac.) | Fraction | (In/Hr) | (dec.) | (In/Hr) |
| 57.8 | 57.8 | 5.30 | 1.000 | 0.710 | 0.372 | 0.264 |

Area-averaged adjusted loss rate Fm (In/Hr) = 0.264

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

| | | | | | |
|---------------|---------------|------------------|------------------|------|----------------------|
| Area (Ac.) | Area Fract | SCS CN (AMC2) | SCS CN (AMC2) | S | Pervious Yield Fr |
| 1.97 | 0.372 | 57.8 | 57.8 | 7.30 | 0.218 |
| 3.33 | 0.628 | 98.0 | 98.0 | 0.20 | 0.951 |

Area-averaged catchment yield fraction, Y = 0.678

Area-averaged low loss fraction, Yb = 0.322

Direct entry of lag time by user

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Watershed area = 5.30 (Ac.)
 Catchment Lag time = 0.108 hours
 Unit interval = 5.000 minutes
 Unit interval percentage of lag time = 77.1605
 Hydrograph baseflow = 0.00 (CFS)
 Average maximum watershed loss rate (Fm) = 0.264 (In/Hr)
 Average low loss rate fraction (Yb) = 0.322 (decimal)
 VALLEY DEVELOPED S-Graph Selected
 Computed peak 5-minute rainfall = 0.411 (In)
 Computed peak 30-minute rainfall = 0.841 (In)
 Specified peak 1-hour rainfall = 1.110 (In)
 Computed peak 3-hour rainfall = 1.910 (In)
 Specified peak 6-hour rainfall = 2.690 (In)
 Specified peak 24-hour rainfall = 4.800 (In)

Rainfall depth area reduction factors:

Using a total area of 5.30 (Ac.) (Ref: fig. E-4)

| | |
|--------------------------|--------------------------------|
| 5-minute factor = 1.000 | Adjusted rainfall = 0.411 (In) |
| 30-minute factor = 1.000 | Adjusted rainfall = 0.841 (In) |
| 1-hour factor = 1.000 | Adjusted rainfall = 1.110 (In) |
| 3-hour factor = 1.000 | Adjusted rainfall = 1.910 (In) |
| 6-hour factor = 1.000 | Adjusted rainfall = 2.690 (In) |
| 24-hour factor = 1.000 | Adjusted rainfall = 4.800 (In) |

Unit Hydrograph

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| | | |
|--------------------|--------------------------|--------------------------|
| Interval Number | 'S' Graph Mean values | Unit Hydrograph (CFS) |
|--------------------|--------------------------|--------------------------|

 (K = 64.10 (CFS))

| | | |
|---|---------|--------|
| 1 | 10.561 | 6.769 |
| 2 | 60.970 | 32.311 |
| 3 | 92.932 | 20.487 |
| 4 | 98.645 | 3.662 |
| 5 | 100.000 | 0.868 |

 Peak Unit Adjusted mass rainfall Unit rainfall

| Number | (In) | (In) |
|--------|--------|--------|
| 1 | 0.4107 | 0.4107 |
| 2 | 0.5419 | 0.1312 |
| 3 | 0.6374 | 0.0954 |
| 4 | 0.7151 | 0.0777 |
| 5 | 0.7819 | 0.0668 |
| 6 | 0.8410 | 0.0592 |
| 7 | 0.8945 | 0.0535 |
| 8 | 0.9436 | 0.0491 |
| 9 | 0.9891 | 0.0455 |
| 10 | 1.0317 | 0.0426 |
| 11 | 1.0718 | 0.0401 |
| 12 | 1.1097 | 0.0380 |
| 13 | 1.1545 | 0.0448 |
| 14 | 1.1976 | 0.0431 |
| 15 | 1.2391 | 0.0415 |
| 16 | 1.2793 | 0.0402 |
| 17 | 1.3182 | 0.0389 |
| 18 | 1.3560 | 0.0378 |
| 19 | 1.3927 | 0.0367 |
| 20 | 1.4284 | 0.0358 |
| 21 | 1.4633 | 0.0349 |
| 22 | 1.4973 | 0.0340 |
| 23 | 1.5306 | 0.0333 |
| 24 | 1.5631 | 0.0325 |
| 25 | 1.5950 | 0.0319 |
| 26 | 1.6262 | 0.0312 |
| 27 | 1.6568 | 0.0306 |
| 28 | 1.6869 | 0.0300 |
| 29 | 1.7164 | 0.0295 |
| 30 | 1.7454 | 0.0290 |
| 31 | 1.7739 | 0.0285 |
| 32 | 1.8019 | 0.0281 |
| 33 | 1.8296 | 0.0276 |
| 34 | 1.8567 | 0.0272 |
| 35 | 1.8835 | 0.0268 |
| 36 | 1.9099 | 0.0264 |
| 37 | 1.9360 | 0.0260 |
| 38 | 1.9617 | 0.0257 |
| 39 | 1.9870 | 0.0253 |
| 40 | 2.0120 | 0.0250 |
| 41 | 2.0367 | 0.0247 |
| 42 | 2.0611 | 0.0244 |
| 43 | 2.0852 | 0.0241 |
| 44 | 2.1090 | 0.0238 |
| 45 | 2.1326 | 0.0235 |
| 46 | 2.1558 | 0.0233 |
| 47 | 2.1789 | 0.0230 |
| 48 | 2.2016 | 0.0228 |
| 49 | 2.2242 | 0.0225 |
| 50 | 2.2465 | 0.0223 |
| 51 | 2.2686 | 0.0221 |
| 52 | 2.2905 | 0.0219 |
| 53 | 2.3121 | 0.0217 |
| 54 | 2.3336 | 0.0215 |
| 55 | 2.3548 | 0.0213 |
| 56 | 2.3759 | 0.0211 |

| | | |
|-----|--------|--------|
| 57 | 2.3967 | 0.0209 |
| 58 | 2.4174 | 0.0207 |
| 59 | 2.4379 | 0.0205 |
| 60 | 2.4582 | 0.0203 |
| 61 | 2.4784 | 0.0202 |
| 62 | 2.4984 | 0.0200 |
| 63 | 2.5182 | 0.0198 |
| 64 | 2.5379 | 0.0197 |
| 65 | 2.5574 | 0.0195 |
| 66 | 2.5768 | 0.0194 |
| 67 | 2.5960 | 0.0192 |
| 68 | 2.6151 | 0.0191 |
| 69 | 2.6340 | 0.0189 |
| 70 | 2.6528 | 0.0188 |
| 71 | 2.6714 | 0.0187 |
| 72 | 2.6900 | 0.0185 |
| 73 | 2.7055 | 0.0155 |
| 74 | 2.7209 | 0.0154 |
| 75 | 2.7362 | 0.0153 |
| 76 | 2.7514 | 0.0152 |
| 77 | 2.7665 | 0.0151 |
| 78 | 2.7814 | 0.0150 |
| 79 | 2.7963 | 0.0148 |
| 80 | 2.8110 | 0.0147 |
| 81 | 2.8256 | 0.0146 |
| 82 | 2.8401 | 0.0145 |
| 83 | 2.8545 | 0.0144 |
| 84 | 2.8689 | 0.0143 |
| 85 | 2.8831 | 0.0142 |
| 86 | 2.8972 | 0.0141 |
| 87 | 2.9112 | 0.0140 |
| 88 | 2.9252 | 0.0139 |
| 89 | 2.9390 | 0.0138 |
| 90 | 2.9527 | 0.0137 |
| 91 | 2.9664 | 0.0137 |
| 92 | 2.9800 | 0.0136 |
| 93 | 2.9935 | 0.0135 |
| 94 | 3.0069 | 0.0134 |
| 95 | 3.0202 | 0.0133 |
| 96 | 3.0334 | 0.0132 |
| 97 | 3.0466 | 0.0132 |
| 98 | 3.0597 | 0.0131 |
| 99 | 3.0727 | 0.0130 |
| 100 | 3.0856 | 0.0129 |
| 101 | 3.0985 | 0.0129 |
| 102 | 3.1112 | 0.0128 |
| 103 | 3.1239 | 0.0127 |
| 104 | 3.1366 | 0.0126 |
| 105 | 3.1491 | 0.0126 |
| 106 | 3.1616 | 0.0125 |
| 107 | 3.1741 | 0.0124 |
| 108 | 3.1864 | 0.0124 |
| 109 | 3.1987 | 0.0123 |
| 110 | 3.2109 | 0.0122 |
| 111 | 3.2231 | 0.0122 |
| 112 | 3.2352 | 0.0121 |
| 113 | 3.2472 | 0.0120 |

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|-----|--------|--------|
| 114 | 3.2592 | 0.0120 |
| 115 | 3.2711 | 0.0119 |
| 116 | 3.2830 | 0.0119 |
| 117 | 3.2948 | 0.0118 |
| 118 | 3.3065 | 0.0117 |
| 119 | 3.3182 | 0.0117 |
| 120 | 3.3298 | 0.0116 |
| 121 | 3.3413 | 0.0116 |
| 122 | 3.3529 | 0.0115 |
| 123 | 3.3643 | 0.0115 |
| 124 | 3.3757 | 0.0114 |
| 125 | 3.3871 | 0.0113 |
| 126 | 3.3983 | 0.0113 |
| 127 | 3.4096 | 0.0112 |
| 128 | 3.4208 | 0.0112 |
| 129 | 3.4319 | 0.0111 |
| 130 | 3.4430 | 0.0111 |
| 131 | 3.4540 | 0.0110 |
| 132 | 3.4650 | 0.0110 |
| 133 | 3.4760 | 0.0109 |
| 134 | 3.4869 | 0.0109 |
| 135 | 3.4977 | 0.0108 |
| 136 | 3.5085 | 0.0108 |
| 137 | 3.5193 | 0.0108 |
| 138 | 3.5300 | 0.0107 |
| 139 | 3.5406 | 0.0107 |
| 140 | 3.5512 | 0.0106 |
| 141 | 3.5618 | 0.0106 |
| 142 | 3.5724 | 0.0105 |
| 143 | 3.5828 | 0.0105 |
| 144 | 3.5933 | 0.0104 |
| 145 | 3.6037 | 0.0104 |
| 146 | 3.6140 | 0.0104 |
| 147 | 3.6244 | 0.0103 |
| 148 | 3.6346 | 0.0103 |
| 149 | 3.6449 | 0.0102 |
| 150 | 3.6551 | 0.0102 |
| 151 | 3.6652 | 0.0102 |
| 152 | 3.6754 | 0.0101 |
| 153 | 3.6854 | 0.0101 |
| 154 | 3.6955 | 0.0100 |
| 155 | 3.7055 | 0.0100 |
| 156 | 3.7155 | 0.0100 |
| 157 | 3.7254 | 0.0099 |
| 158 | 3.7353 | 0.0099 |
| 159 | 3.7451 | 0.0099 |
| 160 | 3.7550 | 0.0098 |
| 161 | 3.7647 | 0.0098 |
| 162 | 3.7745 | 0.0098 |
| 163 | 3.7842 | 0.0097 |
| 164 | 3.7939 | 0.0097 |
| 165 | 3.8035 | 0.0096 |
| 166 | 3.8132 | 0.0096 |
| 167 | 3.8227 | 0.0096 |
| 168 | 3.8323 | 0.0095 |
| 169 | 3.8418 | 0.0095 |
| 170 | 3.8513 | 0.0095 |

| | | |
|-----|--------|--------|
| 171 | 3.8607 | 0.0094 |
| 172 | 3.8701 | 0.0094 |
| 173 | 3.8795 | 0.0094 |
| 174 | 3.8889 | 0.0094 |
| 175 | 3.8982 | 0.0093 |
| 176 | 3.9075 | 0.0093 |
| 177 | 3.9167 | 0.0093 |
| 178 | 3.9260 | 0.0092 |
| 179 | 3.9352 | 0.0092 |
| 180 | 3.9443 | 0.0092 |
| 181 | 3.9535 | 0.0091 |
| 182 | 3.9626 | 0.0091 |
| 183 | 3.9717 | 0.0091 |
| 184 | 3.9807 | 0.0091 |
| 185 | 3.9897 | 0.0090 |
| 186 | 3.9987 | 0.0090 |
| 187 | 4.0077 | 0.0090 |
| 188 | 4.0166 | 0.0089 |
| 189 | 4.0255 | 0.0089 |
| 190 | 4.0344 | 0.0089 |
| 191 | 4.0433 | 0.0089 |
| 192 | 4.0521 | 0.0088 |
| 193 | 4.0609 | 0.0088 |
| 194 | 4.0697 | 0.0088 |
| 195 | 4.0784 | 0.0087 |
| 196 | 4.0872 | 0.0087 |
| 197 | 4.0959 | 0.0087 |
| 198 | 4.1045 | 0.0087 |
| 199 | 4.1132 | 0.0086 |
| 200 | 4.1218 | 0.0086 |
| 201 | 4.1304 | 0.0086 |
| 202 | 4.1390 | 0.0086 |
| 203 | 4.1475 | 0.0085 |
| 204 | 4.1560 | 0.0085 |
| 205 | 4.1645 | 0.0085 |
| 206 | 4.1730 | 0.0085 |
| 207 | 4.1815 | 0.0084 |
| 208 | 4.1899 | 0.0084 |
| 209 | 4.1983 | 0.0084 |
| 210 | 4.2067 | 0.0084 |
| 211 | 4.2150 | 0.0084 |
| 212 | 4.2234 | 0.0083 |
| 213 | 4.2317 | 0.0083 |
| 214 | 4.2400 | 0.0083 |
| 215 | 4.2482 | 0.0083 |
| 216 | 4.2565 | 0.0082 |
| 217 | 4.2647 | 0.0082 |
| 218 | 4.2729 | 0.0082 |
| 219 | 4.2811 | 0.0082 |
| 220 | 4.2892 | 0.0082 |
| 221 | 4.2973 | 0.0081 |
| 222 | 4.3055 | 0.0081 |
| 223 | 4.3135 | 0.0081 |
| 224 | 4.3216 | 0.0081 |
| 225 | 4.3297 | 0.0080 |
| 226 | 4.3377 | 0.0080 |
| 227 | 4.3457 | 0.0080 |

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|-----|--------|--------|
| 228 | 4.3537 | 0.0080 |
| 229 | 4.3617 | 0.0080 |
| 230 | 4.3696 | 0.0079 |
| 231 | 4.3775 | 0.0079 |
| 232 | 4.3854 | 0.0079 |
| 233 | 4.3933 | 0.0079 |
| 234 | 4.4012 | 0.0079 |
| 235 | 4.4090 | 0.0078 |
| 236 | 4.4169 | 0.0078 |
| 237 | 4.4247 | 0.0078 |
| 238 | 4.4325 | 0.0078 |
| 239 | 4.4402 | 0.0078 |
| 240 | 4.4480 | 0.0078 |
| 241 | 4.4557 | 0.0077 |
| 242 | 4.4634 | 0.0077 |
| 243 | 4.4711 | 0.0077 |
| 244 | 4.4788 | 0.0077 |
| 245 | 4.4865 | 0.0077 |
| 246 | 4.4941 | 0.0076 |
| 247 | 4.5017 | 0.0076 |
| 248 | 4.5093 | 0.0076 |
| 249 | 4.5169 | 0.0076 |
| 250 | 4.5245 | 0.0076 |
| 251 | 4.5320 | 0.0076 |
| 252 | 4.5396 | 0.0075 |
| 253 | 4.5471 | 0.0075 |
| 254 | 4.5546 | 0.0075 |
| 255 | 4.5621 | 0.0075 |
| 256 | 4.5695 | 0.0075 |
| 257 | 4.5770 | 0.0074 |
| 258 | 4.5844 | 0.0074 |
| 259 | 4.5918 | 0.0074 |
| 260 | 4.5992 | 0.0074 |
| 261 | 4.6066 | 0.0074 |
| 262 | 4.6140 | 0.0074 |
| 263 | 4.6213 | 0.0073 |
| 264 | 4.6286 | 0.0073 |
| 265 | 4.6360 | 0.0073 |
| 266 | 4.6433 | 0.0073 |
| 267 | 4.6505 | 0.0073 |
| 268 | 4.6578 | 0.0073 |
| 269 | 4.6651 | 0.0073 |
| 270 | 4.6723 | 0.0072 |
| 271 | 4.6795 | 0.0072 |
| 272 | 4.6867 | 0.0072 |
| 273 | 4.6939 | 0.0072 |
| 274 | 4.7011 | 0.0072 |
| 275 | 4.7082 | 0.0072 |
| 276 | 4.7154 | 0.0071 |
| 277 | 4.7225 | 0.0071 |
| 278 | 4.7296 | 0.0071 |
| 279 | 4.7367 | 0.0071 |
| 280 | 4.7438 | 0.0071 |
| 281 | 4.7509 | 0.0071 |
| 282 | 4.7579 | 0.0071 |
| 283 | 4.7650 | 0.0070 |
| 284 | 4.7720 | 0.0070 |

| | | |
|-----|--------|--------|
| 285 | 4.7790 | 0.0070 |
| 286 | 4.7860 | 0.0070 |
| 287 | 4.7930 | 0.0070 |
| 288 | 4.8000 | 0.0070 |

| Unit Period (number) | Unit Rainfall (In) | Unit Soil-Loss (In) | Effective Rainfall (In) |
|----------------------------|--------------------------|---------------------------|-------------------------------|
| 1 | 0.0070 | 0.0022 | 0.0047 |
| 2 | 0.0070 | 0.0022 | 0.0047 |
| 3 | 0.0070 | 0.0023 | 0.0048 |
| 4 | 0.0070 | 0.0023 | 0.0048 |
| 5 | 0.0071 | 0.0023 | 0.0048 |
| 6 | 0.0071 | 0.0023 | 0.0048 |
| 7 | 0.0071 | 0.0023 | 0.0048 |
| 8 | 0.0071 | 0.0023 | 0.0048 |
| 9 | 0.0071 | 0.0023 | 0.0048 |
| 10 | 0.0072 | 0.0023 | 0.0049 |
| 11 | 0.0072 | 0.0023 | 0.0049 |
| 12 | 0.0072 | 0.0023 | 0.0049 |
| 13 | 0.0072 | 0.0023 | 0.0049 |
| 14 | 0.0073 | 0.0023 | 0.0049 |
| 15 | 0.0073 | 0.0023 | 0.0049 |
| 16 | 0.0073 | 0.0023 | 0.0050 |
| 17 | 0.0073 | 0.0024 | 0.0050 |
| 18 | 0.0073 | 0.0024 | 0.0050 |
| 19 | 0.0074 | 0.0024 | 0.0050 |
| 20 | 0.0074 | 0.0024 | 0.0050 |
| 21 | 0.0074 | 0.0024 | 0.0050 |
| 22 | 0.0074 | 0.0024 | 0.0051 |
| 23 | 0.0075 | 0.0024 | 0.0051 |
| 24 | 0.0075 | 0.0024 | 0.0051 |
| 25 | 0.0075 | 0.0024 | 0.0051 |
| 26 | 0.0076 | 0.0024 | 0.0051 |
| 27 | 0.0076 | 0.0024 | 0.0051 |
| 28 | 0.0076 | 0.0024 | 0.0052 |
| 29 | 0.0076 | 0.0025 | 0.0052 |
| 30 | 0.0077 | 0.0025 | 0.0052 |
| 31 | 0.0077 | 0.0025 | 0.0052 |
| 32 | 0.0077 | 0.0025 | 0.0052 |
| 33 | 0.0078 | 0.0025 | 0.0053 |
| 34 | 0.0078 | 0.0025 | 0.0053 |
| 35 | 0.0078 | 0.0025 | 0.0053 |
| 36 | 0.0078 | 0.0025 | 0.0053 |
| 37 | 0.0079 | 0.0025 | 0.0053 |
| 38 | 0.0079 | 0.0025 | 0.0053 |
| 39 | 0.0079 | 0.0025 | 0.0054 |
| 40 | 0.0079 | 0.0026 | 0.0054 |
| 41 | 0.0080 | 0.0026 | 0.0054 |
| 42 | 0.0080 | 0.0026 | 0.0054 |
| 43 | 0.0080 | 0.0026 | 0.0055 |
| 44 | 0.0081 | 0.0026 | 0.0055 |
| 45 | 0.0081 | 0.0026 | 0.0055 |
| 46 | 0.0081 | 0.0026 | 0.0055 |
| 47 | 0.0082 | 0.0026 | 0.0055 |
| 48 | 0.0082 | 0.0026 | 0.0056 |

| | | | |
|-----|--------|--------|--------|
| 49 | 0.0082 | 0.0027 | 0.0056 |
| 50 | 0.0083 | 0.0027 | 0.0056 |
| 51 | 0.0083 | 0.0027 | 0.0056 |
| 52 | 0.0083 | 0.0027 | 0.0057 |
| 53 | 0.0084 | 0.0027 | 0.0057 |
| 54 | 0.0084 | 0.0027 | 0.0057 |
| 55 | 0.0084 | 0.0027 | 0.0057 |
| 56 | 0.0085 | 0.0027 | 0.0057 |
| 57 | 0.0085 | 0.0027 | 0.0058 |
| 58 | 0.0085 | 0.0027 | 0.0058 |
| 59 | 0.0086 | 0.0028 | 0.0058 |
| 60 | 0.0086 | 0.0028 | 0.0058 |
| 61 | 0.0087 | 0.0028 | 0.0059 |
| 62 | 0.0087 | 0.0028 | 0.0059 |
| 63 | 0.0087 | 0.0028 | 0.0059 |
| 64 | 0.0088 | 0.0028 | 0.0060 |
| 65 | 0.0088 | 0.0028 | 0.0060 |
| 66 | 0.0089 | 0.0028 | 0.0060 |
| 67 | 0.0089 | 0.0029 | 0.0060 |
| 68 | 0.0089 | 0.0029 | 0.0061 |
| 69 | 0.0090 | 0.0029 | 0.0061 |
| 70 | 0.0090 | 0.0029 | 0.0061 |
| 71 | 0.0091 | 0.0029 | 0.0062 |
| 72 | 0.0091 | 0.0029 | 0.0062 |
| 73 | 0.0092 | 0.0029 | 0.0062 |
| 74 | 0.0092 | 0.0030 | 0.0062 |
| 75 | 0.0093 | 0.0030 | 0.0063 |
| 76 | 0.0093 | 0.0030 | 0.0063 |
| 77 | 0.0094 | 0.0030 | 0.0063 |
| 78 | 0.0094 | 0.0030 | 0.0064 |
| 79 | 0.0094 | 0.0030 | 0.0064 |
| 80 | 0.0095 | 0.0030 | 0.0064 |
| 81 | 0.0095 | 0.0031 | 0.0065 |
| 82 | 0.0096 | 0.0031 | 0.0065 |
| 83 | 0.0096 | 0.0031 | 0.0065 |
| 84 | 0.0097 | 0.0031 | 0.0066 |
| 85 | 0.0098 | 0.0031 | 0.0066 |
| 86 | 0.0098 | 0.0031 | 0.0066 |
| 87 | 0.0099 | 0.0032 | 0.0067 |
| 88 | 0.0099 | 0.0032 | 0.0067 |
| 89 | 0.0100 | 0.0032 | 0.0068 |
| 90 | 0.0100 | 0.0032 | 0.0068 |
| 91 | 0.0101 | 0.0032 | 0.0068 |
| 92 | 0.0101 | 0.0033 | 0.0069 |
| 93 | 0.0102 | 0.0033 | 0.0069 |
| 94 | 0.0102 | 0.0033 | 0.0069 |
| 95 | 0.0103 | 0.0033 | 0.0070 |
| 96 | 0.0104 | 0.0033 | 0.0070 |
| 97 | 0.0104 | 0.0034 | 0.0071 |
| 98 | 0.0105 | 0.0034 | 0.0071 |
| 99 | 0.0106 | 0.0034 | 0.0072 |
| 100 | 0.0106 | 0.0034 | 0.0072 |
| 101 | 0.0107 | 0.0034 | 0.0073 |
| 102 | 0.0108 | 0.0035 | 0.0073 |
| 103 | 0.0108 | 0.0035 | 0.0074 |
| 104 | 0.0109 | 0.0035 | 0.0074 |
| 105 | 0.0110 | 0.0035 | 0.0075 |

| | | | |
|-----|--------|--------|--------|
| 106 | 0.0110 | 0.0036 | 0.0075 |
| 107 | 0.0111 | 0.0036 | 0.0076 |
| 108 | 0.0112 | 0.0036 | 0.0076 |
| 109 | 0.0113 | 0.0036 | 0.0077 |
| 110 | 0.0113 | 0.0036 | 0.0077 |
| 111 | 0.0115 | 0.0037 | 0.0078 |
| 112 | 0.0115 | 0.0037 | 0.0078 |
| 113 | 0.0116 | 0.0037 | 0.0079 |
| 114 | 0.0117 | 0.0038 | 0.0079 |
| 115 | 0.0118 | 0.0038 | 0.0080 |
| 116 | 0.0119 | 0.0038 | 0.0080 |
| 117 | 0.0120 | 0.0039 | 0.0081 |
| 118 | 0.0120 | 0.0039 | 0.0082 |
| 119 | 0.0122 | 0.0039 | 0.0082 |
| 120 | 0.0122 | 0.0039 | 0.0083 |
| 121 | 0.0124 | 0.0040 | 0.0084 |
| 122 | 0.0124 | 0.0040 | 0.0084 |
| 123 | 0.0126 | 0.0040 | 0.0085 |
| 124 | 0.0126 | 0.0041 | 0.0086 |
| 125 | 0.0128 | 0.0041 | 0.0087 |
| 126 | 0.0129 | 0.0041 | 0.0087 |
| 127 | 0.0130 | 0.0042 | 0.0088 |
| 128 | 0.0131 | 0.0042 | 0.0089 |
| 129 | 0.0132 | 0.0043 | 0.0090 |
| 130 | 0.0133 | 0.0043 | 0.0090 |
| 131 | 0.0135 | 0.0043 | 0.0091 |
| 132 | 0.0136 | 0.0044 | 0.0092 |
| 133 | 0.0137 | 0.0044 | 0.0093 |
| 134 | 0.0138 | 0.0045 | 0.0094 |
| 135 | 0.0140 | 0.0045 | 0.0095 |
| 136 | 0.0141 | 0.0045 | 0.0096 |
| 137 | 0.0143 | 0.0046 | 0.0097 |
| 138 | 0.0144 | 0.0046 | 0.0098 |
| 139 | 0.0146 | 0.0047 | 0.0099 |
| 140 | 0.0147 | 0.0047 | 0.0100 |
| 141 | 0.0150 | 0.0048 | 0.0101 |
| 142 | 0.0151 | 0.0048 | 0.0102 |
| 143 | 0.0153 | 0.0049 | 0.0104 |
| 144 | 0.0154 | 0.0050 | 0.0105 |
| 145 | 0.0185 | 0.0060 | 0.0126 |
| 146 | 0.0187 | 0.0060 | 0.0127 |
| 147 | 0.0189 | 0.0061 | 0.0128 |
| 148 | 0.0191 | 0.0061 | 0.0129 |
| 149 | 0.0194 | 0.0062 | 0.0131 |
| 150 | 0.0195 | 0.0063 | 0.0132 |
| 151 | 0.0198 | 0.0064 | 0.0134 |
| 152 | 0.0200 | 0.0064 | 0.0136 |
| 153 | 0.0203 | 0.0065 | 0.0138 |
| 154 | 0.0205 | 0.0066 | 0.0139 |
| 155 | 0.0209 | 0.0067 | 0.0142 |
| 156 | 0.0211 | 0.0068 | 0.0143 |
| 157 | 0.0215 | 0.0069 | 0.0146 |
| 158 | 0.0217 | 0.0070 | 0.0147 |
| 159 | 0.0221 | 0.0071 | 0.0150 |
| 160 | 0.0223 | 0.0072 | 0.0151 |
| 161 | 0.0228 | 0.0073 | 0.0155 |
| 162 | 0.0230 | 0.0074 | 0.0156 |

| | | | |
|-----|--------|--------|--------|
| 163 | 0.0235 | 0.0076 | 0.0160 |
| 164 | 0.0238 | 0.0077 | 0.0162 |
| 165 | 0.0244 | 0.0078 | 0.0165 |
| 166 | 0.0247 | 0.0079 | 0.0168 |
| 167 | 0.0253 | 0.0082 | 0.0172 |
| 168 | 0.0257 | 0.0083 | 0.0174 |
| 169 | 0.0264 | 0.0085 | 0.0179 |
| 170 | 0.0268 | 0.0086 | 0.0182 |
| 171 | 0.0276 | 0.0089 | 0.0187 |
| 172 | 0.0281 | 0.0090 | 0.0190 |
| 173 | 0.0290 | 0.0093 | 0.0197 |
| 174 | 0.0295 | 0.0095 | 0.0200 |
| 175 | 0.0306 | 0.0098 | 0.0208 |
| 176 | 0.0312 | 0.0100 | 0.0212 |
| 177 | 0.0325 | 0.0105 | 0.0221 |
| 178 | 0.0333 | 0.0107 | 0.0226 |
| 179 | 0.0349 | 0.0112 | 0.0236 |
| 180 | 0.0358 | 0.0115 | 0.0243 |
| 181 | 0.0378 | 0.0122 | 0.0256 |
| 182 | 0.0389 | 0.0125 | 0.0264 |
| 183 | 0.0415 | 0.0134 | 0.0282 |
| 184 | 0.0431 | 0.0139 | 0.0292 |
| 185 | 0.0380 | 0.0122 | 0.0257 |
| 186 | 0.0401 | 0.0129 | 0.0272 |
| 187 | 0.0455 | 0.0146 | 0.0309 |
| 188 | 0.0491 | 0.0158 | 0.0333 |
| 189 | 0.0592 | 0.0190 | 0.0401 |
| 190 | 0.0668 | 0.0215 | 0.0453 |
| 191 | 0.0954 | 0.0220 | 0.0734 |
| 192 | 0.1312 | 0.0220 | 0.1092 |
| 193 | 0.4107 | 0.0220 | 0.3887 |
| 194 | 0.0777 | 0.0220 | 0.0557 |
| 195 | 0.0535 | 0.0172 | 0.0363 |
| 196 | 0.0426 | 0.0137 | 0.0289 |
| 197 | 0.0448 | 0.0144 | 0.0304 |
| 198 | 0.0402 | 0.0129 | 0.0272 |
| 199 | 0.0367 | 0.0118 | 0.0249 |
| 200 | 0.0340 | 0.0109 | 0.0231 |
| 201 | 0.0319 | 0.0102 | 0.0216 |
| 202 | 0.0300 | 0.0097 | 0.0204 |
| 203 | 0.0285 | 0.0092 | 0.0193 |
| 204 | 0.0272 | 0.0087 | 0.0184 |
| 205 | 0.0260 | 0.0084 | 0.0177 |
| 206 | 0.0250 | 0.0080 | 0.0170 |
| 207 | 0.0241 | 0.0078 | 0.0163 |
| 208 | 0.0233 | 0.0075 | 0.0158 |
| 209 | 0.0225 | 0.0073 | 0.0153 |
| 210 | 0.0219 | 0.0070 | 0.0148 |
| 211 | 0.0213 | 0.0068 | 0.0144 |
| 212 | 0.0207 | 0.0067 | 0.0140 |
| 213 | 0.0202 | 0.0065 | 0.0137 |
| 214 | 0.0197 | 0.0063 | 0.0133 |
| 215 | 0.0192 | 0.0062 | 0.0130 |
| 216 | 0.0188 | 0.0060 | 0.0127 |
| 217 | 0.0155 | 0.0050 | 0.0105 |
| 218 | 0.0152 | 0.0049 | 0.0103 |
| 219 | 0.0148 | 0.0048 | 0.0101 |

| | | | |
|-----|--------|--------|--------|
| 220 | 0.0145 | 0.0047 | 0.0098 |
| 221 | 0.0142 | 0.0046 | 0.0096 |
| 222 | 0.0139 | 0.0045 | 0.0094 |
| 223 | 0.0137 | 0.0044 | 0.0093 |
| 224 | 0.0134 | 0.0043 | 0.0091 |
| 225 | 0.0132 | 0.0042 | 0.0089 |
| 226 | 0.0129 | 0.0042 | 0.0088 |
| 227 | 0.0127 | 0.0041 | 0.0086 |
| 228 | 0.0125 | 0.0040 | 0.0085 |
| 229 | 0.0123 | 0.0040 | 0.0083 |
| 230 | 0.0121 | 0.0039 | 0.0082 |
| 231 | 0.0119 | 0.0038 | 0.0081 |
| 232 | 0.0117 | 0.0038 | 0.0080 |
| 233 | 0.0116 | 0.0037 | 0.0078 |
| 234 | 0.0114 | 0.0037 | 0.0077 |
| 235 | 0.0112 | 0.0036 | 0.0076 |
| 236 | 0.0111 | 0.0036 | 0.0075 |
| 237 | 0.0109 | 0.0035 | 0.0074 |
| 238 | 0.0108 | 0.0035 | 0.0073 |
| 239 | 0.0107 | 0.0034 | 0.0072 |
| 240 | 0.0105 | 0.0034 | 0.0071 |
| 241 | 0.0104 | 0.0033 | 0.0071 |
| 242 | 0.0103 | 0.0033 | 0.0070 |
| 243 | 0.0102 | 0.0033 | 0.0069 |
| 244 | 0.0100 | 0.0032 | 0.0068 |
| 245 | 0.0099 | 0.0032 | 0.0067 |
| 246 | 0.0098 | 0.0032 | 0.0067 |
| 247 | 0.0097 | 0.0031 | 0.0066 |
| 248 | 0.0096 | 0.0031 | 0.0065 |
| 249 | 0.0095 | 0.0031 | 0.0065 |
| 250 | 0.0094 | 0.0030 | 0.0064 |
| 251 | 0.0093 | 0.0030 | 0.0063 |
| 252 | 0.0092 | 0.0030 | 0.0063 |
| 253 | 0.0091 | 0.0029 | 0.0062 |
| 254 | 0.0091 | 0.0029 | 0.0061 |
| 255 | 0.0090 | 0.0029 | 0.0061 |
| 256 | 0.0089 | 0.0029 | 0.0060 |
| 257 | 0.0088 | 0.0028 | 0.0060 |
| 258 | 0.0087 | 0.0028 | 0.0059 |
| 259 | 0.0086 | 0.0028 | 0.0059 |
| 260 | 0.0086 | 0.0028 | 0.0058 |
| 261 | 0.0085 | 0.0027 | 0.0058 |
| 262 | 0.0084 | 0.0027 | 0.0057 |
| 263 | 0.0084 | 0.0027 | 0.0057 |
| 264 | 0.0083 | 0.0027 | 0.0056 |
| 265 | 0.0082 | 0.0026 | 0.0056 |
| 266 | 0.0082 | 0.0026 | 0.0055 |
| 267 | 0.0081 | 0.0026 | 0.0055 |
| 268 | 0.0080 | 0.0026 | 0.0054 |
| 269 | 0.0080 | 0.0026 | 0.0054 |
| 270 | 0.0079 | 0.0025 | 0.0054 |
| 271 | 0.0078 | 0.0025 | 0.0053 |
| 272 | 0.0078 | 0.0025 | 0.0053 |
| 273 | 0.0077 | 0.0025 | 0.0052 |
| 274 | 0.0077 | 0.0025 | 0.0052 |
| 275 | 0.0076 | 0.0025 | 0.0052 |
| 276 | 0.0076 | 0.0024 | 0.0051 |

| | | | |
|-----|--------|--------|--------|
| 277 | 0.0075 | 0.0024 | 0.0051 |
| 278 | 0.0075 | 0.0024 | 0.0051 |
| 279 | 0.0074 | 0.0024 | 0.0050 |
| 280 | 0.0074 | 0.0024 | 0.0050 |
| 281 | 0.0073 | 0.0024 | 0.0050 |
| 282 | 0.0073 | 0.0023 | 0.0049 |
| 283 | 0.0072 | 0.0023 | 0.0049 |
| 284 | 0.0072 | 0.0023 | 0.0049 |
| 285 | 0.0071 | 0.0023 | 0.0048 |
| 286 | 0.0071 | 0.0023 | 0.0048 |
| 287 | 0.0070 | 0.0023 | 0.0048 |
| 288 | 0.0070 | 0.0023 | 0.0047 |

 Total soil rain loss = 1.40 (In)
 Total effective rainfall = 3.40 (In)
 Peak flow rate in flood hydrograph = 15.48 (CFS)

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

 Hydrograph in 5 Minute intervals ((CFS))

| Time (h+m) | Volume Ac.Ft | Q(CFS) | 0 | 5.0 | 10.0 | 15.0 | 20.0 |
|------------|--------------|--------|----|-----|------|------|------|
| 0+ 5 | 0.0002 | 0.03 | Q | | | | |
| 0+10 | 0.0015 | 0.19 | Q | | | | |
| 0+15 | 0.0035 | 0.28 | Q | | | | |
| 0+20 | 0.0055 | 0.30 | Q | | | | |
| 0+25 | 0.0076 | 0.31 | Q | | | | |
| 0+30 | 0.0098 | 0.31 | Q | | | | |
| 0+35 | 0.0119 | 0.31 | Q | | | | |
| 0+40 | 0.0140 | 0.31 | Q | | | | |
| 0+45 | 0.0161 | 0.31 | Q | | | | |
| 0+50 | 0.0183 | 0.31 | Q | | | | |
| 0+55 | 0.0204 | 0.31 | Q | | | | |
| 1+ 0 | 0.0226 | 0.31 | Q | | | | |
| 1+ 5 | 0.0248 | 0.31 | Q | | | | |
| 1+10 | 0.0269 | 0.32 | Q | | | | |
| 1+15 | 0.0291 | 0.32 | Q | | | | |
| 1+20 | 0.0313 | 0.32 | Q | | | | |
| 1+25 | 0.0335 | 0.32 | Q | | | | |
| 1+30 | 0.0357 | 0.32 | Q | | | | |
| 1+35 | 0.0379 | 0.32 | QV | | | | |
| 1+40 | 0.0401 | 0.32 | QV | | | | |
| 1+45 | 0.0423 | 0.32 | QV | | | | |
| 1+50 | 0.0445 | 0.32 | QV | | | | |
| 1+55 | 0.0468 | 0.32 | QV | | | | |
| 2+ 0 | 0.0490 | 0.33 | QV | | | | |
| 2+ 5 | 0.0513 | 0.33 | QV | | | | |
| 2+10 | 0.0535 | 0.33 | QV | | | | |
| 2+15 | 0.0558 | 0.33 | QV | | | | |
| 2+20 | 0.0581 | 0.33 | QV | | | | |
| 2+25 | 0.0604 | 0.33 | QV | | | | |
| 2+30 | 0.0626 | 0.33 | QV | | | | |

| | | | | | | | |
|------|--------|------|-----|--|--|--|--|
| 2+35 | 0.0649 | 0.33 | QV | | | | |
| 2+40 | 0.0672 | 0.33 | QV | | | | |
| 2+45 | 0.0696 | 0.34 | QV | | | | |
| 2+50 | 0.0719 | 0.34 | QV | | | | |
| 2+55 | 0.0742 | 0.34 | QV | | | | |
| 3+ 0 | 0.0766 | 0.34 | Q V | | | | |
| 3+ 5 | 0.0789 | 0.34 | Q V | | | | |
| 3+10 | 0.0813 | 0.34 | Q V | | | | |
| 3+15 | 0.0836 | 0.34 | Q V | | | | |
| 3+20 | 0.0860 | 0.34 | Q V | | | | |
| 3+25 | 0.0884 | 0.35 | Q V | | | | |
| 3+30 | 0.0908 | 0.35 | Q V | | | | |
| 3+35 | 0.0932 | 0.35 | Q V | | | | |
| 3+40 | 0.0956 | 0.35 | Q V | | | | |
| 3+45 | 0.0980 | 0.35 | Q V | | | | |
| 3+50 | 0.1005 | 0.35 | Q V | | | | |
| 3+55 | 0.1029 | 0.35 | Q V | | | | |
| 4+ 0 | 0.1053 | 0.36 | Q V | | | | |
| 4+ 5 | 0.1078 | 0.36 | Q V | | | | |
| 4+10 | 0.1103 | 0.36 | Q V | | | | |
| 4+15 | 0.1127 | 0.36 | Q V | | | | |
| 4+20 | 0.1152 | 0.36 | Q V | | | | |
| 4+25 | 0.1177 | 0.36 | Q V | | | | |
| 4+30 | 0.1202 | 0.36 | Q V | | | | |
| 4+35 | 0.1228 | 0.37 | Q V | | | | |
| 4+40 | 0.1253 | 0.37 | Q V | | | | |
| 4+45 | 0.1278 | 0.37 | Q V | | | | |
| 4+50 | 0.1304 | 0.37 | Q V | | | | |
| 4+55 | 0.1330 | 0.37 | Q V | | | | |
| 5+ 0 | 0.1355 | 0.37 | Q V | | | | |
| 5+ 5 | 0.1381 | 0.38 | Q V | | | | |
| 5+10 | 0.1407 | 0.38 | Q V | | | | |
| 5+15 | 0.1433 | 0.38 | Q V | | | | |
| 5+20 | 0.1459 | 0.38 | Q V | | | | |
| 5+25 | 0.1486 | 0.38 | Q V | | | | |
| 5+30 | 0.1512 | 0.38 | Q V | | | | |
| 5+35 | 0.1539 | 0.39 | Q V | | | | |
| 5+40 | 0.1566 | 0.39 | Q V | | | | |
| 5+45 | 0.1592 | 0.39 | Q V | | | | |
| 5+50 | 0.1619 | 0.39 | Q V | | | | |
| 5+55 | 0.1646 | 0.39 | Q V | | | | |
| 6+ 0 | 0.1673 | 0.39 | Q V | | | | |
| 6+ 5 | 0.1701 | 0.40 | Q V | | | | |
| 6+10 | 0.1728 | 0.40 | Q V | | | | |
| 6+15 | 0.1756 | 0.40 | Q V | | | | |
| 6+20 | 0.1784 | 0.40 | Q V | | | | |
| 6+25 | 0.1811 | 0.40 | Q V | | | | |
| 6+30 | 0.1839 | 0.41 | Q V | | | | |
| 6+35 | 0.1868 | 0.41 | Q V | | | | |
| 6+40 | 0.1896 | 0.41 | Q V | | | | |
| 6+45 | 0.1924 | 0.41 | Q V | | | | |
| 6+50 | 0.1953 | 0.41 | Q V | | | | |
| 6+55 | 0.1982 | 0.42 | Q V | | | | |
| 7+ 0 | 0.2010 | 0.42 | Q V | | | | |
| 7+ 5 | 0.2039 | 0.42 | Q V | | | | |
| 7+10 | 0.2069 | 0.42 | Q V | | | | |
| 7+15 | 0.2098 | 0.43 | Q V | | | | |

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|-------|--------|------|----|---|--|--|--|--|
| 7+20 | 0.2127 | 0.43 | Q | V | | | | |
| 7+25 | 0.2157 | 0.43 | Q | V | | | | |
| 7+30 | 0.2187 | 0.43 | Q | V | | | | |
| 7+35 | 0.2217 | 0.44 | Q | V | | | | |
| 7+40 | 0.2247 | 0.44 | Q | V | | | | |
| 7+45 | 0.2277 | 0.44 | Q | V | | | | |
| 7+50 | 0.2308 | 0.44 | Q | V | | | | |
| 7+55 | 0.2339 | 0.45 | Q | V | | | | |
| 8+ 0 | 0.2370 | 0.45 | Q | V | | | | |
| 8+ 5 | 0.2401 | 0.45 | Q | V | | | | |
| 8+10 | 0.2432 | 0.45 | Q | V | | | | |
| 8+15 | 0.2463 | 0.46 | Q | V | | | | |
| 8+20 | 0.2495 | 0.46 | Q | V | | | | |
| 8+25 | 0.2527 | 0.46 | Q | V | | | | |
| 8+30 | 0.2559 | 0.47 | Q | V | | | | |
| 8+35 | 0.2591 | 0.47 | Q | V | | | | |
| 8+40 | 0.2623 | 0.47 | Q | V | | | | |
| 8+45 | 0.2656 | 0.47 | Q | V | | | | |
| 8+50 | 0.2689 | 0.48 | Q | V | | | | |
| 8+55 | 0.2722 | 0.48 | Q | V | | | | |
| 9+ 0 | 0.2755 | 0.48 | Q | V | | | | |
| 9+ 5 | 0.2789 | 0.49 | Q | V | | | | |
| 9+10 | 0.2823 | 0.49 | Q | V | | | | |
| 9+15 | 0.2857 | 0.49 | Q | V | | | | |
| 9+20 | 0.2891 | 0.50 | Q | V | | | | |
| 9+25 | 0.2925 | 0.50 | IQ | V | | | | |
| 9+30 | 0.2960 | 0.50 | IQ | V | | | | |
| 9+35 | 0.2995 | 0.51 | IQ | V | | | | |
| 9+40 | 0.3030 | 0.51 | IQ | V | | | | |
| 9+45 | 0.3066 | 0.52 | IQ | V | | | | |
| 9+50 | 0.3101 | 0.52 | IQ | V | | | | |
| 9+55 | 0.3138 | 0.52 | IQ | V | | | | |
| 10+ 0 | 0.3174 | 0.53 | IQ | V | | | | |
| 10+ 5 | 0.3210 | 0.53 | IQ | V | | | | |
| 10+10 | 0.3247 | 0.54 | IQ | V | | | | |
| 10+15 | 0.3285 | 0.54 | IQ | V | | | | |
| 10+20 | 0.3322 | 0.54 | IQ | V | | | | |
| 10+25 | 0.3360 | 0.55 | IQ | V | | | | |
| 10+30 | 0.3398 | 0.55 | IQ | V | | | | |
| 10+35 | 0.3437 | 0.56 | IQ | V | | | | |
| 10+40 | 0.3475 | 0.56 | IQ | V | | | | |
| 10+45 | 0.3515 | 0.57 | IQ | V | | | | |
| 10+50 | 0.3554 | 0.57 | IQ | V | | | | |
| 10+55 | 0.3594 | 0.58 | IQ | V | | | | |
| 11+ 0 | 0.3634 | 0.58 | IQ | V | | | | |
| 11+ 5 | 0.3675 | 0.59 | IQ | V | | | | |
| 11+10 | 0.3716 | 0.60 | IQ | V | | | | |
| 11+15 | 0.3757 | 0.60 | IQ | V | | | | |
| 11+20 | 0.3799 | 0.61 | IQ | V | | | | |
| 11+25 | 0.3841 | 0.61 | IQ | V | | | | |
| 11+30 | 0.3884 | 0.62 | IQ | V | | | | |
| 11+35 | 0.3927 | 0.63 | IQ | V | | | | |
| 11+40 | 0.3971 | 0.63 | IQ | V | | | | |
| 11+45 | 0.4015 | 0.64 | IQ | V | | | | |
| 11+50 | 0.4060 | 0.65 | IQ | V | | | | |
| 11+55 | 0.4105 | 0.65 | IQ | V | | | | |
| 12+ 0 | 0.4150 | 0.66 | IQ | V | | | | |

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|-------|--------|-------|---|---|--|--|--|
| 12+ 5 | 0.4197 | 0.68 | Q | V | | | |
| 12+10 | 0.4249 | 0.75 | Q | V | | | |
| 12+15 | 0.4304 | 0.80 | Q | V | | | |
| 12+20 | 0.4361 | 0.82 | Q | V | | | |
| 12+25 | 0.4418 | 0.83 | Q | V | | | |
| 12+30 | 0.4475 | 0.84 | Q | V | | | |
| 12+35 | 0.4534 | 0.85 | Q | V | | | |
| 12+40 | 0.4593 | 0.86 | Q | V | | | |
| 12+45 | 0.4653 | 0.87 | Q | V | | | |
| 12+50 | 0.4713 | 0.88 | Q | V | | | |
| 12+55 | 0.4775 | 0.89 | Q | V | | | |
| 13+ 0 | 0.4837 | 0.90 | Q | V | | | |
| 13+ 5 | 0.4900 | 0.91 | Q | V | | | |
| 13+10 | 0.4963 | 0.93 | Q | V | | | |
| 13+15 | 0.5028 | 0.94 | Q | V | | | |
| 13+20 | 0.5094 | 0.95 | Q | V | | | |
| 13+25 | 0.5161 | 0.97 | Q | V | | | |
| 13+30 | 0.5228 | 0.98 | Q | V | | | |
| 13+35 | 0.5297 | 1.00 | Q | V | | | |
| 13+40 | 0.5367 | 1.02 | Q | V | | | |
| 13+45 | 0.5438 | 1.03 | Q | V | | | |
| 13+50 | 0.5511 | 1.05 | Q | V | | | |
| 13+55 | 0.5584 | 1.07 | Q | V | | | |
| 14+ 0 | 0.5660 | 1.09 | Q | V | | | |
| 14+ 5 | 0.5736 | 1.11 | Q | V | | | |
| 14+10 | 0.5814 | 1.14 | Q | V | | | |
| 14+15 | 0.5894 | 1.16 | Q | V | | | |
| 14+20 | 0.5976 | 1.19 | Q | V | | | |
| 14+25 | 0.6060 | 1.21 | Q | V | | | |
| 14+30 | 0.6146 | 1.25 | Q | V | | | |
| 14+35 | 0.6234 | 1.28 | Q | V | | | |
| 14+40 | 0.6324 | 1.31 | Q | V | | | |
| 14+45 | 0.6417 | 1.35 | Q | V | | | |
| 14+50 | 0.6513 | 1.39 | Q | V | | | |
| 14+55 | 0.6612 | 1.44 | Q | V | | | |
| 15+ 0 | 0.6715 | 1.49 | Q | V | | | |
| 15+ 5 | 0.6821 | 1.54 | Q | V | | | |
| 15+10 | 0.6932 | 1.61 | Q | V | | | |
| 15+15 | 0.7048 | 1.68 | Q | V | | | |
| 15+20 | 0.7169 | 1.76 | Q | V | | | |
| 15+25 | 0.7294 | 1.82 | Q | V | | | |
| 15+30 | 0.7414 | 1.74 | Q | V | | | |
| 15+35 | 0.7535 | 1.75 | Q | V | | | |
| 15+40 | 0.7666 | 1.90 | Q | V | | | |
| 15+45 | 0.7810 | 2.10 | Q | V | | | |
| 15+50 | 0.7977 | 2.42 | Q | V | | | |
| 15+55 | 0.8179 | 2.93 | Q | V | | | |
| 16+ 0 | 0.8469 | 4.22 | Q | V | | | |
| 16+ 5 | 0.9011 | 7.87 | Q | V | | | |
| 16+10 | 1.0078 | 15.48 | Q | V | | | |
| 16+15 | 1.0799 | 10.47 | Q | V | | | |
| 16+20 | 1.1076 | 4.03 | Q | V | | | |
| 16+25 | 1.1243 | 2.42 | Q | V | | | |
| 16+30 | 1.1377 | 1.94 | Q | V | | | |
| 16+35 | 1.1502 | 1.81 | Q | V | | | |
| 16+40 | 1.1616 | 1.66 | Q | V | | | |
| 16+45 | 1.1721 | 1.53 | Q | V | | | |

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|-------|--------|------|---|--|--|---|--|
| 16+50 | 1.1819 | 1.42 | Q | | | V | |
| 16+55 | 1.1911 | 1.34 | Q | | | V | |
| 17+ 0 | 1.1999 | 1.27 | Q | | | V | |
| 17+ 5 | 1.2082 | 1.21 | Q | | | V | |
| 17+10 | 1.2161 | 1.15 | Q | | | V | |
| 17+15 | 1.2237 | 1.11 | Q | | | V | |
| 17+20 | 1.2311 | 1.06 | Q | | | V | |
| 17+25 | 1.2381 | 1.03 | Q | | | V | |
| 17+30 | 1.2450 | 0.99 | Q | | | V | |
| 17+35 | 1.2516 | 0.96 | Q | | | V | |
| 17+40 | 1.2580 | 0.94 | Q | | | V | |
| 17+45 | 1.2643 | 0.91 | Q | | | V | |
| 17+50 | 1.2704 | 0.89 | Q | | | V | |
| 17+55 | 1.2764 | 0.86 | Q | | | V | |
| 18+ 0 | 1.2822 | 0.84 | Q | | | V | |
| 18+ 5 | 1.2878 | 0.81 | Q | | | V | |
| 18+10 | 1.2928 | 0.73 | Q | | | V | |
| 18+15 | 1.2975 | 0.68 | Q | | | V | |
| 18+20 | 1.3020 | 0.65 | Q | | | V | |
| 18+25 | 1.3064 | 0.64 | Q | | | V | |
| 18+30 | 1.3107 | 0.62 | Q | | | V | |
| 18+35 | 1.3149 | 0.61 | Q | | | V | |
| 18+40 | 1.3190 | 0.60 | Q | | | V | |
| 18+45 | 1.3230 | 0.59 | Q | | | V | |
| 18+50 | 1.3270 | 0.58 | Q | | | V | |
| 18+55 | 1.3309 | 0.57 | Q | | | V | |
| 19+ 0 | 1.3348 | 0.56 | Q | | | V | |
| 19+ 5 | 1.3385 | 0.55 | Q | | | V | |
| 19+10 | 1.3422 | 0.54 | Q | | | V | |
| 19+15 | 1.3459 | 0.53 | Q | | | V | |
| 19+20 | 1.3495 | 0.52 | Q | | | V | |
| 19+25 | 1.3530 | 0.51 | Q | | | V | |
| 19+30 | 1.3565 | 0.51 | Q | | | V | |
| 19+35 | 1.3600 | 0.50 | Q | | | V | |
| 19+40 | 1.3633 | 0.49 | Q | | | V | |
| 19+45 | 1.3667 | 0.49 | Q | | | V | |
| 19+50 | 1.3700 | 0.48 | Q | | | V | |
| 19+55 | 1.3732 | 0.47 | Q | | | V | |
| 20+ 0 | 1.3765 | 0.47 | Q | | | V | |
| 20+ 5 | 1.3796 | 0.46 | Q | | | V | |
| 20+10 | 1.3828 | 0.46 | Q | | | V | |
| 20+15 | 1.3859 | 0.45 | Q | | | V | |
| 20+20 | 1.3889 | 0.44 | Q | | | V | |
| 20+25 | 1.3920 | 0.44 | Q | | | V | |
| 20+30 | 1.3950 | 0.43 | Q | | | V | |
| 20+35 | 1.3979 | 0.43 | Q | | | V | |
| 20+40 | 1.4008 | 0.43 | Q | | | V | |
| 20+45 | 1.4037 | 0.42 | Q | | | V | |
| 20+50 | 1.4066 | 0.42 | Q | | | V | |
| 20+55 | 1.4094 | 0.41 | Q | | | V | |
| 21+ 0 | 1.4122 | 0.41 | Q | | | V | |
| 21+ 5 | 1.4150 | 0.40 | Q | | | V | |
| 21+10 | 1.4178 | 0.40 | Q | | | V | |
| 21+15 | 1.4205 | 0.40 | Q | | | V | |
| 21+20 | 1.4232 | 0.39 | Q | | | V | |
| 21+25 | 1.4259 | 0.39 | Q | | | V | |
| 21+30 | 1.4285 | 0.39 | Q | | | V | |

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|-------|--------|------|---|--|--|--|---|--|
| 21+35 | 1.4312 | 0.38 | Q | | | | V | |
| 21+40 | 1.4338 | 0.38 | Q | | | | V | |
| 21+45 | 1.4364 | 0.37 | Q | | | | V | |
| 21+50 | 1.4389 | 0.37 | Q | | | | V | |
| 21+55 | 1.4414 | 0.37 | Q | | | | V | |
| 22+ 0 | 1.4440 | 0.37 | Q | | | | V | |
| 22+ 5 | 1.4465 | 0.36 | Q | | | | V | |
| 22+10 | 1.4489 | 0.36 | Q | | | | V | |
| 22+15 | 1.4514 | 0.36 | Q | | | | V | |
| 22+20 | 1.4538 | 0.35 | Q | | | | V | |
| 22+25 | 1.4562 | 0.35 | Q | | | | V | |
| 22+30 | 1.4586 | 0.35 | Q | | | | V | |
| 22+35 | 1.4610 | 0.35 | Q | | | | V | |
| 22+40 | 1.4634 | 0.34 | Q | | | | V | |
| 22+45 | 1.4657 | 0.34 | Q | | | | V | |
| 22+50 | 1.4681 | 0.34 | Q | | | | V | |
| 22+55 | 1.4704 | 0.34 | Q | | | | V | |
| 23+ 0 | 1.4727 | 0.33 | Q | | | | V | |
| 23+ 5 | 1.4750 | 0.33 | Q | | | | V | |
| 23+10 | 1.4772 | 0.33 | Q | | | | V | |
| 23+15 | 1.4795 | 0.33 | Q | | | | V | |
| 23+20 | 1.4817 | 0.32 | Q | | | | V | |
| 23+25 | 1.4839 | 0.32 | Q | | | | V | |
| 23+30 | 1.4861 | 0.32 | Q | | | | V | |
| 23+35 | 1.4883 | 0.32 | Q | | | | V | |
| 23+40 | 1.4905 | 0.32 | Q | | | | V | |
| 23+45 | 1.4926 | 0.31 | Q | | | | V | |
| 23+50 | 1.4948 | 0.31 | Q | | | | V | |
| 23+55 | 1.4969 | 0.31 | Q | | | | V | |
| 24+ 0 | 1.4990 | 0.31 | Q | | | | V | |

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